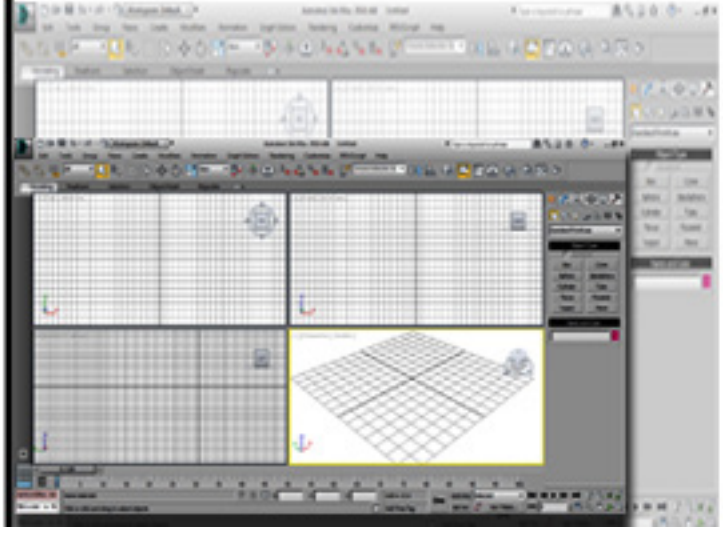
1

Introduction to Autodesk 3ds Max 2014



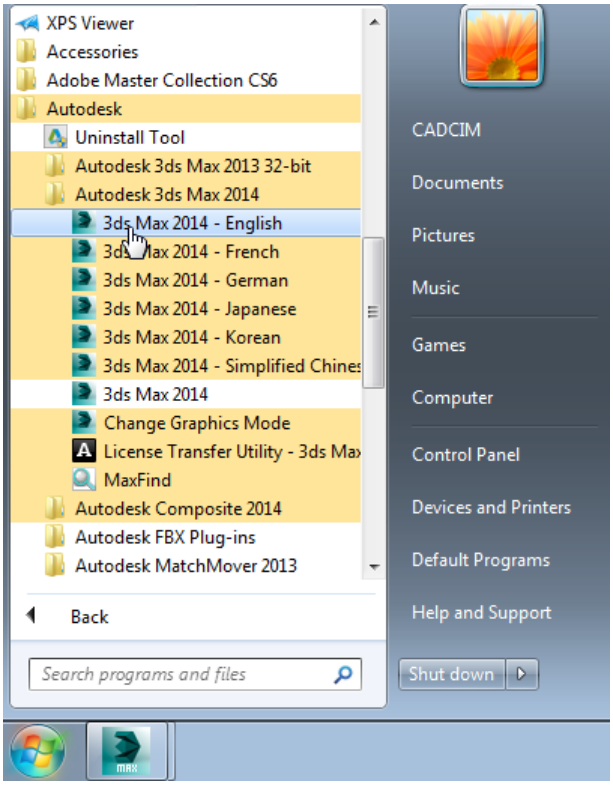


Figure 1-1 *Starting Autodesk 3ds Max 2014 using the taskbar*

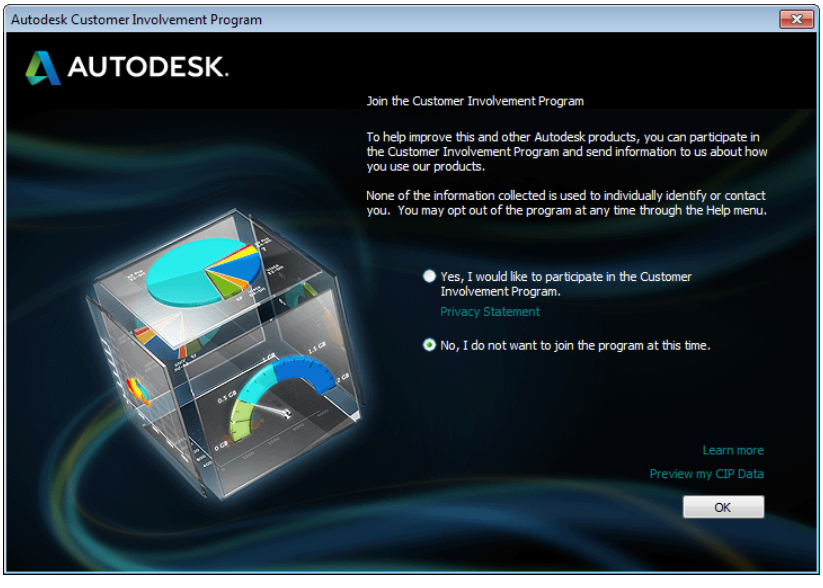


Figure 1-2 *The* ***Autodesk Customer Involvement Program*** *dialog box*

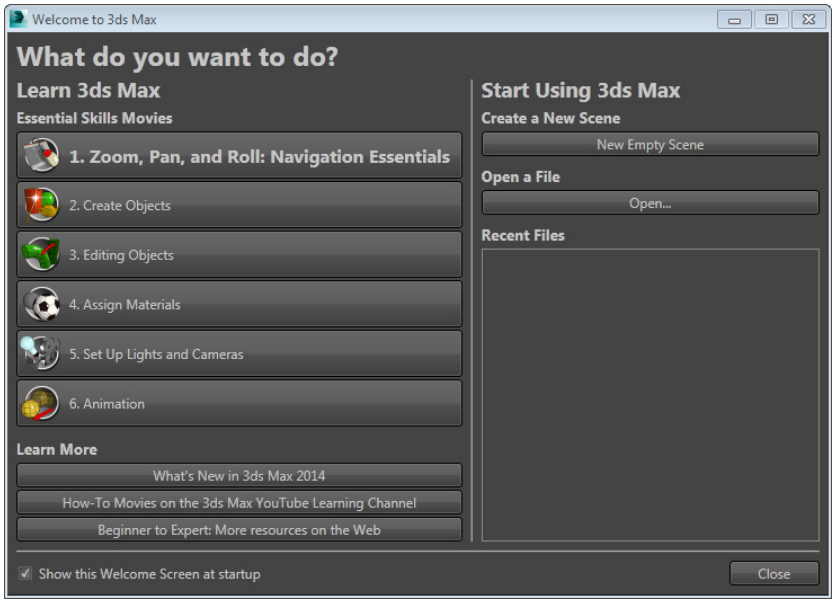


Figure 1-3 *The* ***Welcome to 3ds Max*** *dialog box*

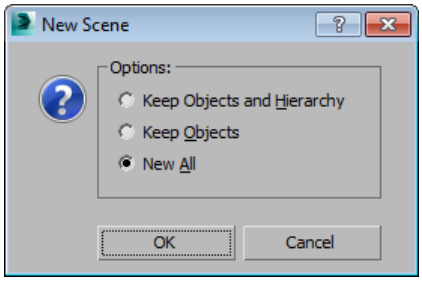


Figure 1-4 *The* ***New Scene*** *dialog box*

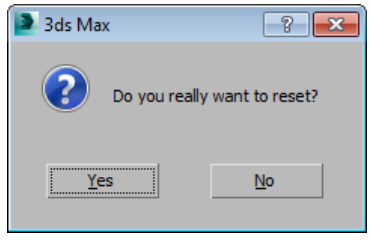


Figure 1-5 *The* ***3ds Max*** *message box*

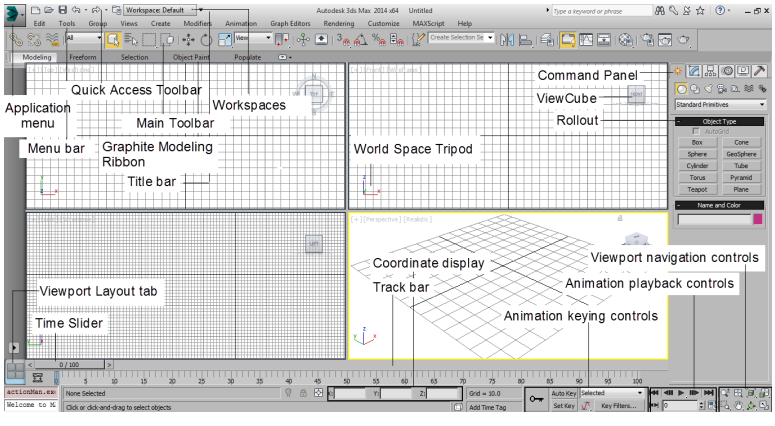


Figure 1-6 *Different screen components of Autodesk 3ds Max interface screen*

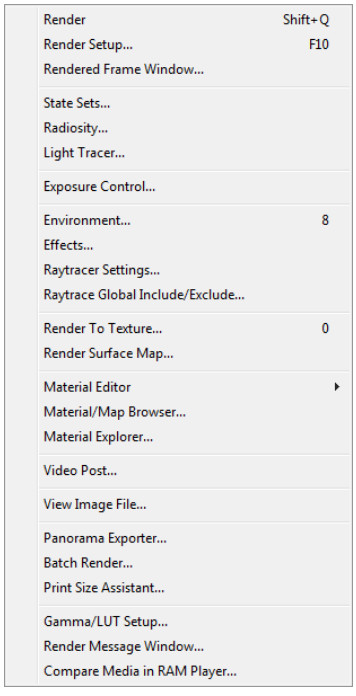


Figure 1-7 *The keyboard shortcuts in the* ***Rendering*** *pull-down menu*

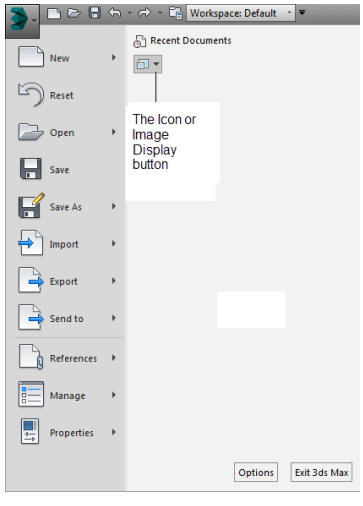


Figure 1-8 *Partial view of the* ***Application*** *menu*

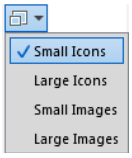


Figure 1-9 *A flyout displayed on choosing the Icon or Image Display button*

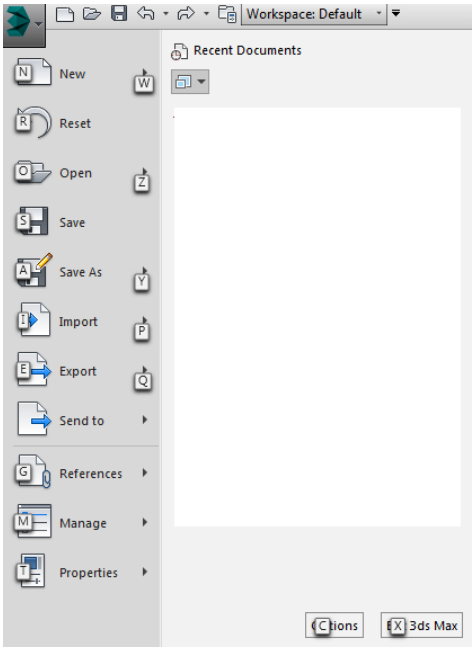


Figure 1-10 *The* ***Application*** *menu with the shortcuts*

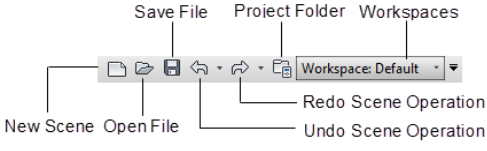


Figure 1-11 *The* ***Quick Access Toolbar***

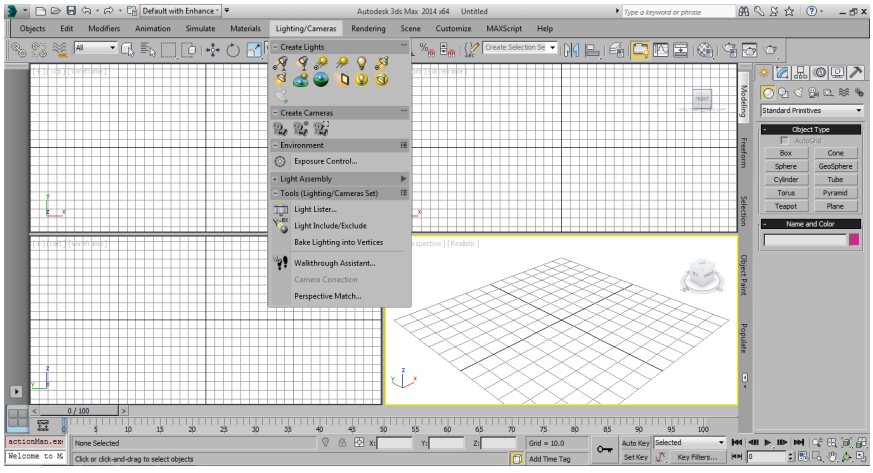


Figure 1-12 *The enhanced* ***Lighting/Cameras*** *pull-down menu displayed*

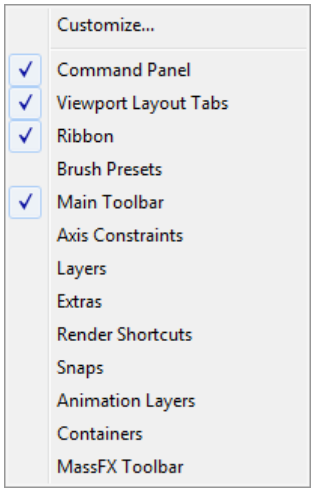


Figure 1-13 *The shortcut menu displayed to view the hidden toolbars*

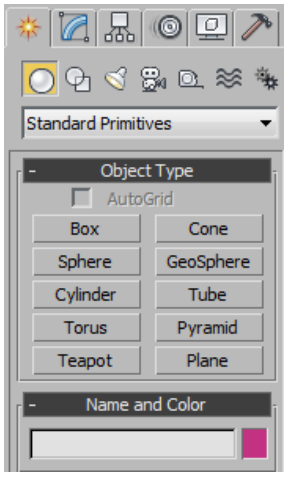


Figure 1-14 *The* ***Command Panel***

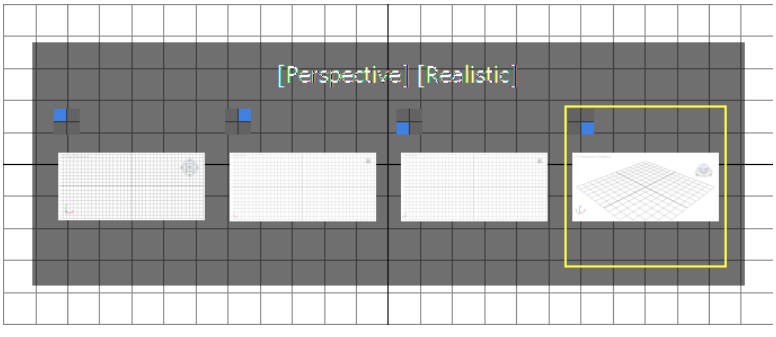


Figure 1-15 *Selecting a viewport to make it active*

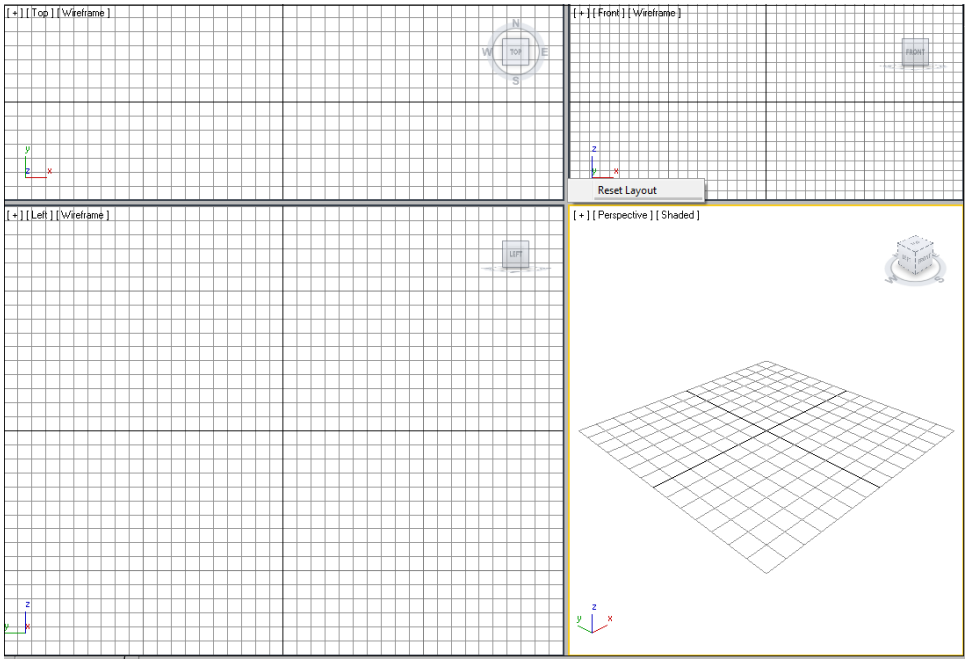


Figure 1-16 *Choosing the* ***Reset Layout*** *option from the shortcut menu*

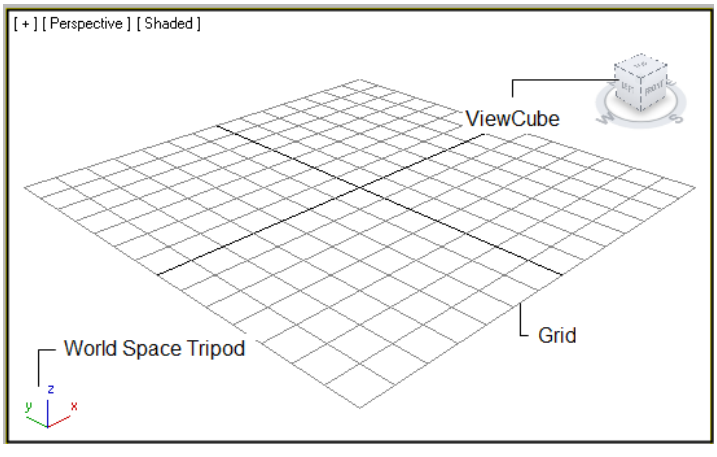


Figure 1-17 *The world space tripod, grid, and ViewCube in the Perspective viewport*

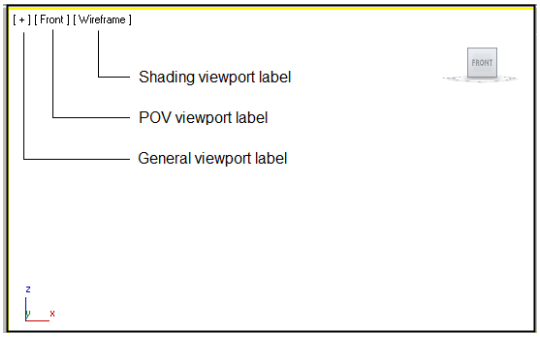


Figure 1-18 *The viewport labels in the Front viewport*

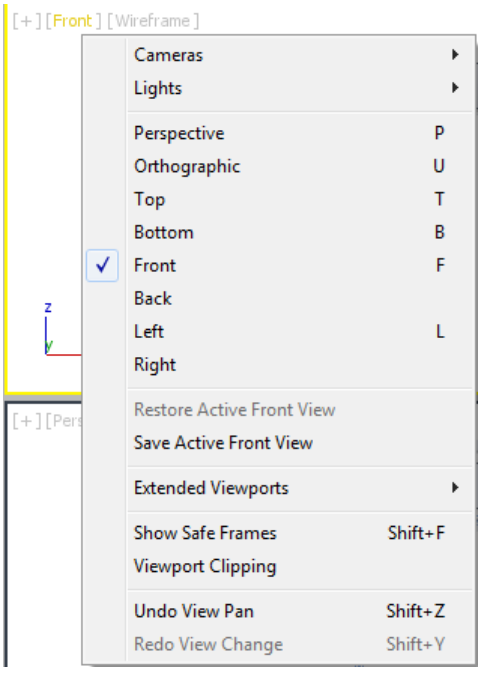


Figure 1-19 *The flyout displayed on clicking the POV viewport label*

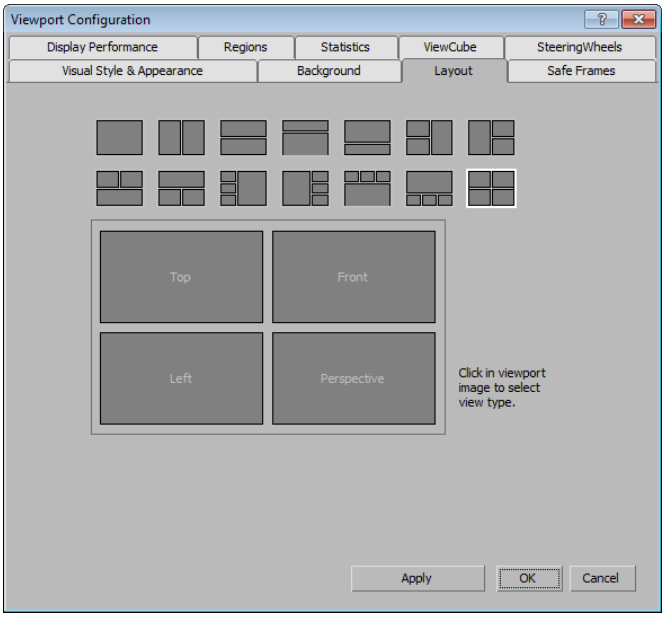


Figure 1-20 *The* ***Layout*** *tab of the* ***Viewport Configuration*** *dialog box*

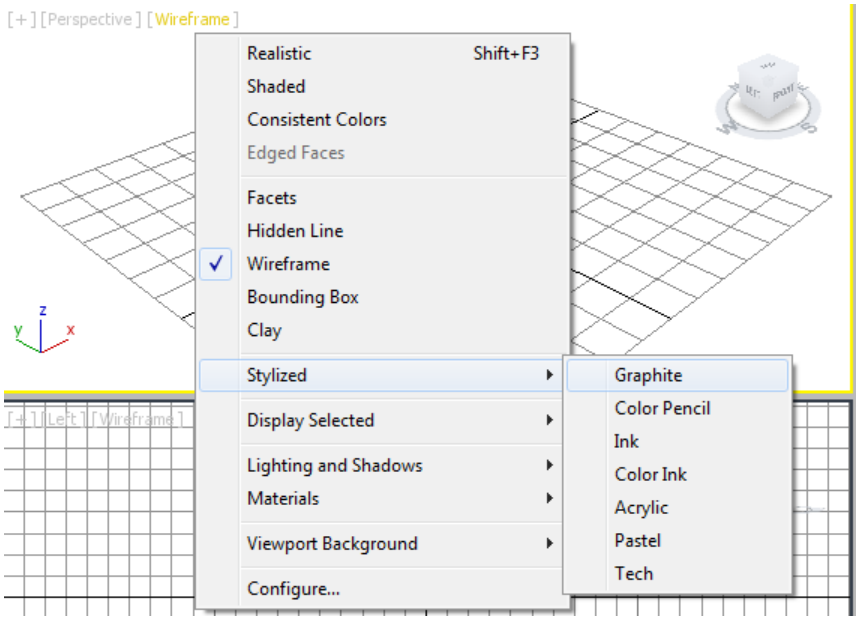


Figure 1-21 *Different shading types in the cascading menu of the* ***Stylized*** *option*

Figure 1-22 *The viewport navigation controls*

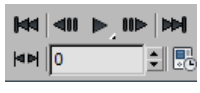


Figure 1-23 *The animation playback controls*

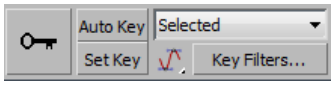


Figure 1-24 *The animation keying controls*

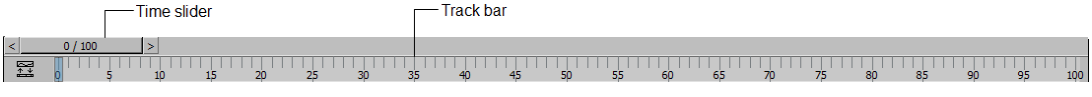


Figure 1-25 *The track bar and the time slider*

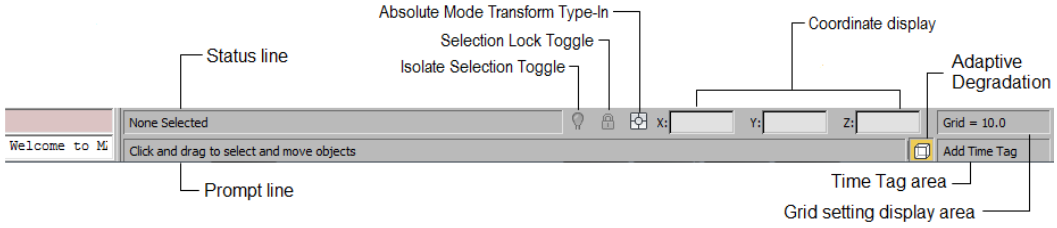


Figure 1-26 *The status bar*

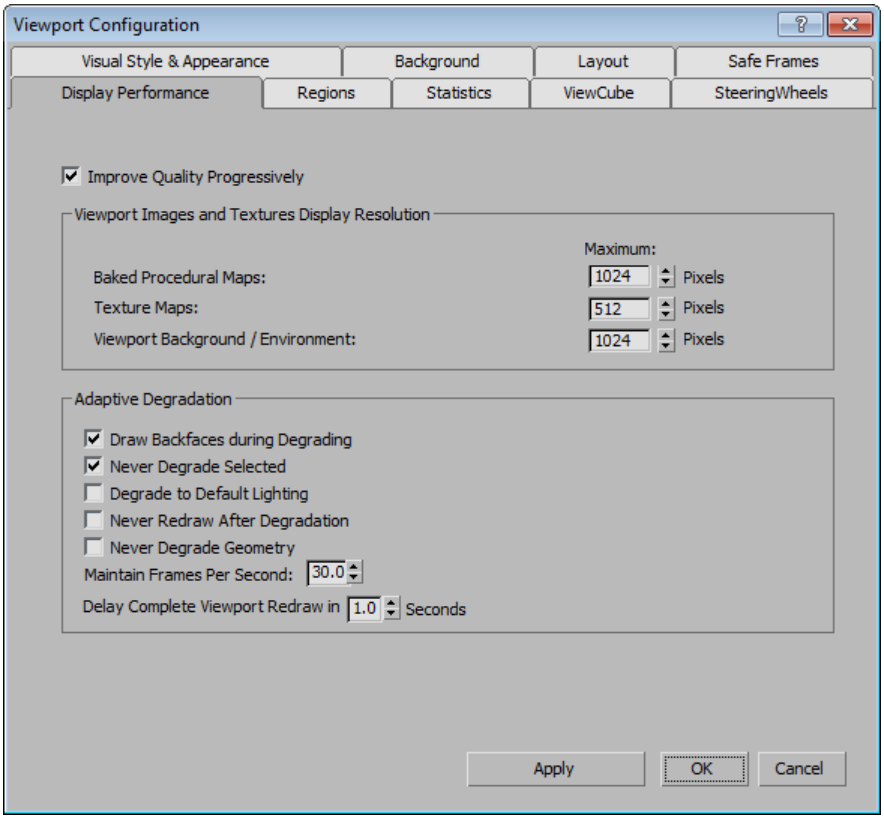


Figure 1-27 *The* ***Viewport Configuration*** *dialog box*

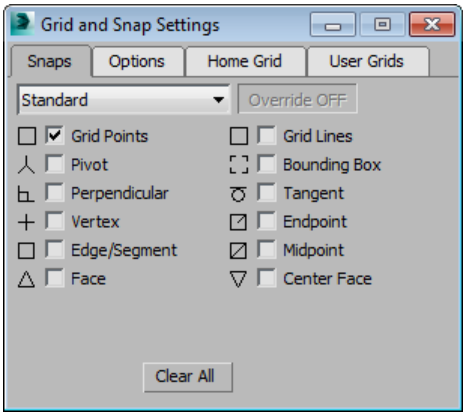


Figure 1-28 *The* ***Grid and Snap Settings*** *dialog box*

Figure 1-29 *The* ***Snaps Toggle*** *flyout*

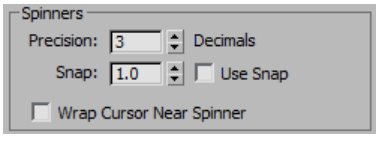


Figure 1-30 *The* ***Spinners*** *area in the* ***Preference Settings*** *dialog box*

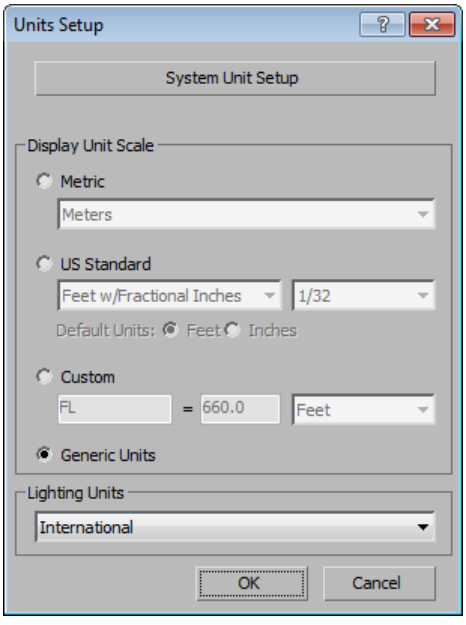


Figure 1-31 The ***Units Setup*** *dialog box*

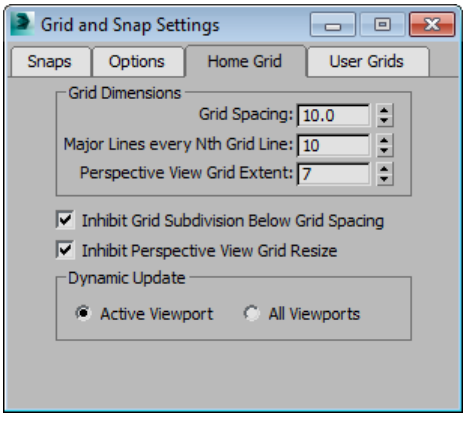


Figure 1-32 The ***Home Grid*** *tab chosen in the* ***Grid and Snap Settings*** *dialog box*

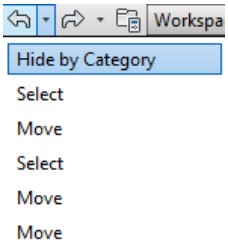


Figure 1-33 The list of actions displayed after choosing on the ***Undo Scene Operation*** *tool*

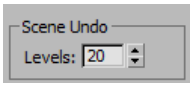


Figure 1-34 The ***Scene Undo*** *area in the* ***Preference Settings*** *dialog box*

Figure 1-35 The ***About to Fetch. OK?*** *dialog box*

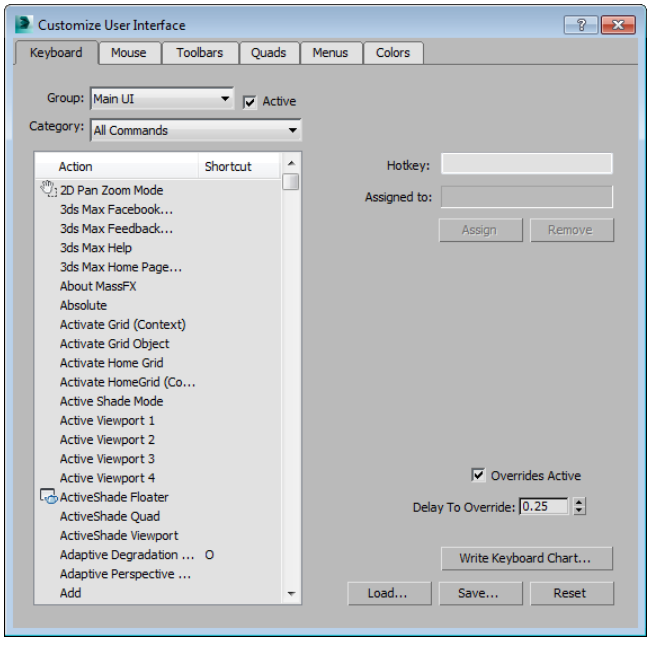


Figure 1-36 *The* ***Customize User Interface*** *dialog box*

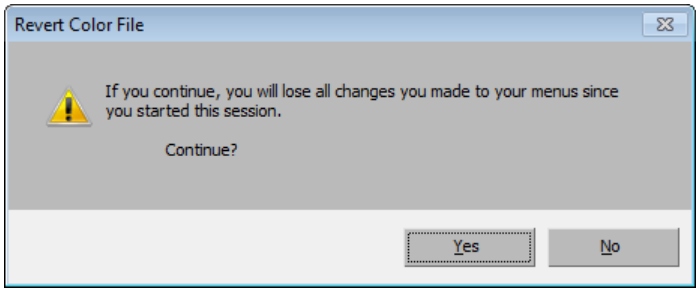


Figure 1-37 *The* ***Revert Color File*** *message box*

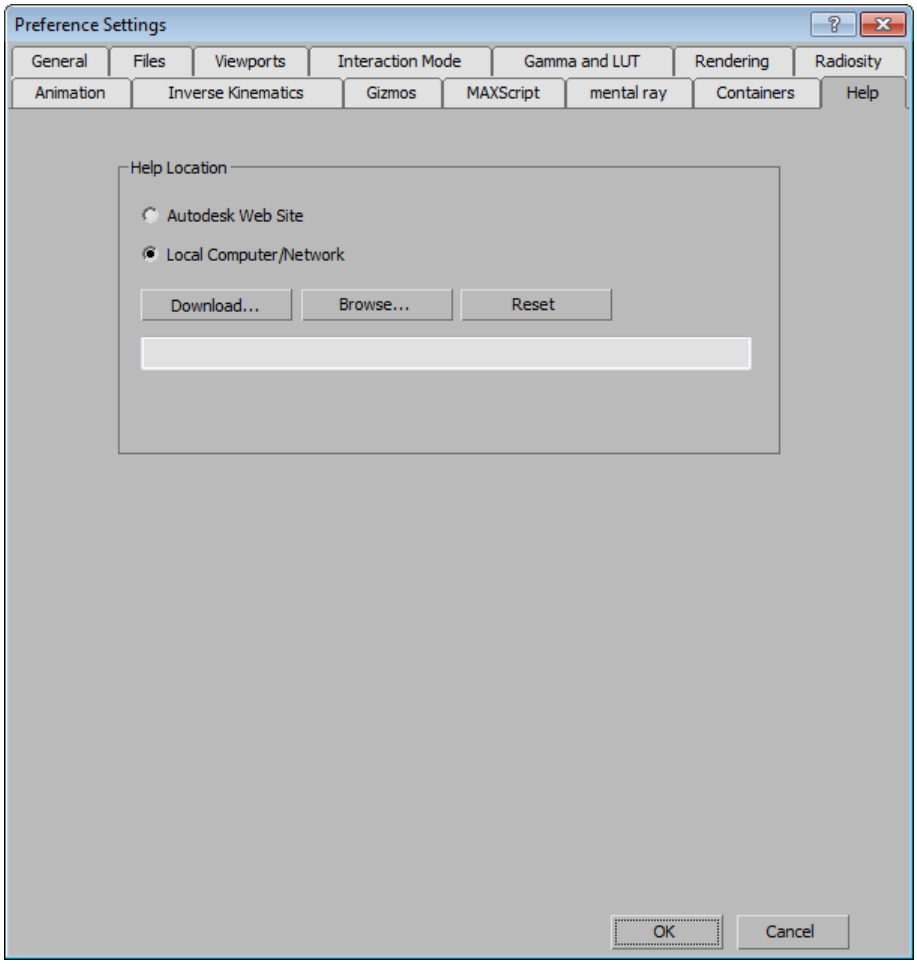


Figure 1-38 *The* ***Help*** *tab chosen in the* ***Preference Settings*** *dialog box*

Figure 1-39 *The search field*

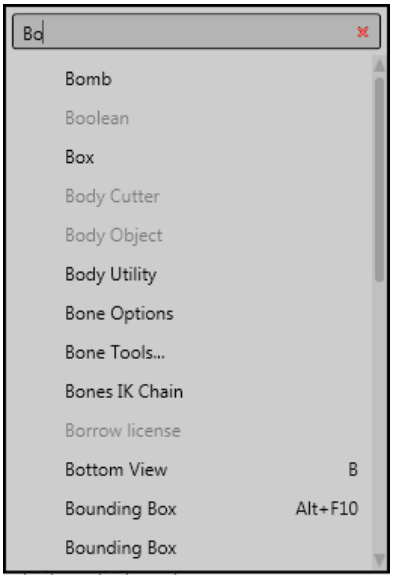


Figure 1-40 *List of commands displayed on entering first few characters*

2

Standard Primitives

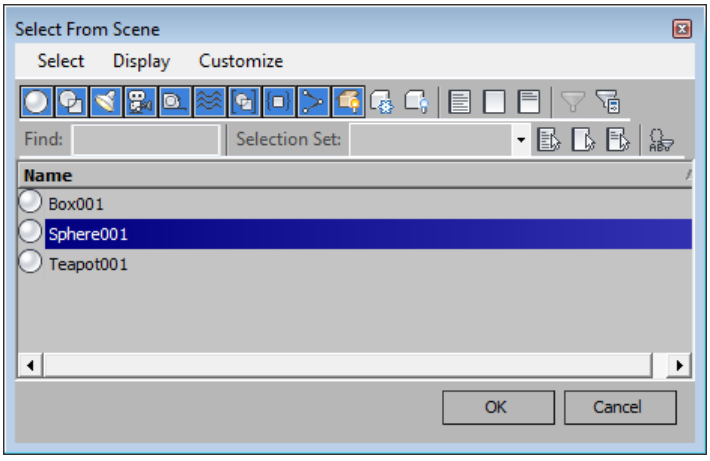


Figure 2-1 *The* ***Select From Scene*** *dialog box*

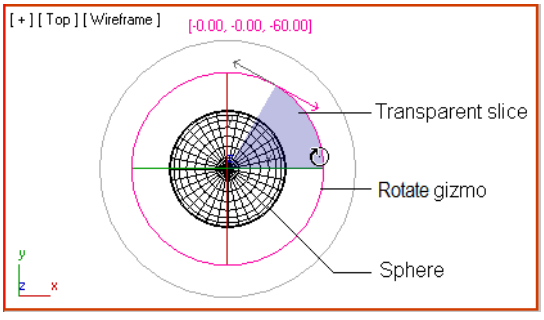


Figure 2-2 *The circular gizmo in the Top viewport while rotating the object*

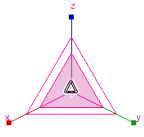


Figure 2-3 *The scale gizmo for uniform scaling*

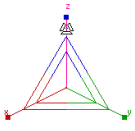


Figure 2-4 *Selecting the Z-axis for non-uniform scaling*

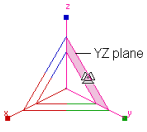


Figure 2-5 *Selecting the YZ plane for non-uniform scaling*

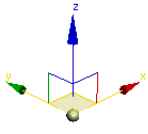


Figure 2-6 *The move gizmo*

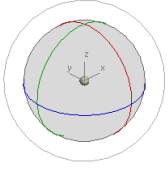


Figure 2-7 *The rotate gizmo*

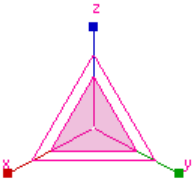


Figure 2-8 *The scale gizmo*

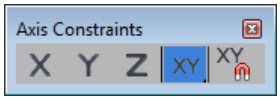


Figure 2-9 *The* ***Axis Constraints*** *toolbar*

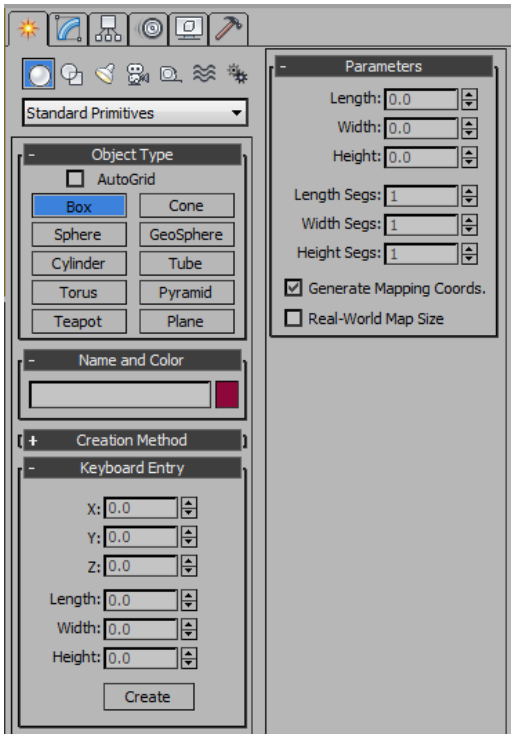


Figure 2-10 *Various rollouts to create a box*

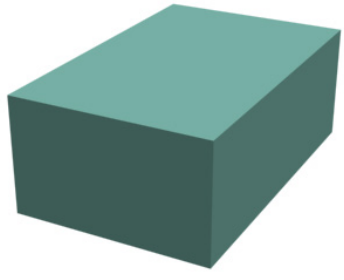


Figure 2-11 *A box displayed in the viewport*

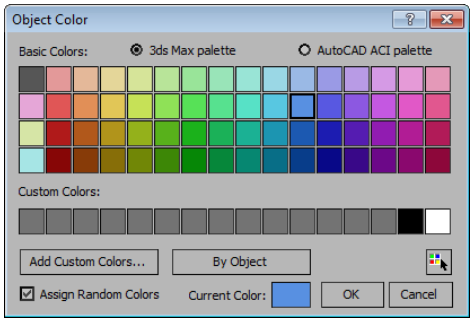


Figure 2-12 *The* ***Object Color*** *dialog box*

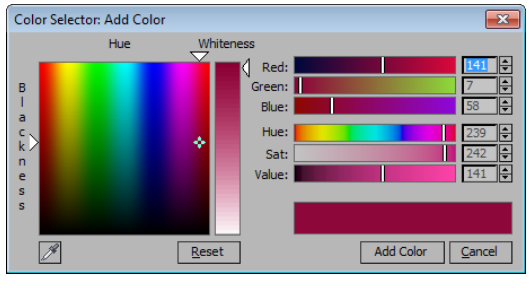


Figure 2-13 ***The Color Selector: Add Color*** *dialog box*

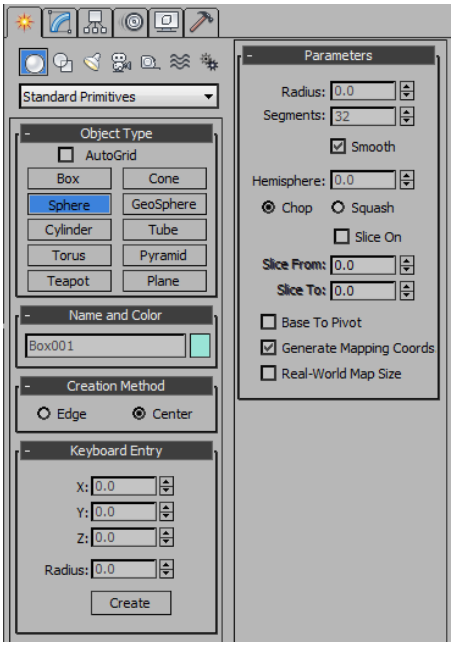


Figure 2-14 *Various rollouts to create a sphere*

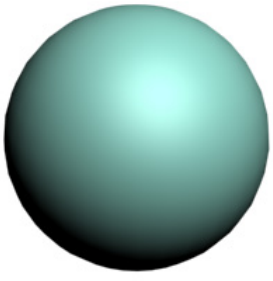


Figure 2-15 *A sphere displayed in the viewport*

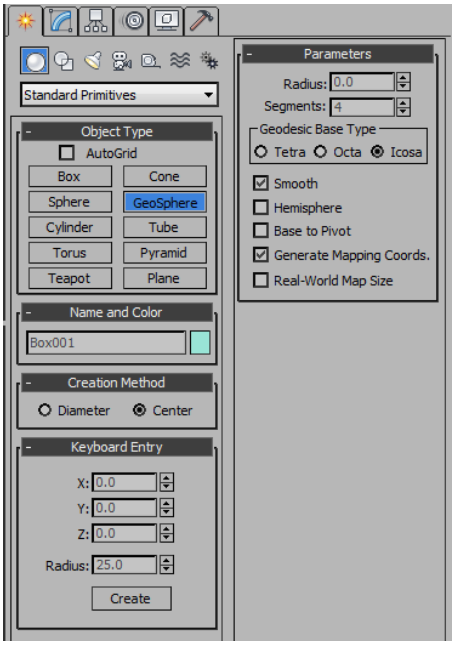


Figure 2-16 *Various rollouts to create a geosphere*

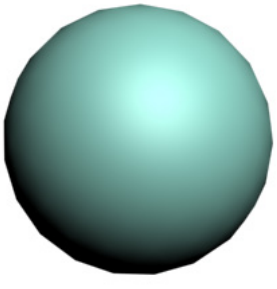


Figure 2-17 *A geosphere displayed in the viewport*

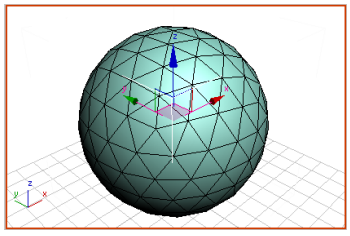


Figure 2-18 *The geosphere displayed on selecting the* ***Icosa*** *radio button*

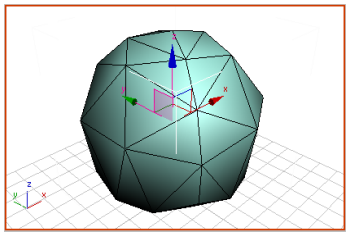


Figure 2-19 *The geosphere displayed on selecting the* ***Tetra*** *radio button*

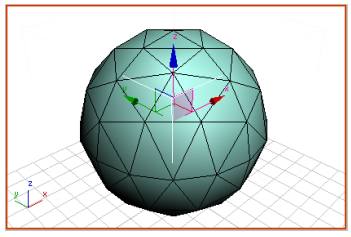


Figure 2-20 *The geosphere displayed on selecting the* ***Octa*** *radio button*

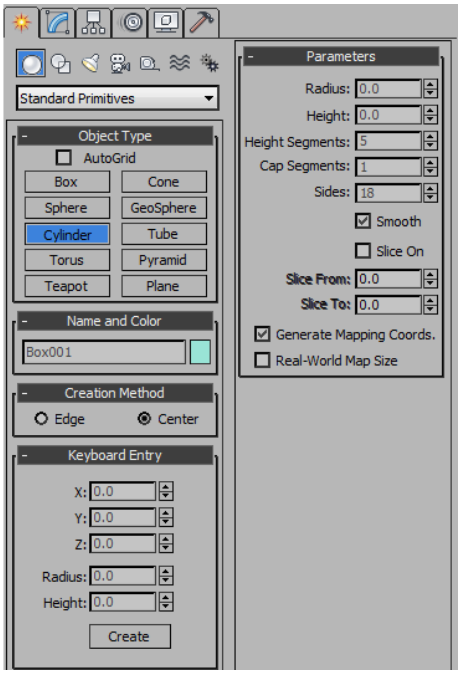


Figure 2-21 *Various rollouts to create a cylinder*

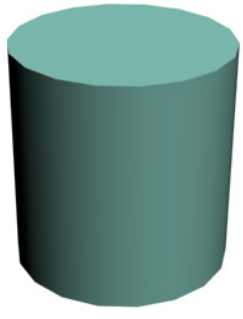


Figure 2-22 *A cylinder displayed in the viewport*

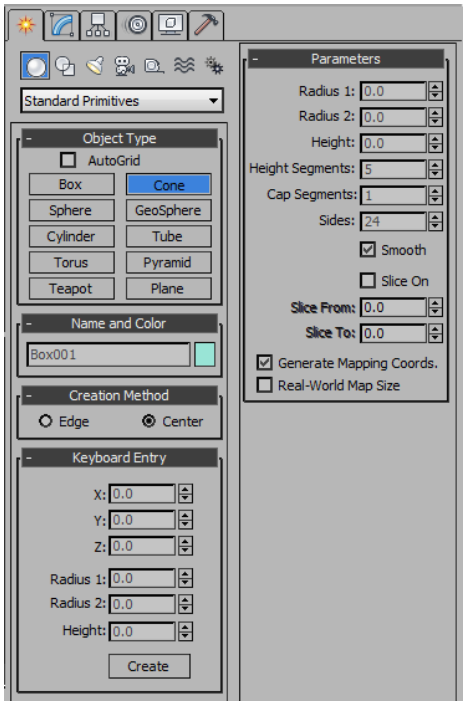


Figure 2-23 *Various rollouts to create a cone*

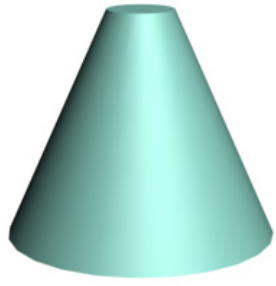


Figure 2-24 *A cone displayed in the viewport*

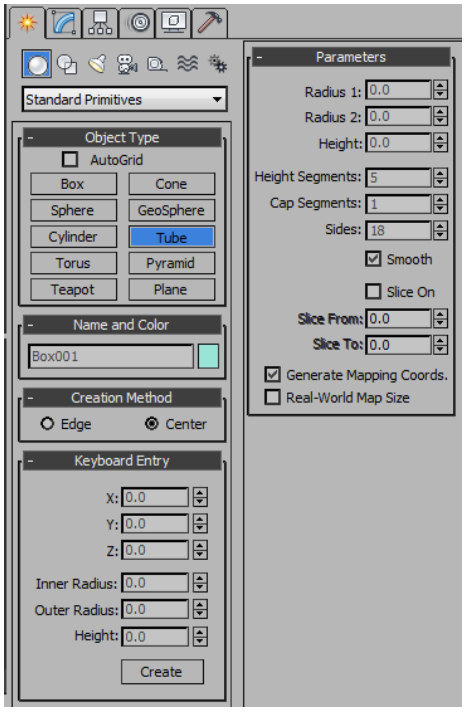


Figure 2-25 *Various rollouts to create a tube*

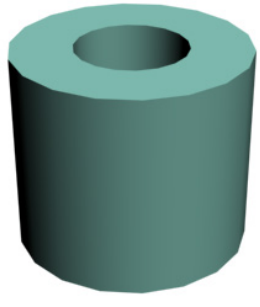


Figure 2-26 *A tube displayed in the viewport*

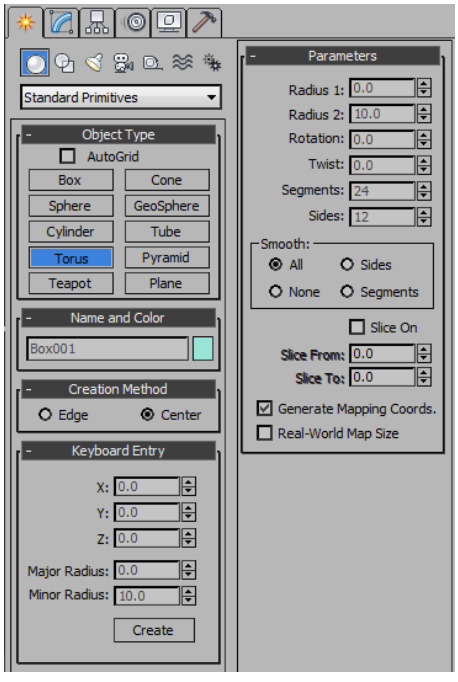


Figure 2-27 *Various rollouts to create a torus*

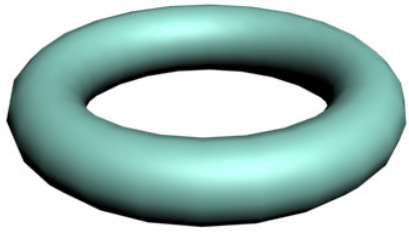


Figure 2-28 *A torus displayed in the viewport*

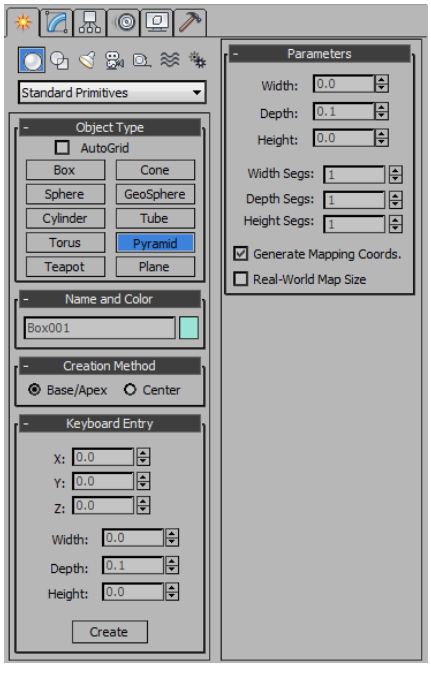


Figure 2-29 *Various rollouts to create a pyramid*

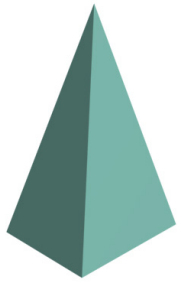


Figure 2-30 *A pyramid displayed in the viewport*

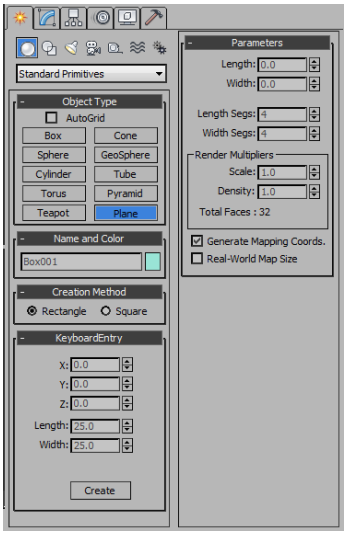


Figure 2-31 *Various rollouts to create a plane*

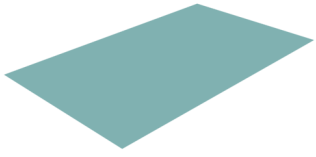


Figure 2-32 *A plane displayed in the viewport*

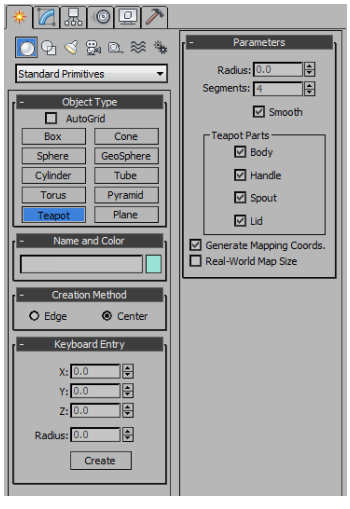


Figure 2-33 *Various rollouts to create a teapot*

Figure 2-34 *A teapot displayed in the viewport*

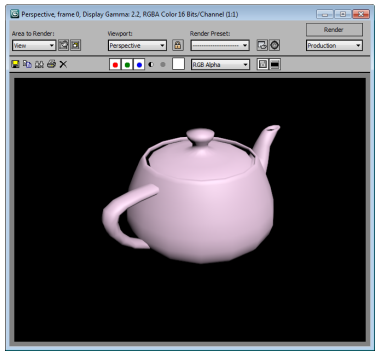


Figure 2-35 The ***Perspective, frame 0, RGBA Color16 Bits/Channel (1:1)*** *window*

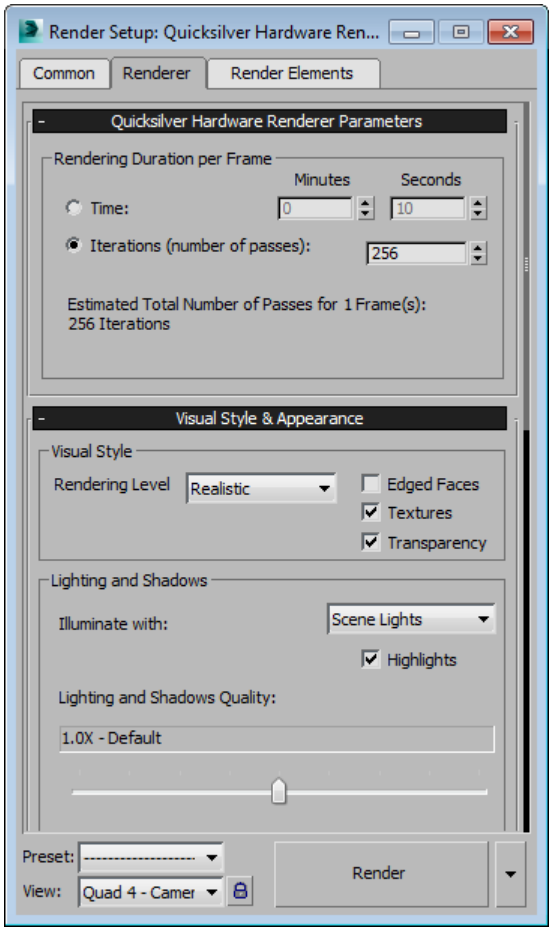


Figure 2-36 The ***Render Setup: Quicksilver Hardware Renderer*** *dialog box*

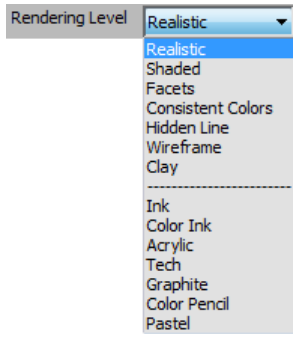


Figure 2-37 The ***Rendering Level*** *drop-down list*

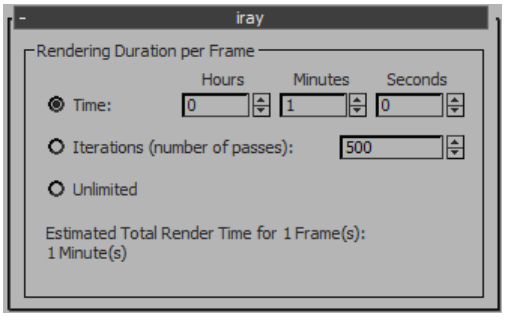


Figure 2-38 *The* ***iray*** *rollout in the* ***Render Setup*** *dialog box*

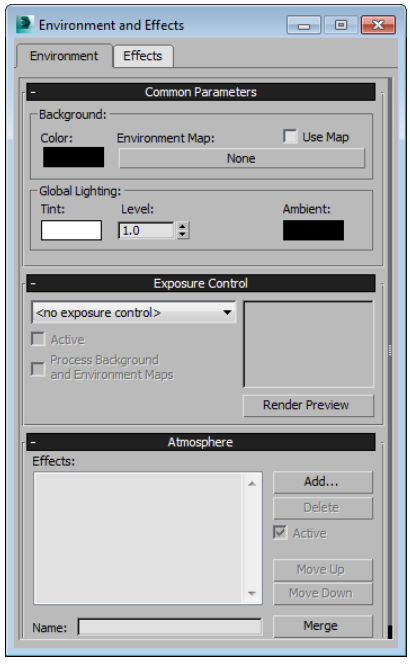


Figure 2-39 *The* ***Environment and Effects*** *dialog box*

Figure 2-40 *The model of a table with drawers*

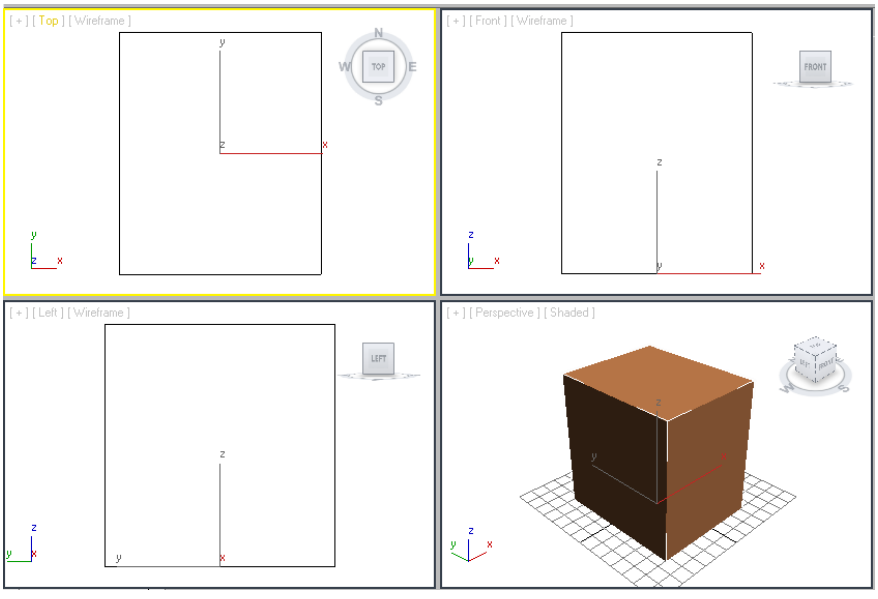


Figure 2-41 *The box displayed in viewports*

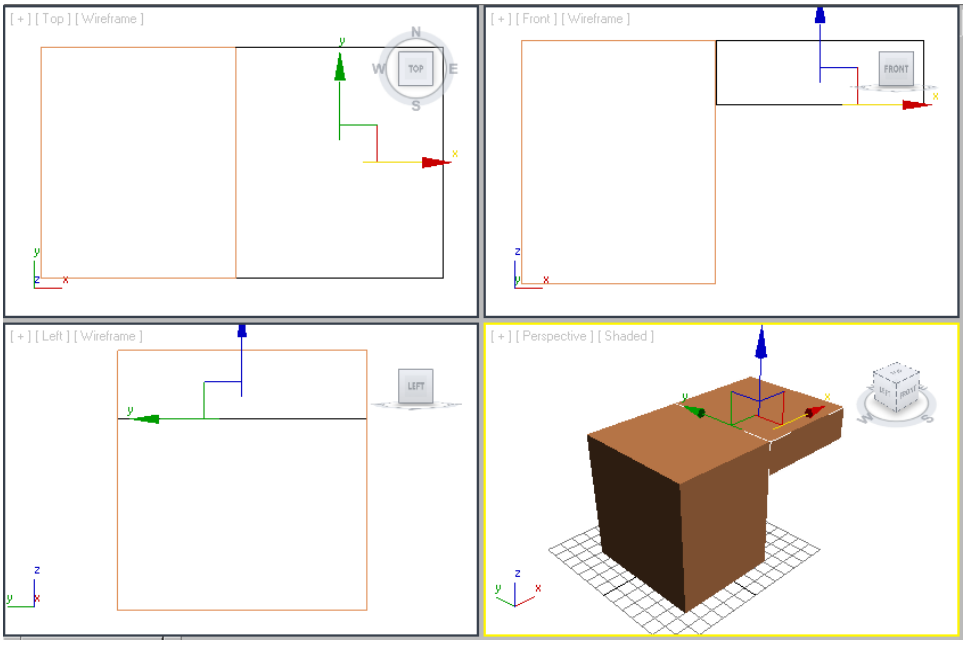


Figure 2-42 *Alignment of left box with right box in viewports*

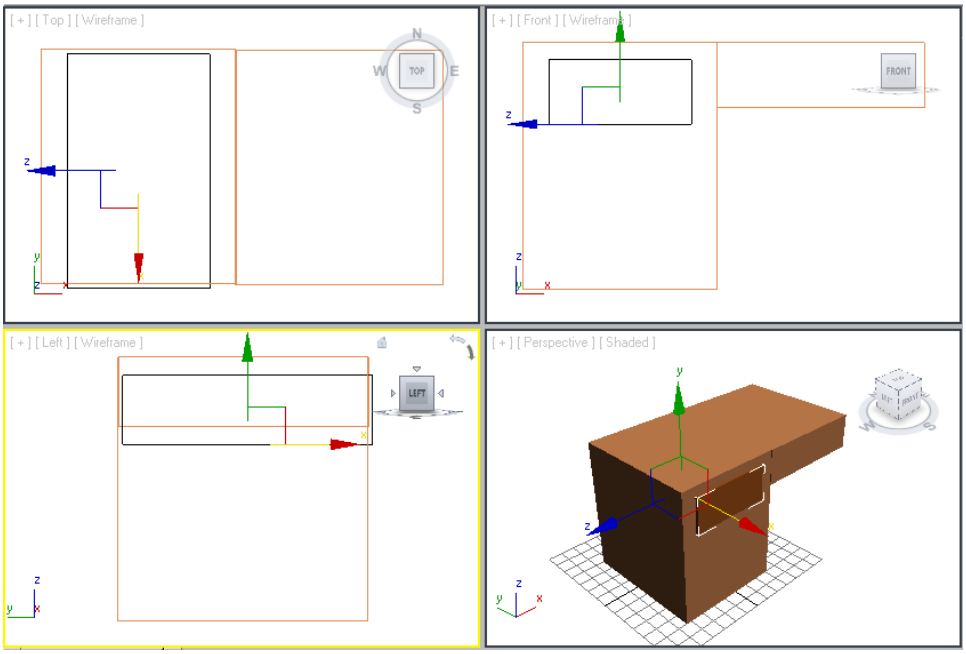


Figure 2-43 *Alignment of drawer001 with left box*

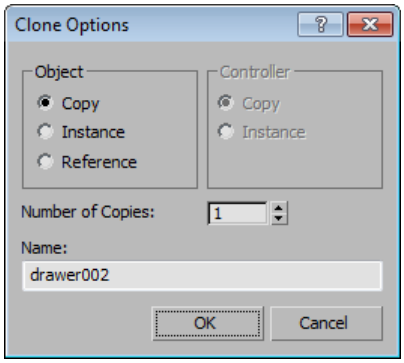


Figure 2-44 *The* ***Clone Options*** *dialog box*

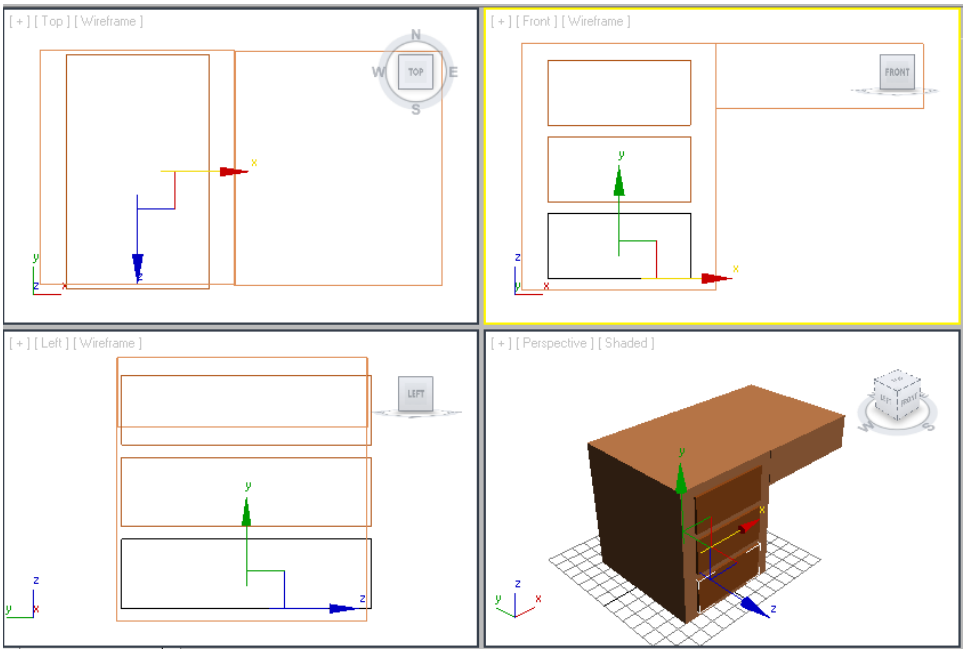


Figure 2-45 *The drawer002 and drawer003 geometry created after cloning drawer001*

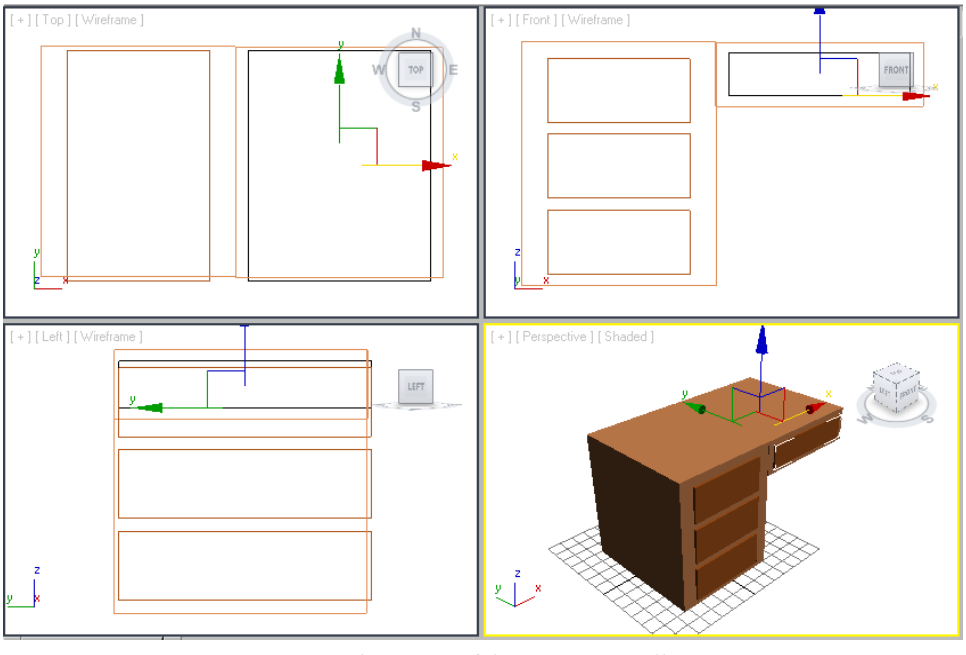


Figure 2-46 *Alignment of drawer004 in all viewports*

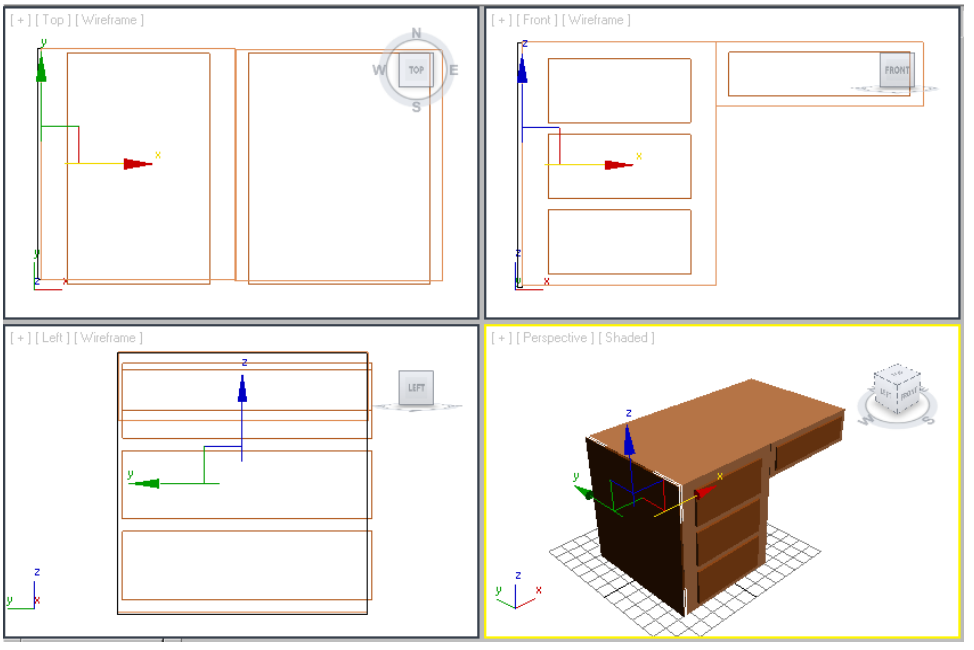


Figure 2-47 *Alignment of left face001 with left side of the left box*

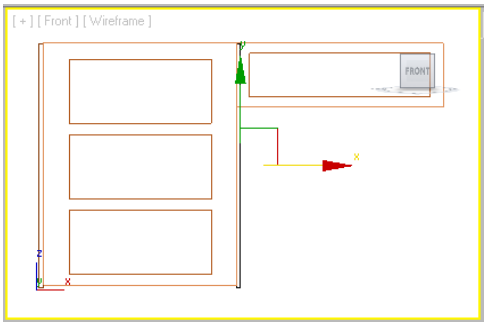


Figure 2-48 *Alignment of left face002*

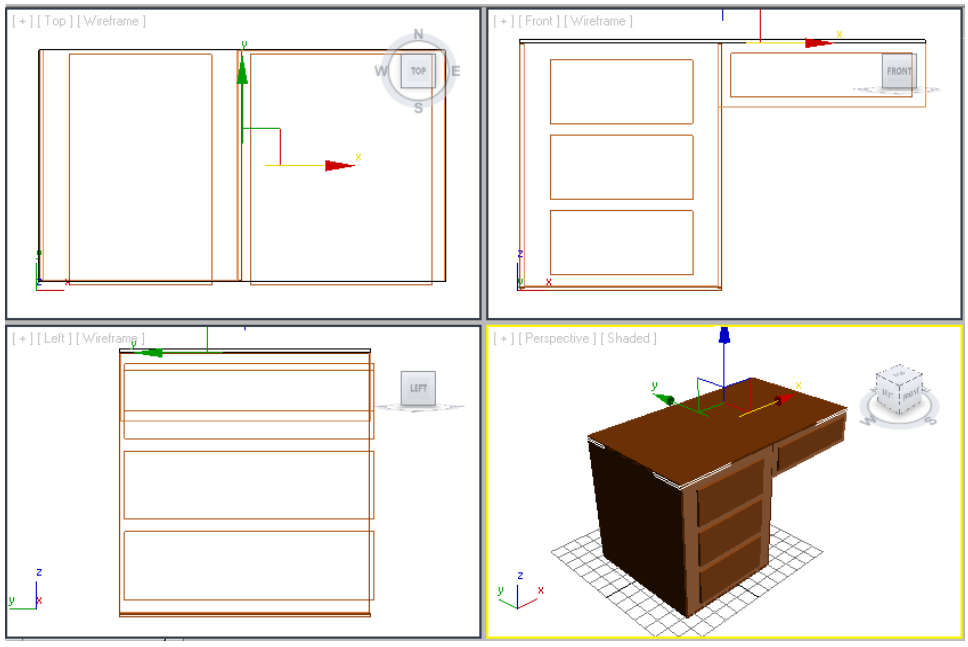


Figure 2-49 *Alignment of upper face with top of the table*

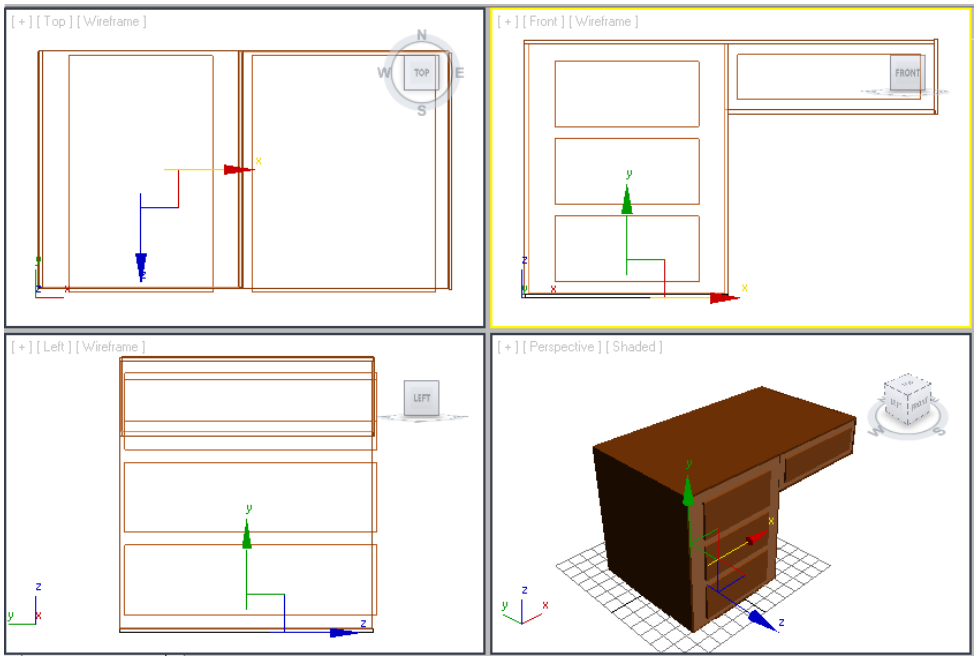


Figure 2-50 *Alignment of lower face with the bottom of left box*

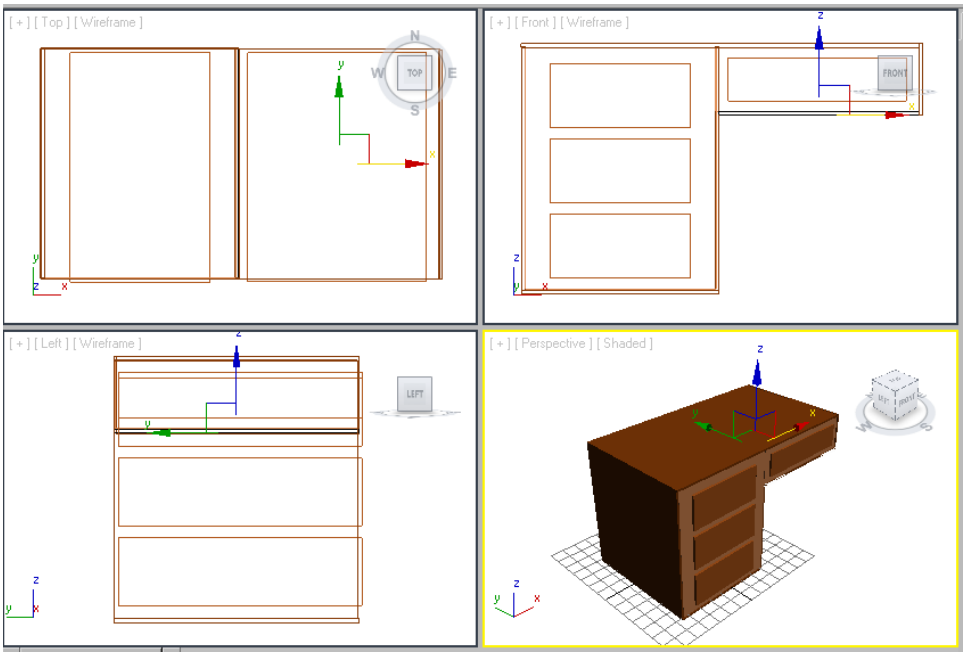


Figure 2-51 *Alignment of right lower face to the bottom of right box of the table*

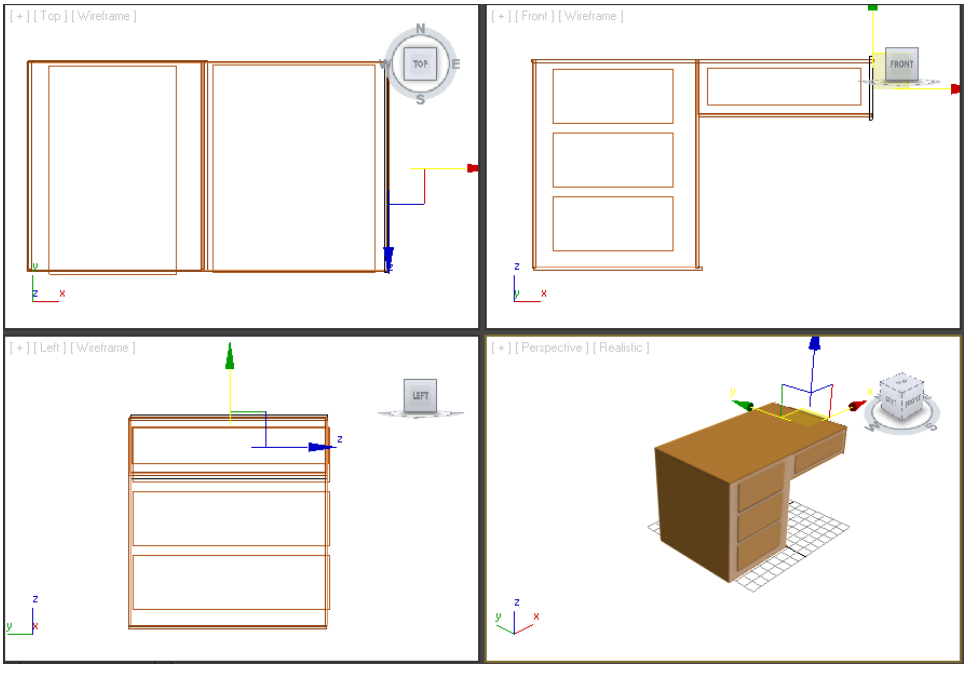


Figure 2-52 *Alignment of right face with the right side of right box of the table*

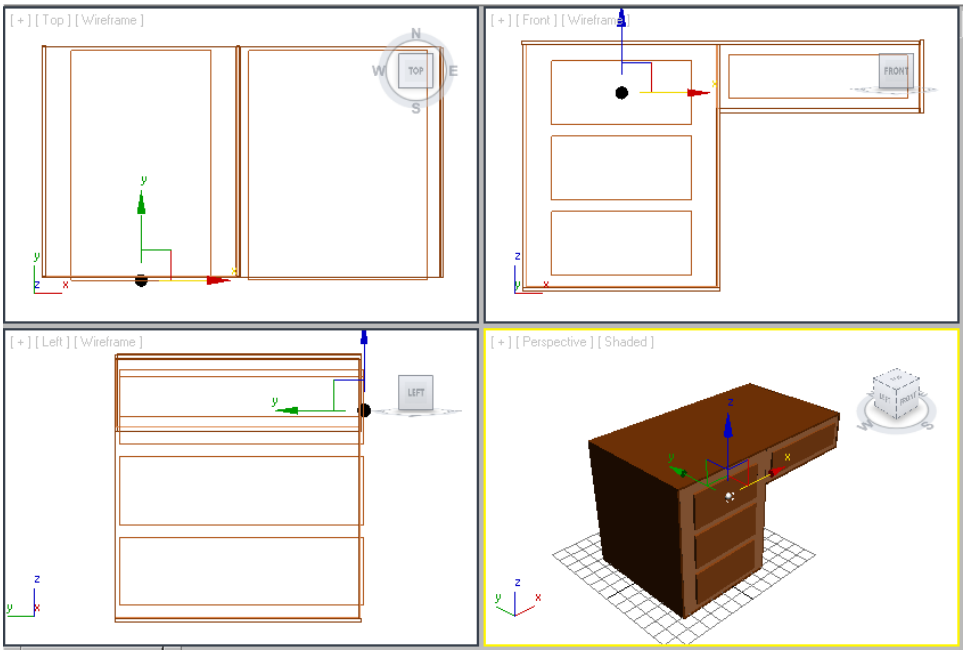


Figure 2-53 *Alignment of knob001 with drawer001*

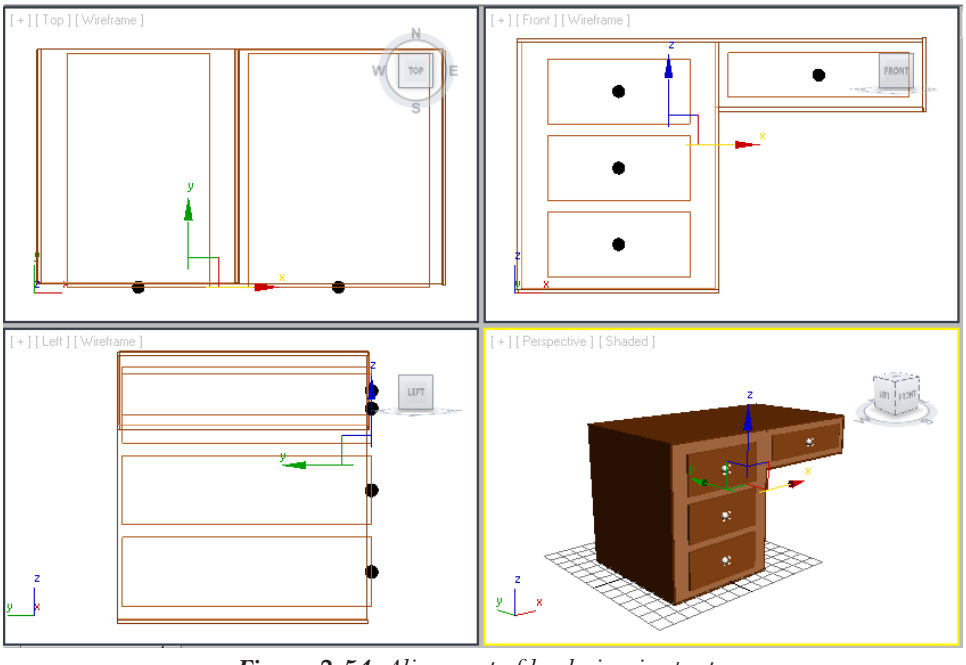


Figure 2-54 *Alignment of knobs in viewports*

Figure 2-55 *The final output after rendering*

Figure 2-56 *The model of a park bench*

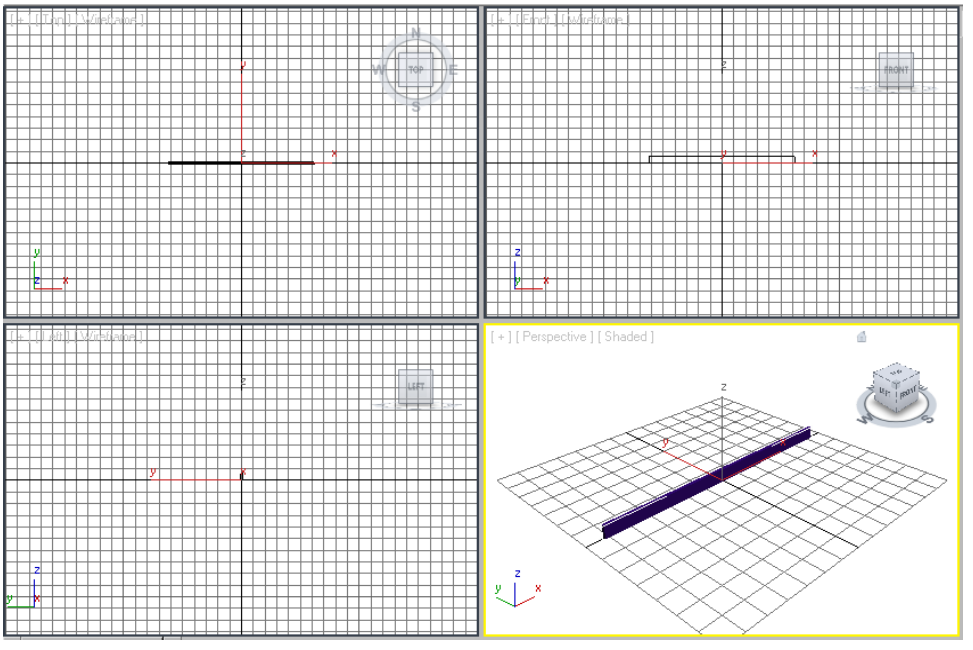


Figure 2-57 *A box created*

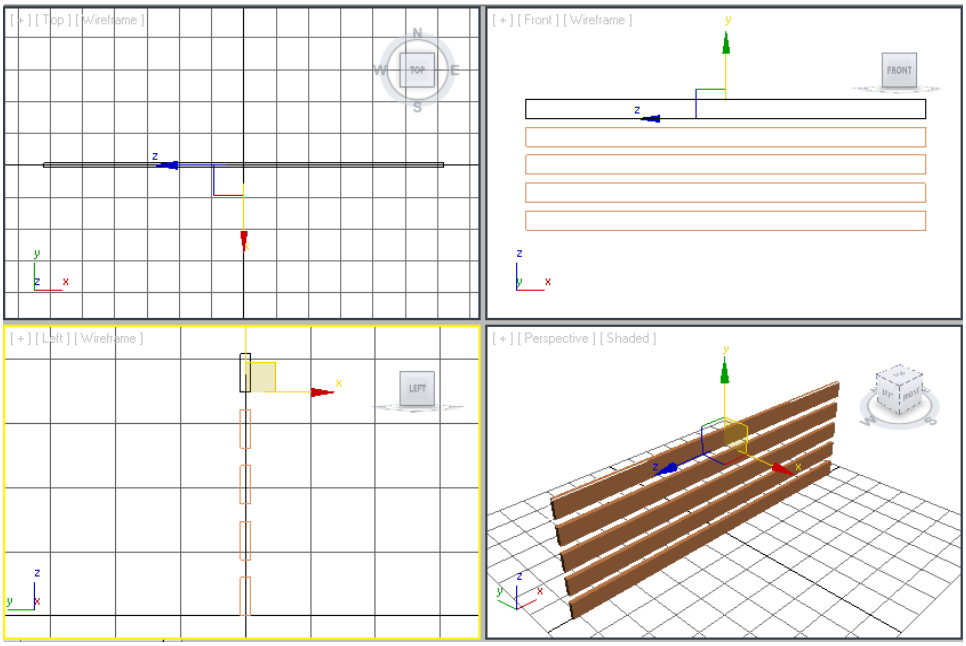


Figure 2-58 *Horizontal back supports displayed in viewports*

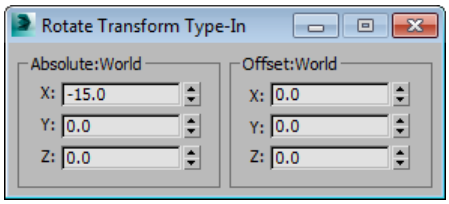


Figure 2-59 *The* ***Rotate Transform Type-In*** *dialog box*

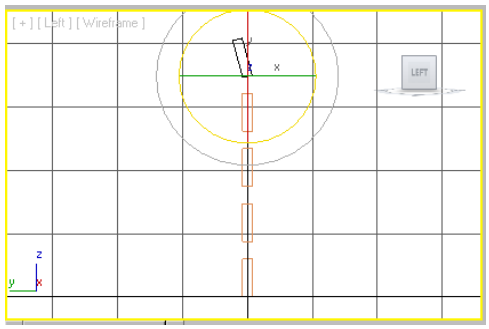


Figure 2-60 *The horizontal back support005 geometry after rotating in the Left viewport*

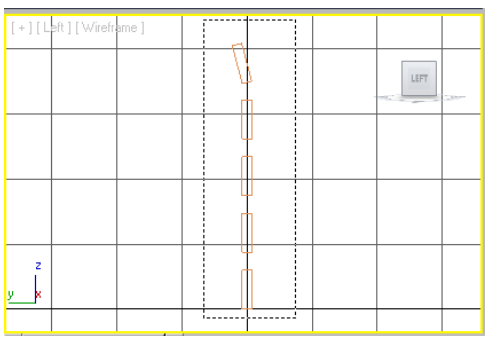


Figure 2-61 *All horizontal back supports selected simultaneously*

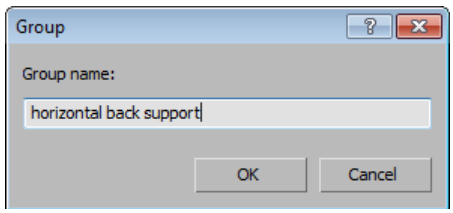


Figure 2-62 *The* ***Group*** *dialog box*

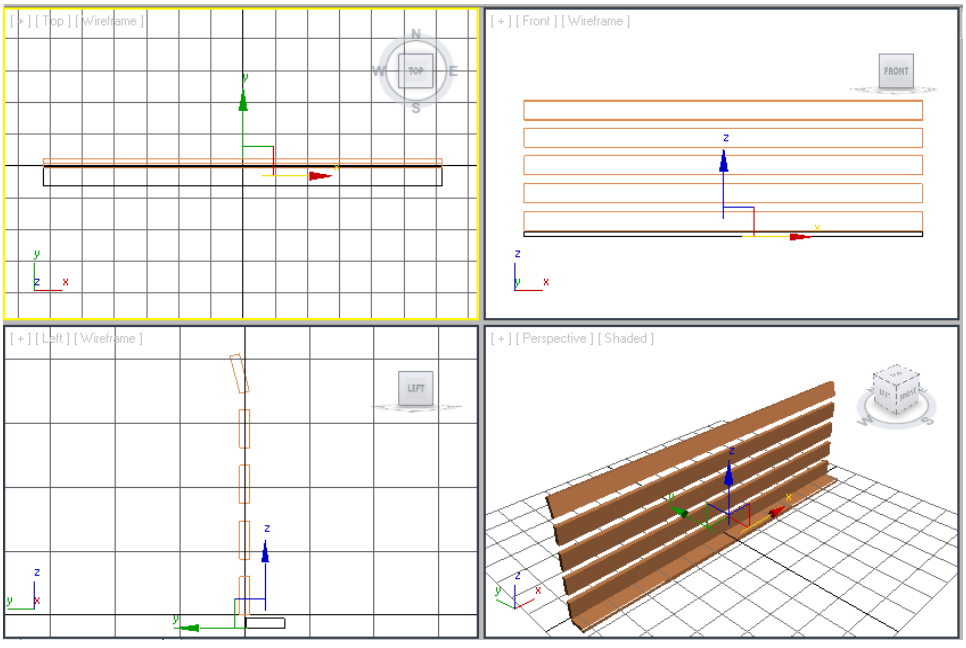


Figure 2-63 *Alignment of horizontal seat support001 in viewports*

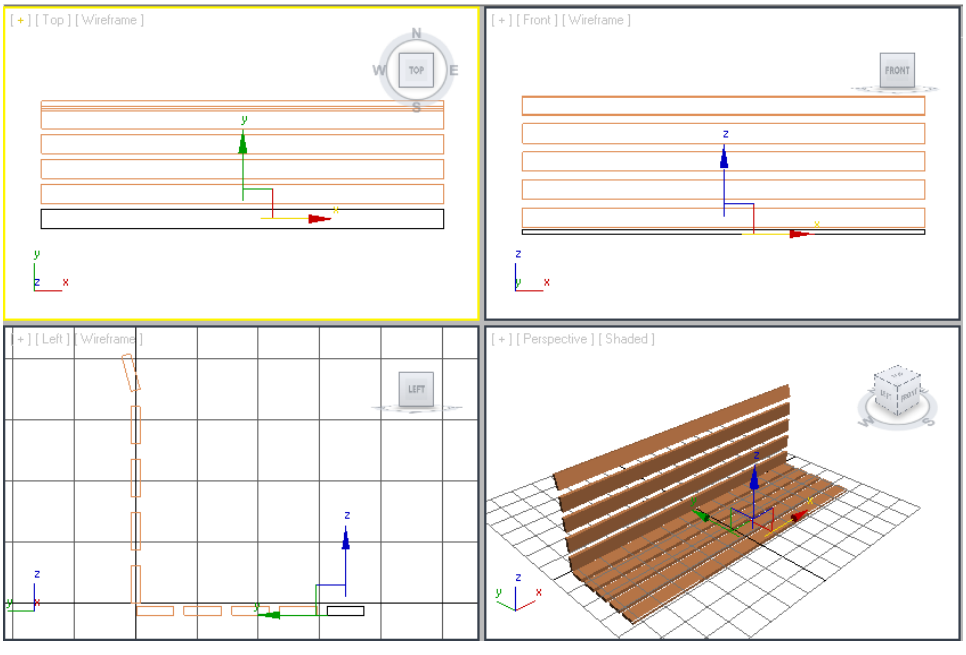


Figure 2-64 *Horizontal seat supports displayed in viewports*

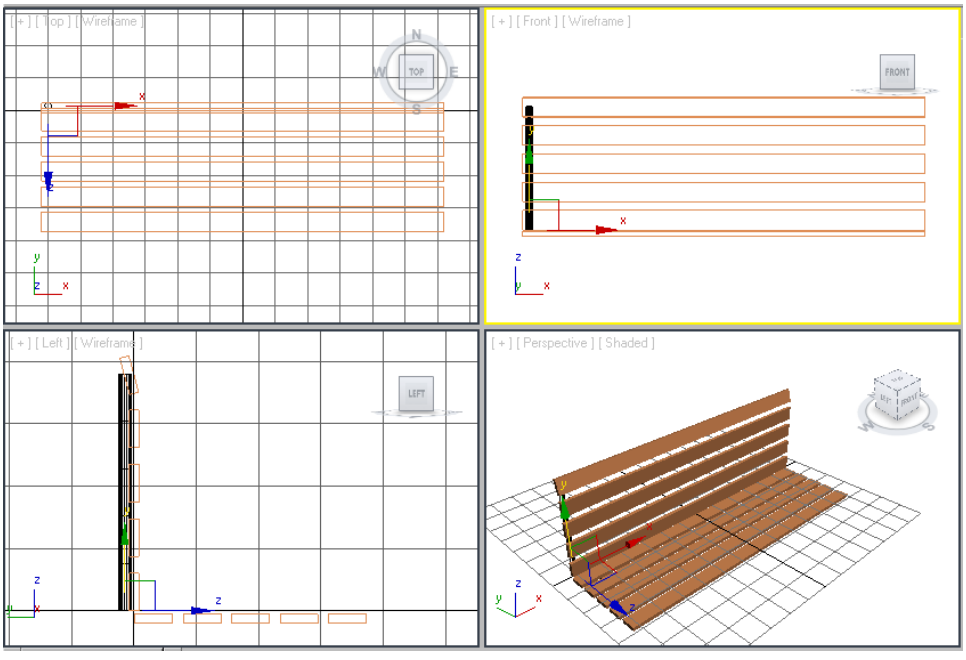


Figure 2-65 *The vertical back support001 geometry in viewports*

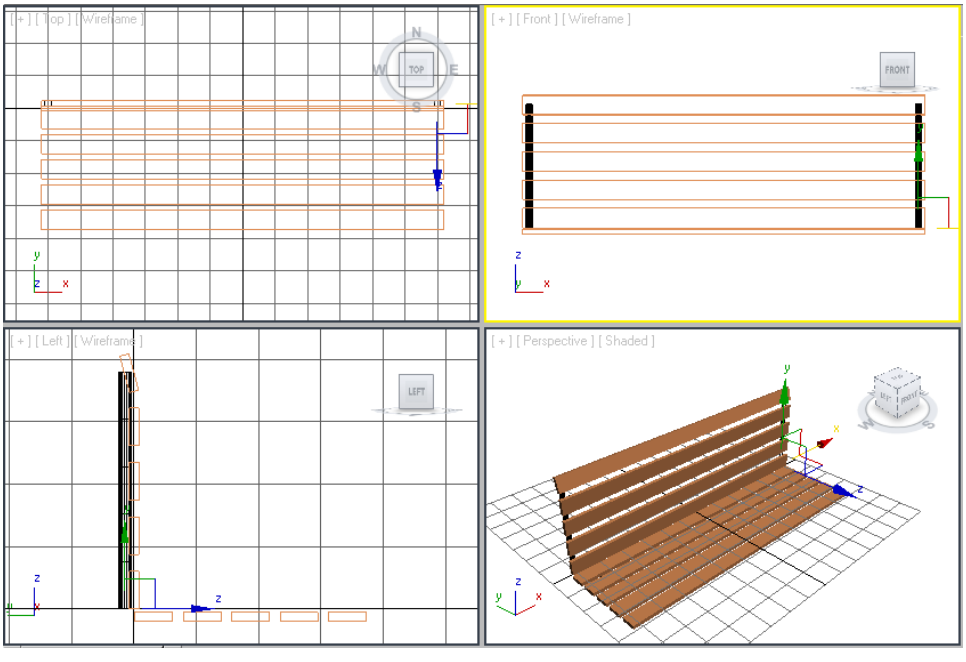


Figure 2-66 *The vertical back support002 in viewports*

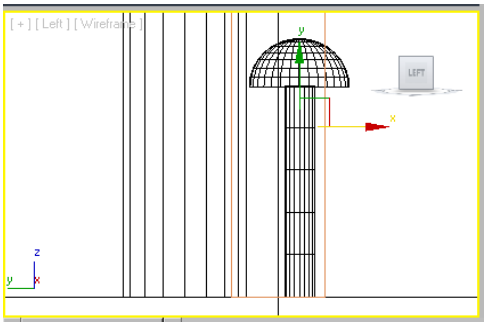


Figure 2-67 *Alignment of cap and body*

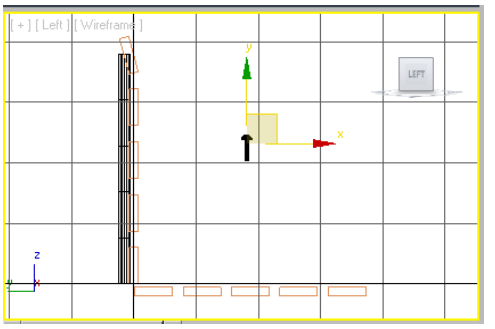


Figure 2-68 *The rivet001 group in the Left viewport*

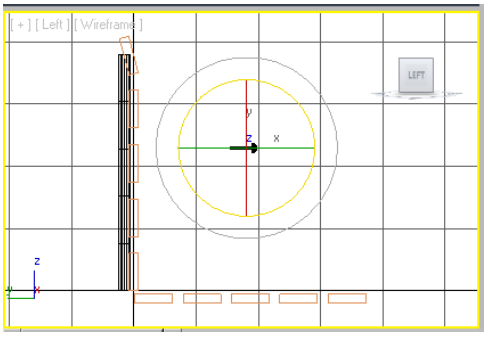


Figure 2-69 *Rotating rivet001 in the Left viewport*

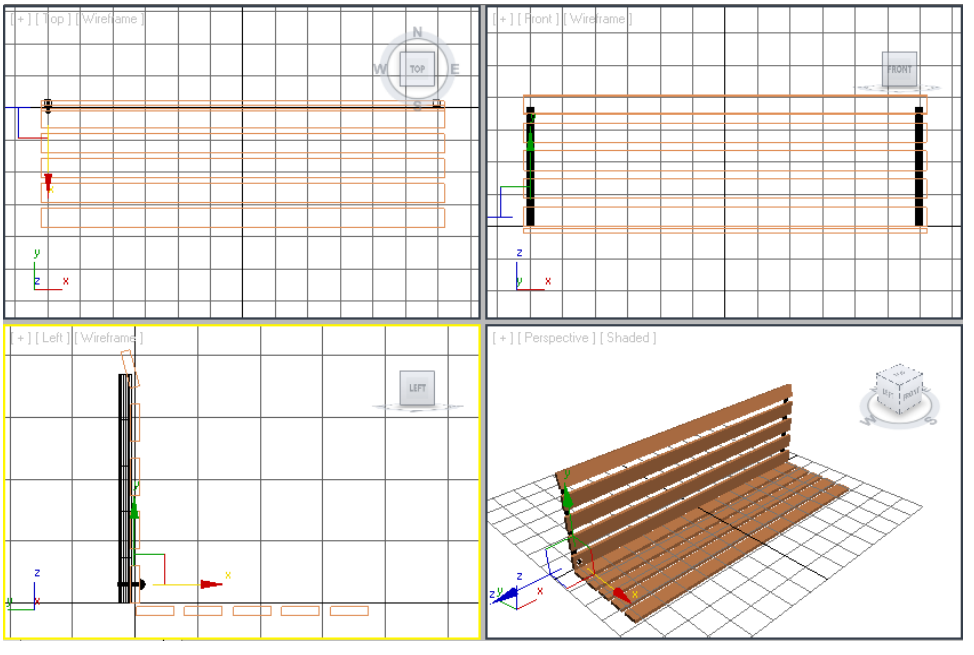


Figure 2-70 *Alignment of rivet001 with horizontal back support*

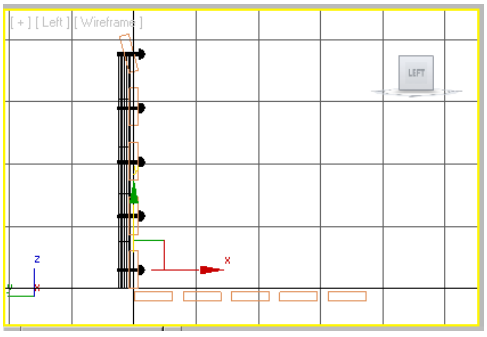


Figure 2-71 *Alignment of rivets in the Left viewport*

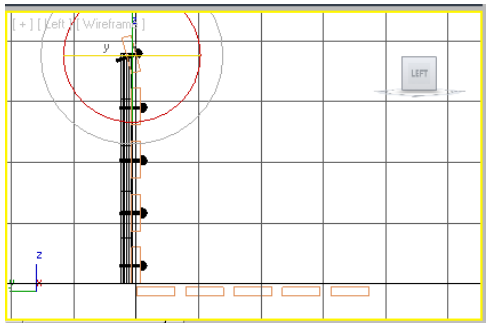


Figure 2-72 *Rotating uppermost rivet*

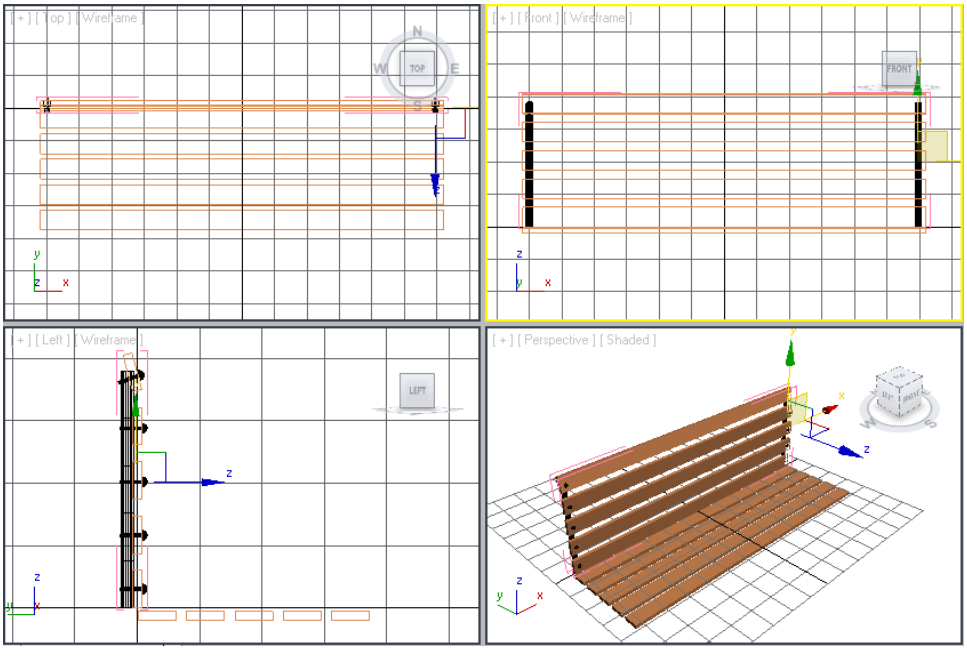


Figure 2-73 *The right side rivets group displayed in viewports*

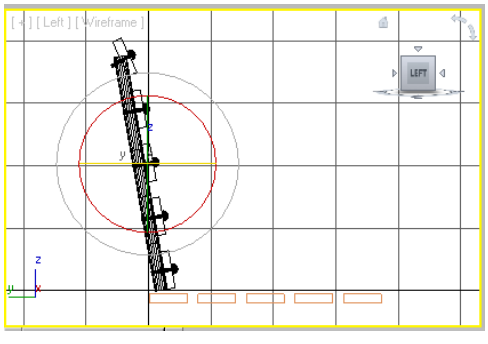


Figure 2-74 *Rotating back support in the Left viewport*

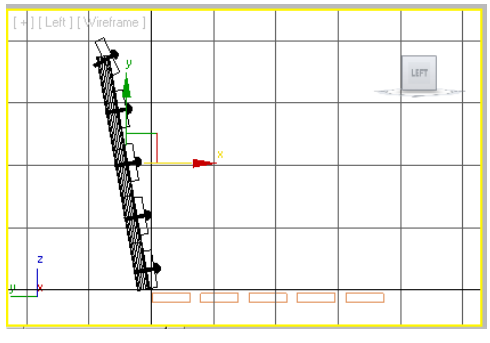


Figure 2-75 *Alignment of back support in the Left viewport*

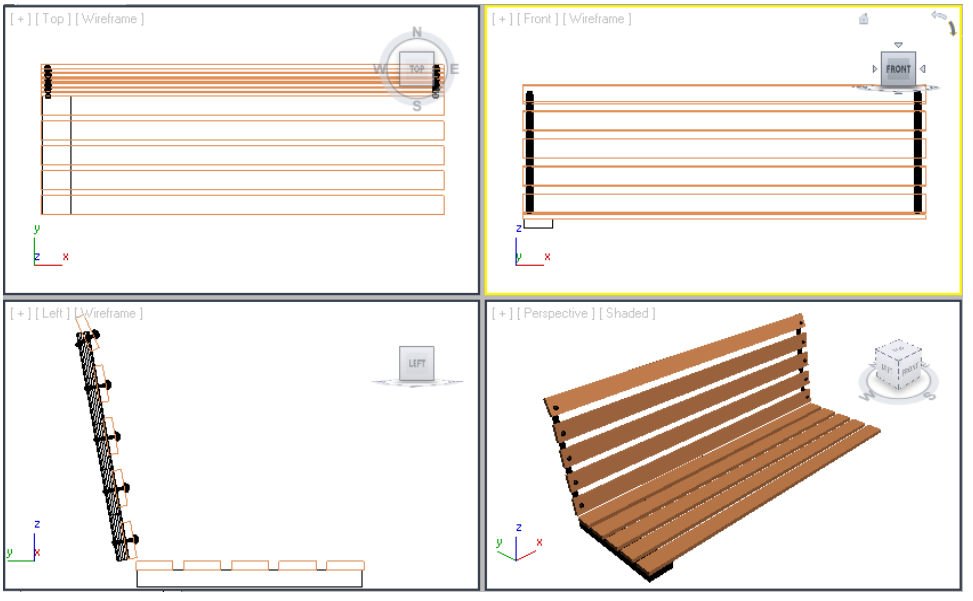


Figure 2-76 *Alignment of leg support001 with horizontal seat support*

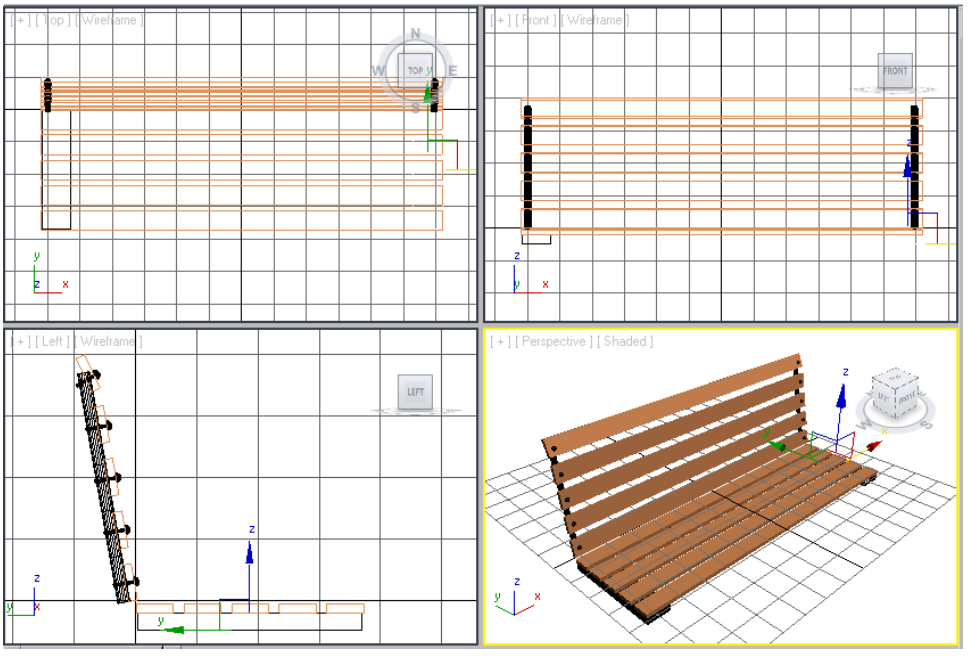


Figure 2-77 *Alignment of leg support002 with horizontal seat support*

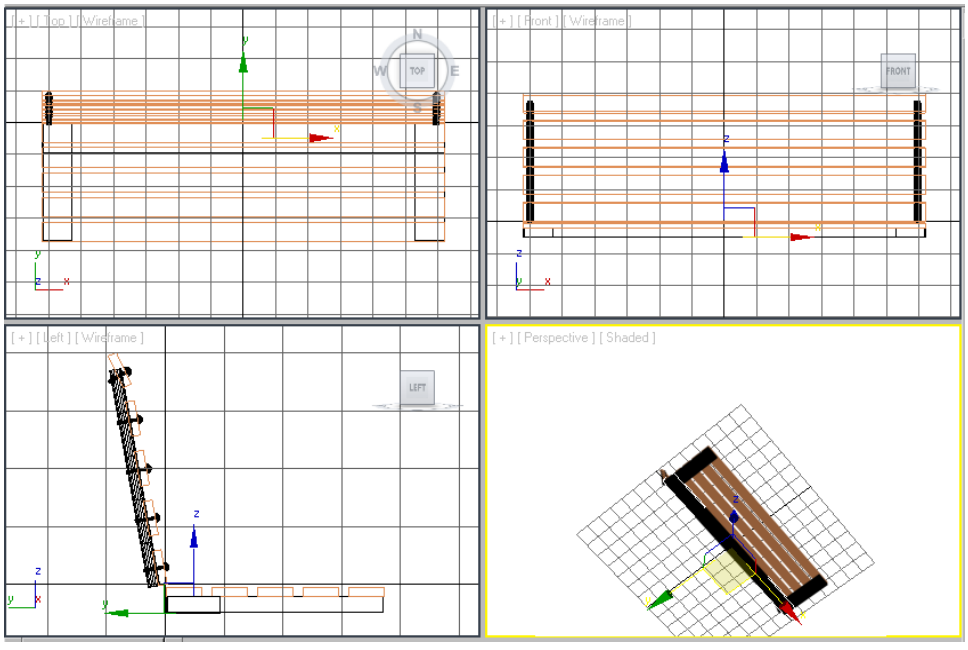


Figure 2-78 *Alignment of leg support003 with horizontal seat support in viewports*

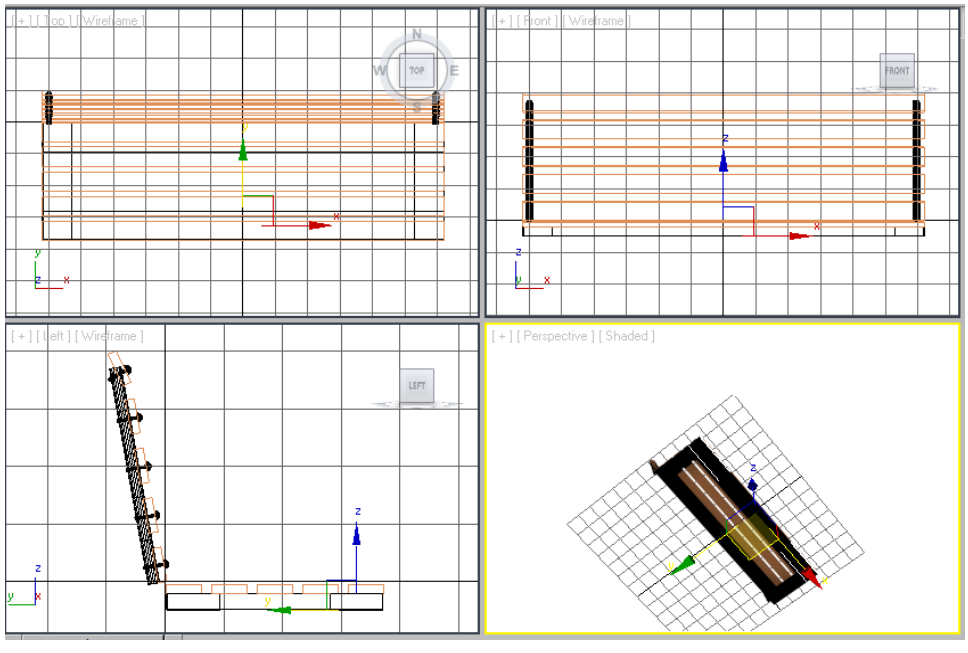


Figure 2-79 *Alignment of leg support004 in viewports*

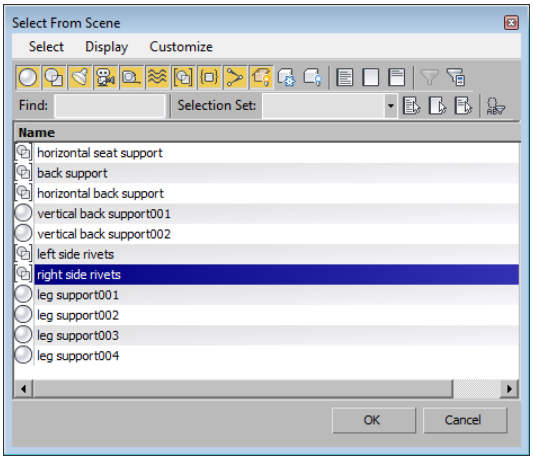


Figure 2-80 *The* ***right side rivets*** *group selected in the* ***Select From Scene*** *dialog box*

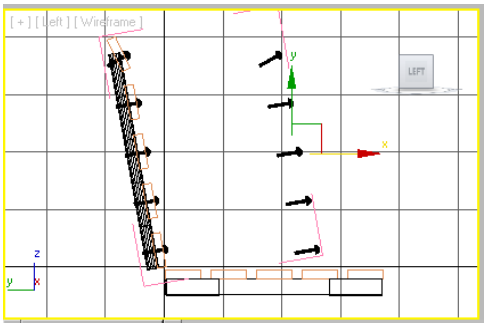


Figure 2-81 *The right side seat rivets group in the Left viewport*

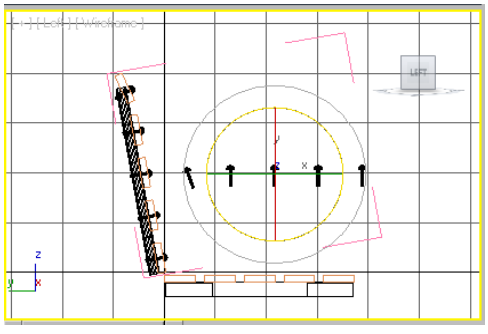


Figure 2-82 *Rotating the right side seat rivets group in the Left viewport*

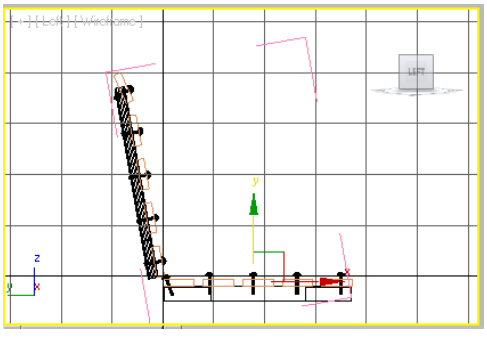


Figure 2-83 *Alignment of right side seat rivets in the Left viewport*

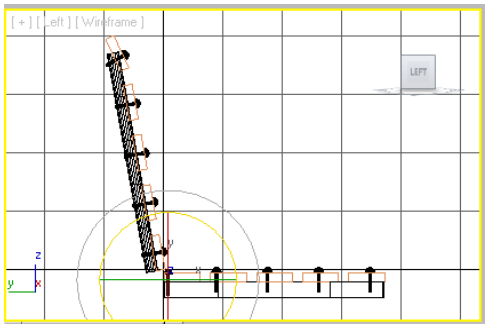


Figure 2-84 *Rotating rivet in the Left viewport*

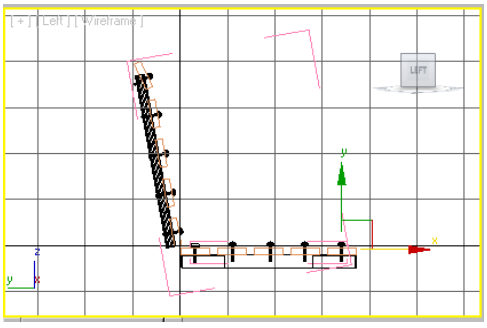


Figure 2-85 *Alignment of right side seat rivets in the Left viewport*

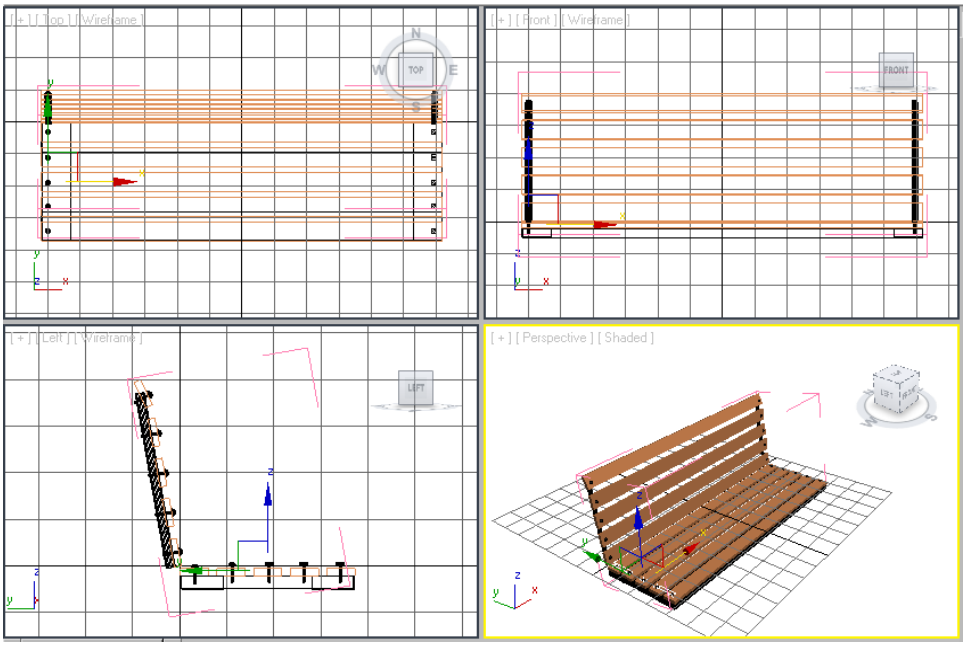


Figure 2-86 *Alignment of left side seat rivets in viewports*

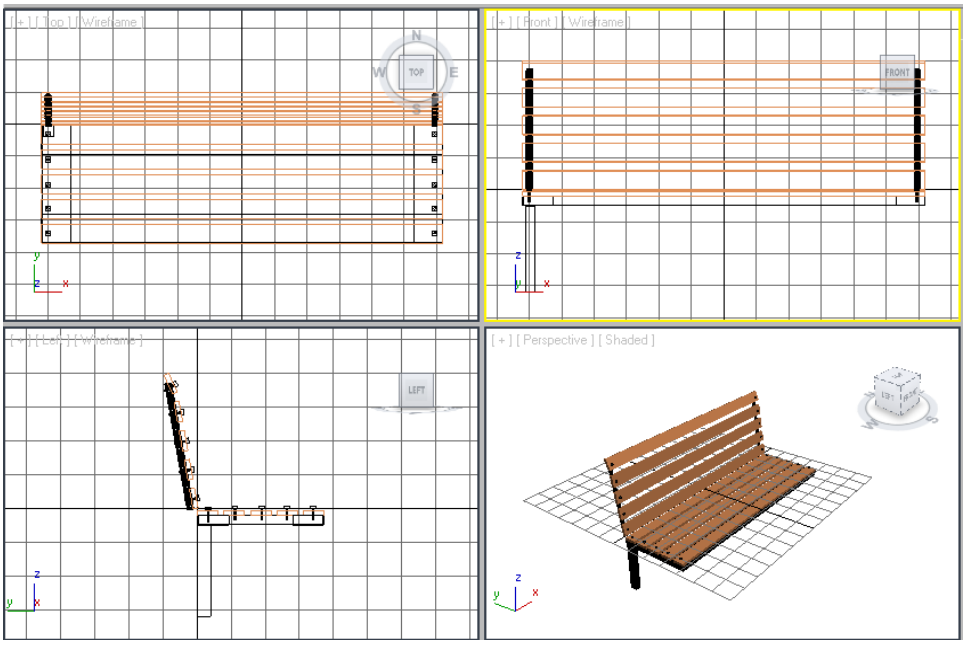


Figure 2-87 *Alignment of leg001 in viewports*

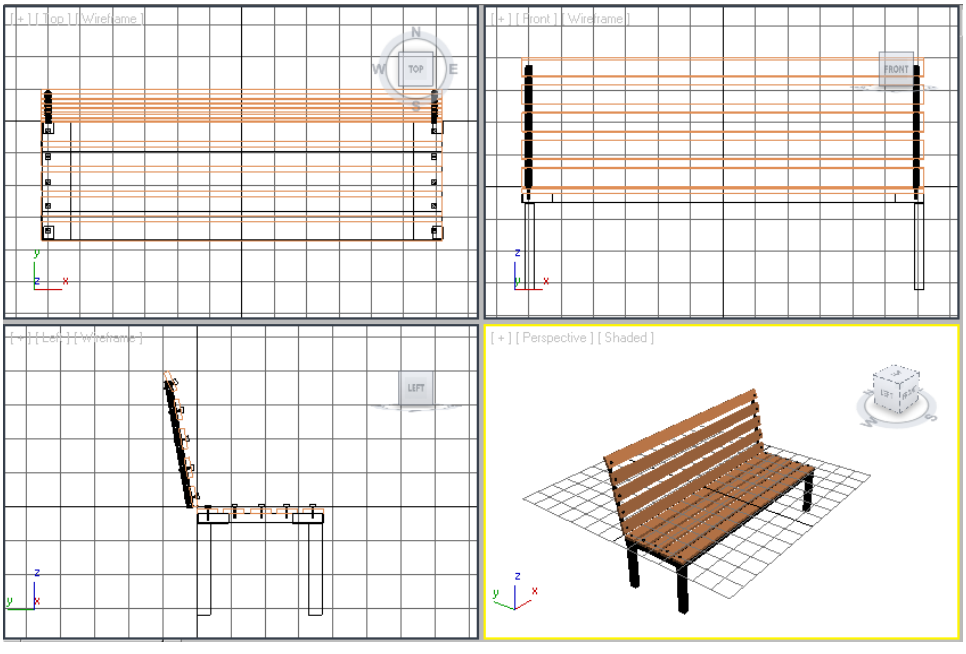


Figure 2-88 *Alignment of legs in viewports*

Figure 2-89 *The final output after rendering*

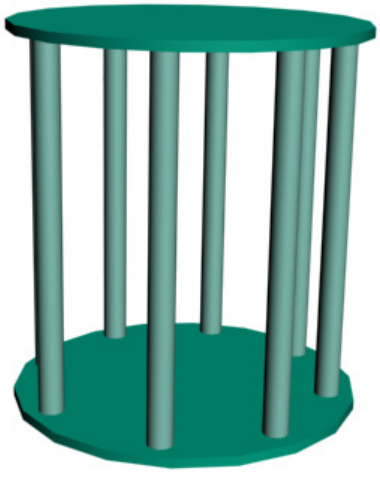


Figure 2-90 *The model to be created in Exercise 2*

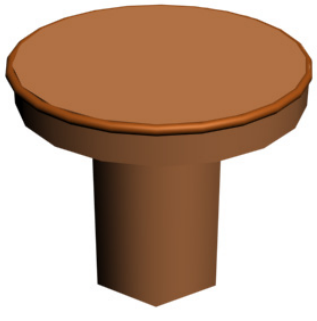


Figure 2-91 *The nut model (view 1)*

Figure 2-92 *The nut model (view 2)*

Figure 2-93 *The table model*

3

Extended Primitives

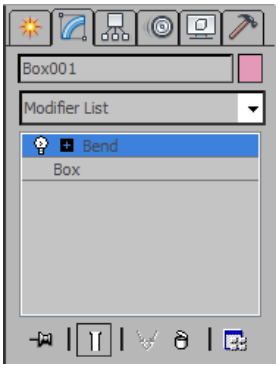


Figure 3-1 *The* ***Bend*** *modifier displayed in the modifier stack*

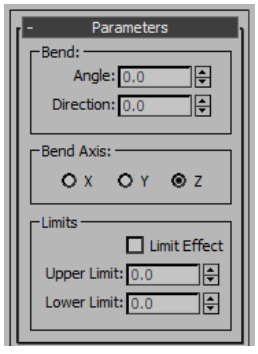


Figure 3-2 *The* ***Parameters*** *rollout of the* ***Bend*** *modifier*

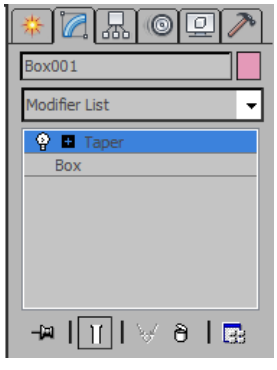


Figure 3-3 *The* ***Taper*** *modifier in the modifier stack*

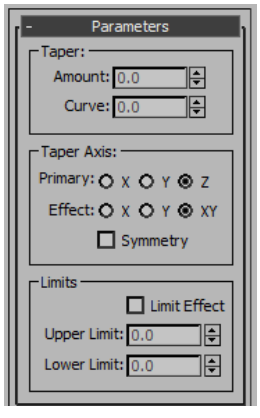


Figure 3-4 *The* ***Parameters*** *rollout of the* ***Taper*** *modifier*

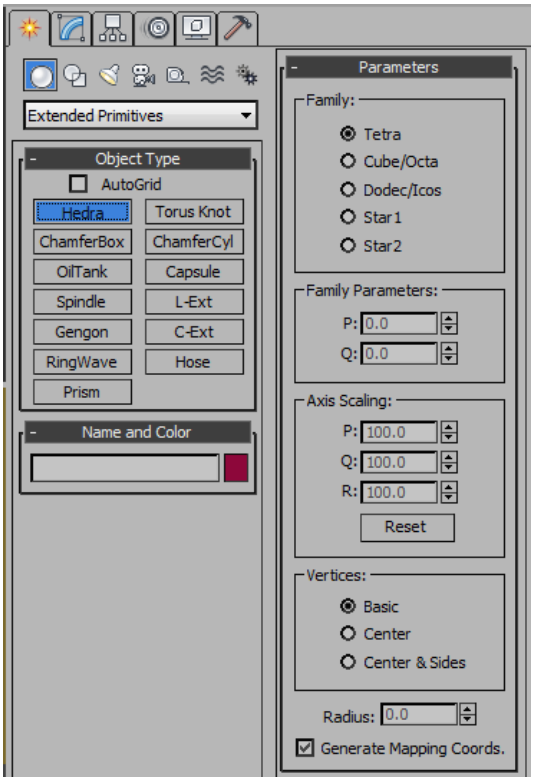


Figure 3-5 *Various rollouts to create a hedra*

Figure 3-6 *A hedra displayed in the viewport*

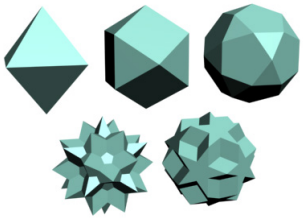


Figure 3-7 *Five basic shapes of hedra*

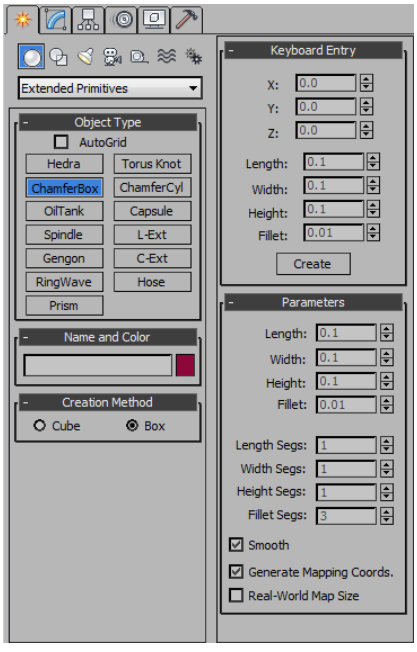


Figure 3-8 *Various rollouts to create a chamfer box*

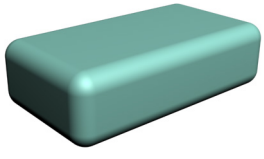


Figure 3-9 *A chamfer box with rounded edges*

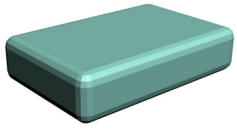


Figure 3-10 *A chamfer box with beveled edges*

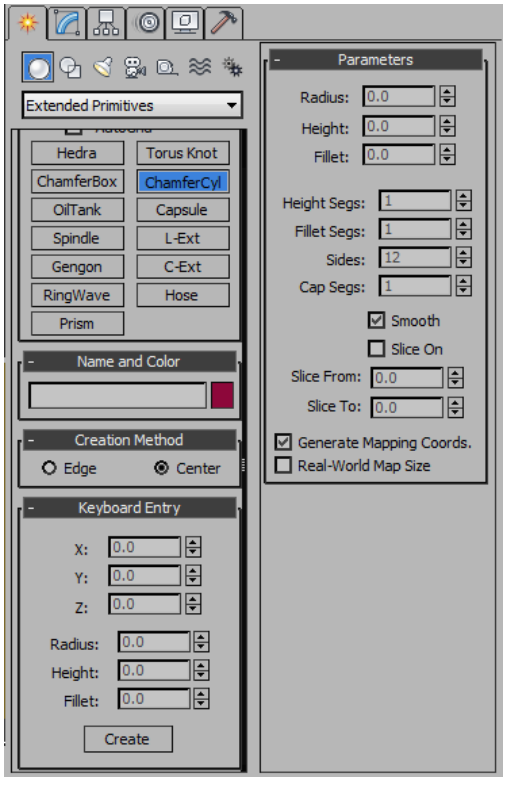


Figure 3-11 *Various rollouts to create a chamfer cylinder*

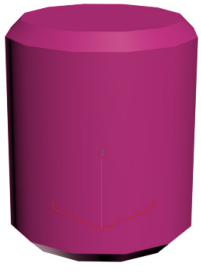


Figure 3-12 *A chamfer cylinder displayed in the viewport*

Figure 3-13 *A chamfer cylinder with beveled edges*

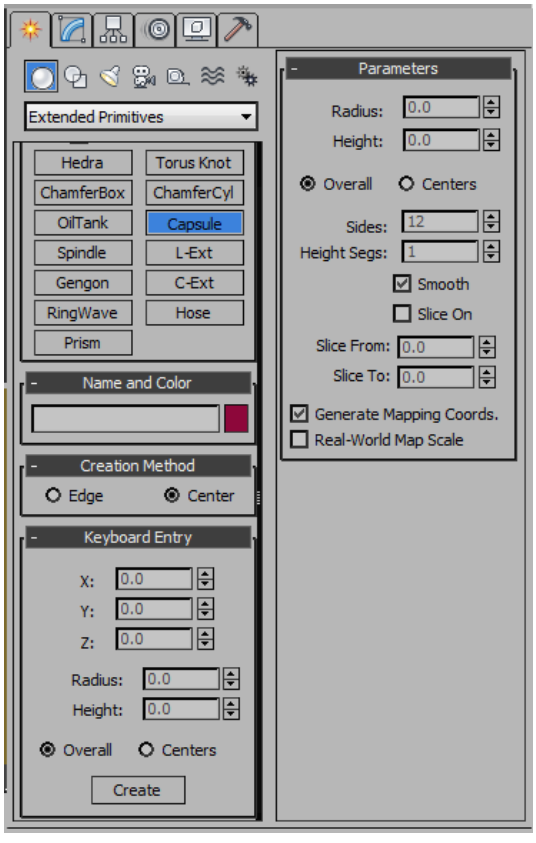


Figure 3-14 *Various rollouts to create a capsule*

Figure 3-15 *A capsule displayed in the viewport*

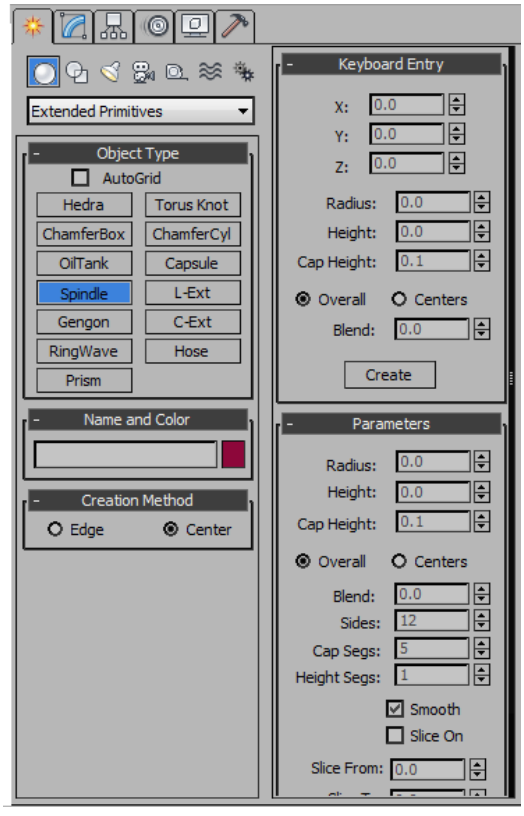


Figure 3-16 *Various rollouts to create a spindle*

Figure 3-17 *A spindle displayed in the viewport*

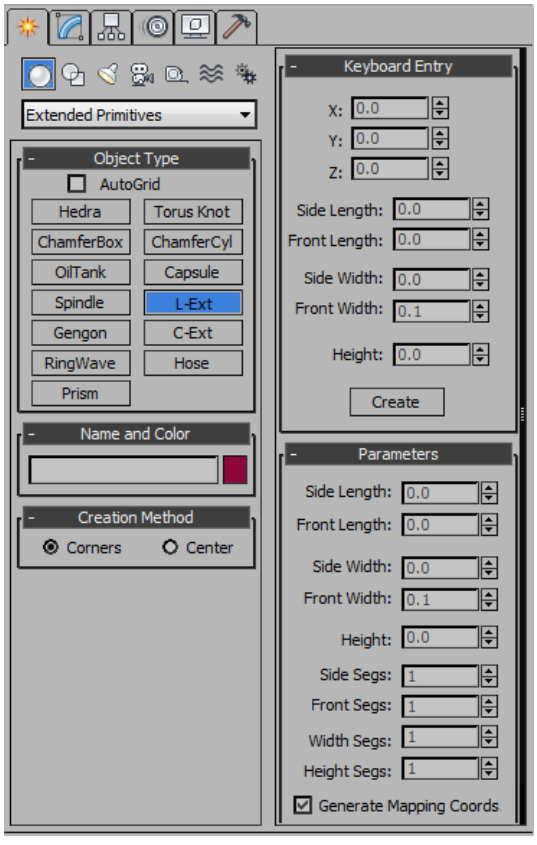


Figure 3-18 *Various rollouts to create an L-Ext*

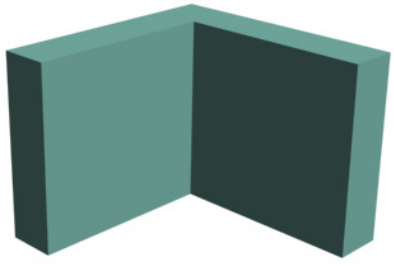


Figure 3-19 *An L-Ext displayed in the viewport*

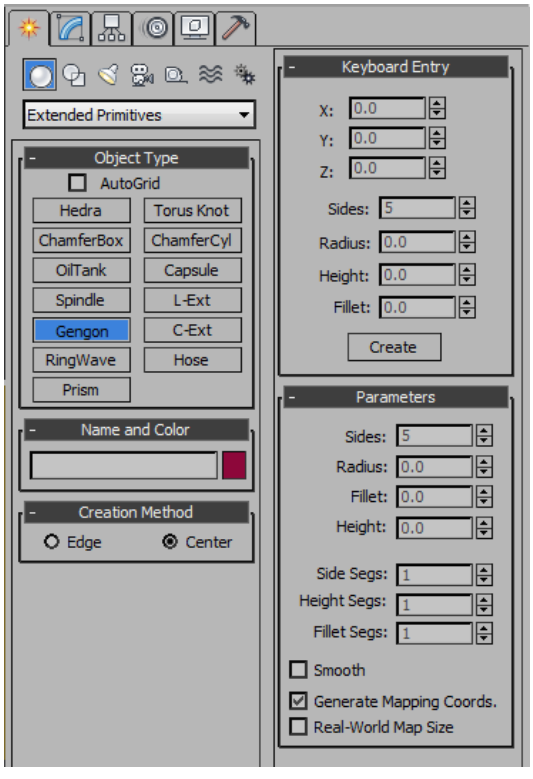


Figure 3-20 *Various rollouts to create a gengon*

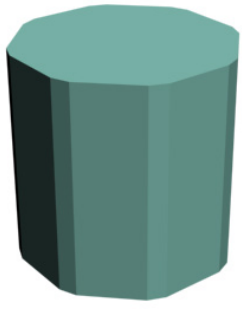


Figure 3-21 *A gengon displayed in the viewport*

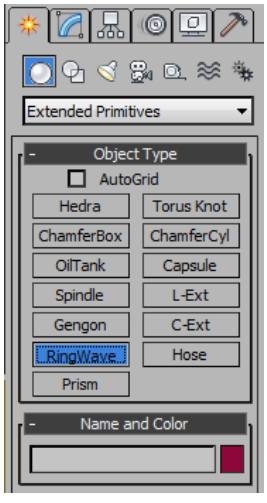


Figure 3-22 *The* ***Name and Color*** *rollout*

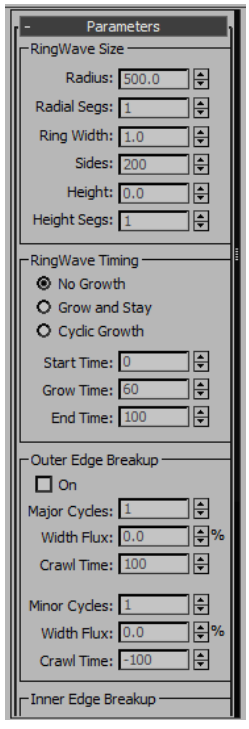


Figure 3-23 *Partial view of the* ***Parameters*** *rollout of the ringwave*

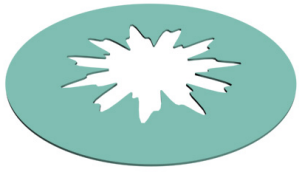


Figure 3-24 *A ringwave displayed in the viewport*

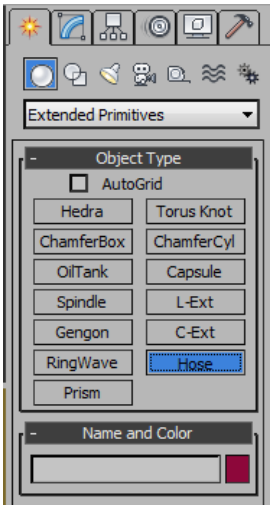


Figure 3-25 *The* ***Name and Color*** *rollout*

Figure 3-26 *Partial view of the* ***Hose Parameters*** *rollout*

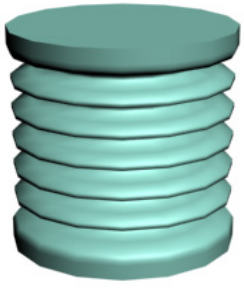


Figure 3-27 *A hose displayed in the viewport*

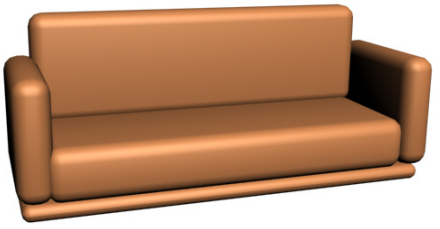


Figure 3-28 *The model of a couch*

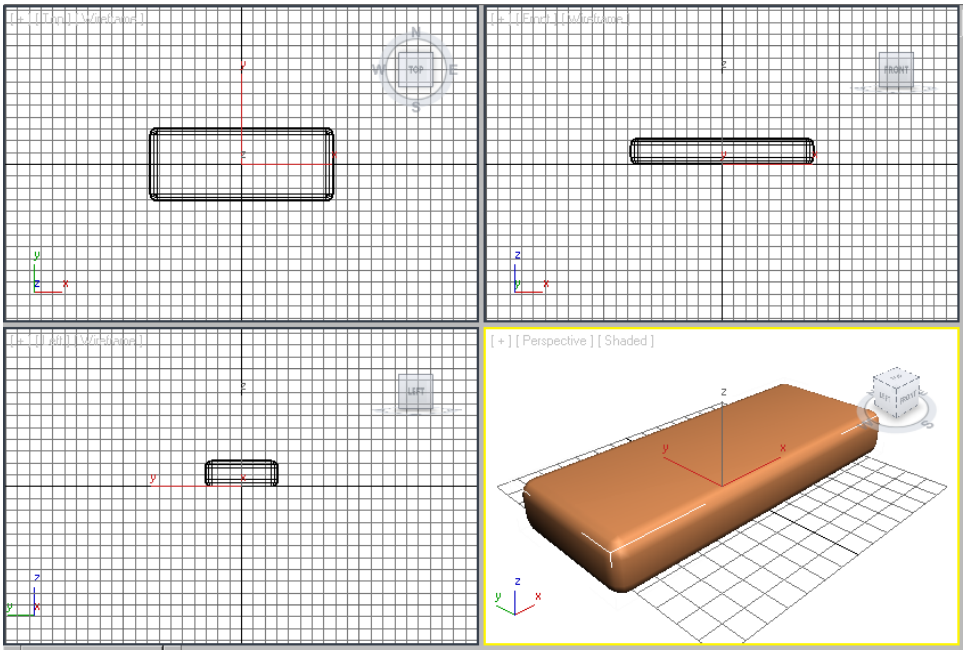


Figure 3-29 *A chamfer box created for seat support*

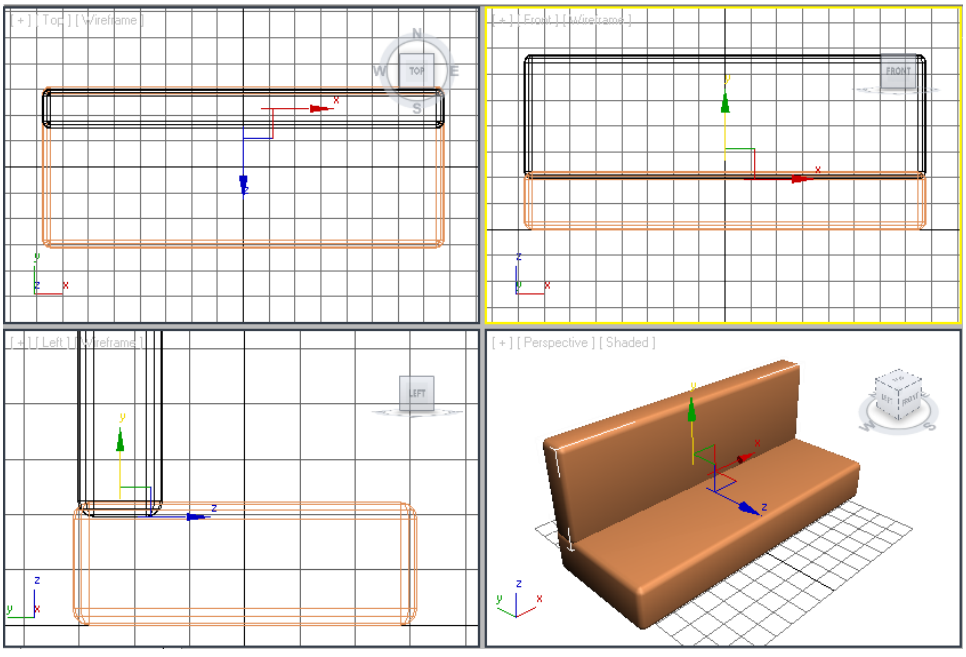


Figure 3-30 *Alignment of back support with seat support*

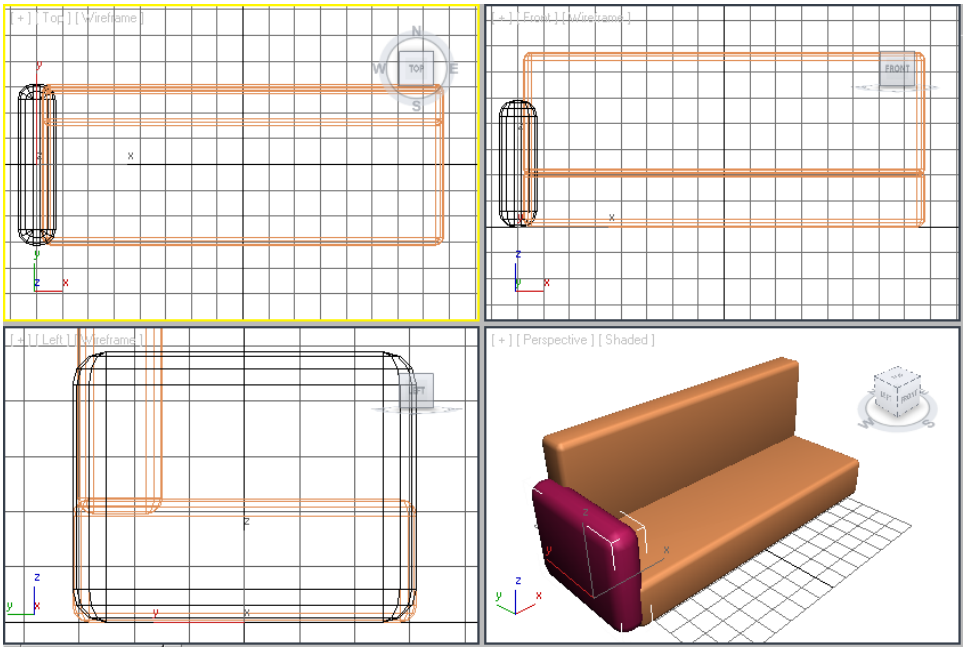


Figure 3-31 *The left side geometry displayed in viewports*

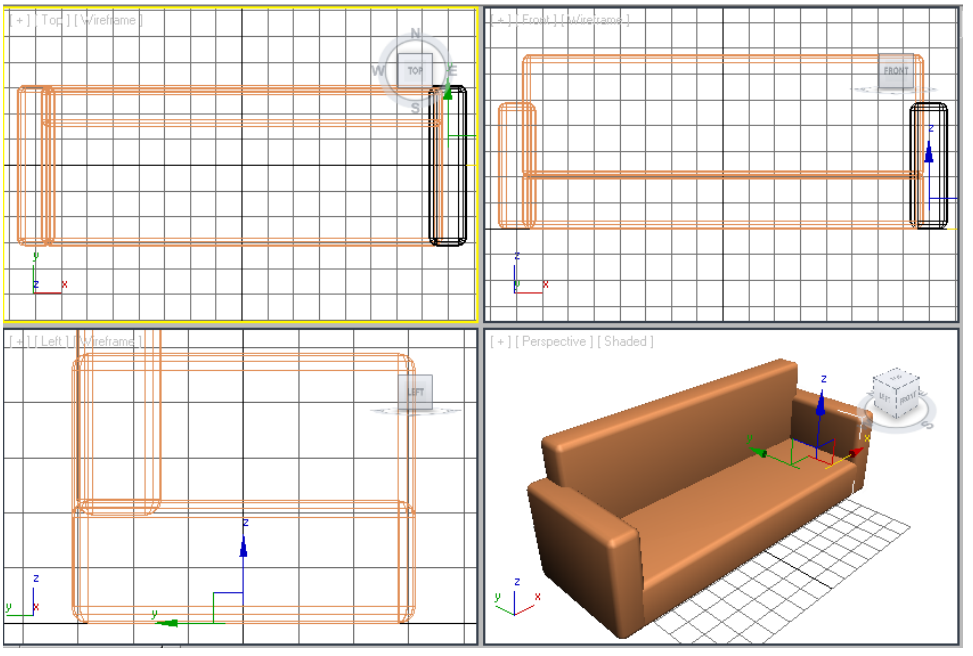


Figure 3-32 *The right side geometry displayed in viewports*

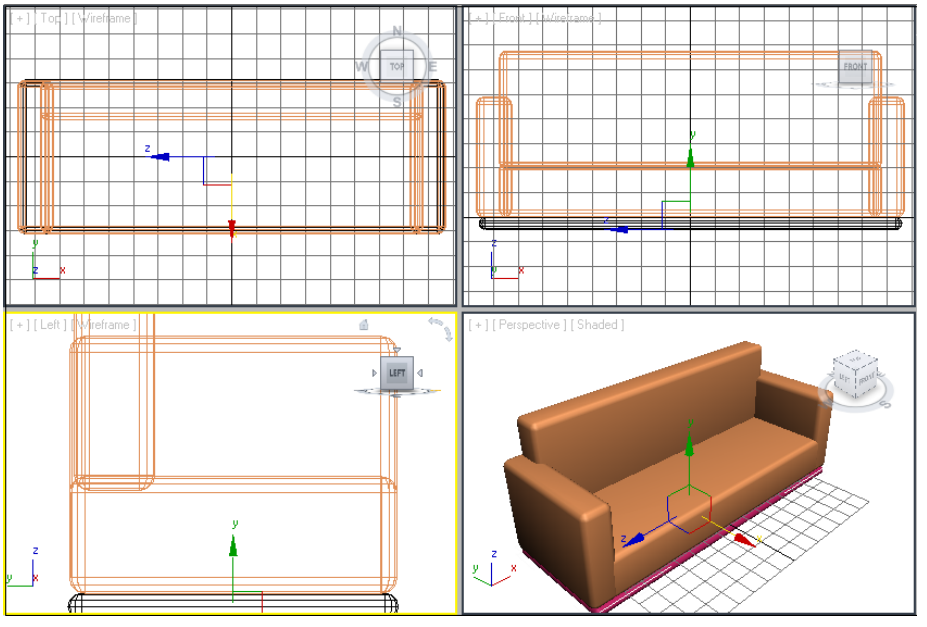


Figure 3-33 *The base geometry displayed in viewports*

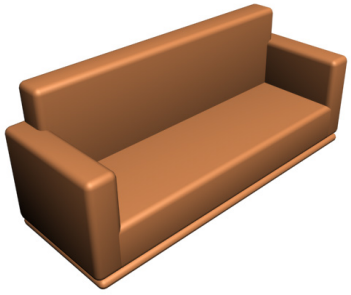


Figure 3-34 *The final output after rendering*

Figure 3-35 *The model of a chair*

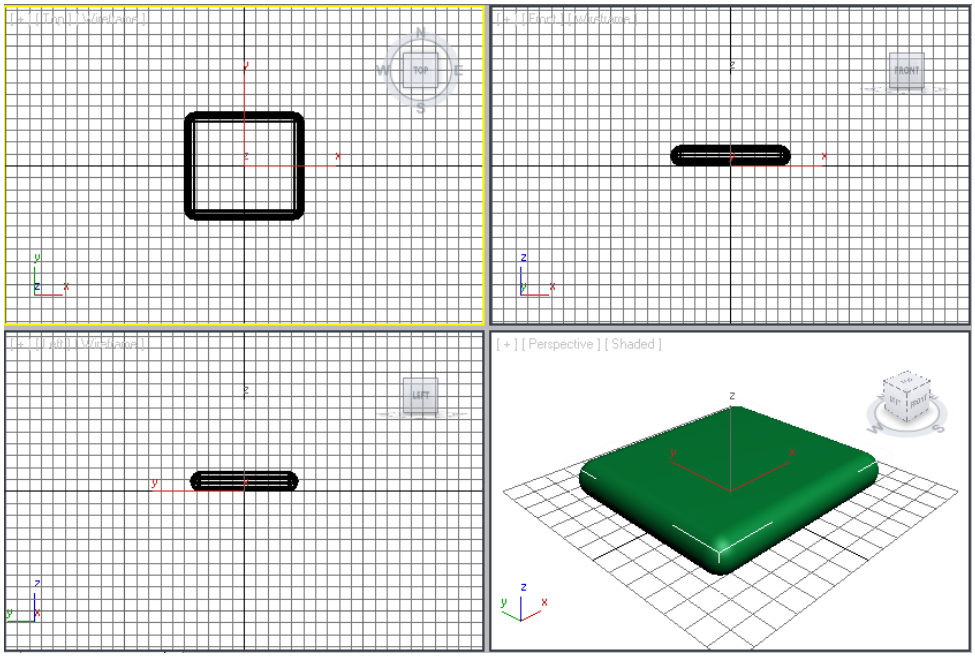


Figure 3-36 *The chamfer box created for seat support of the chair*

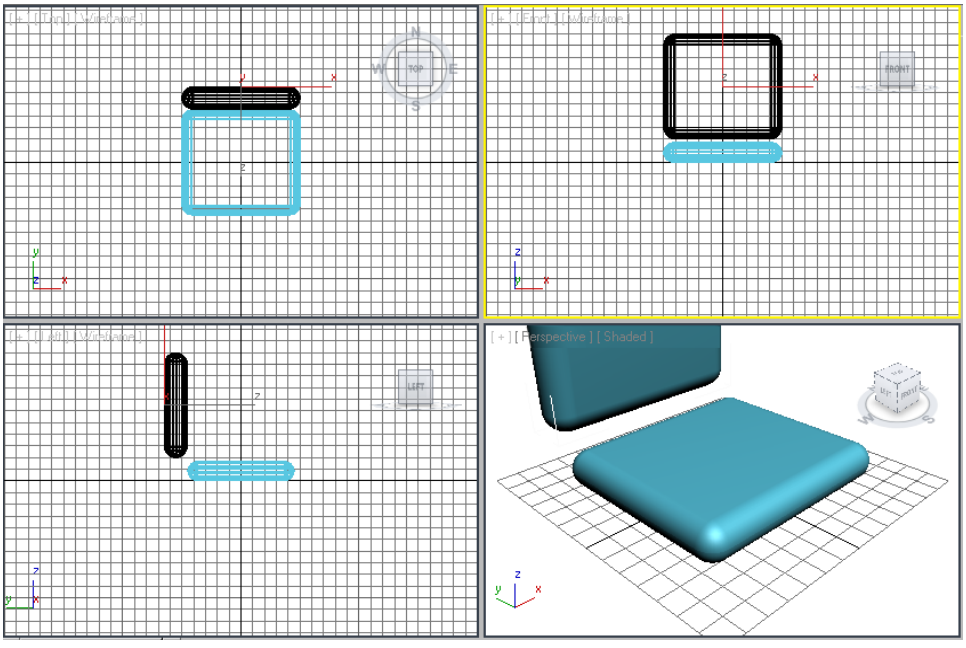


Figure 3-37 *The back support geometry in viewports*

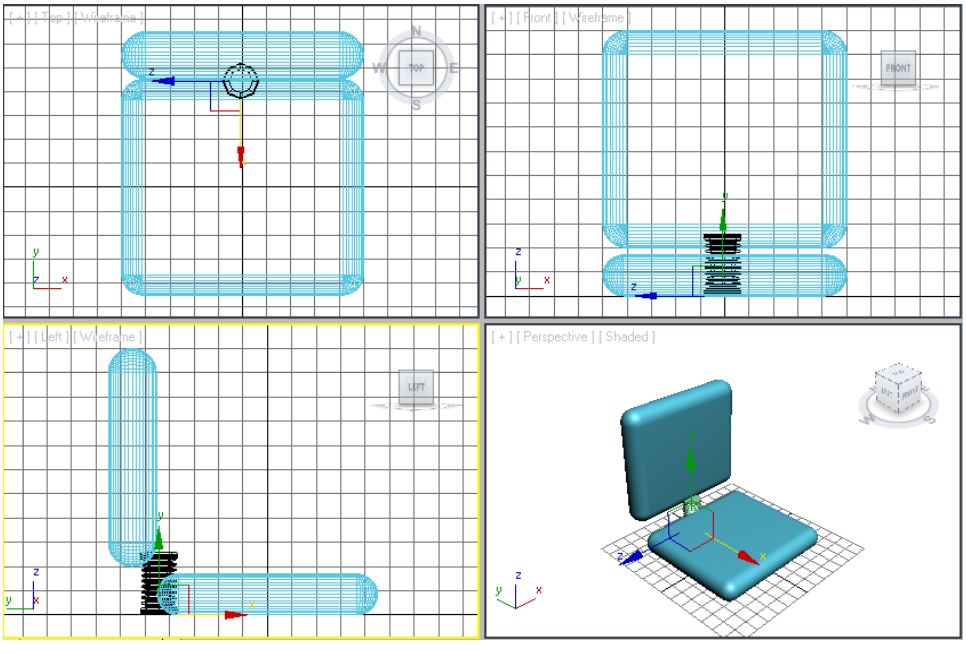


Figure 3-38 *The spring support geometry in viewports*

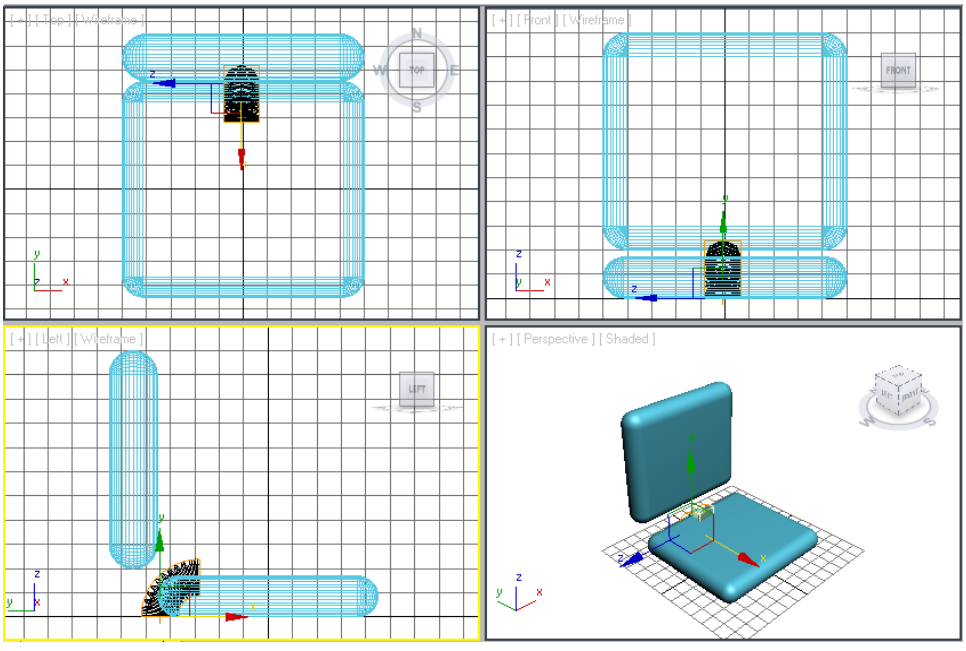


Figure 3-39 *The spring support geometry after applying the* ***Bend*** *modifier*

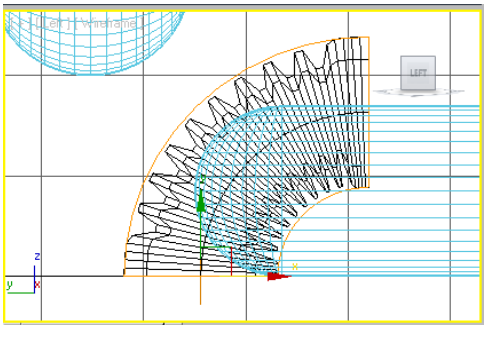


Figure 3-40 *The spring support geometry zoomed in the Left viewport*

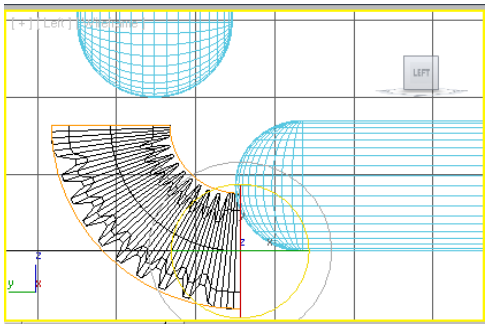


Figure 3-41 *The spring support geometry rotated in the Left viewport*

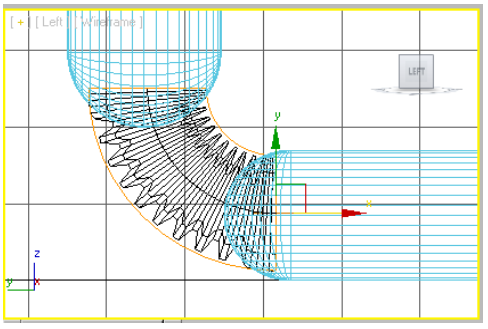


Figure 3-42 *Alignment of spring support in the Left viewport*

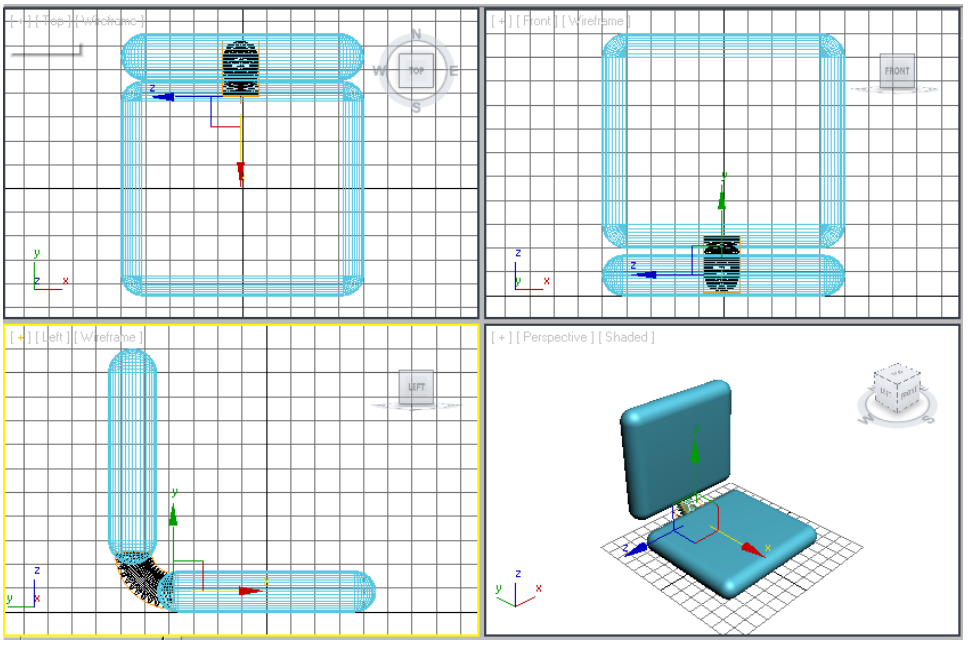


Figure 3-43 *Alignment of spring support in viewports*

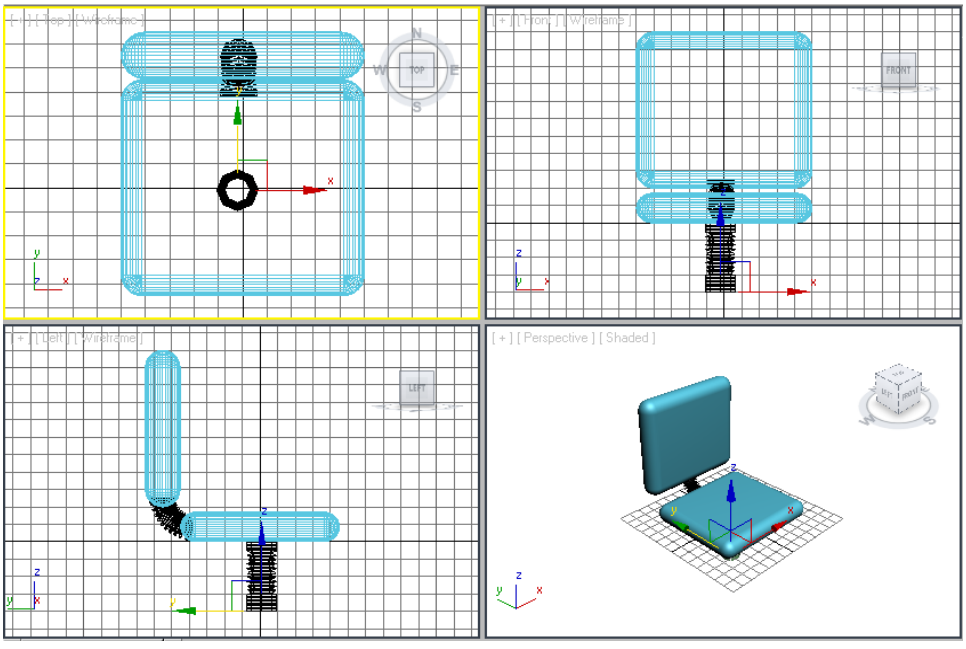


Figure 3-44 *Alignment of leg support in viewports*

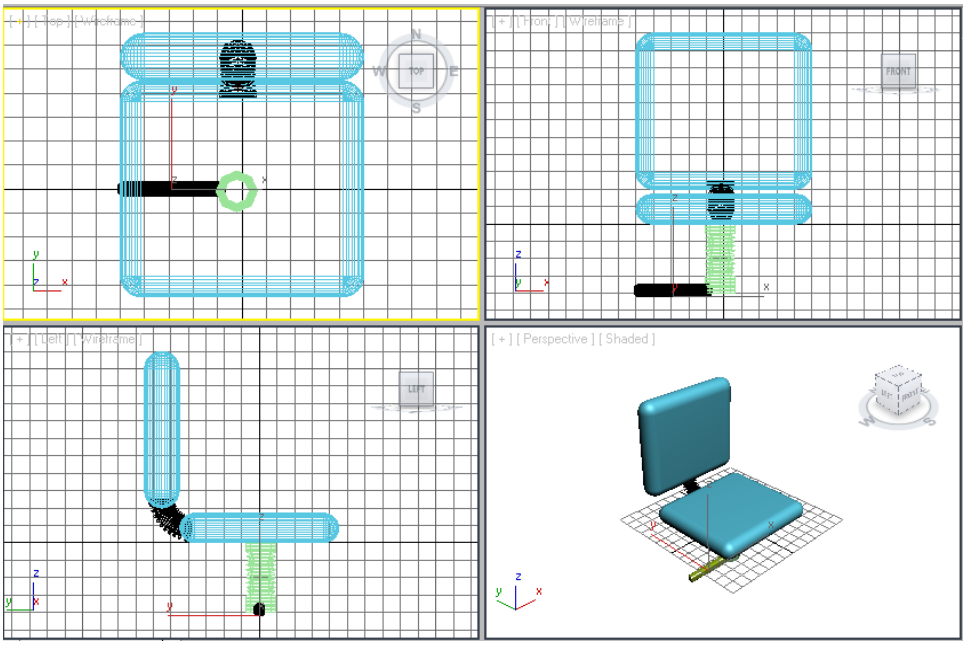


Figure 3-45 *Alignment of leg01 in viewports*

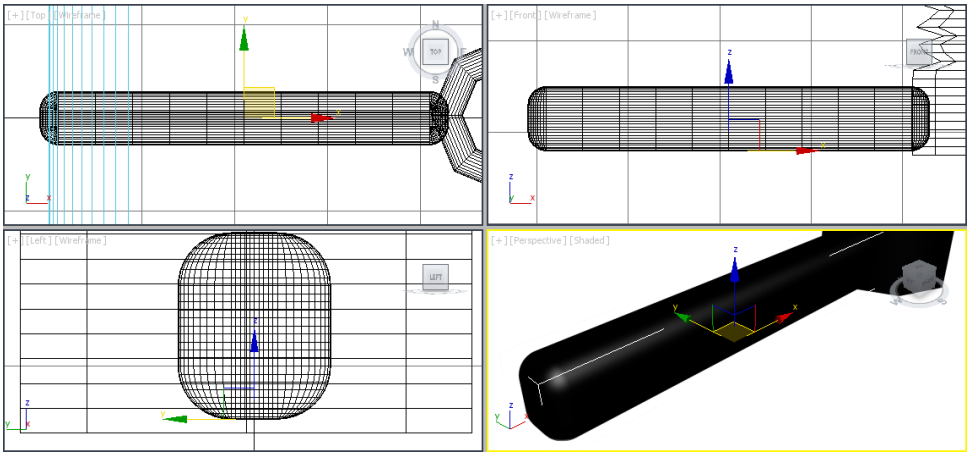


Figure 3-46 *The leg01 geometry after invoking the* ***Zoom Extents All Selected*** *tool*

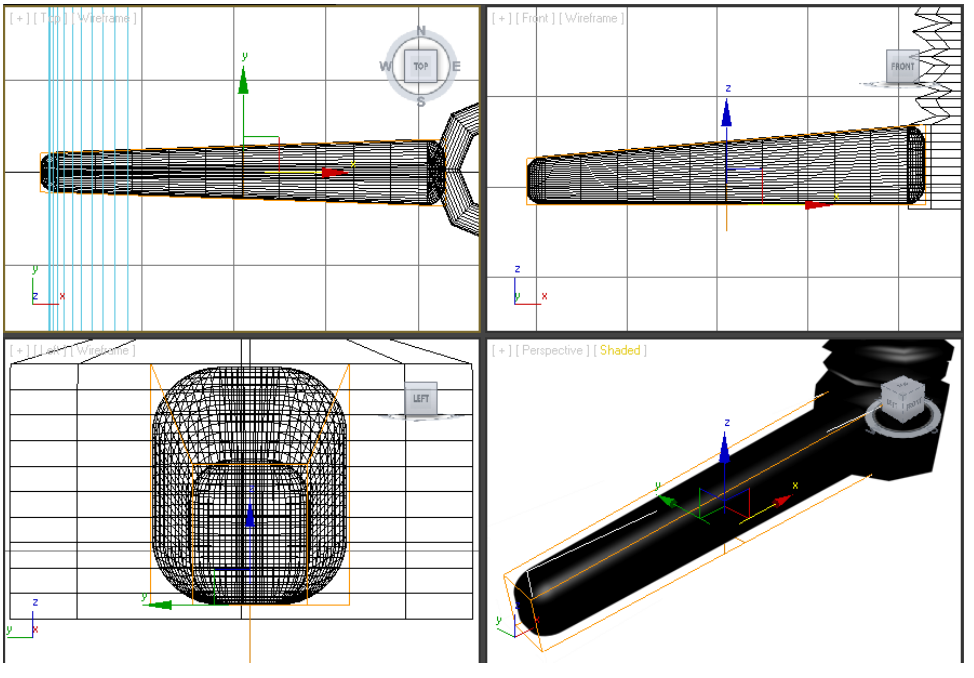


Figure 3-47 *The leg01 geometry displayed in viewports after applying the* ***Taper*** *modifier*

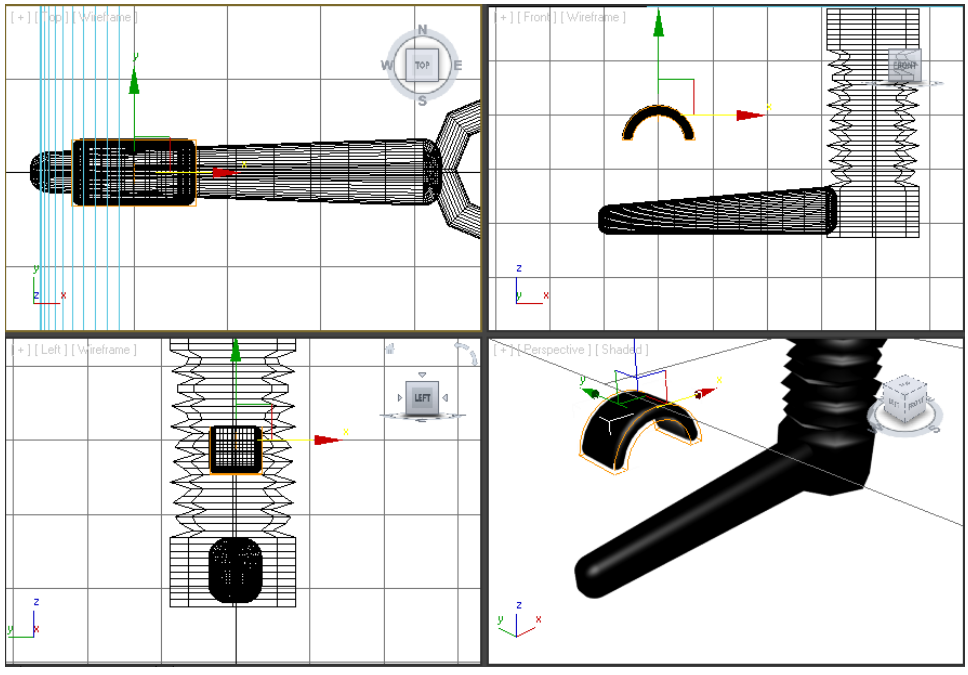


Figure 3-48 *The box01 geometry displayed in viewports after applying the* ***Bend*** *modifier*

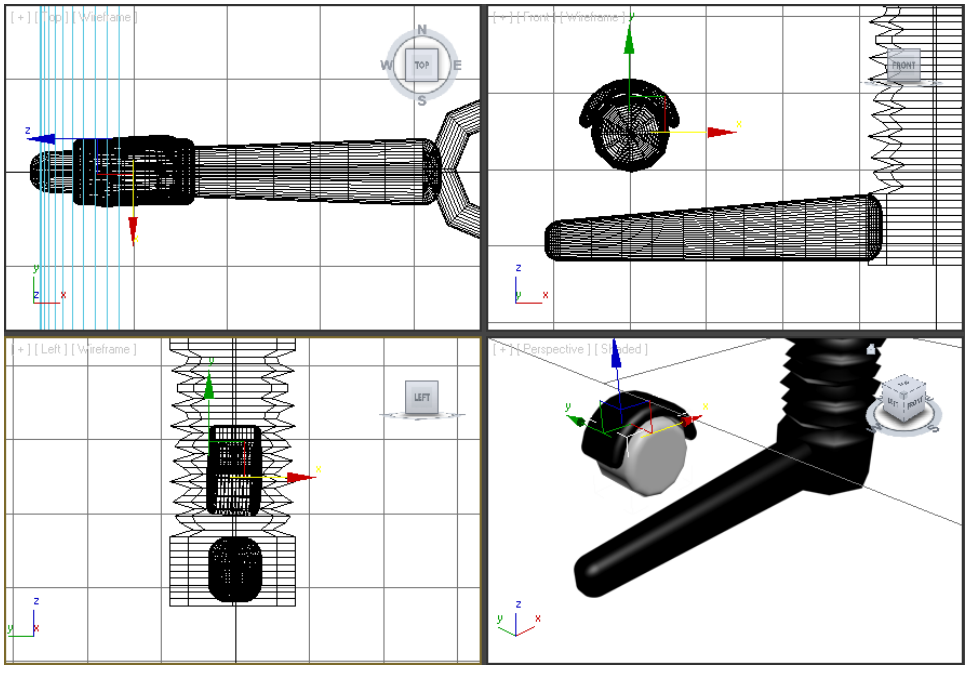


Figure 3-49 *Alignment of cylinder01 with box01 in viewports*

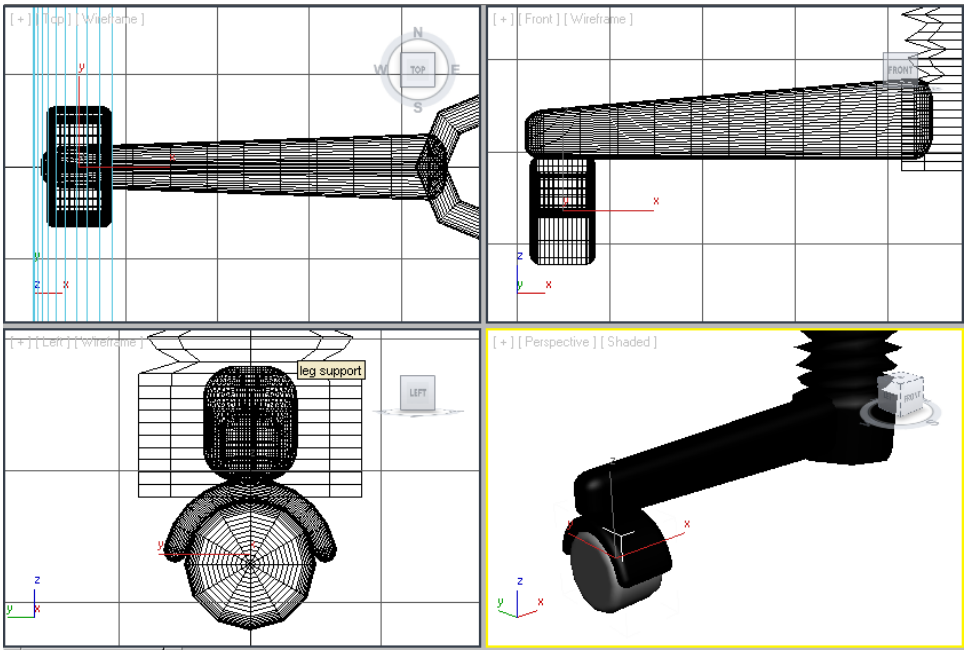


Figure 3-50 *Alignment of roller01 with leg01 in viewports*

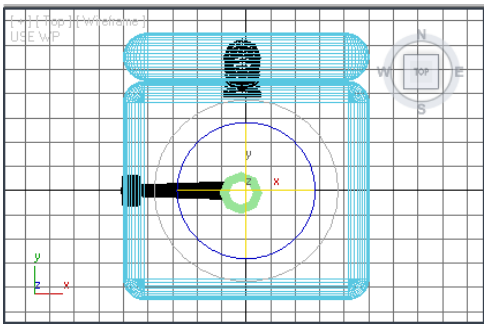


Figure 3-51 *A circular gizmo displayed at the location of the working pivot point*

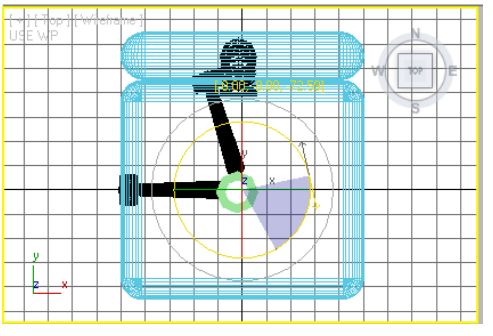


Figure 3-52 *The f_leg01 group rotated about* ***-72*** *degrees with respect to the working pivot point*

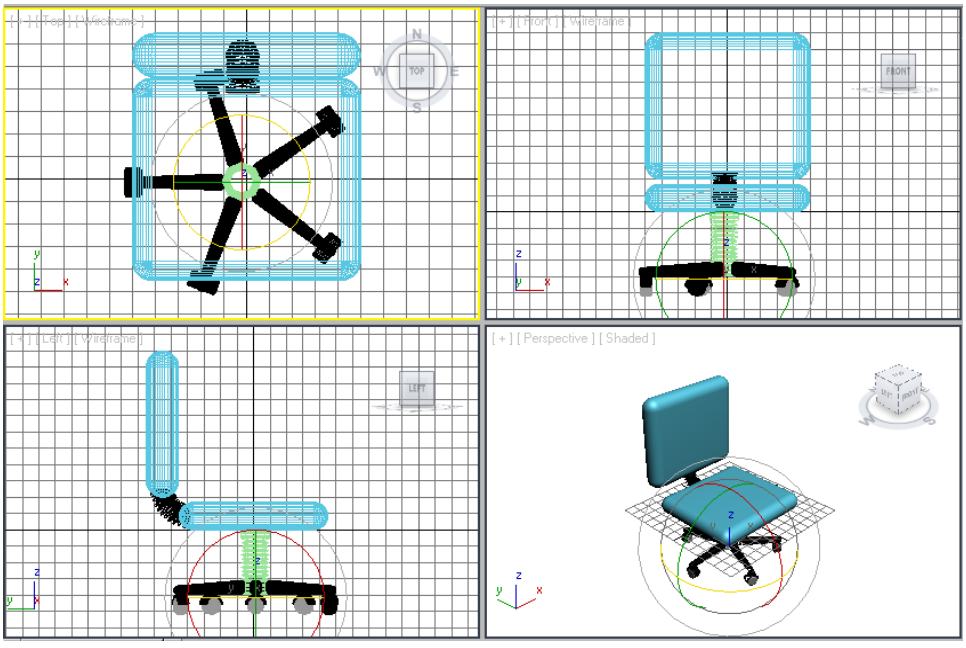


Figure 3-53 *The f_leg002, f_leg003, f_leg004, and f_leg005 groups in viewports*

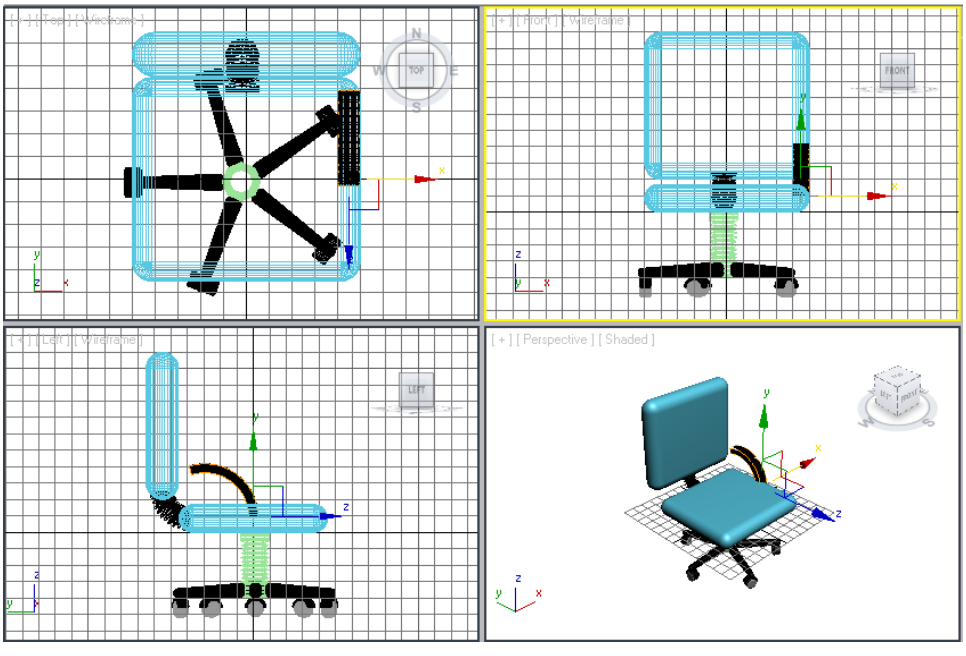


Figure 3-54 *Alignment of right hand support01 in viewports*

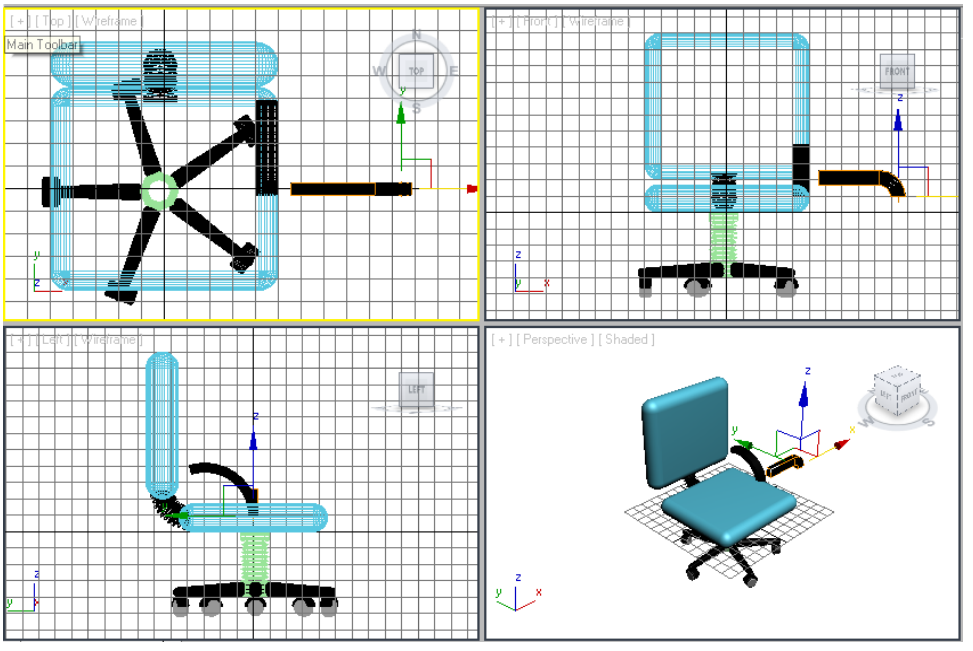


Figure 3-55 *The right hand support002 geometry after modifying the values of the* ***Bend*** *modifier*

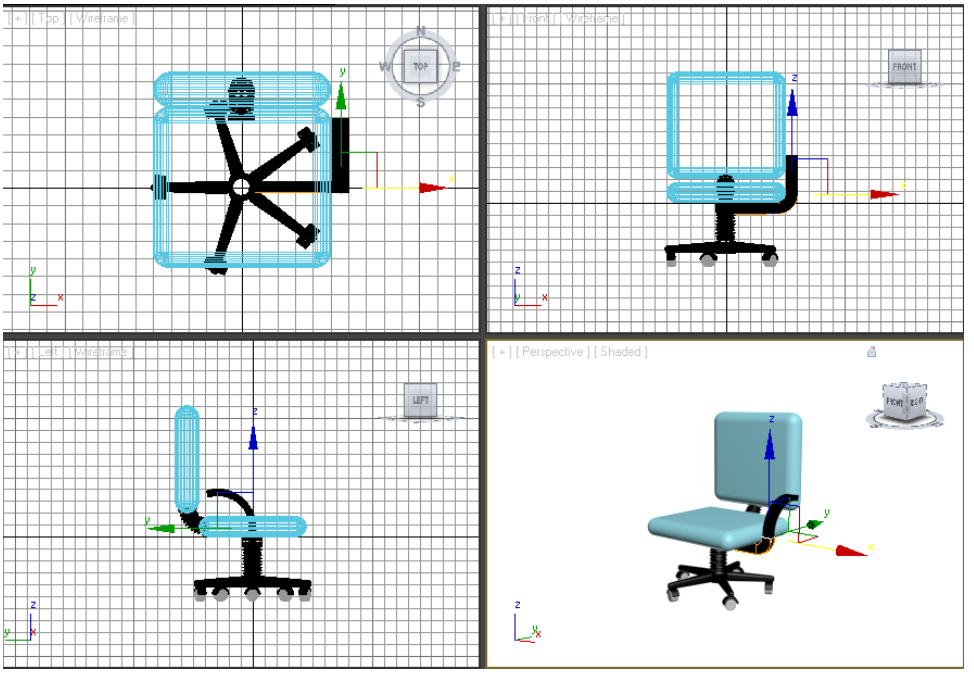


Figure 3-56 *Alignment of right hand support002 in viewports*

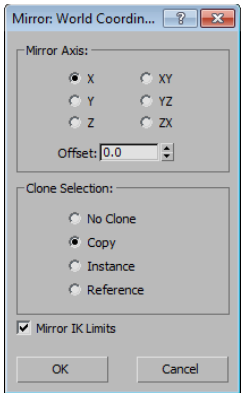


Figure 3-57 *The* ***Mirror: World Coordinates*** *dialog box*

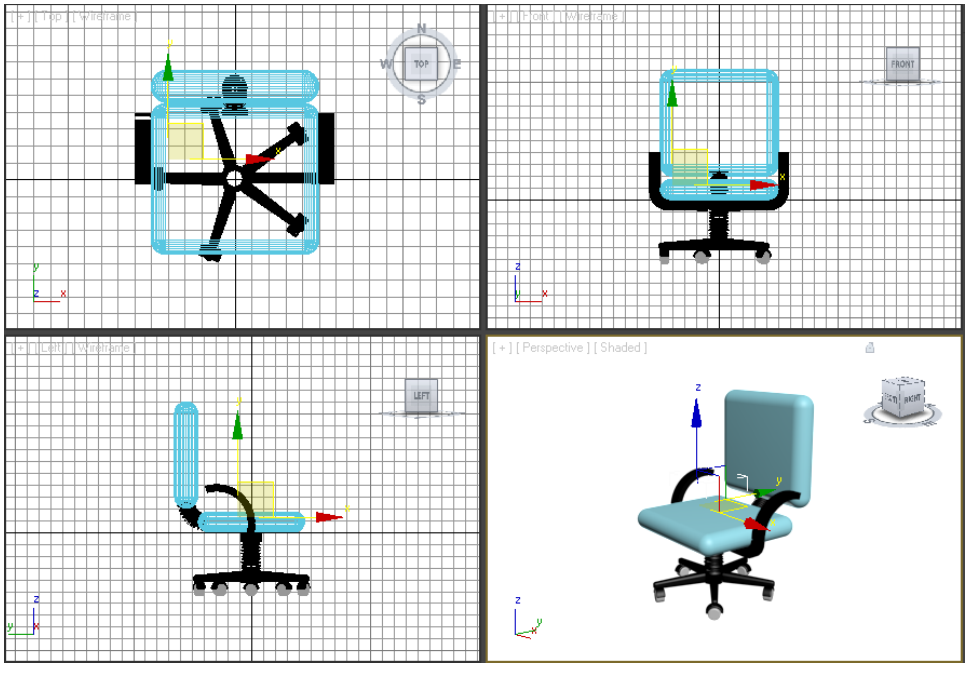


Figure 3-58 *Alignment of left hand support in viewports*

Figure 3-59 *The final rendered output*

Figure 3-60 *The model of a stool*

Figure 3-61 *The model of a table*

Figure 3-62 *The model of a chair*

4

Default Objects and Patch Grids

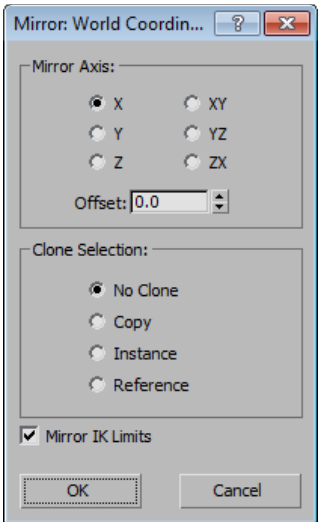


Figure 4-1 *The* ***Mirror: World Coordinates*** *dialog box*

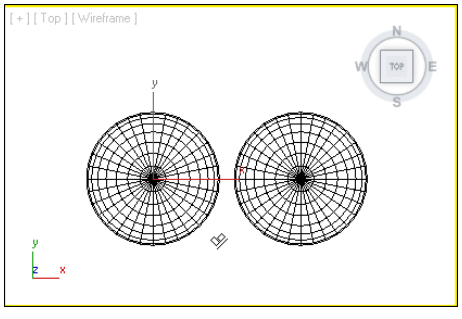


Figure 4-2 *The align cursor in the Top viewport*

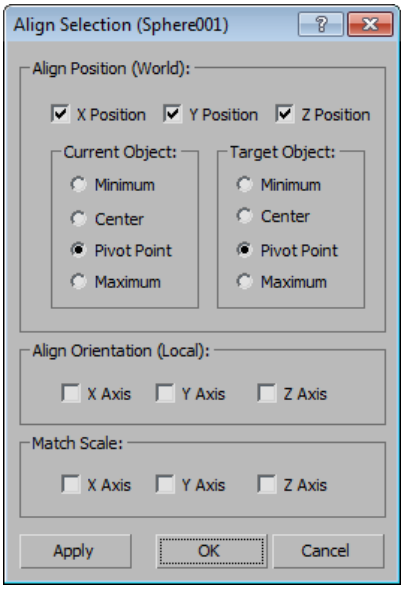


Figure 4-3 *The* ***Align Selection (Sphere001)*** *dialog box*

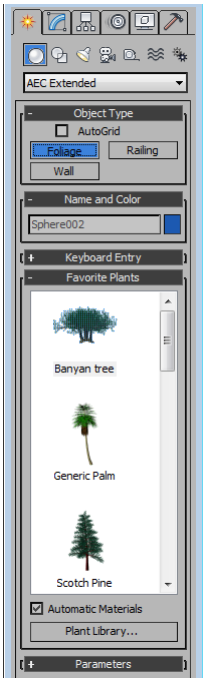


Figure 4-4 *Various rollouts to create a tree*

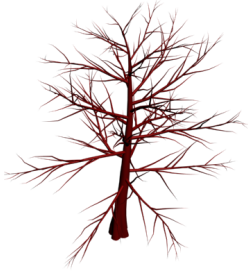


Figure 4-5 *A tree created using the* ***Foliage*** *tool*

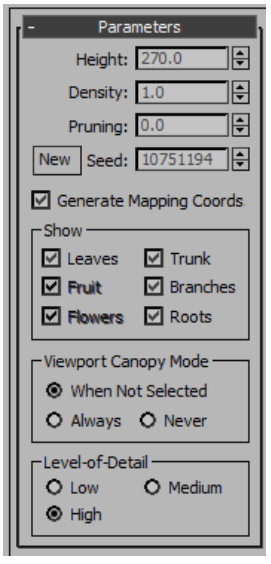


Figure 4-6 *The Parameters rollout*

Figure 4-7 *A tree with the* ***0*** *value in the* ***Pruning*** *spinner*

Figure 4-8 *A tree with the* ***0.5*** *value in the* ***Pruning*** *spinner*

Figure 4-9 *The tree with low level of detail at rendering*

Figure 4-10 *The tree with medium level of detail at rendering*

Figure 4-11 *The tree with high level of detail at rendering*

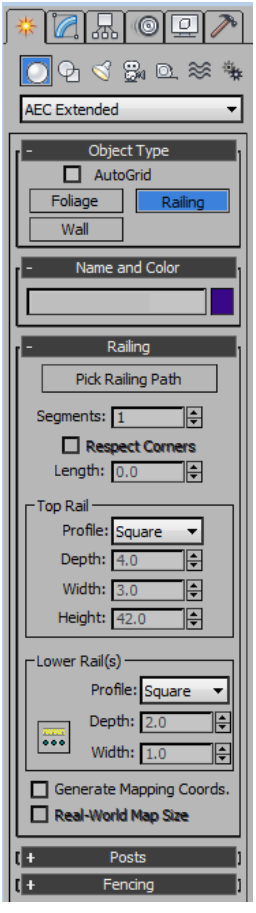


Figure 4-12 *Partial view of various rollouts to create a railing*

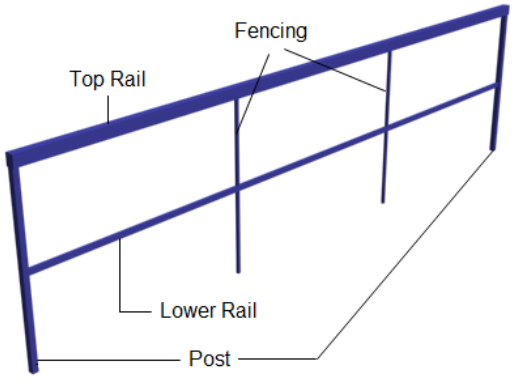


Figure 4-13 *The railing with different parts labeled*

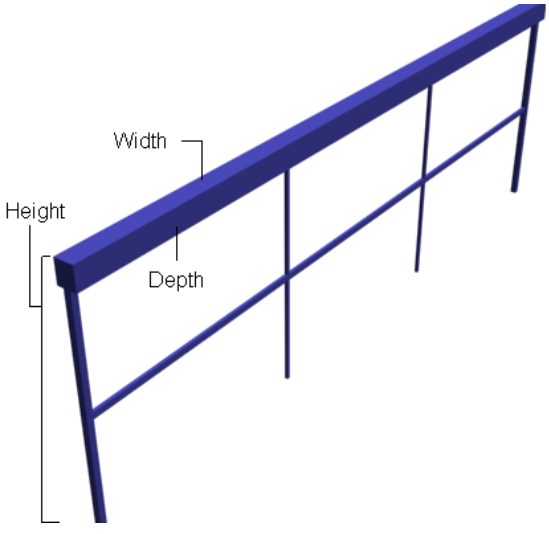


Figure 4-14 *The railing with different dimensions*

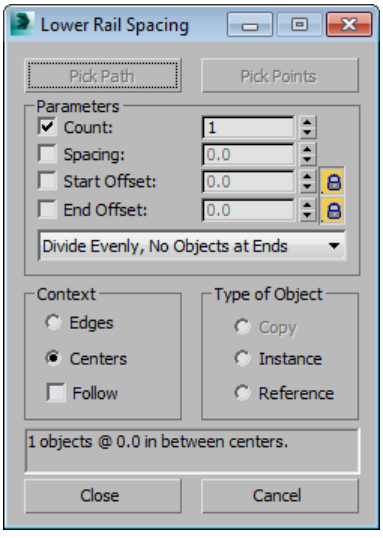


Figure 4-15 *The* ***Lower Rail Spacing*** *dialog box*

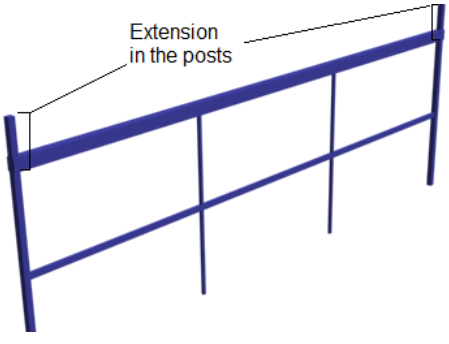


Figure 4-16 *The railing with the extension in the posts*

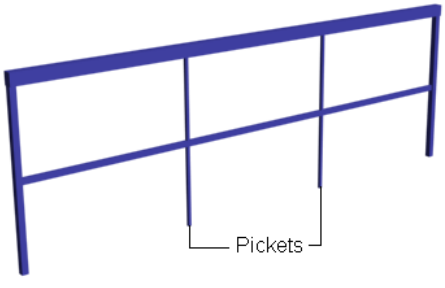


Figure 4-17 *The railing with the picket type of fencing*

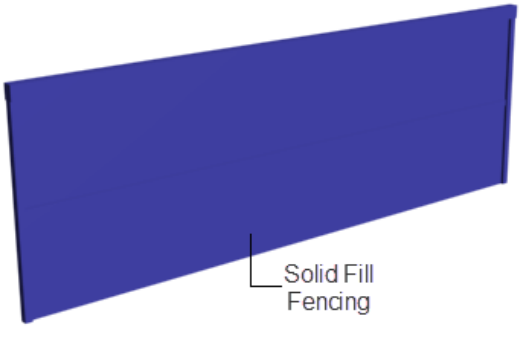


Figure 4-18 *The railing with the solid fill type of fencing*

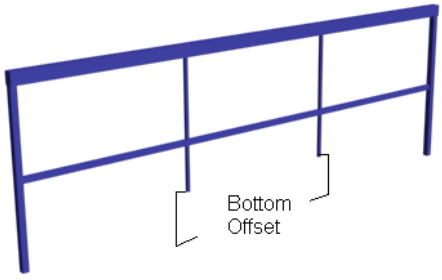


Figure 4-19 *The bottom offset in the picket fencing*

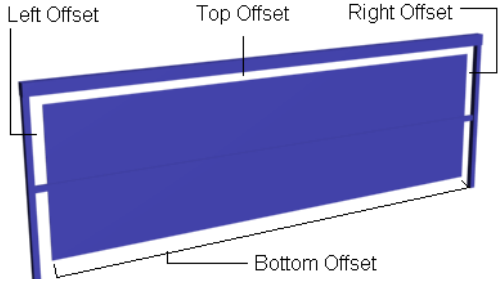


Figure 4-20 *Various offsets in the solid fill fencing*

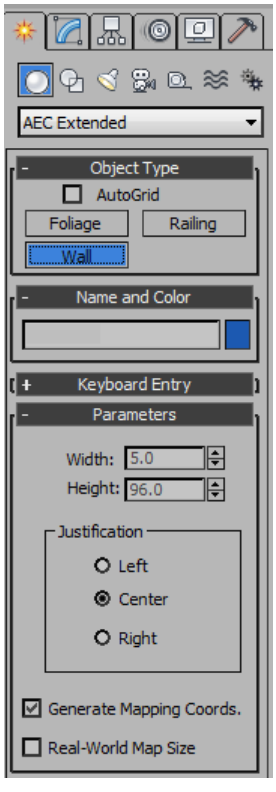


Figure 4-21 *Various rollouts to create a wall*

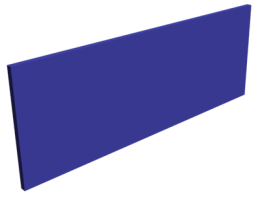


Figure 4-22 *The wall segment displayed*

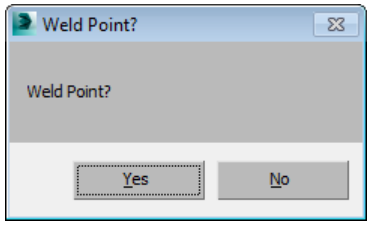


Figure 4-23 *The* ***Weld Point?*** *message box*

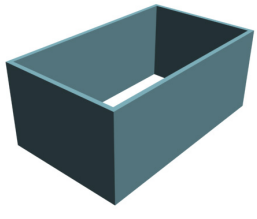


Figure 4-24 *A closed wall displayed*

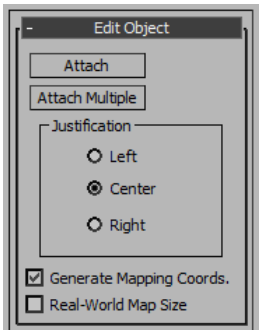


Figure 4-25 *The* ***Edit Object*** *rollout*

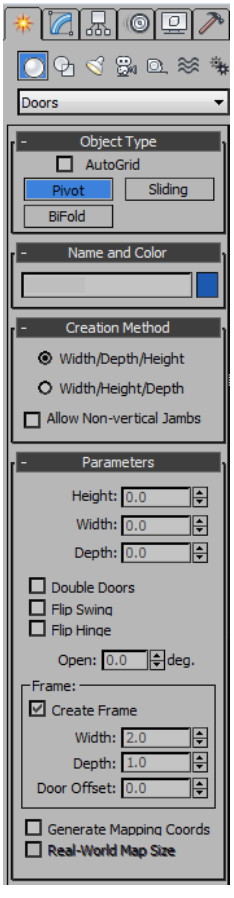


Figure 4-26 *Partial view of various rollouts to create a pivot door*

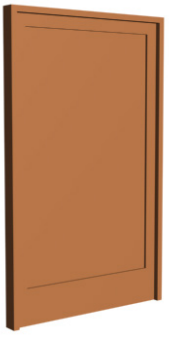


Figure 4-27 *The pivot door created in the viewport*

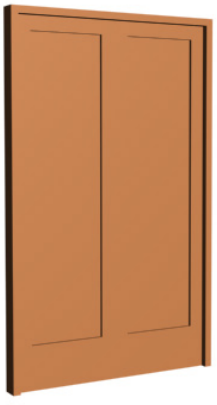


Figure 4-28 A double pivot door

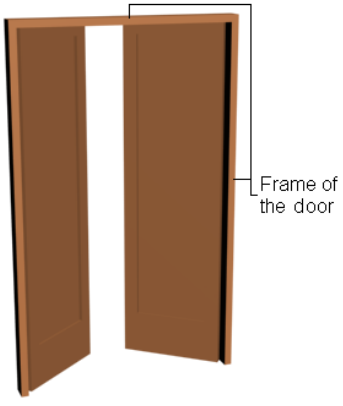


Figure 4-29 An opened double door

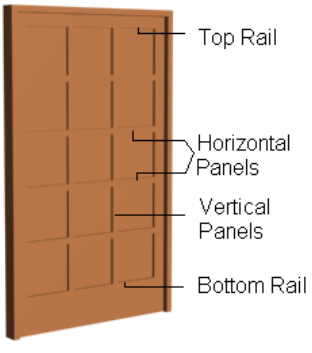


Figure 4-30 The modified door leaf

Figure 4-31 A door with the beveled panels

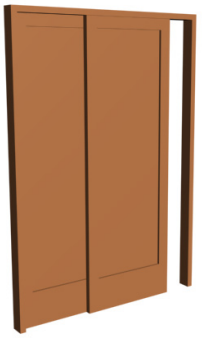


Figure 4-32 *A sliding door*

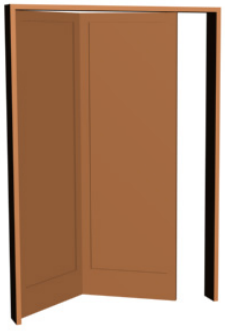


Figure 4-33 *A bifold door*

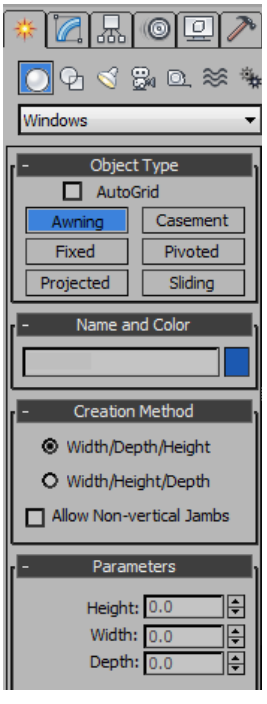


Figure 4-34 *Partial view of various rollouts to create an awning window*

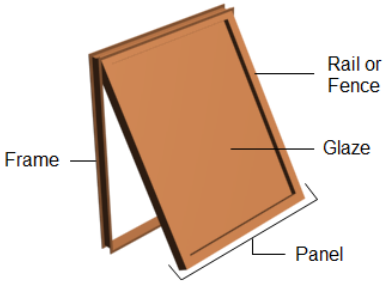


Figure 4-35 *An awning window*

Figure 4-36 *An awning window with two panels*

Figure 4-37 *A casement window*

Figure 4-38 *A casement window with two panels*

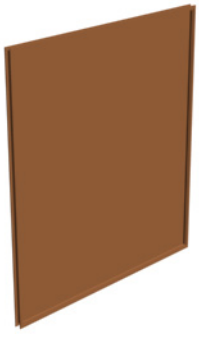


Figure 4-39 *A fixed window*

Figure 4-40 *A fixed window with horizontal and vertical divisions*

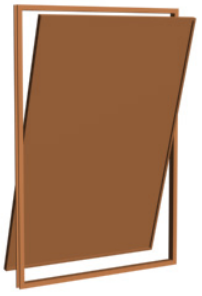


Figure 4-41 *A pivoted window rotated around the horizontal axis*

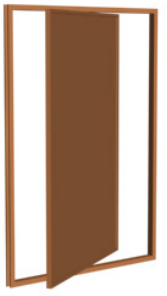


Figure 4-42 *A pivoted window rotated around the vertical axis*

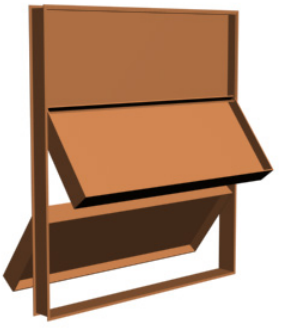


Figure 4-43 *A projected window*

Figure 4-44 *The sliding window*

Figure 4-45 *The sliding window with two horizontal and vertical chamfered divisions*

Figure 4-46 *The sliding window with the horizontal sliding*

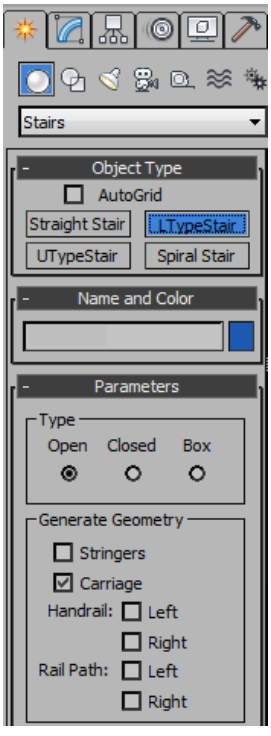


Figure 4-47 *Partial view of various rollouts to create L-type stairs*

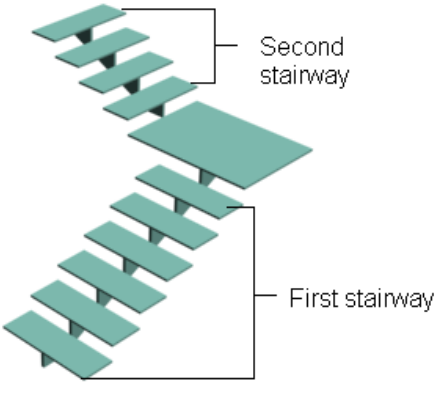


Figure 4-48 *The L-type open stairs created*

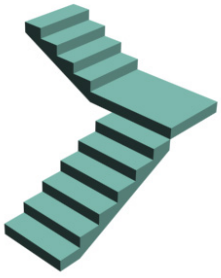


Figure 4-49 *The L-type closed stairs*

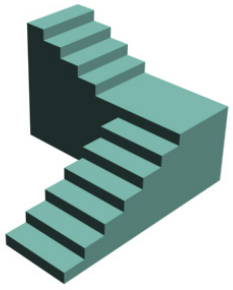


Figure 4-50 *The L-type box stairs*

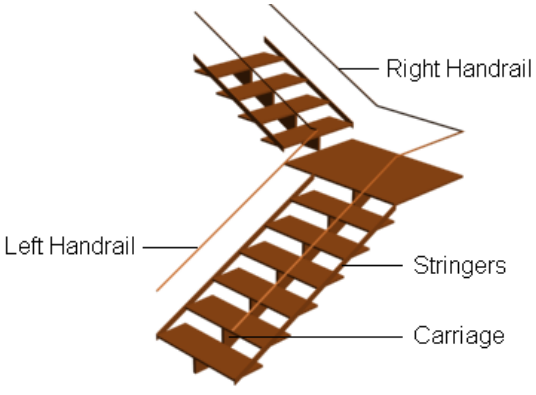


Figure 4-51 *The L-Type stairs with handrails, carriage, and stringers*

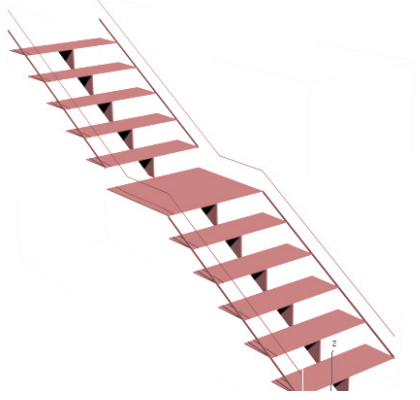


Figure 4-52 *The L-Type stairs with* ***Angle*** *value set to zero*

Figure 4-53 *The spiral stairs*

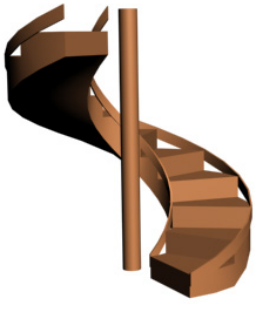


Figure 4-54 *The closed spiral stairs*

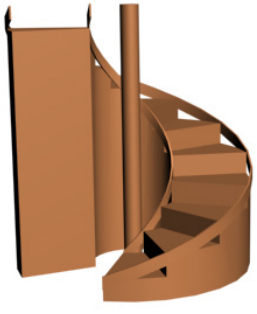


Figure 4-55 *The spiral box stairs*

Figure 4-56 *The straight stairs*

Figure 4-57 *The straight closed stairs*

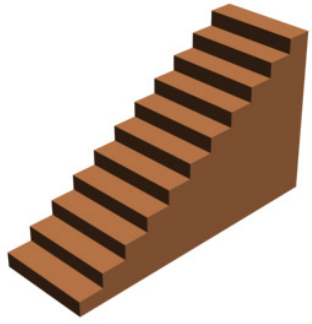


Figure 4-58 *The straight box stairs*

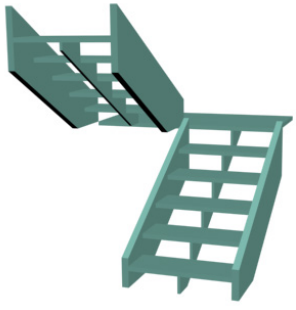


Figure 4-59 *The U-type stairs*

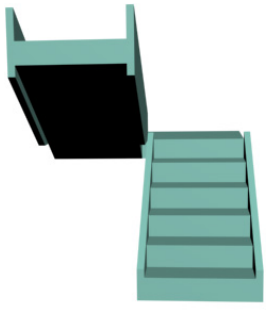


Figure 4-60 *The U-type closed stairs*

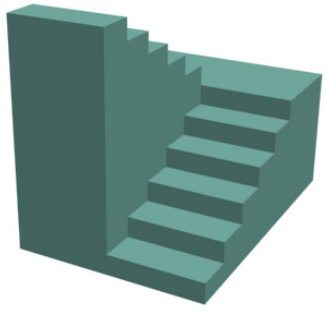


Figure 4-61 *The U-type box stairs*

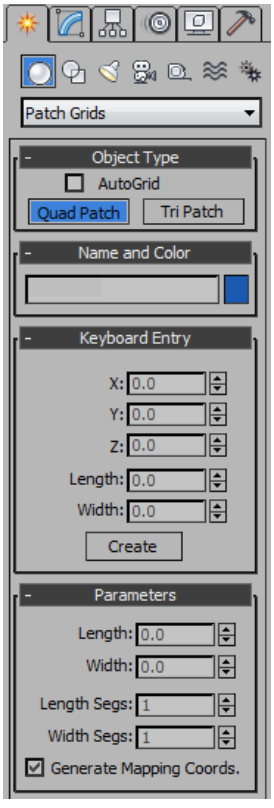


Figure 4-62 *Various rollouts to create a quad patch*

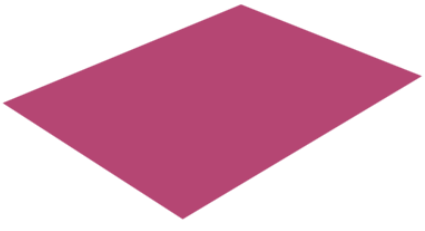


Figure 4-63 *The quad patch displayed in the viewport*

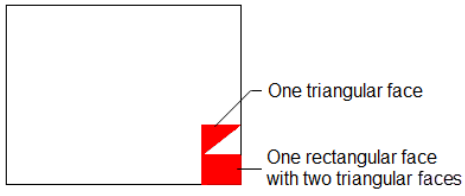


Figure 4-64 *The quad patch with rectangular and triangular faces in the Top viewport*

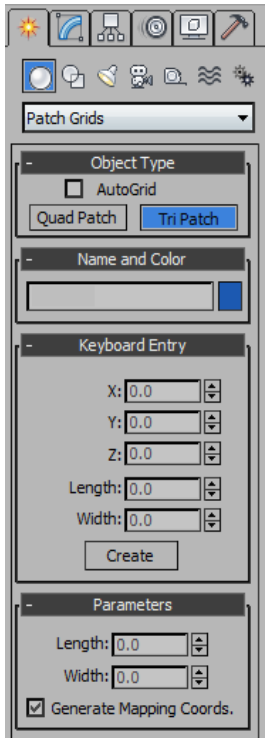


Figure 4-65 *Various rollouts to create a tri patch*

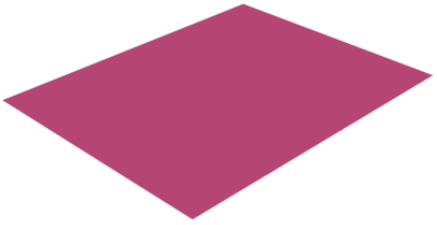


Figure 4-66 *The tri patch*

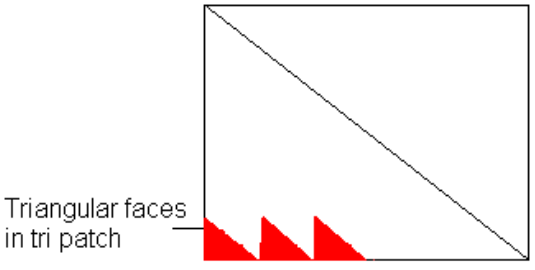


Figure 4-67 *The tri patch with triangular faces in the Top viewport*

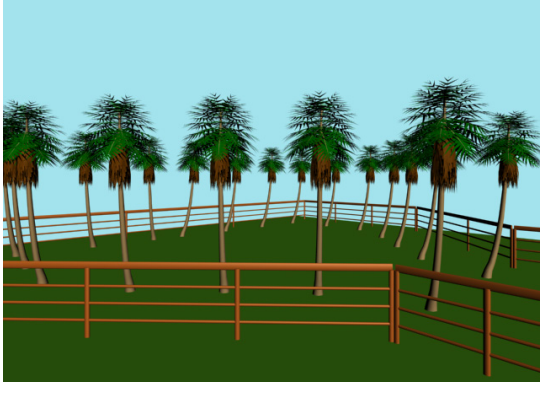


Figure 4-68 *The nature scene*

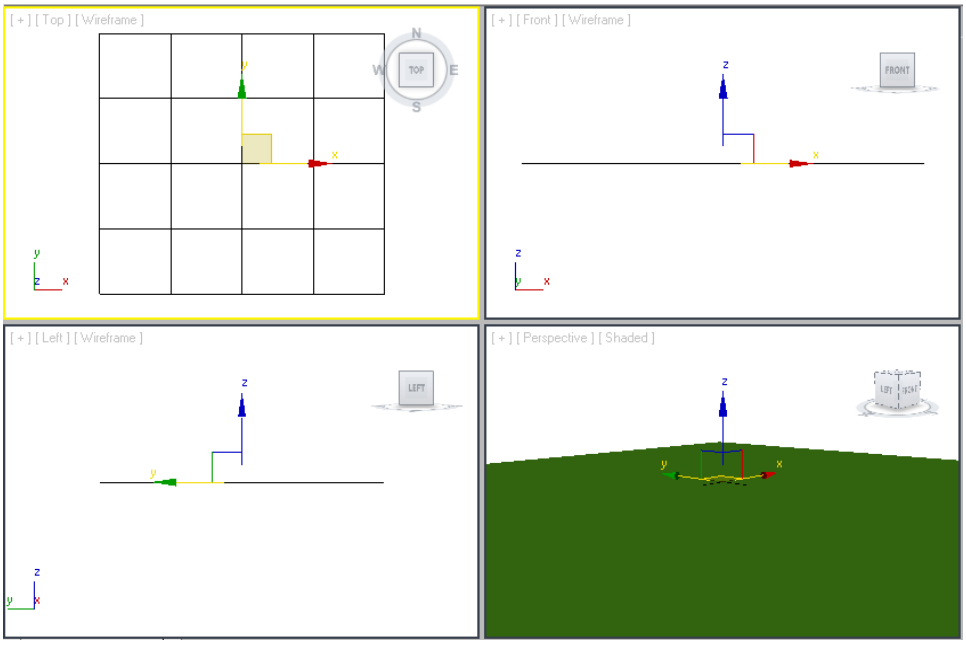


Figure 4-69 *The floor after using the* ***Zoom*** *and* ***Orbit*** *tools*

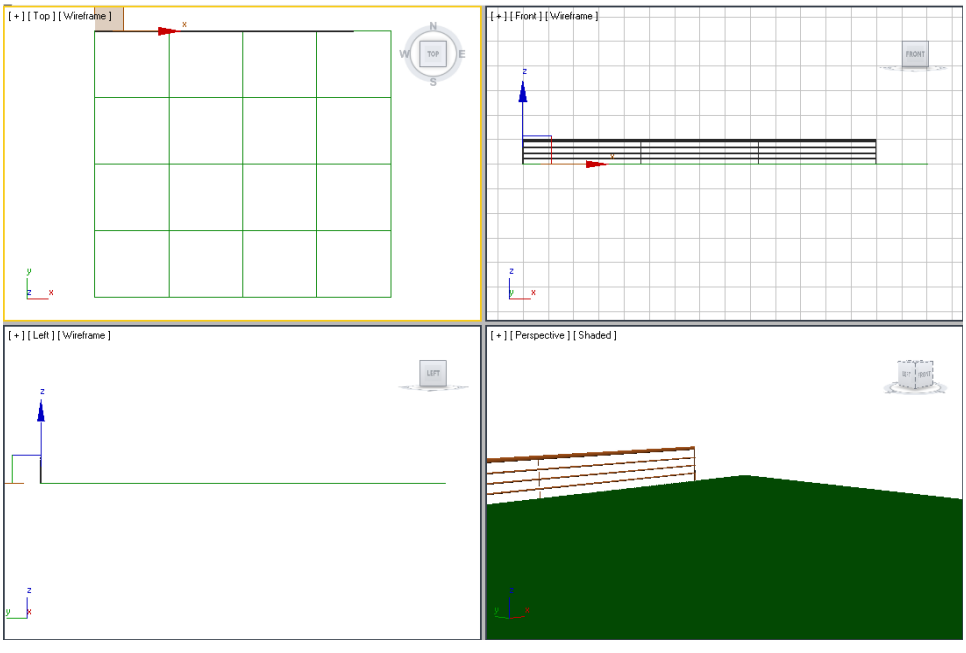


Figure 4-70 *The railing01 displayed in viewports*

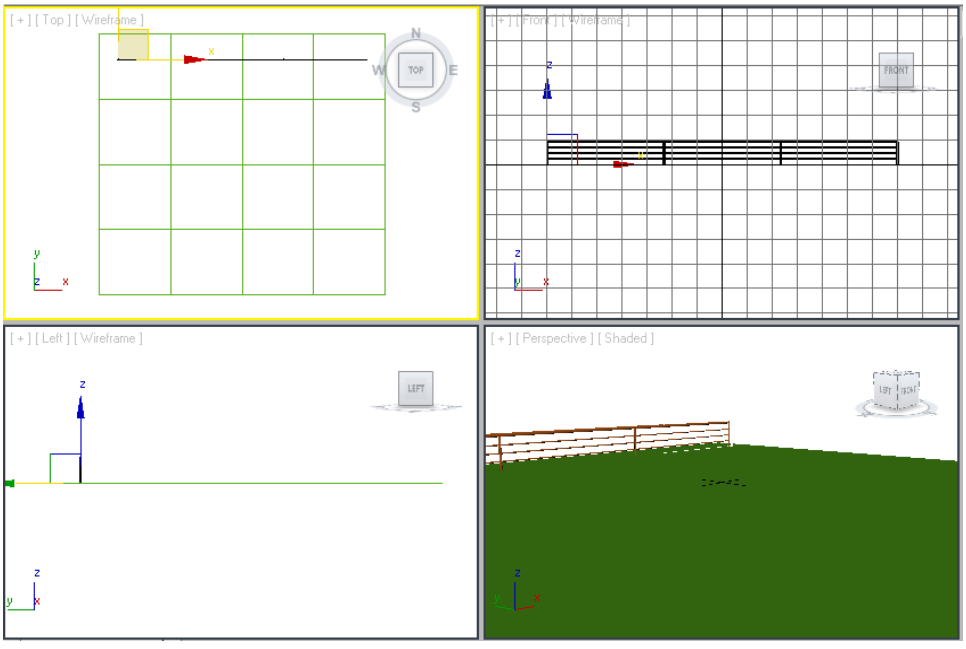


Figure 4-71 *The railing01 geometry in viewports after aligning it in the Top viewport*

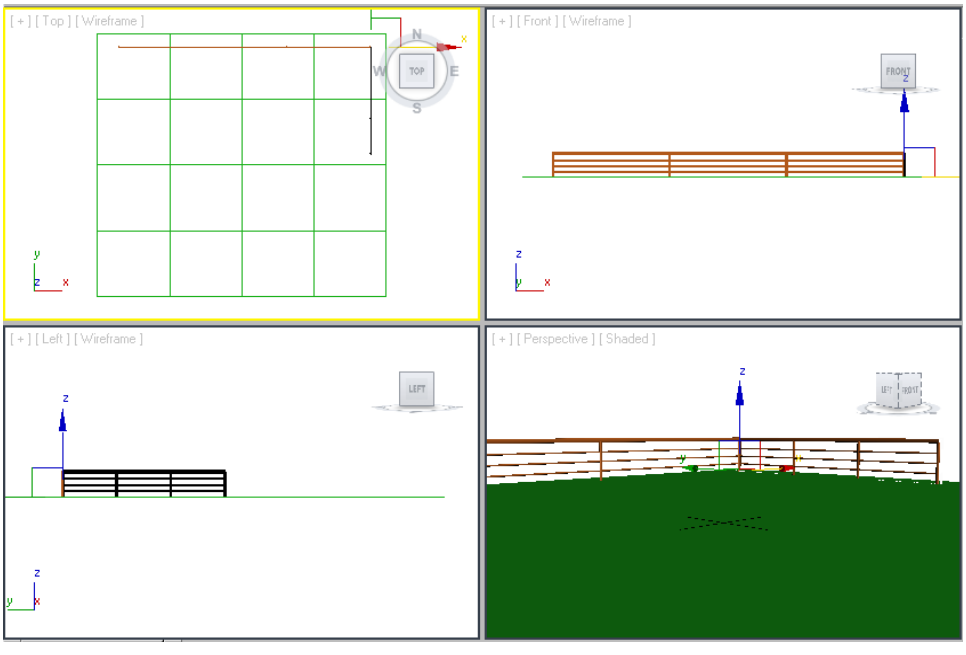


Figure 4-72 *The railing02 geometry in viewports after alignment*

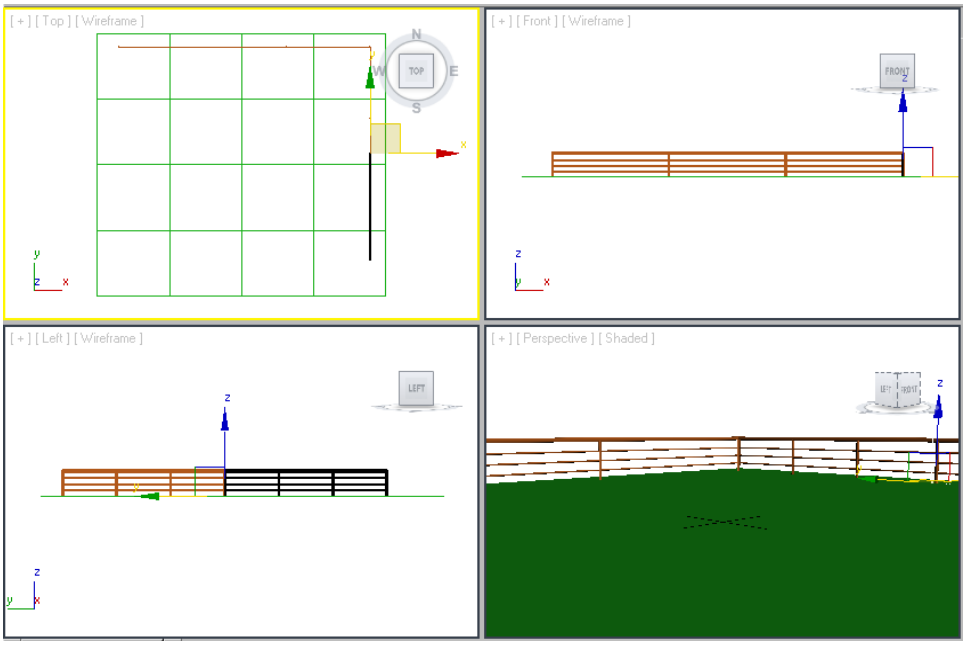


Figure 4-73 *The railing03 geometry after alignment*

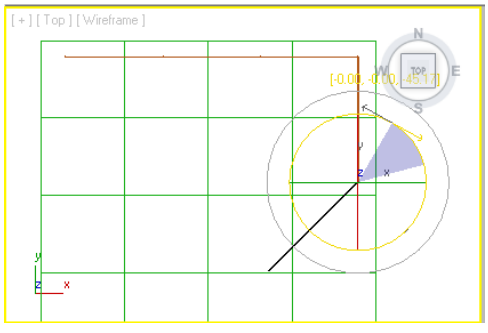


Figure 4-74 *The railing03 geometry rotated in the Top viewport*

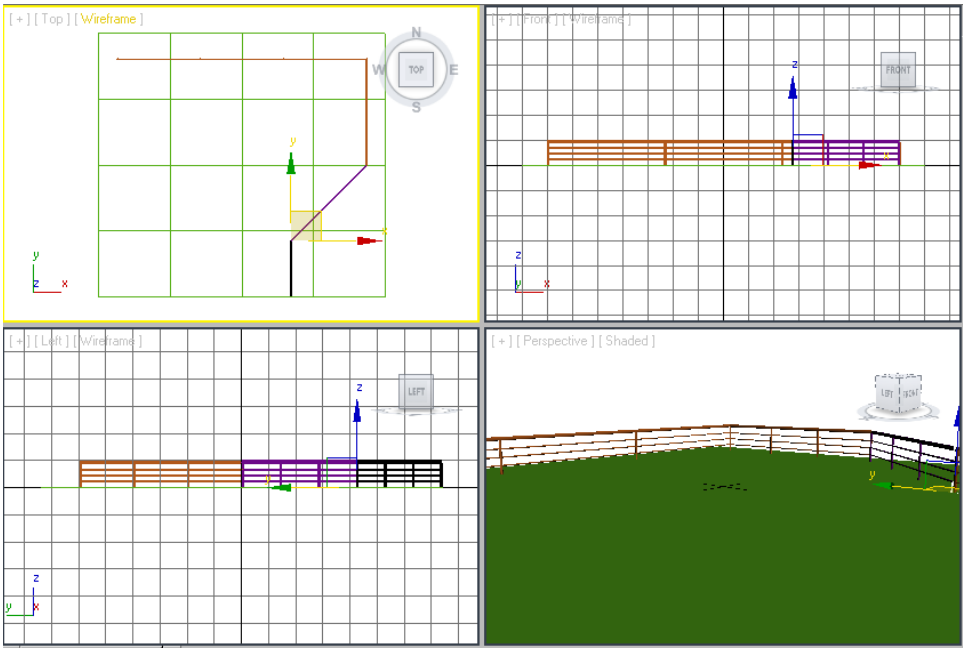


Figure 4-75 *The railing04 geometry aligned in viewports*

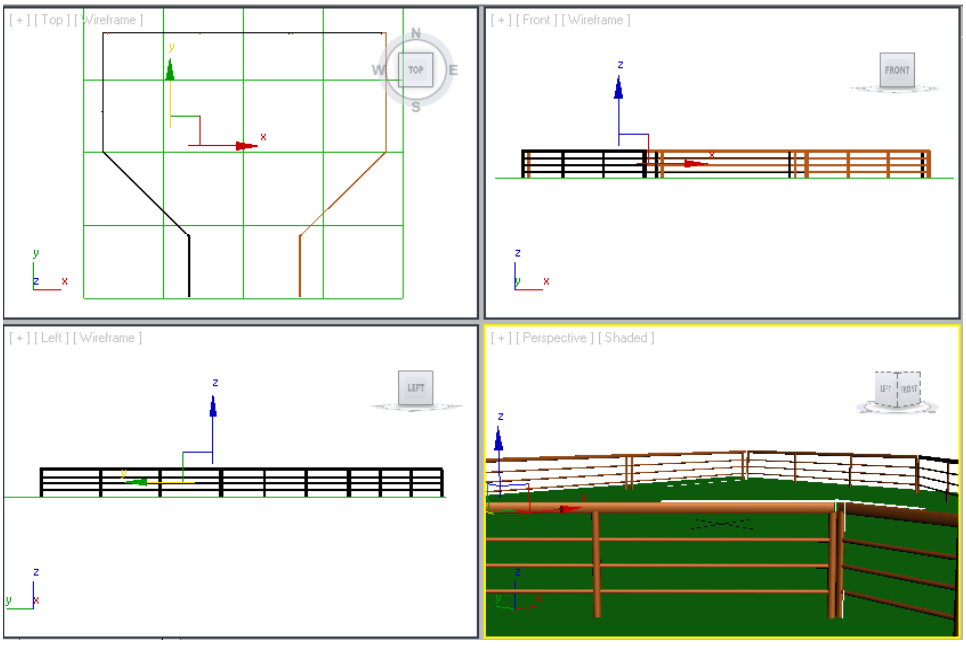


Figure 4-76 *The railings geometry displayed in viewports*

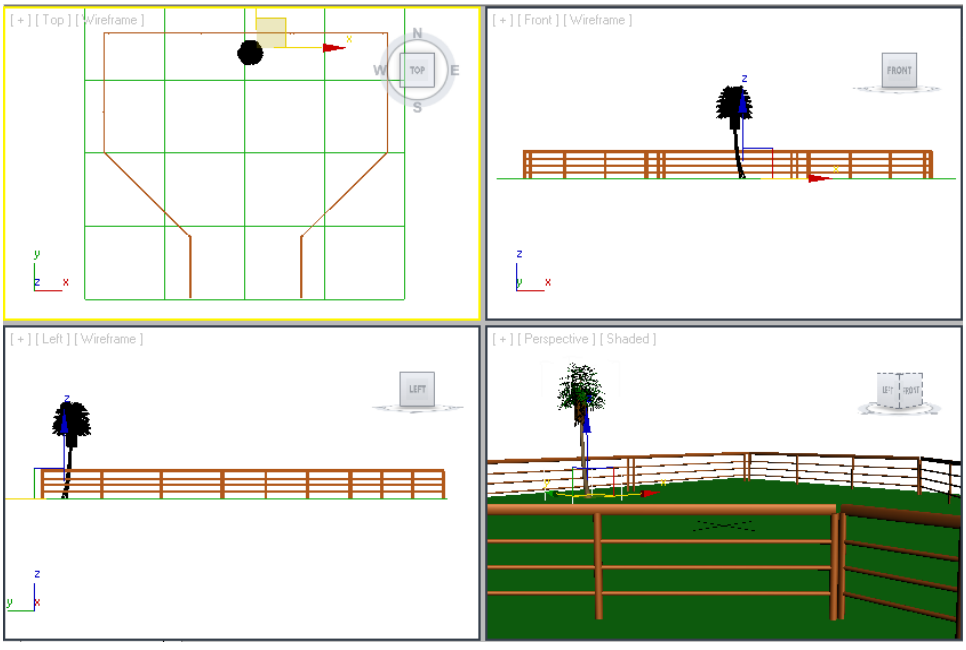


Figure 4-77 *Alignment of tree01 in viewports*

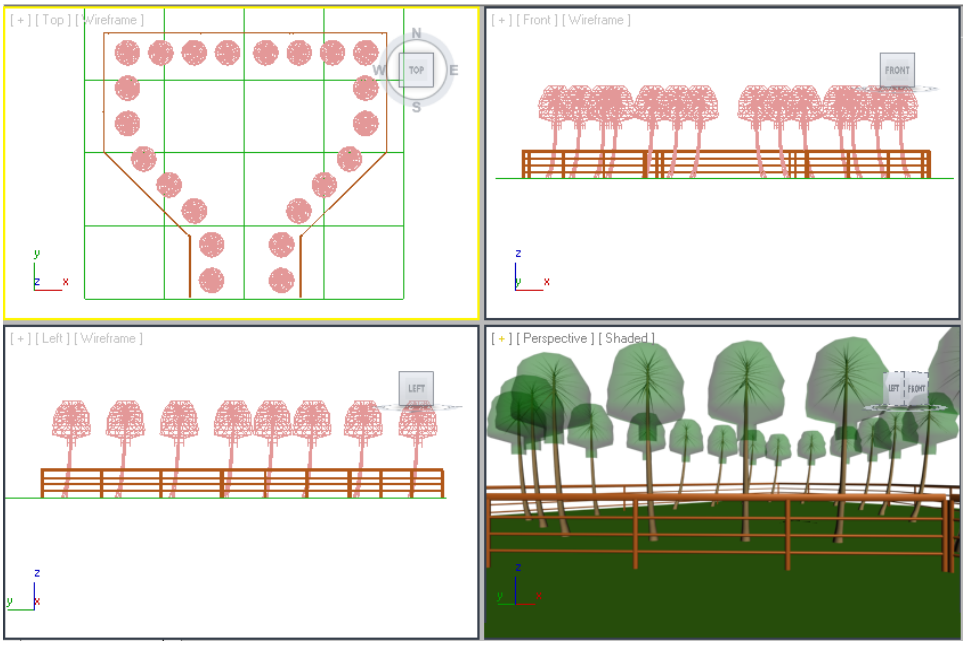


Figure 4-78 *Multiple copies of tree01 created and aligned in viewports*

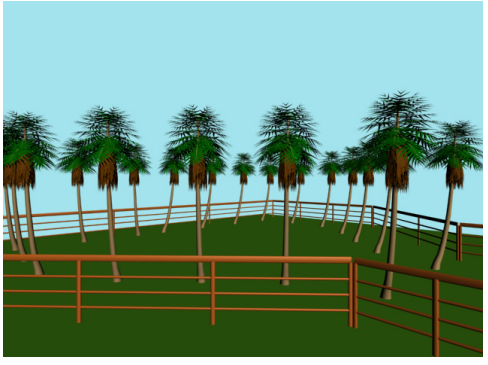


Figure 4-79 *The final output at rendering*

(Expected time: 30 min)

Figure 4-80 *The room model*

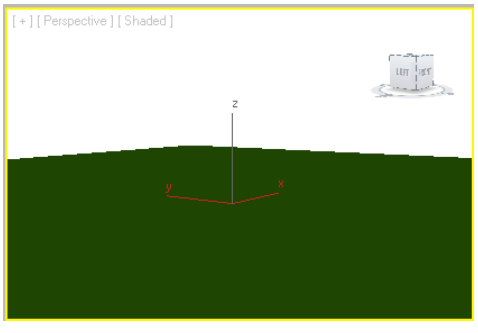


Figure 4-81 *The floor geometry in the Perspective viewport*

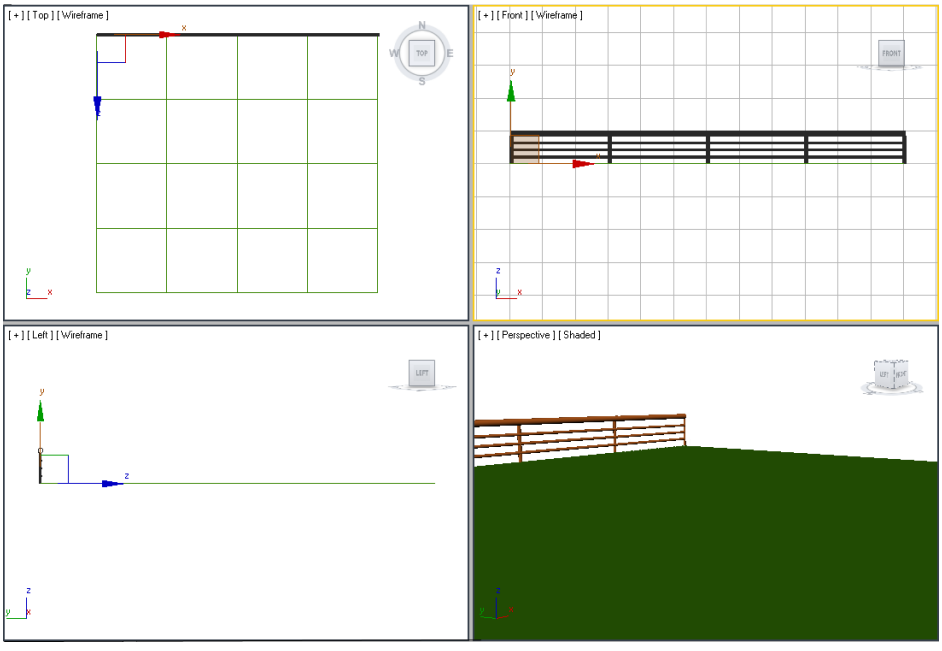


Figure 4-82 *The railing01 geometry in viewports after alignment*

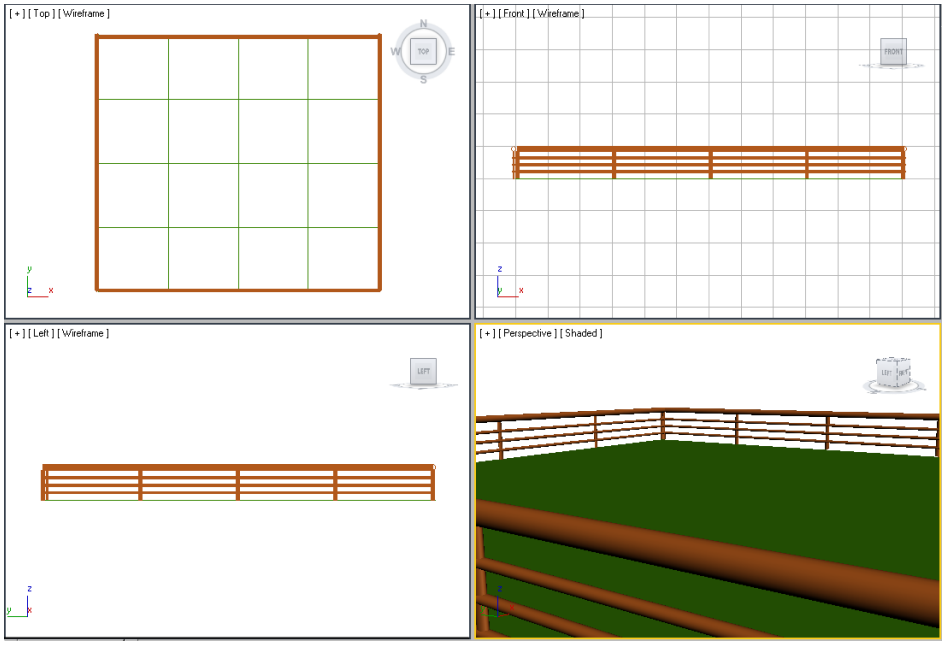


Figure 4-83 *The railings geometry displayed in viewports*

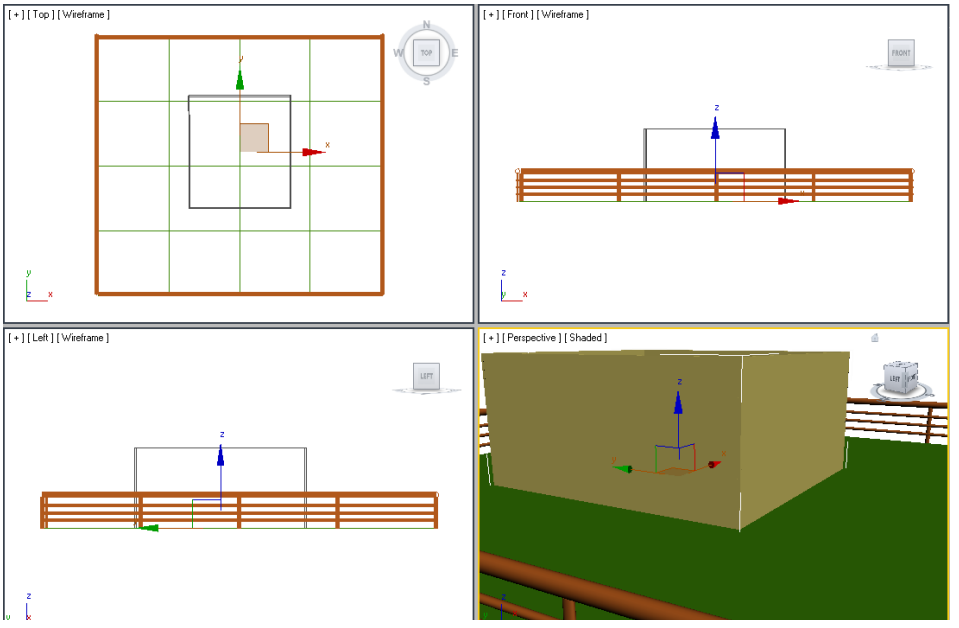


Figure 4-84 *The wall geometry displayed in viewports*

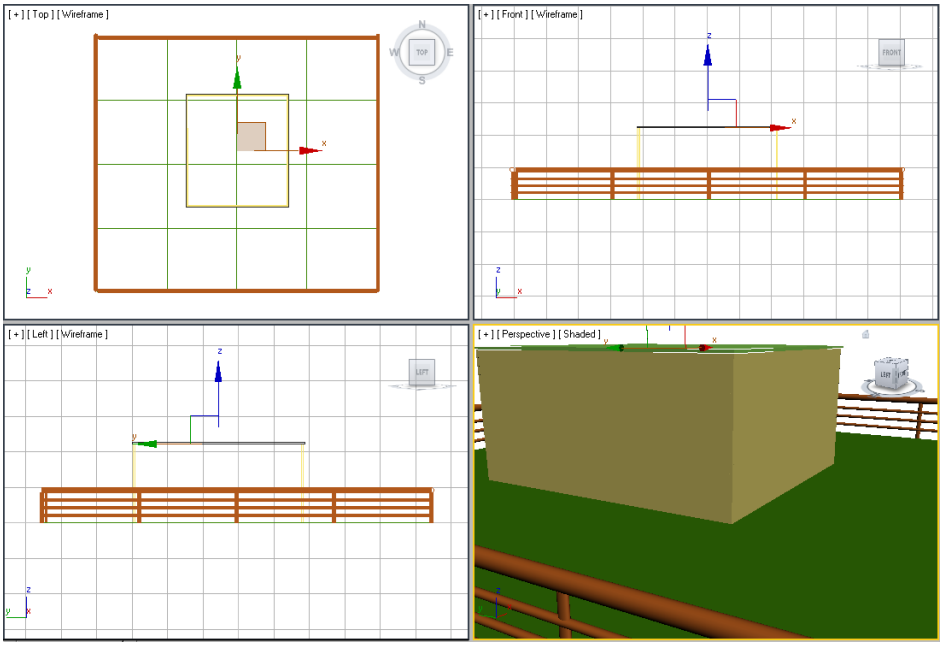


Figure 4-85 *The roof geometry of wall in viewports after alignment*

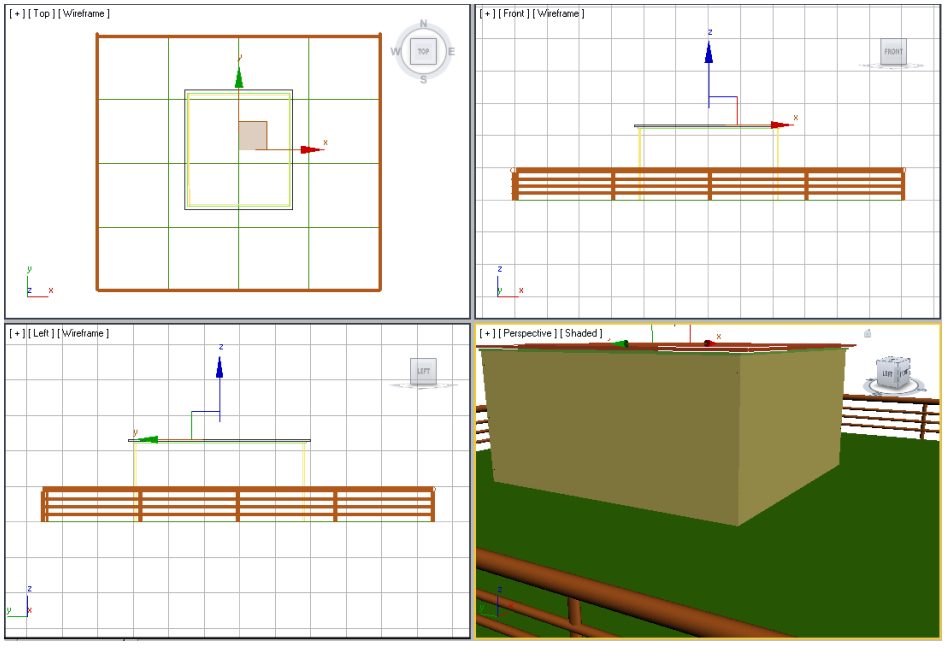


Figure 4-86 *The roof fencing geometry after scaling in the Front viewport*

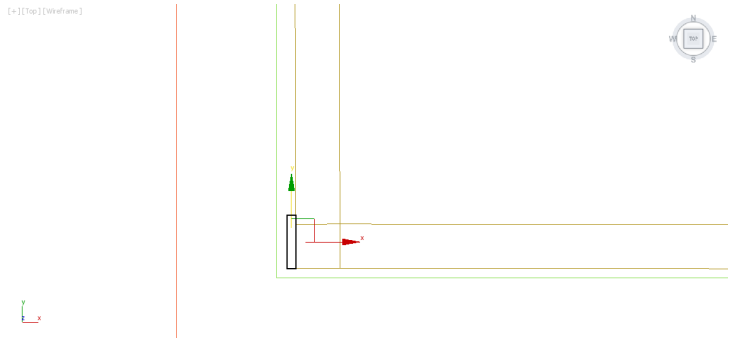


Figure 4-87 *The fc01 geometry in the Top viewport after alignment*

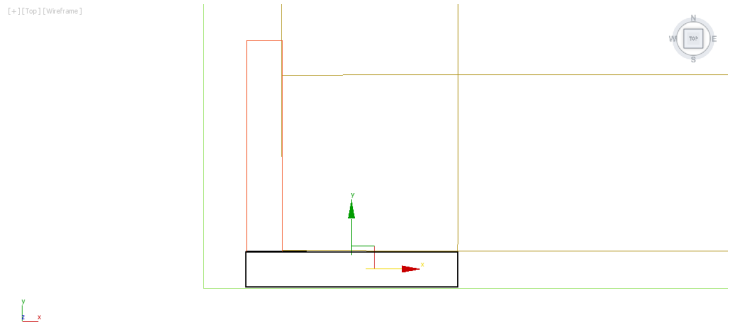


Figure 4-88 *The fc002 geometry in the Top viewport after alignment*

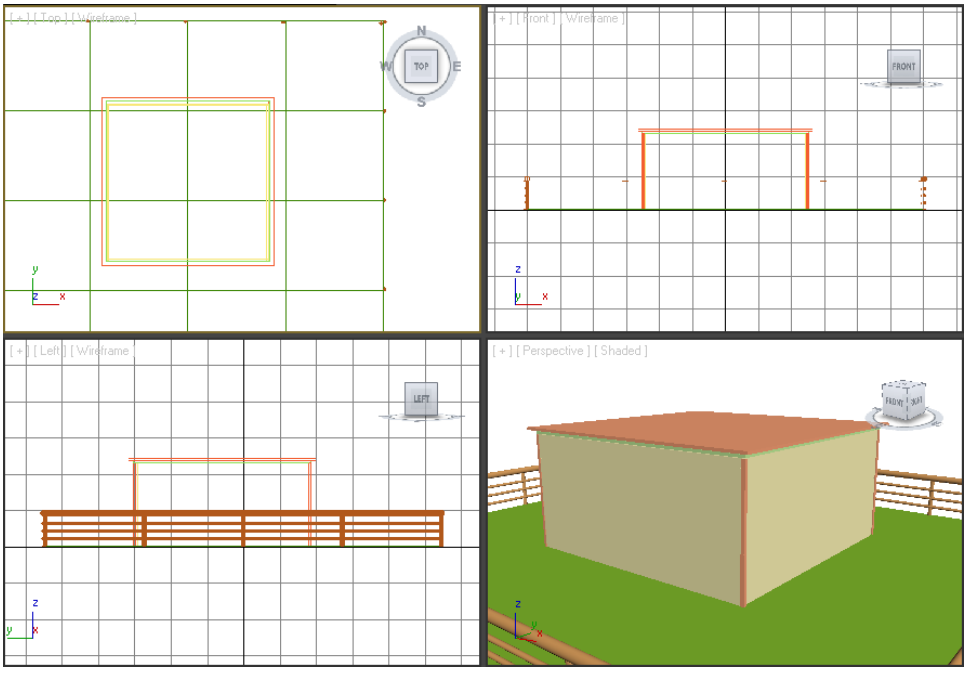


Figure 4-89 *The fencing geometry at the four corners of wall in viewports*

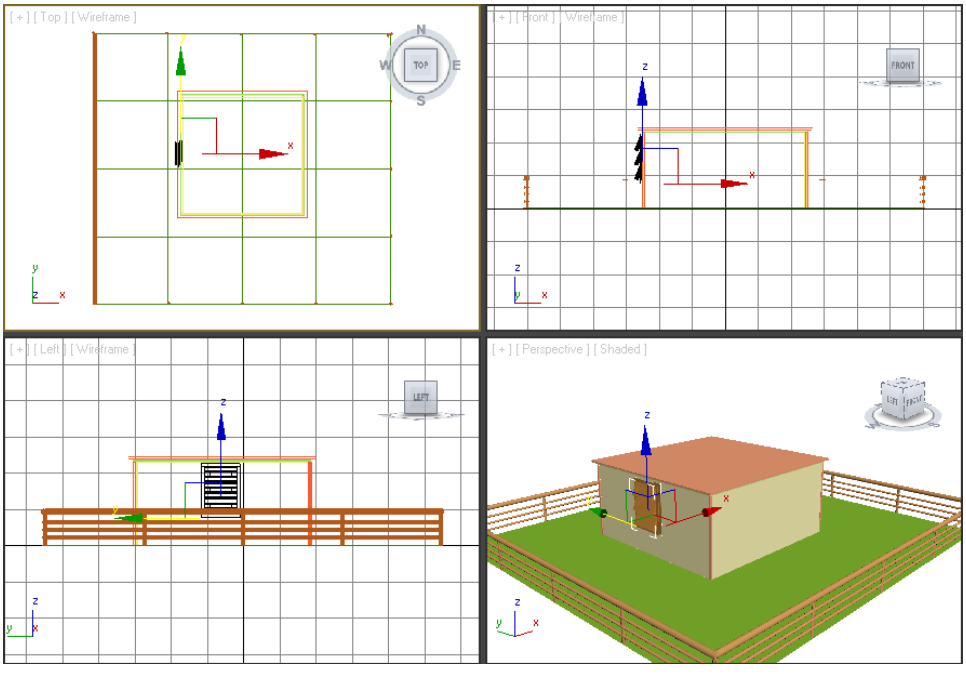


Figure 4-90 *The window geometry in viewports after alignment*

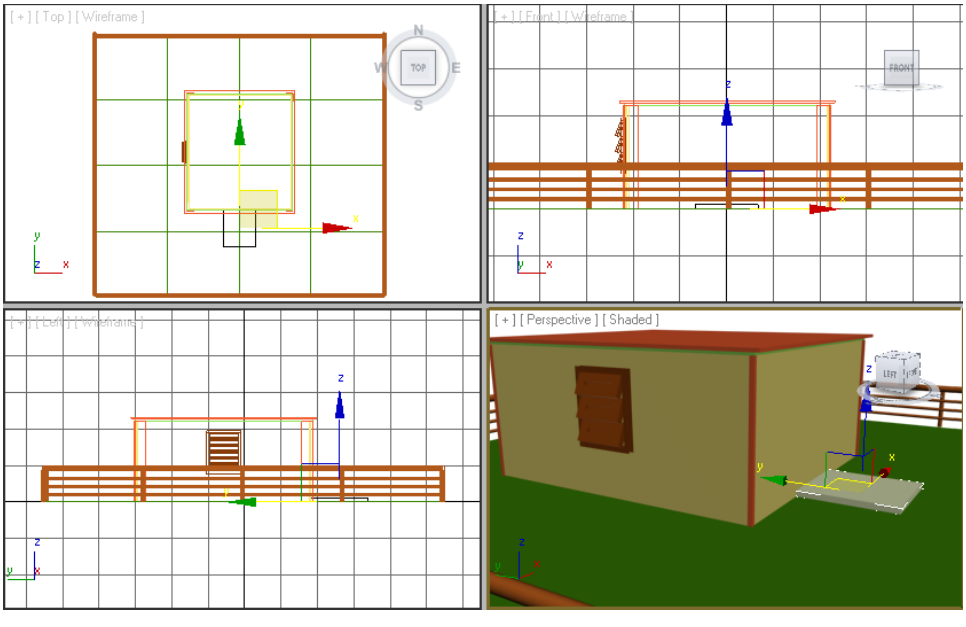


Figure 4-91 *The foot support geometry in viewports after the alignment*

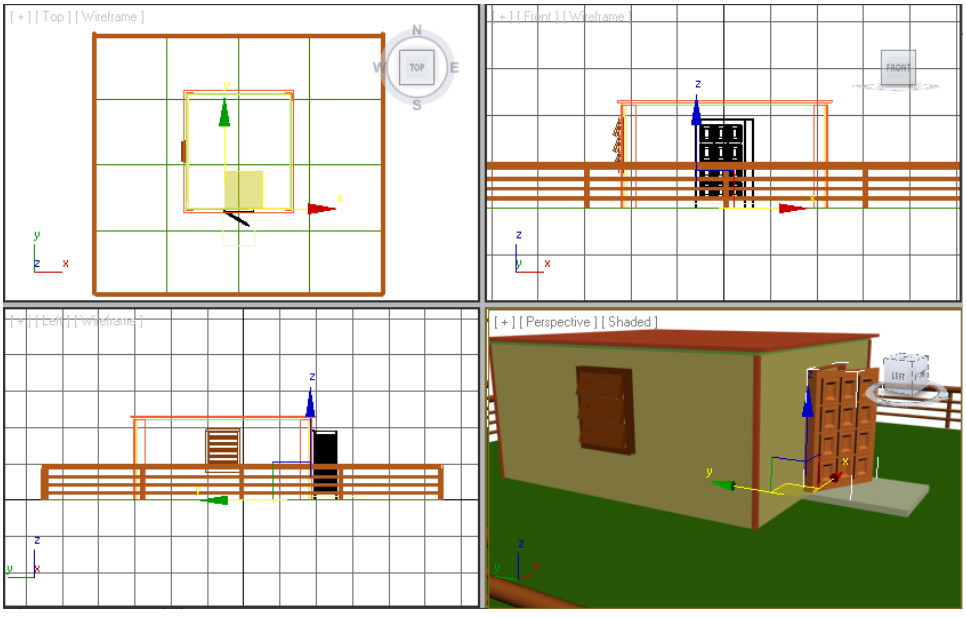


Figure 4-92 *The door geometry in viewports after alignment*

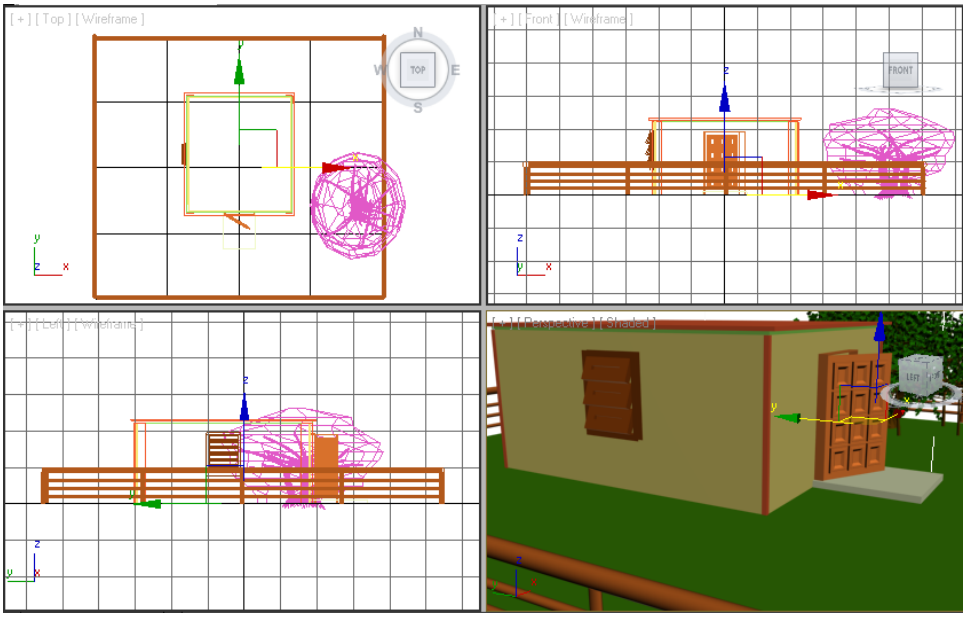


Figure 4-93 *The tree01 geometry displayed in viewports after alignment*

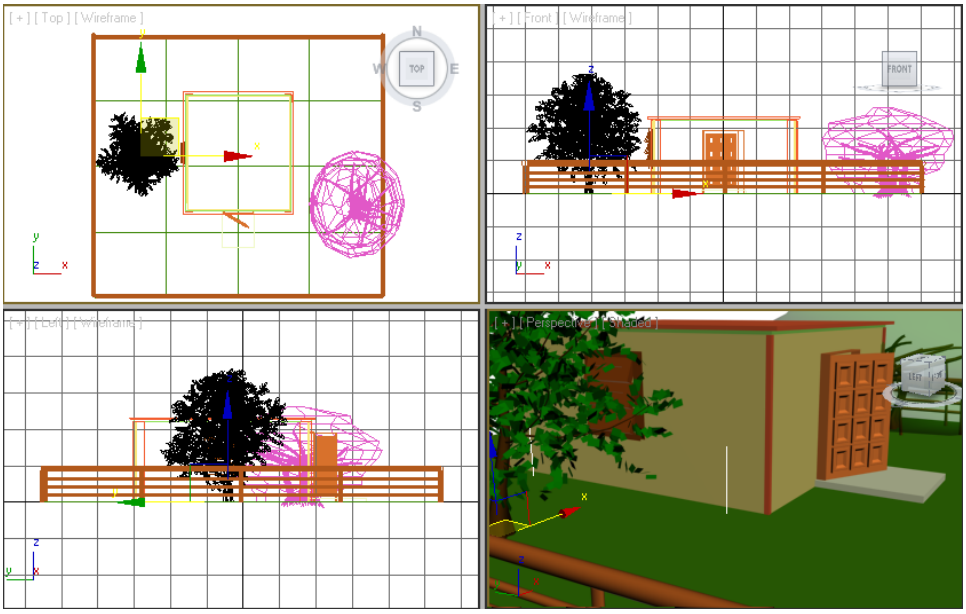


Figure 4-94 *The tree02 geometry in viewports after the alignment*

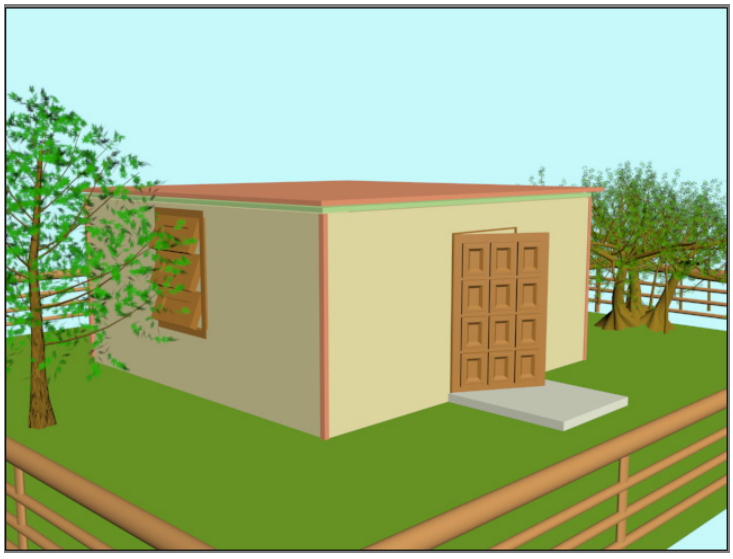


Figure 4-95 *The final output of the scene at rendering*

Figure 4-96 *The model of Exercise 1*

5

Splines and Extended Splines

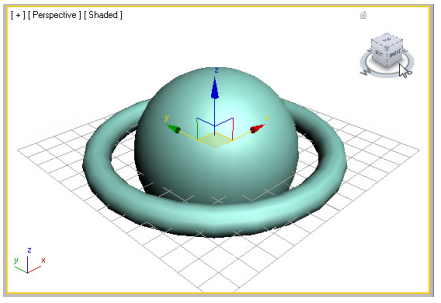


Figure 5-1 *The torus created without selecting the* ***AutoGrid*** *check box*

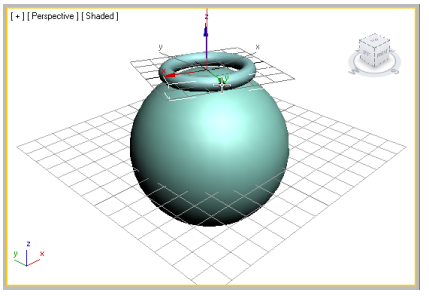


Figure 5-2 *The torus created after selecting the* ***AutoGrid*** *check box*

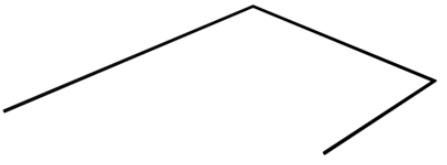


Figure 5-4 *An open line spline created*

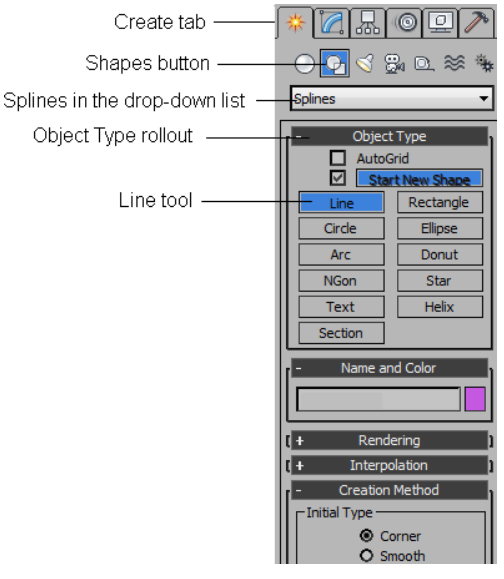


Figure 5-3 *Various rollouts displayed to create and modify a line spline*

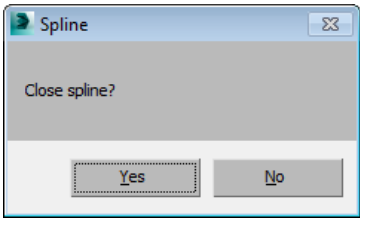


Figure 5-5 *The* ***Spline*** *dialog box*

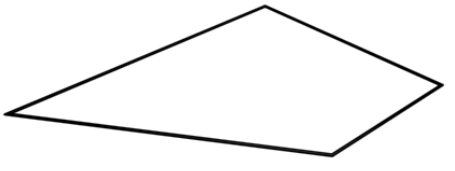


Figure 5-6 *The line spline closed*

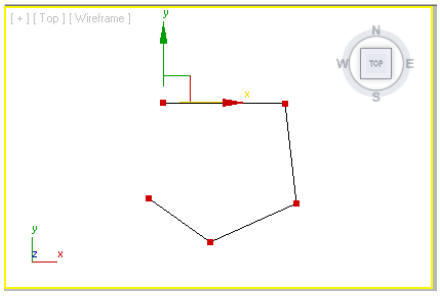


Figure 5-7 *A line with corner vertices*

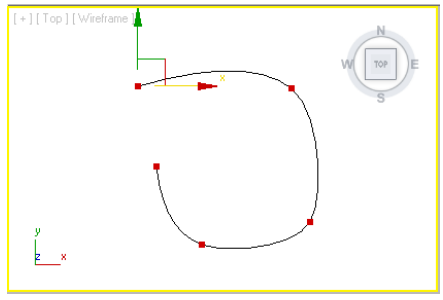


Figure 5-8 *A line spline with bezier vertex and smooth curve*

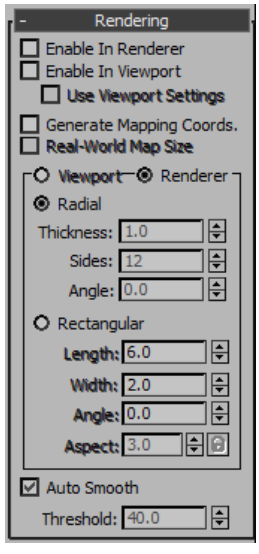


Figure 5-9 *The* ***Rendering*** *rollout*

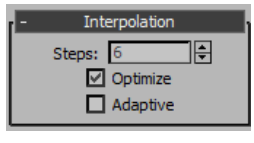


Figure 5-10 *The* ***Interpolation*** *rollout*

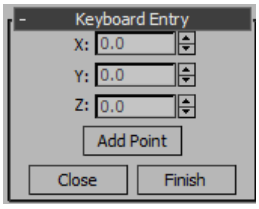


Figure 5-11 *The* ***Keyboard Entry*** *rollout*

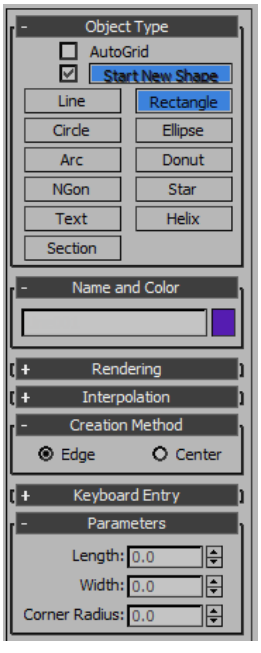


Figure 5-12 *Various rollouts to create and modify a rectangular spline*

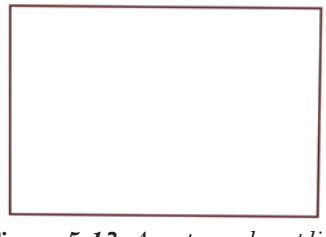


Figure 5-13 *A rectangular spline*

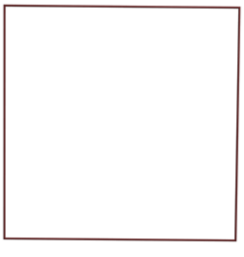


Figure 5-14 *A square spline*

Figure 5-15 *A rectangle with corner radius*

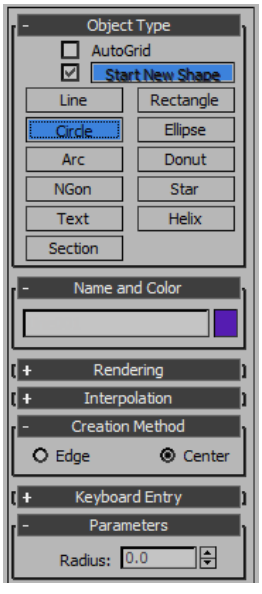


Figure 5-16 *Various rollouts to create and modify a circular spline*

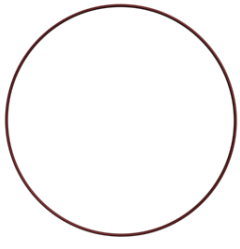


Figure 5-17 *A circular spline*

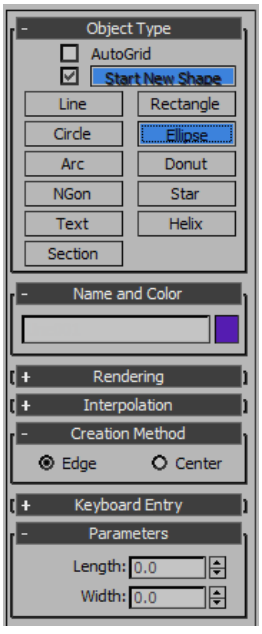


Figure 5-18 *Various rollouts to create and modify an elliptical spline*

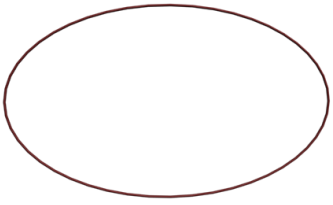


Figure 5-19 *An elliptical spline*

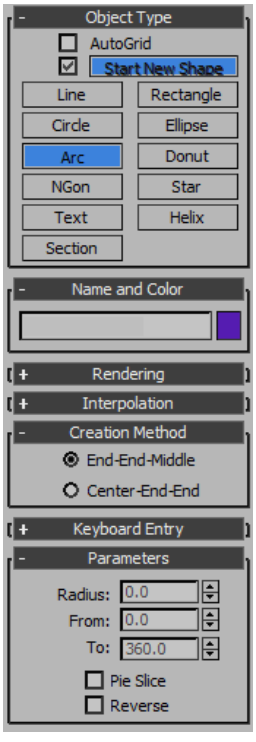


Figure 5-20 *Various rollouts to create and modify an arc spline*

Figure 5-21 *Creating an arc using the* ***End-End-Middle*** *method (step-1)*

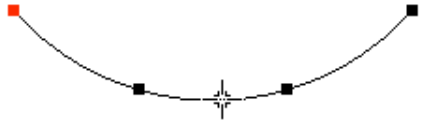


Figure 5-22 *Creating an arc using the* ***End-End-Middle*** *method (step-2)*

Figure 5-23 *An arc spline*

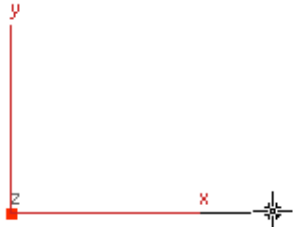


Figure 5-24 *Creating an arc using the* ***Center-End-End*** *method (step-1)*

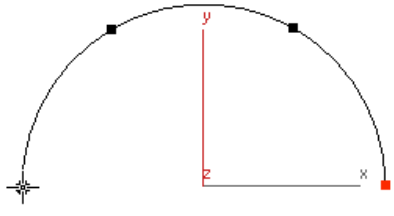


Figure 5-25 *Creating an arc using the* ***Center-End-End*** *method (step-2)*

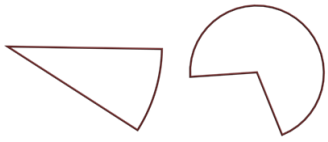


Figure 5-26 *The arcs created on using the* ***Pie Slice*** *check box*

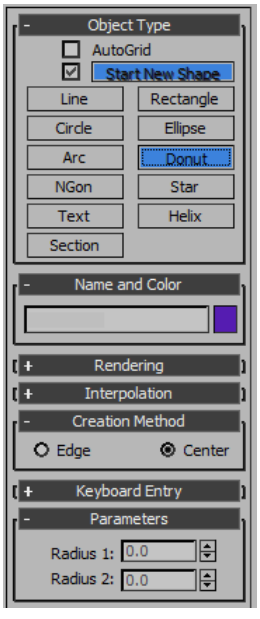


Figure 5-27 *Various rollouts to create and modify the donut spline*

Figure 5-28 *A donut spline*

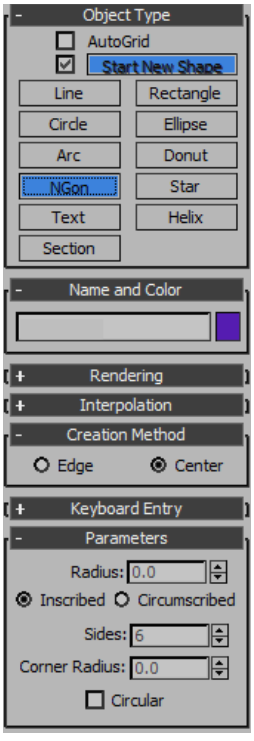


Figure 5-29 *Various rollouts to create and modify an NGon spline*

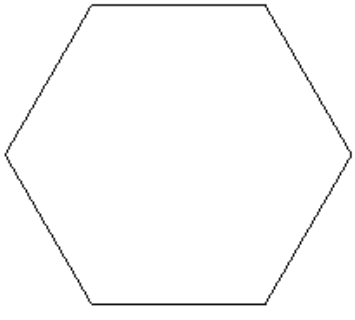


Figure 5-30 *An NGon spline*

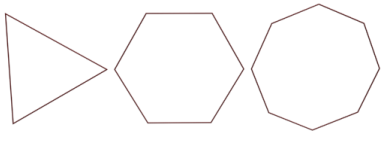


Figure 5-31 *The NGons with 3, 6, and 8 number of sides*

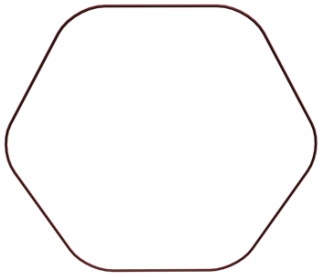


Figure 5-32 *The NGon with round corners*

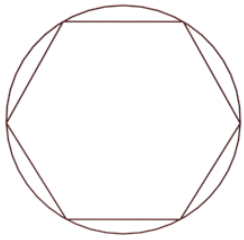


Figure 5-33 *An NGon after selecting the* ***Inscribed*** *radio button*

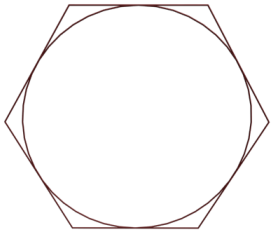


Figure 5-34 *An NGon after selecting the* ***Circumscribed*** *radio button*

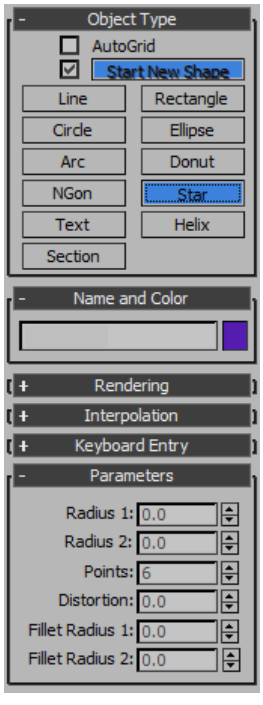


Figure 5-35 *Various rollouts to create and modify a star spline*

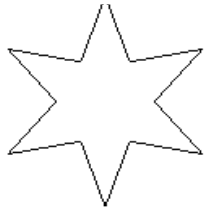


Figure 5-36 *A star spline*

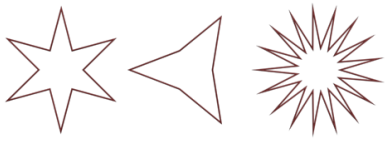


Figure 5-37 *The star splines with different number of points*

Figure 5-38 *A star after setting the value in the* ***Distortion*** *spinner*

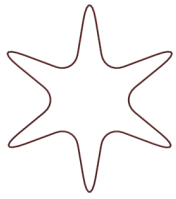


Figure 5-39 *A star after setting the values in the* ***Fillet Radius 1*** *and* ***Fillet Radius 2*** *spinner*

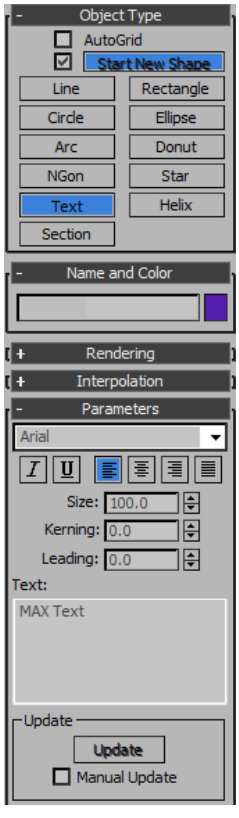


Figure 5-40 *Various rollouts to create and modify a text spline*

Figure 5-41 *The text in the viewports*

Figure 5-42 *Various align buttons to align the text*

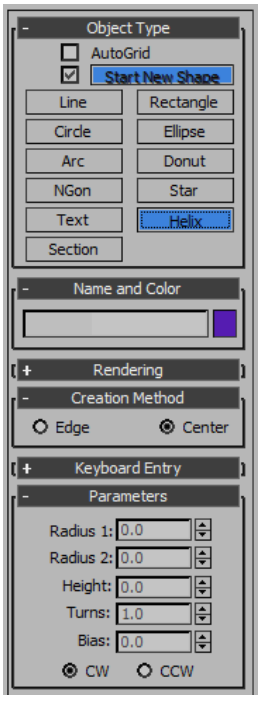


Figure 5-43 *Various rollouts to create and modify a helix spline*

Figure 5-44 *A helix spline*

Figure 5-45 *The helix spline with three turns and zero value in the* ***Bias*** *spinner*

Figure 5-46 *The helix spline with three turns and +1 value in the* ***Bias*** *spinner*

Figure 5-47 *The helix spline with three turns and -1 value in the* ***Bias*** *spinner*

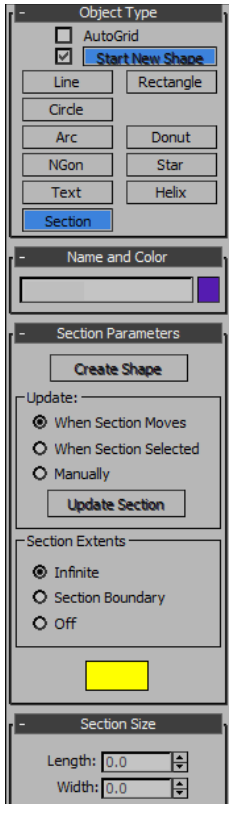


Figure 5-48 *Various rollouts to create and modify a section spline*

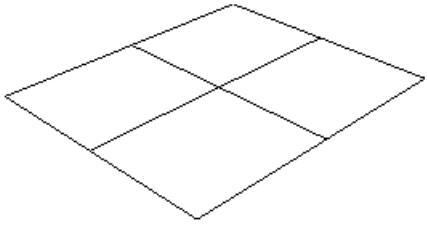


Figure 5-49 *A section spline*

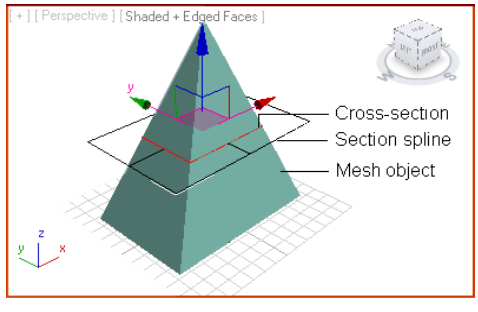


Figure 5-50 *The cross-section of the section spline according to the object*

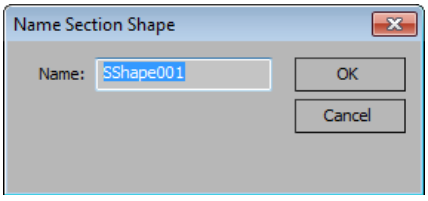


Figure 5-51 *The* ***Name Section Shape*** *dialog box*

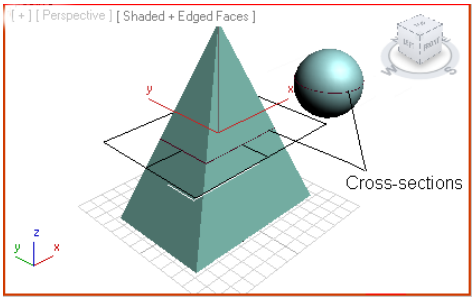


Figure 5-52 *The cross-sections generated in both the objects in their planes on selecting the* ***Infinite*** *radio button*

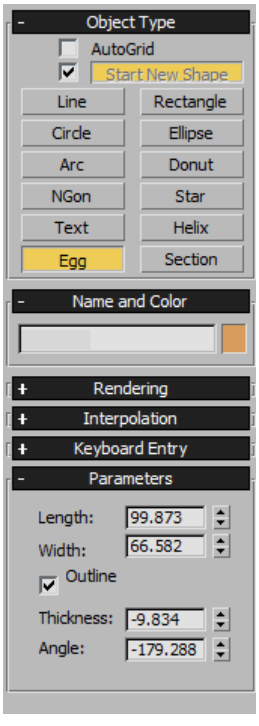


Figure 5-53 *Various rollouts to create and modify an egg spline*

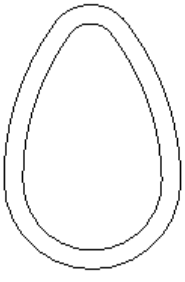


Figure 5-54 *An egg spline*

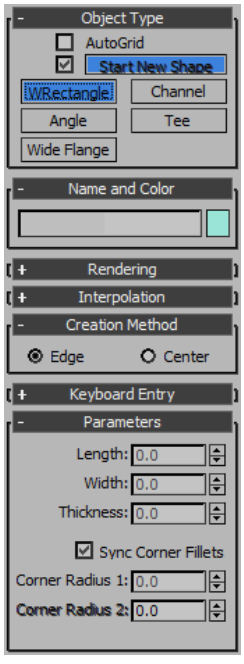


Figure 5-55 *Various rollouts to create and modify a WRectangle spline*

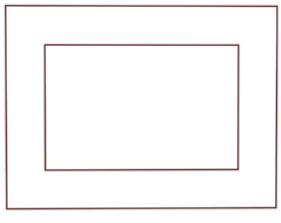


Figure 5-56 *A WRectangle spline*

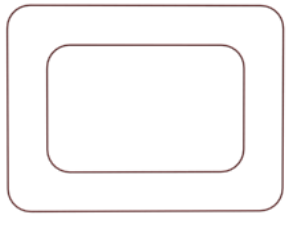


Figure 5-57 *The WRectangle spline with corner radius*

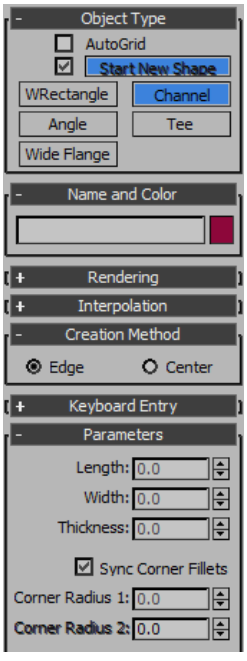


Figure 5-58 *Various rollouts to create and modify a channel spline*

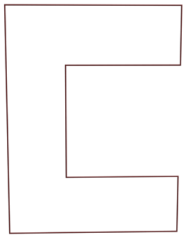


Figure 5-59 *A channel spline*

Figure 5-60 *The channel spline with corner radius*

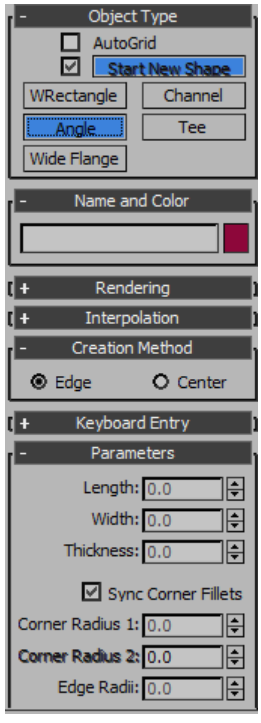


Figure 5-61 *Various rollouts to create and modify an angle spline*

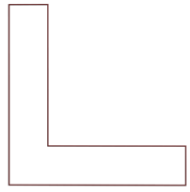


Figure 5-62 *An angle spline*

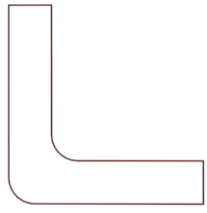


Figure 5-63 *The angle spline with corner radius*

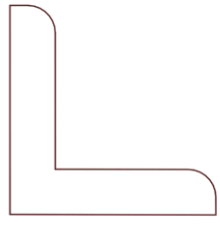


Figure 5-64 *An angle spline with edge radii*

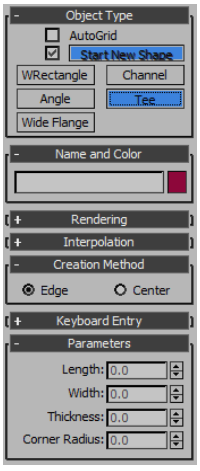


Figure 5-65 *Various rollouts to create and modify a tee spline*

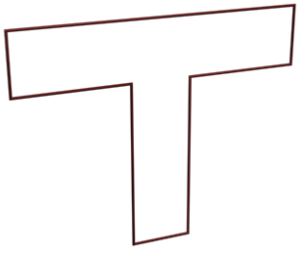


Figure 5-66 *A T-shaped tee spline*

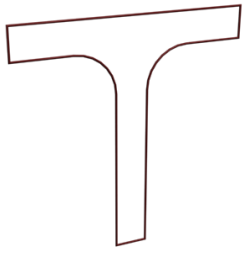


Figure 5-67 *A tee spline with corner radius*

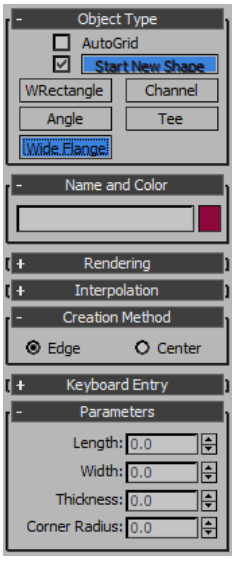


Figure 5-68 *Various rollouts to create and modify a wide flange spline*

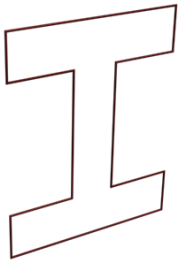


Figure 5-69 *An I-shaped wide flange spline*

Figure 5-70 *The wide flange spline with corner radius*

Figure 5-71 *The Christmas tree model*

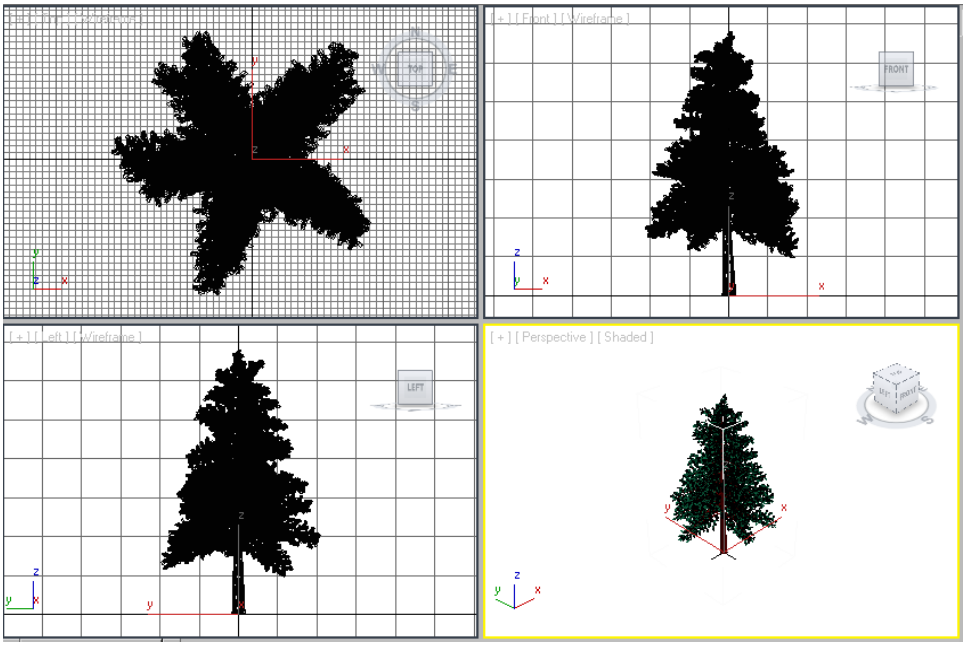


Figure 5-72 *The Christmas tree displayed in viewports*

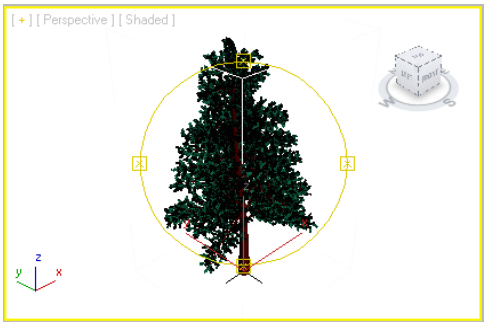


Figure 5-73 *The Christmas tree displayed in the Perspective viewport*

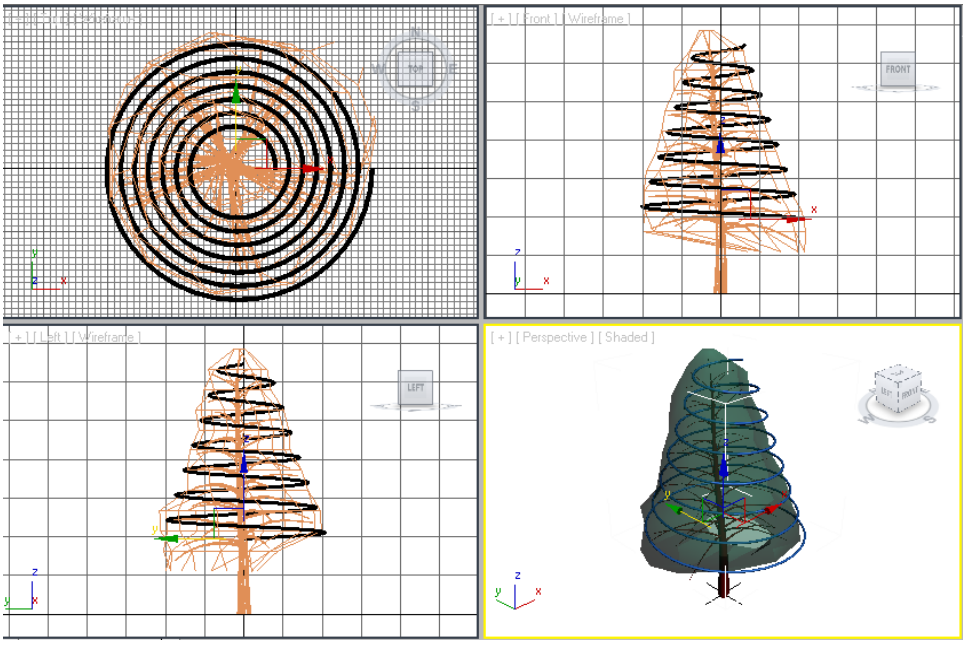


Figure 5-74 *Alignment of outer spiral ring in viewports*

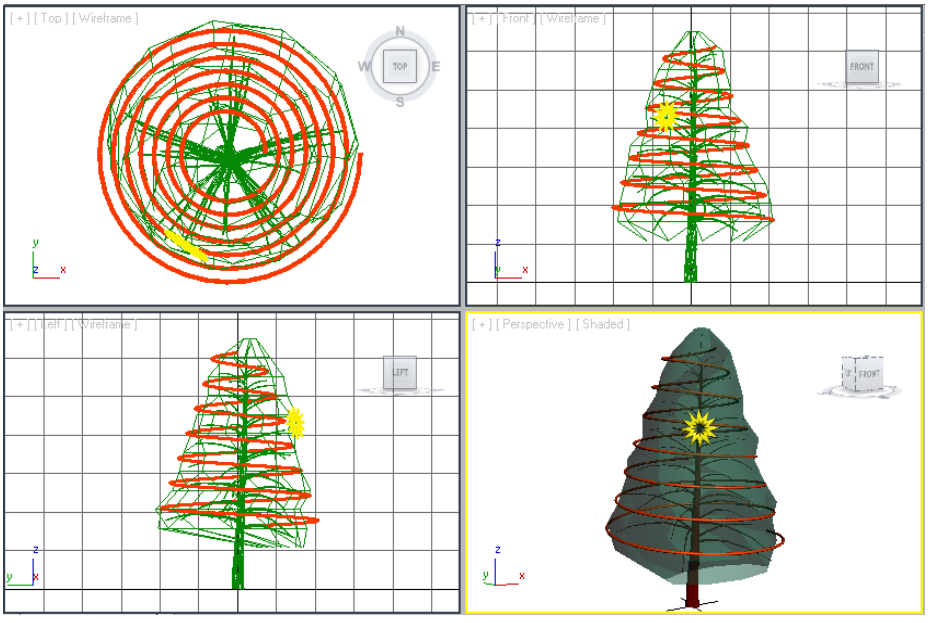


Figure 5-75 *The Star A01 geometry displayed in viewports after the alignment*

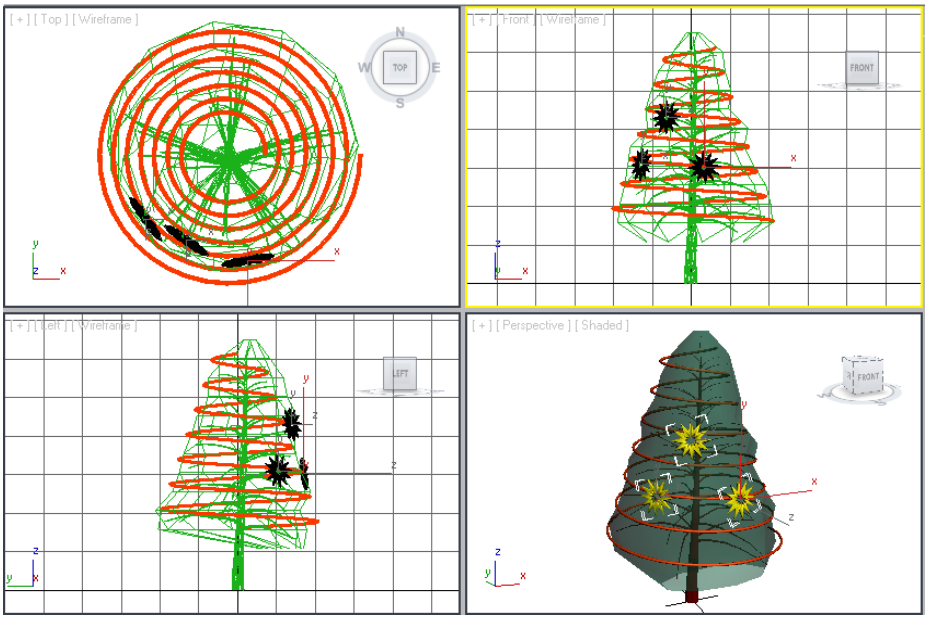


Figure 5-76 *The Star A002 and Star A003 geometry displayed after the alignment*

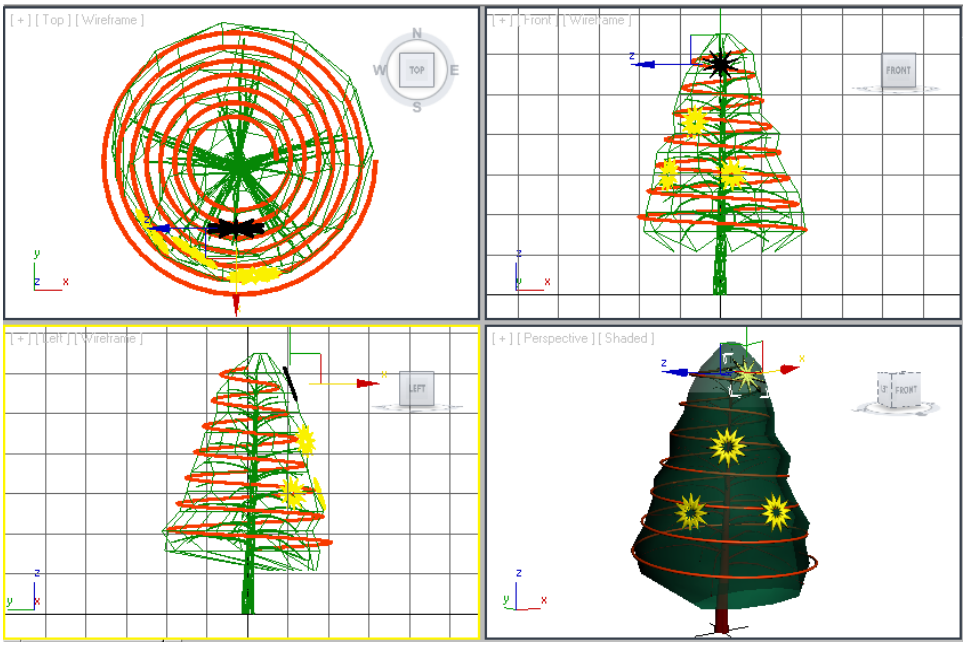


Figure 5-77 *Alignment of Star B01 in viewports*

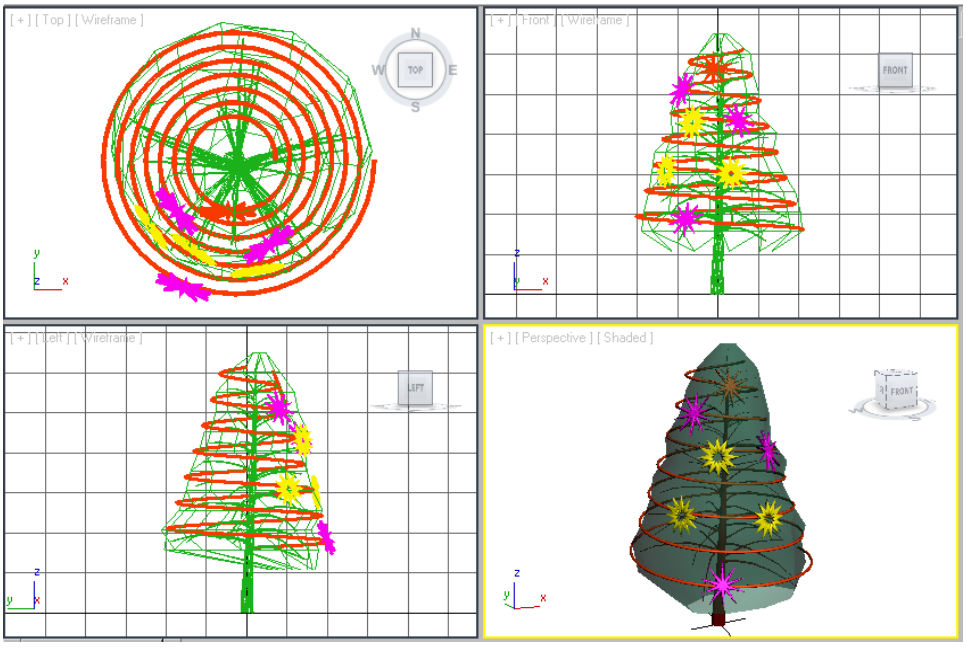


Figure 5-78 *Alignment of Star B002, Star B003, and Star B004 in viewports*

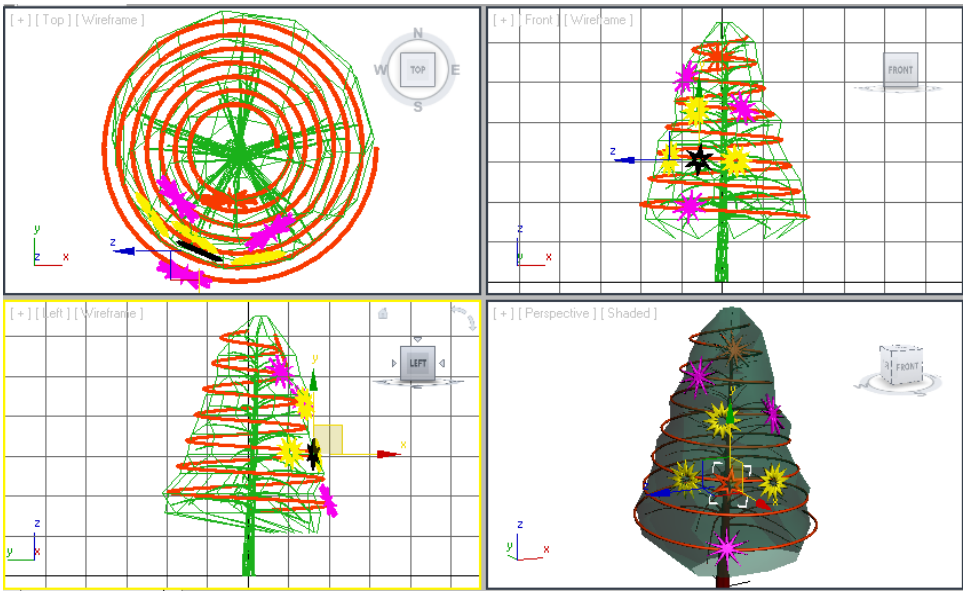


Figure 5-79 *Alignment of Star C01 in viewports*

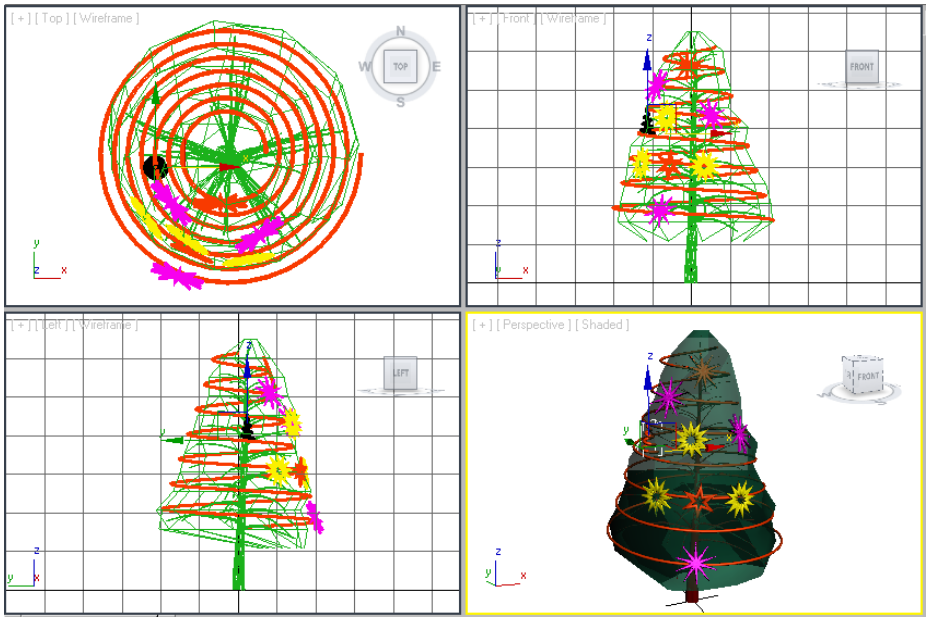


Figure 5-80 *Alignment of spiral coil01 in viewports*

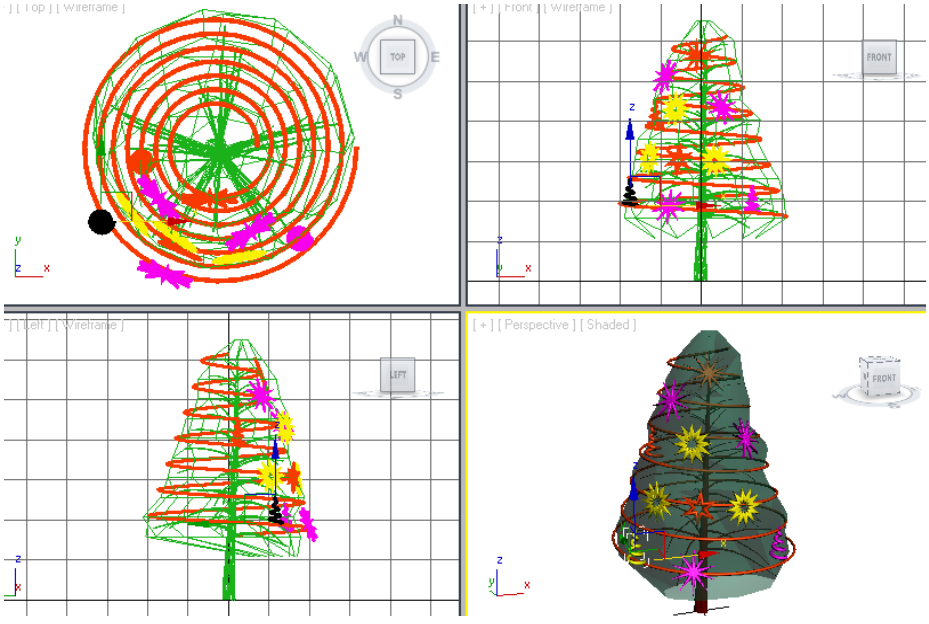


Figure 5-81 *Alignment of spiral coil002 and spiral coil003 in viewports*

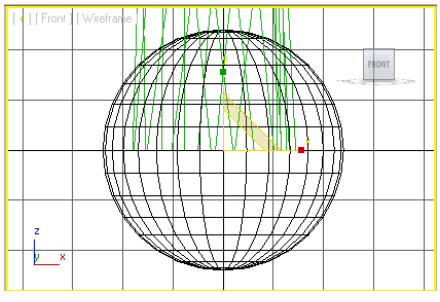


Figure 5-82 *The balloon01 geometry in the Front viewport*

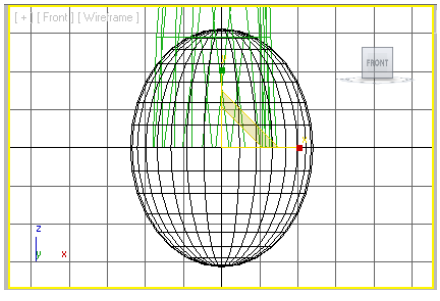


Figure 5-83 *The balloon01 geometry in the Front viewport after scaling*

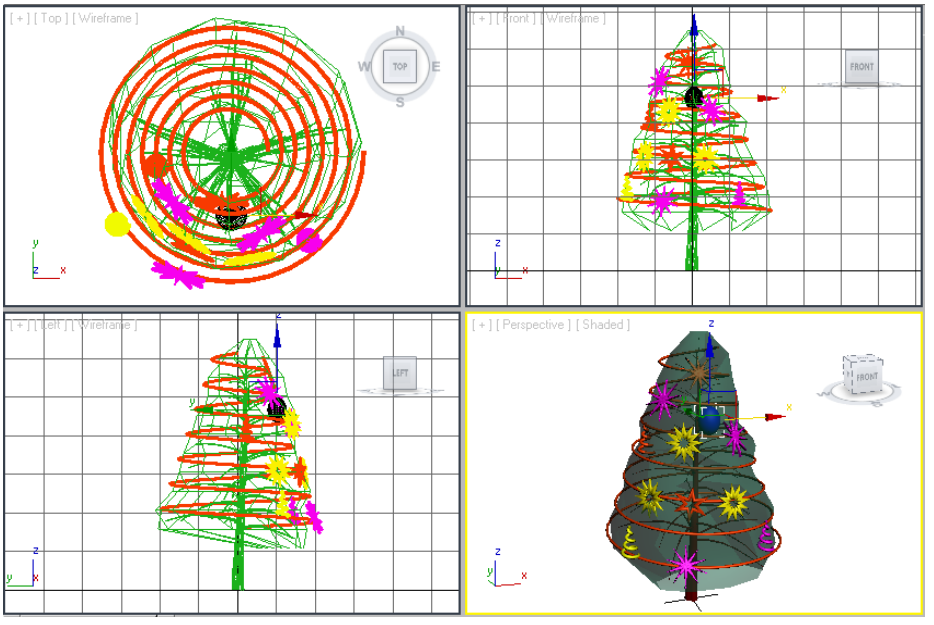


Figure 5-84 *Alignment of balloon01 in viewports*

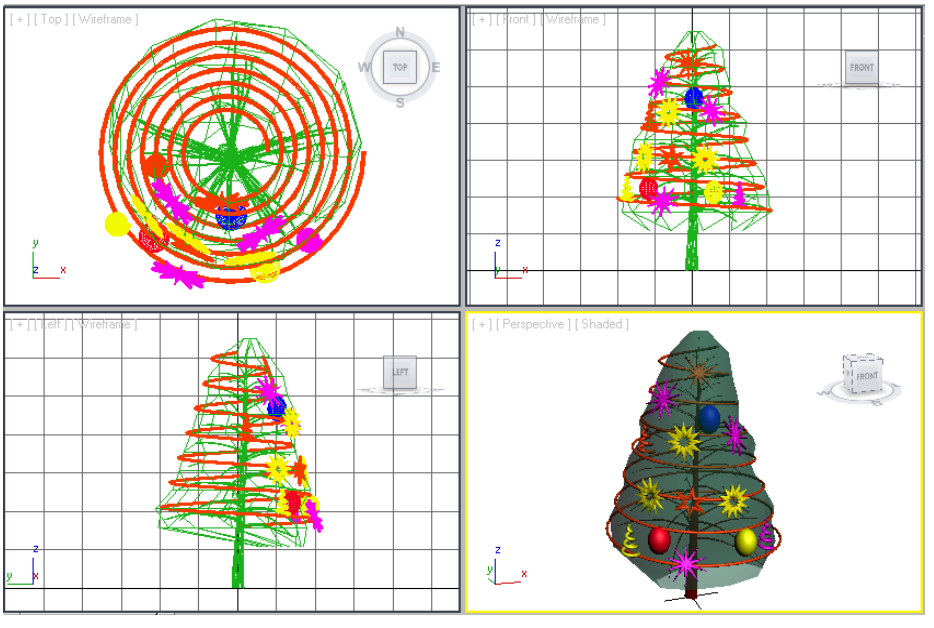


Figure 5-85 *Alignment of balloon002 and balloon003 in viewports*

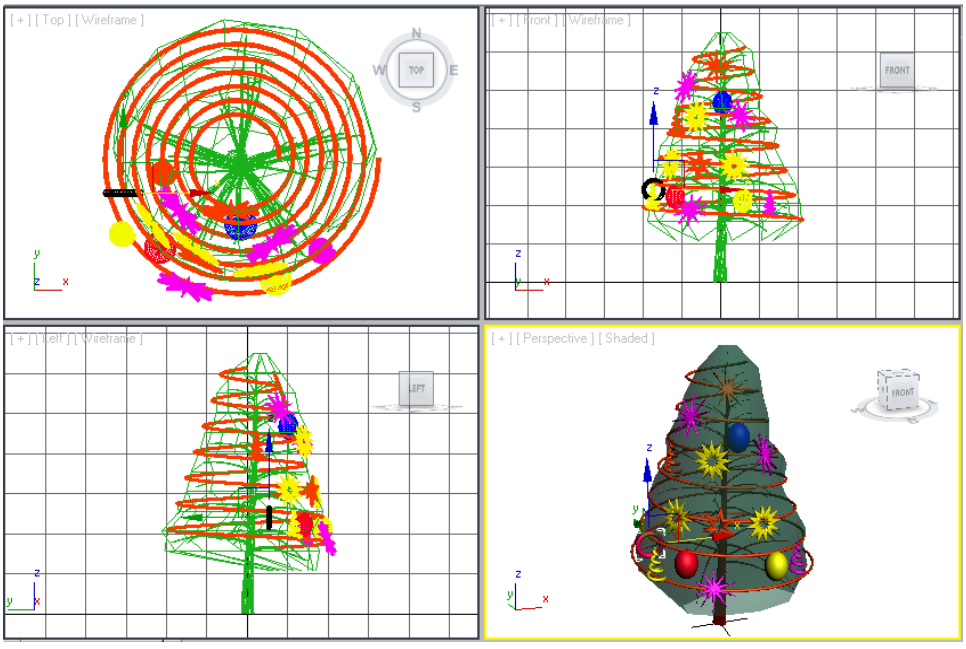


Figure 5-86 *Alignment of ring01 in viewports*

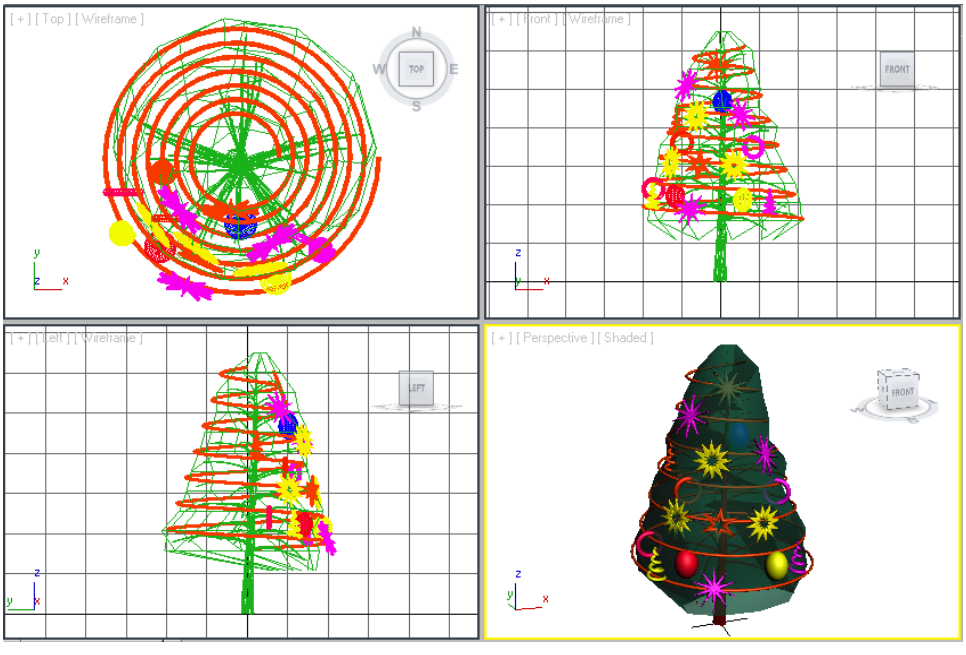


Figure 5-87 *Alignment of ring002 and ring003 in viewports*

Figure 5-88 *The final output after rendering*

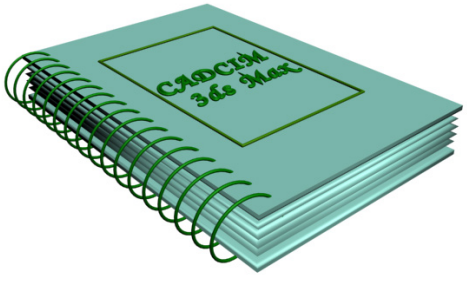


Figure 5-89 *The model of a book*

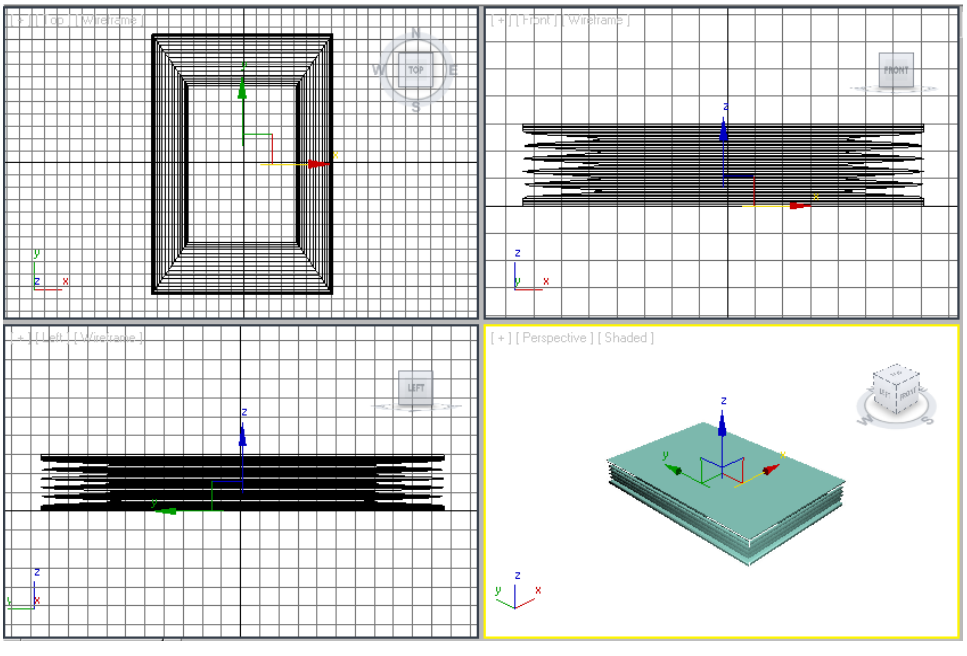


Figure 5-90 *The book geometry after invoking the* ***Zoom Extents All*** *tool*

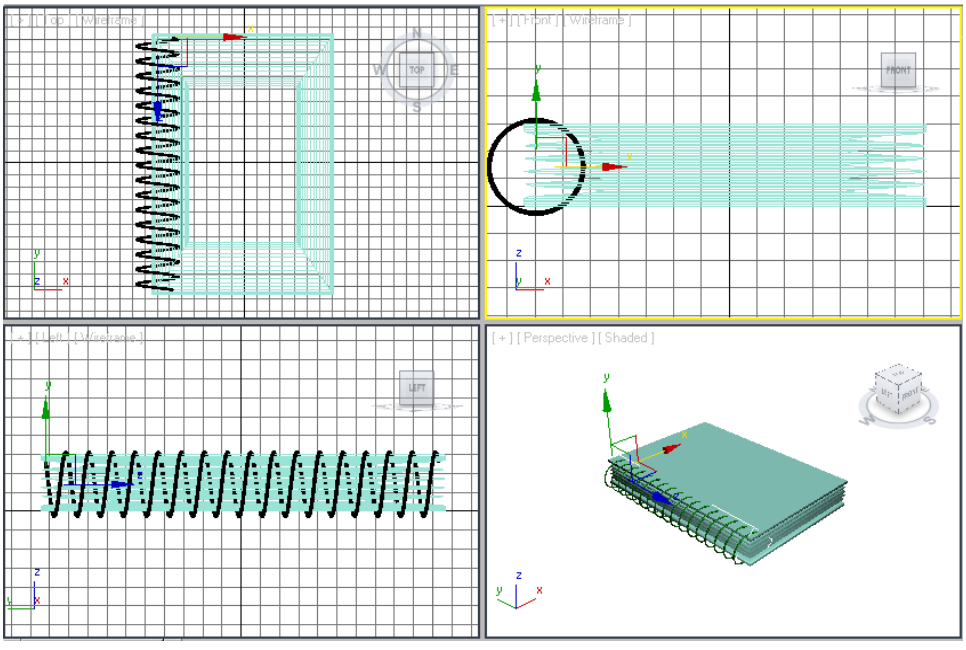


Figure 5-91 *Alignment of spiral binding with book in viewports*

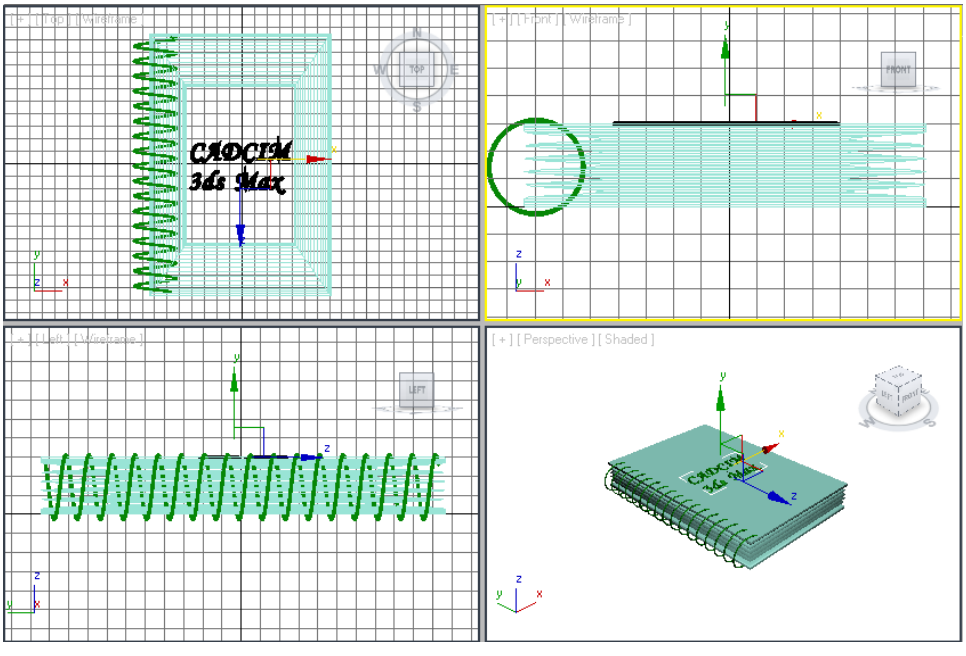


Figure 5-92 *Alignment of text01 on book in viewports*

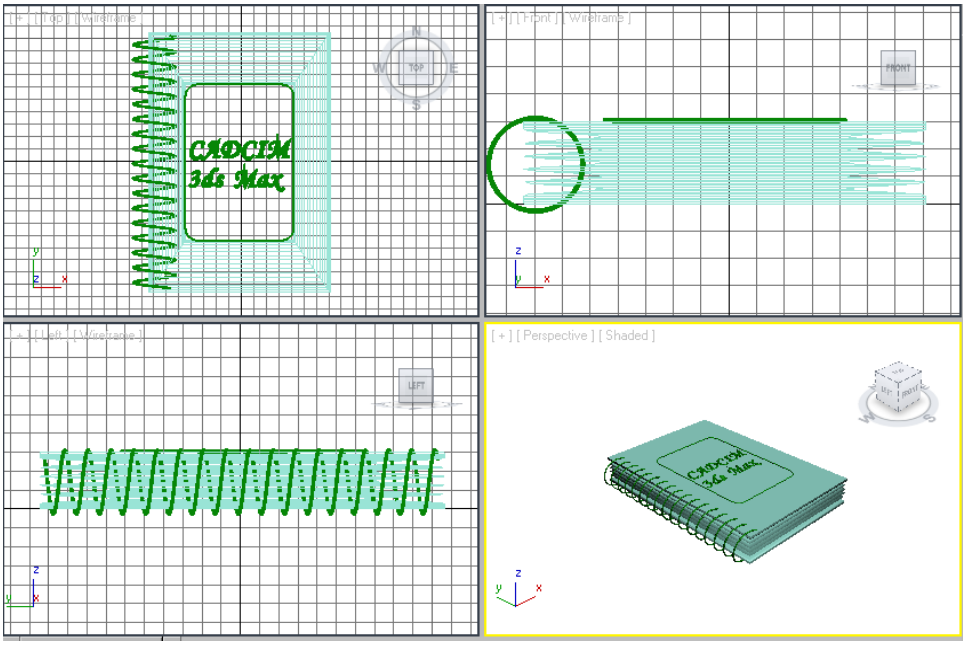


Figure 5-93 *Alignment of rectangular design in viewports*

Figure 5-94 *The final output after rendering*

Figure 5-95 *The model of a grid*

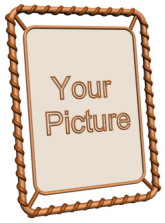


Figure 5-96 *The model of a photo frame*

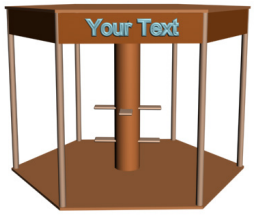


Figure 5-97 *The model of an entrance*

6

Modifying Splines

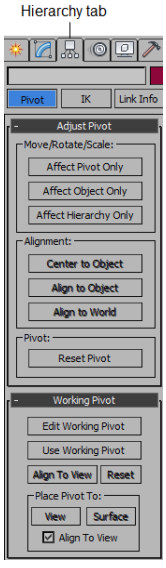


Figure 6-1 *The* ***Pivot*** *tab chosen in the* ***Hierarchy*** *tab*

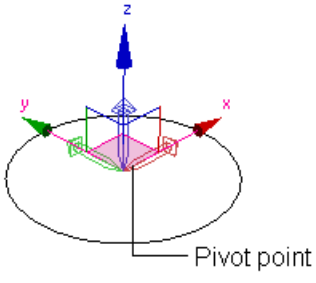


Figure 6-2 *The pivot point of a circle*

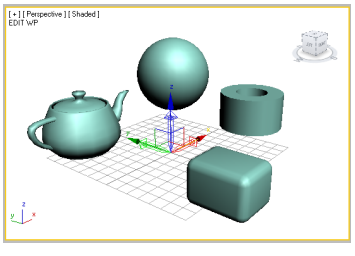


Figure 6-3 *The working pivot along with the gizmo in the scene*

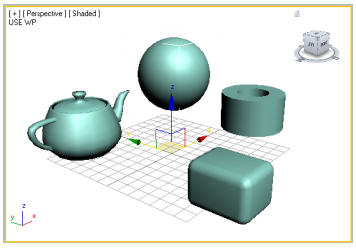


Figure 6-4 *The move transform gizmo displayed*

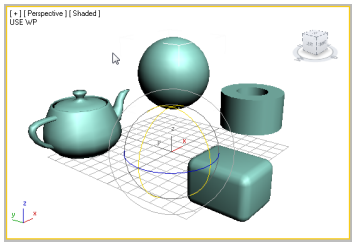


Figure 6-5 *The rotate transform gizmo displayed*

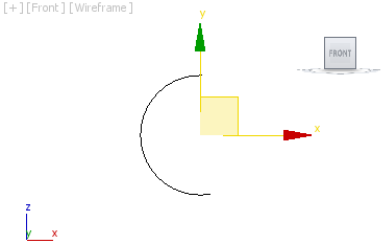


Figure 6-6 *An arc displayed in the Front viewport*

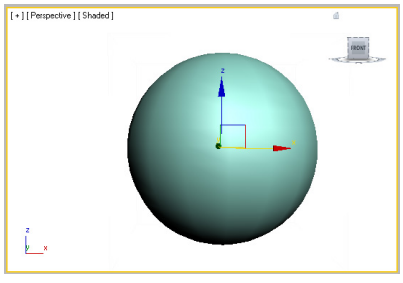


Figure 6-7 *The arc converted into a 3D object after applying the* ***Lathe*** *modifier*

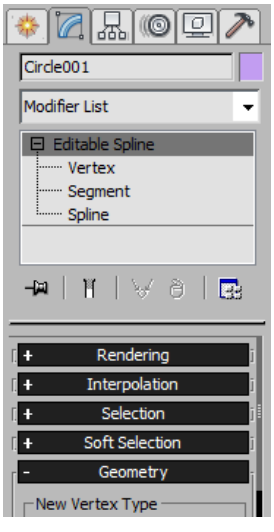


Figure 6-8 *The sub-object levels and rollouts displayed*

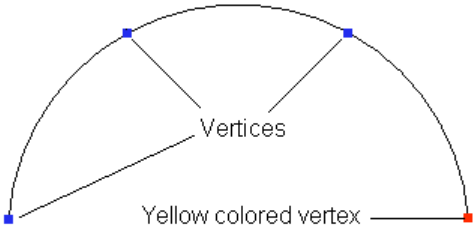


Figure 6-9 *The vertices of an arc spline displayed after selecting the* ***Vertex*** *sub-object level*

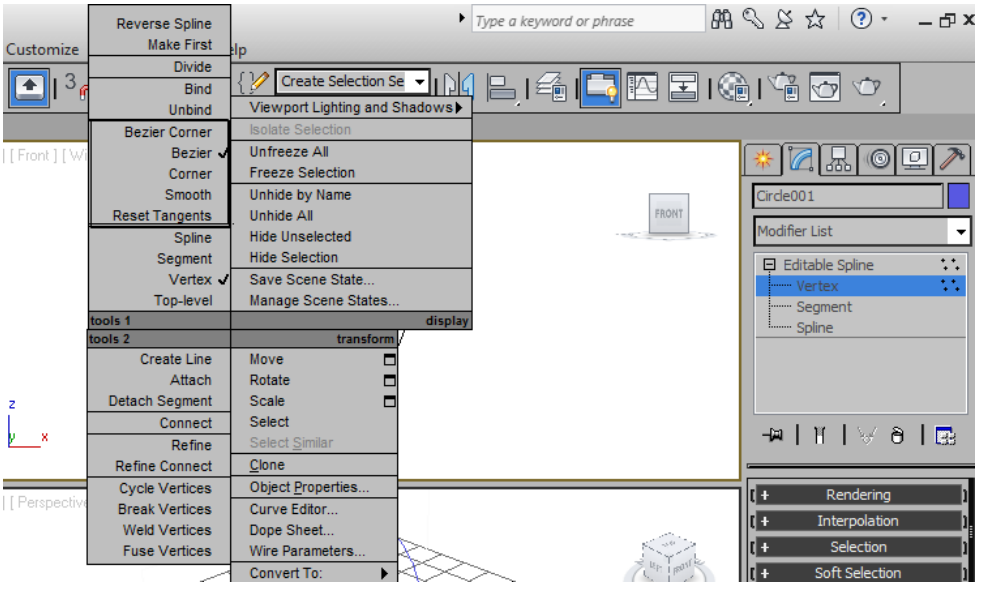


Figure 6-10 *Various types of vertices highlighted in a quad menu*

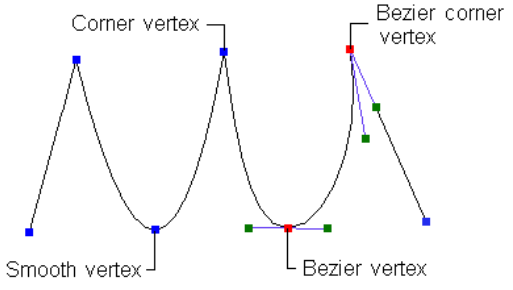


Figure 6-11 *Various types of vertices in a line spline*

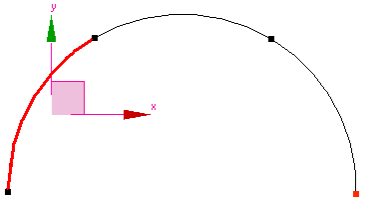


Figure 6-12 *The curved segment selected in an arc spline*

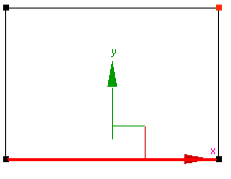


Figure 6-13 *The line segment selected in a rectangular spline*

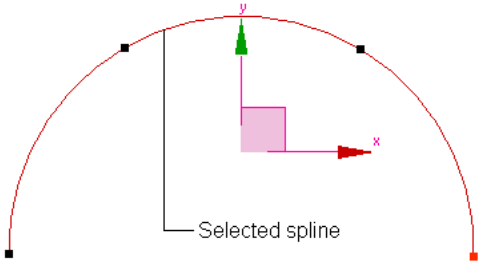


Figure 6-14 *The spline selected in an arc*

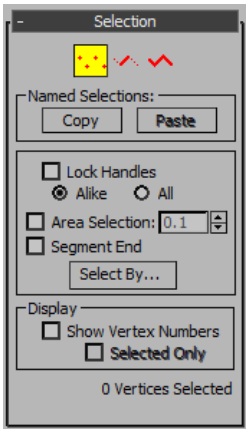


Figure 6-15 *The* ***Selection*** *rollout*

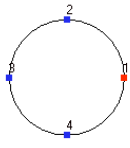


Figure 6-16 *The vertex numbers displayed on selecting the* ***Show Vertex Numbers*** *check box*

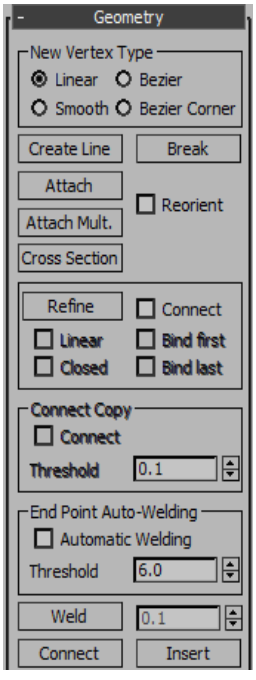


Figure 6-17 *Partial view of the* ***Geometry*** *rollout*

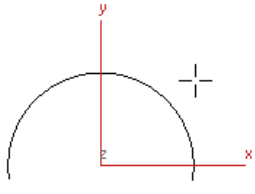


Figure 6-18 *The cursor displayed in the viewport on choosing the* ***Create Line*** *button*

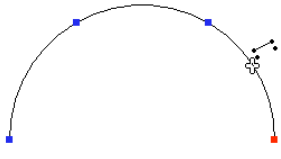


Figure 6-19 *The cursor displayed after choosing the* ***Insert*** *button*

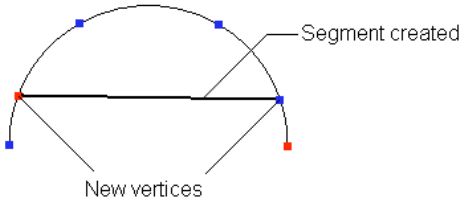


Figure 6-20 *The new vertices and the segment created using the* ***Refine*** *button and the* ***Connect*** *check box*

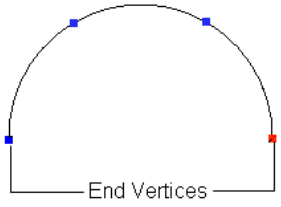


Figure 6-21 *The end vertices in an arc spline*

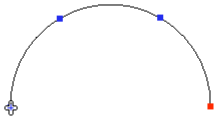


Figure 6-22 *The cursor over one of the end vertices*

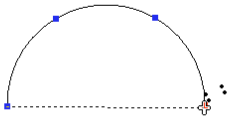


Figure 6-23 *The cursor over another end vertex and the dotted line displayed*

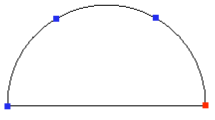


Figure 6-24 *The end vertices connected with a segment*

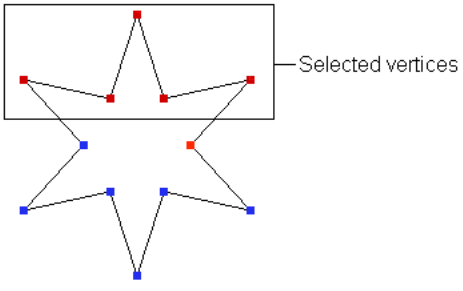


Figure 6-25 *The selected vertices inside the rectangular area*

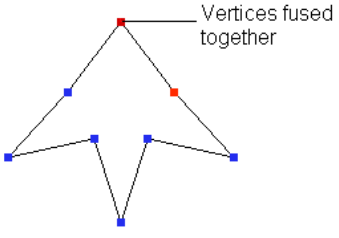


Figure 6-26 *The selected vertices fused at their average center*

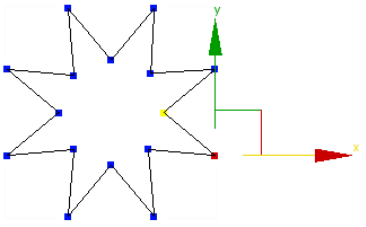


Figure 6-27 *The selected vertex in a star spline*

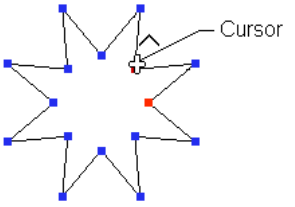


Figure 6-28 *The changed shape of cursor displayed after moving the cursor over the selected vertex*

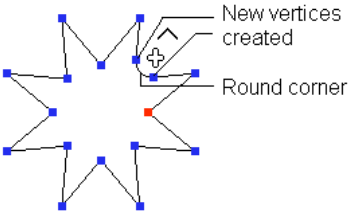


Figure 6-29 *The two new vertices and the round corner displayed*

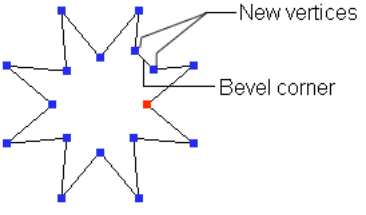


Figure 6-30 *The new vertices with a beveled corner*

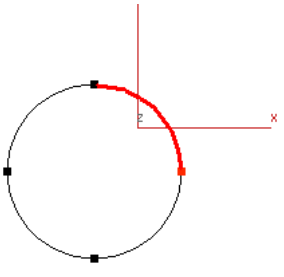


Figure 6-31 *A segment selected in the circle spline*

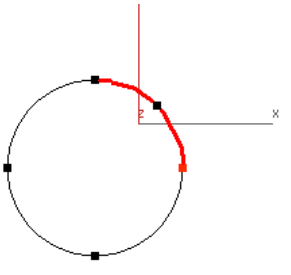


Figure 6-32 *The selected segment sub-divided after using the* ***Divide*** *button*

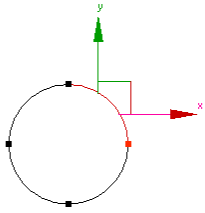


Figure 6-33 *A segment sub-object selected in the circle spline*

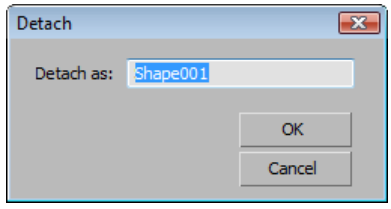


Figure 6-34 *The* ***Detach*** *dialog box*

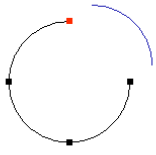


Figure 6-35 *The detached segment as a new independent shape*

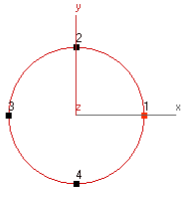


Figure 6-36 *The spline selected in a circle*

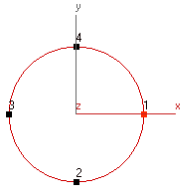


Figure 6-37 *The reversed direction of the selected spline after choosing the* ***Reverse*** *button*

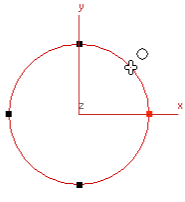


Figure 6-38 *The shape of the cursor changed after choosing the* ***Outline*** *button*

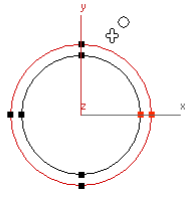


Figure 6-39 *A copy of the spline created as an outline of the selected spline*

Figure 6-40 *An open arc spline*

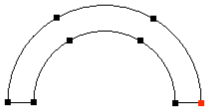


Figure 6-41 *The closed spline after using the* ***Outline*** *button on the open spline*

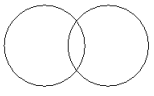


Figure 6-42 *The two attached splines overlapping each other*

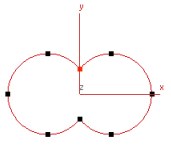


Figure 6-43 *The union boolean final output*

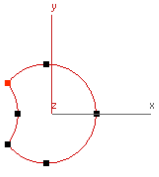


Figure 6-44 *The subtraction boolean final output*

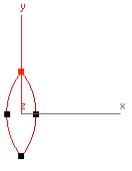


Figure 6-45 *The intersection boolean final output*

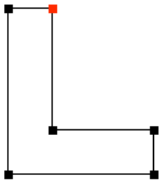


Figure 6-46 *The angle extended spline created to mirror*

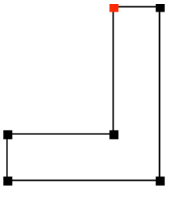


Figure 6-47 *The spline mirrored horizontally*

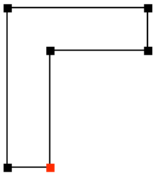


Figure 6-48 *The spline mirrored vertically*

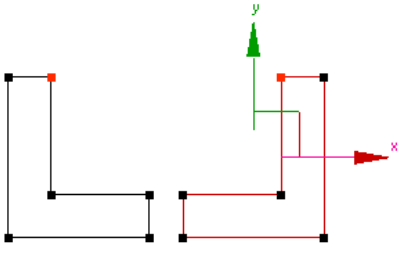


Figure 6-49 *The spline mirrored horizontally after selecting the* ***Copy*** *check box*

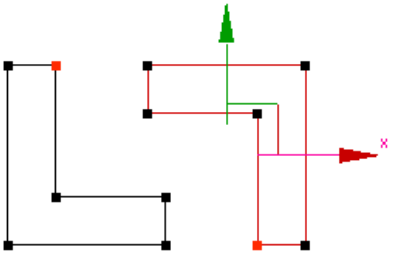


Figure 6-50 *The spline mirrored on both the sides after selecting the* ***Copy*** *check box*

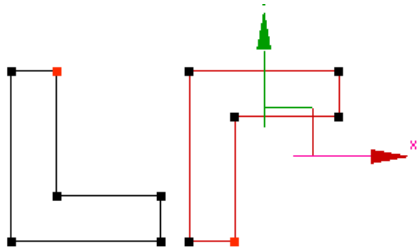


Figure 6-51 *The spline mirrored vertically after selecting the* ***Copy*** *check box*

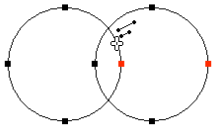


Figure 6-52 *The two attached splines and the cursor over the overlapping segments*

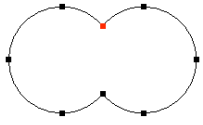


Figure 6-53 *The splines after using the* ***Trim*** *button*

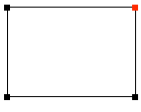


Figure 6-54 *The rectangular spline for explosion*

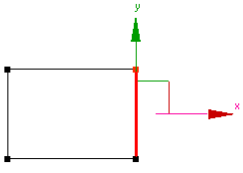


Figure 6-55 *One of the broken splines selected after using the* ***Explode*** *button*

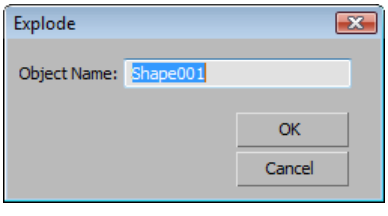


Figure 6-56 *The* ***Explode*** *dialog box*

Figure 6-57 *The glass models*

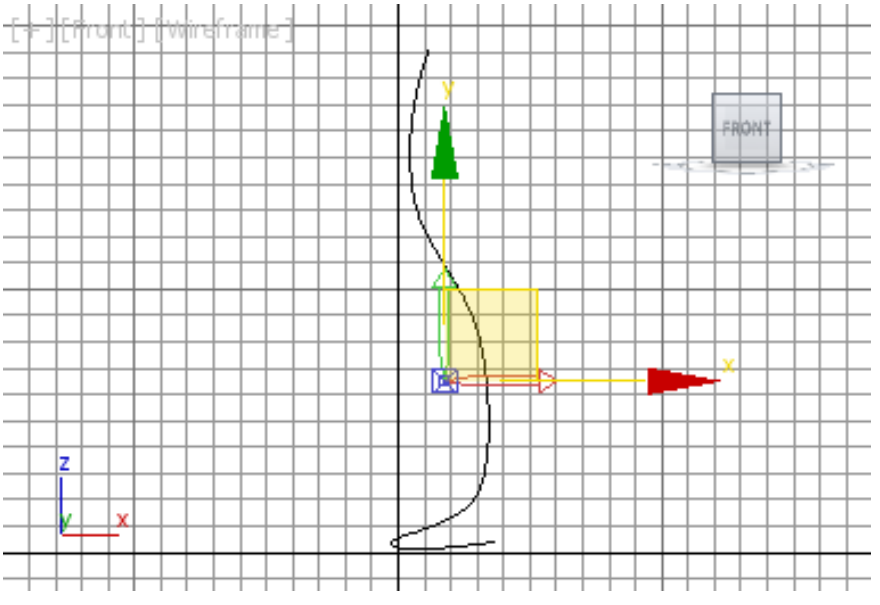


Figure 6-58 *The line spline created for glass*

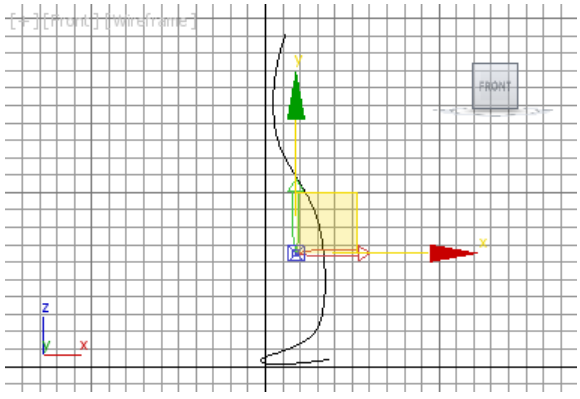


Figure 6-59 *The pivot point of the line spline at its original position*

Figure 6-60 *The pivot point after adjusting its position in the Front viewport*

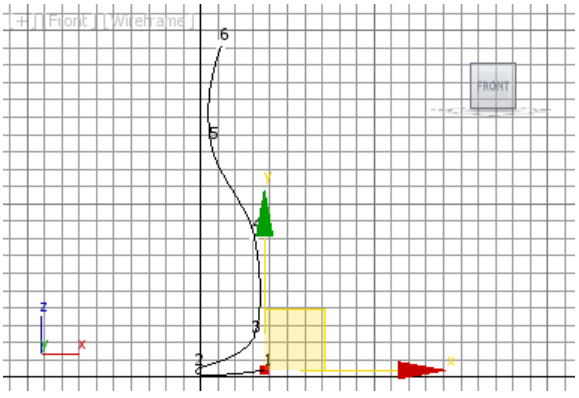


Figure 6-61 *The first vertex selected in the line spline*

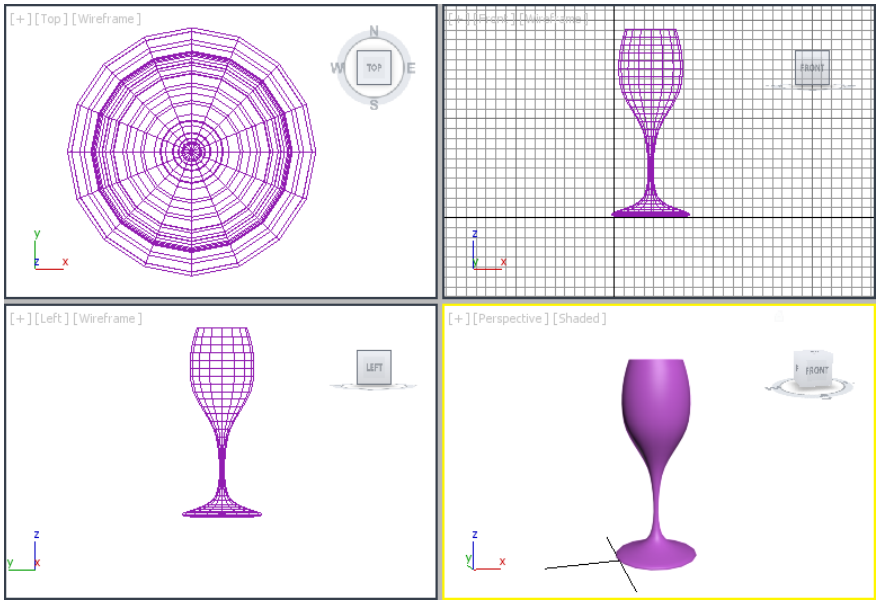


Figure 6-62 *The glass geometry displayed in viewports after applying the* ***Lathe*** *modifier*

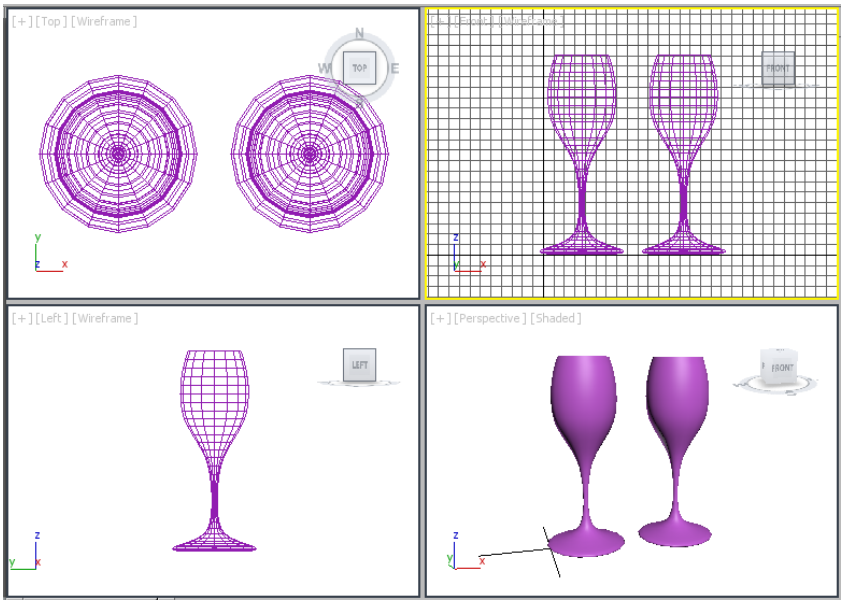


Figure 6-63 *A pair of glasses in viewports*

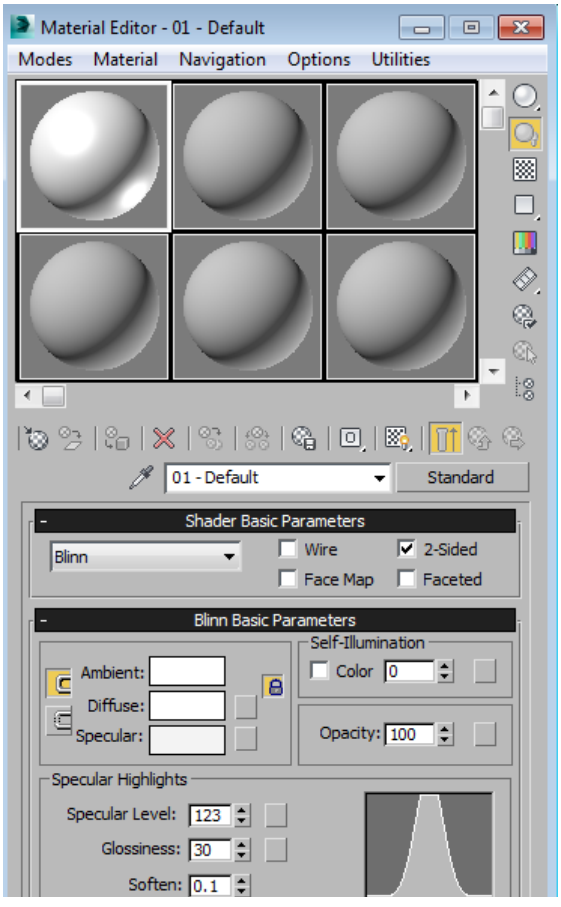


Figure 6-64 *Partial view of the* ***Material Editor*** *dialog box*

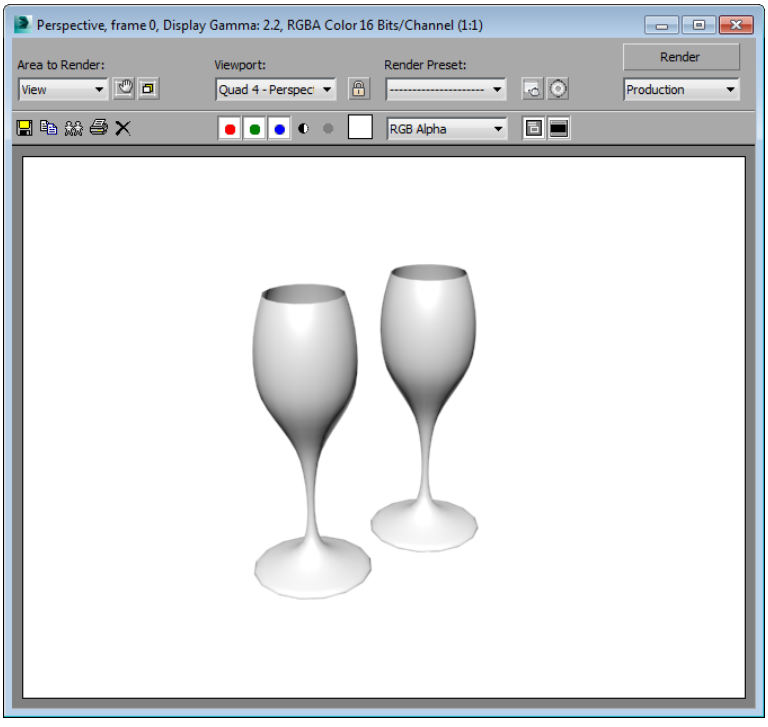


Figure 6-65 *The glass models in the final output after rendering*

Figure 6-66 *The model of a vase with flower plants in it*

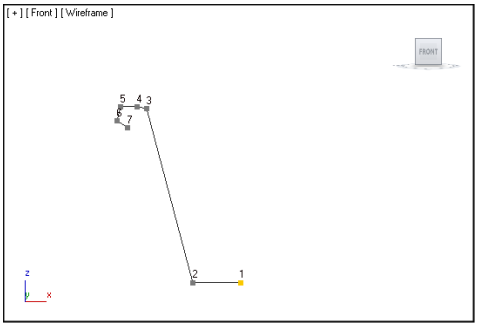


Figure 6-67 *A line spline created for the vase*

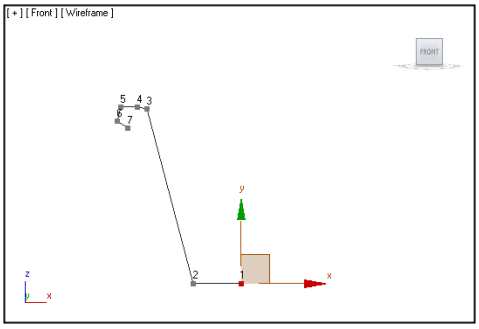


Figure 6-68 *The first vertex of the line spline selected in the Front viewport*

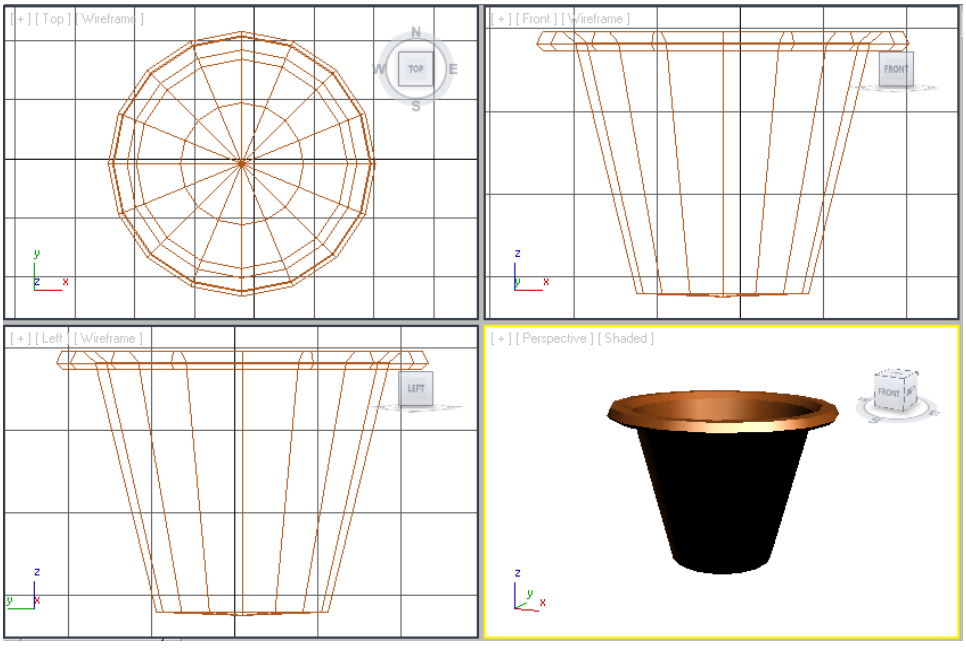


Figure 6-69 *The vase geometry after applying the* ***Lathe*** *modifier*

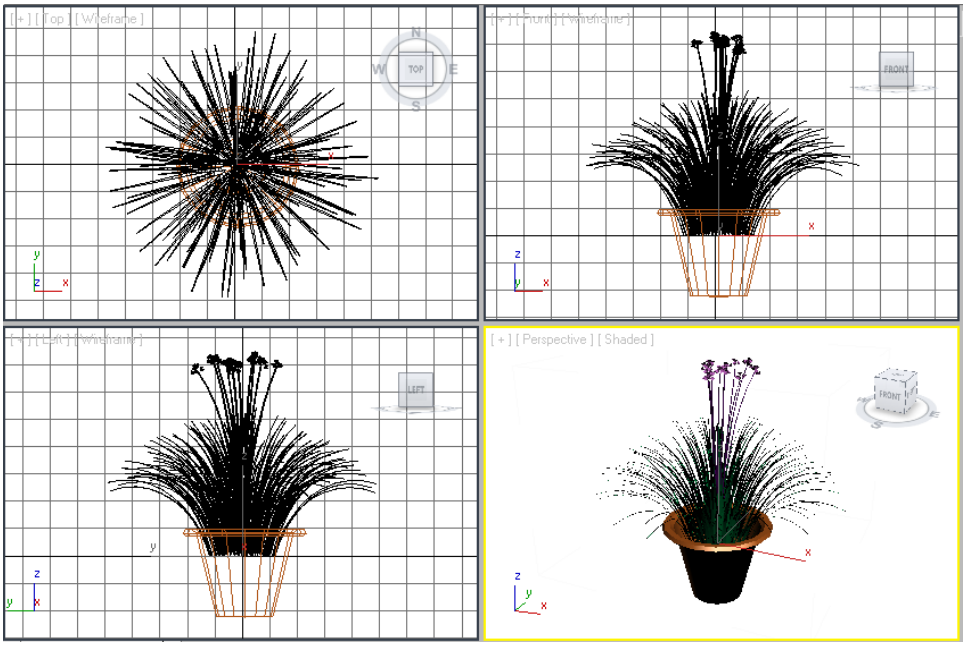


Figure 6-70 *Alignment of plant with vase in viewports*

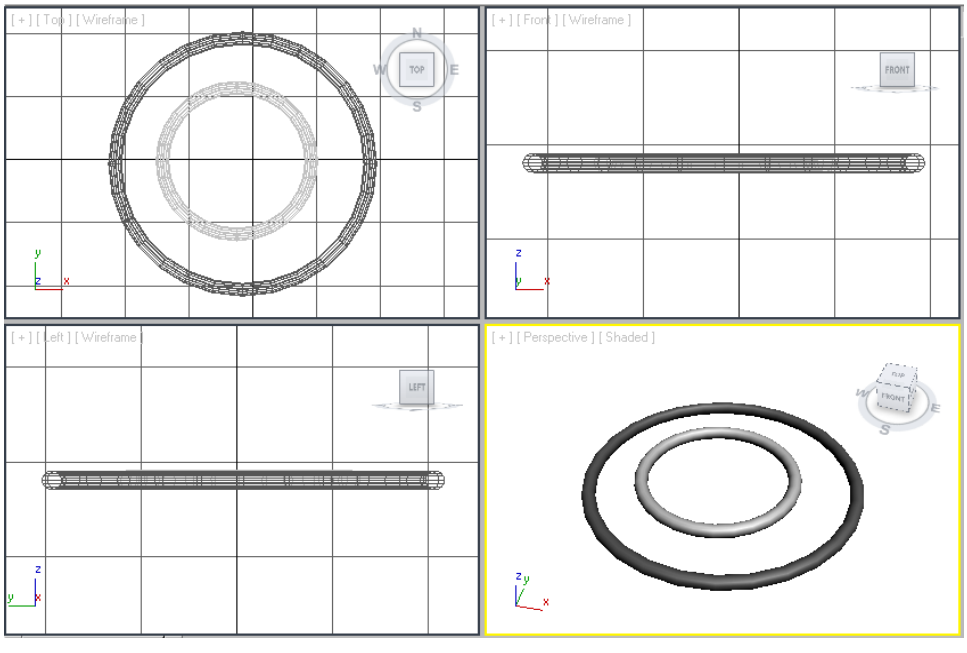


Figure 6-71 *Alignment of the circles in viewports*

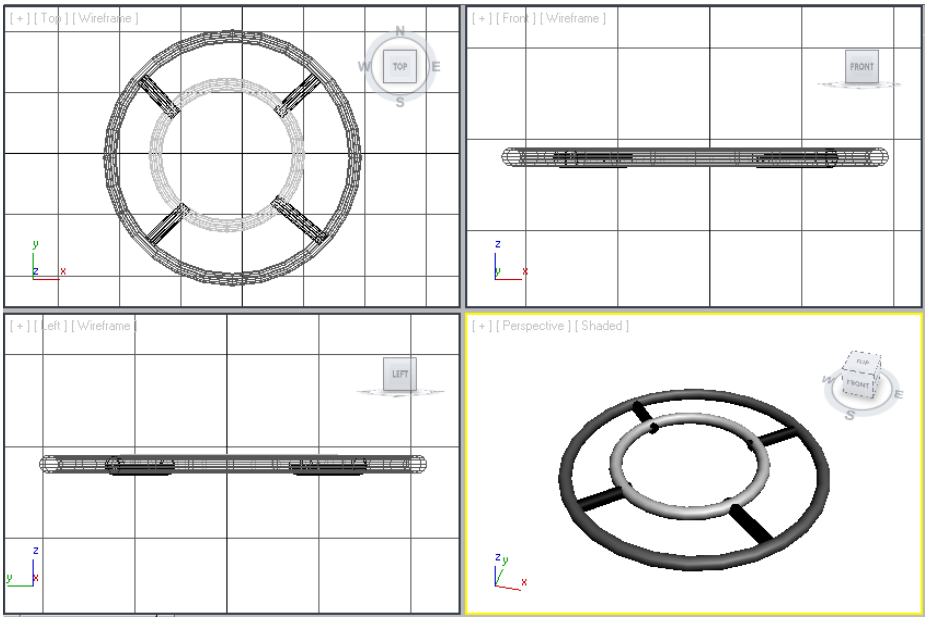


Figure 6-72 *The line splines created to join both the circles*

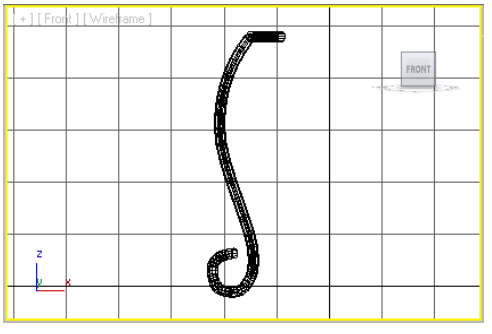


Figure 6-73 *The line spline for leg of stand*

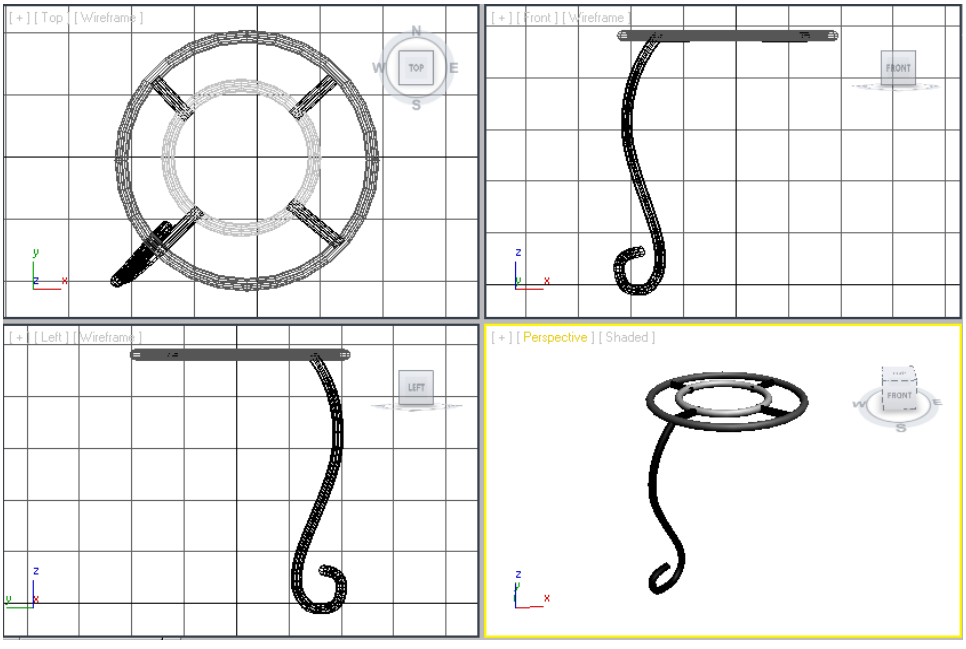


Figure 6-74 *Alignment of upper portion and leg01 in viewports*

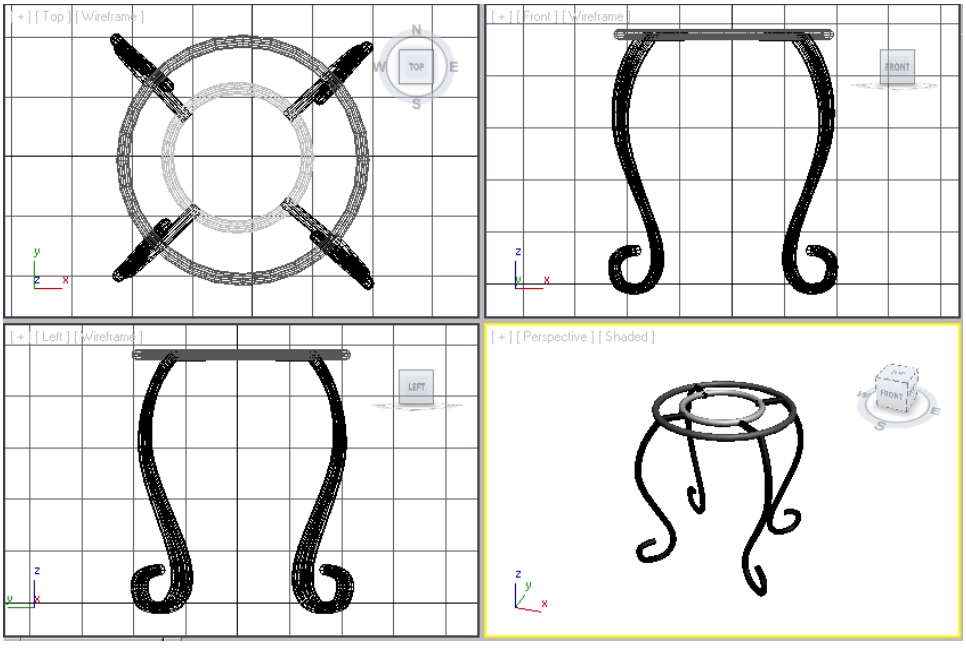


Figure 6-75 *Alignment of leg01, leg002, leg003, and leg004 in viewports*

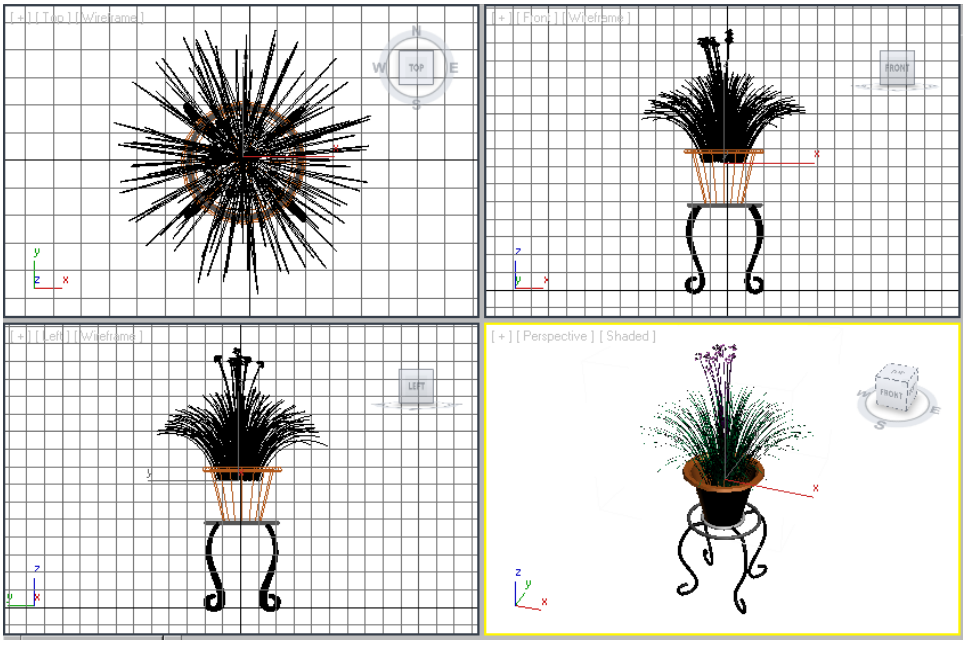


Figure 6-76 *Alignment of flower vase and vase stand in viewports*

Figure 6-77 *The pair of cocktail glasses*

Figure 6-78 *Set of vases*

Figure 6-79 *A candle stand*

Figure 6-80 *The pair of glasses*

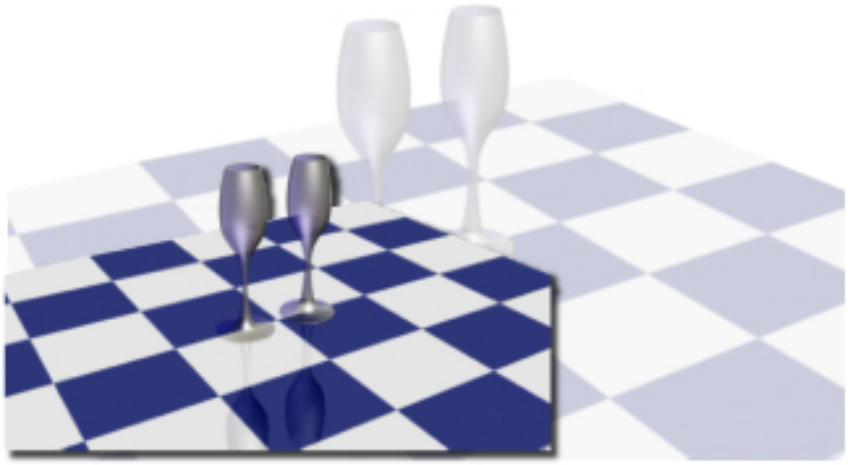
7

Materials and Maps

Learning Objectives

After completing this chapter, you will be able to:

- *Use the Material Editor dialog box*
- *Understand the types of materials and maps*
- *Create materials and maps*
- *Assign materials to objects*



INTRODUCTION

In this chapter, you will learn to assign various materials and maps to the objects in a scene to make it more realistic. Materials are used to describe the reflection or transmission of light of an object. Maps are used to simulate texture, and apply designs, reflection, refraction, and other effects. To assign materials and maps, you need to use the **Material Editor** tool from the **Main Toolbar**, which is discussed next.

MATERIAL EDITOR

Menu bar: Rendering > Material Editor > Compact/Slate Material Editor
Main Toolbar: Material Editor flyout > Compact/Slate Material Editor
Keyboard: M

In 3ds Max, there are two types of material editors, Slate Material Editor and Compact Material Editor. You can use any of these material editors to create new materials and maps, modify the existing materials, apply these new materials and maps to the models in the scene, and create a new environment for the scene. The Slate Material Editor uses nodes and wiring to graphically display the design of the materials created by you. The Compact Material Editor is easy and stripped down version of Slate Material Editor.

To create a new material, press the M key; the **Slate Material Editor** dialog box will be displayed, as shown in Figure 7-1. Next, if you choose **Modes > Compact Material Editor** from the material editor menu bar, the **Material Editor** dialog box will be displayed, as shown in Figure 7-2. The title bar of the **Material Editor** dialog box displays the number and name of the current material, which gets changed depending on the material that you select. The **Material Editor** dialog box is divided into various areas, refer to Figure 7-2. These areas are discussed next.

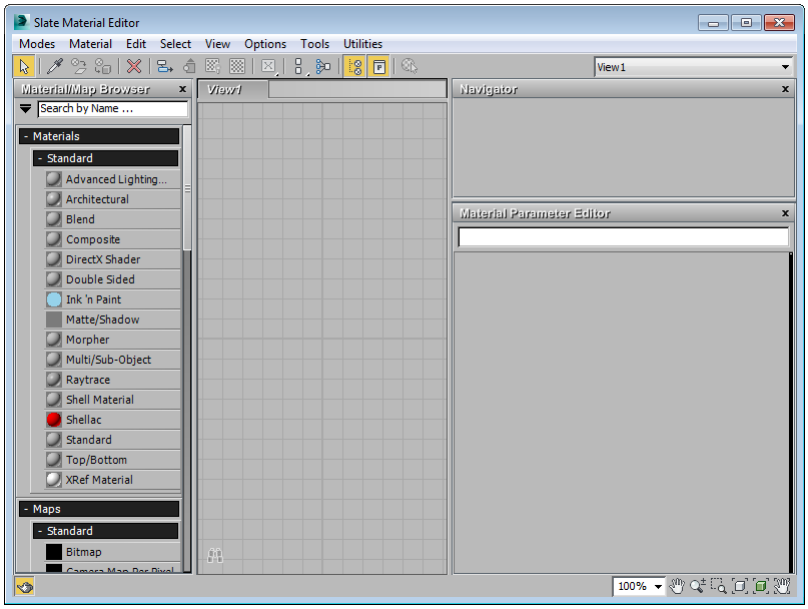


*Figure 7-1 The **Slate Material Editor** dialog box*

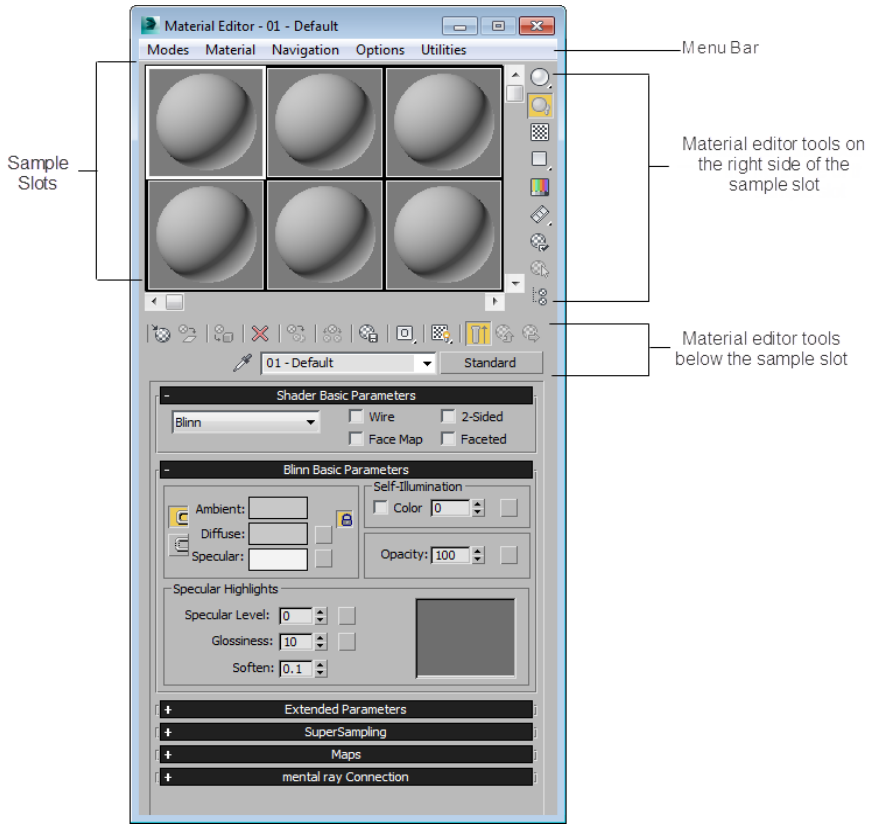


Figure 7-2 *The* ***Material Editor*** *dialog box*

Note

When you press the M key, the material editor that you opened last in 3ds Max will be displayed. However, if you press the M key for the first time in 3ds Max, then the ***Slate Material Editor*** *will be displayed.*

Menu Bar

The menu bar is located at the top of the **Material Editor** dialog box. It consists of various pull-down menus such as **Material**, **Navigation**, and so on. The options in these pull-down menus are used to choose various tools. These tools can also be invoked using the options available below as well as on the right side of the sample slots in the **Material Editor** dialog box, refer to Figure 7-2.

Sample Slots

The sample slots in the **Material Editor** dialog box are used to preview the material or the maps that are assigned to the objects in the viewport. By default, there are 6 slots which can be extended to 24 slots and each sample slot represents a single material or map. To view other sample slots, move the scroll bar available on the right, and just below the sample slots. You can also increase the number of visible sample slots. To do so, select one of the sample slots;

it will be surrounded by a white colored boundary and will get activated. Next, right-click on the active sample slot; a shortcut menu will be displayed, as shown in Figure 7-3. By default, the **3x2 Sample Windows** option is chosen in the shortcut menu. Next, choose the required option; the number of visible sample slots will be increased accordingly, refer to Figures 7-4 and 7-5.

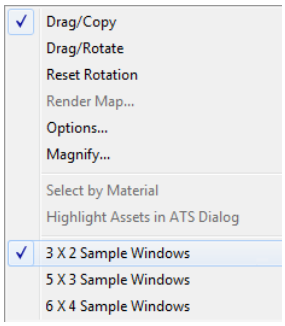


Figure 7-3 *The shortcut menu displayed*

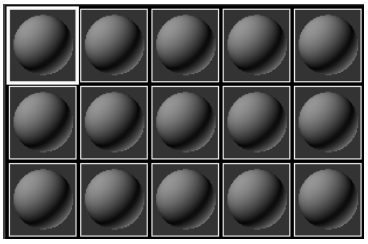


Figure 7-4 *The sample slots after choosing the* ***5x3 Sample Windows*** *option*

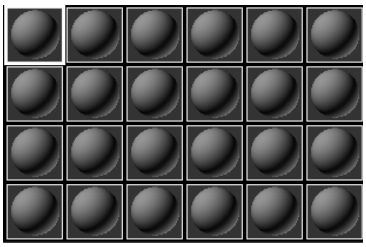


Figure 7-5 *The sample slots after choosing the* ***6x4 Sample Windows*** *option*

In the shortcut menu, the **Drag/Copy** option is chosen by default. It is used to copy the material or the map from one sample slot to another. Select the sample slot, whose material or map you want to copy. Next, press and hold the left mouse button on it, drag it to another sample slot, and then release the left mouse button; the same material or the map will be copied to the other sample slot, as shown in Figures 7-6 and 7-7.

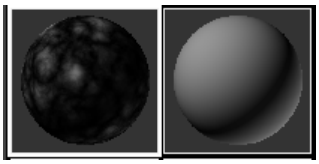


Figure 7-6 *Two sample slots in the* ***Material Editor*** *dialog box*

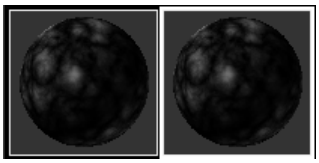


Figure 7-7 *The map/material of one sample slot copied to the other*

On choosing the **Drag/Rotate** option in the shortcut menu, the shape of the cursor will change. Now, you can view the material map on the sample slot by rotating it. The **Reset Rotation** option in the shortcut menu is used to reset the sample slot to its default orientation. By default, the **Render Map** option in the shortcut menu is not activated. It will be activated on assigning a map to the sample slot. This option is used to render the map in the selected sample slot by creating a bitmap or an *avi* file (if the map is animated). When you choose the **Options** option, the **Material Editor Options** dialog box will be displayed. The options in this dialog box are used to modify the sample slots.

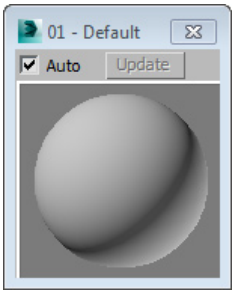


Figure 7-8 *The sample slot displayed in a separate window*

Choose the **Magnify** option; the selected sample slot will be displayed in an enlarged window, as shown in Figure 7-8. Alternatively,

double-click on the selected sample slot to display it in an enlarged window. To resize the window, move the shape of the cursor at the bottom of the window; the cursor will change to an arrow. Now, drag the cursor to resize the window.

Material Editor Tools

The material editor tools are used to modify the default settings of the selected sample slot, and apply the materials or the maps to the objects. These tools are available below as well as on the right side of the sample slots in the **Material Editor** dialog box. The most commonly used tools are discussed next.

Get Material

Material Editor Menu:	Material > Get Material
Material Toolbar:	Get Material
Keyboard:	G

The **Get Material** tool is used to get a material or a map for the selected sample slot. Materials affect the color, opacity, glossiness, and other physical properties of objects.

To get a material, select one of the sample slots to activate it. Choose the **Get Material** tool available below the sample slots; the **Material/Map Browser** dialog box with a list of materials and maps will be displayed, as shown in Figure 7-9. You can collapse and expand this list as required. Now, double-click on one of the materials or maps from the list; the default material will be replaced by the new material or map. Also, the new material will be displayed on the sample slot in the **Sample Slots** rollout of the **Material/Map Browser** dialog box. The **Material/Map Browser** dialog box is discussed next.

Note

*The shortcut key G mentioned above will work only if the **Keyboard Shortcut Override Toggle** tool in the **Main Toolbar** is activated and the **Material Editor** dialog box is displayed.*

Material/Map Browser

The **Material/Map Browser** dialog box is used to select different types of materials and maps from the lists displayed in it. Various options in this dialog box are discussed next.

Search by Name: The **Search by Name** text box is located on the top of this dialog box. It is used to search and select the name of the materials or the maps. For example, enter the alphabet **d** in this text box; a drop-down list of all the materials and maps starting with the alphabet d will be displayed, as shown in Figure 7-10. You can double-click on the required material or map; it will be displayed on the selected sample slot. Now, choose the **Clear Results** button on the right side of the text box; the drop-down list will be cleared.

Material/Map Browser Options: The **Material/Map Browser Options** button is located on the left of the **Search by Name** text box. Choose the **Material/Map Browser Options** button; a flyout with various options will be displayed, as shown in Figure 7-11. The

options in this flyout are used to manage the **Material/Map Browser** dialog box based on the requirement. Also, these options will help you to create new material library, manage Autodesk material library, and so on. These options are discussed next.

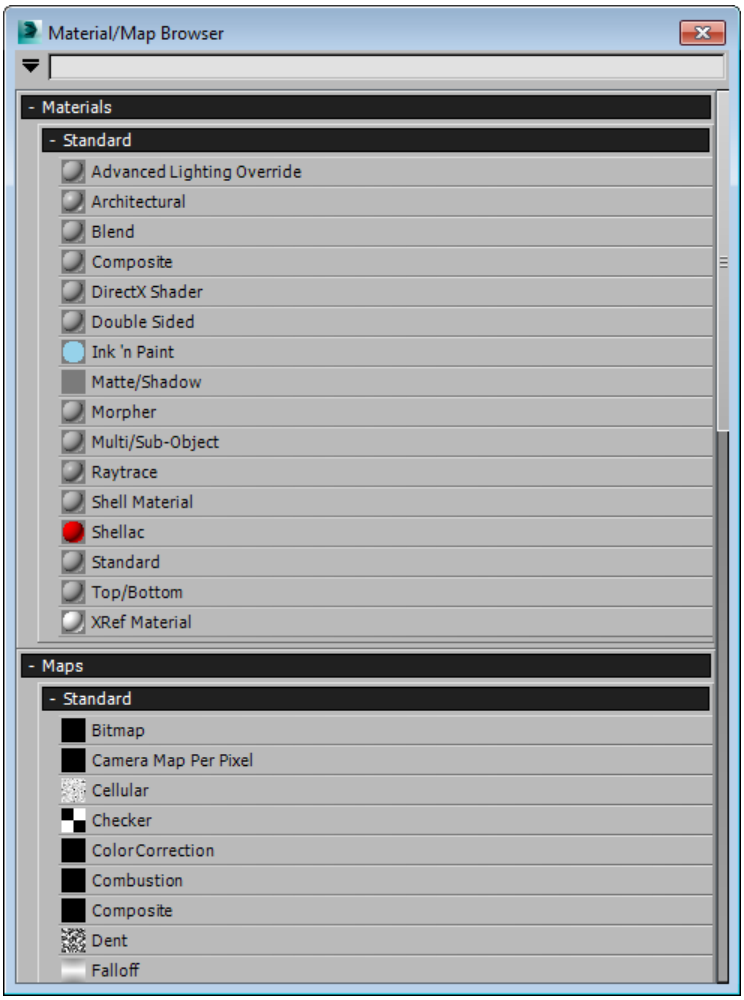


Figure 7-9 *Partial view of the rollouts in the* ***Material/Map Browser*** *dialog box*

The **New Group** option is used to create a new group and add it to the **Material/Map Browser** dialog box. Choose the **New Group** option from the flyout; the **Create New Group** dialog box will be displayed, as shown in Figure 7-12. Type a name of your choice in the text box and then choose the **OK** button; a new group with the specified name will be displayed in the **Material/Map Browser** dialog box. You can expand and collapse the group as required.

When you install 3ds Max, the material libraries will automatically get installed in your system in the *.mat* format. To select the material library of your choice, choose the

Open Material Library option from the shortcut menu; the **Import Material Library** dialog box will be displayed. Navigate to the location C:*Program Files\Autodesk\3ds Max 2014\materiallibraries*; the material libraries will be displayed in the **Import Material Library** dialog box, as shown in Figure 7-13. Next, select the required material and choose the **Open** button; all materials of the selected material library will be displayed in the **Material/Map Browser** dialog box, as shown in Figure 7-14.

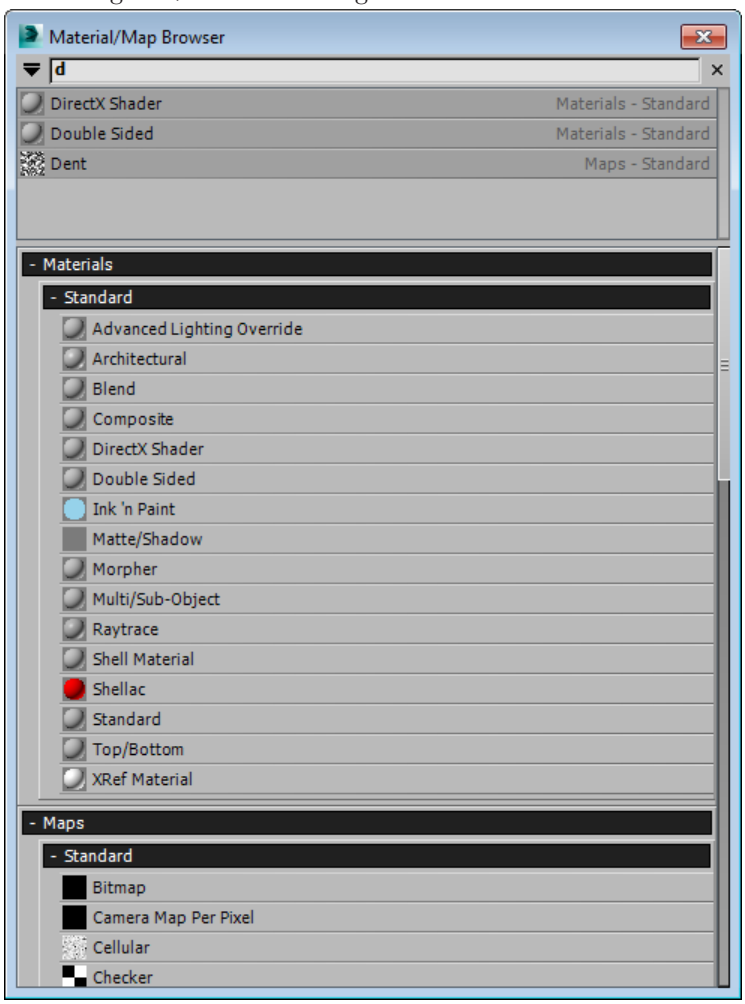


Figure 7-10 *The drop-down list displayed after entering the alphabet* ***d*** *in the text box*

You can also create a new library to put all materials and maps defined in the sample slots of the current file. To create a new library, choose the **New Material Library** option from the shortcut menu; the **Create New Material Library** dialog box will be displayed, as shown in Figure 7-15. Type a name in the text box and choose the **OK** button; a new library with the specified name will be displayed in the **Material/Map Browser** dialog box. You can expand and collapse this dialog box, as per your requirement. Next, you can put the materials defined in the sample slots to the new library using the **Put To Library** tool in the **Material Editor** dialog box.

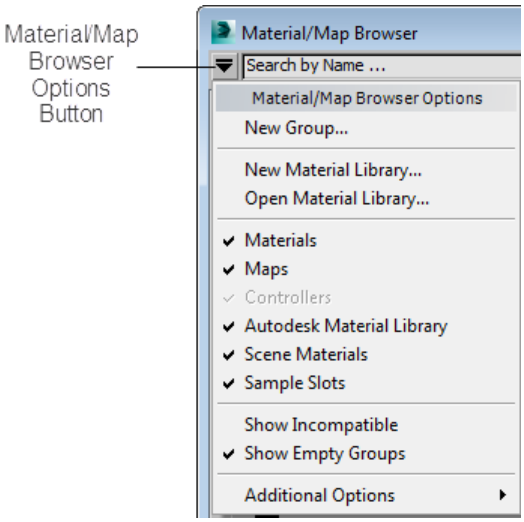


Figure 7-11 *The flyout displayed after choosing the* ***Material/Map Browser Options*** *button*

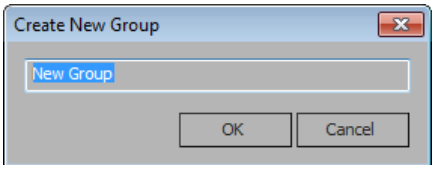


Figure 7-12 *The* ***Create New Group*** *dialog box*

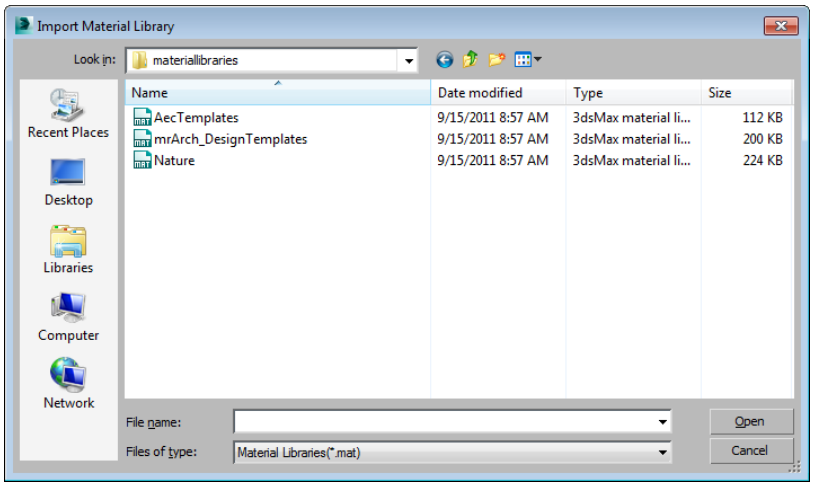


Figure 7-13 *The* ***Import Material Library*** *dialog box*

When you create a new material library using the **New Material Library** option, the newly created library will have a default name and location assigned to it. To modify the name and location, right-click on the title bar of the new library in the **Material/Map Browser** dialog box; a shortcut menu will be displayed, as shown in Figure 7-16. Now, choose the **Save As** option from the shortcut menu; the **Export Material Library** dialog box will be displayed. Next, navigate to the location where you want to save the new library. Also, type a new name in the **File name** text box and make sure that the **Material Libraries (*.mat)** option is selected in the **Save as type** drop-down list. Now, choose the **Save** button; the new library will be saved at the specified location. You can use the newly created library in another scene.

There are various rollouts such as **Materials**, **Maps**, **Scene Materials**, and **Sample Slots** in the **Material/Map Browser** dialog box. You can toggle the display of these groups by choosing the respective option from the shortcut menu.

You can also reset the **Material/Map Browser** dialog box to its default appearance. Choose the **Additional Options** option from the shortcut menu; a cascading menu will be displayed. Now, choose the **Reset Material/Map Browser** option; the **Reset Material/Map Browser** message box will be displayed. Choose the **Yes** button in this message box; the **Material/Map Browser** dialog box will be reset to its default appearance.

Note

*In 3ds Max 2014, when you right-click on a material or map in the **Material/Map Browser** dialog box, a shortcut menu will be displayed. On choosing the **Copy to** option from this shortcut menu, a cascading menu will be displayed. You can copy the material or map to an existing material library or to a new material library using the options available in this cascading menu.*

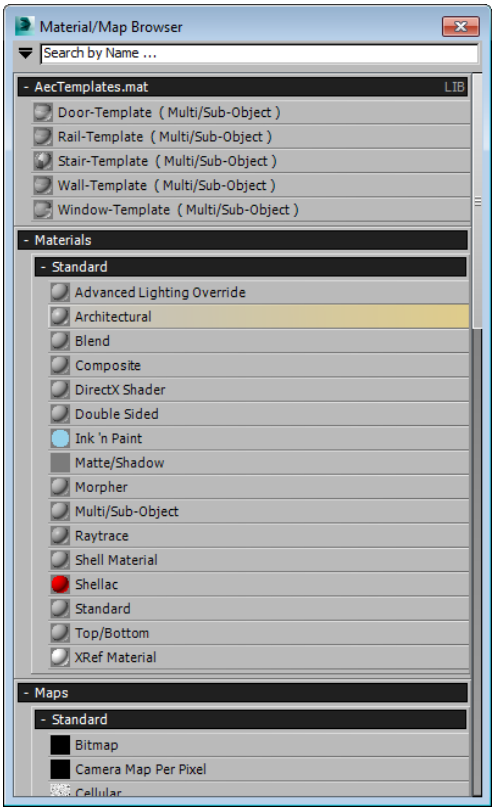


Figure 7-14 *The materials displayed in the **Material/Map Browser** dialog box*

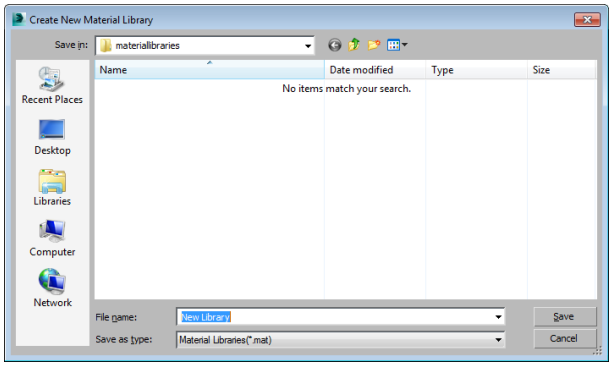


Figure 7-15 *The **Create New Material Library** dialog box*

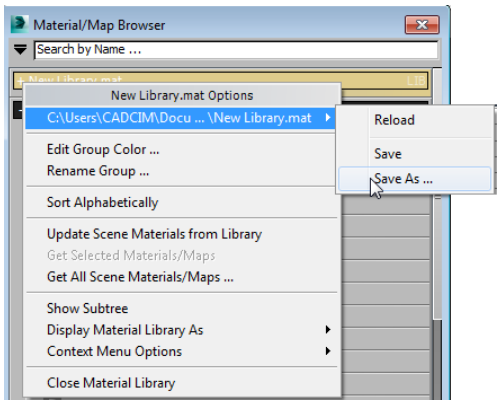


Figure 7-16 *The shortcut menu displayed*

Assign Material to Selection

Material Editor Menu: Material > Assign to Selection
Toolbar: Assign Material to Selection

The **Assign Material to Selection** tool is used to assign the material or map from the active sample slot to the selected object in the viewport. On choosing the **Assign Material to Selection** tool, the active sample slot will be surrounded by four triangles at corners, as shown in Figure 7-17.

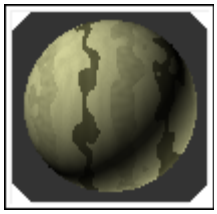


Figure 7-17 *The triangles displayed on a sample slot*

For assigning a material to the selected object in the viewport, select the sample slot and then select the object on which you need to assign the material in the viewport. Next, choose the **Assign Material to Selection** button in the **Material Editor** dialog box to assign the material to the selected object in the scene. You can also select more than one object to assign the same material to all of them. Alternatively, you can drag the material from the sample slot to the selected objects in the viewport to assign materials to them. You need to choose the **Show Shaded Material in Viewport** tool in the **Material Editor** dialog box to view the assigned material in the viewport. You will learn more about this tool later in the chapter.

Reset Map/Mtl to Default Settings

Toolbar: Reset Map/Mtl to Default Settings

The **Reset Map/Mtl to Default Settings** tool is used to reset the values that were assigned to the map or material in the active sample slot using various rollouts displayed in the **Material Editor** dialog box.

Put to Library

Material Editor Menu: Material > Put to Library
Toolbar: Put to Library

The **Put to Library** tool is used to add the selected material to the temporary library or the library created. To do so, select the sample slot that has the material that you want to add to the library. Next, choose the **Put to Library** tool; the **Put to Library** dialog box will be displayed, as shown in Figure 7-18. In the **Name** text box, enter a new name for the material and then choose the **OK** button; the material will be saved in the temporary library.

If you are in the sub-level of the material and you invoke the **Put to Library** tool, the **Material Editor** message box will be displayed, as shown in Figure 7-19. In this message box, you will be prompted to specify if you want to put the entire material/map tree to the library. Choose the **Yes** option from the message box; the **Put to Library** dialog box will be displayed. As described earlier, in the **Name** text box, enter a new name of the material and choose the **OK** button; the material will be saved in the temporary library. Also, the material will be displayed in the **Temporary Library** rollout of the **Material/Map Browser** dialog box.

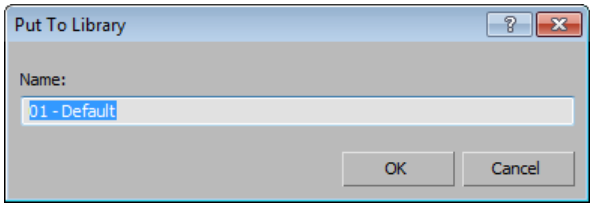


*Figure 7-18 The **Put to Library dialog** box*

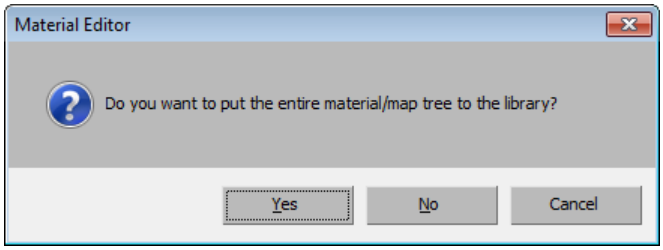


*Figure 7-19 The **Material Editor** message box*

Show Shaded Material in Viewport

Toolbar:	Show Shaded Material in Viewport

The **Show Shaded Material in Viewport** tool is used to display the material or map assigned to the selected object in the viewport. To do so, select the object in the viewport and assign a material to it and then choose the **Show Shaded Material in Viewport** tool; the material will be displayed on the selected object in the viewport.

Go to Parent

Material Editor Menu:	Navigation > Go to Parent
Toolbar:	Go to Parent
Keyboard:	Up Arrow key

The **Go to Parent** tool is used to go one level up in the current material.

Go Forward to Sibling

Material Editor Menu:	Navigation > Go Forward to Sibling
Toolbar:	Go Forward to Sibling
Keyboard:	Right Arrow key

The **Go Forward to Sibling** tool is used to go to the next map or material at the same level for the current material. This tool is active in compound materials such as **Composite** material, **Blend** material, and so on. These materials are discussed later in the chapter.

Sample Type

Toolbar:	Sample Type

On invoking the **Sample Type** tool, a flyout will be displayed. This flyout consists of three options: sphere, cylinder, and cube. These options are used to choose the geometry type to be displayed in the active sample slot. By default, the material will be displayed on a spherical sample slot.

Backlight

Material Editor Menu:	Options > Backlight
Toolbar:	Backlight
Keyboard:	L

The **Backlight** tool is invoked by default. It is used to add the backside light to the active sample slot, refer to Figures 7-20 and 7-21.

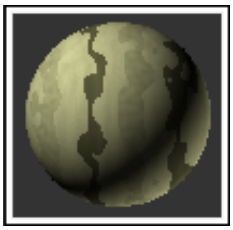


Figure 7-20 *The effect of the* ***Backlight*** *tool in the sample slot*

Figure 7-21 *The sample slot without the backlight effect*

Background

Material Editor Menu:	Options > Background
Toolbar:	Background
Keyboard:	B

The **Background** tool is used to add a multicolored background to the active sample slot, refer to Figures 7-22 and 7-23.

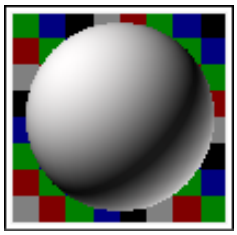


Figure 7-22 *The sample slot with the* ***Background*** *tool invoked*

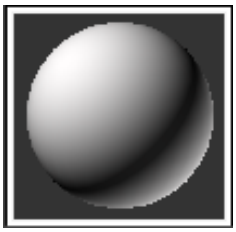


Figure 7-23 *The sample slot without invoking the* ***Background*** *tool*

Sample UV Tiling

Toolbar: Sample UV Tiling

On invoking the **Sample UV Tiling** tool, a flyout will be displayed. This flyout has four options: 1x1, 2x2, 3x3, and 4x4. On selecting any of these tiling patterns, the object in the viewport will not be affected. The selected tiling pattern will be displayed only in the active sample slot, refer to Figures 7-24, 7-25, and 7-26.

Figure 7-24 *The 1x1 sample UV tiling in a cube sample slot*

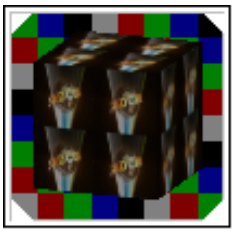


Figure 7-25 *The 2x2 sample UV tiling in a cube sample slot*

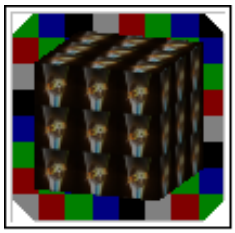


Figure 7-26 *The 3x3 sample UV tiling in a cube sample slot*

Pick Material From Object

The **Pick Material From Object** tool is used to pick the material from the object in the viewport and apply it to the active sample slot. To do so, select the sample slot to activate it and choose the **Pick Material From Object** tool; the shape of the cursor will be changed to the shape of an eye dropper. Now, move the cursor over the object in the viewport from which you want to pick the material and click on it; the selected sample slot will display the same material.

You can change the name of the material of each sample slot by entering a new name in the **Material Name** drop-down list on the right of the **Pick Material From Object** tool. The **Material Type** button on the right of the **Material Name** drop-down list displays the name of the material that is selected from the **Material/Map Browser** dialog box, refer to Figure 7-27.

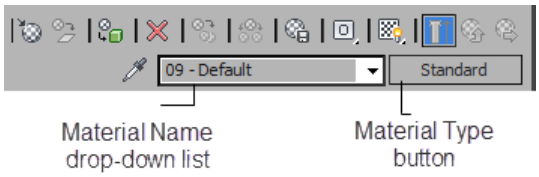


Figure 7-27 *The **Material Name** drop-down list and the **Material Type** button*

MATERIALS

In this section, you will learn about the **Material Editor** tool that helps you to create materials and assign them to the objects to make them more realistic. The materials assigned to the objects give the best results with lights, about which you will learn in the later chapters. In

3ds Max, you can create and assign various materials to the objects using the **Material Editor** tool in the **Main Toolbar**.

Choose the **Material Editor** tool from the **Main Toolbar**; the **Material Editor** dialog box will be displayed. Now, choose the **Material Type** button on the right side of the **Material Name** drop-down list, refer to Figure 7-27; the **Material/Map Browser** dialog box will be displayed. Next, expand the **Materials > Standard** rollout, if it is not already expanded; a list of 16 types of materials will be displayed. In this list, there are some materials that can combine other materials in them. These are known as Compound materials. The Compound materials in this list are **Blend**, **Composite**, **Double-Sided**, **Morpher**, **Multi/Sub-Object**, **Shellac**, and **Top/Bottom**. Select the material as per your requirement from the list and then choose the **OK** button; the name of the selected material will be displayed on the **Material Type** button in the **Material Editor** dialog box. Also, the rollouts related to that material will be displayed in the **Material Editor** dialog box. The material can be modified by using the parameters available in these rollouts. The most commonly used materials are discussed next.

Note

*You can also get the default materials using the **Get Material** tool in the **Material Editor** dialog box, as discussed earlier in this chapter.*

Standard Material

By default, the **Standard** material is selected in the **Material Editor** dialog box. Various rollouts are also displayed below the **Material Type** button to create new materials or modify the properties of the current material. The most commonly used rollouts are discussed next.

Shader Basic Parameters Rollout

The options in this rollout are used to specify the shading types and other properties for the material, refer to Figure 7-28. Select the **Wire** check box in this rollout to render the material as wireframe, as shown in Figure 7-29. Select the **2-Sided** check box to apply the material to both sides of the selected faces on rendering. Select the **Face Map** check box to apply the maps or images to each face of the object, as shown in Figure 7-30. Select the **Faceted** check box to create a faceted object, as shown in Figure 7-31. In this case, each face of the surface will be rendered as flat face.

Note

*1. To view the effect of the selection of the **Face Map** or **Faceted** check box on an object, you need to assign an image or a map to the object. You will learn more about assigning an image or a map to the object later in this chapter.*

*2. You can see the effect of the selection of the **Faceted** check box only after rendering.*

There are eight types of shaders in the drop-down list located on the top of this rollout, refer to Figure 7-28. These shaders provide different effects to the material after rendering. By default, the **Blinn** shader is selected in this drop-down list. Various shaders and their rollouts are discussed next.

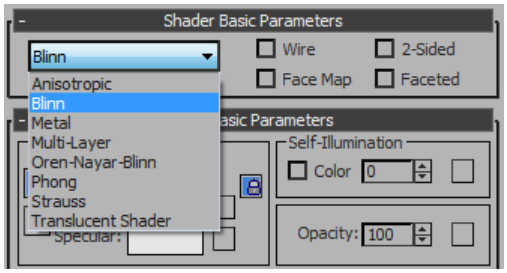


Figure 7-28 *The* ***Shader Basic Parameters*** *rollout with eight shaders displayed in the drop-down list*

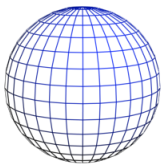


Figure 7-29 *The sphere geometry with the* ***Wire*** *check box selected*

Figure 7-30 *The sphere geometry with the* ***Face Map*** *check box selected*

Figure 7-31 *The sphere geometry with the* ***Faceted*** *check box selected*

Anisotropic Shader

The **Anisotropic** shader is used to create elliptical highlights, refer to Figure 7-32. This shader is suitable for creating glasses, brushed metals, grass, and so on. To assign this shader to the material, select the **Anisotropic** option from the drop-down list in the **Shader Basic Parameters** rollout. On doing so, the **Anisotropic Basic Parameters** rollout will be displayed below the **Shader Basic Parameters** rollout, as shown in Figure 7-33. This rollout is discussed next.

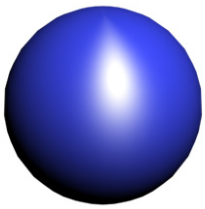


Figure 7-32 *The sphere geometry with* ***Anisotropic*** *shader*

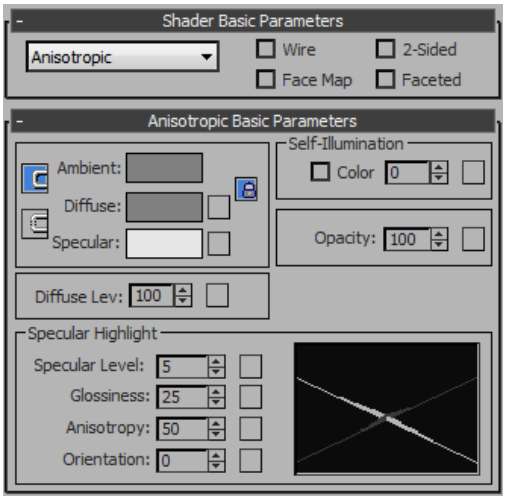


Figure 7-33 *The* ***Anisotropic Basic Parameters*** *rollout*

Note

*To view the effects of shaders, you need to set the parameters in the **Basic Parameters** rollout of the corresponding shader.*

Anisotropic Basic Parameters Rollout: The options in the **Anisotropic Basic Parameters** rollout are used to set the colors, transparency, shine, and so on of the material.

The **Ambient**, **Diffuse**, and **Specular** color swatches are used to set the colors of the material. The **Ambient** color swatch is used to specify the color of an object in shadow. The **Diffuse** color swatch is used to specify the color of an object in direct light. It is the primary color of the material. The **Specular** color swatch is used to specify the color of the highlighted or the shiny part of the material, refer to Figure 7-34.

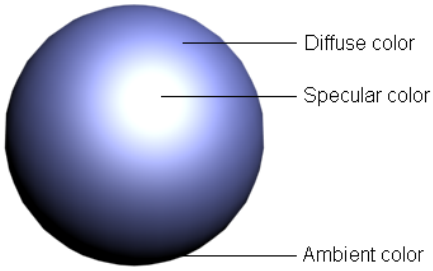


Figure 7-34 *The ambient, diffuse, and specular colors in a sphere*

To set the color of the material, select one of the color swatches; the **Color Selector** dialog box will be displayed along with the name of the color swatch that you have selected. Select a color and choose the **OK** button; the selected color will be displayed in the color swatch and the active sample slot.

Self-Illumination Area: The options in the **Self-Illumination** area are used to create incandescence effect by replacing shadows on the surface with color specified using the **Diffuse** color swatch. It creates an illusion of light being generated from the material. The value of the spinner in the **Self-Illumination** area specifies the percentage of shadow replaced with the color. To set the illumination of the object, select the **Color** check box in this area; the spinner on its right will be replaced by a color swatch. You can change the intensity as well as the color for the self-illumination using the color swatch. Choose the color swatch in the **Self-Illumination** area; the **Color Selector: Self Illum Color** dialog box will be displayed. As you increase the value in the **Value** spinner, the intensity of the incandescence effect also increases, refer to Figures 7-35 and 7-36.

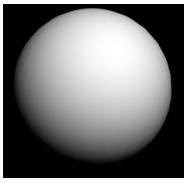


Figure 7-35 *A sphere geometry without self-illumination*

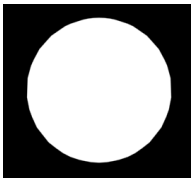


Figure 7-36 *A sphere geometry with self-illumination*

The value in the **Opacity** spinner is used to control the transparency of the material. By default, the value in the spinner is 100, which makes a material opaque. As you decrease the value, the transparency will increase, refer to Figure 7-37.

Figure 7-37 *A teapot geometry within a transparent box*

The value in the **Diffuse Lev** spinner is used to control the brightness of the diffuse color in the material, refer to Figures 7-38 and 7-39. By default, the value in this spinner is 100.

Figure 7-38 *The torus knot geometry with the default value in the* ***Diffuse Lev*** *spinner*

Figure 7-39 *The torus knot geometry with the value* ***150*** *in the* ***Diffuse Lev*** *spinner*

Specular Highlight Area: The options in the **Specular Highlight** area are used to set the shape, appearance, strength, and orientation of the specular highlight or the shiny part of the material.

The value in the **Specular Level** spinner is used to set the brightness or intensity of the specular highlight of the material. As you increase the value in the spinner, the brightness of the specular highlight will also increase, refer to Figures 7-40 and 7-41.

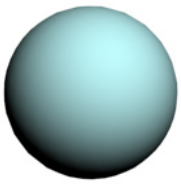


Figure 7-40 *The sphere geometry with the value* ***0*** *in the* ***Specular Level*** *spinner*

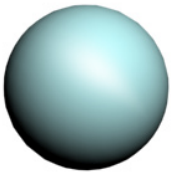


Figure 7-41 *The sphere geometry with the value* ***66*** *in the* ***Specular Level*** *spinner*

The value in the **Glossiness** spinner is used to set the size of the specular highlight of the material. However, if you increase the value in the **Glossiness** spinner, the size of the specular highlight will decrease, refer to Figures 7-42 and 7-43.

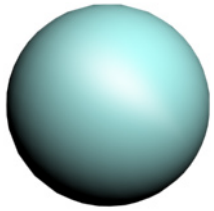


Figure 7-42 *The sphere geometry with less value in the* ***Glossiness*** *spinner*

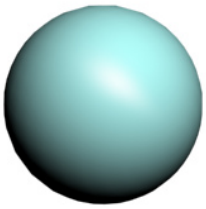


Figure 7-43 *The sphere geometry with more value in the* ***Glossiness*** *spinner*

The value in the **Anisotropy** spinner is used to set the shape of the specular highlight of the material. As you increase the value in the **Anisotropy** spinner, the shape of the specular highlight will reduce, refer to Figures 7-44 and 7-45.

Figure 7-44 *The teapot geometry with less value in the* ***Anisotropy*** *spinner*

Figure 7-45 *The teapot geometry with more value in the* ***Anisotropy*** *spinner*

The value in the **Orientation** spinner is used to change the orientation of the specular highlight of the material in degrees. By default, its value is 0. By changing the value in the **Orientation** spinner, you can change the orientation of the specular highlight of the material, as shown in Figures 7-46 and 7-47.

Figure 7-46 *The teapot geometry with the value* ***0*** *in the* ***Orientation*** *spinner*

Figure 7-47 *The teapot geometry with the value* ***45*** *in the* ***Orientation*** *spinner*

Note
*In the **Specular Highlight** area, there is a graph on the right that graphically represents the changes in all spinners.*

Blinn Shader

The **Blinn** shader is used to create round and soft highlights, as shown in Figure 7-48. To assign this shader to the material, select the **Blinn** option from the drop-down list available in the **Shader Basic Parameters** rollout; the **Blinn Basic Parameters** rollout will be displayed below the **Shader Basic Parameters** rollout. This rollout is discussed next.

Blinn Basic Parameters Rollout: The **Ambient**, **Diffuse**, and **Specular** color swatches, the **Self-Illumination** area, and the **Opacity** spinner in this rollout are the same as those discussed in the **Anisotropic Basic Parameters** rollout.

In the **Specular Highlights** area, the **Specular Level** and **Glossiness** spinners are the same as those discussed in the **Anisotropic Shader**. The value in the **Soften** spinner is used to soften the effect of the specular highlight. By default, its value is 0.1.

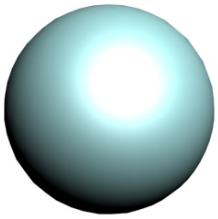


Figure 7-48 *The sphere geometry with the **Blinn** shader*

Metal Shader

The **Metal** shader is used to give a metallic effect to objects, as shown in Figure 7-49. To assign this shader to the material, select the **Metal** shader from the drop-down list available in the **Shader Basic Parameters** rollout; the **Metal Basic Parameters** rollout will be displayed below the **Shader Basic Parameters** rollout. This rollout is discussed next.

Figure 7-49 *The teapot geometry with the **Metal** shader*

Metal Basic Parameters Rollout: The options in this rollout are the same as discussed in the **Anisotropic Basic Parameters** rollout.

Multi-Layer Shader

The **Multi-Layer** shader is similar to the **Anisotropic** shader with the only difference that the **Multi-Layer** shader has two specular highlight controls. To assign this shader to the material, select the **Multi-Layer** shader from the drop-down list available in the **Shader Basic Parameters** rollout; the **Multi-Layer Basic Parameters** rollout will be displayed. This rollout is discussed next.

Multi-Layer Basic Parameters Rollout: In the **Multi-Layer Basic Parameters** rollout, the **Ambient** and **Diffuse** color swatches are same as those discussed in the **Anisotropic Basic Parameters** rollout. Also, the **Self-Illumination** area, the **Opacity** spinner, and the **Diffuse Level** spinner are same as those discussed in the **Anisotropic Basic Parameters** rollout.

The **Roughness** spinner is used to set the transition from diffuse color to the ambient color. By default, its value is 0 and it ranges from 0 to 100. When you increase the value in the **Roughness** spinner, the material becomes less shiny, refer to Figures 7-50 and 7-51.

Figure 7-50 *The teapot with less value in the* ***Roughness*** *spinner*

Figure 7-51 *The teapot with more value in the* ***Roughness*** *spinner*

In the **Multi-Layer Basic Parameters** rollout, there are two specular highlight areas, **First Specular Layer** and **Second Specular Layer**. You can use both highlights independently to produce complex and blend shadings in the material. The options in the **First Specular Layer** and the **Second Specular Layer** areas are same. However, you can use different settings to produce the blend shadings in the material, as shown in Figure 7-52. These options are discussed next.

Figure 7-52 *The teapot with the* ***Multi-Layer*** *shader*

Choose the **Color** color swatch to change the specular color of the first and the second highlights in the respective areas. The **Level** spinner is used to set the brightness or the

intensity of the specular highlight of the material. By default, its value is 0. As you increase the value in the spinner, the brightness of the specular highlight will also increase. The **Glossiness**, **Anisotropy**, and **Orientation** options are the same as those discussed in the **Anisotropic** shader.

Oren-Nayar-Blinn Shader

The **Oren-Nayar-Blinn** shader is a variant of the **Blinn** shader and is used to create dull or matte highlights, as shown in Figure 7-53. This shader can be used for rubber, clay, clothes, and so on. To assign this shader to the material, select the **Oren-Nayar-Blinn** shader from the drop-down list available in the **Shader Basic Parameters** rollout; the **Oren-Nayar-Blinn Basic Parameters** rollout will be displayed. This rollout is discussed next.

Figure 7-53 *The teapot geometry with the* ***Oren-Nayer-Blinn*** *shader*

Oren-Nayar-Blinn Basic Parameters Rollout: The **Ambient**, **Diffuse**, and **Specular** color swatches, the **Self-Illumination** area, and the **Opacity** spinner in this rollout are the same as discussed in the **Anisotropic Basic Parameters** rollout. In the **Advanced Diffuse** area, the **Diffuse Level** and **Roughness** spinners are the same as discussed in the **Multi-Layer** shader.

In the **Specular Highlights** area, the **Specular Level**, **Glossiness**, and **Soften** spinners are the same as discussed in the **Blinn** shader.

Phong Shader

The **Phong** shader is very similar to the **Blinn** shader. The only difference is that the highlights produced by the **Phong** shader are stronger than those produced by the **Blinn** shader, as shown in Figure 7-54. To assign this shader to the material, select the **Phong** shader from the drop-down list available in the **Shader Basic Parameters** rollout; the **Phong Basic Parameters** rollout will be displayed. This rollout is discussed next.

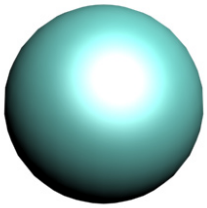


Figure 7-54 *The sphere geometry with the* ***Phong*** *shader*

Phong Basic Parameters Rollout: The **Ambient**, **Diffuse**, and **Specular** color swatches, the **Self-Illumination** area, and the **Opacity** spinner in this rollout are the same as described in the **Anisotropic Basic Parameters** rollout. In the **Specular Highlights** area, the **Specular Level**, **Glossiness**, and **Soften** spinners are the same as those discussed in the **Blinn** shader.

Strauss Shader

The **Strauss** shader is used to create the metallic and non-metallic surfaces, as shown in Figure 7-55. To assign this shader to the material, select the **Strauss** shader from the drop-down list; the **Strauss Basic Parameters** rollout will be displayed. This rollout is discussed next.

Strauss Basic Parameters Rollout: The **Strauss** shader does not have the **Ambient**, **Diffuse**, and **Specular** color swatches. Choose the **Color** swatch to change the color of the material. The value in the **Glossiness** spinner is used to set the size and the intensity of the specular highlight of the material. The value in the **Metalness** spinner is used to set the metallic effect in the material. The value in the **Opacity** spinner is used to set the transparency of the material.

Figure 7-55 *The teapot geometry with the* ***Strauss*** *shader*

Translucent Shader

The **Translucent** shader is used to create translucent materials. In such materials, the light gets scattered as it passes through them, as shown in Figure 7-56. It is very similar to the **Blinn** shader. Additionally, it defines the translucency of the material. To assign this shader to the material, you need to select the **Translucent Shader** from the drop-down list in the **Shader Basic Parameters** rollout; the **Translucent Basic Parameters** rollout will be displayed. This rollout is discussed next.

Figure 7-56 *The sphere geometry with the* ***Translucent*** *shader*

Translucent Basic Parameters Rollout: Most of the options in this rollout are the same as discussed earlier. By default, the **Backside specular** check box is selected in this rollout. As a result, the specular highlight is displayed on both sides of the material.

Note

*Select the **Backside specular** check box in the **Specular Highlights** area in the **Translucent Basic Parameters** rollout to create materials such as plastic or smooth glass. Clear the **Backside specular** check box to create the frosted or rough material.*

In the **Translucency** area, the **Translucent Clr** swatch is used to define the color of the light that will be scattered inside the material. The **Filter Color** swatch is used to define the color of the light that will be transmitted by the material.

Architectural Material

The **Architectural** material is used to provide a highly realistic view of an object when rendered with photometric lights and radiosity, about which you will learn in the later chapters. To apply the **Architectural** material, choose the **Material Type** button on the right side of the Material Name drop-down list; the **Material/Map Browser** dialog box will be displayed. Choose the **Architectural** material from the **Material/Map Browser** dialog box; the **Architectural** label will be displayed on the **Material Type** button. Also, various rollouts such as **Physical Qualities**, **Special Effects**, and so on will be displayed below the **Architectural** button. You can use these rollouts to create new materials and modify the physical properties of those materials. The most commonly used rollouts are discussed next.

Templates Rollout

The drop-down list in the **Templates** rollout consists of a number of preset materials such as **Water**, **Glass-Clear**, **Metal**, **Paper,** and so on, as shown in Figure 7-57. On selecting one of the preset materials from the drop-down list, you will get a template in the selected sample slot for the type of material you have selected. After selecting the material, you can set the parameters in other rollouts to get a realistic view of the material, as shown in Figure 7-58.

Physical Qualities Rollout

The **Diffuse Color** swatch is used to specify the color of an object in direct light. It is the main color of the material. Choose the **Diffuse Color** swatch to define the color of the material. The **Diffuse Map** option is used to assign a map or an image to the material. To do so, choose the **Diffuse Map** button labeled as **None** on the right side of the **Diffuse Map** spinner; the **Material/Map Browser** dialog box will be displayed. Select one of the maps from the **Maps > Standard** rollout and double-click on it to assign it. The basic parameters rollouts of the selected map will be displayed. Set the parameters as per your requirement and then choose the **Go To Parent** button to go back to the previous level; the **None** label will be replaced by the name of the selected map. The spinner on the right side of the **Diffuse Map** option is used to set the amount of visibility of the map in the material in percentage. By default, its value is 100. On decreasing the value in this spinner, the visibility of the map in the material will be decreased. Note that by default, the check boxes located in between the spinners and the buttons in the **Physical Qualities** rollout are selected. As a result, the selected map will be displayed on the material.

The **Set color to texture average** button, available next to the **Diffuse Color** color swatch will be activated only if you assign a diffuse map to the material using the **Diffuse Map** button. This button is used to set the diffuse color according to the map that you have assigned to the material using the **Diffuse Map** button.

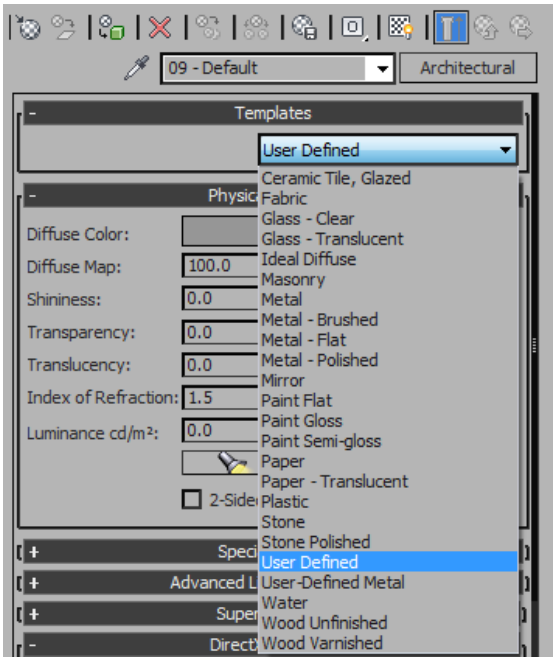


Figure 7-57 *The preset materials in the drop-down list in the* ***Templates*** *rollouts*

Figure 7-58 *The teapot geometry with the* ***Architectural*** *material applied*

The **Shininess**, **Transparency**, and **Translucency** options in the **Physical Qualities** rollout are used to define the shine, transparency, and the translucency of the material. Also, you can assign a map or an image to these options as you did for the **Diffuse Map** option. The **Index of Refraction** spinner is used to set the amount of refraction of the light transmitted by the material. The **Luminance cd/m²** spinner is used to give the glow effect to the material. The luminance is measured in candelas per meter square. The **Set luminance from light** button uses the scene light to obtain the materials luminance. Select the **2-Sided** check box to assign the material on both sides of the selected faces.

Note

The ***Architectural*** *material gives a realistic result only with photometric lights.*

Raytrace Material

The **Raytrace** material creates highly refractive and reflective surfaces. When this material is assigned to an object in the scene, the materials/maps of other objects in the scene get reflected on it, as shown in Figure 7-59. It is an advance material and is used to provide realistic raytraced images. It also creates raytraced reflections and refractions, and takes a longer time to render. On selecting the **Raytrace** material, various rollouts will also be displayed below the **Material Type** button to create new materials and modify the properties of those materials. The **Raytrace Basic Parameters** rollout is most commonly used and is discussed next.

Raytrace Basic Parameters Rollout

The basic parameters in this rollout are similar to those used in the **Standard** material but the color swatches in this rollout act differently, refer to Figure 7-60. These color controls are discussed next.

Figure 7-59 *The teapot geometry with the* ***Raytrace*** *material applied*

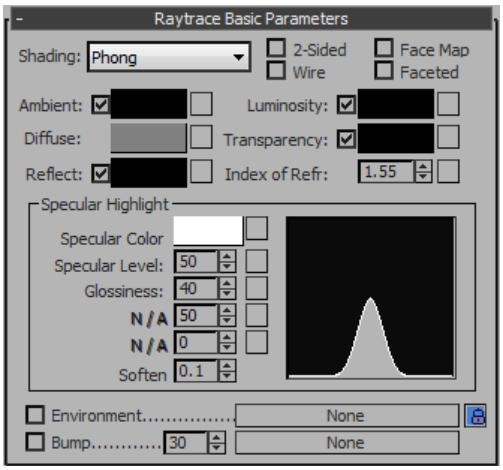


Figure 7-60 *The* ***Raytrace Basic Parameters*** *rollout*

By default, the check box on the left side of the **Ambient** color swatch is selected, which is used to specify the amount of absorption of the ambient light by the material. By default, the black color is selected in this color swatch and it specifies the maximum absorption of the ambient light by the material. On setting a lighter color in the **Ambient** color swatch, the ambient light will be reflected. If you clear the check box, the color swatch will be replaced by a spinner. The value in the spinner specifies the grayscale value.

The **Diffuse** color swatch specifies the color of the object without the specular highlight. The **Reflect** color swatch is used to specify the specular reflection color. By default, the color in this color swatch is black and the object does not reflect. If you change the color to white, then the object will reflect everything and will be visible. If you clear the check box, the color swatch will be replaced by a spinner. If you set the value in the **Reflect** spinner to 100, then the diffuse color will not be visible on the object. The value in the spinner specifies the grayscale value. If you select this check box again, the spinner will be replaced by the **Fresnel** option. This option adds the fresnel effect to the reflecting object resulting in a bit of extra reflection in the reflecting object.

The **Luminosity** color swatch is very similar to the **Self-Illumination** area in the **Standard** material. By default, the check box on the right of the **Luminosity** option is selected. If you clear the check box, the **Luminosity** label will be replaced by **Self-Illum** and the color swatch will be replaced by a spinner. The value in the spinner specifies the grayscale value.

The **Transparency** color swatch is used to define the transparency of the object. By default, the check box on the right of the **Transparency** option is selected. If you clear this check box, the **Transparency** color swatch is replaced by a spinner. The value in the spinner also defines the transparency of the object.

Blend Material

The **Blend** material is a compound material and is used to mix two different materials, as shown in Figure 7-61. You can assign this mixed or blend material as a single material. When you select the **Blend** material from the **Material/Map Browser** dialog box, the **Replace Material** dialog box will be displayed, as shown in Figure 7-62. Select the **Discard old material?** radio button to remove the current material of the selected sample slot. Select the **Keep old material as sub-material?** radio button to keep the material of the selected sample slot as a sub-material in the **Blend** material. Choose the **OK** button; the **Blend** material will be displayed in the **Material Type** button with a number of rollouts. The most commonly used rollout is discussed next.

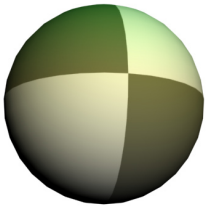


Figure 7-61 *The sphere geometry with the* ***Blend*** *material applied*

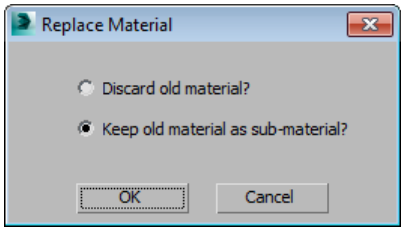


Figure 7-62 *The* ***Replace Material*** *dialog box*

Blend Basic Parameters Rollout

On the top of this rollout, there are two buttons, **Material 1** and **Material 2**, as shown in Figure 7-63. These buttons are labeled with the name of the default materials and are used to select two different materials to blend. By default, the **Standard** material is displayed as the sub-material. Choose these buttons to assign desired materials. Next, choose the **Go To Parent** tool to go back to the **Blend** material.

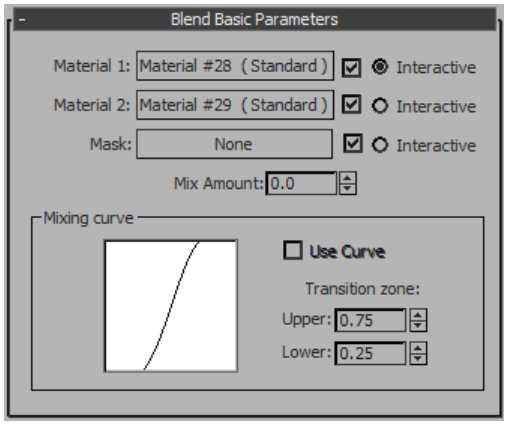


Figure 7-63 *The* ***Blend Basic Parameters*** *rollout*

The **Mask** button is used to insert an image or a map as a mask. The amount of blending of the two materials depends on the mask image. The lighter area of the mask image will show more of **Material 1** and the darker area of the mask image will show more of **Material 2**.

By default, the check boxes on the right side of the **Material 1**, **Material 2**, and **Mask** buttons are selected, which specify that the concerned material or the mask will be displayed on the object. If you clear any of the check boxes, the corresponding material or mask will not be displayed.

Select the two **Interactive** radio buttons on the right side of the check boxes to specify the materials that will be displayed on the object in the shaded viewports. The value in the **Mix Amount** spinner is used to set the blending amount of the materials in percentage. When you insert a map using the **Mask** button, the **Mix Amount** spinner will become inactive.

The **Mixing Curve** area is used to define the transition between two colors being blended. It affects the transition only when the mask map is applied to the **Mask** button. Select the **Use Curve** check box to apply the curve settings to the blending. This check box will be active only if you have assigned the mask map. In the **Transition zone** group, the values in the **Upper** and **Lower** spinners set the transition of the materials. The values in these spinners vary from 0 to 1.0.

Note
*The blending of maps can be animated over time using the **Mix Amount** spinner.*

Composite Material

The **Composite** material is similar to the **Blend** material and is used to mix ten different materials. You can assign this mixed material as a single material. On choosing the **Material Type** button, the **Material/Map Browser** dialog box will be displayed. Select the **Composite** material and choose the **OK** button; the **Replace Material** dialog box will be displayed. Select the **Discard old material?** radio button to remove the material of the selected sample slot. Else, select the **Keep old material as sub-material?** radio button to retain the material of the selected sample slot as a sub-material in the **Composite** material. Choose the **OK** button; the **Composite** material will be displayed in the **Material Type** button with a number of rollouts. The most commonly used rollout is **Composite Basic Parameters** rollout, which is discussed next.

Composite Basic Parameters Rollout

On the top of this rollout, there is the **Base Material** button which is labeled with the name of the material on it, refer to Figure 7-64. It is used to define the base material of the object. By default, the **Standard** material is displayed on it. Choose this button and set the parameters for the base material as required. Next, choose the **Go to Parent** tool to go back to the parent level.

There are nine buttons below the **Base Material** button, from **Mat.1** to **Mat.9**, labeled with **None**. These buttons are used to composite nine materials. Choose these buttons one by one to assign different materials; the **None** labels will be replaced by the names of the materials that will be assigned to them. The check boxes on the left side of these buttons are selected to display the corresponding materials in the objects. If you do not want to display any of the materials, then clear the respective check boxes.

The **A**, **S**, and **M** buttons are used to specify the composition of the materials. Choose the **A** button to use the additive color to compose the materials. It specifies that the color of the base material will be added to the color of the composed material. Choose the **S** button to use the subtractive color to compose. It specifies that the color of the composed material will be subtracted from the color of the base material. Choose the **M** button to blend the materials as discussed in the Blend Material section with the only difference that the option for masking is not available in this case. For each material, the spinner on the right of the **A**, **S**, and **M** buttons determines the amount of mixing of the respective material with the **Base Material**. When the **A** and **S** buttons are active, the value in the spinner ranges from 0 to 200. Whereas, when the **M** button is active, the value in the spinner ranges from 0 to 100.

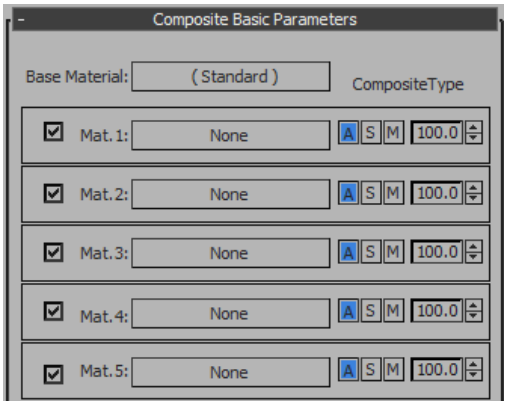


Figure 7-64 *The* ***Composite Basic Parameters*** *rollout*

Double Sided Material

The **Double Sided** material is used to assign two different materials to the front and back faces of an object, refer to Figures 7-65 and 7-66. Choose the **Double Sided** material from the **Material/Map Browser** dialog box; the **Double Sided** material will be displayed in the **Material Type** button with a number of rollouts. The **Double Sided Basic Parameters** rollout is discussed next.

Figure 7-65 *The object with the* ***Standard*** *material*

Figure 7-66 *The object with the* ***Double Sided*** *material*

Double Sided Basic Parameters Rollout

The **Translucency** spinner at the top of this rollout specifies the amount of blending of **Facing Material** and **Back Material**, refer to Figure 7-67. The value in this spinner varies from 0 to 100.0. If you set the value **100** in the **Translucency** spinner, the back material will completely

cover the face material. Choose the buttons next to the **Facing Material** and **Back Material** options to select the material for the front and back sides of the object, respectively.

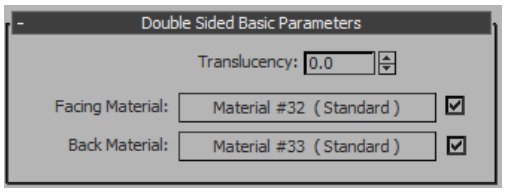


Figure 7-67 *The* ***Double Sided Basic Parameters*** *rollout*

Multi/Sub-Object Material

The **Multi/Sub-Object** material is used to assign different materials to an object at the sub-object level, as shown in Figure 7-68. Select the object to which the **Multi/Sub-Object** material is to be assigned. Convert the object to editable poly and then select the **Polygon** sub-object level. Next, select the group of polygons in the viewport, refer to Figure 7-69. Now, expand the **Polygon Material IDs** rollout and enter the value **1** in the **Set ID** spinner and press ENTER. Then, invert the selection and enter the value **2** in the **Set ID** spinner. Next, press ENTER, refer to Figure 7-70. Note that multiple numbers of IDs can be assigned to an object depending on the number of materials to be assigned to it. Once IDs are set to different parts of the object, choose the **Multi/Sub-Object** material from the **Material/Map Browser** dialog box; the **Replace Material** message box will be displayed. Select the **Discard old material?** radio button from it and choose the **OK** button; the **Multi/Sub-object** material will be displayed in the **Material Type** button. Also, the **Multi/Sub-Object Basic Parameters** rollout will be displayed, refer to Figure 7-71. This rollout is discussed next.

Figure 7-68 *The object with the* ***Multi/Sub-Object*** *material*

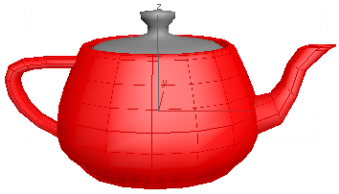


Figure 7-69 *The object with group of polygons selected*

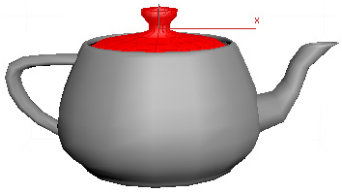


Figure 7-70 *The object with remaining polygons selected*

Multi/Sub-Object Basic Parameters Rollout

Choose the **Set Number** button in this rollout; the **Set Number of Materials** dialog box will be displayed. Enter **2** in the **Number of Materials** spinner and choose the **OK** button; the **Multi/Sub-Object Basic Parameters** rollout will display two entries instead of ten entries. Note that the value entered in the **Number of Materials** spinner should be equal to the number of IDs created for the object which in turn is equal to the entries in this rollout. Now, choose the **None** button for each of the IDs to assign the required sub-material. Also, you can enter the name of the sub-material in the **Name** text box. Next, assign the material to the object to see the effect of the **Multi-Sub-Object** material.

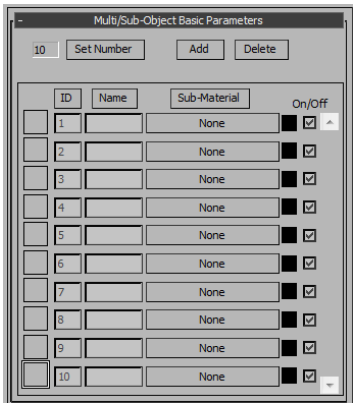


Figure 7-71 *The* ***Multi/Sub-Object Basic Parameters*** *rollout*

Note

If you want to change only the color of the sub-material without assigning any map to it, then the color swatch next to it will be inactive. It will be activated only when you assign ***Standard*** *material to it.*

Top/Bottom Material

The **Top/Bottom** material is used to assign two different materials on the top and bottom portions of the object, as shown in Figure 7-72. To do so, choose the **Top/Bottom** material from the **Material/Map Browser** dialog box; the **Top/Bottom** material will be displayed in the **Material Type** button with a number of rollouts. The **Top/Bottom Basic Parameters** rollout is discussed next.

Top/Bottom Basic Parameters Rollout

Choose the buttons next to **Top Material** and **Bottom** to select the material for the top and bottom portions of the object, respectively, refer to Figure 7-73. Choose the **Swap** button to exchange the material of the **Top Material** and **Bottom** buttons.

Figure 7-72 *The object with the* ***Top/Bottom*** *material applied*

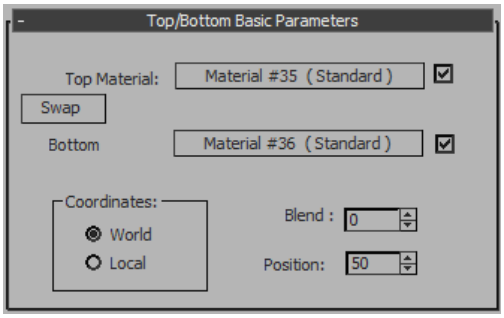


Figure 7-73 *The* ***Top/Bottom Basic Parameters*** *rollout*

The options in the **Coordinates** area are used to set the boundary between the top and bottom of the object. By default, the **World** radio button is selected and the faces will point up or

down according to the world coordinates of the scene. In this case, if you transform the object, then the boundary remains constant at its place. If you select the **Local** radio button, then the faces will point up or down according to the local coordinates of the object. In this case, if you transform the object, the material will also get transformed. The **Blend** spinner is used to blend the edges of the top and bottom materials. The **Position** spinner is used to specify the position of the top and bottom materials on the object. By default, the value in both the spinners ranges from 0 to 100.0.

MAPS

In 3ds Max, maps are the default images assigned to a material. They are used to create texture for the objects to make them appear more realistic. In this section, you will learn about assigning the maps to the objects. When maps are assigned to the objects, the objects demonstrate best effects on applying lights.

To assign a map to the material, choose **Modes > Compact Material Editor** from the material editor menu bar; the **Material Editor** dialog box will be displayed. Select one of the sample slots in the **Material Editor** dialog box to activate it. Now, in the basic parameters rollout of the selected material, choose the small square buttons on the right of the parameters available, refer to Figure 7-74; the **Material/Map Browser** dialog box will be displayed with a list of default maps available in 3ds Max. Next, select the required map from the **Maps > Standard** rollout and then choose the **OK** button; the name of the selected map will be displayed on the **Material Type** button and the rollouts related to that map will also be displayed. Set the parameters for the map in various rollouts displayed. Next, choose the **Go to Parent** button to go back to the previous level; the small square button will be labeled as **M**. Also, when you move the cursor over the **M** button, it will display the name of the map that you have assigned to it.

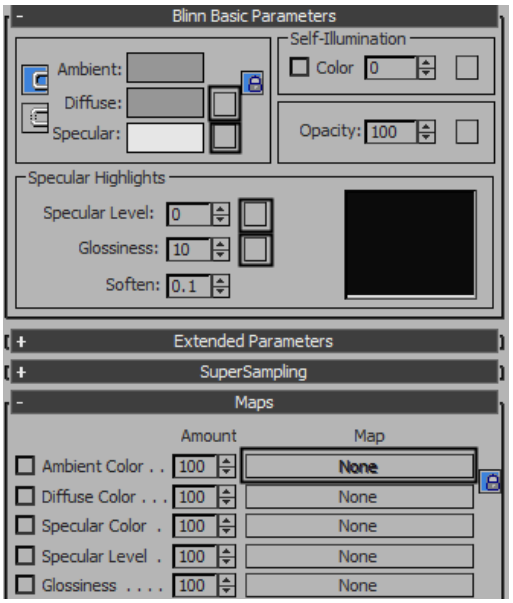


Figure 7-74 *The square buttons highlighted for inserting maps*

Various types of maps available in the **Material/Map Browser** dialog box are discussed next.

Note

*You can also assign maps using different options such as **Ambient Color**, **Diffuse Color**, **Specular Color**, and so on to a material using the **Maps** rollout in the **Material Editor** dialog box. You need to choose the buttons on the right side of these options that are labeled as **None**, refer to Figure 7-73.*

Types of Maps

In 3ds Max, the maps are categorized as bitmaps and procedural maps. The bitmaps are 2D images and they get pixelated when zoomed on them. The procedural maps are **Noise**, **Tiles**, **Marble**, **Gradient**, and so on and they do not get pixelated when zoomed on them. The maps can be categorized into 2D maps, 3D maps, Compositors, Color Mods, and so on. These maps are discussed next.

2D Maps

The 2D maps are two-dimensional images that can be assigned to geometric objects and are used to create an environment for the scene. The most commonly used two-dimensional maps such as **Bitmap**, **Checker**, **Combustion**, **Gradient**, **Gradient Ramp**, **Swirl**, and **Tiles** are discussed next.

Bitmap

The bitmaps are the simplest 2D images. To apply this map on an object, select the **Bitmap** map in the **Material/Map Browser** dialog box; the **Select Bitmap Image File** dialog box will be displayed. In this dialog box, select the image that you want to insert and choose the **Open** button; the image will be displayed in the selected sample slot. Also, various rollouts to modify the image map will be displayed in the **Material Editor** dialog box. Now, when the material is assigned to the object in the viewport, the object will be displayed with the assigned bitmap, as shown in Figure 7-75. You can select all the still or animated files that 3ds Max supports.

Checker

The **Checker** map is a combination of two colors, as shown in Figure 7-76. You can change or replace the colors with the images using the **Checker Parameters** rollout in the **Material Editor** dialog box.

Gradient

The **Gradient** map is used to create a ramp of three colors, as shown in Figure 7-77. You can modify or replace colors with images using the **Gradient Parameters** rollout of the **Material Editor** dialog box.

Gradient Ramp

The **Gradient Ramp** map is a 2D map similar to the **Gradient** map, as shown in Figure 7-78. However, in this map, you can use any numbers of colors and maps for creating the gradient. You can get the best effect using the **Gradient Ramp Parameters** rollout in the **Material Editor** dialog box.

Figure 7-75 A sphere with the ***Bitmap*** *map applied*

Figure 7-76 A sphere with the ***Checker*** *map applied*

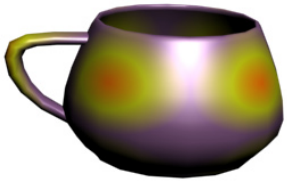


Figure 7-77 An object with the ***Gradient*** *map applied*

Swirl

The **Swirl** map is a procedural map and is used to produce whirl effect in materials, as shown in Figure 7-79. You can modify the colors or replace the colors with the images using the **Swirl Parameters** rollout in the **Material Editor** dialog box.

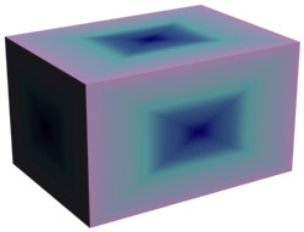


Figure 7-78 A box with the ***Gradient Ramp*** *map applied*

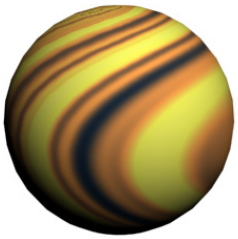


Figure 7-79 A sphere with the ***Swirl*** *map applied*

Tiles

The **Tiles** map is a procedural map and is used to create bricks or tiles effect using different colors and maps, as shown in Figure 7-80. The better effect of this map can be aquired using different rollouts displayed in the **Material Editor** dialog box.

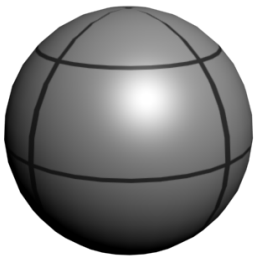


Figure 7-80 A sphere with the ***Tiles*** *map applied*

Substance Map and Map Output Selector Map

The **Substance** map is a collection of 2D textures. To use a texture from the **Substance** map, choose any of the desired map buttons from the **Material Editor** dialog box and select the **Map Output Selector** map from the **Maps** rollout in the **Material/Map Browser** dialog box. On doing so, the **Map Output Selector** map will be displayed in the **Material Type** button. Also, the **Parameters** rollout will be displayed, as shown in Figure 7-81. Next, choose the **None** button on the right of the **Source Map** parameter from the **Parameters** rollout and then select **Substance** from the **Material/Map Browser** dialog box; various rollouts such as **Global Substance Settings**, **Substance Package Browser**, **Coordinates**, and so on will be displayed in the **Material Editor** dialog box, as shown in Figure 7-82.

Now, choose the **Load Substance** button from the **Substance Package Browser** rollout; the **Browse from Substances** dialog box will be displayed. In this dialog box, select the desired texture and choose the **Open** button; the **Load Substance** button will be replaced by the texture you have selected. Also, the rollout for the respective texture parameters will be added at the bottom in the **Material Editor** dialog box. In this rollout, different parameters can be changed to get the desired result. Choose the **Get Substance From Marketplace** button to buy textures online. Next, choose the **Go to Parent** button and select the desired channel name from the **Channel Name** drop-down list.

Vector Displacement Map

The **Vector Displacement** map is a procedural map and is used to displace the meshes in three dimensions. This map uses a range of color to display its effect.

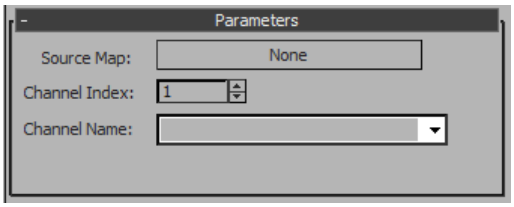


*Figure 7-81 The **Parameters** rollout of the **Map Output Selector** map*

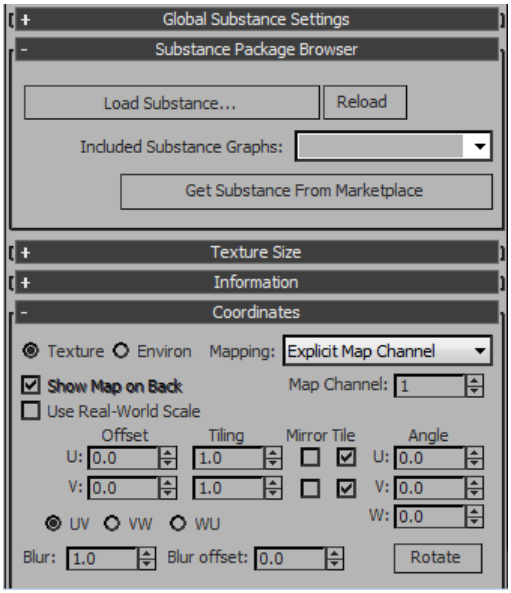


*Figure 7-82 The rollouts displayed on selecting the **Substance** map*

Vector Map

In 3ds Max 2014, the **Vector** map is used to apply the vector-based graphics to objects. The image it generates is independent of display resolution. The **Vector** map supports a variety of industry-standard vector-graphic formats such as AutoCAD PAT Hatch, AI (Adobe Illustrator), SVG, PDF, and SVGZ.

3D Maps

The 3D Maps are three-dimensional images that can be assigned to geometric objects. These are also known as procedural maps. The most commonly used three-dimensional maps such as **Cellular**, **Falloff**, **Noise**, and so on are discussed next.

Dent

The **Dent** map is used to produce material with 3D bumps on its surface. It is basically used as the **Bump** map available in the **Maps** rollout, refer to Figure 7-83. The effects of this map can be modified at an advanced level by using the **Dent Parameters** rollout in the **Material Editor** dialog box.

Cellular

The **Cellular** map is a 3D procedural map. It is used to produce materials such as sand, pebbled surfaces, and so on, as shown in Figure 7-84. The effects of this map can be modified at an advanced level using the **Cellular Parameters** rollout in the **Material Editor** dialog box.

Noise

The **Noise** map is used to create disturbance on the surface of an object by combining two colors or materials in different ways, as shown in Figure 7-85. The effects of this map can be modified at an advanced level using the **Noise Parameters** rollout in the **Material Editor** dialog box.

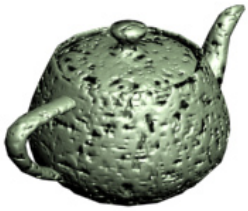


Figure 7-83 *A teapot with the* ***Dent*** *map applied*

Figure 7-84 *An object with the* ***Cellular*** *map applied*

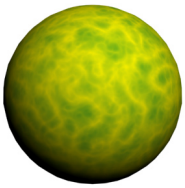


Figure 7-85 *A sphere with the* ***Noise*** *map applied*

Smoke

The **Smoke** map is used to produce textures such as smoke from the fire, cloudy effect, or the beam of lights on the surface of an object, as shown in Figure 7-86. The effects of this map can be modified at an advanced level using the **Smoke Parameters** rollout of the **Material Editor** dialog box.

Speckle

The **Speckle** map is used to produce the texture of the patterned surfaces such as granite and so on, as shown in Figure 7-87. The effects of this map can be modified at an advanced level using the **Speckle Parameters** rollout in the **Material Editor** dialog box.

Splat

The **Splat** map is used to produce texture such as splattered paint on the surface of an object, as shown in Figure 7-88. The effects of this map can be modified at an advanced level using the **Splat Parameters** rollout of the **Material Editor** dialog box.

*Figure 7-86 A sphere with the **Smoke** map applied*

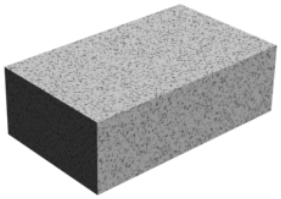


*Figure 7-87 A box with the **Speckle** map applied*

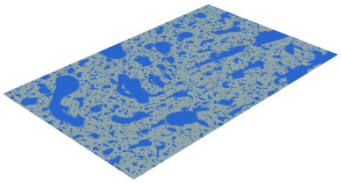


*Figure 7-88 A box with the **Splat** map applied*

Stucco

The **Stucco** map is used to produce the textures such as plaster or cement on the surface of an object, as shown in Figure 7-89. You need to assign a **Bump** map using the **Maps** rollout to get its best effect. The effects of this map can be modified at an advanced level using the **Stucco Parameters** rollout in the **Material Editor** dialog box.

Waves

The **Waves** map is used to create a wavy surface, as shown in Figure 7-90. The effects of this map can be modified at an advanced level using the **Waves Parameters** rollout in the **Material Editor** dialog box.

Wood

The **Wood** map is used to create the 3D wood texture on the surface of the object, refer to Figure 7-91. The effects of this map can be modified at an advanced level using the **Wood Parameters** rollout in the **Material Editor** dialog box.

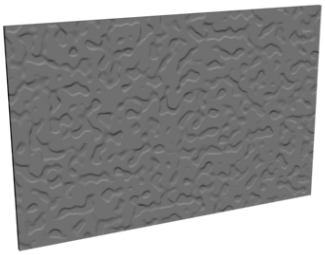


*Figure 7-89 A wall with the **Stucco** map applied*

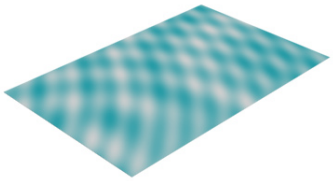


*Figure 7-90 A plane with the **Waves** map applied*

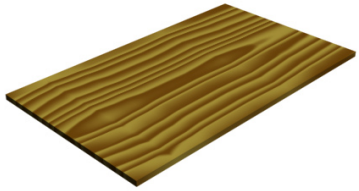


*Figure 7-91 A box with the **Wood** map applied*

Compositors Maps

The **Compositors** maps are used to combine the colors or the maps together. Various maps in this category are: **Composite**, **Mask**, **Mix**, and **RGB Multiply**.

Color Mods Maps

The **Color Mods** maps are used to modify or change the color of pixels in a material. Various maps in this category are: **Output**, **RGB Tint**, and **Vertex Color**.

Other Maps

There are some other types of maps such as **Raytrace**, **Flat Mirror**, and so on, which are used in a different way. These maps are discussed next.

Flat Mirror

The **Flat Mirror** map is used to create a material that generates reflection of other objects in the scene when assigned to the flat surfaces. You can get the best effect of this map using the **Flat Mirror Parameters** rollout in the **Material Editor** dialog box.

Raytrace

The **Raytrace** map is used to create the raytraced reflections and refractions on the surface of the objects. You can get the best effect of this map using the **Raytrace Parameters** rollout in the **Material Editor** dialog box.

Reflect/Refract

The **Reflect/Refract** map is used to produce the reflection and the refraction based on the objects in the scene. You can modify the effects using the **Reflect/Refract Parameters** rollout in the **Material Editor** dialog box.

Once you assign any of the above maps on the square button in the **Material Editor dialog box**, **M** will be displayed on it. If you right-click on this button, a shortcut menu will be displayed, as shown in Figure 7-92. Using the options in the shortcut menu, you can cut or copy the map and paste it at the desired place. You can also clear the unwanted map using the **Clear** option.

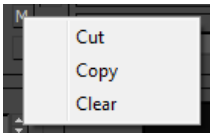


Figure 7-92 *The shortcut menu displayed on right-clicking on the **M** button*

TUTORIALS

Tutorial 1

In this tutorial, you will assign material to two glasses that were created in Tutorial 1 of Chapter 6, refer to Figure 7-93. **(Expected time: 15 min)**

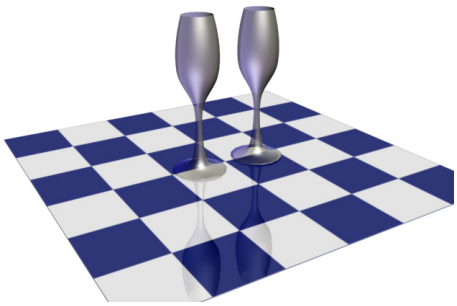


Figure 7-93 *The models of glasses*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Download and open the file.
c. Create base.
d. Create material for the base.
e. Create material for the glasses.
f. Save and render scene.

Creating the Project Folder

Create a new project folder with the name *c07_tut1* at *\Documents\3dsmax2014* and save the file with the name *c07tut1*, as discussed in Tutorial 1 of Chapter 2.

Downloading and Opening the File

In this section, you will download and open the file.

1. Before starting the tutorial, you need to download the *c07_3dsmax_2014_tut.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2014: A Comprehensive Guide*

   Extract the contents of the zipped file and save them in the *Documents* folder.

2. Choose the **Open** button from the **Application** menu; the **Open File** dialog box is displayed. In this dialog box, browse to *\Documents\c07_3dsmax_2014_tut* and then select the *c07_tut1_start.max* file from it. Choose the **Open** button to open the file, refer to Figure 7-94.

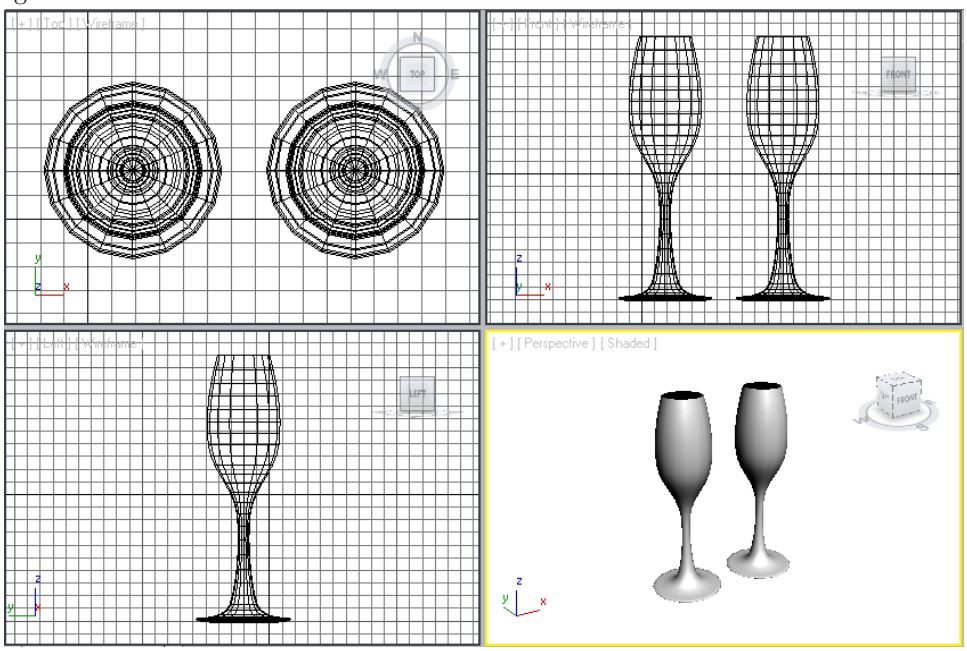


Figure 7-94 *The file with glasses displayed*

Note

Instead of following steps 1 and 2, you can directly open the file that you created in Tutorial 1 of Chapter 6 and then follow step 3 given below to save it.

3. Choose the **Save As** button from the **Application menu**; the **Save File As** dialog box is displayed. Browse to the location *\Documents\3dsmax2014\c07_tut1\scenes*. Save the file with the name *c07tut1.max* at this location.

4. Open the Windows Explorer and then browse to the *c07_3dsmax_2014_tut* folder and copy the *CHROMBLU.jpg* file from this folder to *\Documents\3dsmax2014\c07_tut1\sceneassets\images*.

Creating Base

In this section, you will create the base for the cocktail glasses by using the **Box** tool.

1. Activate the Top viewport and choose **Create > Geometry** in the **Command Panel**; the **Standard Primitives** option is displayed in the drop-down list below the **Geometry** button. Choose the **Box** tool from the **Object Type** rollout and create a box in the Top viewport.

2. Name the box as *base*.

3. In the **Parameters** rollout, set the length and width parameters of the box according to your scene. Set the value in the **Height** spinner to **1.0**.

4. Align *base* with glasses using the **Select and Move** tool, as shown in Figure 7-95.

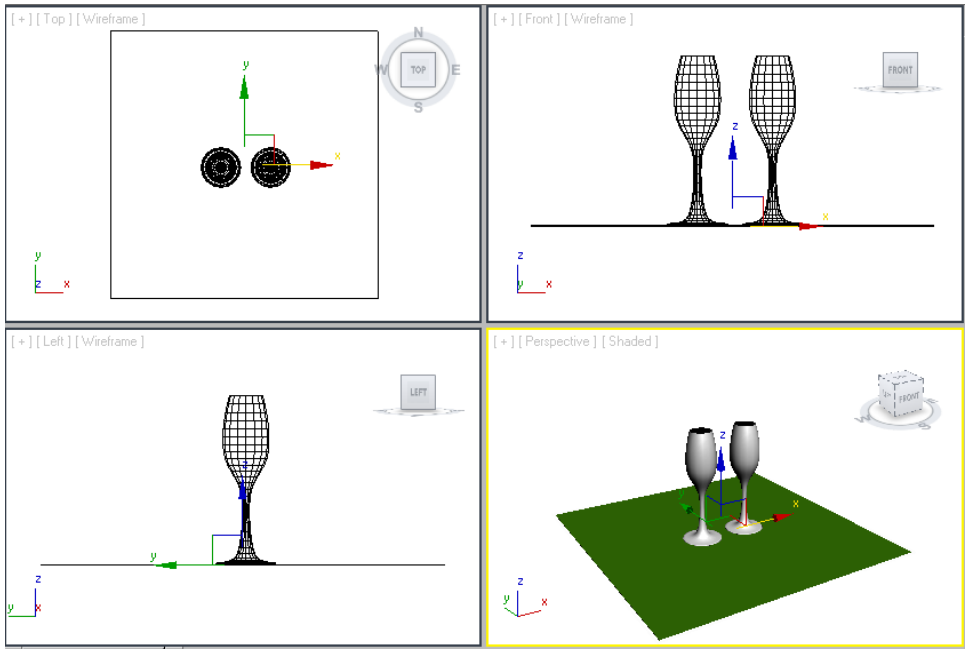


Figure 7-95 *Alignment of base in viewports*

Next, you need to create materials for objects in the scene.

Creating Material for the Base

In this section, you will create the material and then assign it to the base by using the **Material Editor** dialog box.

1. Select *base* in any viewport and then choose **Rendering > Material Editor > Compact Material Editor** from the menu bar; the **Material Editor** dialog box is displayed.

2. In the **Material Editor** dialog box, select the second sample slot to which no material is assigned; the selected sample slot is surrounded by a white triangles. In the **Material Name** drop-down list, enter **base** and then press the ENTER key.

   Next, you need to set parameters for the **Standard** material.

3. In the **Shader Basic Parameters** rollout, make sure that the **Blinn** shader is selected in the drop-down list.

4. In the **Blinn Basic Parameters** rollout, choose the small square button on the right of the **Diffuse** color swatch, as shown in Figure 7-96; the **Material/Map Browser** dialog box is displayed.

5. Expand the **Maps > Standard** rollout and select the **Checker** map from the list displayed in the **Material/Map Browser** dialog box. Choose the **OK** button; the **Checker** map is displayed in the selected sample slot, as shown in Figure 7-97. Also, the **Coordinates**, **Noise**, and **Checker Parameters** rollouts are displayed in the **Material Editor** dialog box, as shown in Figure 7-98.

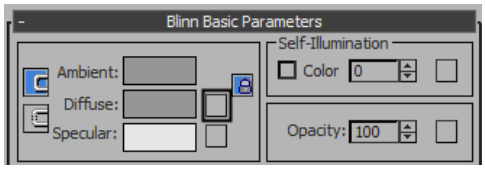


Figure 7-96 *The highlighted square button to be chosen*

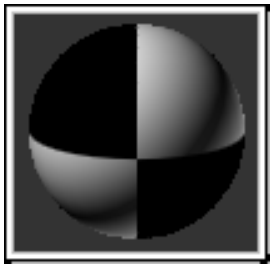


Figure 7-97 *The **Checker** map in the sample slot*

6. In the **Coordinates** rollout, set the value **3** in both the **U Tiling** and **V Tiling** spinners to apply the **Checker** map thrice on U and V. Note that the map is displayed in the selected sample slot, as shown in Figure 7-99. Use the default values for other options.

7. In the **Checker Parameters** rollout, select the black color swatch; the **Color Selector: Color1** dialog box is displayed. Set the values as follows:

   Red: **0** Green: **12** Blue: **104**

Now, choose the **OK** button to close this dialog box.

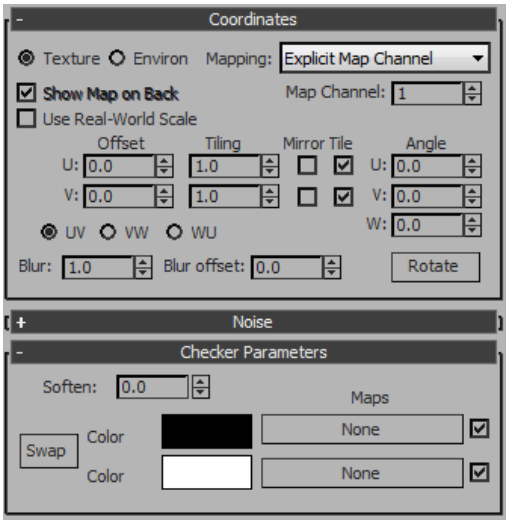


Figure 7-98 *The rollouts displayed on selecting the* ***Checker*** *map*

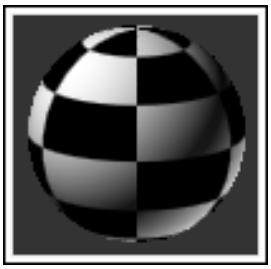


Figure 7-99 *The* ***Checker*** *map with 3x3 tiling*

8. Make sure that the white color is selected in the other color swatch, refer to Figure 7-98.

9. Choose the **Go to Parent** tool to go back to the **Standard** material.

Next, you need to assign the **Raytrace** map to the material to give it a realistic look.

Note

After assigning the map, the small square button on the right of the ***Diffuse*** *color swatch is labeled as* ***M****.*

10. Expand the **Maps** rollout; a list of maps is displayed, as shown in Figure 7-100.

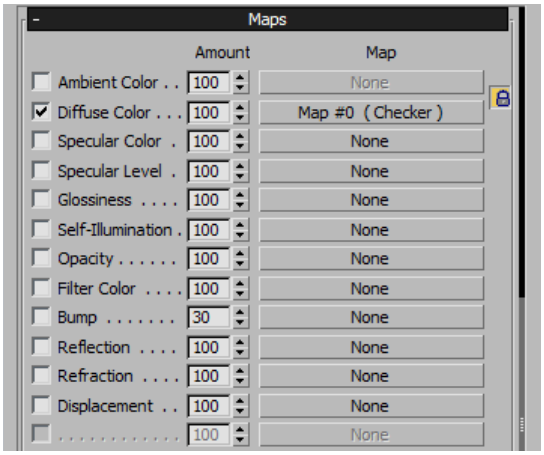


Figure 7-100 *The* ***Maps*** *rollout*

11. In this rollout, select the **Reflection** check box to make it active. Choose the **Reflection** map button on the right of the spinner that is labeled as **None**; the **Material/Map Browser** dialog box is displayed. Select the **Raytrace** map from the **Maps > Standard** rollout and choose the **OK** button; the **Raytrace** map with various rollouts is displayed in the **Material Editor** dialog box. Use the default values for the **Raytrace** map.

12. Choose the **Go to Parent** tool. Expand the **Maps** rollout and set the value **20** in the **Reflection** spinner.

    Now, you need to assign the **base** material to *base*.

13. Make sure that *base* is selected in the viewport and the **base** material is selected in the **Material Editor** dialog box.

14. Choose the **Assign Material to Selection** tool from the **Material Editor** dialog box; the **base** material is assigned to *base* in the viewport.

15. Choose the **Show Shaded Material in Viewport** tool to display the **base** material on the object in the viewport, as shown in Figure 7-101.

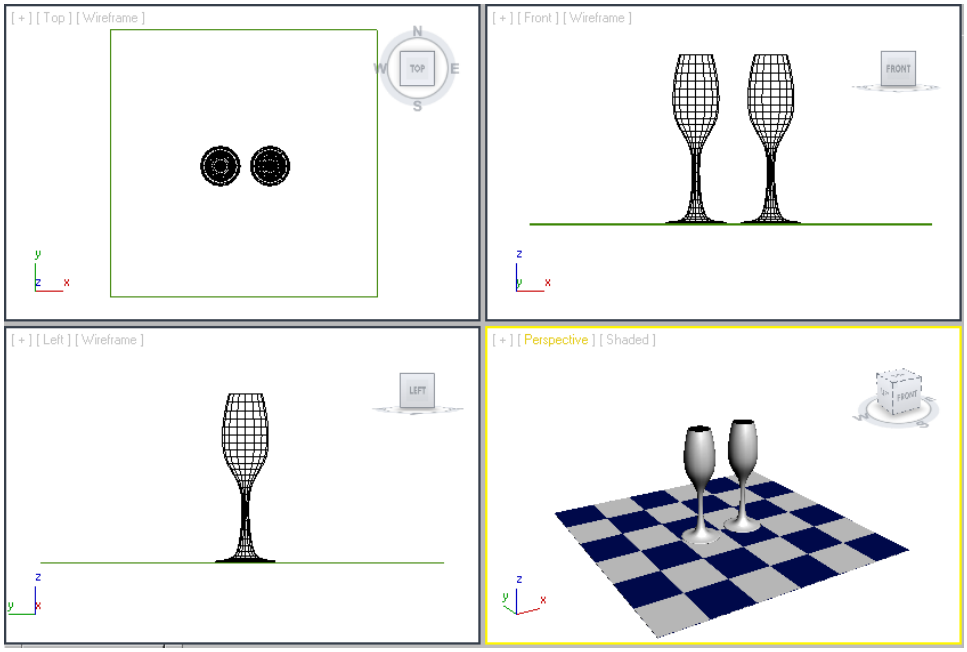


Figure 7-101 *The **base** material displayed on the floor*

Creating Material for the Glasses

The material has already been assigned to the cocktail glasses in Tutorial 1 of Chapter 6. But, in this section, you will assign another material to it.

1. Select glasses in the viewport and then select another sample slot in the **Material Editor** dialog box. In the **Material Name** drop-down list, enter **glass** and press ENTER.

2. Use the **Standard** material for the cocktail glasses.

   Next, you need to set parameters for the **Standard** material.

3. In the **Shader Basic Parameters** rollout, select the **Phong** shader; the **Phong Basic Parameters** rollout is displayed. Select the **2-Sided** check box.

4. In the **Phong Basic Parameters** rollout, choose the small square button on the right of the **Diffuse** color swatch; the **Material/Map Browser** dialog box is displayed.

5. Select the **Bitmap** map from the list displayed in the **Material/Map Browser** dialog box and double-click on it; the **Select Bitmap Image File** dialog box is displayed.

   As the project folder is already set, the *images* folder is displayed in the **Look in** drop-down list of this dialog box.

6. Select the file *CHROMBLU.jpg* from it and choose the **Open** button; the image is displayed in the selected sample slot, as shown in Figure 7-102.

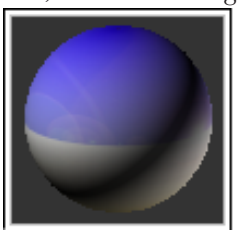


Figure 7-102 *The sample slot after assigning the* ***Bitmap*** *map*

7. Choose the **Go to Parent** tool from the **Material Editor** dialog box to go back to the **Standard** material.

8. In the **Specular Highlights** area of the **Material Editor**, set the values as follows:

   Specular Level: **96** Glossiness: **18** Soften: **0.1**

9. In the **Opacity** spinner, set the value **30** to make the object transparent.

   Next, you need to assign the *CHROMBLU.jpg* image, which you had assigned to the **Diffuse** map, to the **Opacity** map to get a realistic effect.

10. Move the cursor over the **Diffuse** map button that is labelled as **M**. Press and hold the left mouse button and then drag the button to the **Opacity** map button on the right of the **Opacity** spinner. Next, release the left mouse button; the **Copy (Instance) Map** dialog box is displayed.

11. In this dialog box, make sure the **Copy** radio button is selected and then choose the **OK** button; the *CHROMBLU.jpg* image is assigned to the **Opacity** map. Also, the square button is labeled as **M**.

Note

*You can also insert the **Diffuse** and **Opacity** maps using the **Maps** rollout.*

Next, you need to apply **glass** material to cocktail glasses.

12. Make sure that cocktail glasses are selected in the viewport. In the **Material Editor** dialog box, make sure that **glass** material is selected.

13. Choose the **Assign Material to Selection** tool; the **glass** material is assigned to cocktail glasses in the viewport, refer to Figure 7-103.

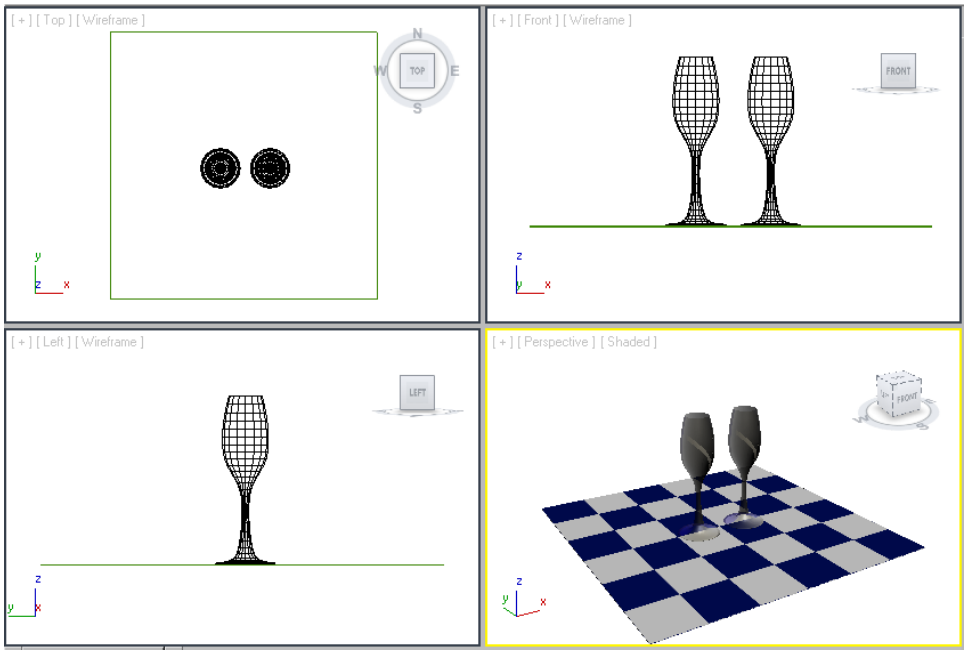


Figure 7-103 *The **glass** material displayed on cocktail glasses*

14. Close the **Material Editor** dialog box.

Saving and Rendering the Scene

In this section, you will save the scene and then render it. You can also view the final rendered image of this model by downloading the *c07_3dsmax_2014_rndr.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2014: A Comprehensive Guide*

1. Choose **Save** from the **Application** menu.

2. Activate the Perspective viewport. Next, choose the **Render Production** tool from the **Main Toolbar**; the **Rendered Frame** window is displayed. This window shows the final output of the scene, refer to Figure 7-104.

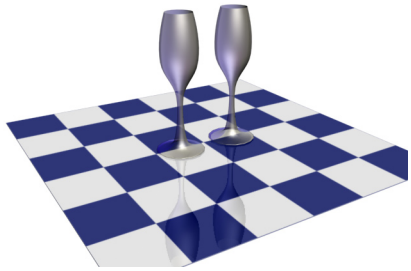


Figure 7-104 *The final output of the scene*

Tutorial 2

In this tutorial, you will create brass material and assign it to a flower pot, as shown in Figure 7-105. **(Expected time: 15 min)**

Figure 7-105 *The model of a flower pot*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Download and open the file.
c. Create brass material for the flower pot.
d. Save and render the scene.

Creating the Project Folder

Create a new project folder with the name *c07_tut2* at *\Documents\3dsmax2014* and then save the file with the name *c07tut2*, as discussed in Tutorial 1 of Chapter 2.

Downloading and Opening the File

In this section, you will download and open the file.

1. Before you start the tutorial, download the *c07_3dsmax_2014_tut.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2014: A Comprehensive Guide*

   Extract the contents of the zipped file and save them in the *\Documents* folder.

2. Choose **Open** from the **Application** menu; the **Open File** dialog box is displayed. In this dialog box, browse to the location *Documents\c07_3dsmax_2014_tut* and select the *c07_tut2_start.max* file in it. Choose the **Open** button to open the file, refer to Figure 7-106.

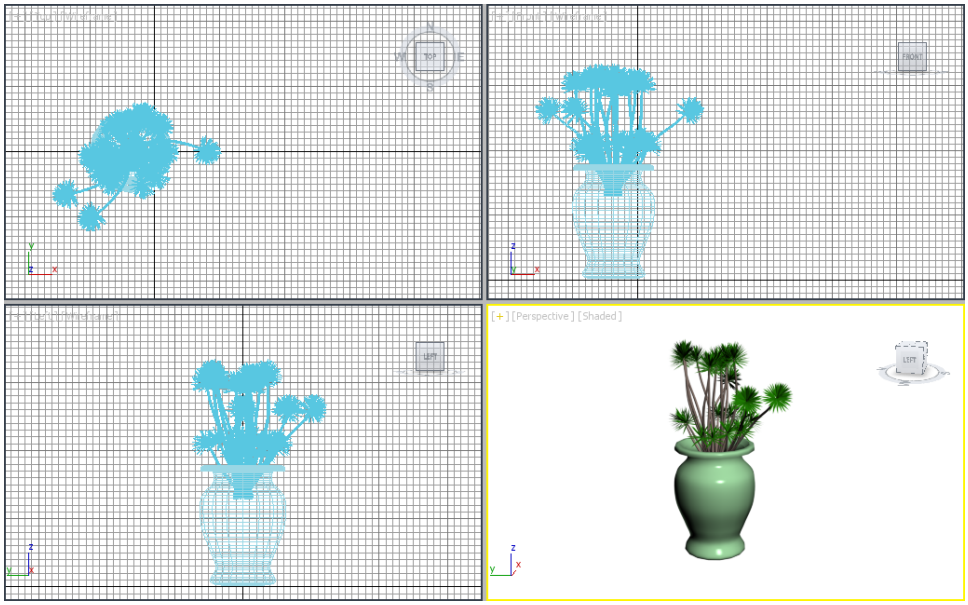


Figure 7-106 *The flower pot geometry with a plant*

3. Choose **Save As** from the **Application menu**; the **Save File As** dialog box is displayed. Browse to the location *\Documents\3dsmax2014\c07_tut2\scenes*. Save the file with the name *c07tut2.max* at this location.

4. Open the Windows Explorer and then browse to the *c07_3dsmax_2014_tut* folder and copy the *Lakerem2.jpg* file from this folder to the location *\Documents\3dsmax2014\c07_tut2\sceneassets\images*.

Creating Brass Material for the Flower Pot

In this section, you will create the brass material for the flower pot by using the **Compact Material Editor** tool.

1. Select *flower pot* in a viewport and choose the **Compact Material Editor** tool from the **Main Toolbar**; the **Material Editor** dialog box is displayed.

2. Select one of the empty sample slots in the **Material Editor** dialog box. In the **Material Name** drop-down list of this dialog box, enter **brass** and then press the ENTER key.

3. By default, the **Standard** material is displayed on the **Material Type** button and you need to use the same for creating the **brass** material.

   Next, you need to set parameters for the **Standard** material.

4. In the **Shader Basic Parameters** rollout, select the **Metal** shader option from the drop-down list; the **Metal Basic Parameters** rollout is displayed. Select the **2-Sided** check box.

5. In the **Metal Basic Parameters** rollout, choose the **Diffuse** color swatch to change the color of the material; the **Color Selector** dialog box is displayed. Set the values as follows:

   Red: **253** Green: **159** Blue: **37**

   Now, choose the **OK** button to close this dialog box.

6. In the **Specular Highlights** area, set the values as follows:

   Specular Level: **80** Glossiness: **75**

   Next, you need to assign the **Reflection** map from the **Maps** rollout to get a realistic effect.

7. Expand the **Maps** rollout in the **Material Editor** dialog box; a list of maps is displayed.

8. Select the **Reflection** check box to make it active. Choose the **Reflection** map button that is labeled as **None** on the right of the **Reflection** spinner; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map from the **Maps > Standard** rollout and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed.

   As the project folder is already set, the *images* folder is displayed in the **Look in** drop-down list of this dialog box.

9. Select the file *Lakerem2.jpg* from this dialog box and choose the **Open** button; the image is displayed in the selected sample slot, as shown in Figure 7-107.

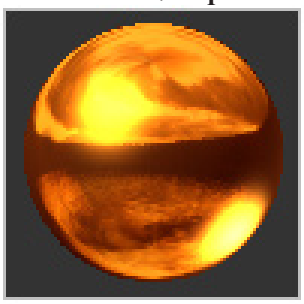


Figure 7-107 *The brass material displayed in the sample slot*

10. Choose the **Go to Parent** tool from the **Material Editor** dialog box. In the **Maps** rollout, set the value **50** in the **Reflection** spinner.

11. Make sure that *flower pot* is selected in the viewport and the **brass** material is selected in the **Material Editor** dialog box.

12. Choose the **Assign Material to Selection** tool; the **brass** material is assigned to *flower pot*.

13. Choose the **Show Shaded Material in Viewport** tool; the **brass** material is displayed on *flower pot* in the Perspective viewport, as shown in Figure 7-108.

Saving and Rendering the Scene

In this section, you will save the scene and then render it. You can also view the final rendered image of this model by downloading the *c07_3dsmax_2014_rndr.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2014: A Comprehensive Guide*

1. Choose **Save** from the **Application** menu.

2. Activate the Perspective viewport. Next, choose the **Render Production** tool from the **Main Toolbar**; the **Rendered Frame** window is displayed. This window shows the final output of the scene, refer to Figure 7-109.

Figure 7-108 *The* ***brass*** *material displayed in flower pot*

Figure 7-109 *The final output after rendering*

Tutorial 3

In this tutorial, you will assign a map to the LCD monitor, as shown in Figure 7-110.

(Expected time: 15 min)

Figure 7-110 *The model of LCD monitor*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Download and open the file.
c. Assign the map to the LCD screen.
d. Save and render the scene.

Creating the Project Folder

Create a new project folder with the name *c07_tut3* at *\Documents\3dsmax2014* and then save the file with the name *c07tut3*, as discussed in Tutorial 1 of Chapter 2.

Downloading and Opening the file

In this section, you will download and open the file.

1. Before starting the tutorial, download the *c07_3dsmax_2014_tut.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2014: A Comprehensive Guide*

   Extract the contents of the zipped file and save them in the *Documents* folder.

2. Choose **Open** from the **Application menu**; the **Open File** dialog box is displayed. In this dialog box, browse to the location *\Documents\c07_3dsmax_2014_tut* and select the *c07_tut3_start.max* file in it. Choose the **Open** button to open the file, refer to Figure 7-111.

3. Choose **Save As** from the **Application menu**; the **Save File As** dialog box is displayed. Browse to the location *\Documents\3dsmax2014\c07_tut3\scenes*. Save the file with the name *c07tut3.max* at this location.

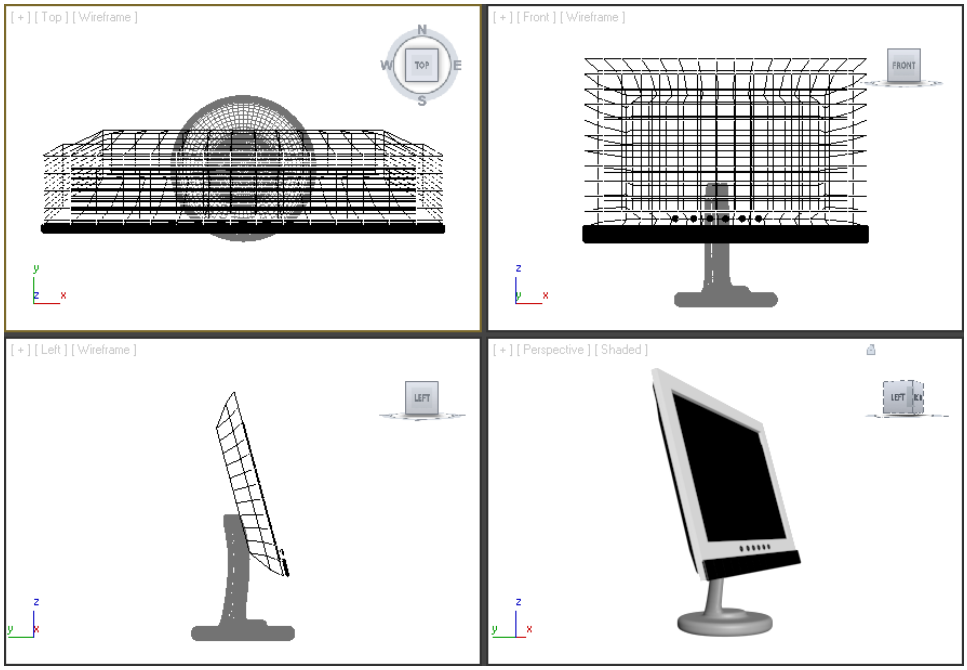


Figure 7-111 *The LCD computer in viewports*

Assigning the Map to the LCD Screen

In this section, you will apply an image to the LCD screen of the computer.

1. Display the image on your computer screen and press the PRT SCR keys. Next, open the **Microsoft Paint** software and press the CTRL+V keys to paste the image. Now, save the file with the name *desktop_screen* in the *jpg* format at the following location: *\Documents\3dsmax2014\c07_tut3\sceneassets\images*.

2. Select *LCD monitor* in the viewport and then choose **Group > Open** from the menubar. Select *screen* in any viewport and then choose the **Compact Material Editor** tool from the **Main Toolbar**; the **Material Editor** dialog box is displayed.

3. Select one of the sample slots from the **Material Editor** dialog box. In the **Material Name** drop-down list, enter **screen** and press the ENTER key. By default, the **Standard** material is displayed on the **Material Type** button. You will use the same material for assigning the map.

   Next, you need to assign the ***desktop_screen****.jpg* image to the **Diffuse** map button.

4. Make sure that the **Blinn** shader is selected in the **Shader Basic Parameters** rollout.

5. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** map button; the **Material/Map Browser** dialog box is displayed. Choose the **Bitmap** map from the **Maps > Standard**

rollout and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. As the project folder is already set, the *images* folder is displayed in the **Look in** drop-down list of this dialog box. Select the file ***desktop_screen***.*jpg* and then choose the **Open** button; the image is displayed in the selected sample slot.

6. Choose the **Go to Parent** tool.

7. In the **Specular Highlights** area, set the values as follows:

   Specular Level: **40** Glossiness: **16** Soften: **0.1**

   Next, you need to apply the map to *screen*.

8. Make sure that *screen* is selected in the viewport and the **screen** material is selected in the **Material Editor** dialog box.

9 Choose the **Assign Material to Selection** tool; the **screen** material is assigned to *screen* of *LCD computer* in the viewport.

10. Now, choose the **Show Shaded Material in Viewport** tool, if it is not already chosen; the **screen** material is displayed on *screen* in the Perspective viewport, as shown in Figure 7-112.

Figure 7-112 *The* ***screen*** *material assigned to the screen of the computer*

You can also assign other materials or maps to different parts of the computer to give it a realistic look.

Saving and Rendering the Scene

In this section, you will save the scene and then render it. You can also view the final rendered image of this model by downloading the file *c07_3dsmax_2014_rndr.zip* from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2014: A Comprehensive Guide*

1. Change the background color of the scene to white, as discussed in Tutorial 1 of Chapter 2.

2. Choose **Save** from the **Application** menu.

3. Activate the Perspective viewport. Next, choose the **Render Production** tool from the **Main Toolbar**; the **Rendered Frame** window is displayed. This window shows the final output of the scene, refer to Figures 7-113 and 7-114.

Figure 7-113 *The final output after rendering (view 1)*

Figure 7-114 *The final output after rendering (view 2)*

Self-Evaluation Test

Answer the following questions and then compare them to those given at the end of this chapter:

1. Which of the following keys is used to invoke the **Slate Material Editor** dialog box?

   (a) S (b) L
   (c) M (d) G

2. Which of the following tools in the **Material Editor** dialog box is used to pick material from an object in the viewport to apply it to the active sample slot?

   (a) **Assign Material to Selection** (b) **Get Material**
   (c) **Pick Material from Object** (d) All of these

3. Which of the following materials is known as the **Compound** material?

   (a) **Blend** (b) **Composite**
   (c) **Double-Sided** (d) All of these

4. Which of the following materials has the **Templates** rollout to insert preset materials to the objects?

   (a) **Standard** (b) **Architectural**
   (c) **Raytrace** (d) **Composite**

5. Which of the following shaders in the **Standard** material is used to create elliptical highlights?

   (a) **Anisotropic** (b) **Blinn**
   (c) **Metal** (d) **Phong**

6. The _____ color swatch in the **Basic Parameters** rollout of shaders is used to specify the color of the objects in direct light.

7. The _____ shader in the **Standard** material is used to create matte highlights.

8. The _____ material is used to provide highly realistic raytraced images.

9. The **Material Editor** dialog box is used to create new materials and maps for objects to make them look more realistic. (T/F)

10. The **Get Material** tool is used to select materials or maps for the selected sample slot. (T/F)

11. The **Phong** shader is very similar to the **Oren-Nayar-Blinn** shader. (T/F)

Review Questions

Answer the following questions:

1. Which of the following maps in the **Material/Map Browser** dialog box is a 2D map?

   (a) **Checker** (b) **Bitmap**
   (c) **Cellular** (d) **Wood**

2. Which of the following **Standard** maps is used to select the **Bitmap** image file to make the objects realistic?

   (a) **Checker** (b) **Dent**
   (c) **Bitmap** (d) All of these

3. Which of the following maps is used to produce textures such as plaster and cement?

   (a) **Stucco** (b) **Speckle**
   (c) **Splat** (d) **Smoke**

4. The **Composite** maps are used to modify or change the color of pixels in a material. (T/F)

5. You can apply maps to different materials using the **Maps** rollout. (T/F)

6. The **Flat Mirror** map is used to generate reflections and refractions based on the objects in the scene. (T/F)

7. The **Anisotropic** shader in the **Standard** material has two specular highlight controls. (T/F)

8. The _____ spinner in the **Basic Parameters** rollout of the **Standard** material is used to control the transparency of material.

9. The _____ material is used to create the preset materials such as **Glass**, **Water**, **Paper**, and so on.

10. The **Ambient** color swatch in the _____ material is used to specify the amount of absorption of the ambient light by the material.

EXERCISES

The rendered output of the models used in the following exercises can be accessed by downloading the *c07_3dsmax_2014_exr.zip* from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2014: A Comprehensive Guide*

Exercise 1

Start Autodesk 3ds Max 2014 and then perform the following operations:

Create an object in the viewport and choose the **Compact Material Editor** tool; the **Material Editor** dialog box will be displayed. Then, perform the following steps:

1. By default, the **Standard** material is selected. In the **Shader Basic Parameters** rollout, select the **Anisotropic** shader from the drop-down list. Modify the parameters of the **Anisotropic Basic Parameters** rollout and assign a material to the object in the viewport using the **Assign Material to Selection** tool. Then, render the Perspective viewport to notice the effects. Use different shaders in the drop-down list to notice the difference in the shaders.

2. Choose the **Get Material** tool; the **Material/Map Browser** dialog box is displayed. Select the **Architectural** material from the material list in the dialog box. In the **Templates** rollout, select various preset materials from the drop-down list. Set the parameters for the selected materials using the **Physical Qualities** rollout. Then, assign a material to the object in the viewport using the **Assign Material to Selection** tool. Render the Perspective viewport to notice the effects in the output. Select different materials from the list displayed in the

Material/Map Browser dialog box and assign them to the objects to view various realistic effects in the objects.

3. In the **Standard** material, select any shader from the drop-down list in the **Shader Basic Parameters** rollout. In the **Basic Parameters** rollout, select the **Diffuse** map button on the right of the **Diffuse** color swatch; the **Material/Map Browser** dialog box will be displayed. Select different maps from the maps list in the **Material/Map Browser** dialog box and assign the maps to the objects in the viewports. Next, render the Perspective viewport to notice the effects in the final output.

4. In the **Standard** material, set the value below 100 in the **Opacity** spinner. Modify other parameters in the **Basic Parameters** rollout and assign material to the objects in the viewport. Next, render the Perspective viewport to notice the effect of opacity in the final output.

5. Try to assign different maps and materials to all objects created in the previous chapters to make them more realistic.

Exercise 2

Create the model of cups and glasses shown in Figure 7-115 using the **Line** tool and the **Lathe** modifier. To create the steel material, you need to use the **Oren-Nayar-Blinn** shader in the **Standard** material and the **Reflection** map in the **Maps** rollout. **(Expected time: 15 min)**

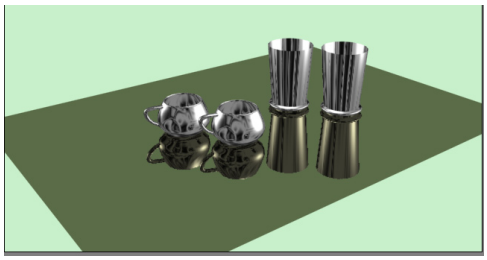


Figure 7-115 *The model of cups and glasses*

Exercise 3

Download the file *c07_3dsmax_2014_exr.zip* from *www.cadcim.com*. Extract the contents of the zipped file and open *c07_exr3_start* from it. Next, assign different maps and materials to give it a realistic view, as shown in Figure 7-116. **(Expected time: 15 min)**

Figure 7-116 *The model of a room*

Exercise 4

Create the model of tea cup in the viewport, as shown in Figure 7-117. Then, create a copper material using the **Phong** shader from the **Standard** material and assign it to the object.

(Expected time: 15 min)

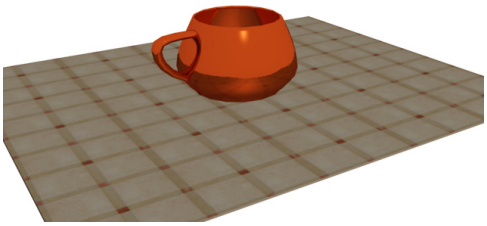


Figure 7-117 *The model of a tea cup*

Answers to Self-Evaluation Test

1. c, **2.** c, **3.** d, **4.** b, **5.** a, **6. Diffuse**, **7. Oren-Nayar-Blinn**, **8. Raytrace**, **9.** T, **10.** T, **11.** F

8

Modifying 3D Mesh Objects

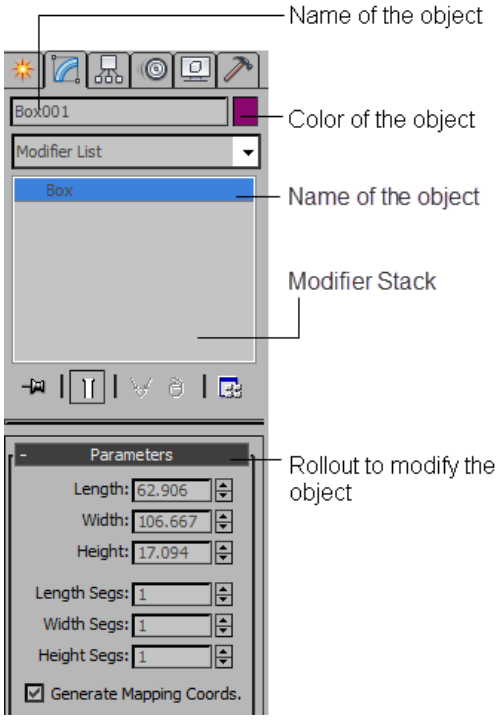


Figure 8-1 *The Modify panel*

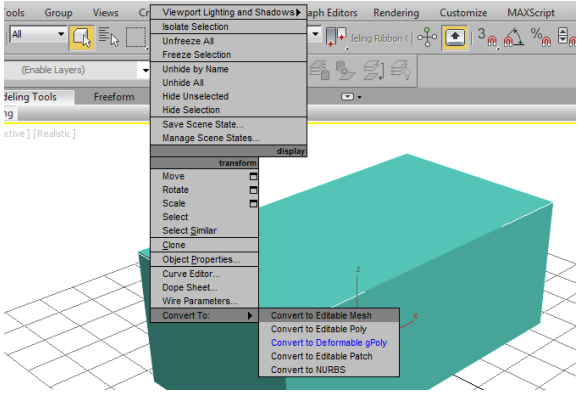


Figure 8-2 *The cascading menu displayed on choosing the* ***Convert To*** *option*

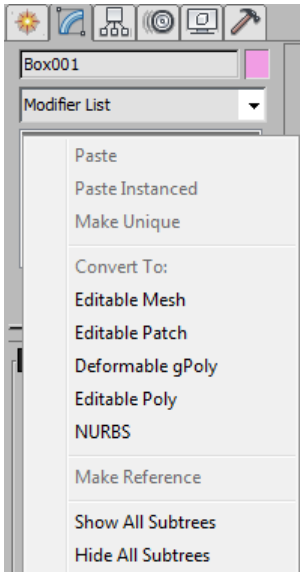


Figure 8-3 *The shortcut menu displayed*

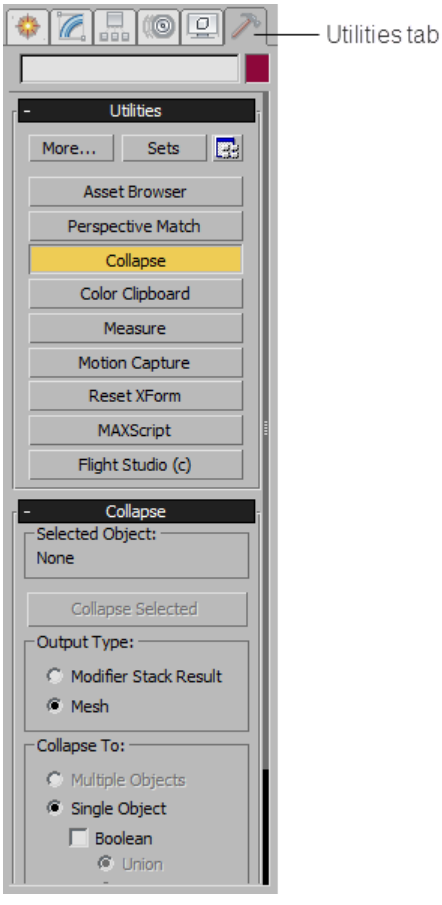


Figure 8-4 *The* ***Utilities*** *rollout displayed after choosing the* ***Utilities*** *tab*

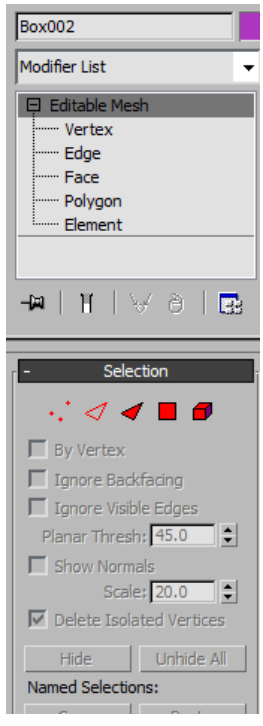


Figure 8-5 *The sub-object levels of an object displayed*

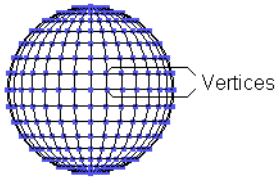


Figure 8-6 *Displaying the vertices of the sphere*

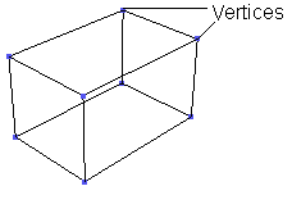


Figure 8-7 *Displaying the vertices of the box*

Note

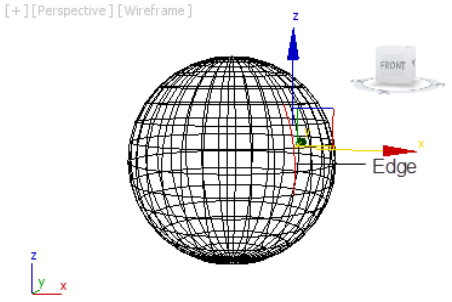


Figure 8-8 *Selecting the edges of the sphere*

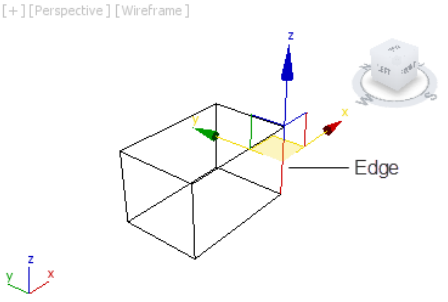


Figure 8-9 *Selecting the edge of the box*

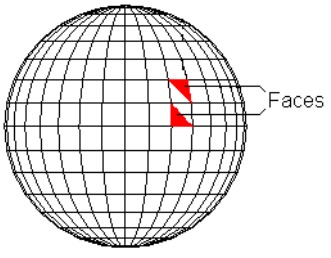


Figure 8-10 *The face sub-object level*

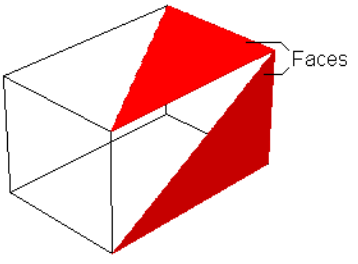


Figure 8-11 *A box with the faces selected*

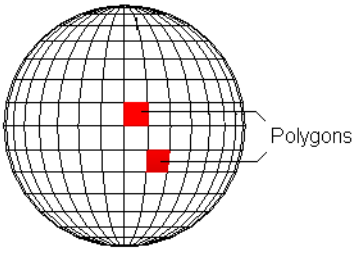


Figure 8-12 *The polygon sub-object level*

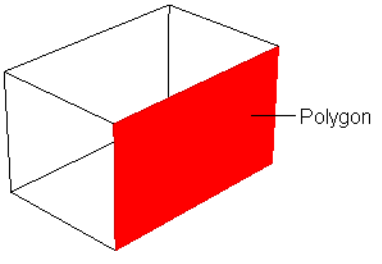


Figure 8-13 *A polygon of the box selected*

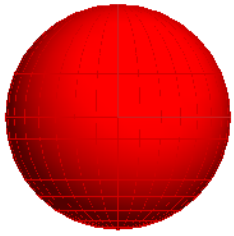


Figure 8-14 The element sub-object level

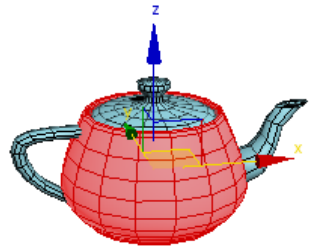


Figure 8-15 The element of the box selected

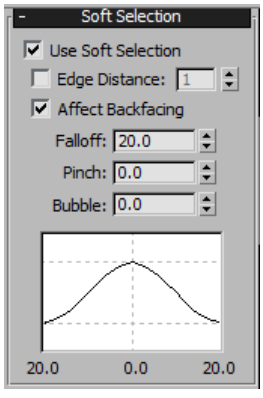


*Figure 8-16 The **Soft Selection** rollout*

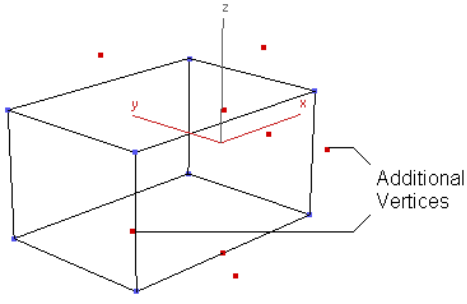


*Figure 8-17 Additional vertices created in a box using the **Create** button*

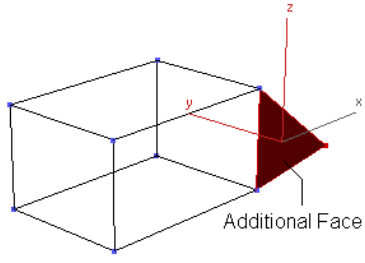


*Figure 8-18 Additional face created in a box using the **Create** button*

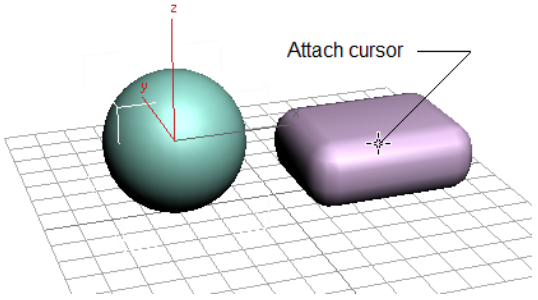


Figure 8-19 *The attach cursor after choosing the* ***Attach*** *button*

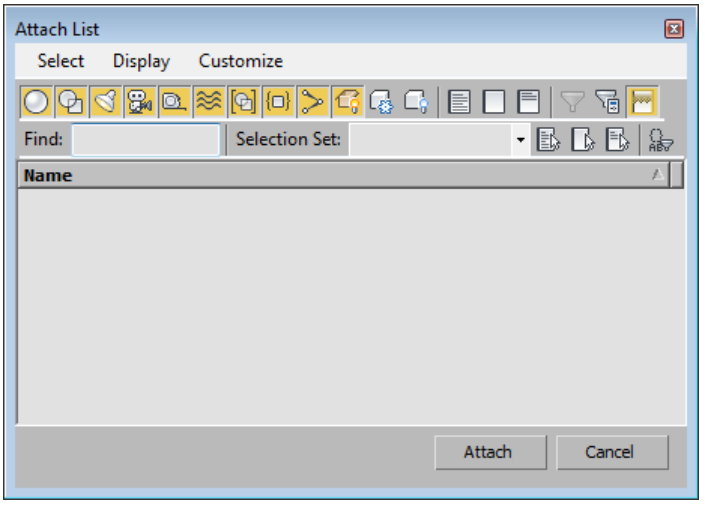


Figure 8-20 *The* ***Attach List*** *dialog box*

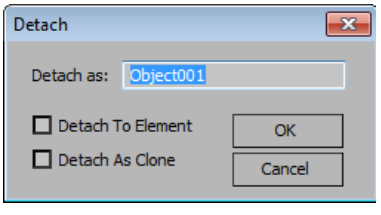


Figure 8-21 *The* ***Detach*** *dialog box*

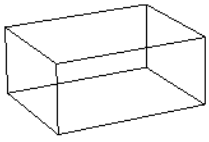


Figure 8-22 *The box before choosing the* ***Turn*** *button*

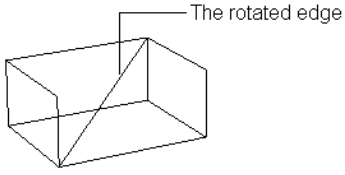


Figure 8-23 *The rotated edge of the box after choosing the* ***Turn*** *button*

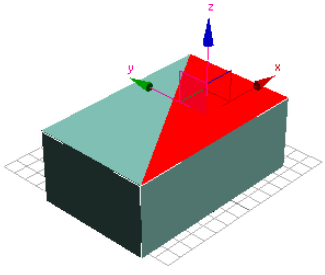


Figure 8-24 *The face before choosing the* ***Divide*** *button*

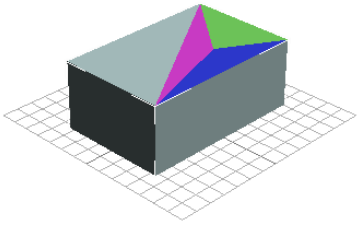


Figure 8-25 *The face divided after using the* ***Divide*** *button*

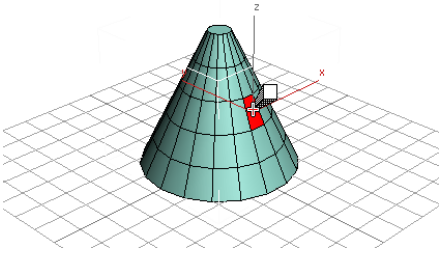


Figure 8-26 *The extrude cursor displayed over the selected polygon*

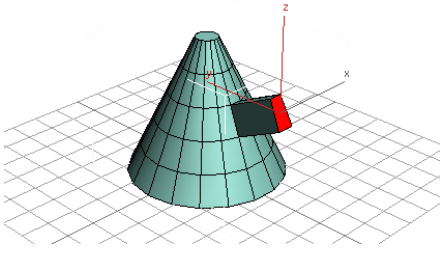


Figure 8-27 *The selected polygon sub-object after extrusion*

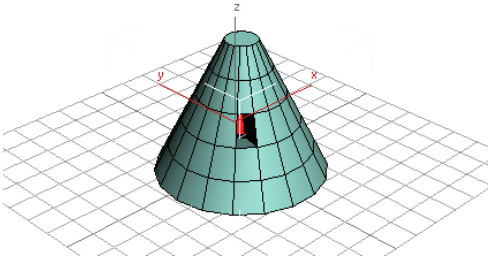


Figure 8-28 *The selected polygon after negative extrusion*

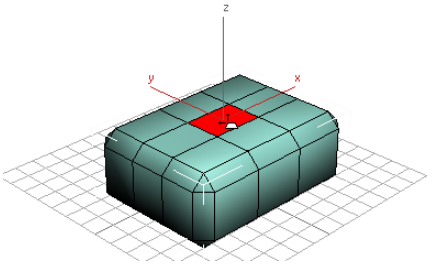


Figure 8-29 *The bevel cursor displayed over the selected polygon*

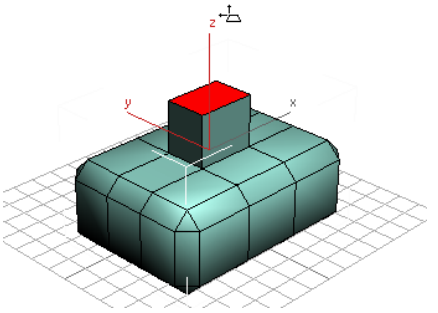


Figure 8-30 *The polygon extruded*

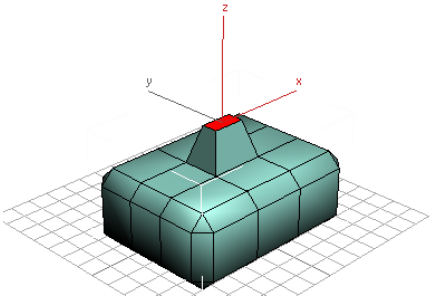


Figure 8-31 *The reduced size of the extruded polygon using the* ***Bevel*** *button*

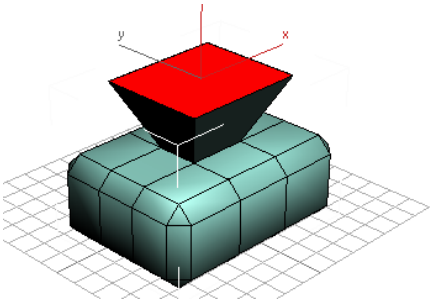


Figure 8-32 *The increased size of the extruded polygon using the* ***Bevel*** *button*

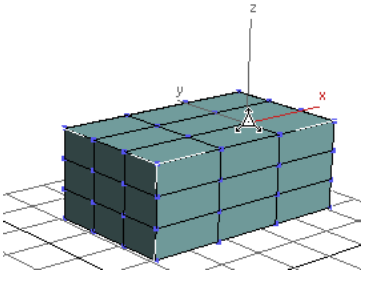


Figure 8-33 *The chamfer cursor displayed over the selected vertex*

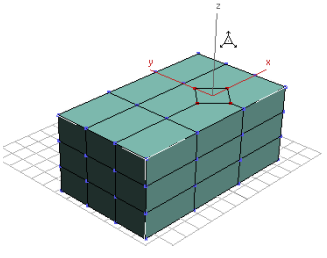


Figure 8-34 *The vertex sub-object chamfered using the* ***Chamfer*** *button*

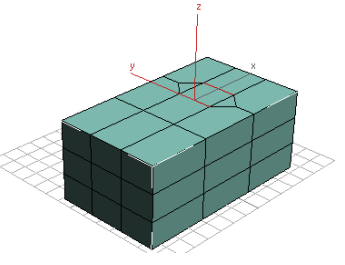


Figure 8-35 *The edge sub-object chamfered using the* ***Chamfer*** *button*

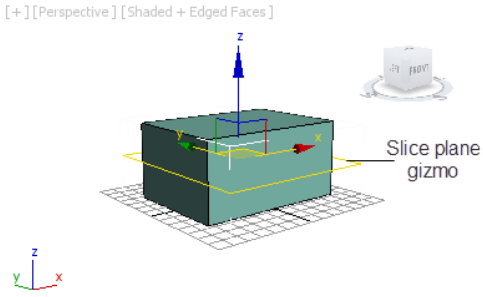


Figure 8-36 *The slice plane gizmo displayed in the selected object*

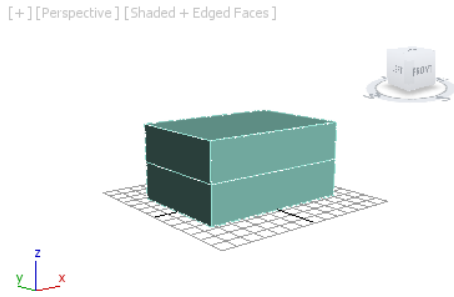


Figure 8-37 *The selected object sliced after choosing the* ***Slice*** *button*

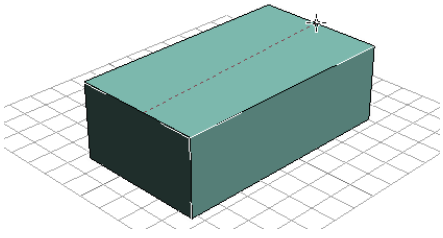


Figure 8-38 *The dotted lines*

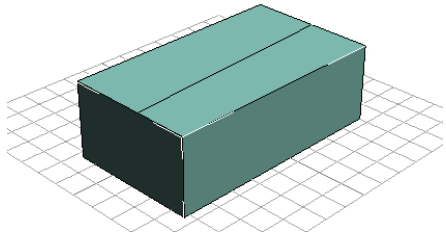


Figure 8-39 *The cut on the object after using the* ***Cut*** *button*

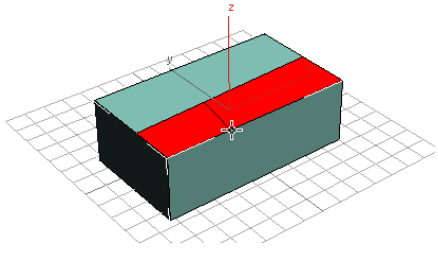


Figure 8-40 *The cut on the selected polygon*

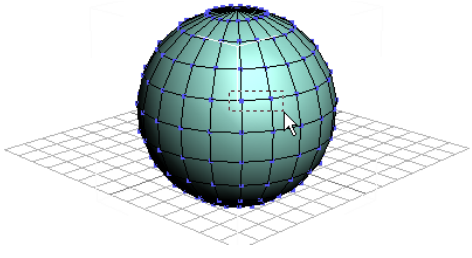


Figure 8-41 *The selection box around the vertices to be welded*

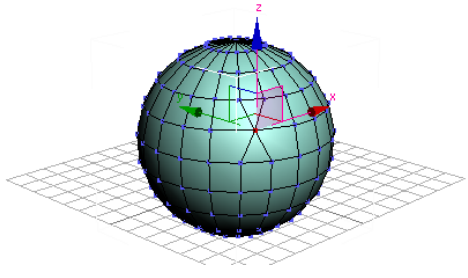


Figure 8-42 *The vertices welded together*

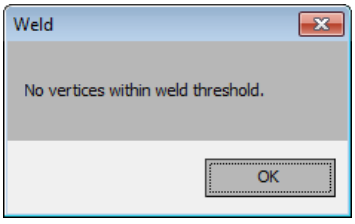


Figure 8-43 *The* ***Weld*** *message box*

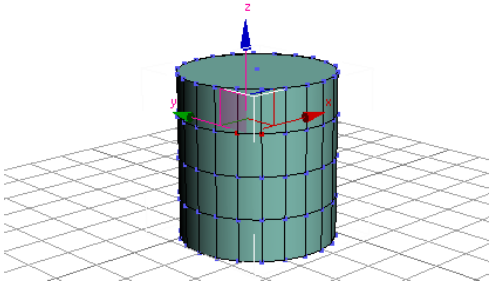


Figure 8-44 *The vertices selected for welding*

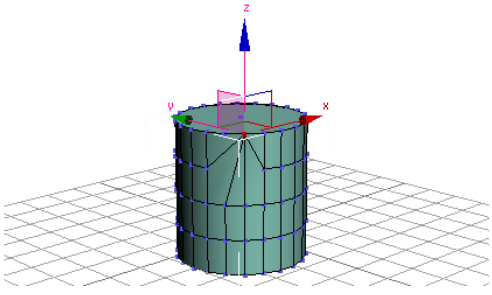


Figure 8-45 *The selected vertices welded to the target vertex*

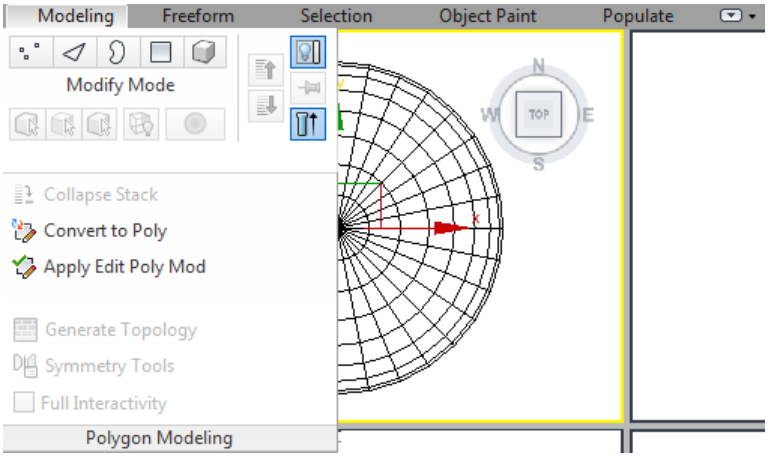


Figure 8-46 *Flyout displayed after moving the cursor over the* ***Polygon Modeling*** *panel*

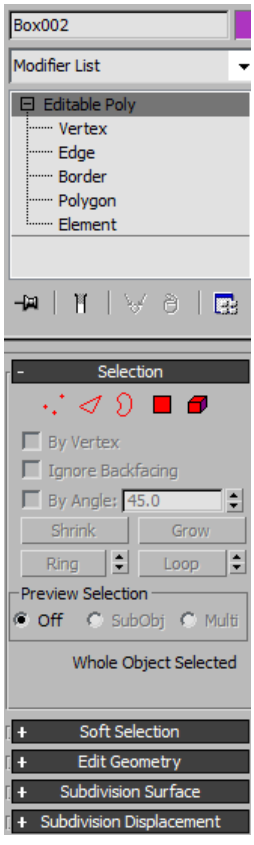


Figure 8-47 *The sub-object levels displayed*

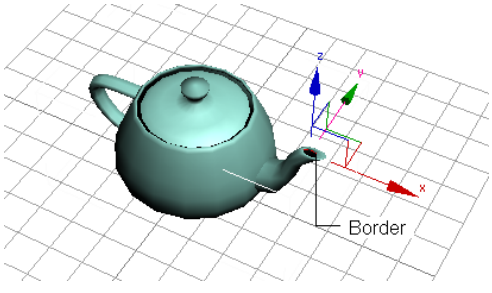


Figure 8-48 *The border selected around the hole of the spout of a teapot*

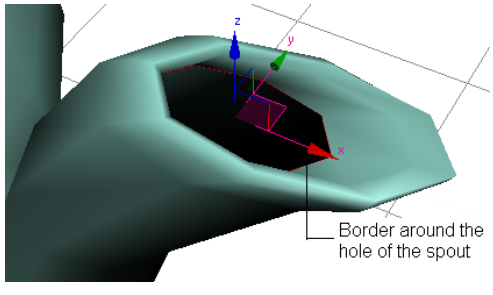


Figure 8-49 *The maximized view of the border selected around the hole of the spout of a teapot*

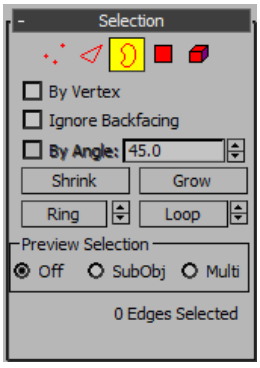


Figure 8-50 *The* ***Selection*** *rollout with the* ***Border*** *sub-object level selected*

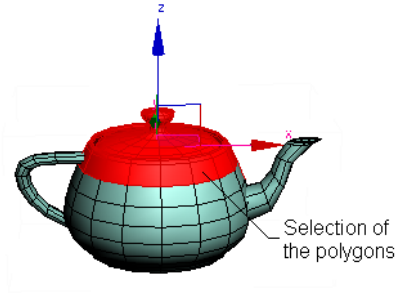


Figure 8-51 *The selection area in the teapot*

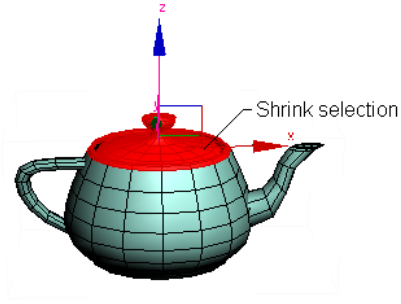


Figure 8-52 *The selection area in the teapot decreases after choosing the* ***Shrink*** *button*

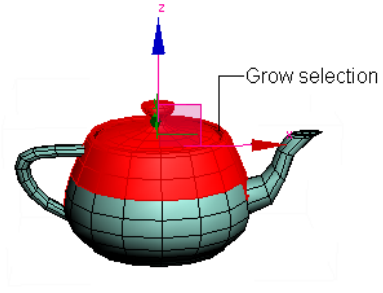


Figure 8-53 *The selection area in the teapot increases after choosing the* ***Grow*** *button*

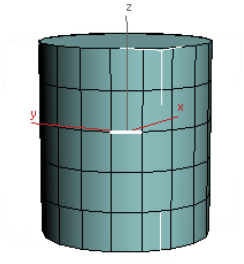


Figure 8-54 *An edge selected in a cylinder*

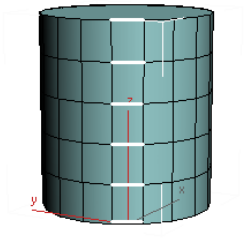


Figure 8-55 *The parallel edges selected after choosing the* ***Ring*** *button*

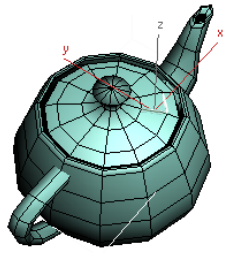


Figure 8-56 *The selected edge of the teapot*

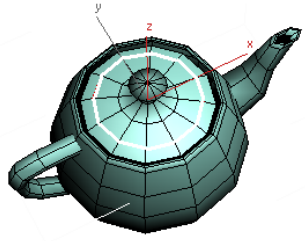


Figure 8-57 *The edges selected after choosing the* ***Loop*** *button*

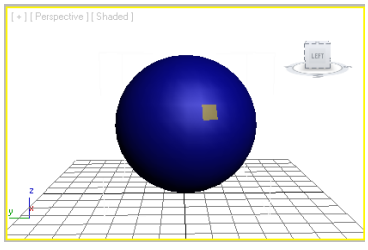


Figure 8-58 *The selected sub-object level highlighted*

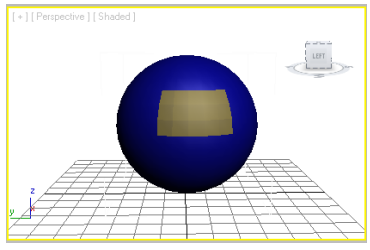


Figure 8-59 *More than one polygon highlighted*

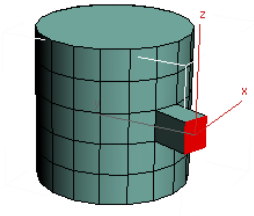


Figure 8-60 *The extruded polygon in a cylinder*

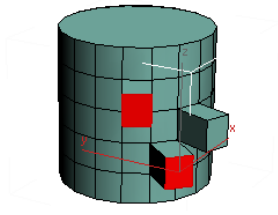


Figure 8-61 *The same extrusion on other polygons after choosing the* ***Repeat Last*** *button*

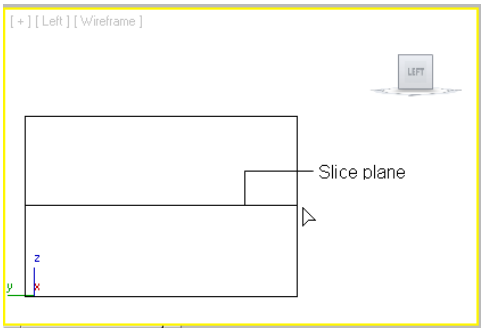


Figure 8-62 *The quick slice cursor and slice plane displayed*

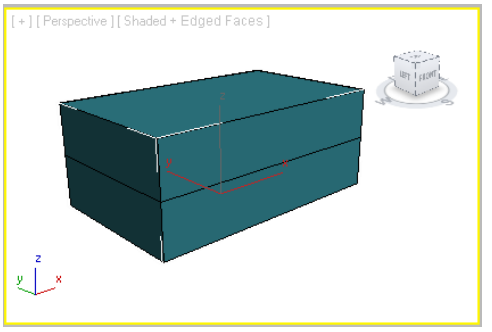


Figure 8-63 *The box sliced in the Perspective viewport*

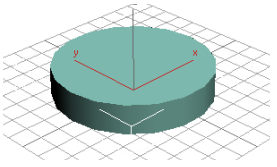


Figure 8-64 *Selecting the cylinder in the viewport*

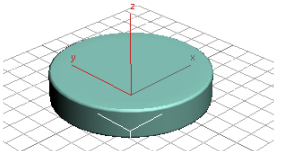


Figure 8-65 *The cylinder smoothened after choosing the* ***MSmooth*** *button*

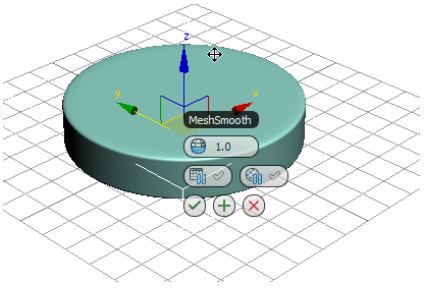


Figure 8-66 *The* ***MeshSmooth Selection*** *caddy control*

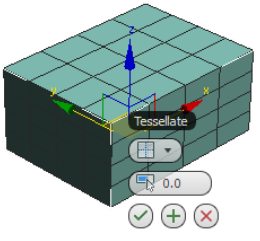


Figure 8-67 *The* ***Tessellate Selection*** *caddy control*

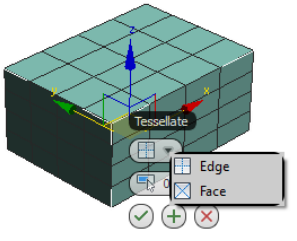


Figure 8-68 *The drop-down list displayed after clicking on the arrow*

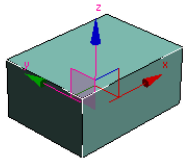


Figure 8-69 *A box*

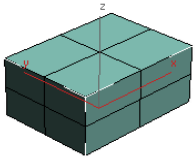


Figure 8-70 *The box after selecting the* ***Edge*** *radio button*

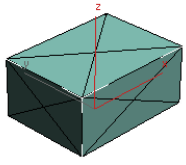


Figure 8-71 *The box after selecting the* ***Face*** *radio button*

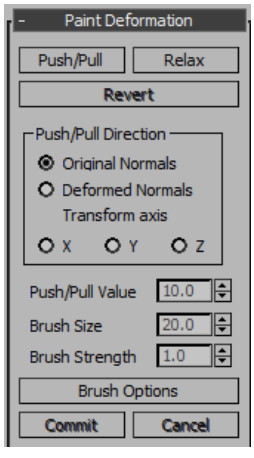


Figure 8-72 *The* ***Paint Deformation*** *rollout*

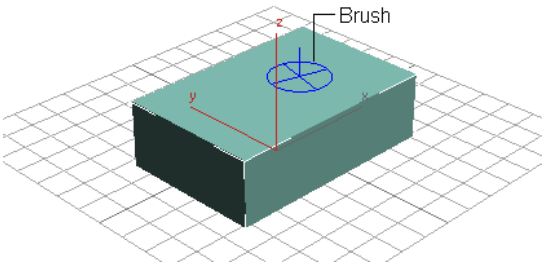


Figure 8-73 *The brush displayed on choosing the* ***Push/Pull*** *button*

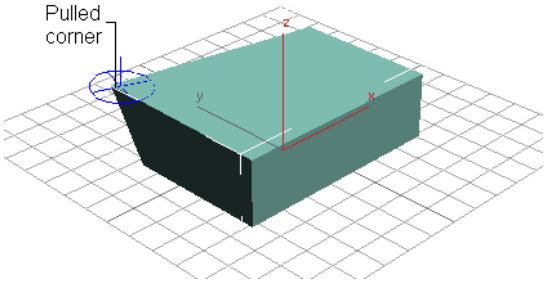


Figure 8-74 *The object deformed at the corner vertex*

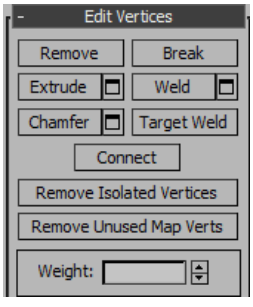


Figure 8-75 *The* ***Edit Vertices*** *rollout*

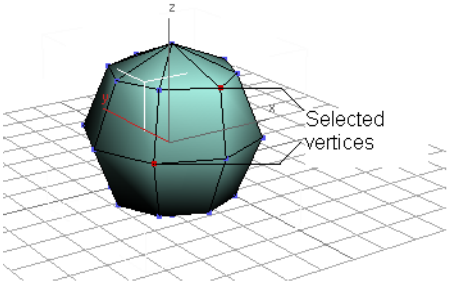


Figure 8-76 *The vertices selected in the object*

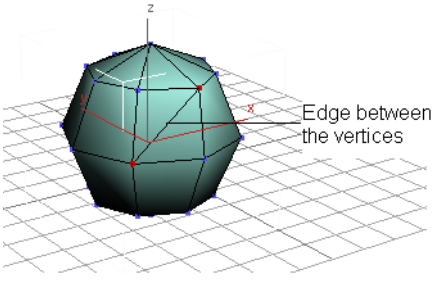


Figure 8-77 *The edge created between the*

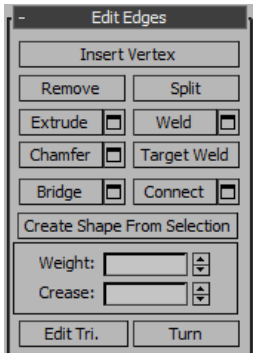


Figure 8-78 *The* ***Edit Edges*** *rollout*

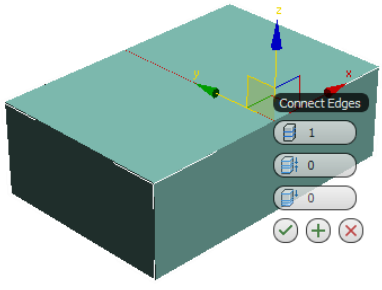


Figure 8-79 *The* ***Connect Edges*** *caddy control in the viewport*

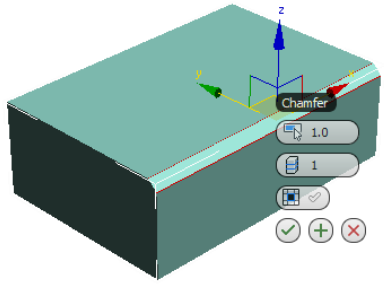


Figure 8-80 *The* ***Chamfer*** *caddy control in the viewport*

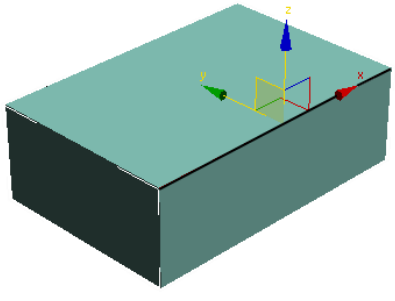


Figure 8-81 *An edge selected to be chamfered*

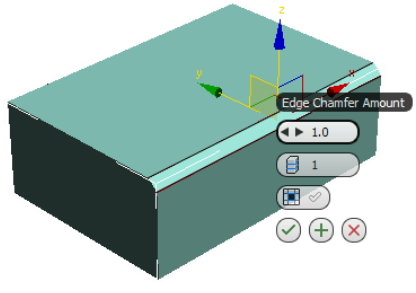


Figure 8-82 *The edge after chamfering*

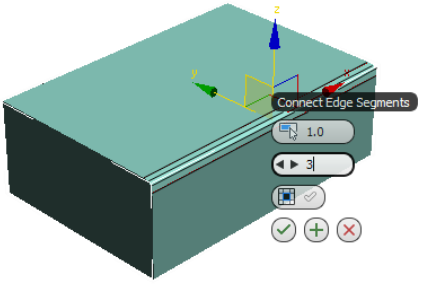


Figure 8-83 *The number of segments increased in the chamfer*

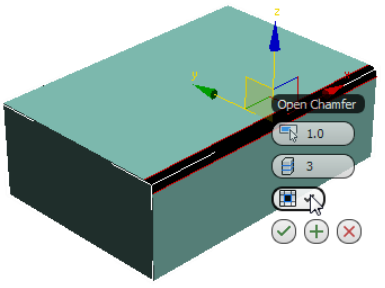


Figure 8-84 *A hole created on selecting the* ***Open Chamfer*** *check box*

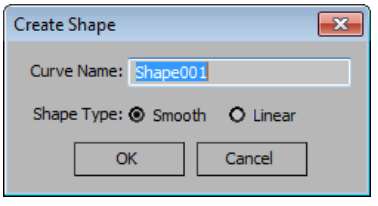


Figure 8-85 *The* ***Create Shape*** *dialog box*

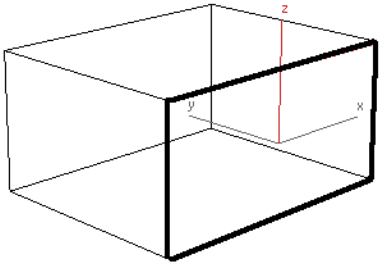


Figure 8-86 *The edges selected in the box*

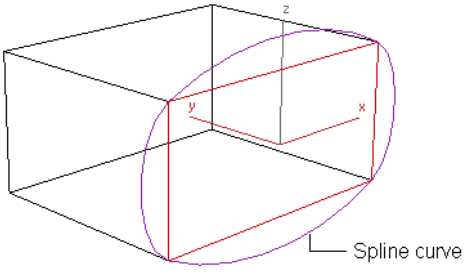


Figure 8-87 *The spline created after using the* ***Create Shape From Selection*** *button*

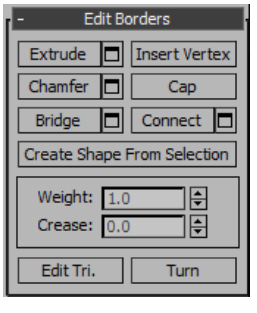


Figure 8-88 *The* ***Edit Borders*** *rollout*

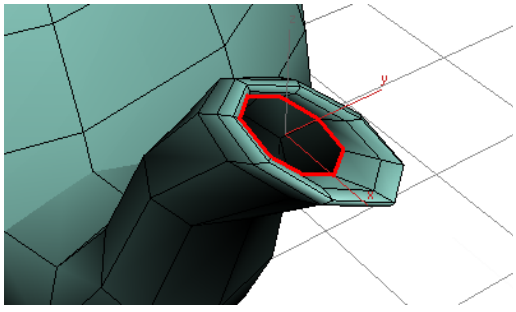


Figure 8-89 *The border selected in the spout of a teapot*

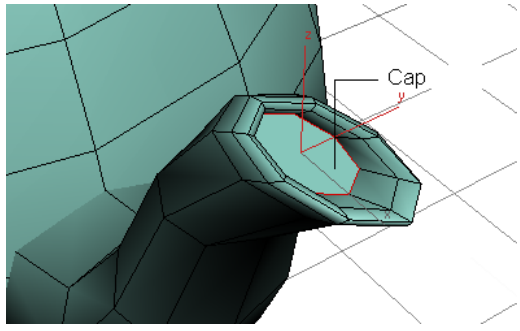


Figure 8-90 *The cap after choosing the* ***Cap*** *button*

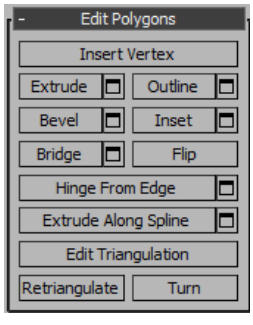


Figure 8-91 *The* ***Edit Polygons*** *rollout*

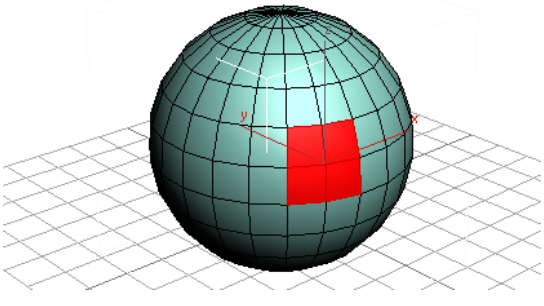


Figure 8-92 *The selected polygons in a sphere*

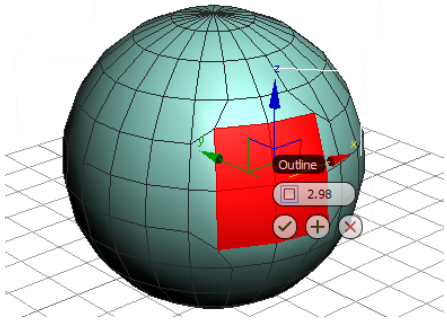


Figure 8-93 *The selected polygons after choosing the* ***Outline*** *button*

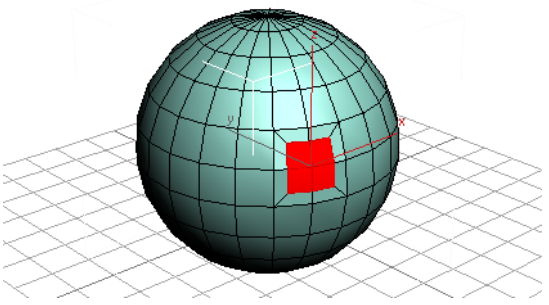


Figure 8-94 *The group of polygons inset on selecting the* ***Group*** *option*

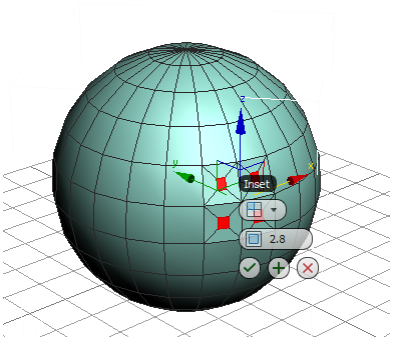


Figure 8-95 *The* ***Inset*** *caddy control displayed*

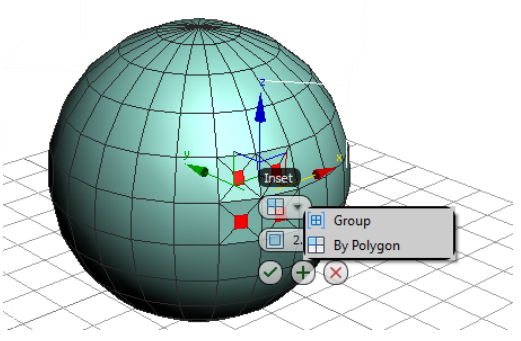


Figure 8-96 *The drop-down list displayed in the* ***Inset*** *caddy control*

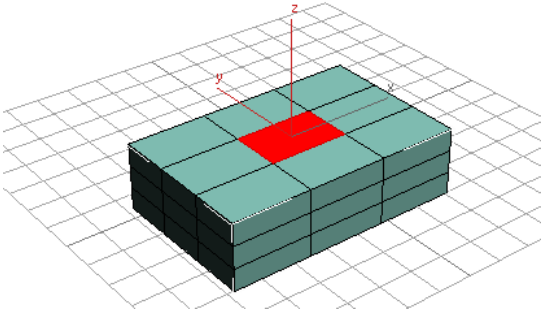


Figure 8-97 *The polygon selected in the box*

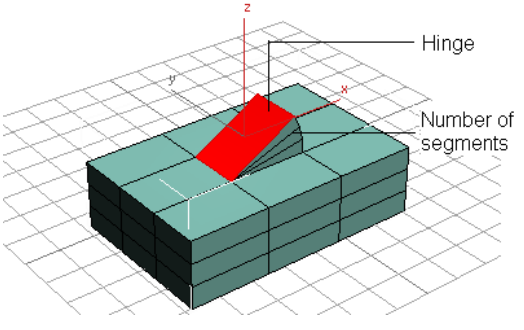


Figure 8-98 *The hinge created on choosing the* ***Hinge From Edge*** *button*

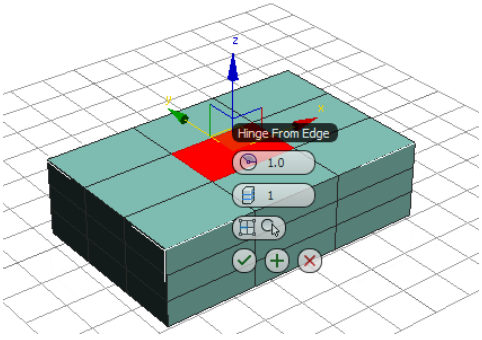


Figure 8-99 *The* ***Hinge From Edge*** *caddy control*

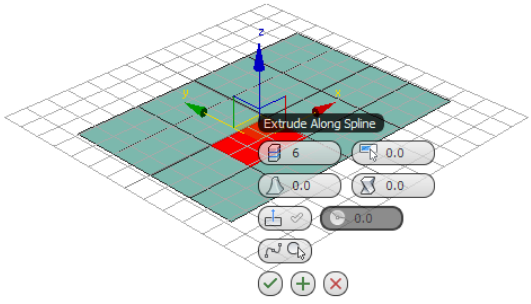


Figure 8-100 *The* ***Extrude Along Spline*** *caddy control*

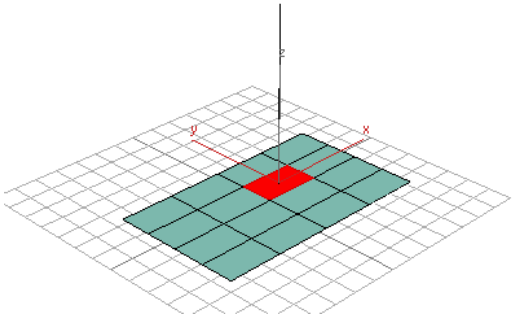


Figure 8-101 *The polygon selected in the plane and the spline*

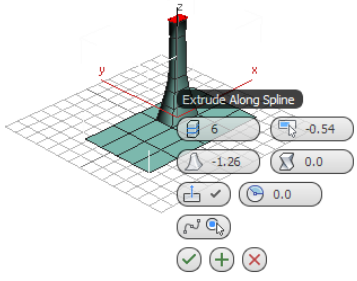


Figure 8-102 *The selected polygon extruded along the spline*

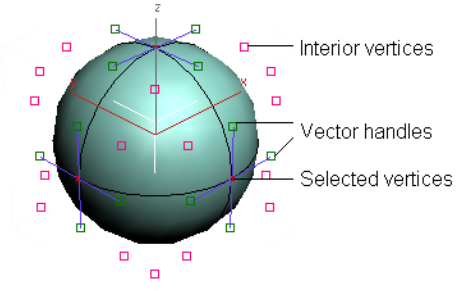


Figure 8-103 *An editable patch sphere with vector handles and interior vertices*

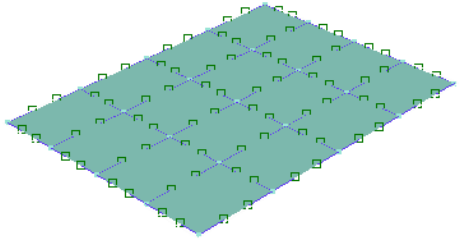


Figure 8-104 *The vector handles in a plane*

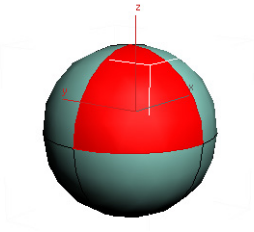


Figure 8-105 *The patch sub-object selected in an editable patch sphere*

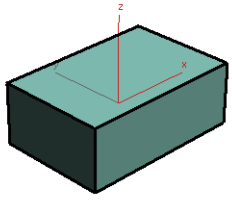


Figure 8-106 *The element sub-object selected in an editable patch box*

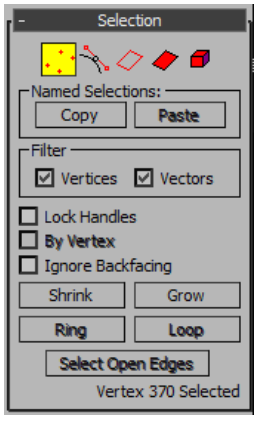


Figure 8-107 *The* ***Selection*** *rollout with the* ***Vertex*** *button chosen*

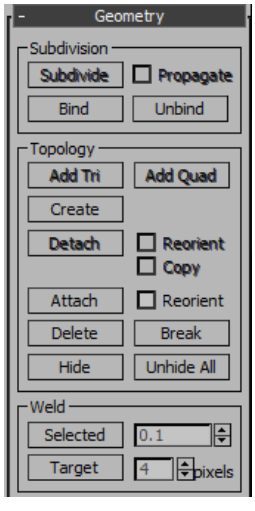


Figure 8-108 *Partial view of the* ***Geometry*** *rollout*

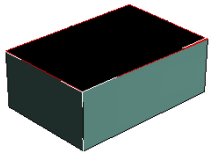


Figure 8-109 *The patch selected in an editable patch box*

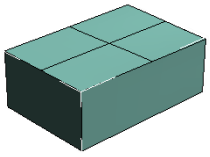


Figure 8-110 *The selected patch subdivided on choosing the* ***Subdivide*** *button*

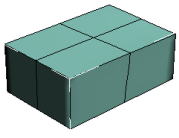


Figure 8-111 *The selected patch subdivided after selecting the* ***Propagate*** *check box*

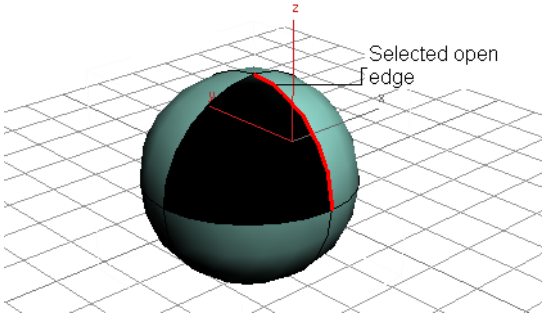


Figure 8-112 *The open edge selected in the editable patch sphere*

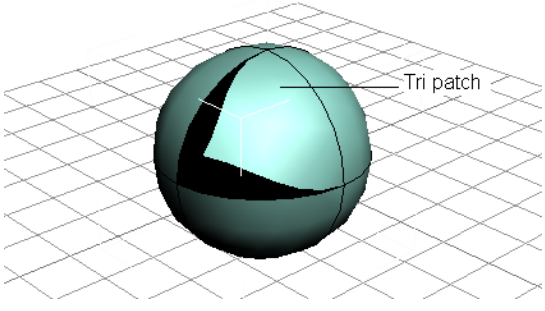


Figure 8-113 *The tri patch after choosing the* ***Tri Patch*** *button*

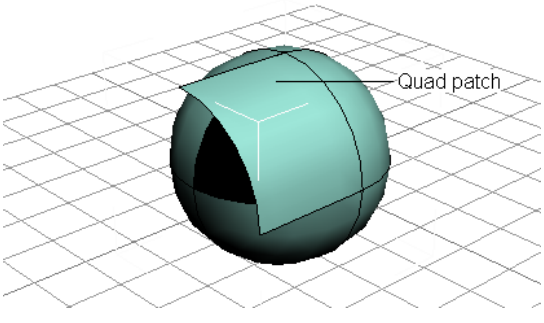


Figure 8-114 *The quad patch after choosing the* ***Quad Patch*** *button*

Figure 8-115 *A golf ball model*

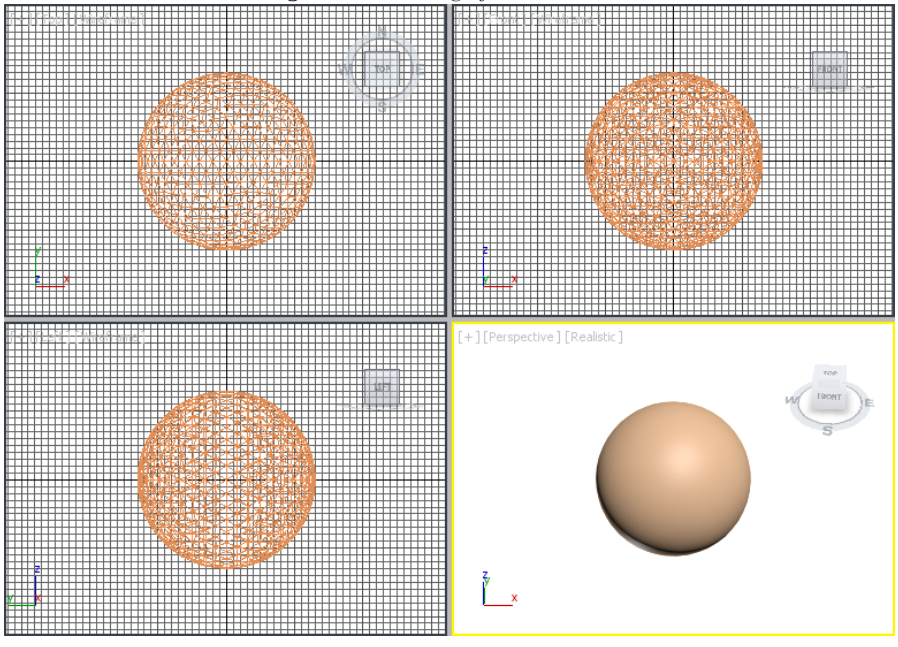


Figure 8-116 *The geosphere displayed in viewports*

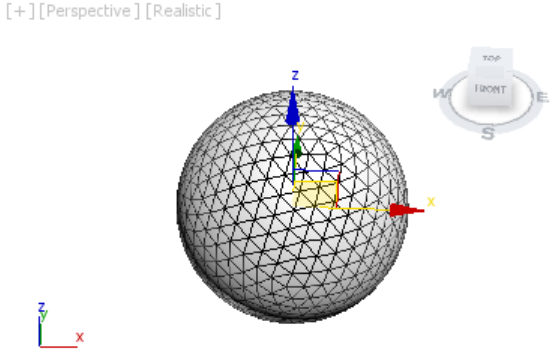


Figure 8-117 *The golf ball geometry zoomed in the Perspective viewport*

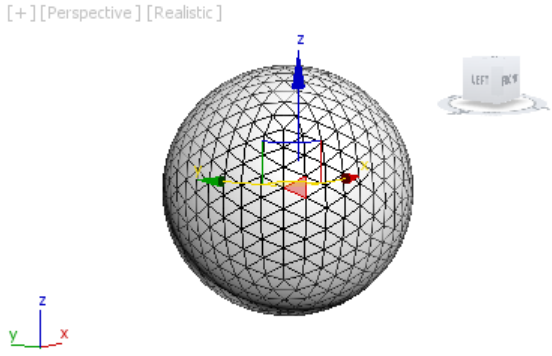


Figure 8-118 *Selected polygon of the golf ball*

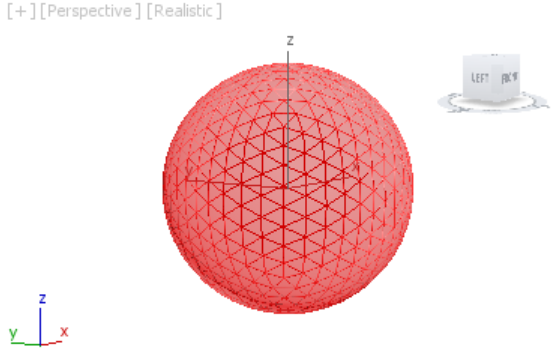


Figure 8-119 *All polygons in the golf ball selected*

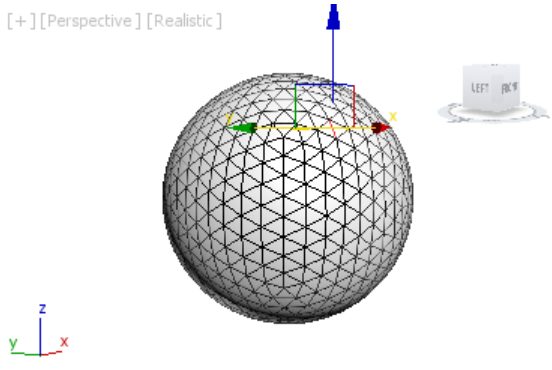


Figure 8-120 *The edge selected on golf ball*

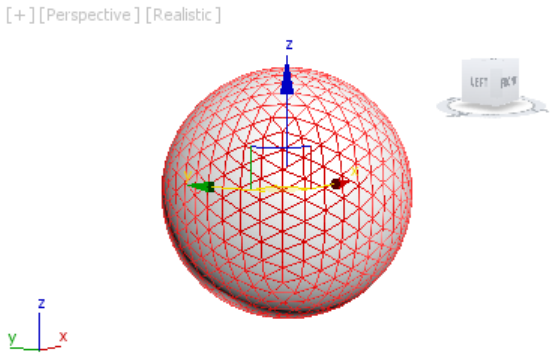


Figure 8-121 *All edges of golf ball selected*

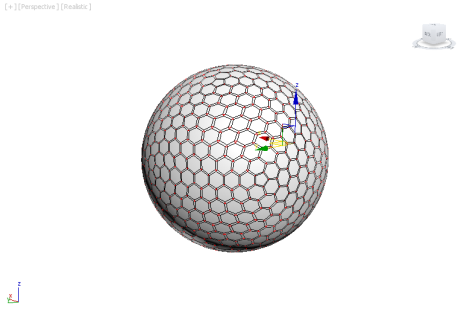


Figure 8-122 *All edges of golf ball chamfered*

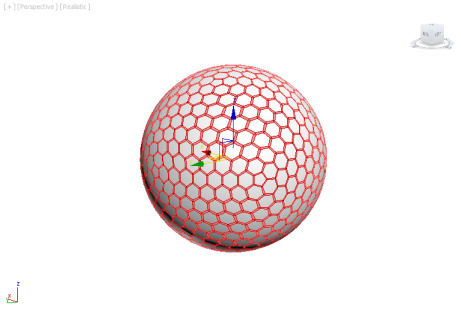


Figure 8-123 *All polygons in golf ball, except new hexagonal polygons selected*

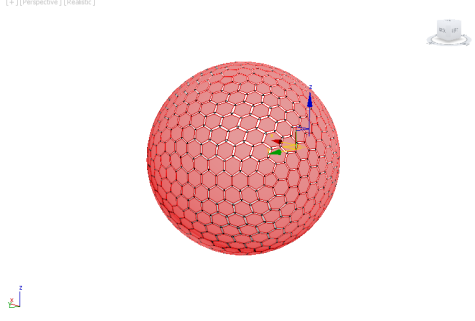


Figure 8-124 *All hexagonal polygons of golf boll selected in the viewport*

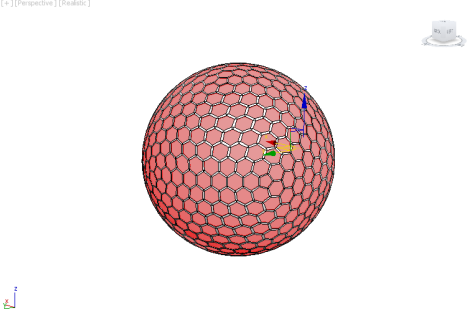


Figure 8-125 *Hexagonal polygons displayed after negative extrusion*

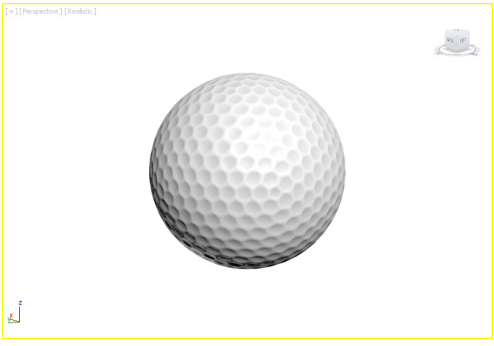


Figure 8-126 *The golf ball geometry after applying the Mesh Smooth modifier*

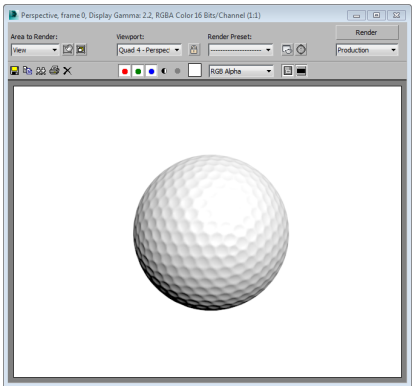


Figure 8-127 *The final output after rendering*

Figure 8-128 *The model of an LCD monitor (view 1)*

Figure 8-129 *The model of an LCD monitor (view 2)*

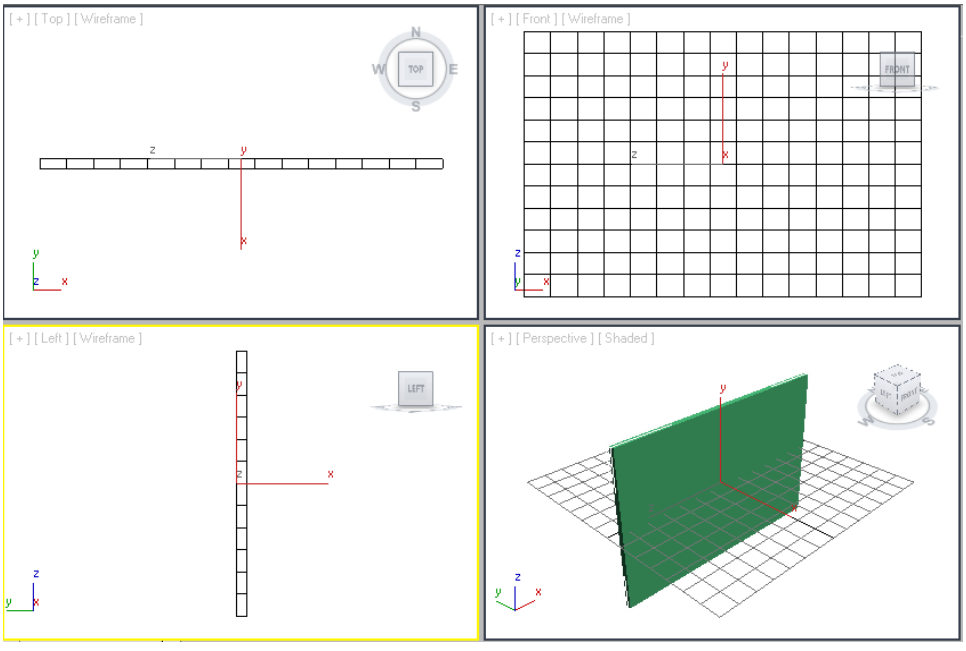


Figure 8-130 *The box for the front portion of the monitor displayed in viewports*

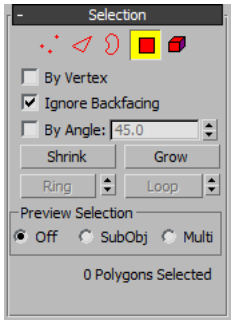


Figure 8-131 *The* ***Ignore Backfacing*** *check box selected*

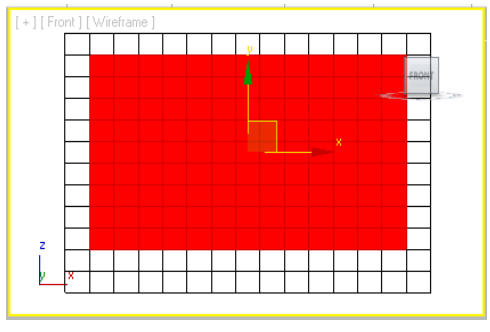


Figure 8-132 *All polygons selected in the Front viewport*

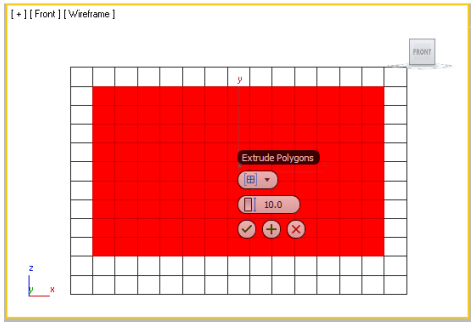


Figure 8-133 *The Extrude Polygons caddy control*

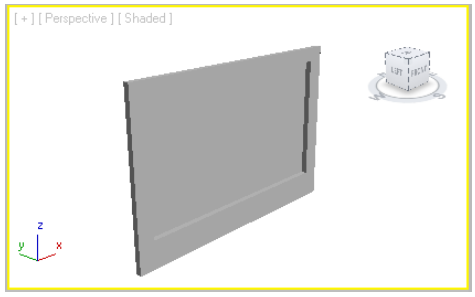


Figure 8-134 *The extrusion effect displayed in the Perspective viewport*

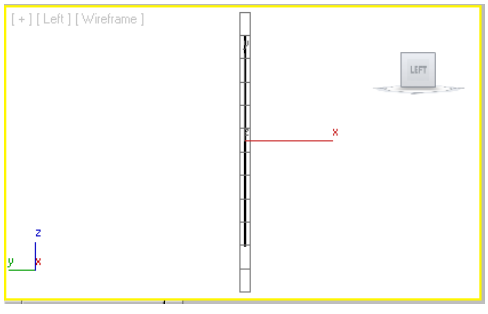


Figure 8-135 *Alignment of screen with front portion in the Left viewport*

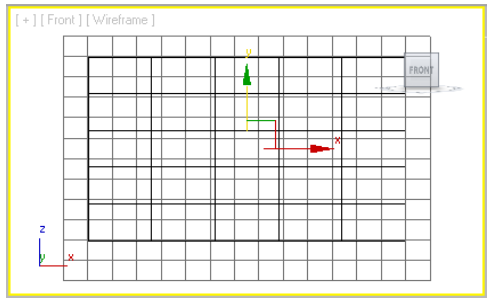


Figure 8-136 *Alignment of screen with front portion in the Front viewport*

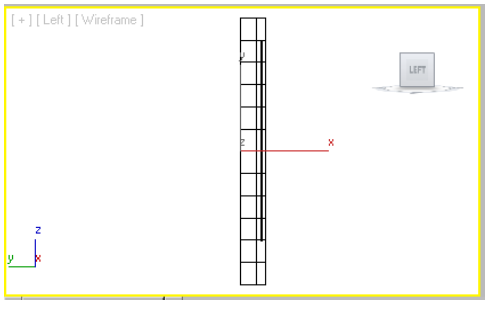


Figure 8-137 *Alignment of the back portion with the front part in the Left viewport*

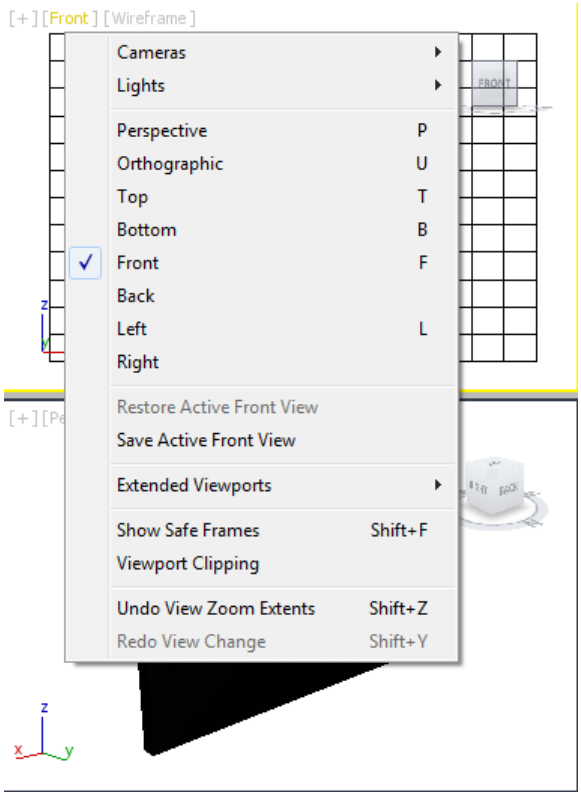


Figure 8-138 *A flyout showing various options to display views*

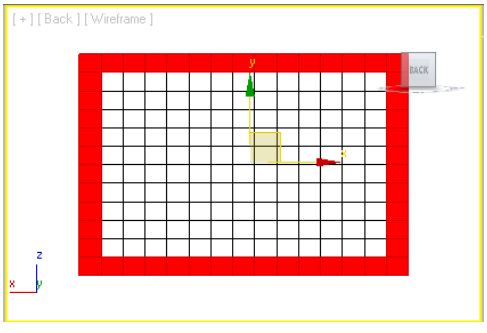


Figure 8-139 *The outer polygons selected in back portion*

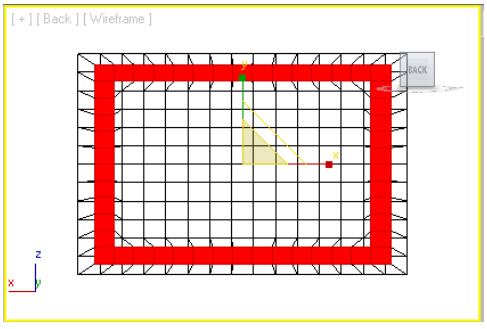


Figure 8-140 *The selected polygons uniformly scaled in back portion*

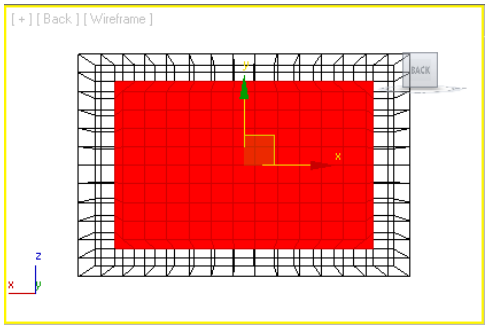


Figure 8-141 *The inner polygons selected in back portion*

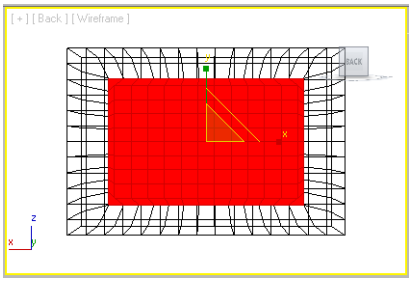


Figure 8-142 *The selected polygons uniformly scaled to 90 percent*

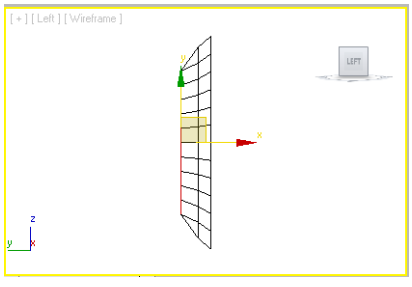


Figure 8-143 *Selected polygons dragged horizontally*

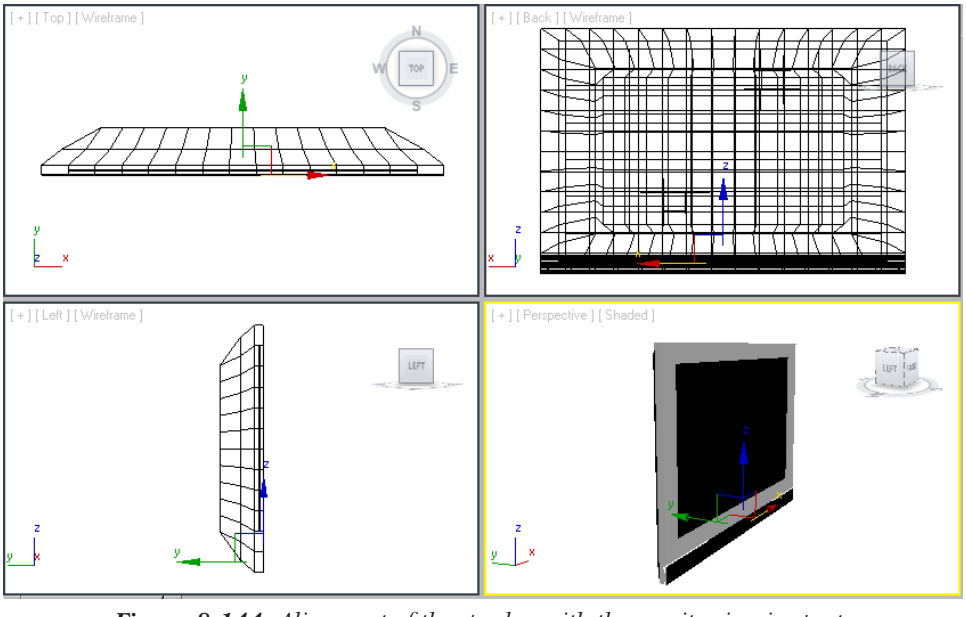


Figure 8-144 *Alignment of the speaker with the monitor in viewports*

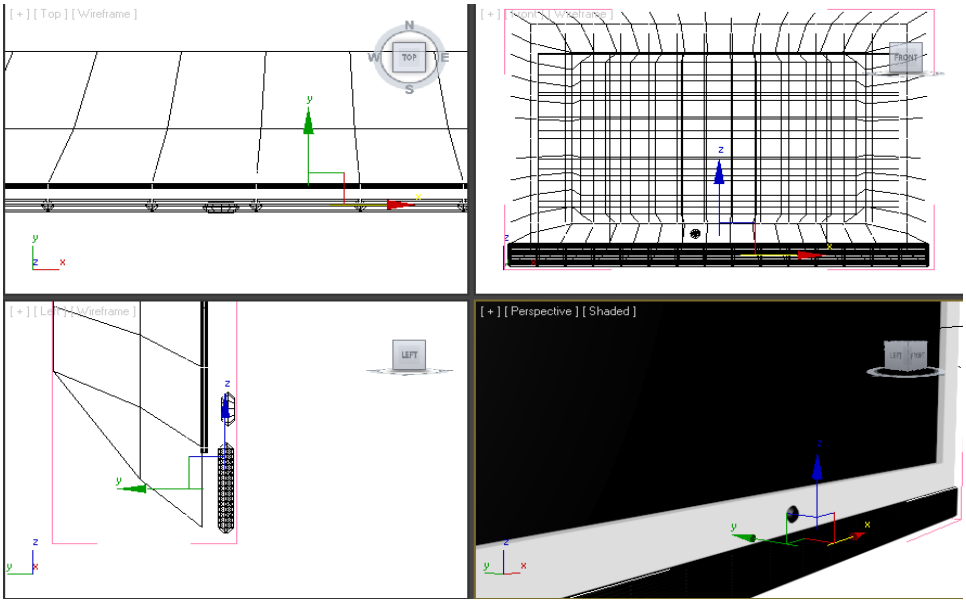


Figure 8-145 *Alignment of b01 with front portion in viewports*

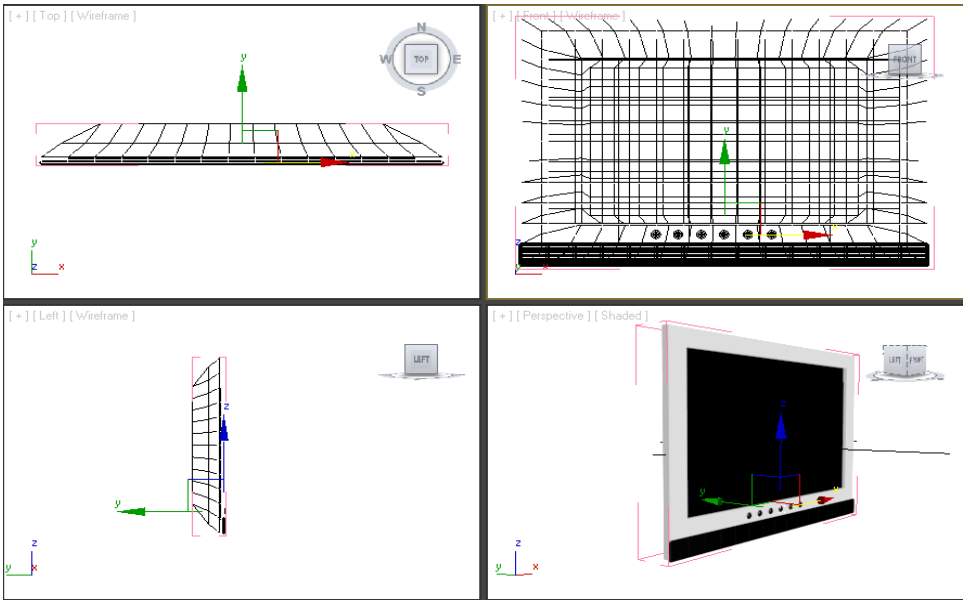


Figure 8-146 *Alignment of b002, b003, b004, b005, and b006 in viewports*

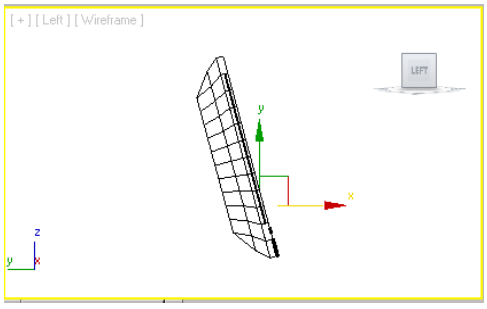


Figure 8-147 *The LCD monitor displayed after rotating it in the Left viewport*

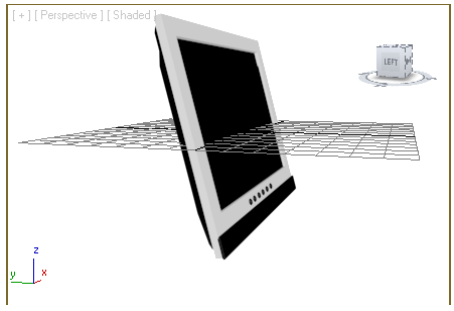


Figure 8-148 *The LCD monitor group displayed in the Perspective viewport*

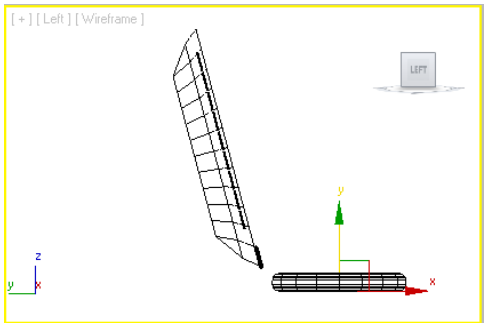


Figure 8-149 *The support geometry moved in the Left viewport*

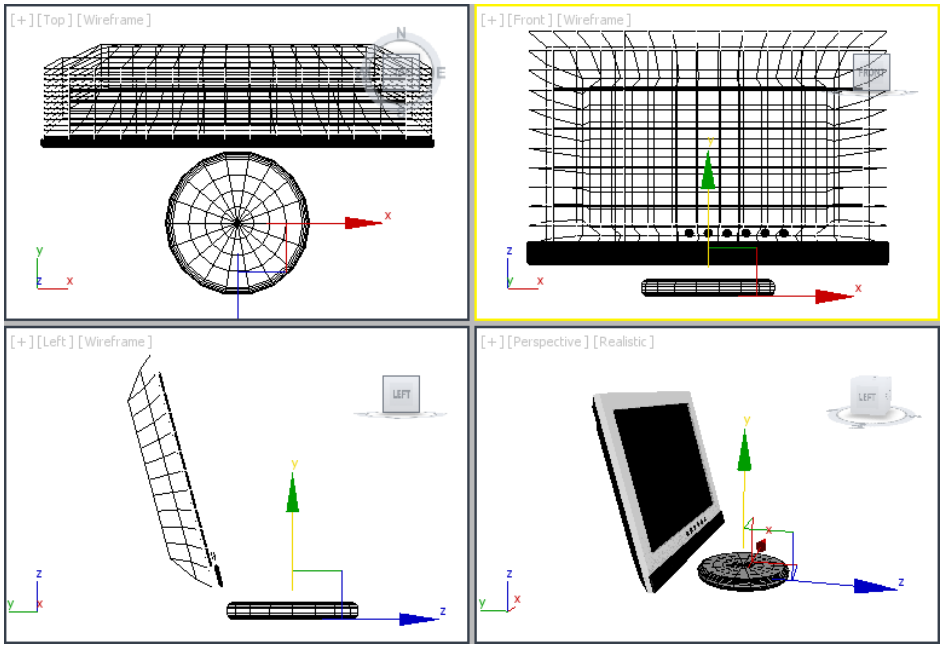


Figure 8-150 *The support geometry zoomed in viewports*

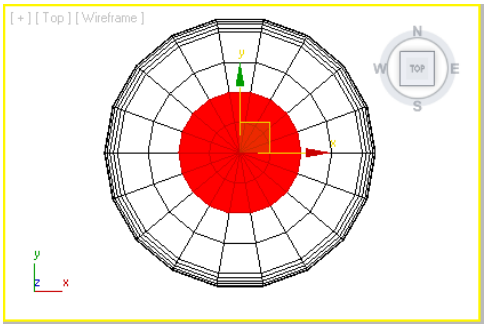


Figure 8-151 *The inner polygons of support selected*

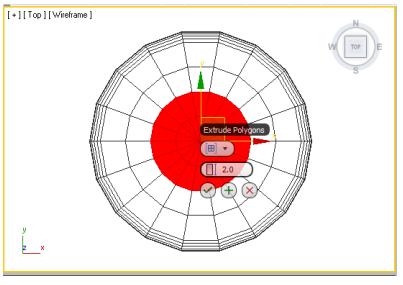


Figure 8-152 *The* ***Extrude Polygons*** *caddy control*

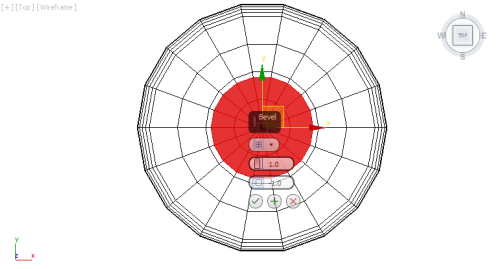


Figure 8-153 *The value set in the* ***Height*** *spinner of the* ***Bevel*** *caddy control*

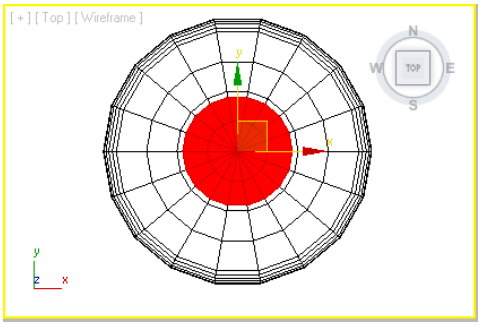


Figure 8-154 *The selected polygons in the Top viewport after extruding and beveling*

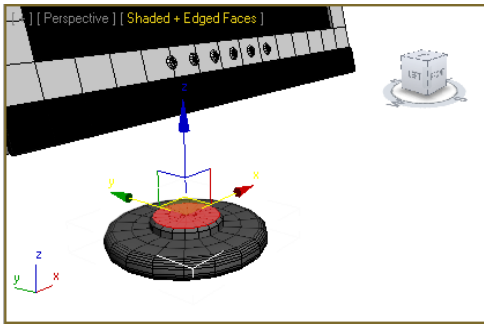


Figure 8-155 *The selected polygons in the Perspective viewport after extruding and beveling*

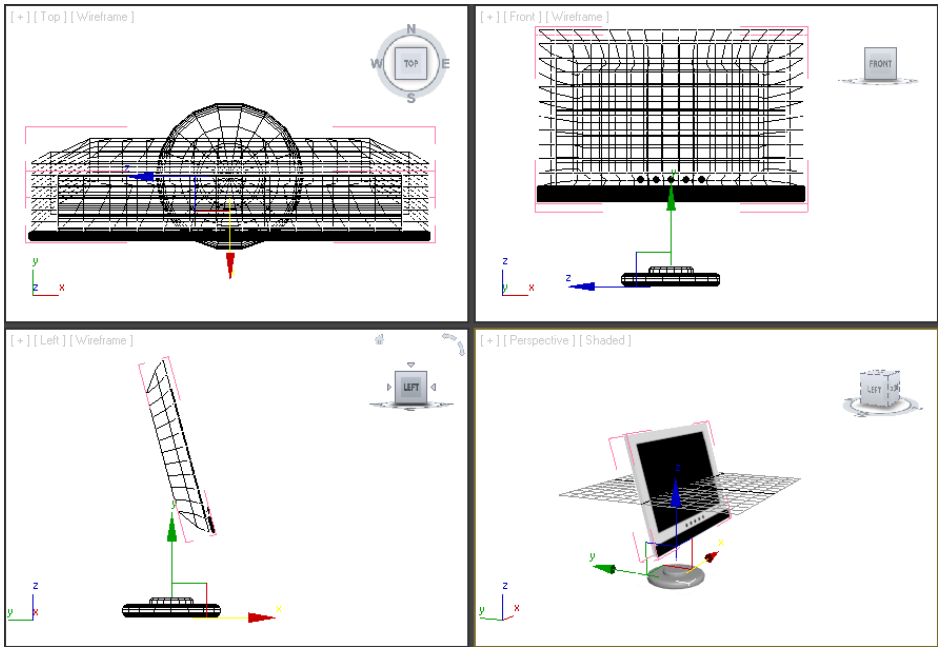


Figure 8-156 *Alignment of support in viewports*

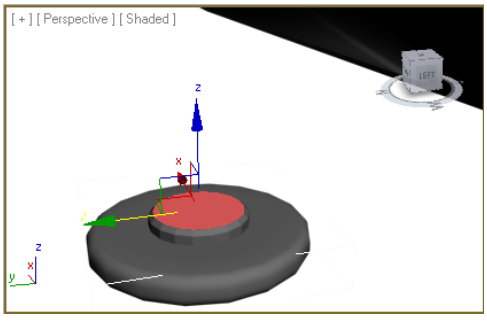


Figure 8-157 *The view of Perspective viewport after using the* ***Zoom*** *and* ***Orbit*** *tools*

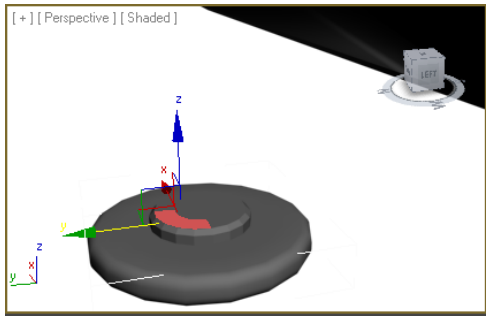


Figure 8-158 *The polygons selected in the Perspective viewport*

Figure 8-159 *The back side geometry of LCD monitor in the Perspective viewport*

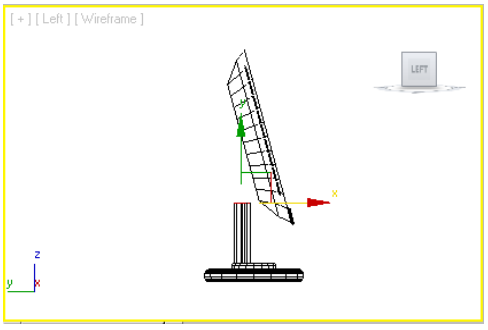


Figure 8-160 *The selected polygons extruded in the Left viewport*

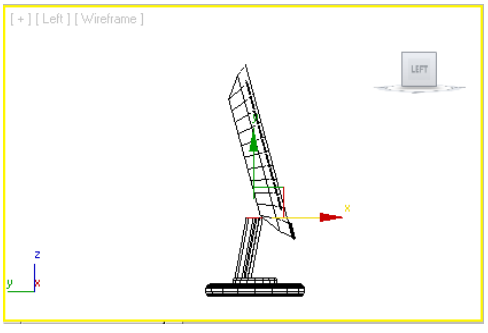


Figure 8-161 *The support geometry in the Left viewport after moving it horizontally*

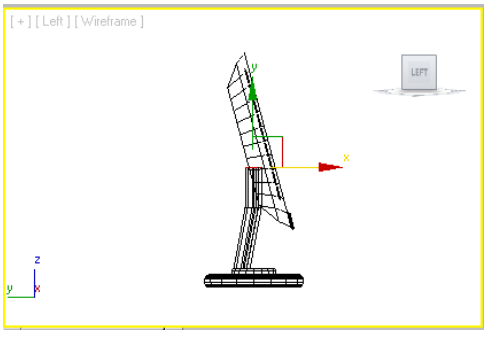


Figure 8-162 *The support geometry in the Left viewport after extrusion*

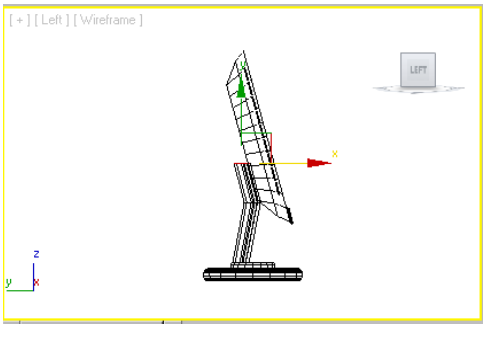


Figure 8-163 *The selected polygons of support in the Left viewport*

Figure 8-164 *Model of the bed*

9

Graphite Modeling Technique

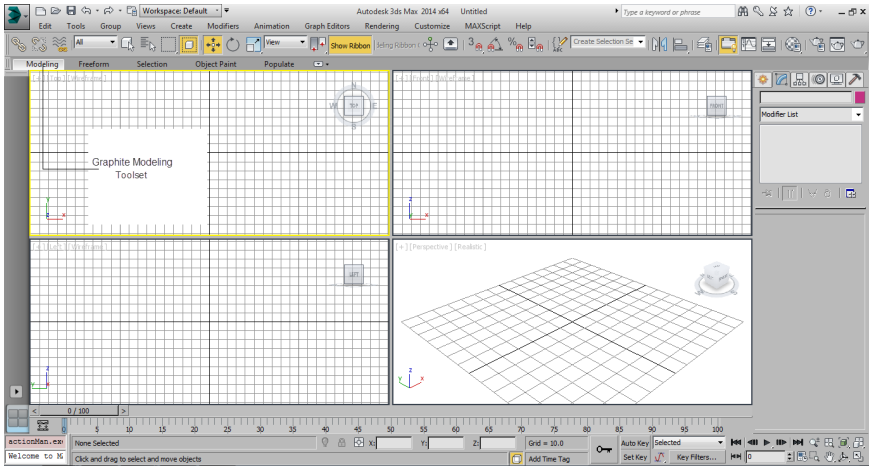


Figure 9-1 *The graphite modeling toolset*

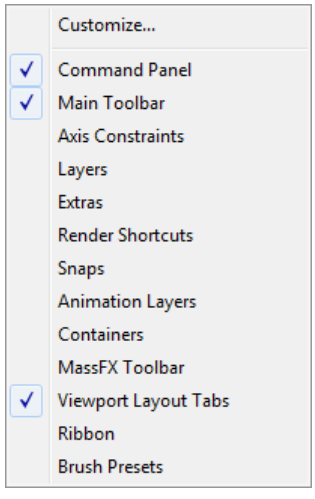


Figure 9-2 *The shortcut menu displayed on right-clicking the* ***Main Toolbar***

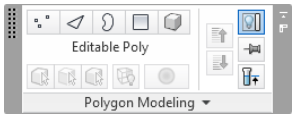


Figure 9-3 The ***Polygon Modeling*** *panel*

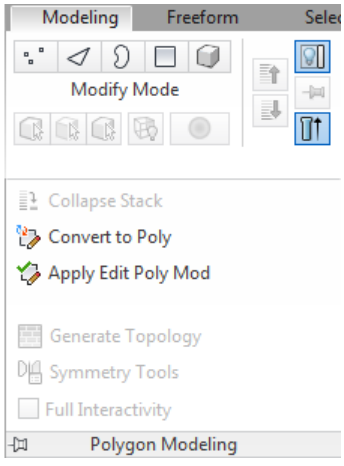


Figure 9-4 The ***Polygon Modeling*** *panel expanded*

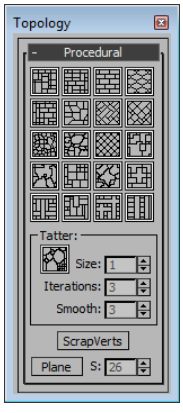


Figure 9-5 The ***Topology*** *dialog box*

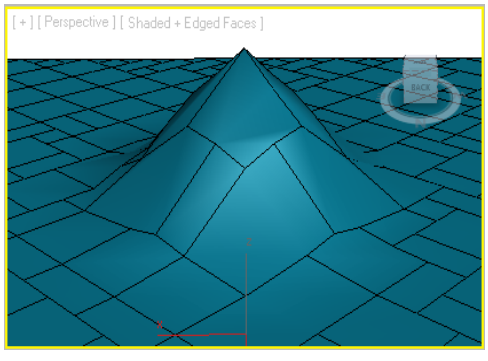


Figure 9-6 The ***Floor2*** *topology pattern displayed on the polygonal object*

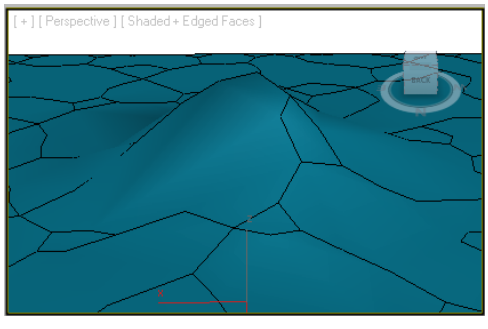


Figure 9-7 The ***Smoothstar*** *topology pattern*

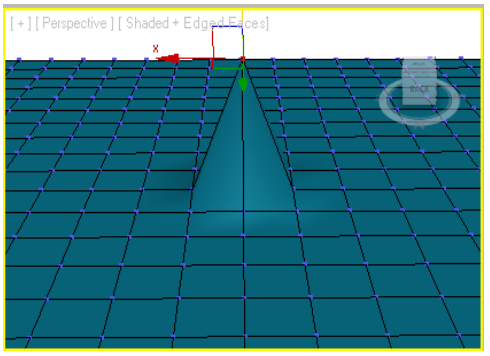


Figure 9-8 *Vertex moved without choosing the* ***Use Soft Selection*** *tool*

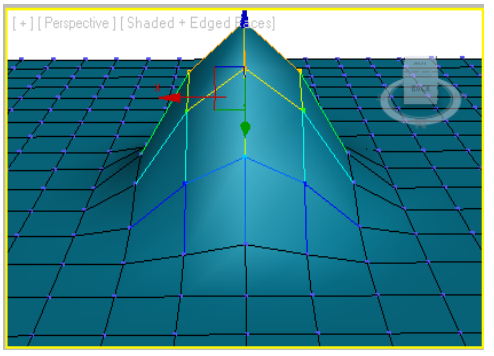


Figure 9-9 *Vertex moved after choosing the* ***Use Soft Selection*** *tool*

Figure 9-10 *The* ***Edit*** *panel*

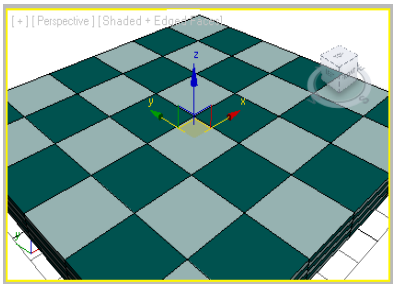


Figure 9-11 *Checker map applied to an object*

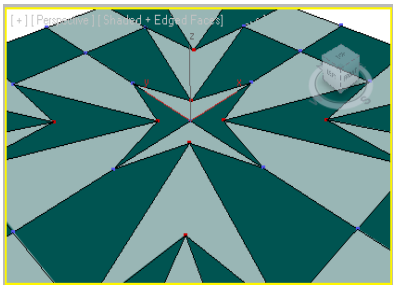


Figure 9-12 *Checker map distorted before choosing the* ***Preserve UVs*** *tool*

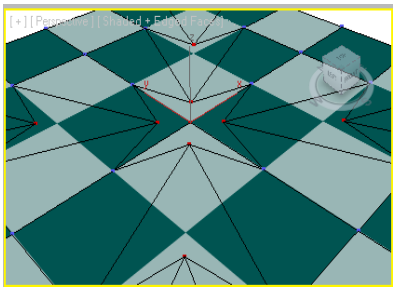


Figure 9-13 *The checker map after choosing the* ***Preserve UVs*** *tool*

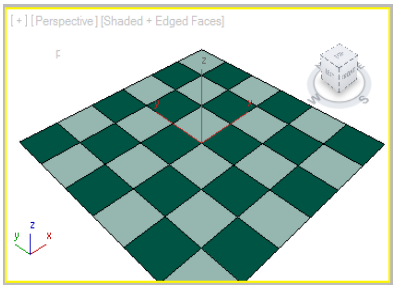


Figure 9-14 *Checker map applied to an object*

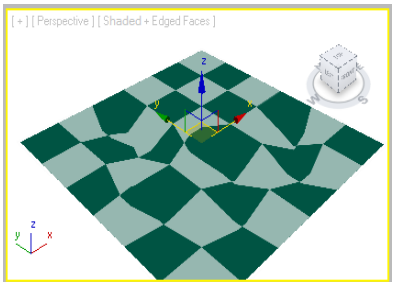


Figure 9-15 *Checker map tweaked using the* ***Tweak*** *tool*

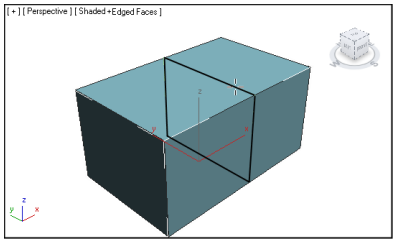


Figure 9-16 *A green colored gizmo displayed on the object*

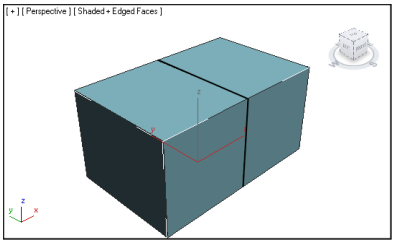


Figure 9-17 *A new edge loop created using the* ***SwiftLoop*** *tool*

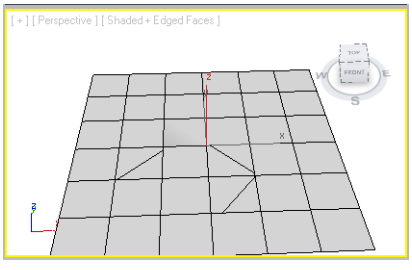


Figure 9-18 *New segments created on an object using the* ***Paint Connect*** *tool*

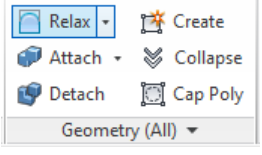


Figure 9-19 *The* ***Geometry (All)*** *panel*

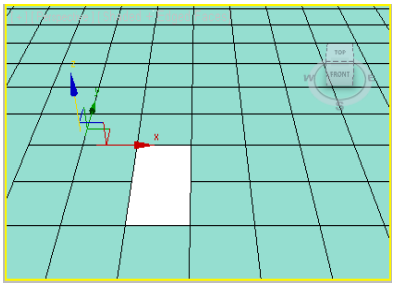


Figure 9-20 *An object with a hole*

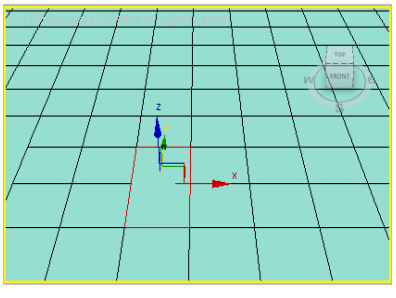


Figure 9-21 *The hole covered after choosing the* ***Cap Poly*** *tool*

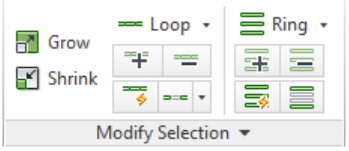


Figure 9-22 *The* ***Modify Selection*** *panel*

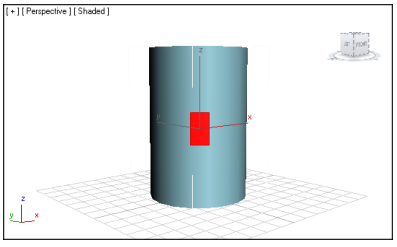


Figure 9-23 *A polygon selected to create a loop selection*

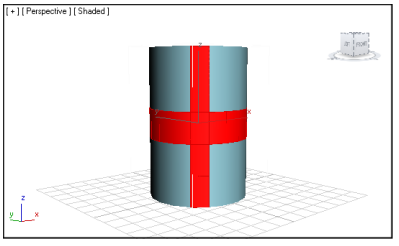


Figure 9-24 *The polygons selected after choosing the* ***Loop*** *tool*

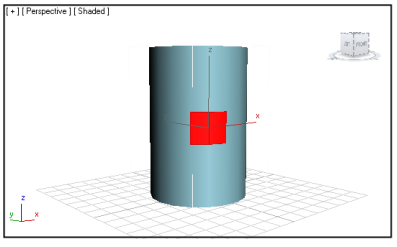


Figure 9-25 *Two polygons selected to create a loop*

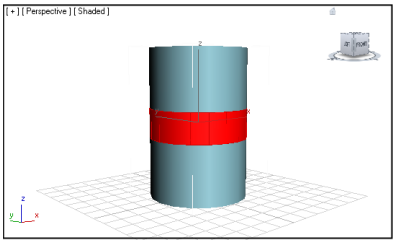


Figure 9-26 *The loop created after choosing the* ***Loop*** *tool*

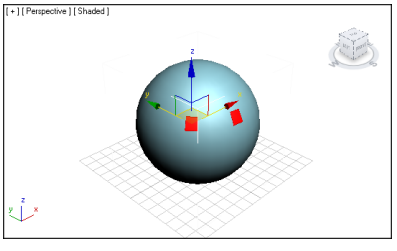


Figure 9-27 *The polygons selected on a sphere*

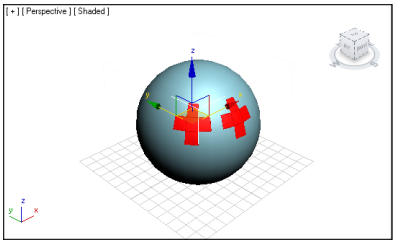


Figure 9-28 *The polygons selected after choosing the* ***Grow Loop*** *tool*

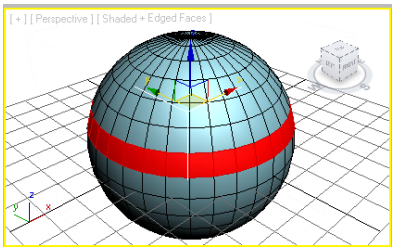


Figure 9-29 *The loop selection*

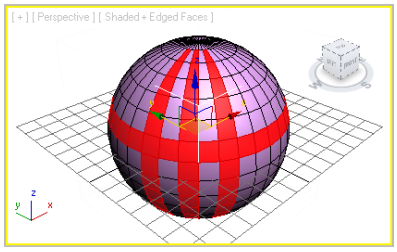


Figure 9-30 *The selected polygons after choosing the* ***Loop Mode*** *tool*

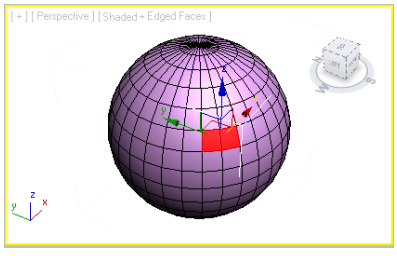


Figure 9-31 *Two adjacent polygons selected*

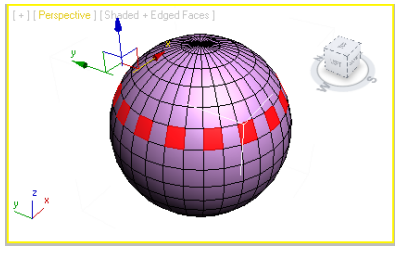


Figure 9-32 *The selection loop on choosing the* ***Dot Loop*** *tool*

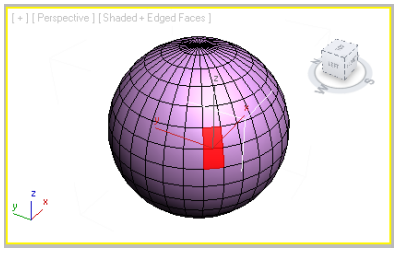


Figure 9-33 *Two adjacent polygons selected*

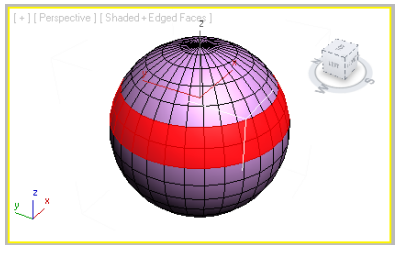


Figure 9-34 *The sub-objects selected in the form of a ring*

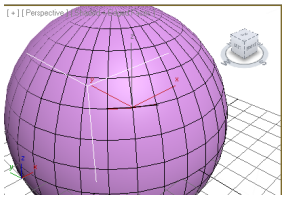


Figure 9-35 *The edges selected*

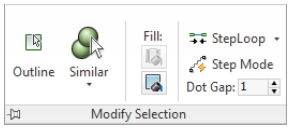


Figure 9-36 *The* ***Modify Selection*** *panel expanded*

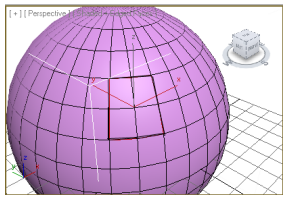


Figure 9-37 *An ouline created around the selected edges*

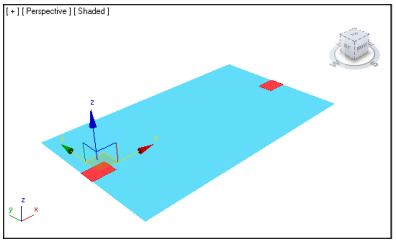


Figure 9-38 *Two polygons selected*

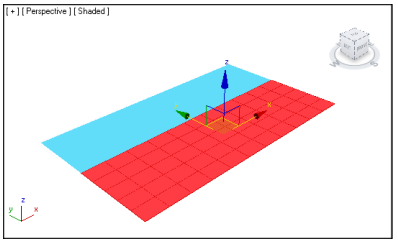


Figure 9-39 *All sub-objects selected between the two selected polygons*

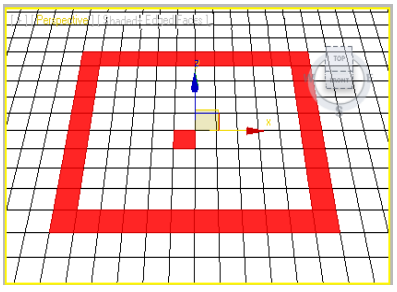


Figure 9-40 *The sub-objects selected to create a boundary*

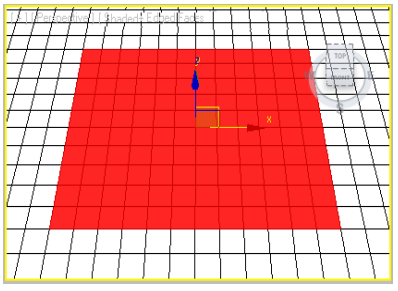


Figure 9-41 *All sub-objects selected inside the defined boundary*

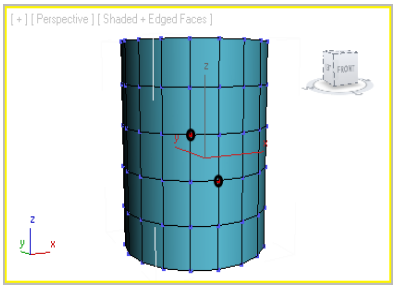


Figure 9-42 *The two vertices selected*

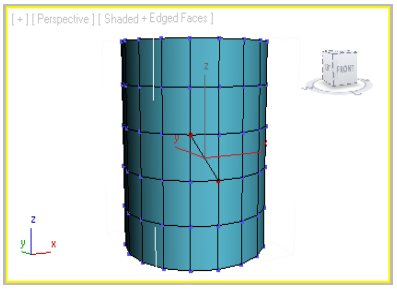


Figure 9-43 *A new edge created between the two selected vertices*

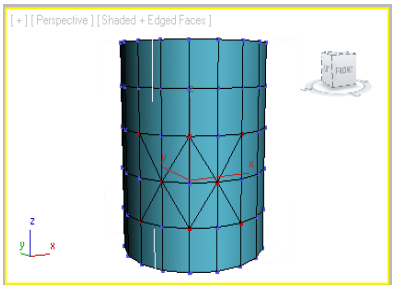


Figure 9-44 *Multiple vertices connected on choosing the* ***Connect*** *tool*

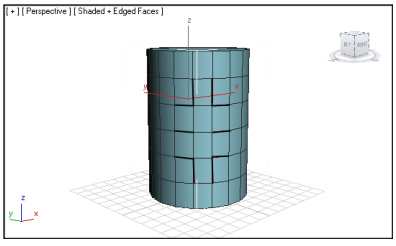


Figure 9-45 *The edges selected*

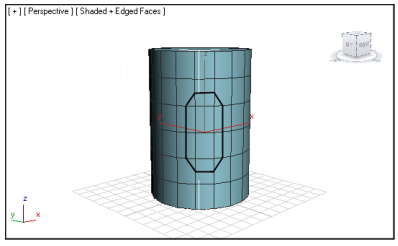


Figure 9-46 *The selected edges connected by new edges*

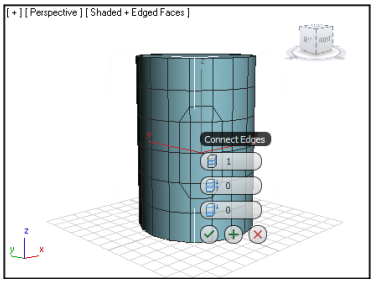


Figure 9-47 *The* ***Connect Edges*** *caddy control*

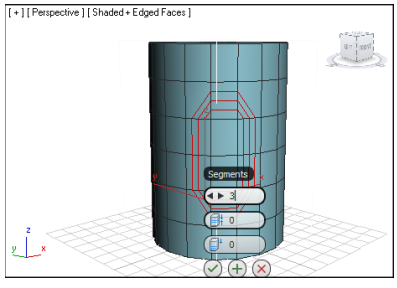


Figure 9-48 *Multiple edges created between the selected edges*

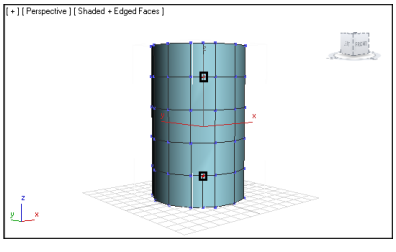


Figure 9-49 *Two vertices selected*

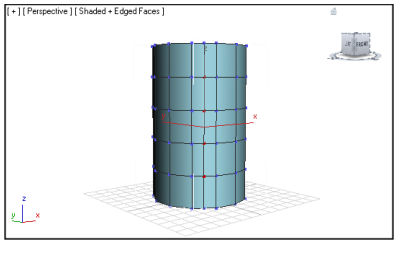


Figure 9-50 *Connection made between the selected vertices*

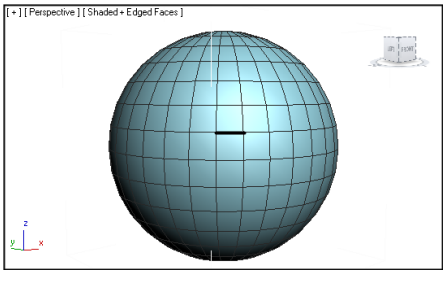


Figure 9-51 *An edge selected on the sphere*

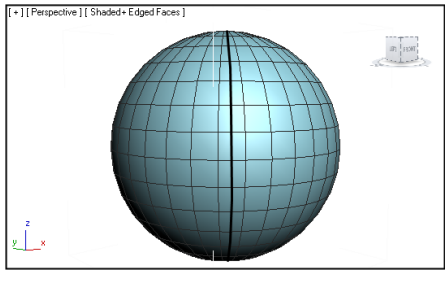


Figure 9-52 *The complete edge loop of the selected edge*

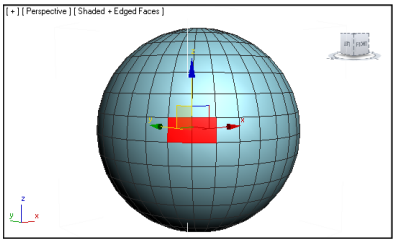


Figure 9-53 *The polygons selected on an object*

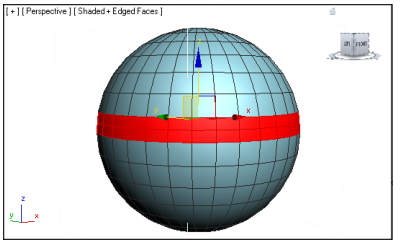


Figure 9-54 *An edge loop created along the selected polygons using the* ***Insert Loop*** *tool*

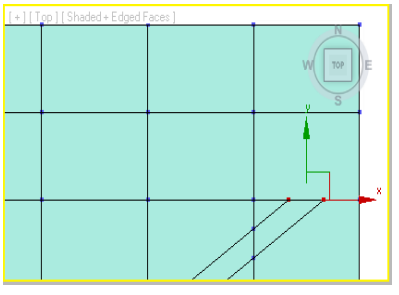


Figure 9-55 *The two vertices selected*

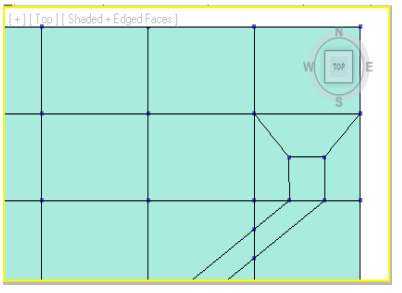


Figure 9-56 *A quad built at the ends of the two selected vertices*

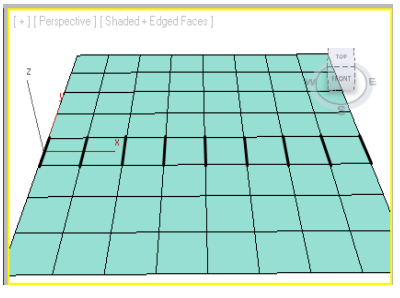


Figure 9-57 *The edges selected*

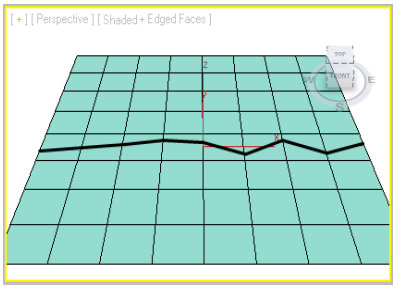


Figure 9-58 *Randomly connected edges*

Figure 9-59 *The model of a acoustic guitar*

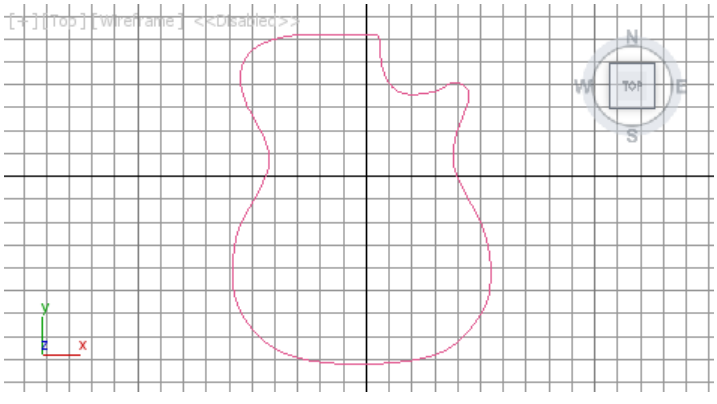


Figure 9-60 *The outline of the body of guitar*

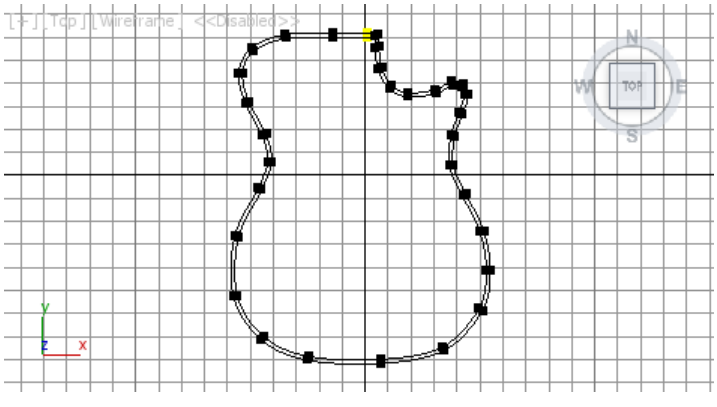


Figure 9-61 *The outline created using the* ***Outline*** *spinner*

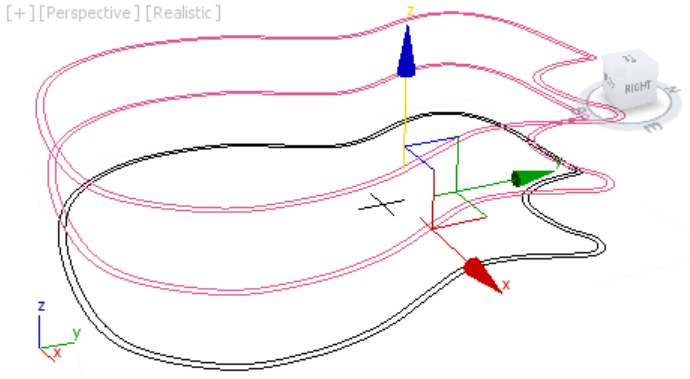


Figure 9-62 *Duplicate copies of Line001*

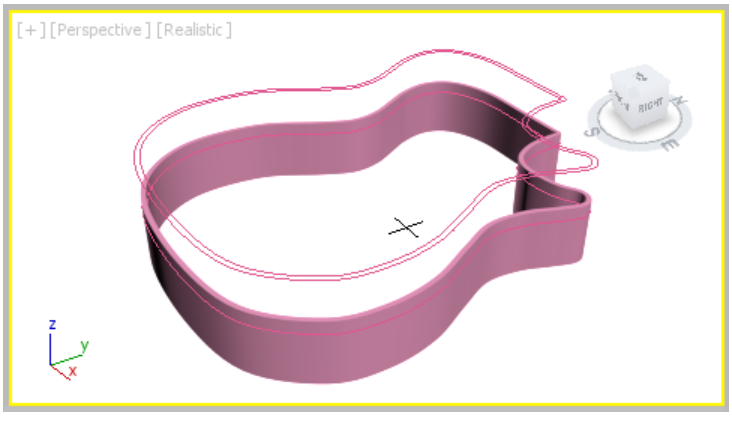


Figure 9-63 *Line001 extruded*

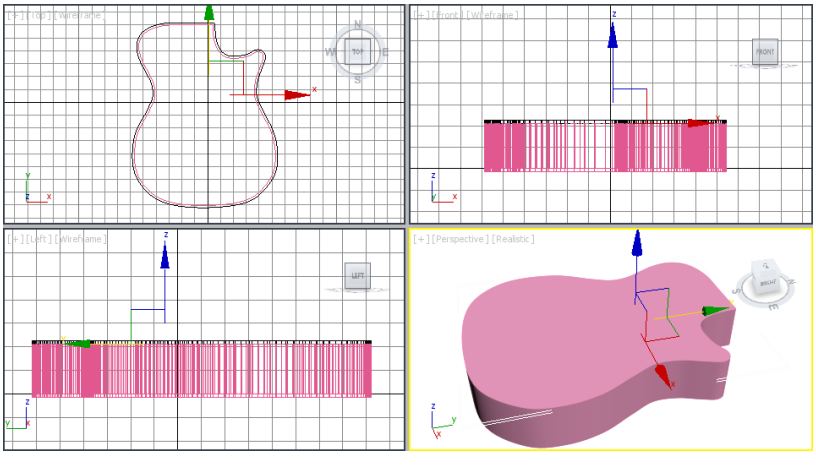


Figure 9-64 *Different parts of the guitar aligned*

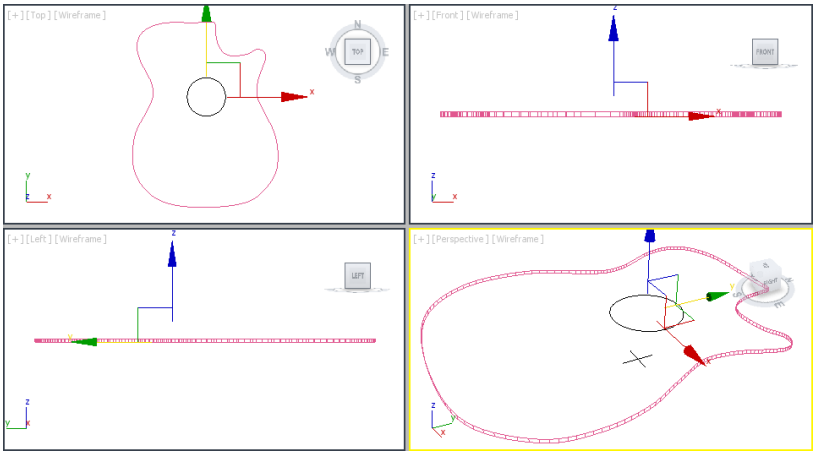


Figure 9-65 *The circle aligned with soundhole_guitar*

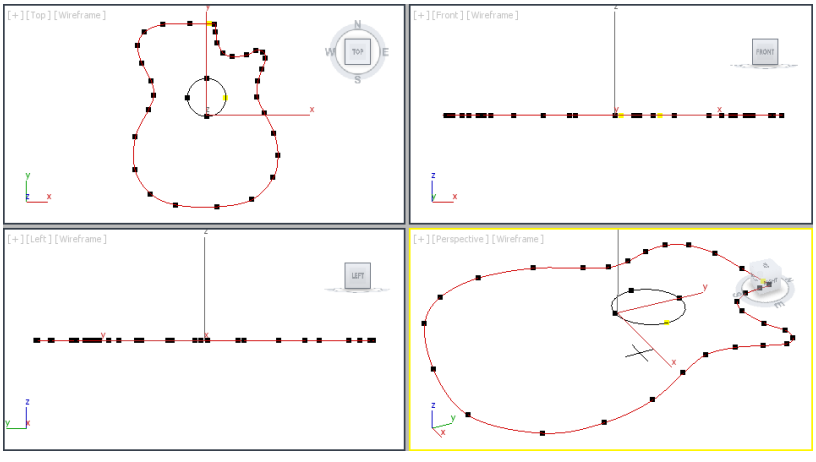


Figure 9-66 *The circle attached to soundhole_guitar*

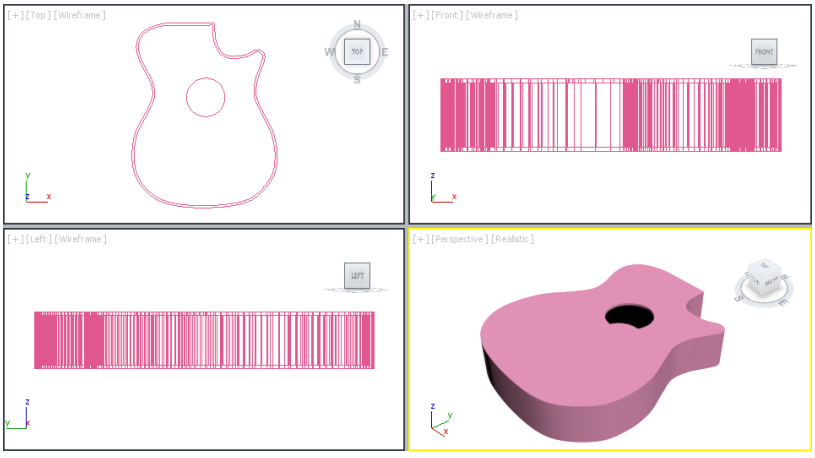


Figure 9-67 *The body of the guitar in viewports*

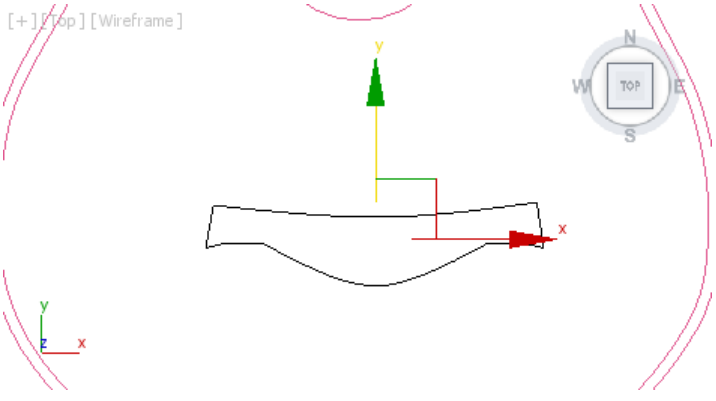


Figure 9-68 *The profile curve created for the bridge*

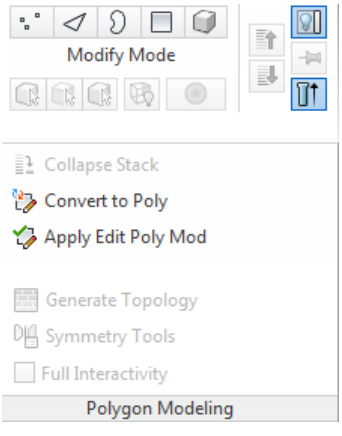


Figure 9-69 *The expanded* ***Polygon Modeling*** *panel*

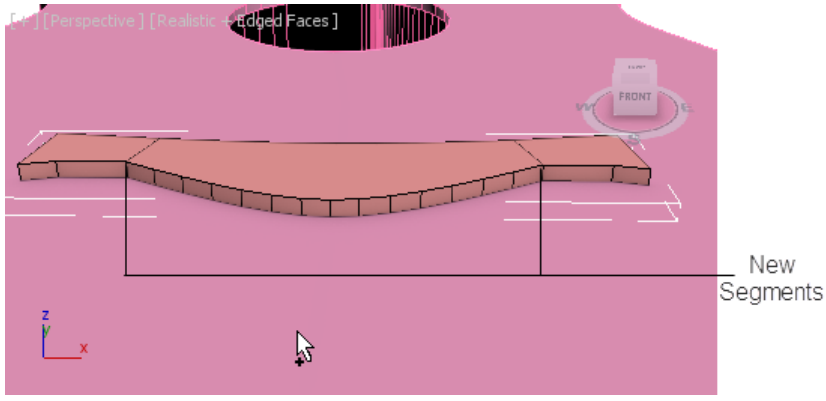


Figure 9-70 *New segments created on the bridge*

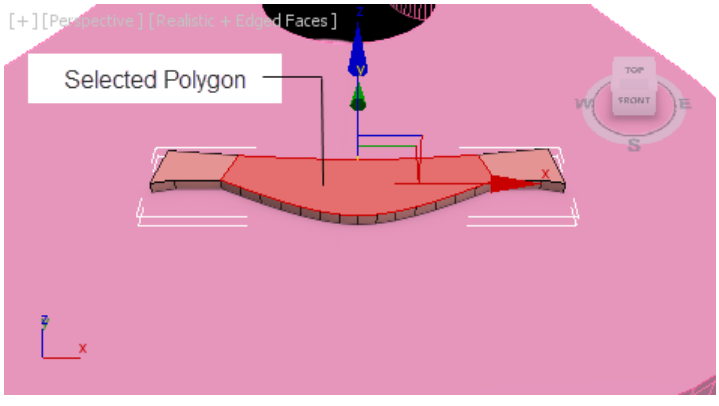


Figure 9-71 *The selected polygon*

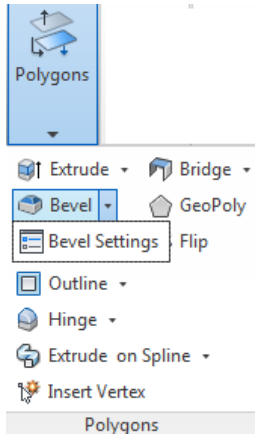


Figure 9-72 *Choosing the* ***Bevel Settings*** *button from the* ***Bevel*** *drop-down*

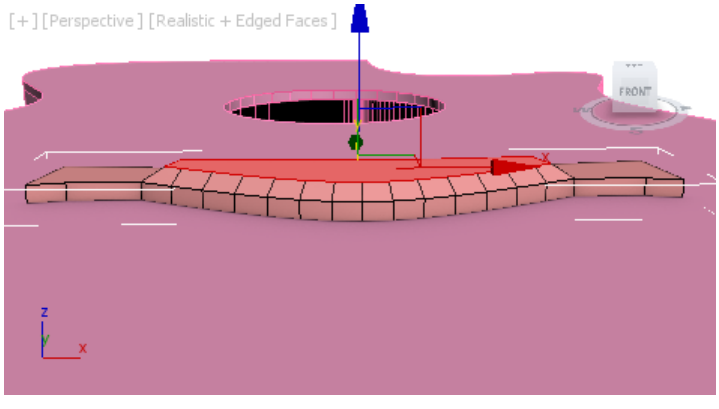


Figure 9-73 *The beveled polygons*

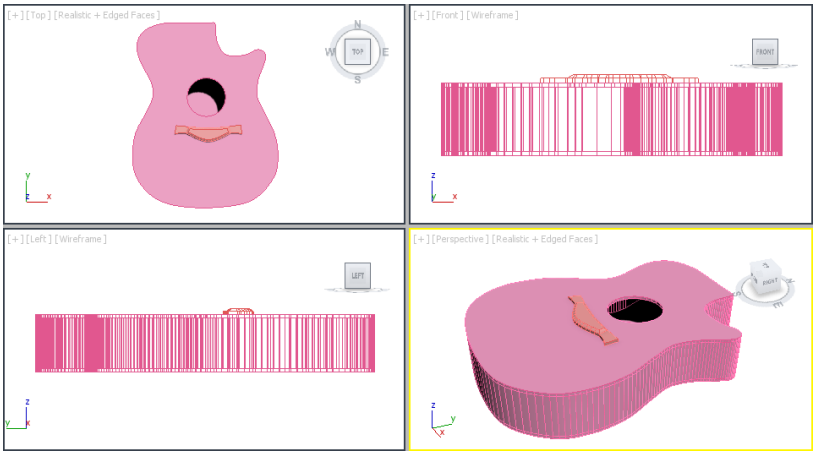


Figure 9-74 *The bridge geometry aligned with guitar body*

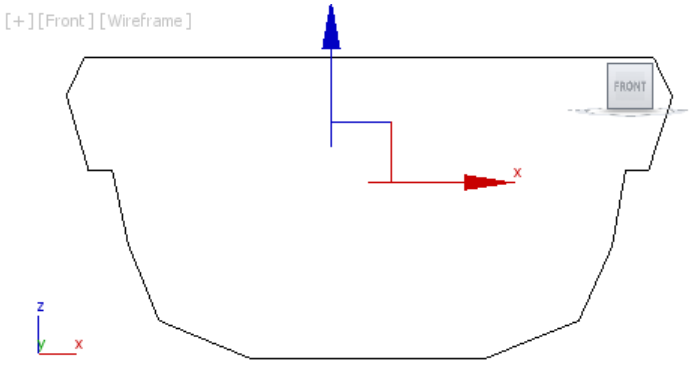


Figure 9-75 *The profile curve for neck*

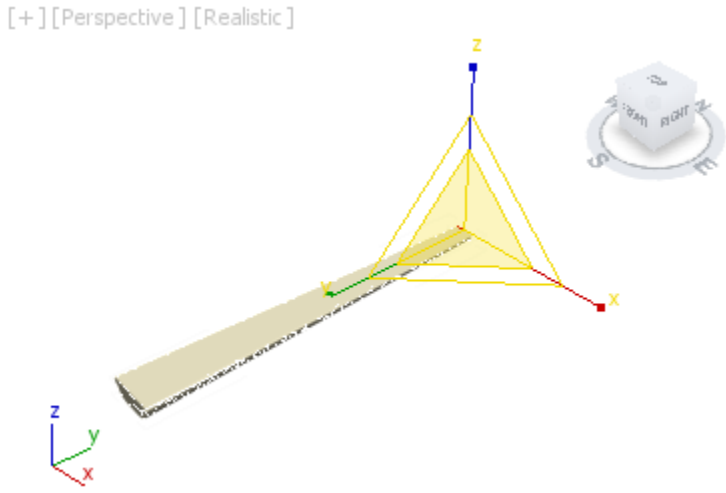


Figure 9-76 *The vertices scaled down*

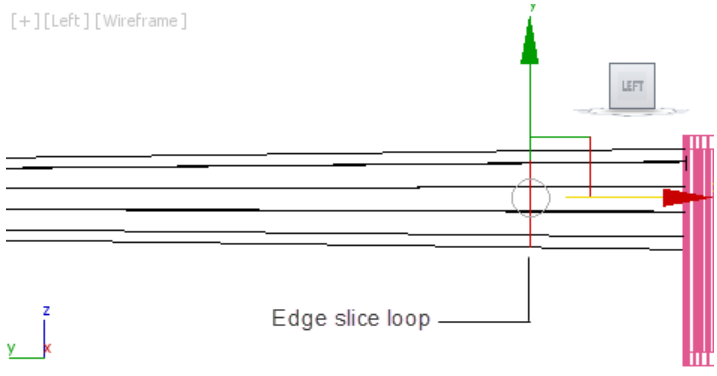


Figure 9-77 *The new edge slice loop added*

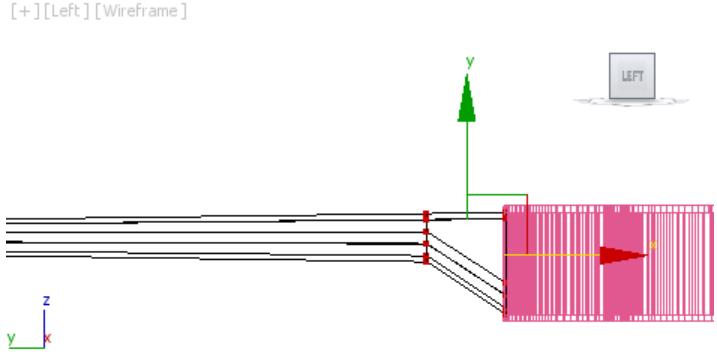


Figure 9-78 *Alignment of vertices*

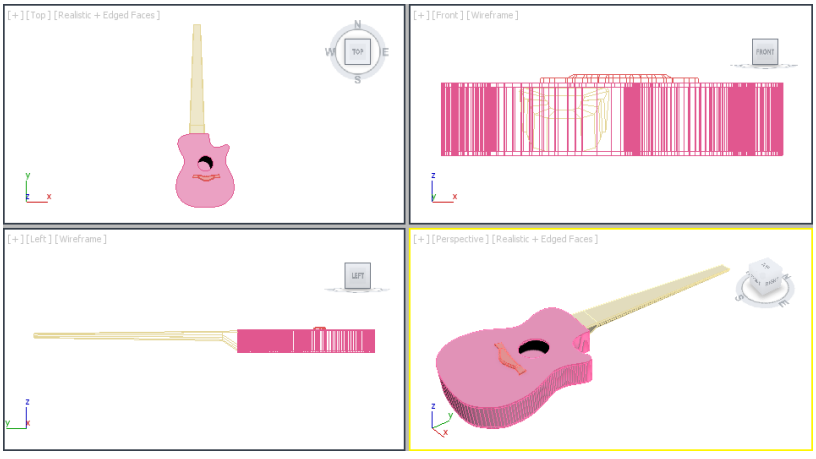


Figure 9-79 *The neck aligned with the guitar*

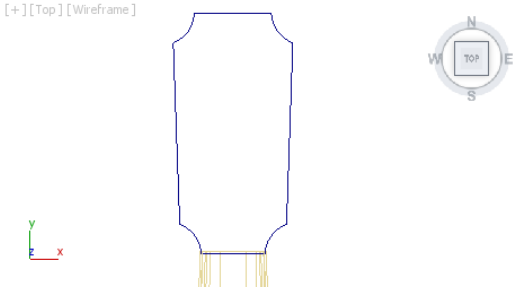


Figure 9-80 *Profile curve for the head*

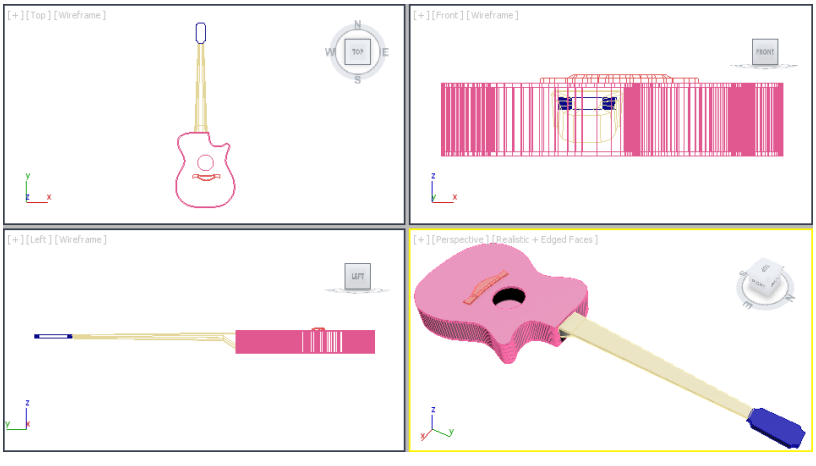


Figure 9-81 *The head aligned with the neck*

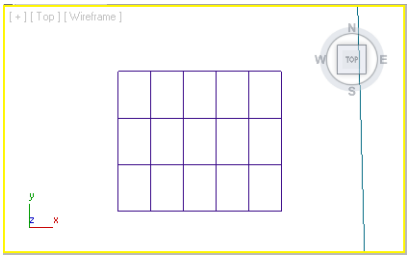


Figure 9-82 *The modified box*

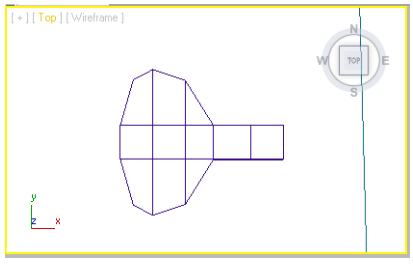


Figure 9-83 *The vertices modified to create a key shape*

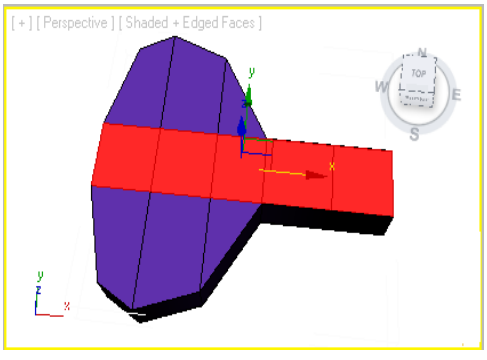


Figure 9-84 *The polygons selected*

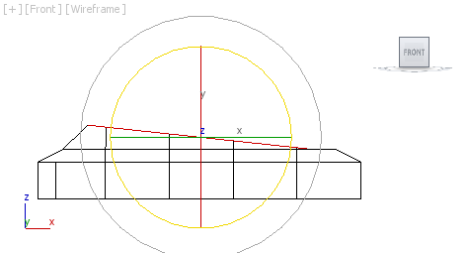


Figure 9-85 *The polygons rotated*

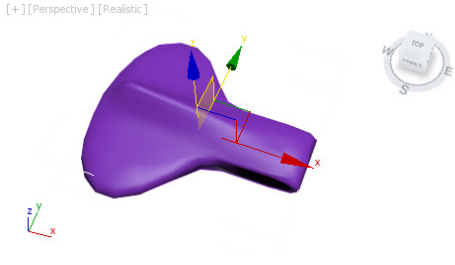


Figure 9-86 *Key after applying the* ***MeshSmooth*** *modifier*

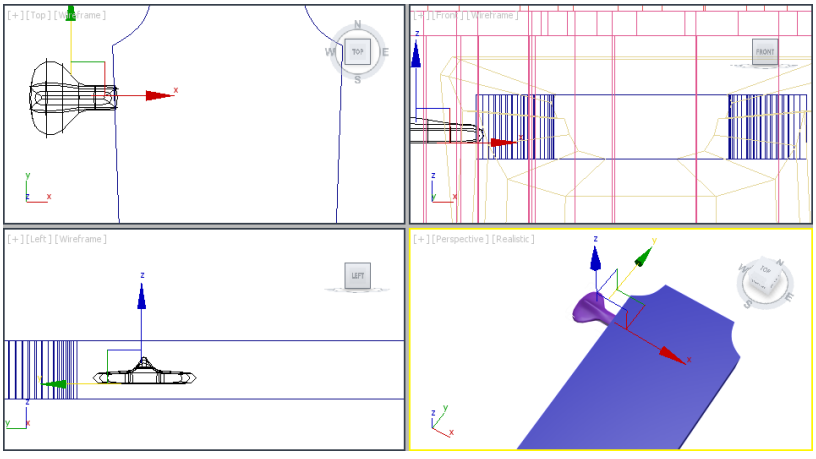


Figure 9-87 *Key aligned with guitar*

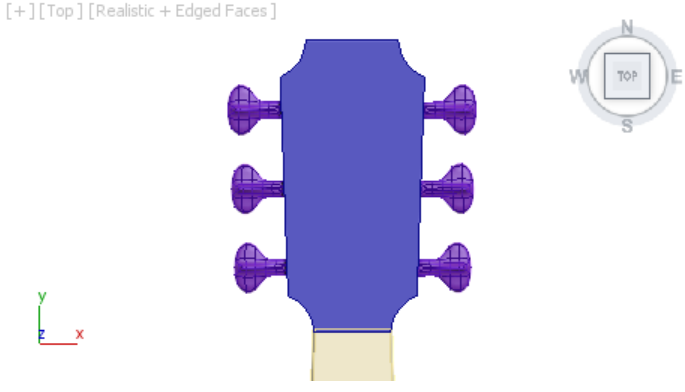


Figure 9-88 *The keys aligned with the head*

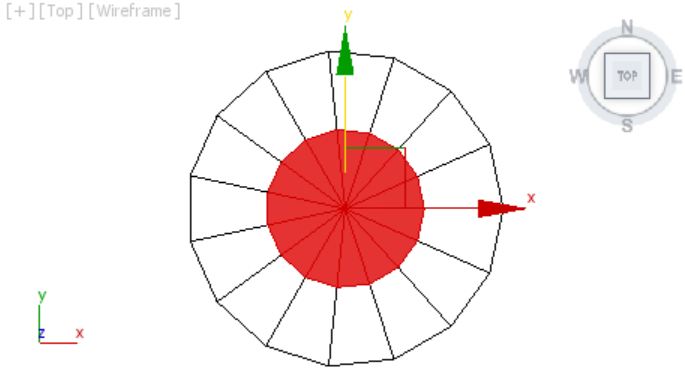


Figure 9-89 *The polygons selected*

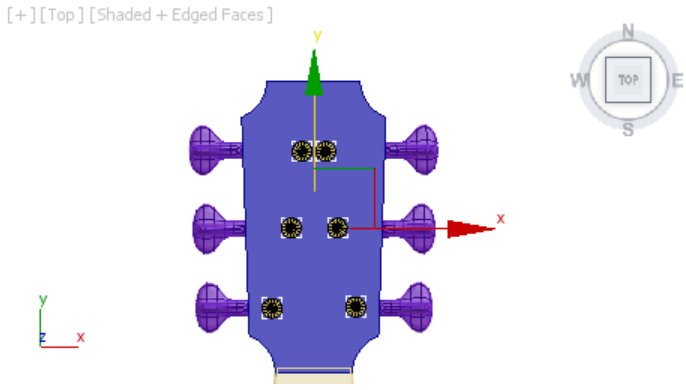


Figure 9-90 *The string capstan aligned in viewport*

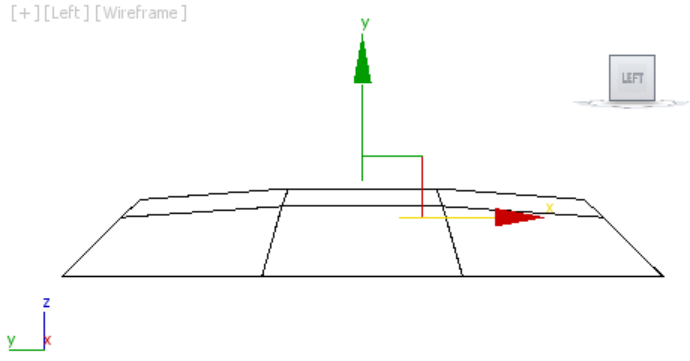


Figure 9-91 *The fret vertex aligned*

Figure 9-92 *The frets geometry duplicated and aligned with neck of guitar*

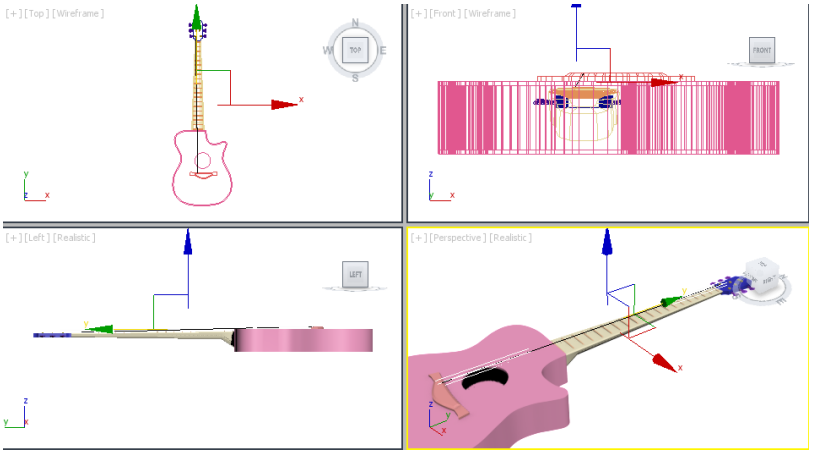


Figure 9-93 *The string1 geometry aligned with neck of guitar*

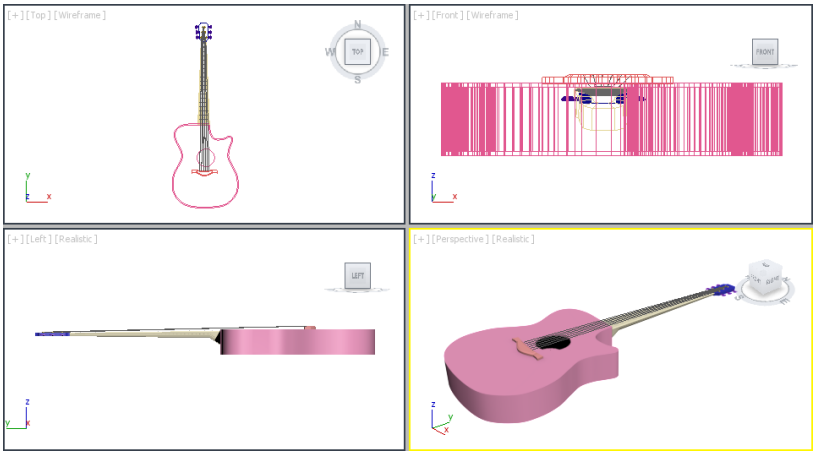


Figure 9-94 *All strings aligned with neck of guitar*

Figure 9-95 *The rendered model of the guitar*

10

NURBS Modeling

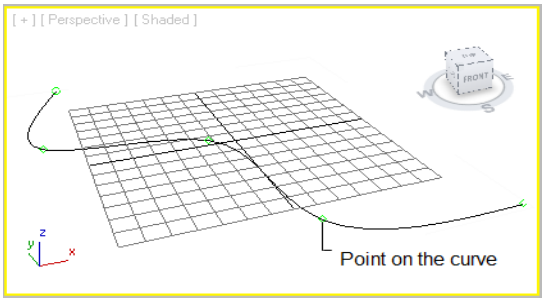


Figure 10-1 *A point curve*

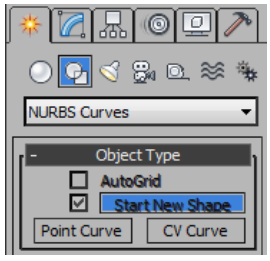


Figure 10-2 *The tools for creating NURBS curves*

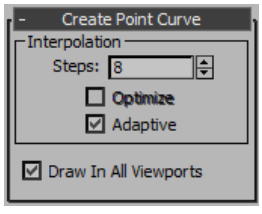


Figure 10-3 *The* ***Create Point Curve*** *rollout*

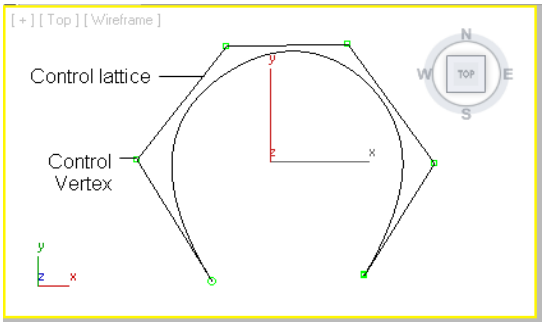


Figure 10-4 *A CV curve*

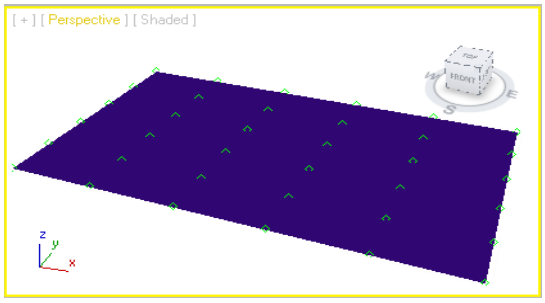


Figure 10-5 *A point surface*

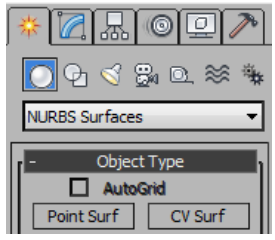


Figure 10-6 *The tools displayed to create NURBS Surfaces*

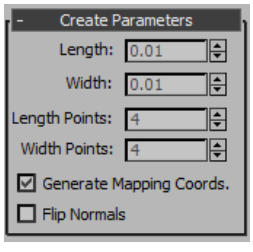


Figure 10-7 *The* ***Create Parameters*** *rollout*

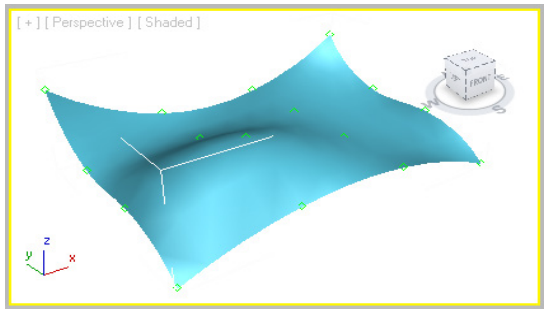


Figure 10-8 *The points in the point surface moved up*

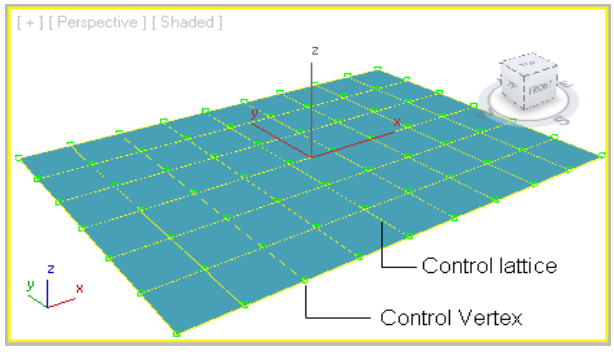


Figure 10-9 *A CV surface*

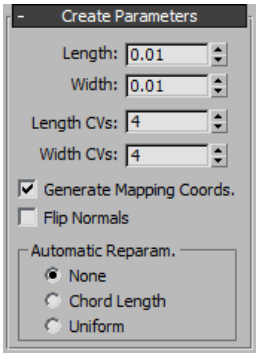


Figure 10-10 *The* ***Create Parameters*** *rollout*

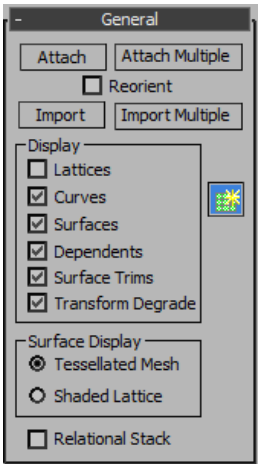


Figure 10-11 *The* ***General*** *rollout*

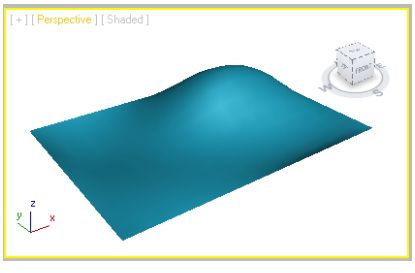


Figure 10-12 *The NURBS surface object displayed as a mesh object*

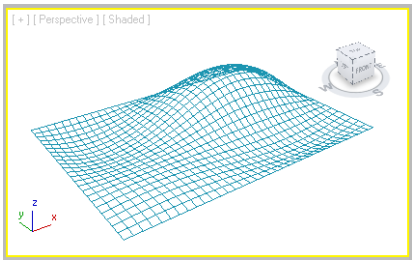


Figure 10-13 *The NURBS surface object displayed as iso lines*

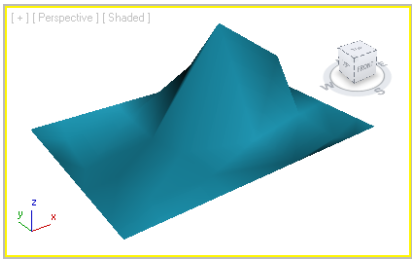


Figure 10-14 *The NURBS surface object displayed as shaded lattices*

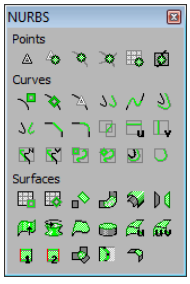


Figure 10-15 *The* ***NURBS*** *toolbox*

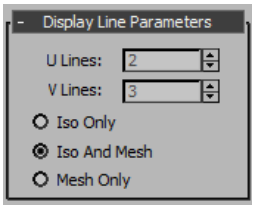


Figure 10-16 *The* ***Display Line Parameters*** *rollout*

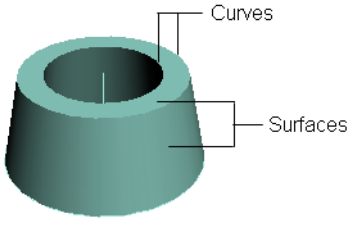


Figure 10-17 *The dependent and independent sub-objects in a loft object*

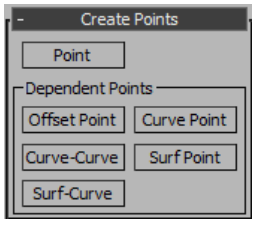


Figure 10-18 *The* ***Create Points*** *rollout*

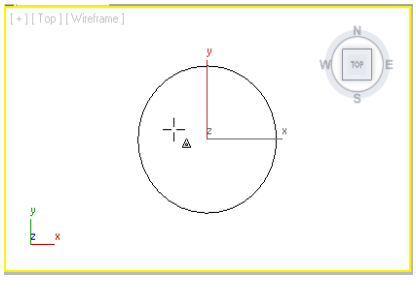


Figure 10-19 *The cursor displayed to create independent points*

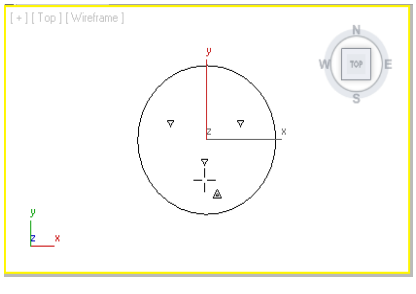


Figure 10-20 *The independent points created in the viewport*

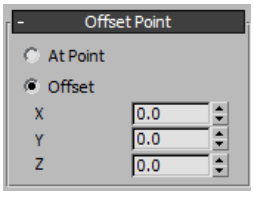


Figure 10-21 *The* ***Offset Point*** *rollout*

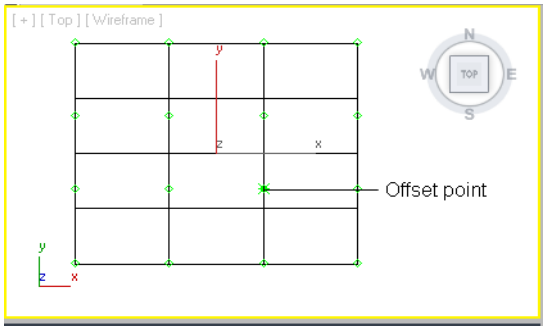


Figure 10-22 *The offset point displayed*

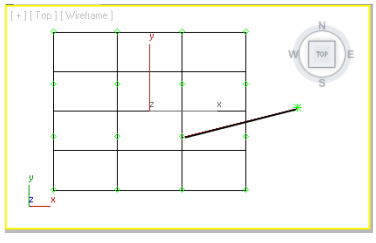


Figure 10-23 *The red line displayed between the parent point and the offset point*

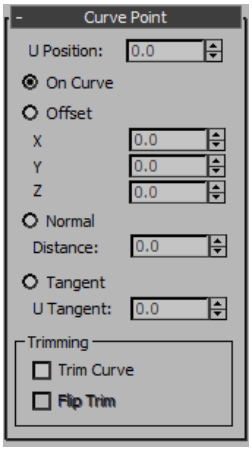


Figure 10-24 *The* ***Curve Point*** *rollout*

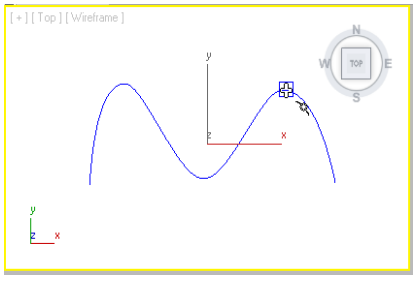


Figure 10-25 *A blue box displayed along with the cursor*

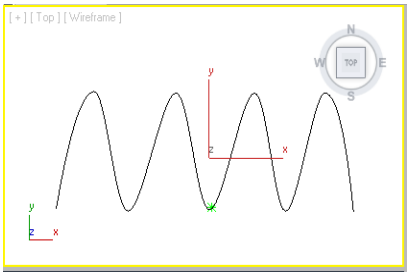


Figure 10-26 *A curve point placed on the curve*

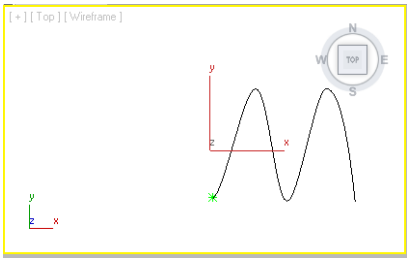


Figure 10-27 *The curve after selecting the* ***Trim Curve*** *check box*

Figure 10-28 *The curve after selecting the* ***Flip Trim*** *check box*

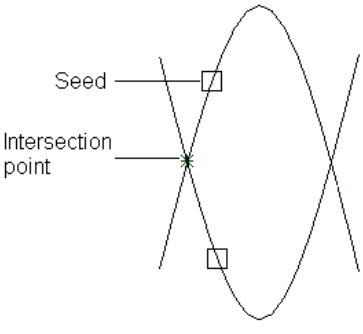


Figure 10-29 *The intersection point created*

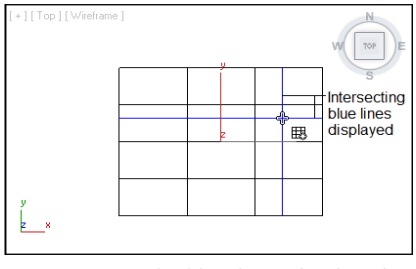


Figure 10-30 *The blue lines displayed*

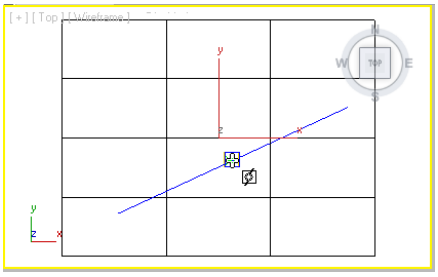


Figure 10-31 *A seed created on the NURBS curve*

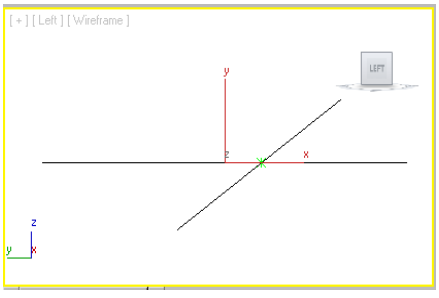


Figure 10-32 *A surface curve intersection point created in the Left viewport*

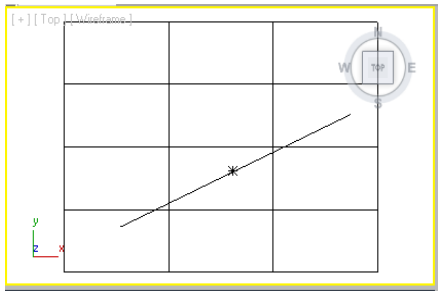


Figure 10-33 *A surface curve intersection point created in the Top viewport*

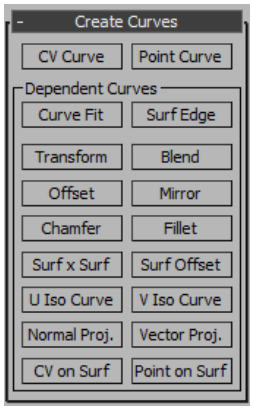


Figure 10-34 *The* ***Create Curves*** *rollout*

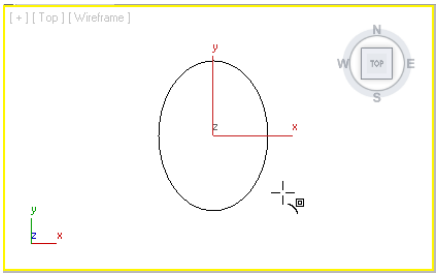


Figure 10-35 *The changed shape of the cursor*

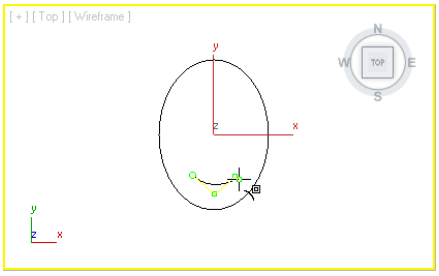


Figure 10-36 *The new CV curve created*

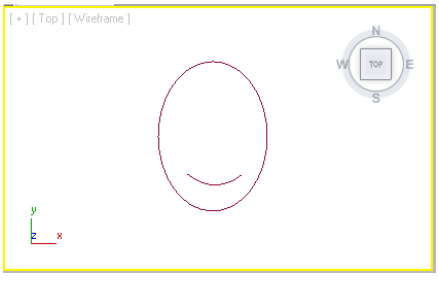


Figure 10-37 *The new CV curve attached to the NURBS object*

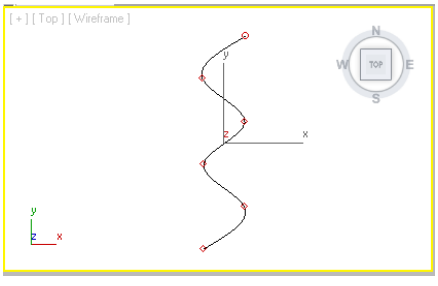


Figure 10-38 *A NURBS curve object*

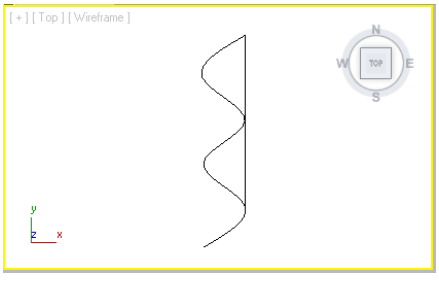


Figure 10-39 *A fit curve created between the points in a NURBS curve object*

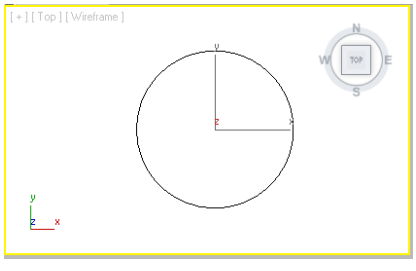


Figure 10-40 *A NURBS curve object*

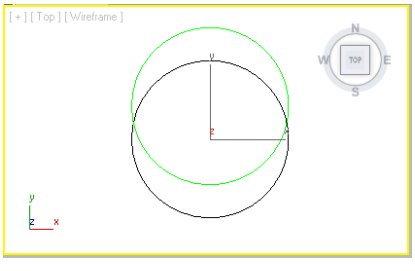


Figure 10-41 *A transform curve created*

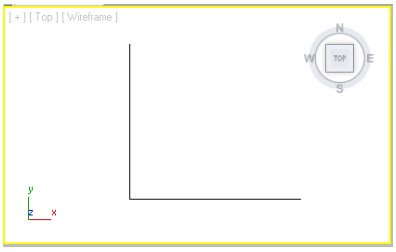


Figure 10-42 *A NURBS curve to create a chamfer curve*

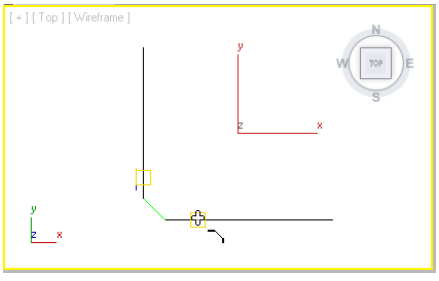


Figure 10-43 *The seeds placed on the curves*

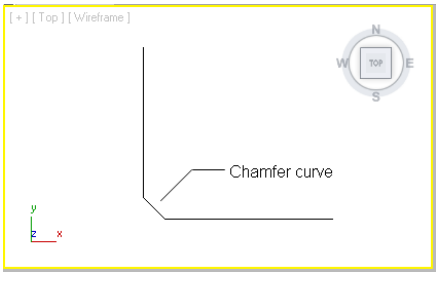


Figure 10-44 *A chamfer curve created*

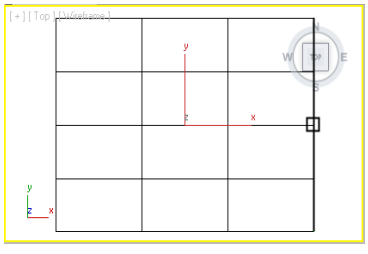


Figure 10-45 *A surface edge curve created*

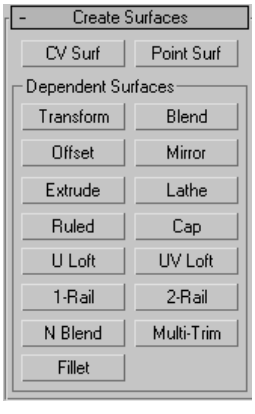


Figure 10-46 *The* ***Create Surfaces*** *rollout*

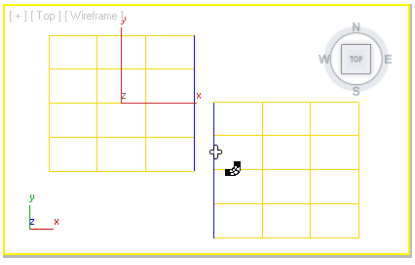


Figure 10-47 *The cursor placed over another edge*

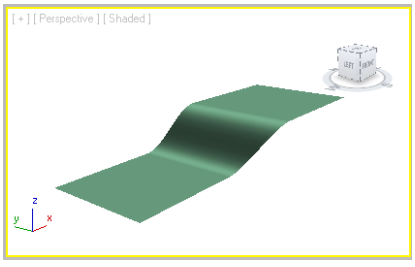


Figure 10-48 *A blend surface created*

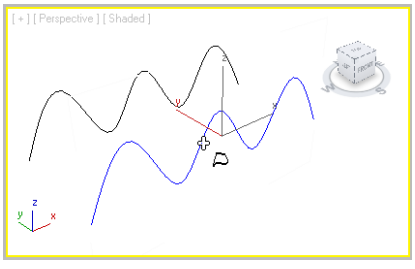


Figure 10-49 *The cursor displayed to create the ruled surface*

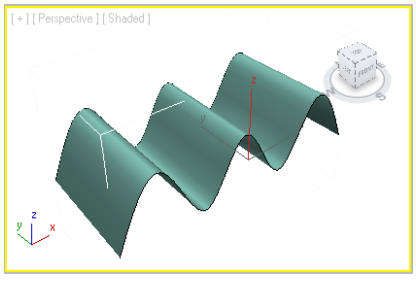


Figure 10-50 *A ruled surface created*

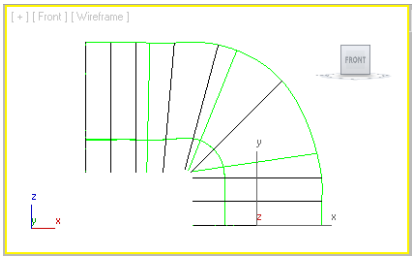


Figure 10-51 *The green iso lines of the U loft surface displayed*

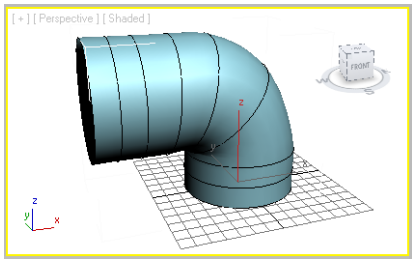


Figure 10-52 *A U loft surface created*

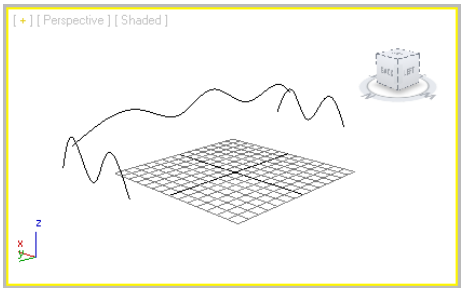


Figure 10-53 *The curves to create 1-rail surface*

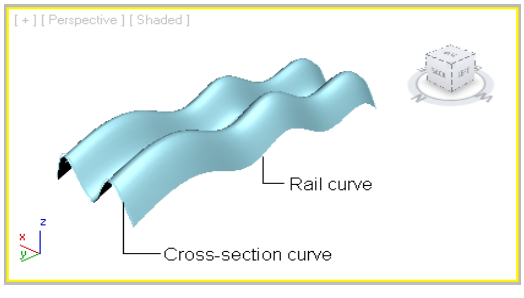


Figure 10-54 *A 1-rail surface created*

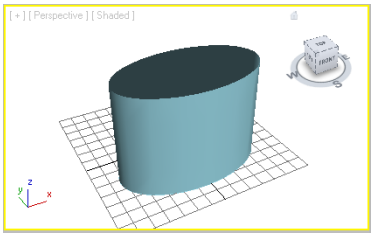


Figure 10-55 *An open ended closed surface*

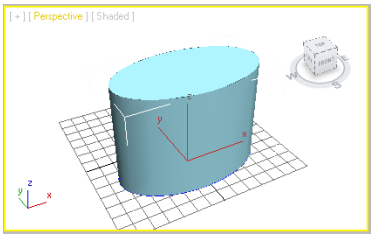


Figure 10-56 *A cap created to cap the open end of the closed surface*

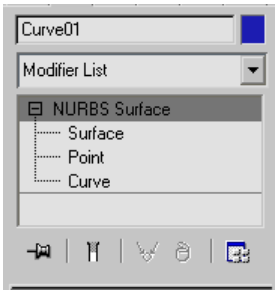


Figure 10-57 *The sub-object levels displayed in the modifier stack*

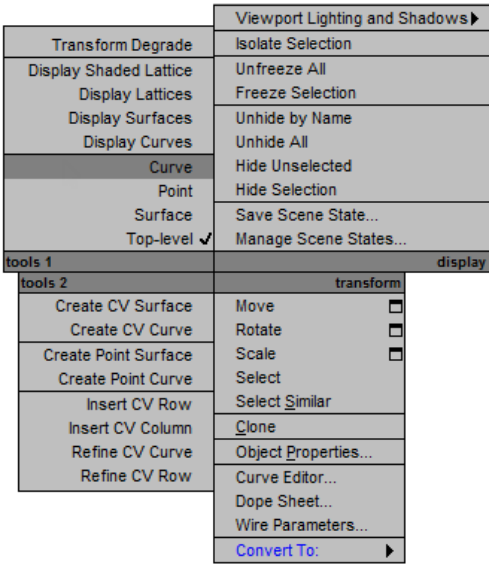


Figure 10-58 *The quad menu displayed*

Figure 10-59 *The model of a washbasin*

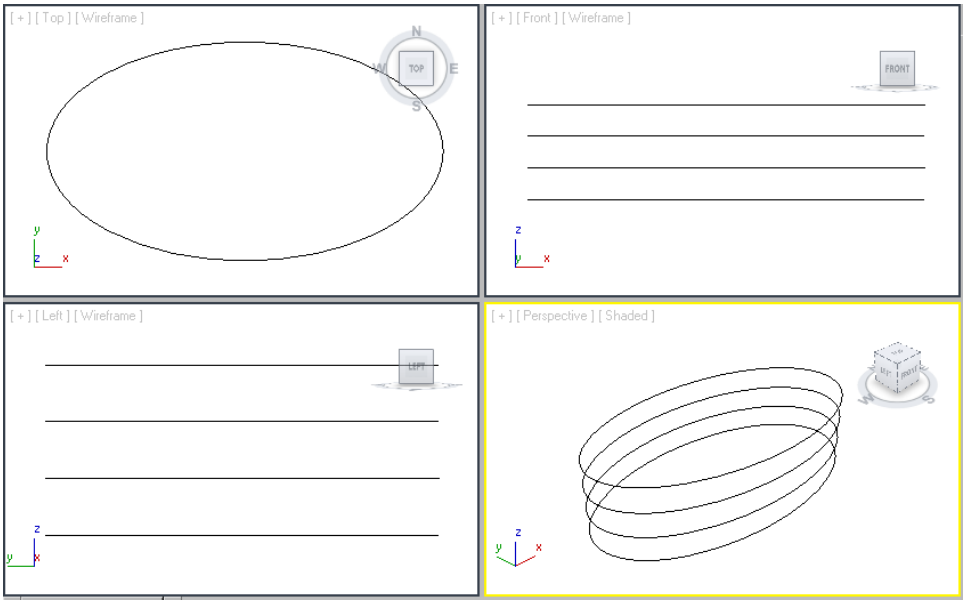


Figure 10-60 *All ellipses displayed in viewports*

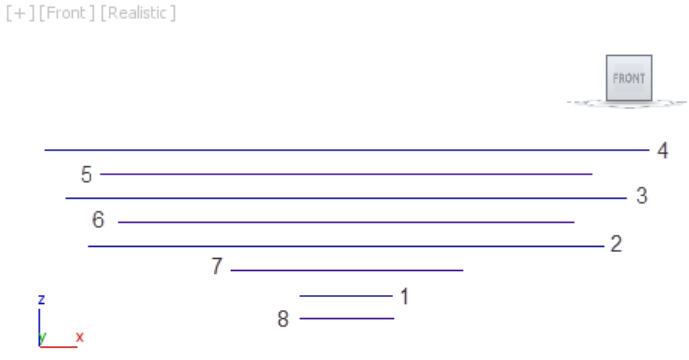


Figure 10-61 *All NURBS curves scaled in the Front viewport*

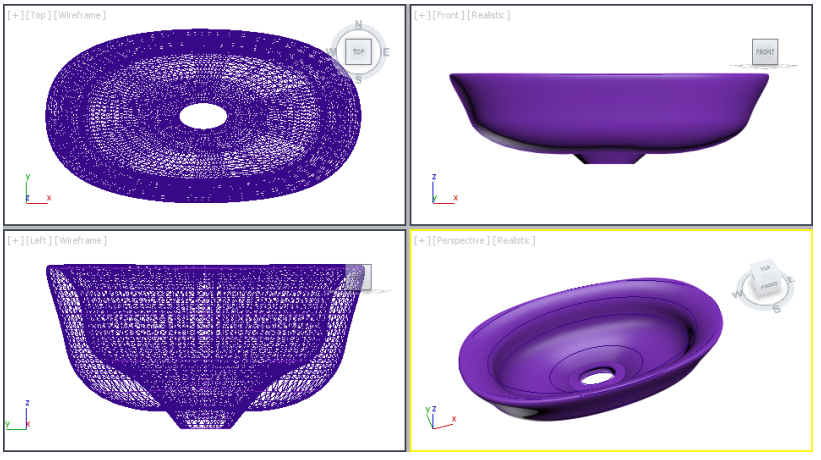


Figure 10-62 *A NURBS surface created in viewports*

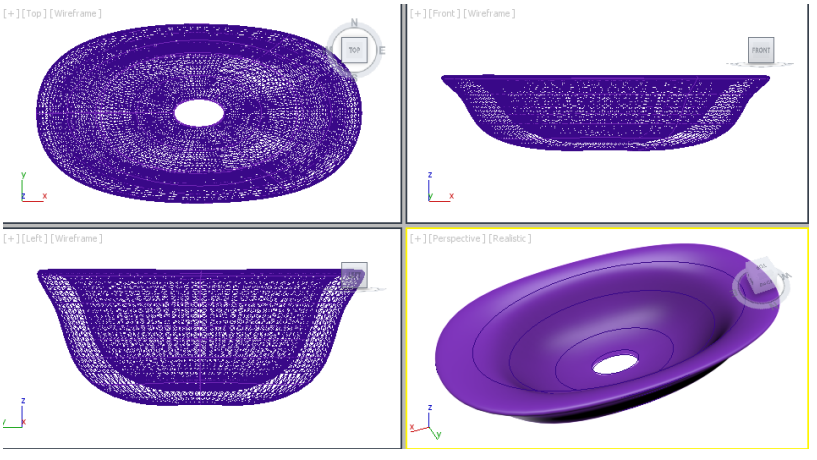


Figure 10-63 *The washbasin modified at the Curve sub-object level*

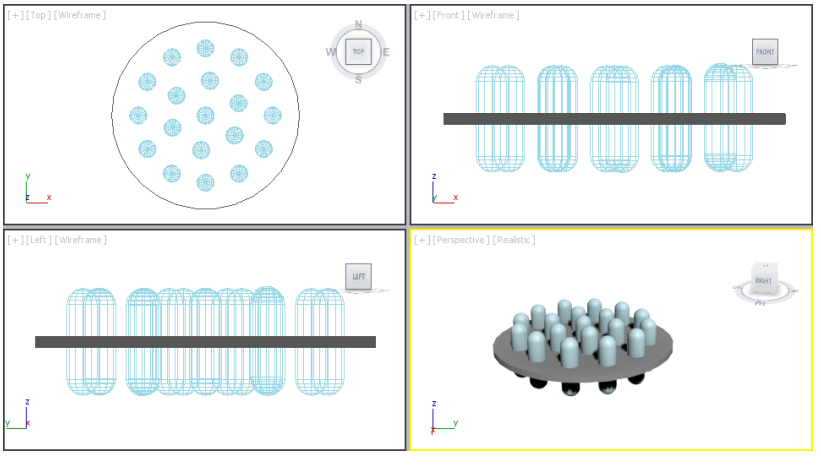


Figure 10-64 *A number of capsules created and aligned*

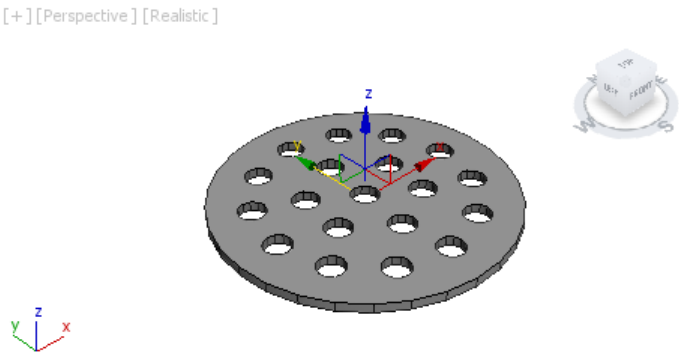


Figure 10-65 *A sieve created in the Perspective viewport*

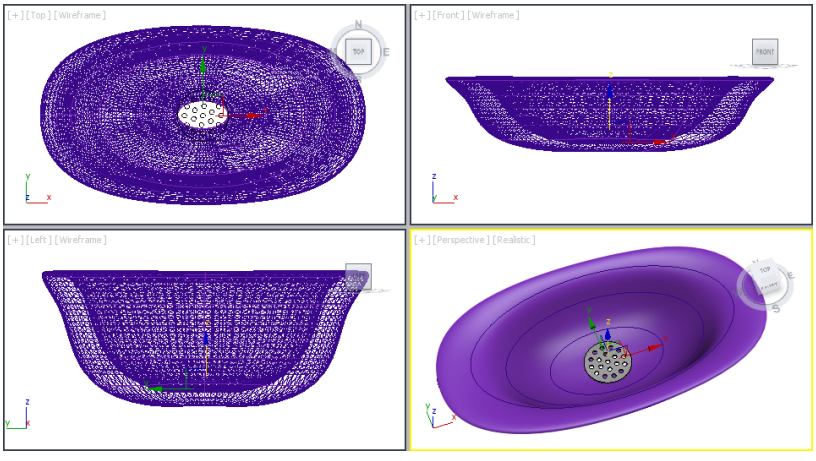


Figure 10-66 *A sieve created and aligned in viewports*

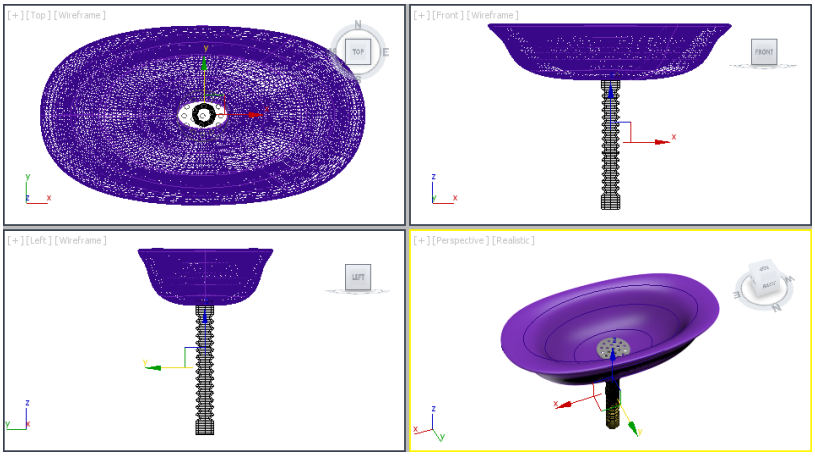


Figure 10-67 *A duct created and aligned in viewports*

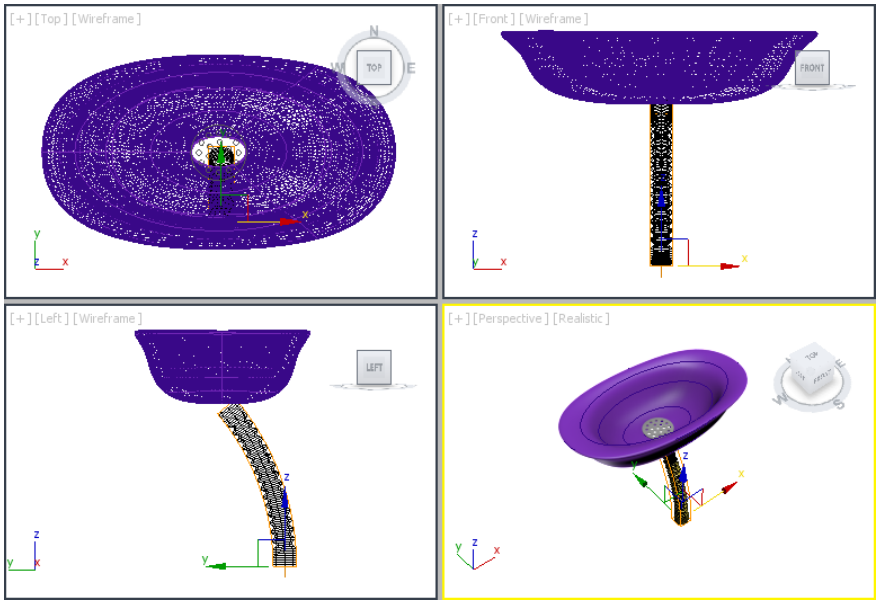


Figure 10-68 *The duct geometry rotated and aligned in viewports*

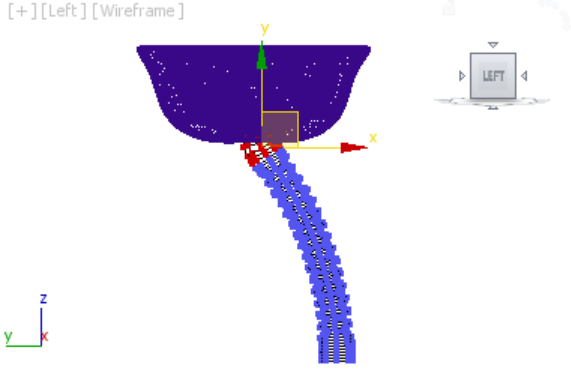


Figure 10-69 *The vertices of duct aligned in the Left viewport*

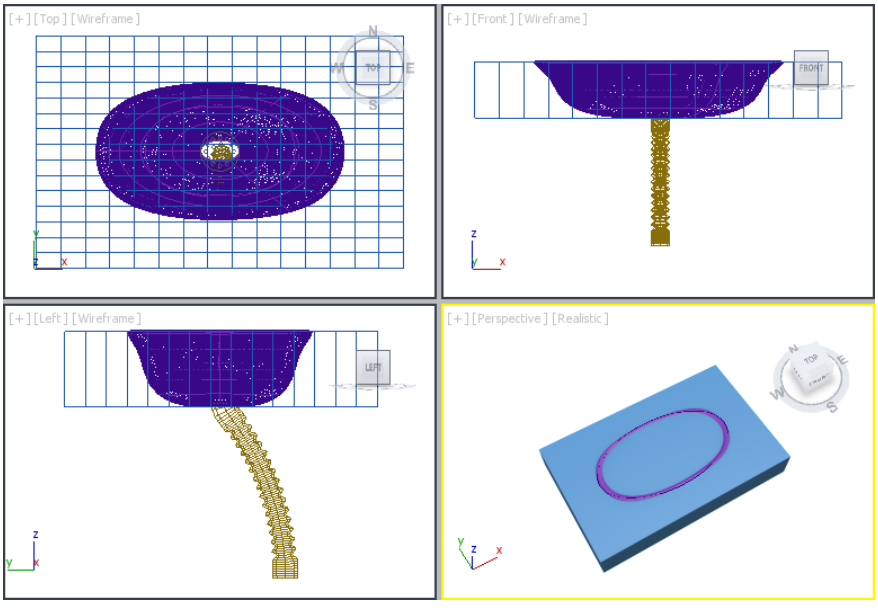


Figure 10-70 *The washbasin slab created and aligned in viewports*

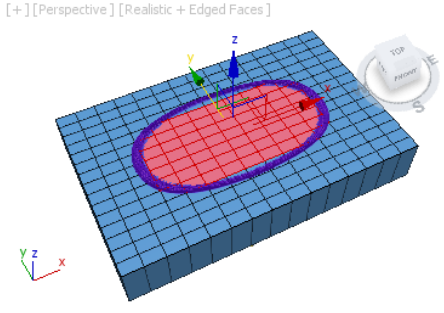


Figure 10-71 *The inner polygons selected to be deleted*

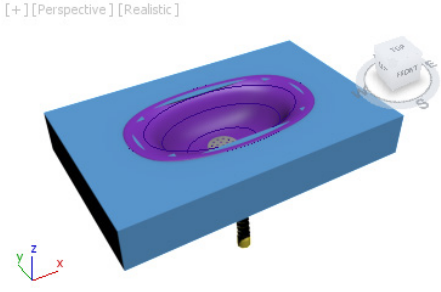


Figure 10-72 *The washbasin slab after deleting the polygons*

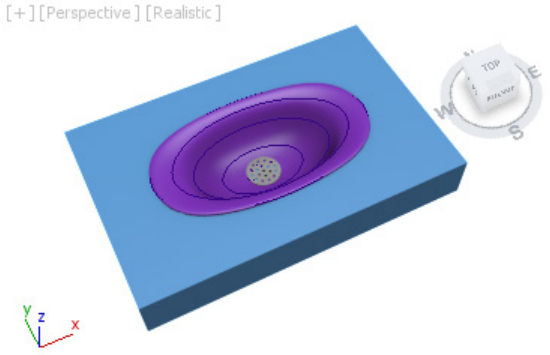


Figure 10-73 *The vertices moved to view the inner portion of washbasin*

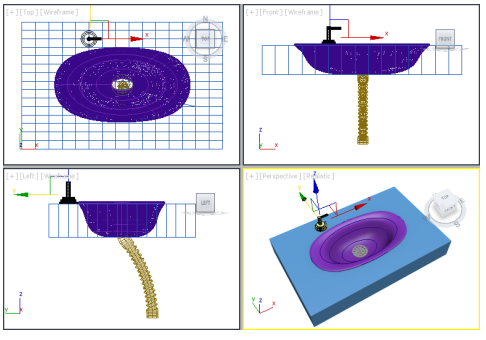


Figure 10-74 *The tap01 geometry created and aligned in viewports*

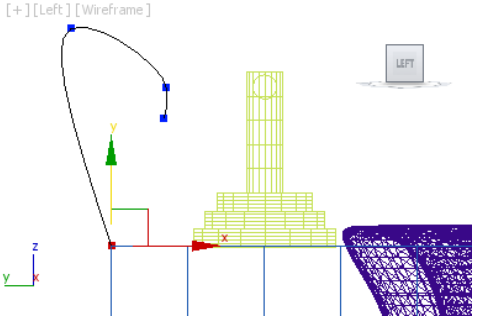


Figure 10-75 *The line spline created in the Left viewport*

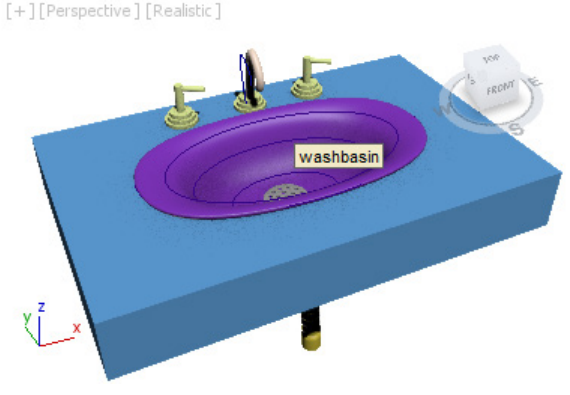


Figure 10-76 *Alignment of upper tap and base*

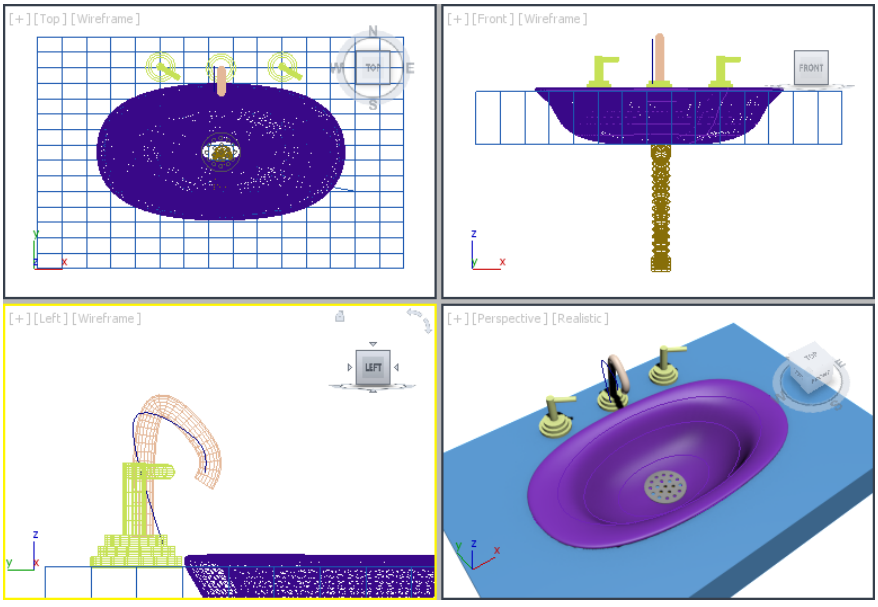


Figure 10-77 *Alignment of the main tap in viewports*

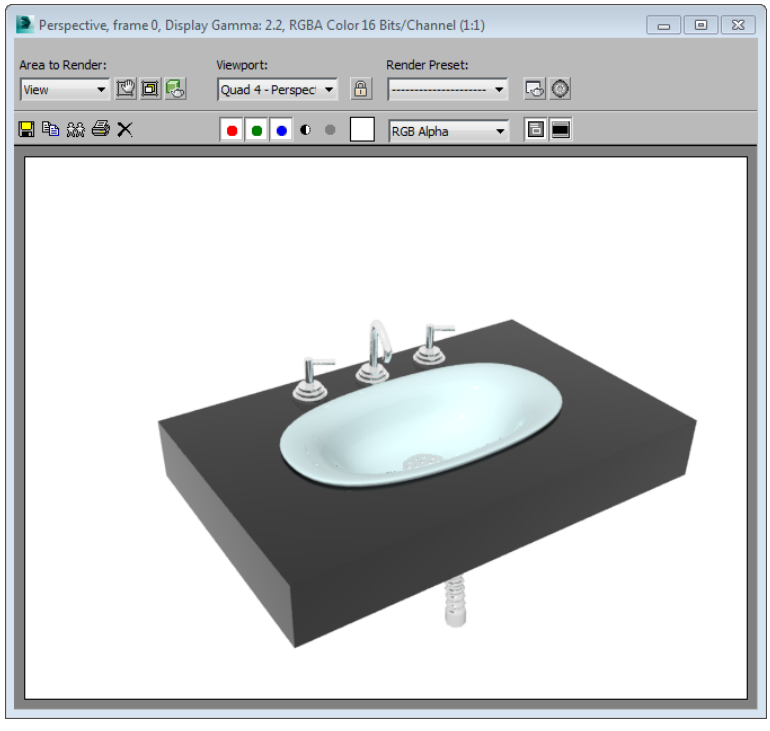


Figure 10-78 *The final output at rendering*

Figure 10-79 *The model of cap (view 1)*

Figure 10-80 *The model of cap (view 2)*

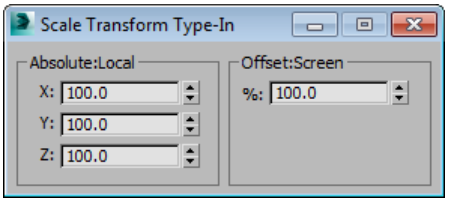


Figure 10-81 *The* ***Scale Transform Type-In*** *dialog box*

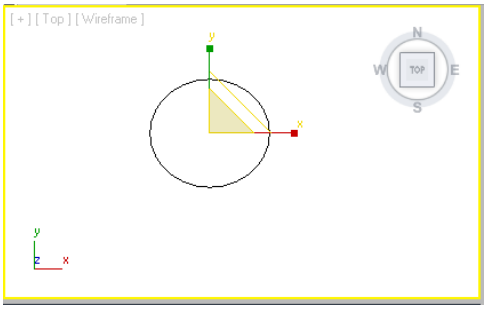


Figure 10-82 *The Circle001 spline scaled along the X-axis*

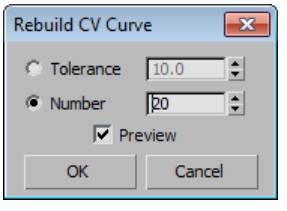


Figure 10-83 *The* ***Rebuild CV Curve*** *dialog box*

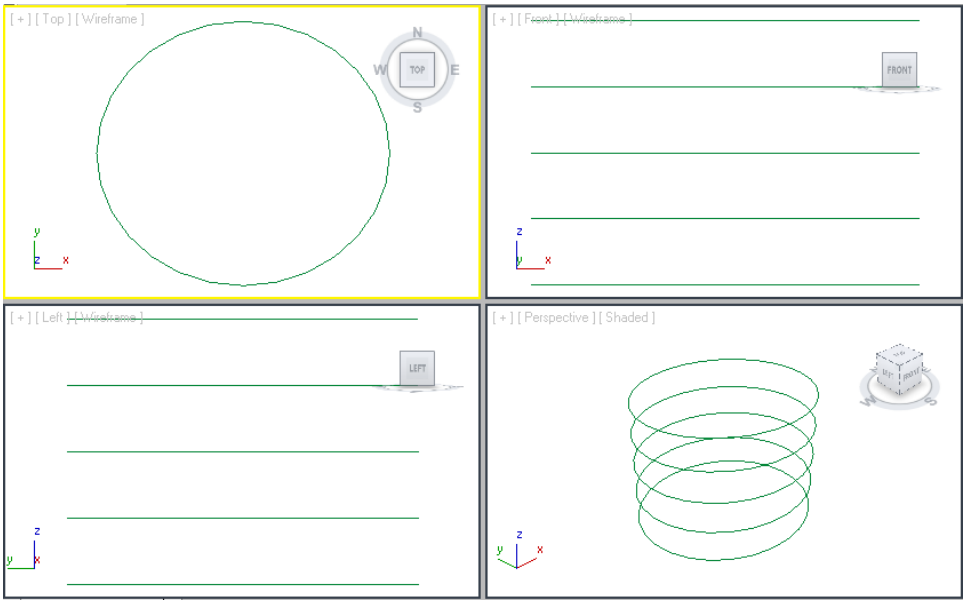


Figure 10-84 *The circular NURBS curves displayed in viewports*

Figure 10-85 *The Circle001 spline moved vertically*

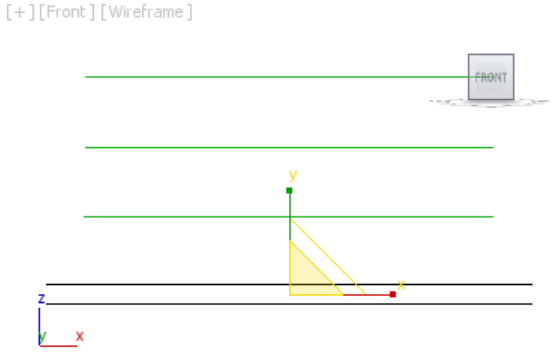


Figure 10-86 *The Circle001 and Circle002 splines scaled vertically*

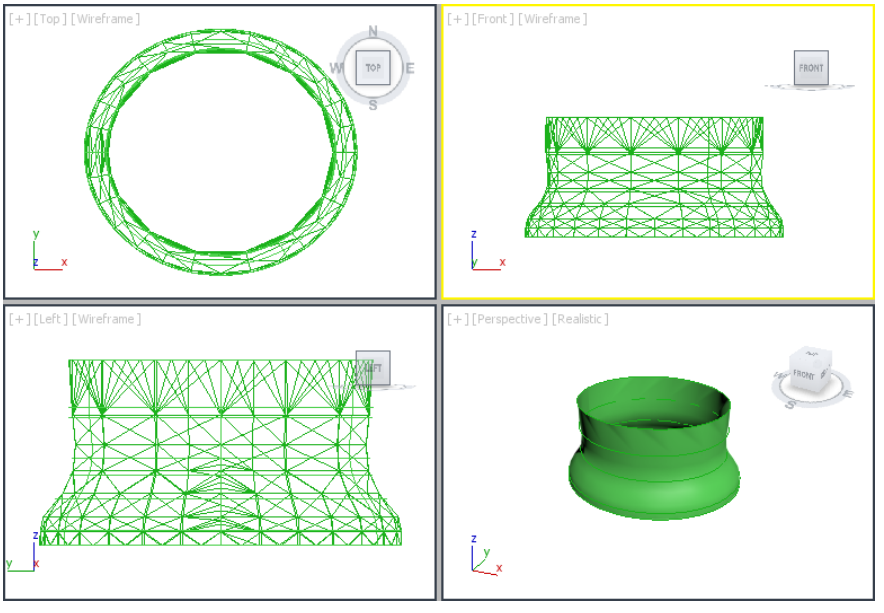


Figure 10-87 *A NURBS surface created*

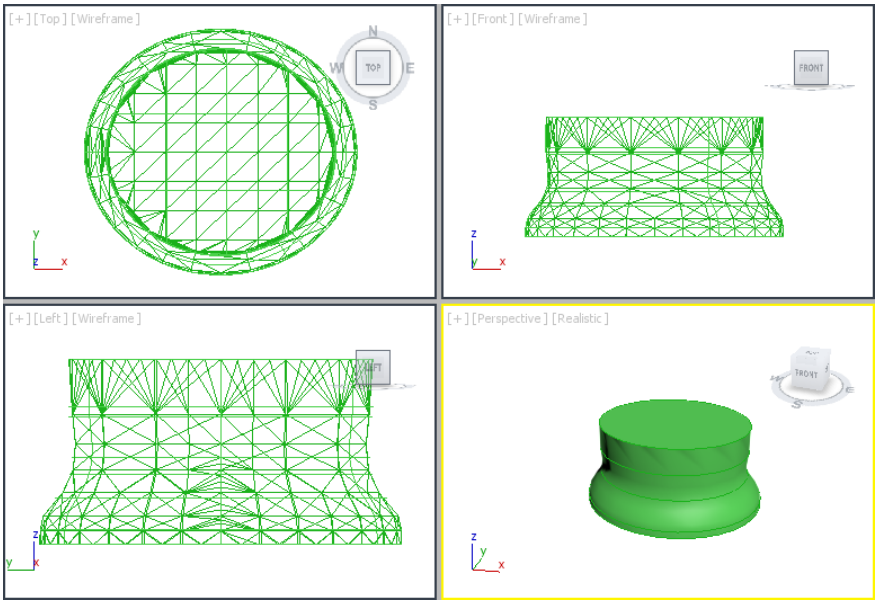


Figure 10-88 *The NURBS surface capped at one end*

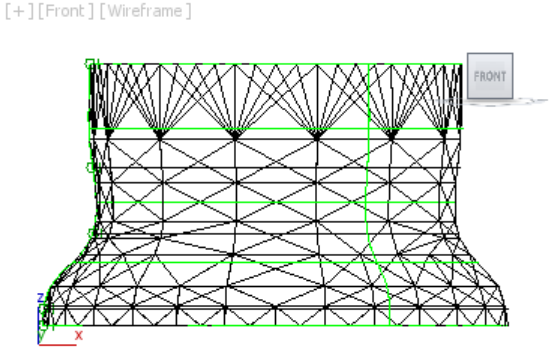


Figure 10-89 *The NURBS curves modified in the Front viewport*

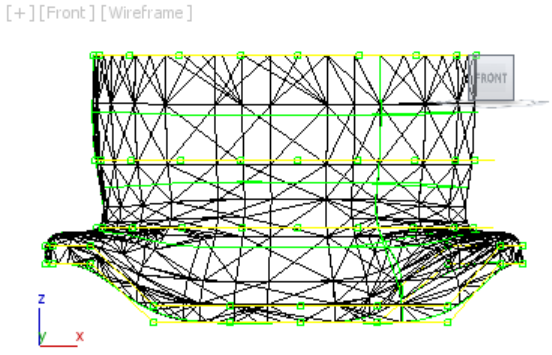


Figure 10-90 *The outer control vertices moved vertically*

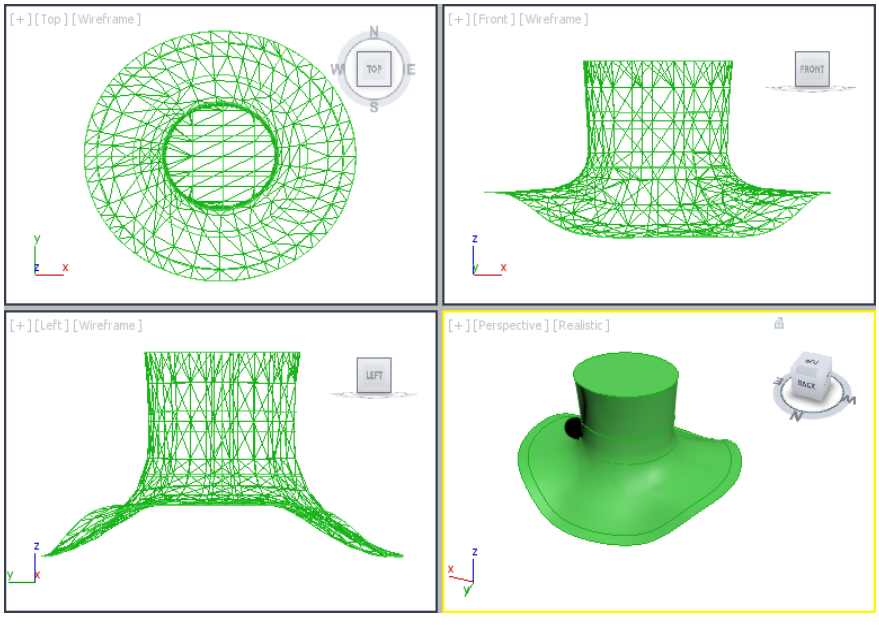


Figure 10-91 *The surface modified at the sub-object level*

Figure 10-92 *The final output after rendering*

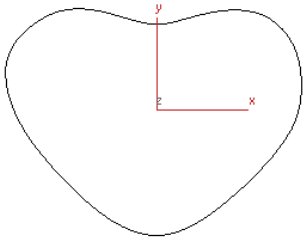


Figure 10-93 *The NURBS curve to create the model of heart*

Figure 10-94 *The model of heart*

11

Compound Objects

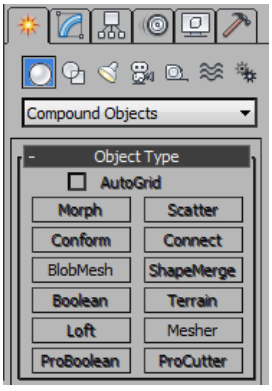


Figure 11-1 *The tools for creating compound objects displayed in the rollout*

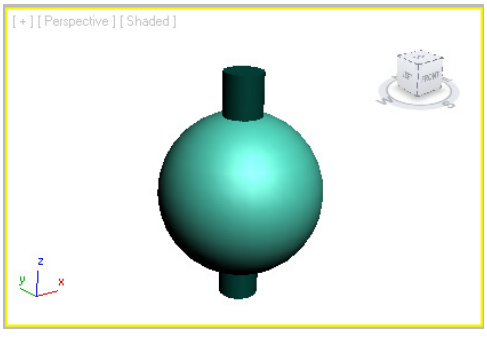


Figure 11-2 *Two overlapping objects created in the viewport*

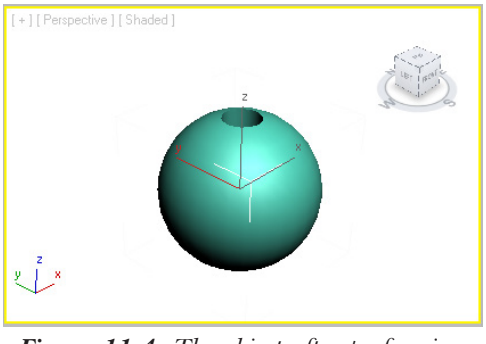


Figure 11-4 *The object after performing the boolean operation*

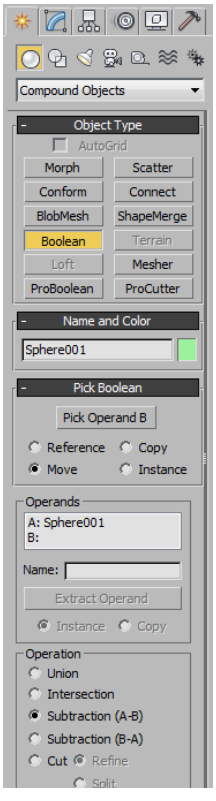


Figure 11-3 *Partial view of the rollouts displayed on invoking the* ***Boolean*** *tool*

i

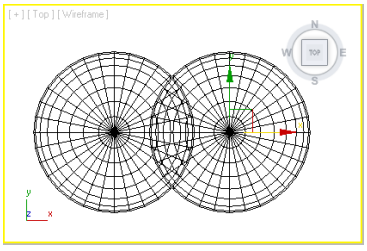


Figure 11-5 *Two spheres in the Top viewport before performing the* ***Union*** *boolean operation*

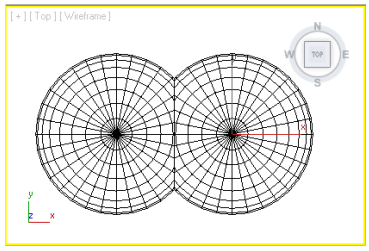


Figure 11-6 *Two spheres in the Top viewport after performing the* ***Union*** *boolean operation*

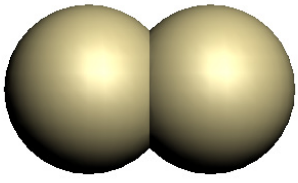


Figure 11-7 *Two spheres in the perspective viewport after performing the* ***Union*** *boolean operation*

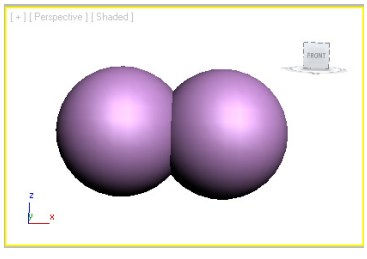


Figure 11-8 *Two spheres for the* ***Intersection*** *boolean operation*

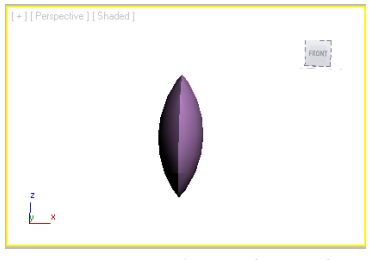


Figure 11-9 *Two spheres after performing the* ***Intersection*** *boolean operation*

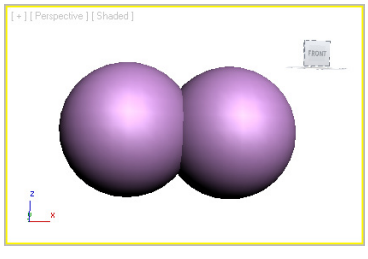


Figure 11-10 *The operand A and B selected for performing the* ***Subtraction (B-A)*** *boolean operation*

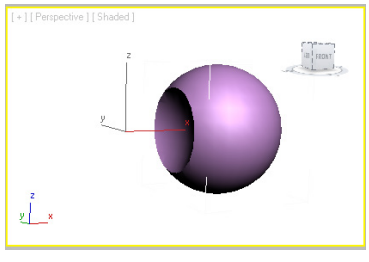


Figure 11-11 *The boolean object after performing the* ***Subtraction (B-A)*** *boolean operation*

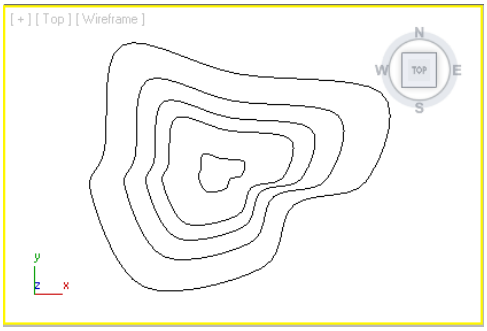


Figure 11-12 *The contour lines created for the terrain object in the Top viewport*

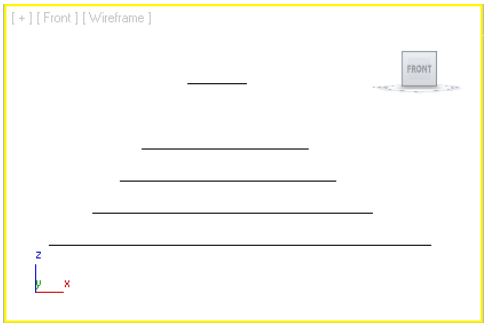


Figure 11-13 *The contour lines aligned for the terrain object in the Front viewport*

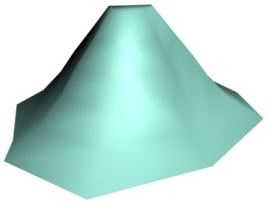


Figure 11-14 *The terrain object created from the contour lines*

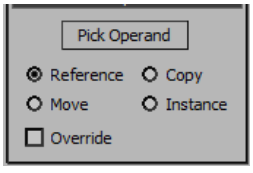


Figure 11-15 *The* ***Pick Operand*** *rollout*

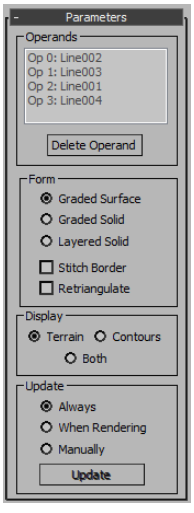


Figure 11-16 *Different areas in the* ***Parameters*** *rollout*

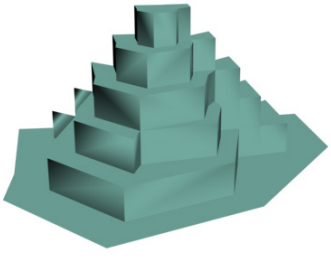


Figure 11-17 *The terrain object with the* ***Layered Solid*** *radio button selected*

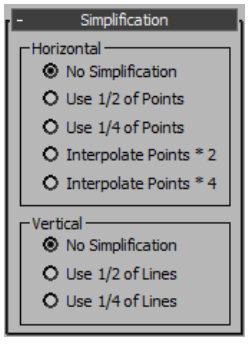


Figure 11-18 *Different areas in the* ***Simplification*** *rollout*

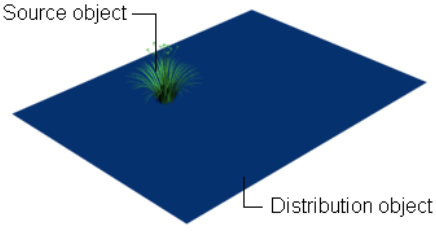


Figure 11-19 *The distribution and source objects*

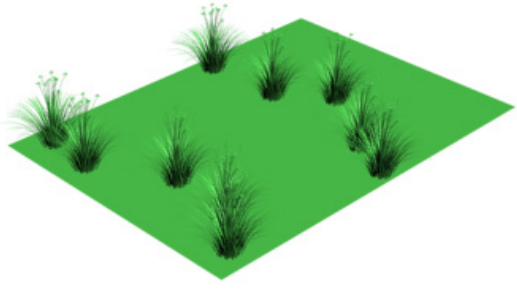


Figure 11-20 *The duplicates of the source objects distributed over the distribution object*

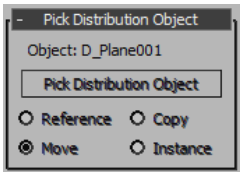


Figure 11-21 *The* ***Pick Distribution Object*** *rollout*

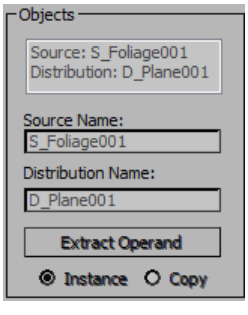


Figure 11-22 *The* ***Objects*** *area*

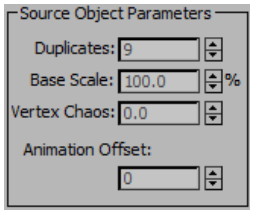


Figure 11-23 *The* ***Source Object Parameters*** *area*

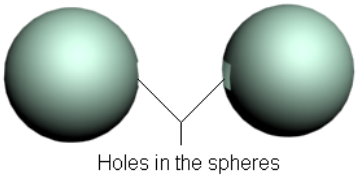


Figure 11-24 *Two spheres with holes on their surfaces*

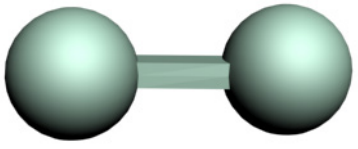


Figure 11-25 *The spheres after performing the* ***Connect*** *operation*

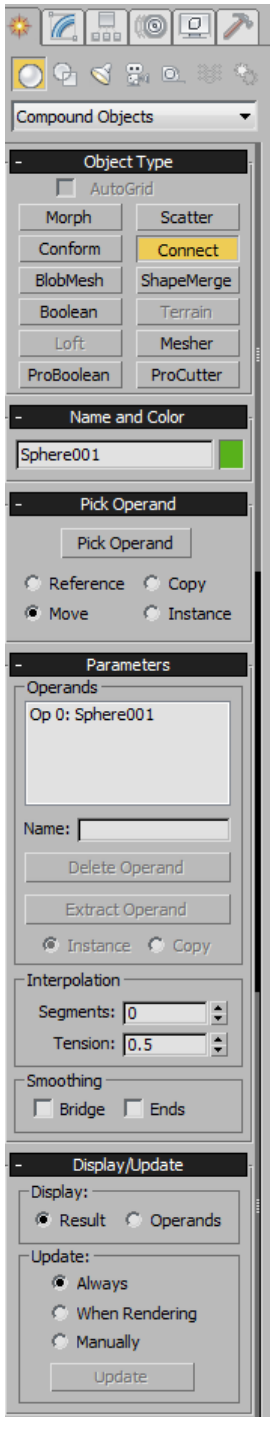


Figure 11-26 *the rollouts displayed after invoking the* ***Connect*** *tool*

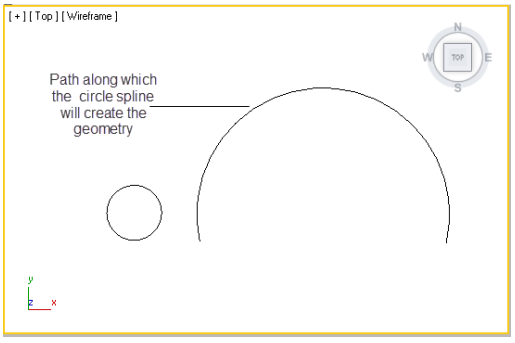


Figure 11-27 *Two splines to create a loft object*

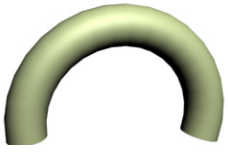


Figure 11-29 *The loft object created*

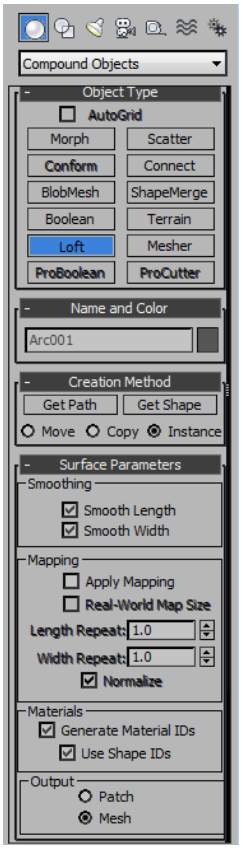


Figure 11-28 *Partial view of the rollouts displayed after invoking the* ***Loft*** *tool*

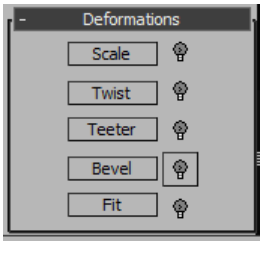


Figure 11-30 *The* ***Deformations*** *rollout*

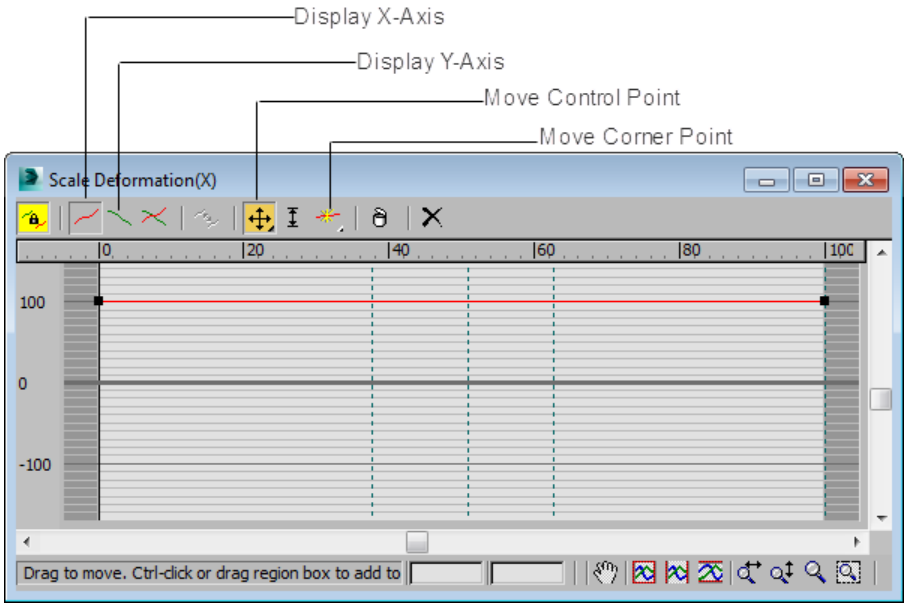


Figure 11-31 *The* ***Scale Deformation(X)*** *dialog box*

Figure 11-32 *The loft object modified using the* ***Scale*** *tool*

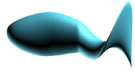


Figure 11-33 *The loft object modified using the* ***Twist*** *tool*

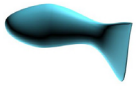


Figure 11-34 *The loft object modified using the* ***Fit*** *tool*

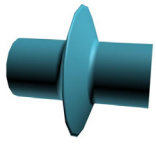


Figure 11-35 *The loft object modified using the* ***Bevel*** *tool*

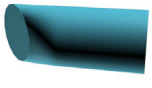


Figure 11-36 *The loft object modified using the* ***Teeter*** *tool*

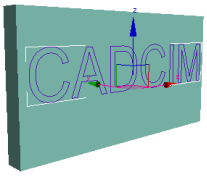


Figure 11-37 *Alignment of the shape with the mesh object*

Figure 11-38 *The shape embedded in the mesh object*

Figure 11-39 *The shape subtracted from the mesh object*

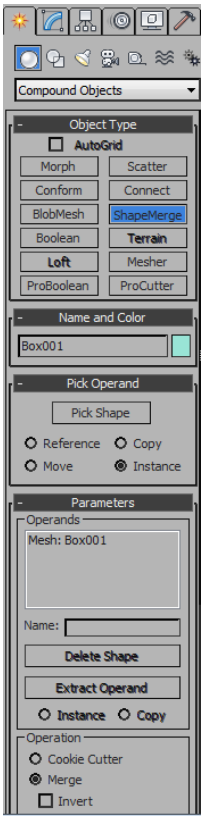


Figure 11-40 *Partial view of the rollouts displayed after invoking the* ***ShapeMerge*** *tool*

Figure 11-41 *The road (Wrapper object) over a hilly area (Wrap-To object) before using the* ***Conform*** *tool*

Figure 11-42 *The road (Wrapper object) over a hilly area (Wrap-To object) after using the* ***Conform*** *tool*

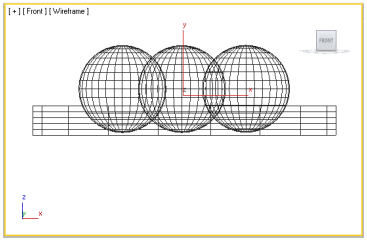


Figure 11-43 *The objects to perform the proboolean operation in the Front viewport*

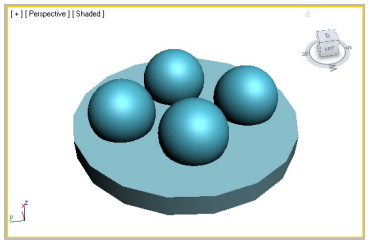


Figure 11-44 *The objects to perform the proboolean operation in the Perspective viewport*

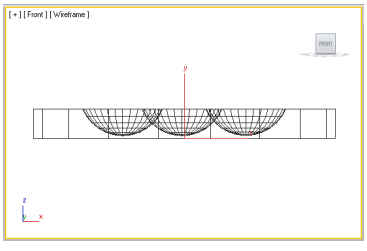


Figure 11-45 *The objects after performing the proboolean operation in the Front viewport*

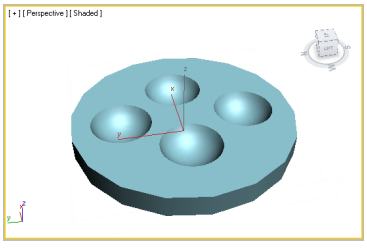


Figure 11-46 *The objects after performing the proboolean operation in the Perspective viewport*

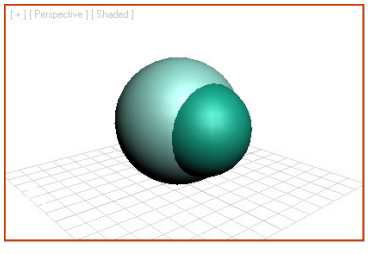


Figure 11-47 *The two spheres intersecting each other to perform the boolean operation*

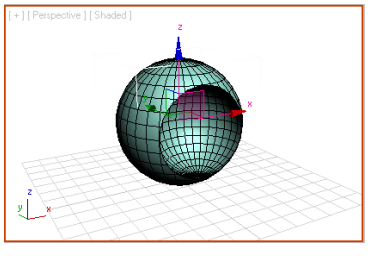


Figure 11-48 *The proboolean object after performing the boolean operation*

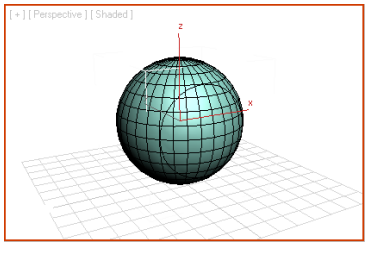


Figure 11-49 *The proboolean object after selecting the* ***Imprint*** *check box*

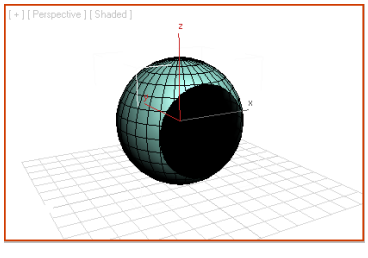


Figure 11-50 *The proboolean object after selecting the* ***Cookie*** *check box*

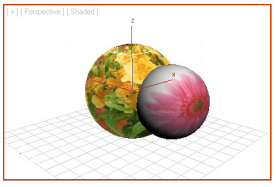


Figure 11-51 *The two spheres with materials applied on them*

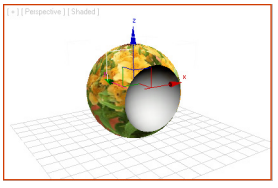


Figure 11-52 *The proboolean object after selecting the* ***Apply Operand Material*** *radio button*

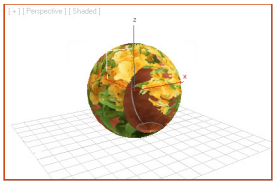


Figure 11-53 *The proboolean object after selecting the* ***Retain Original Material*** *radio button*

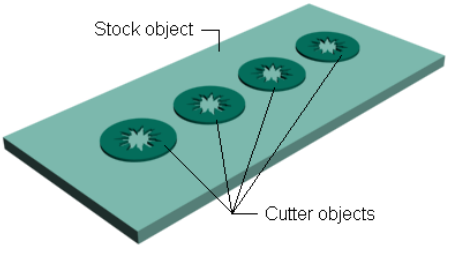


Figure 11-54 *The cutter and stock objects aligned for the procutter operation*

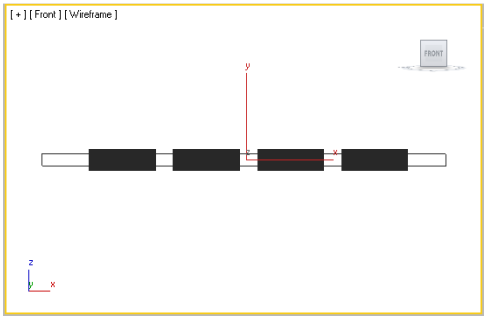


Figure 11-55 *The cutter and stock objects before performing the procutter operation in the Front viewport*

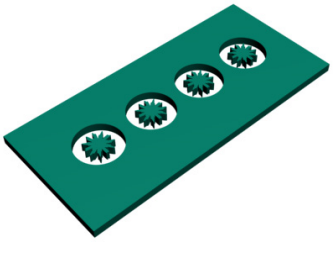


Figure 11-56 *The cutter and stock objects after performing the procutter operation*

Figure 11-57 *The cutter and stock objects after selecting the* ***Stock Inside Cutter*** *check box*

Figure 11-58 *The cutter and stock objects after selecting the* ***Cutter Outside Stock*** *check box*

Figure 11-59 *The toothpaste model*

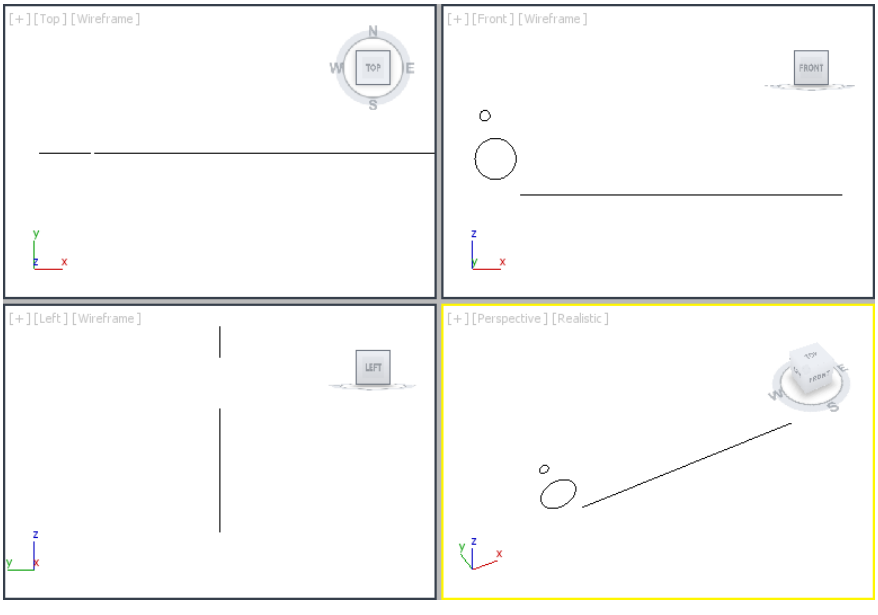


Figure 11-60 *The Circle001, Circle002, and Line001 splines in viewports*

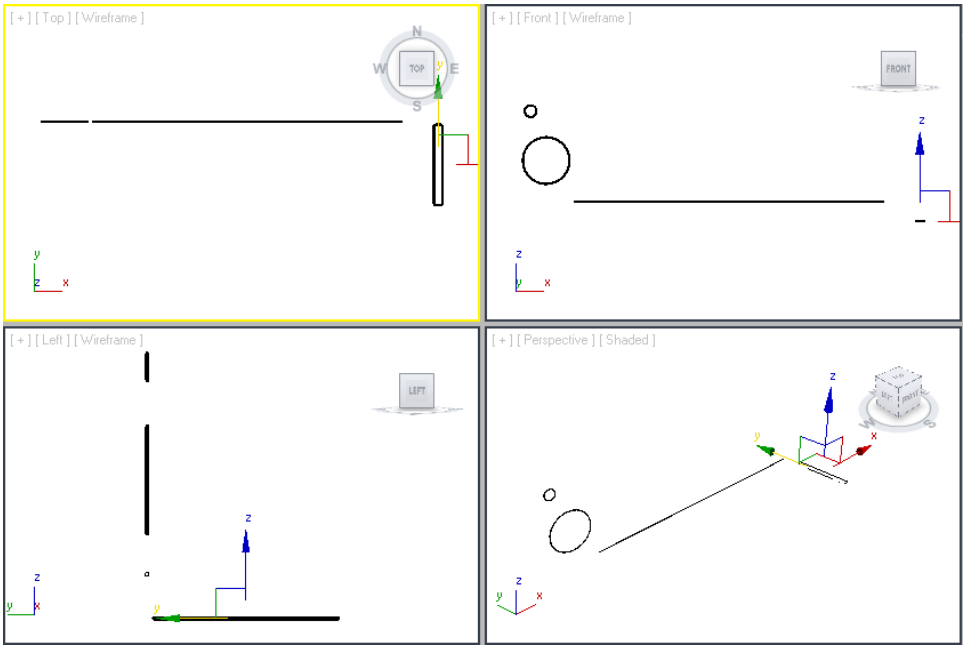


Figure 11-61 *The Rectangle001 in viewports*

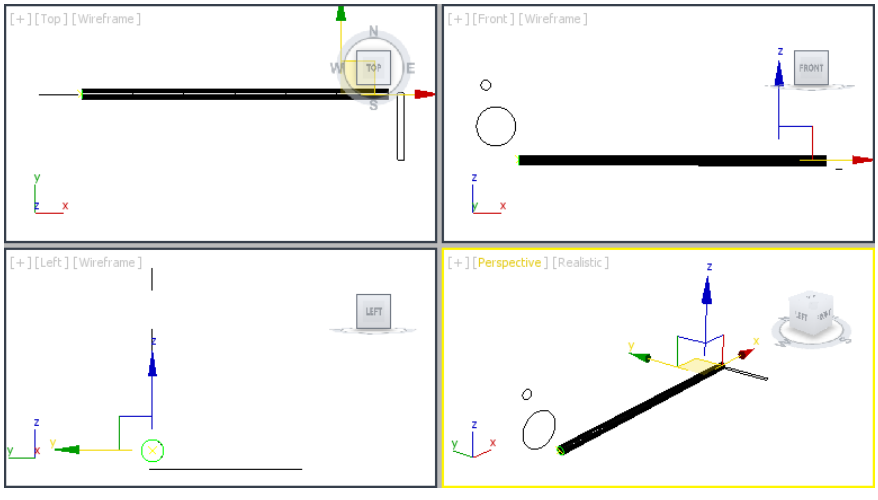


Figure 11-62 *A shape created along the path spline (Line001)*

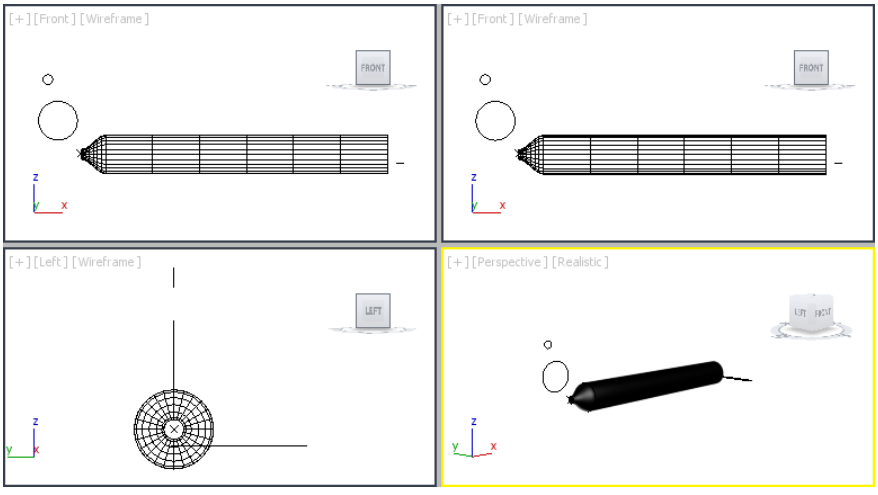


Figure 11-63 *The shape of the tube created along the path spline*

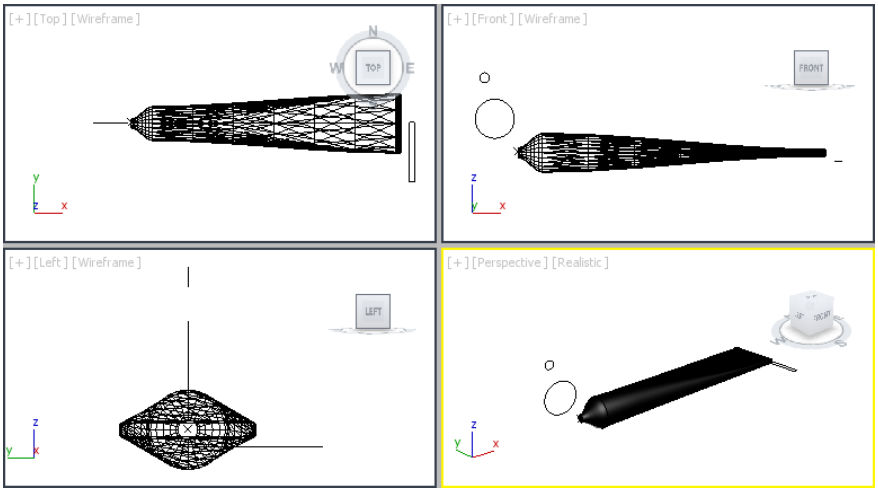


Figure 11-64 *The shape of tube created in viewports*

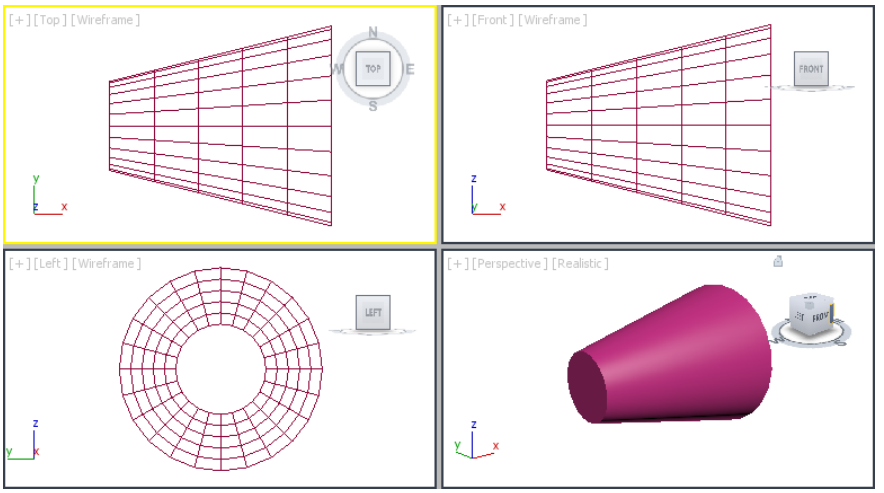


Figure 11-65 *The cap01 geometry zoomed in viewports*

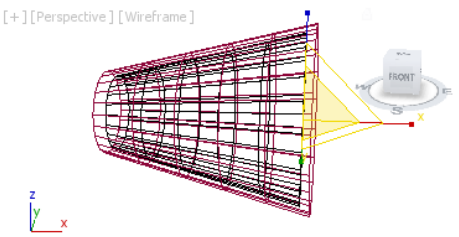


Figure 11-66 *The cap002 geometry displayed*

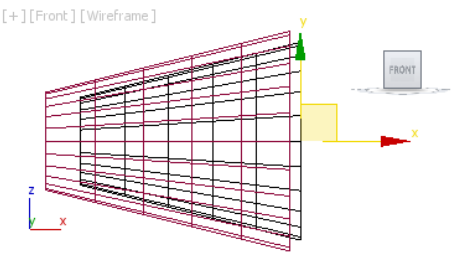


Figure 11-67 *The cap002 geometry after the alignment*

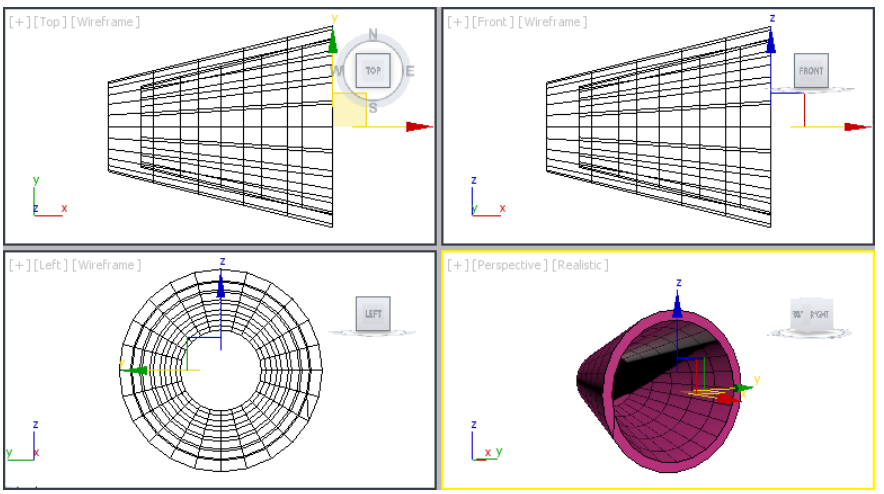


Figure 11-68 *The cap01 after performing the Subtraction(A-B) boolean operation in viewports*

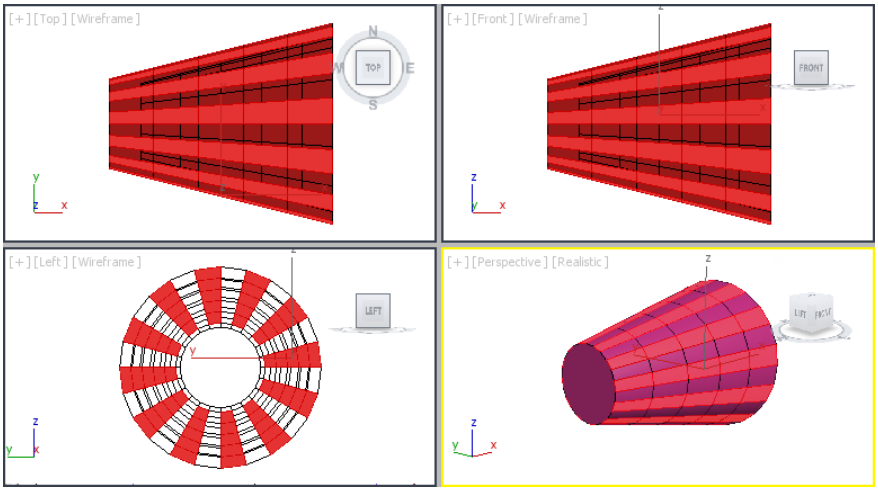


Figure 11-69 *The selected polygons of the cap01*

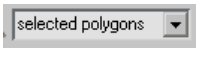


Figure 11-70 *The* ***Named Selection Sets*** *drop-down list*

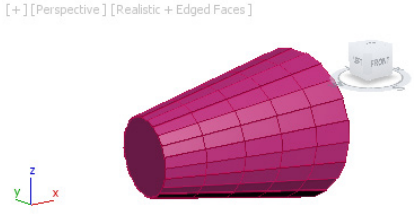


Figure 11-71 *The extruded polygons in the Perspective viewport*

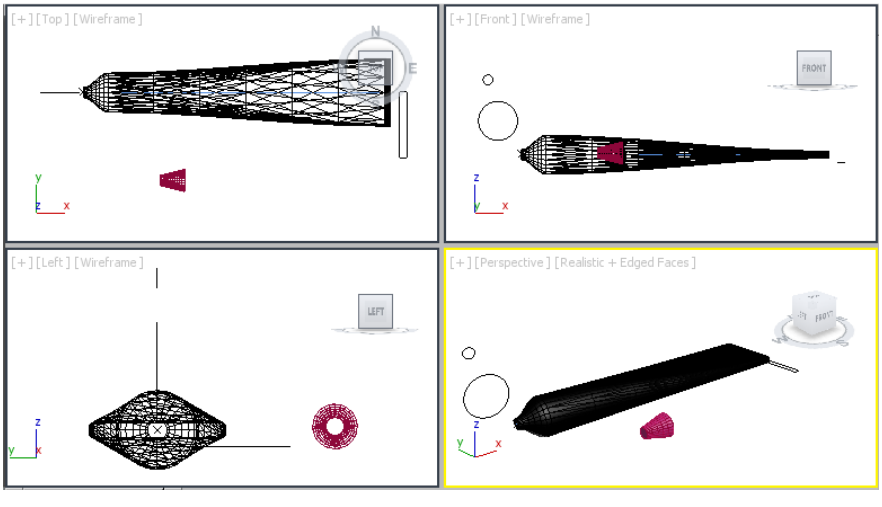


Figure 11-72 *The objects in viewports*

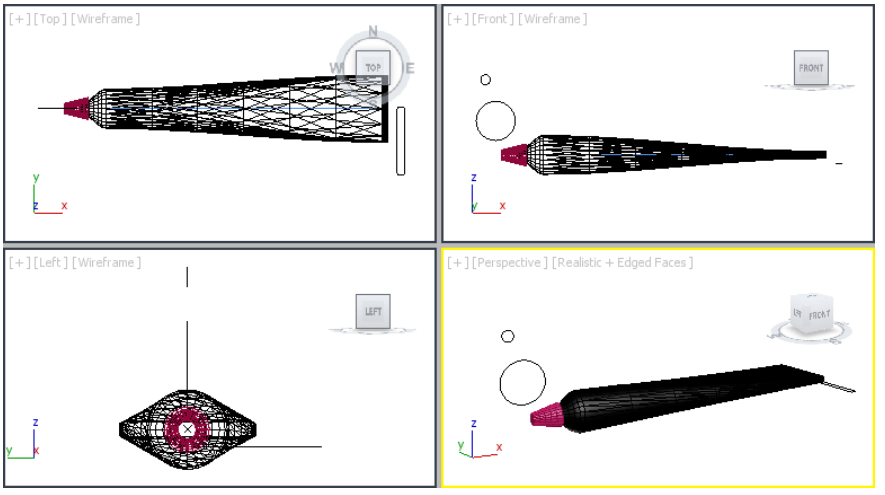


Figure 11-73 *The cap01 geometry in viewports after aligning with toothpaste tube*

Figure 11-74 *The map on the toothpaste tube*

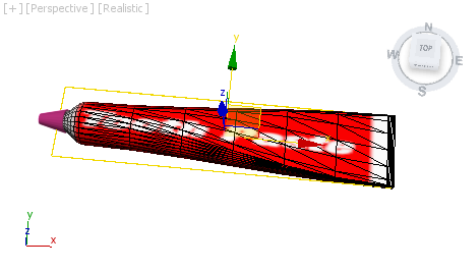


Figure 11-75 *The map on the toothpaste tube after applying the* ***UVW Map*** *modifier*

Figure 11-76 *The toothpaste tube after assigning the map*

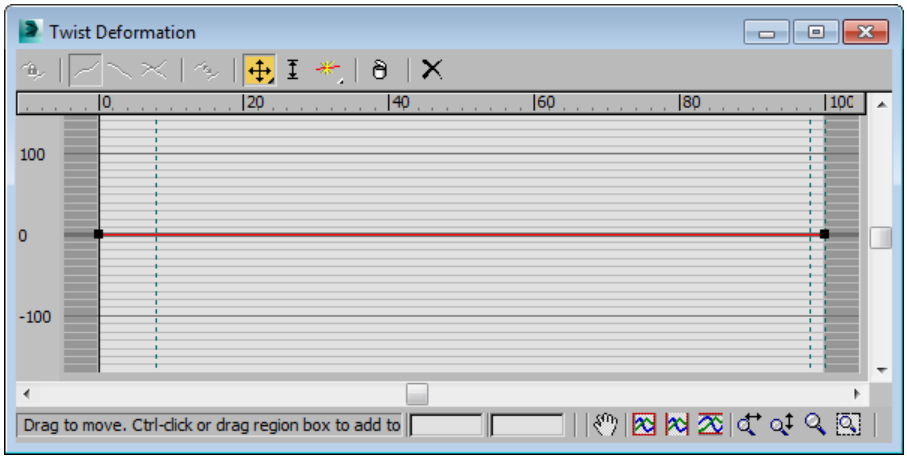


Figure 11-77 *The* ***Twist Deformation*** *dialog box*

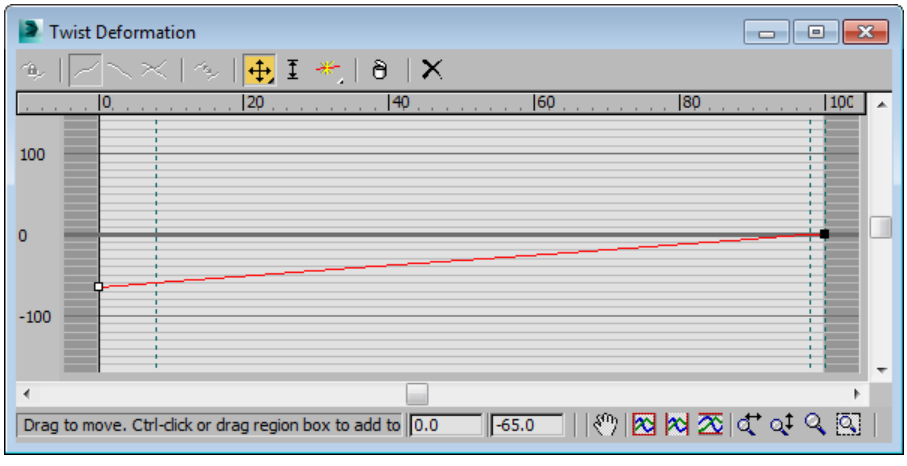


Figure 11-78 *The first vertex point moved in the* ***Twist Deformation*** *dialog box*

Figure 11-79 *On applying Twist the tent on other sides is distorted*

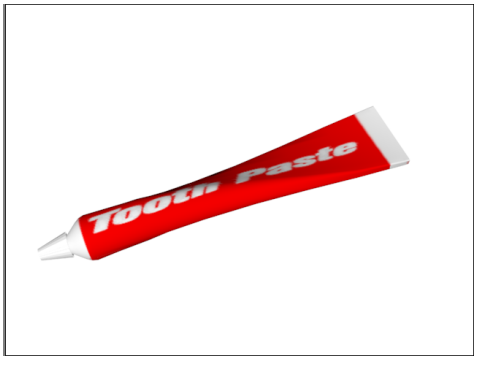


Figure 11-80 *The final output after rendering (view 1)*

Figure 11-81 *The final output after rendering (view 2)*

Figure 11-82 *Scene for Tutorial 2*

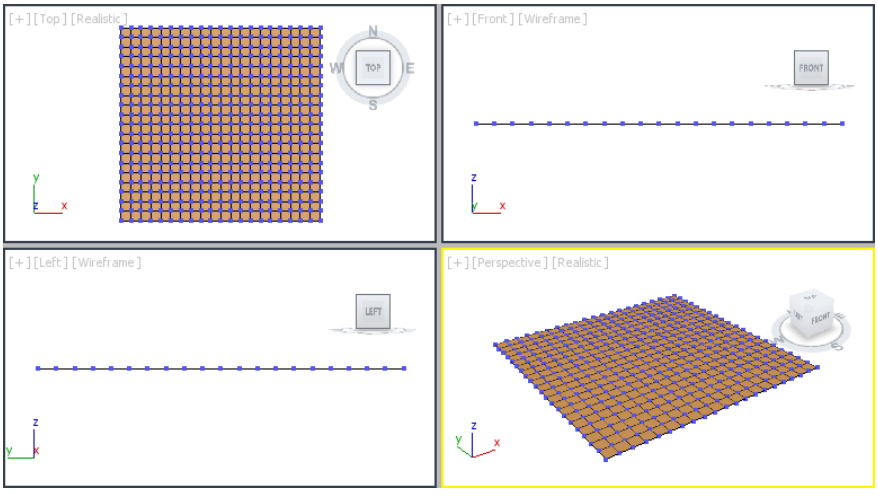


Figure 11-83 *All vertices displayed in viewports*

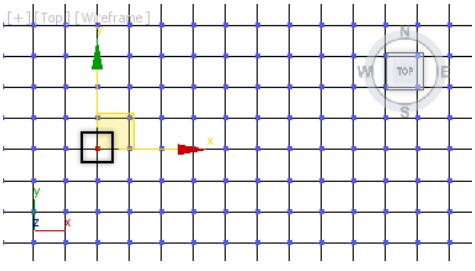


Figure 11-84 *A vertex selected in the Top viewport*

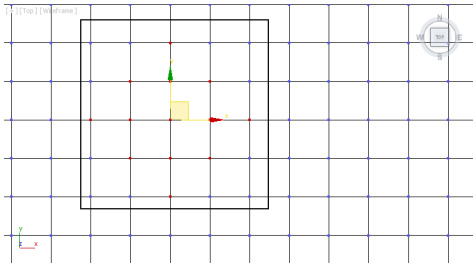


Figure 11-85 *The vertices selected after choosing the* ***Grow*** *button*

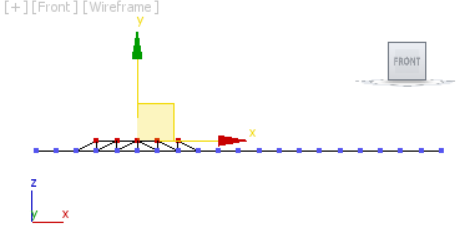


Figure 11-86 *The selected vertices dragged up in the Front viewport*

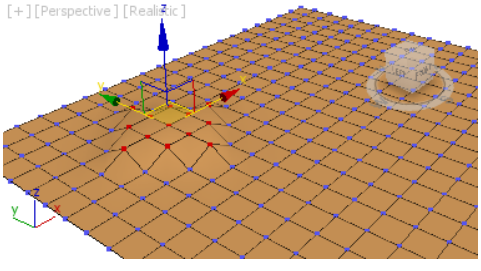


Figure 11-87 *The selected vertices dragged up in the Perspective viewport*

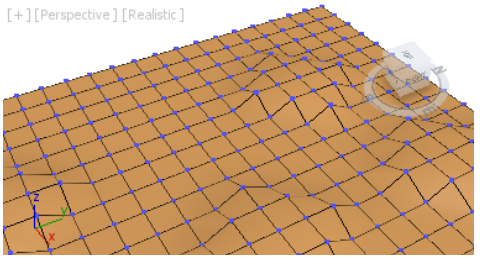


Figure 11-88 *The hilly surface created using the vertices of the plane*

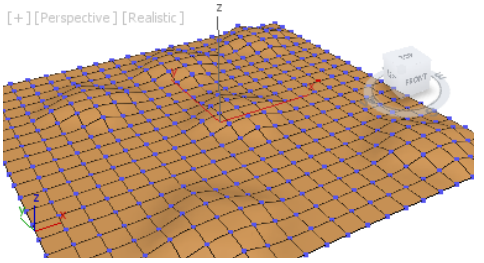


Figure 11-89 *The hilly surface after applying the* ***MeshSmooth*** *modifier*

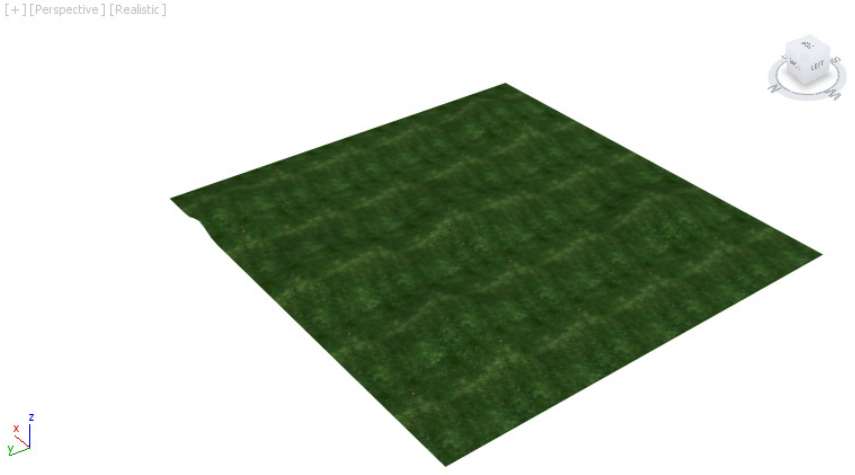


Figure 11-90 *The plane after assigning the map to it in the Perspective viewport*

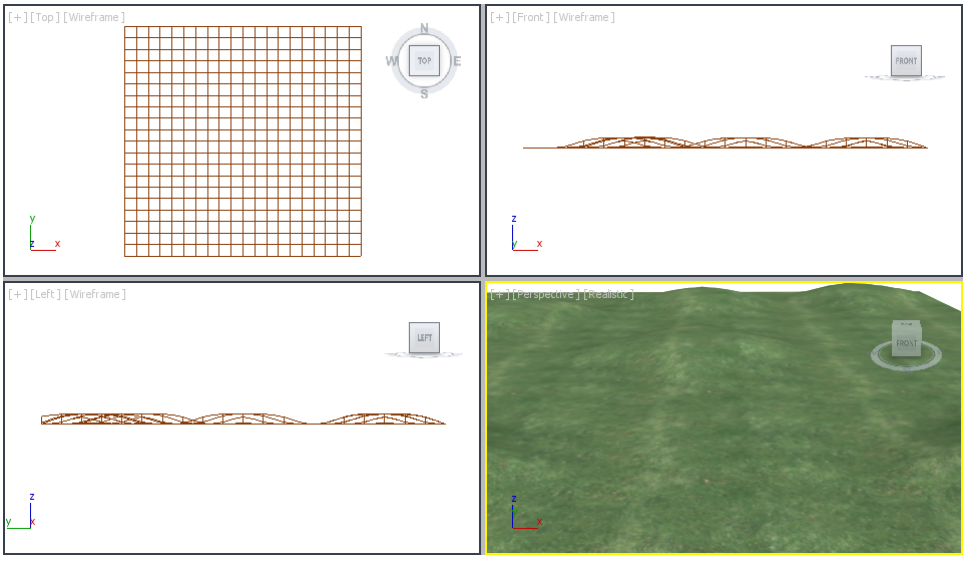


Figure 11-91 *The plane after using the viewport navigation tools*

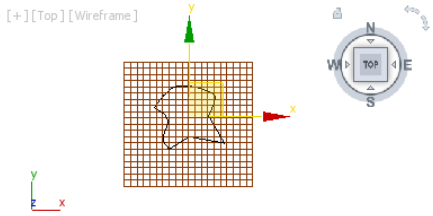


Figure 11-92 *A close line spline created in the Top viewport*

Figure 11-93 *Four copies of the line splines created in the Front viewport*

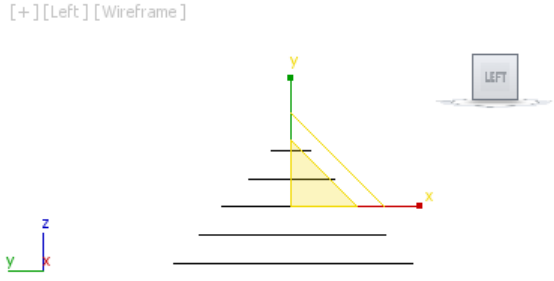


Figure 11-94 *The scaled lines after using the* ***Select and Uniform Scale*** *tool*

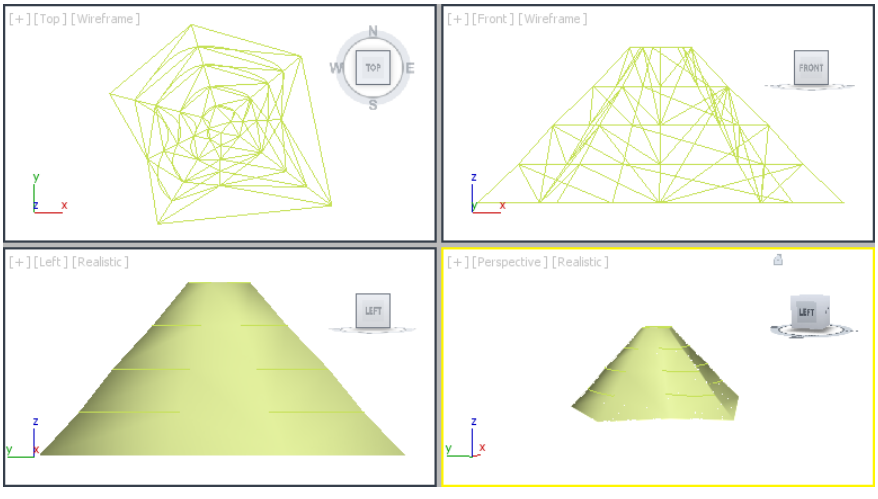


Figure 11-95 *The terrain object created in viewports*

Figure 11-96 *The map assigned to hill01*

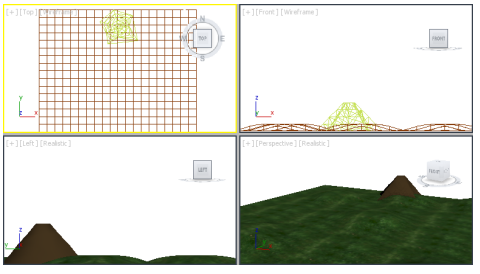


Figure 11-97 *The hill01 after scaling and aligning with the ground*

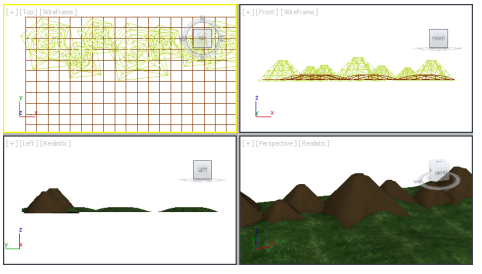


Figure 11-98 *The hills displayed after scaling and alignment*

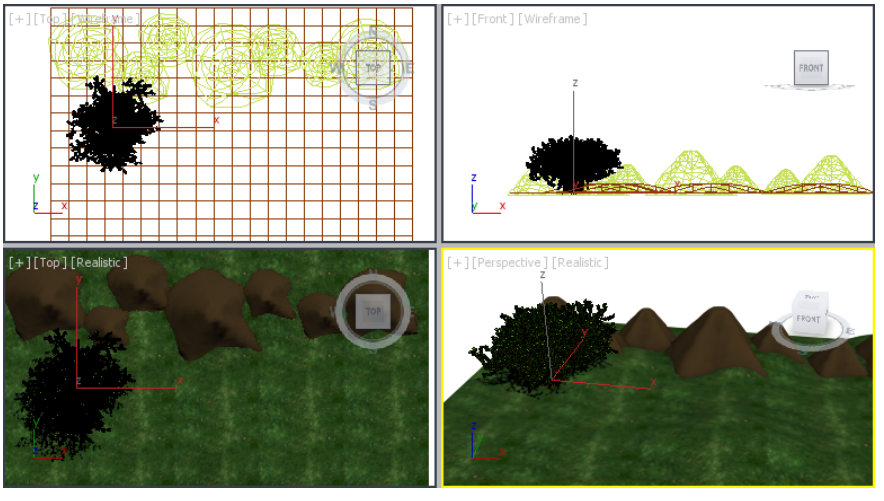


Figure 11-99 *Alignment of the tree01 in viewports*

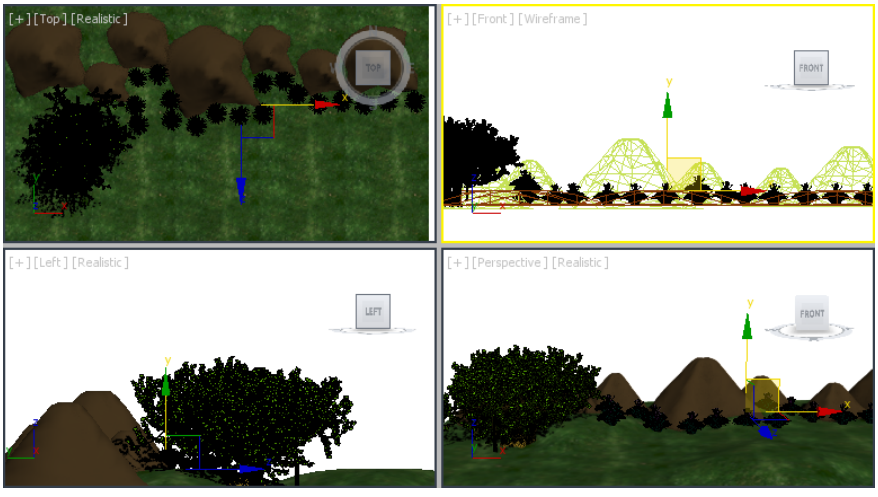


Figure 11-100 *Alignment of trees in viewports*

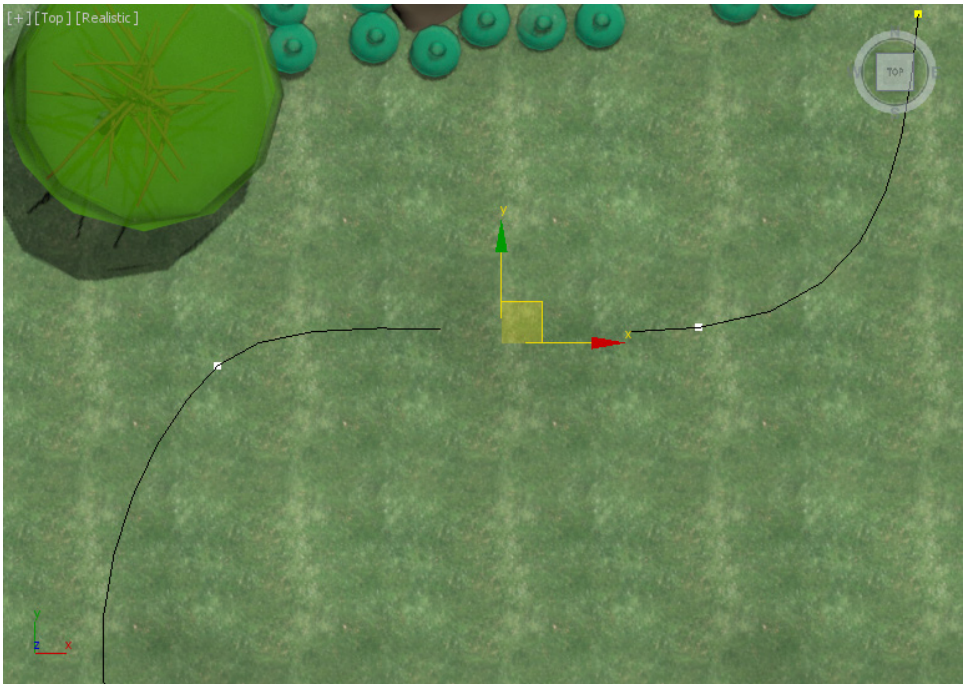


Figure 11-101 *The line created in the Top viewport*

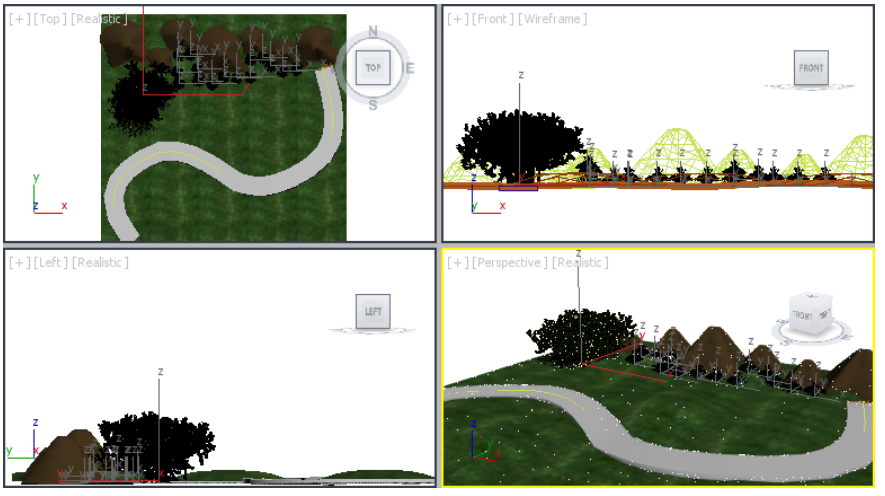


Figure 11-102 *The road geometry aligned with ground*

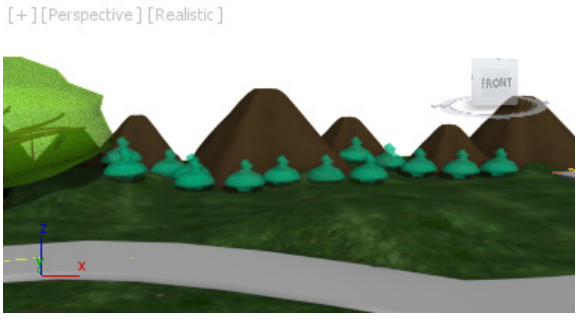


Figure 11-103 *The road after assigning the map to it*

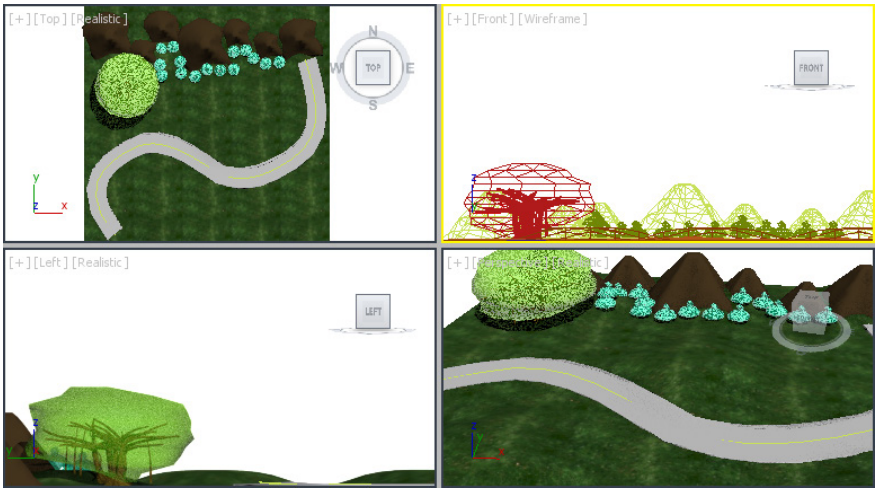


Figure 11-104 *The scene after using the* ***Conform*** *tool*

Figure 11-105 *The final output of the scene*

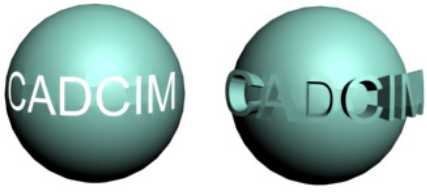


Figure 11-106 *Model to be created in Exercise 2*

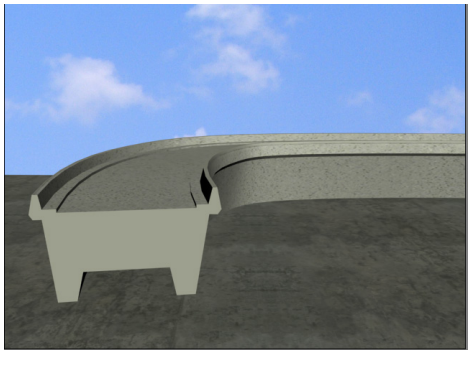


Figure 11-107 *Model to be created in Exercise 3*

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Modifiers

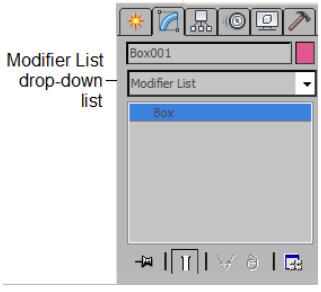

Figure 12-1 *The* ***Modifier List*** *drop-down list*

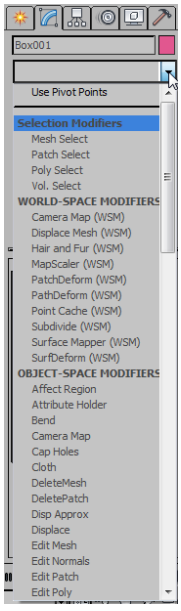

Figure 12-2 *Partial view of the* ***Modifier List*** *drop-down list*

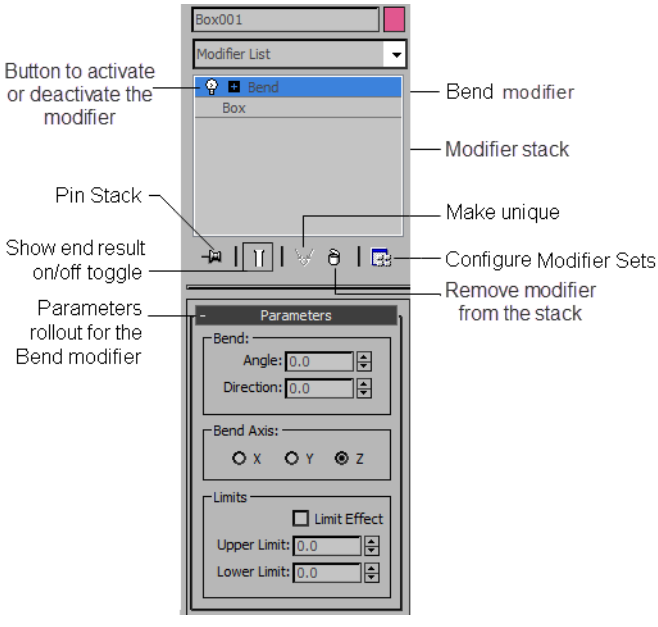

Figure 12-3 *The modifier stack*

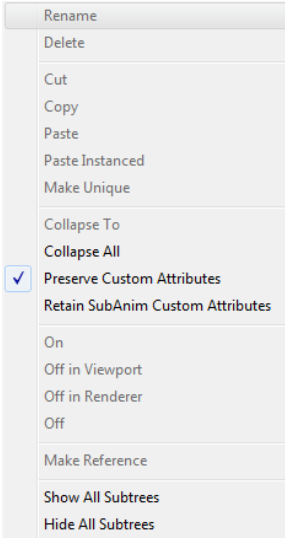

Figure 12-4 *The shortcut menu displayed on right-clicking on the modifier in the modifier stack*

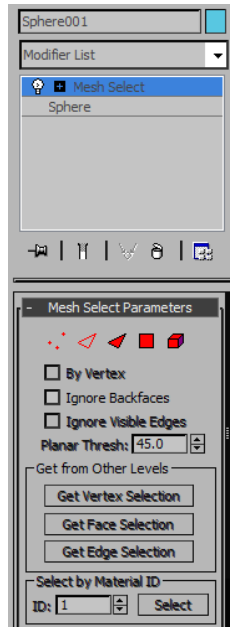

Figure 12-5 *Partial view of the rollouts displayed on selecting the* ***Mesh Select*** *modifier*

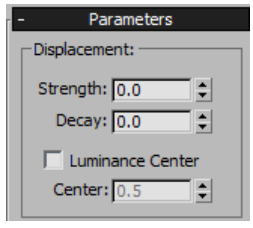

Figure 12-6 *The* ***Displacement*** *area in the* ***Parameters*** *rollout*

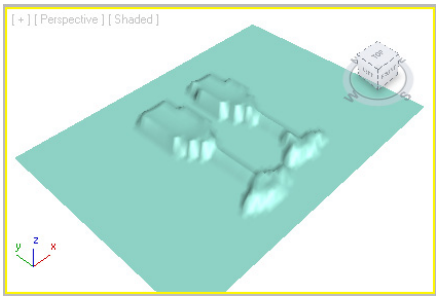

Figure 12-7 *The plane after using the bitmap image in the* ***Displace*** *modifier*

Figure 12-8 *The bitmap image that has been used for displacement in Figure 12-7*

Figure 12-9 *The plane after using the map image in the* ***Displace*** *modifier*

Figure 12-10 *The map image that has been used for displacement in Figure 12-9*

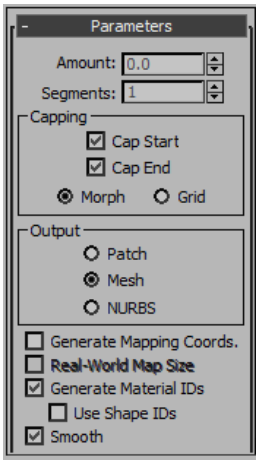

Figure 12-11 *The* ***Parameters*** *rollout*

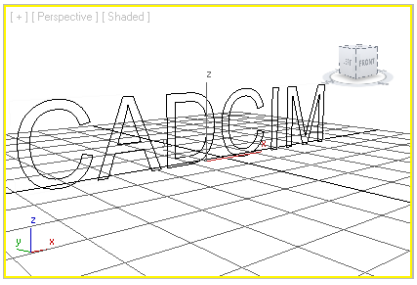

Figure 12-12 *The text spline before applying the* ***Extrude*** *modifier*

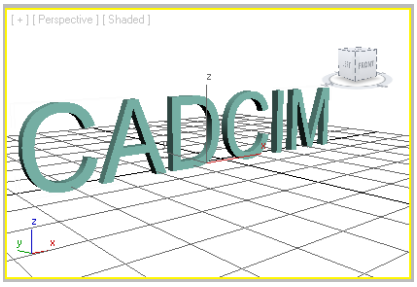

Figure 12-13 *The text spline after applying the* ***Extrude*** *modifier*

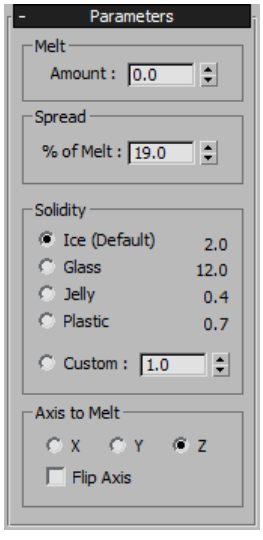

Figure 12-14 *The* ***Parameters*** *rollout*

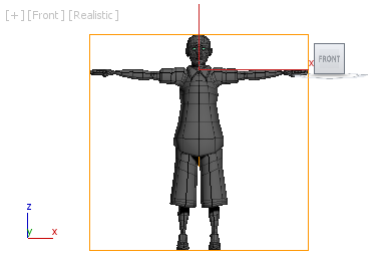

Figure 12-15 *The object before applying the* ***Melt*** *modifier*

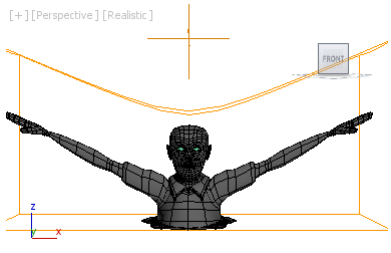

Figure 12-16 *The object after applying the* ***Melt*** *modifier*

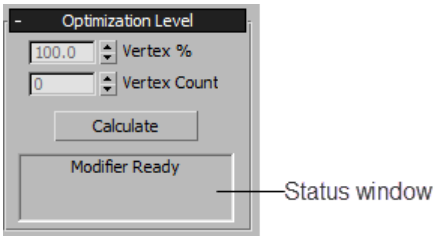

Figure 12-17 *The* ***Optimization Level*** *rollout*

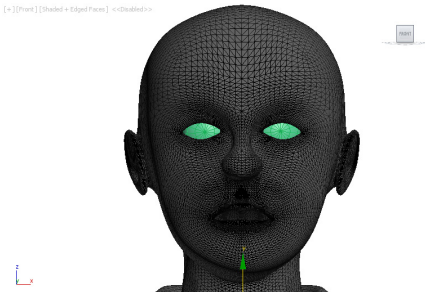

Figure 12-18 *The object before applying the* ***ProOptimizer*** *modifier*

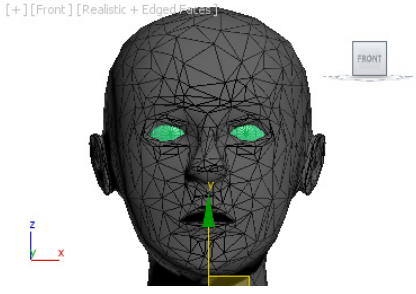

Figure 12-19 *The object after applying the* ***ProOptimizer*** *modifier*

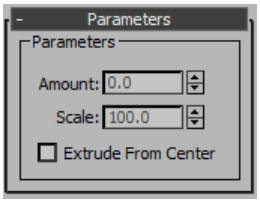

Figure 12-20 *The* ***Parameters*** *rollout*

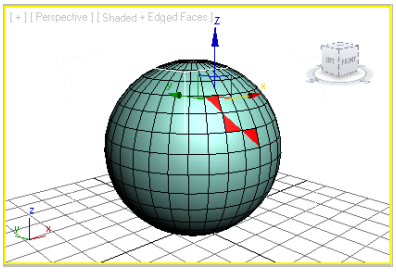

Figure 12-21 *The faces selected to be extruded in a sphere*

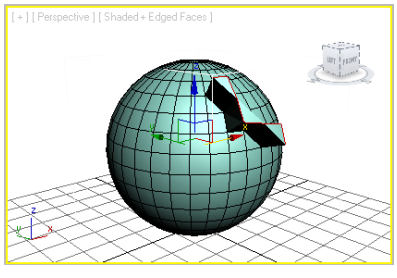

Figure 12-22 *The selected faces extruded*

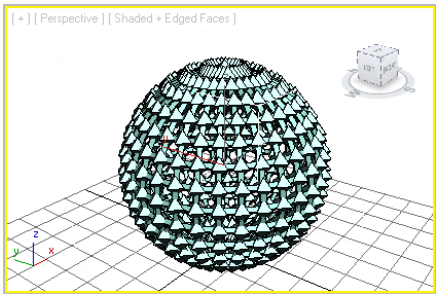

Figure 12-23 *The sphere after applying the* ***Lattice*** *modifier*

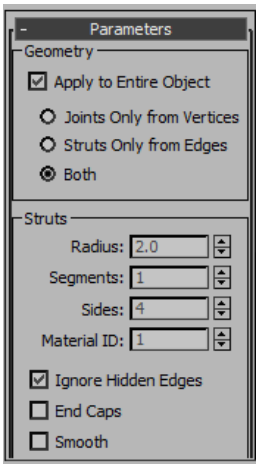

Figure 12-24 *Partial view of the* ***Parameters*** *rollout*

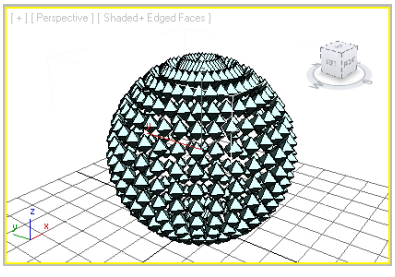

Figure 12-25 *The sphere after selecting the* ***Joints Only from Vertices*** *radio button*

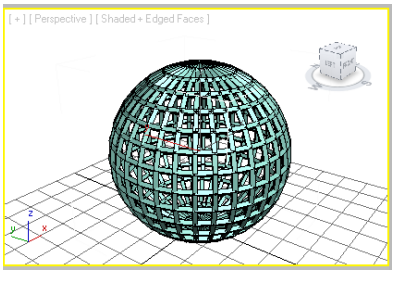

Figure 12-26 *The sphere after selecting the* ***Struts Only from Edges*** *radio button*

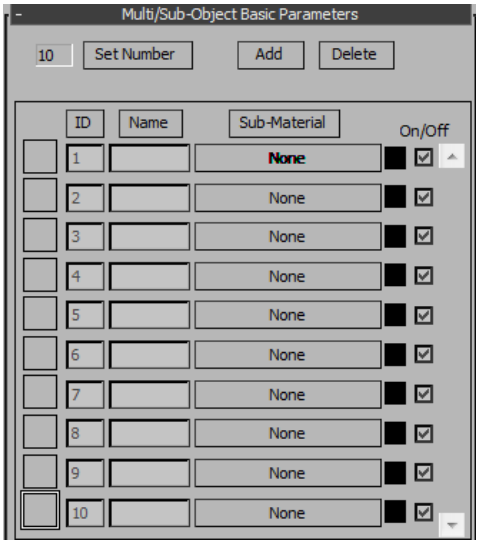

Figure 12-27 *Partial view of the* ***Multi/Sub-Object Basic Parameters*** *rollout in the* ***Material Editor*** *dialog box*

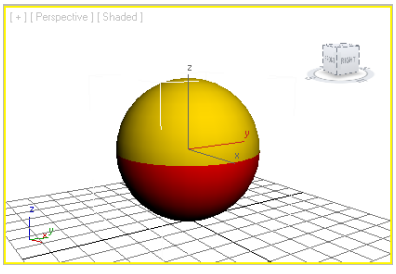

Figure 12-28 *The object displayed in two different colors after applying the* ***Material*** *modifier*

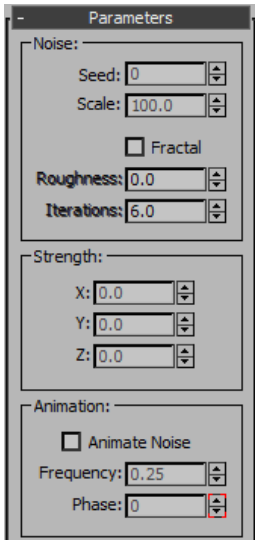

Figure 12-29 *The* ***Parameters*** *rollout*

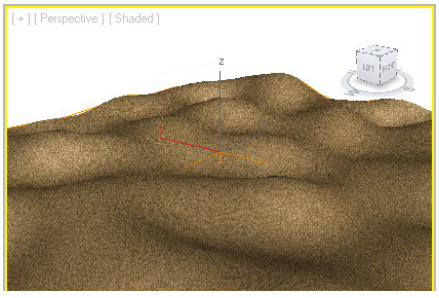

Figure 12-30 *The plane with the* ***Noise*** *modifier applied*

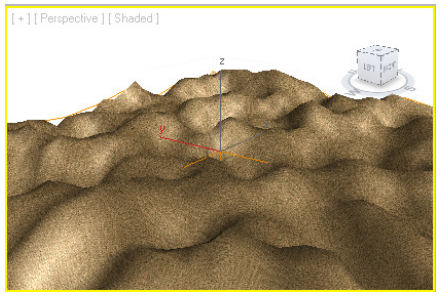

Figure 12-31 *The plane with the* ***Fractal*** *checkbox selected*

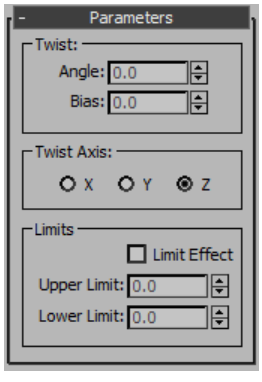

Figure 12-32 *The* ***Parameters*** *rollout*

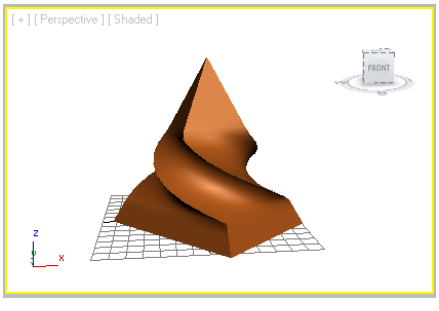

Figure 12-33 *The* ***Twist*** *modifier applied to the pyramid object*

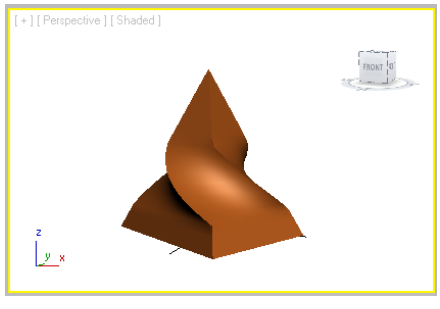

Figure 12-34 *The* ***Twist*** *modifier applied to a portion of the pyramid object using the options in the* ***Limits*** *area*

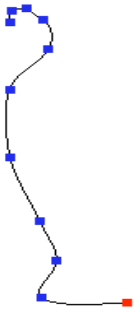

Figure 12-35 *The* ***Line*** *spline created to apply the* ***Lathe*** *modifier*

Figure 12-36 *The* ***Line*** *spline after applying the* ***Lathe*** *modifier*

Figure 12-37 *Partial view of the* ***Parameters*** *rollout*

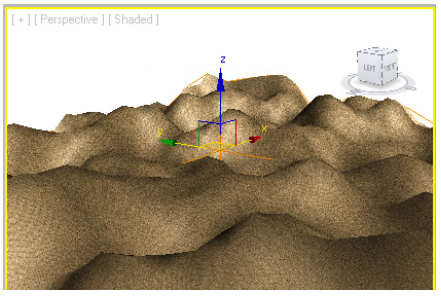

Figure 12-38 *The surface before applying the* ***MeshSmooth*** *modifier*

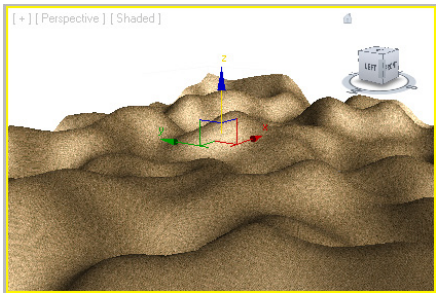

Figure 12-39 *The surface after applying the* ***MeshSmooth*** *modifier*

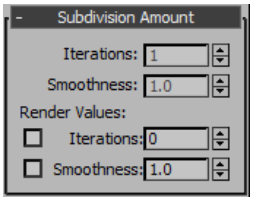

Figure 12-40 *The* ***Subdivision Amount*** *rollout*

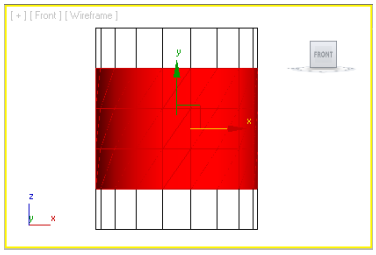

Figure 12-41 *The sub-objects selected in a object to apply the* ***Tessellate*** *modifier*

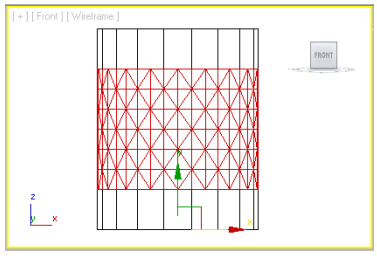

Figure 12-42 *The selected sub-objects converted into triangular faces after applying the* ***Tessellate*** *modifier*

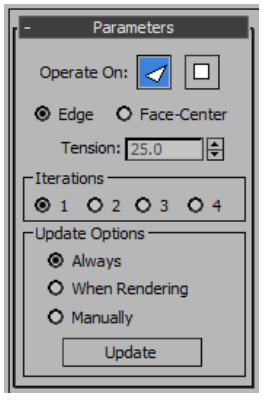

Figure 12-43 *The* ***Parameters*** *rollout*

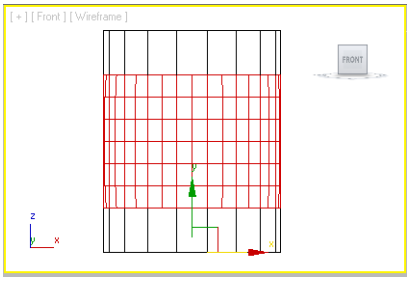

Figure 12-44 *The selected sub-objects converted into polygonal faces after choosing the* ***Polygons*** *button*

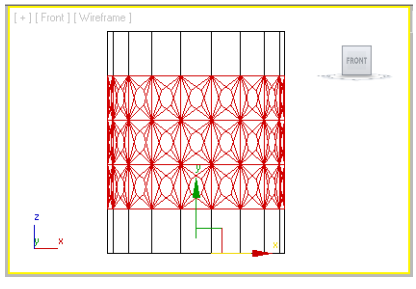

Figure 12-45 *The selected sub-objects converted into triangular faces after choosing the* ***Face-Center*** *radio button*

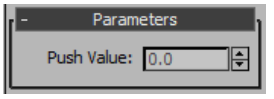

Figure 12-46 *The* ***Parameters*** *rollout*

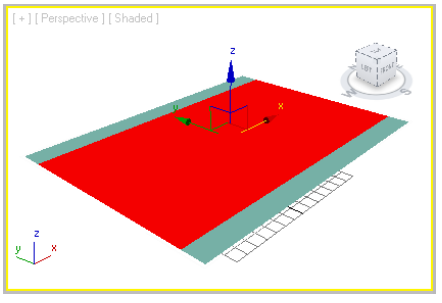

Figure 12-47 *The selected sub-objects of a plane before applying the* ***Push*** *modifier*

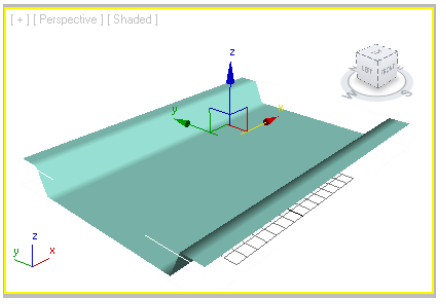

Figure 12-48 *The plane after applying the* ***Push*** *modifier*

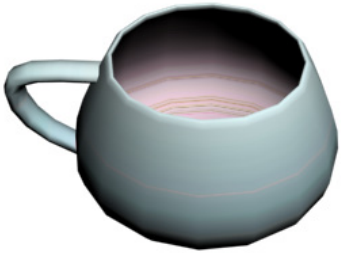

Figure 12-49 *The object with two different materials on the inner and outer sides*

Figure 12-50 *The inner and outer materials interchanged after applying the* ***Normal*** *modifier*

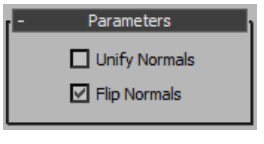

Figure 12-51 *The* ***Parameters*** *rollout*

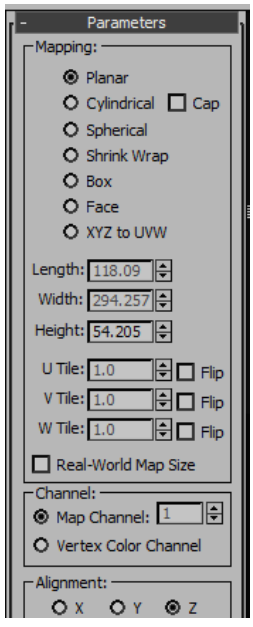

Figure 12-52 *Partial view of the* ***Parameters*** *rollout*

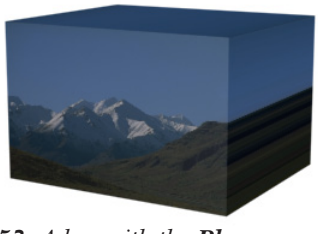

Figure 12-53 *A box with the* ***Planar*** *mapping coordinate*

Figure 12-54 *A cylinder with the* ***Cylindrical*** *mapping coordinates*

Figure 12-55 *The* ***Cylindrical*** *mapping coordinates applied to a cylinder and its cap*

Figure 12-56 *The* ***Spherical*** *mapping coordinates applied to a sphere*

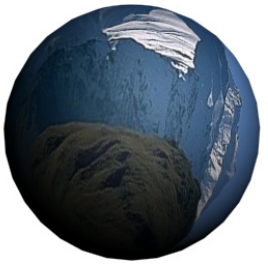

Figure 12-57 *The* ***Shrink Wrap*** *mapping coordinates applied to a sphere*

Figure 12-58 *The* ***Box*** *mapping coordinates applied to a box*

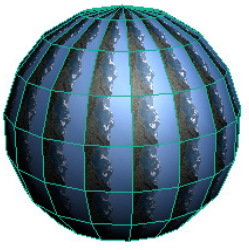

Figure 12-59 *The* ***Face*** *mapping coordinates applied to a sphere*

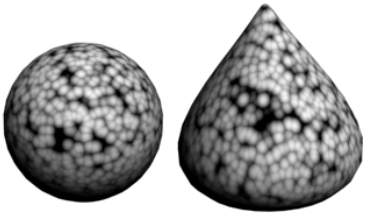

Figure 12-60 *Coordinates of the object adjusted to match the new shape*

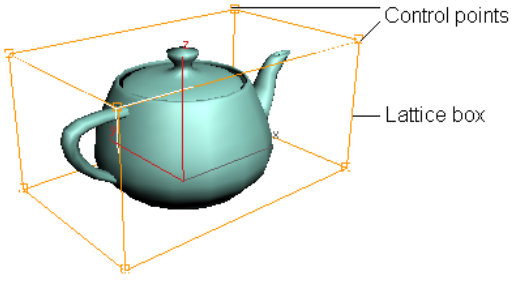

Figure 12-61 *The* ***FFD 2x2x2*** *modifier applied to an object*

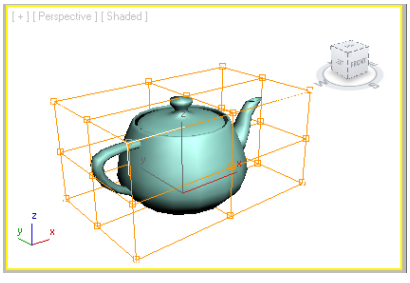

Figure 12-62 *The* ***FFD 3x3x3*** *modifier applied to an object*

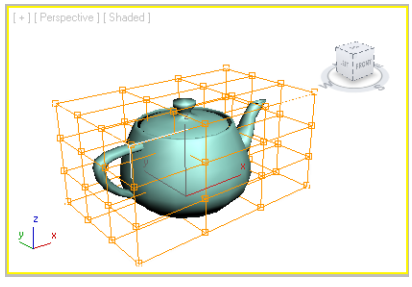

Figure 12-63 *The* ***FFD 4x4x4*** *modifier applied to an object*

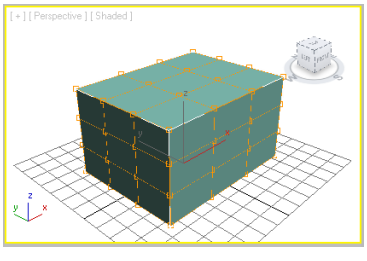

Figure 12-64 *A box object with the* ***FFD(box)*** *modifier applied*

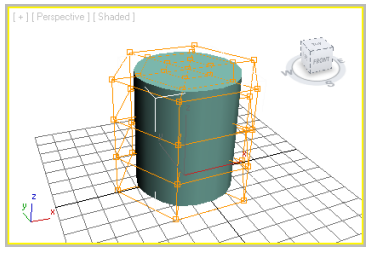

Figure 12-65 *A cylindrical object with the* ***FFD(cyl)*** *modifier applied*

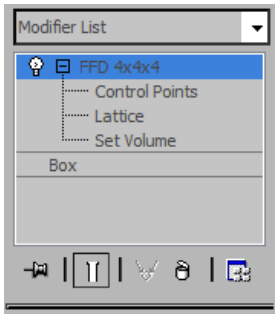

Figure 12-66 *The sub-object levels in the modifier stack*

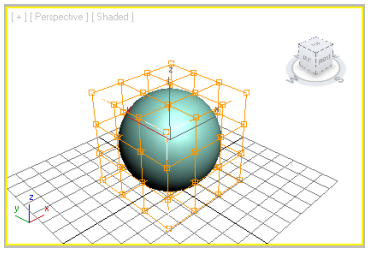

Figure 12-67 *The FFD modifier applied to the objects*

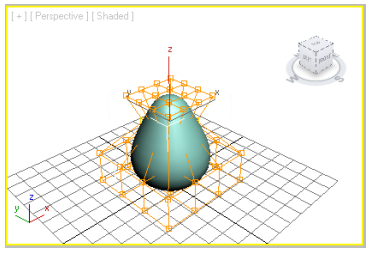

Figure 12-68 *The shape of the object modified after transforming the control points*

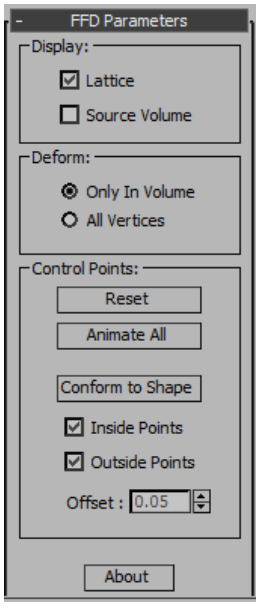

Figure 12-69 *Partial view of the* ***FFD Parameters*** *rollout*

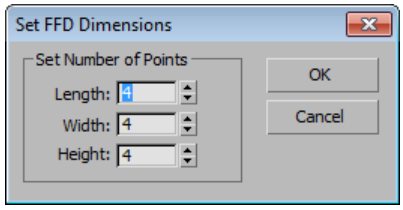

Figure 12-70 *The* ***Set FFD Dimensions*** *dialog box*

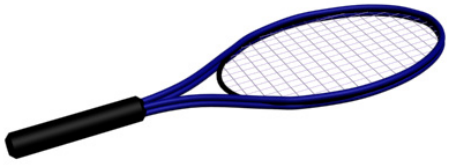

Figure 12-71 *A tennis racket model*

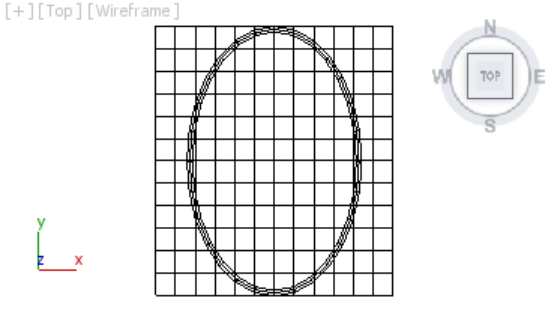

Figure 12-72 *The plane created in the Top viewport*

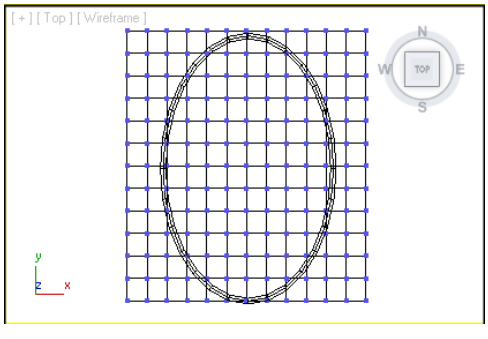

Figure 12-73 *The vertices of the stringed area displayed in the Top viewport*

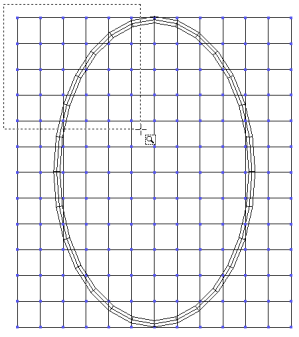

Figure 12-74 *A selection box dragged around the vertices using the* ***Zoom Region*** *tool*

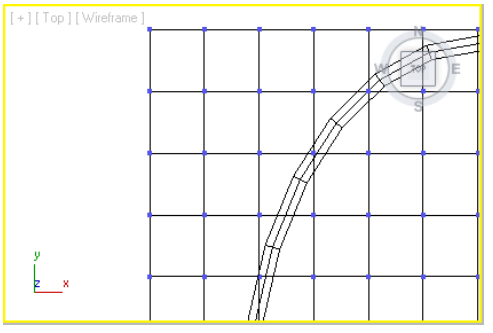

Figure 12-75 *The selected area zoomed in*

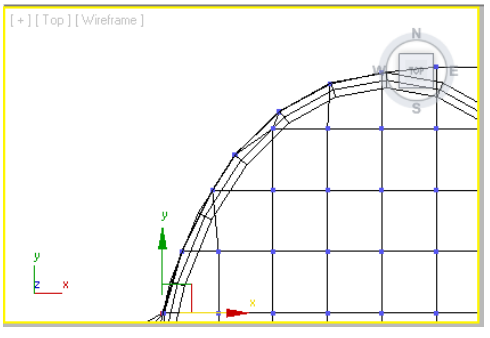

Figure 12-76 *The vertices arranged into the shape of the head*

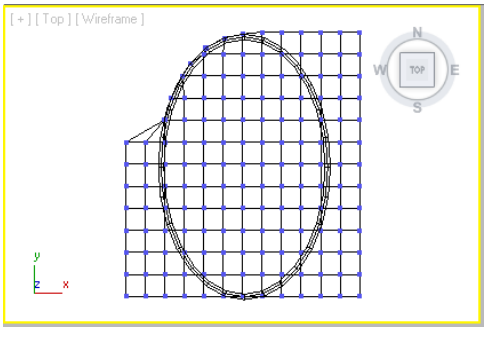

Figure 12-77 *The objects after invoking the* ***Zoom Extents*** *tool*

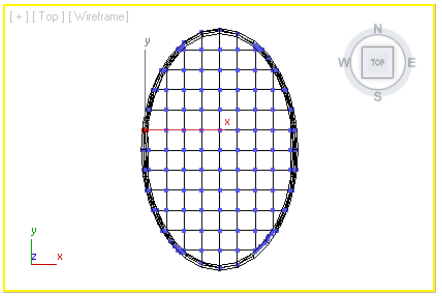

Figure 12-78 *All outer vertices aligned to the shape of the head*

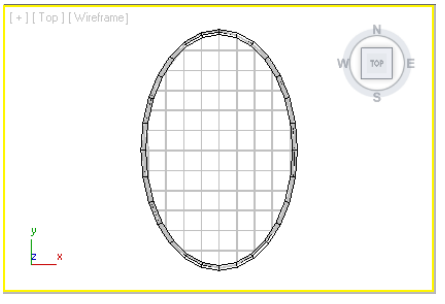

Figure 12-79 *The stringed area after applying the* ***Lattice*** *modifier*

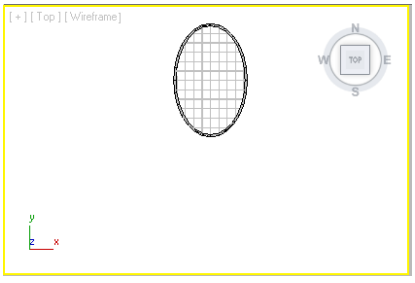

Figure 12-80 *The racket head in the Top viewport*

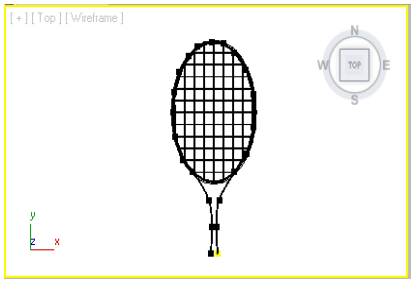

Figure 12-81 *A line created around the racket head*

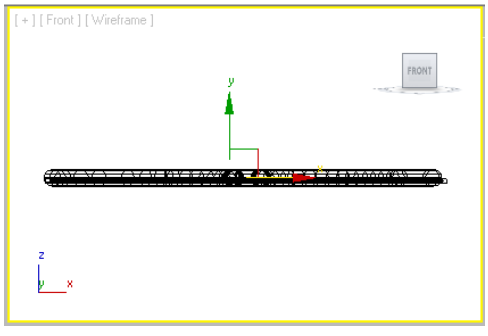

Figure 12-82 *Alignment of the shaft01 at the bottom of the racket head*

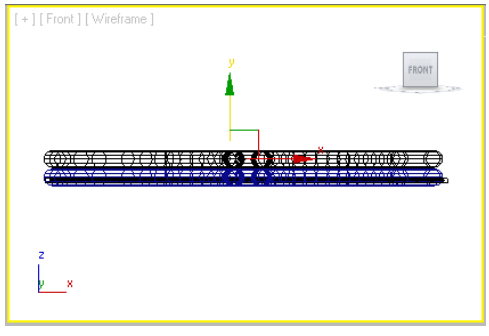

Figure 12-83 *Alignment of the shaft002 at the top of the racket head*

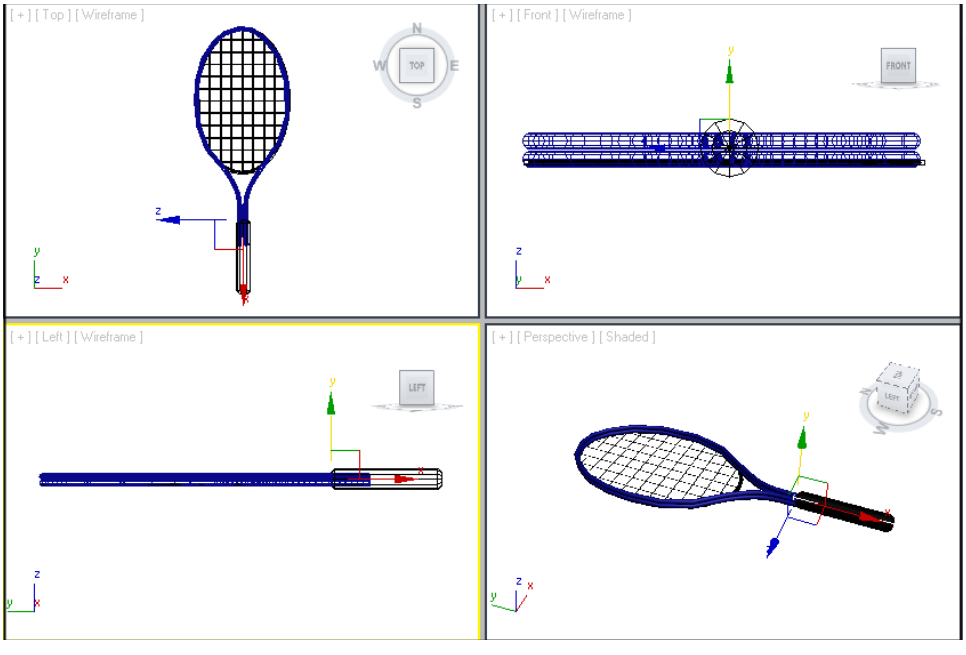

Figure 12-84 *Alignment of handle in viewports*

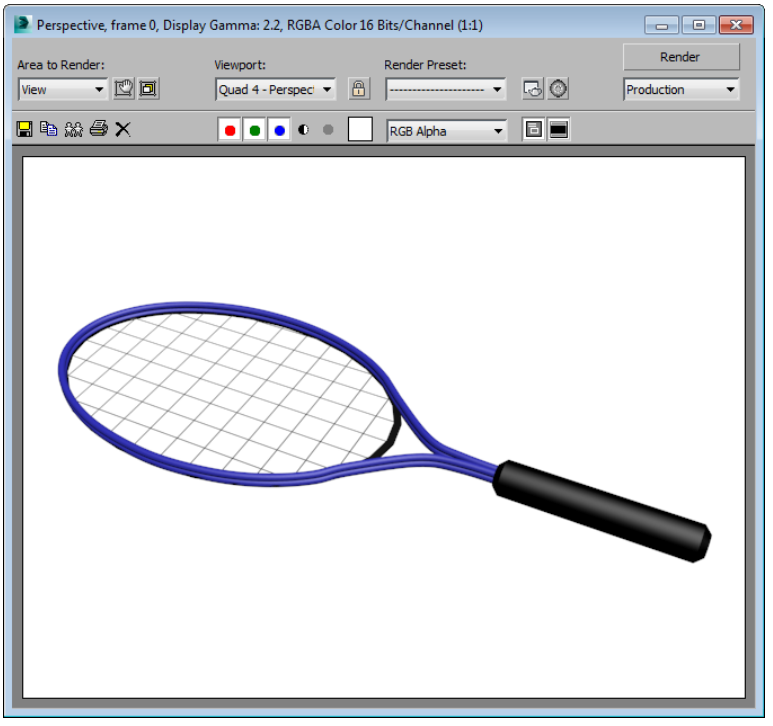

Figure 12-85 *The final output*

Figure 12-86 *The water surface*

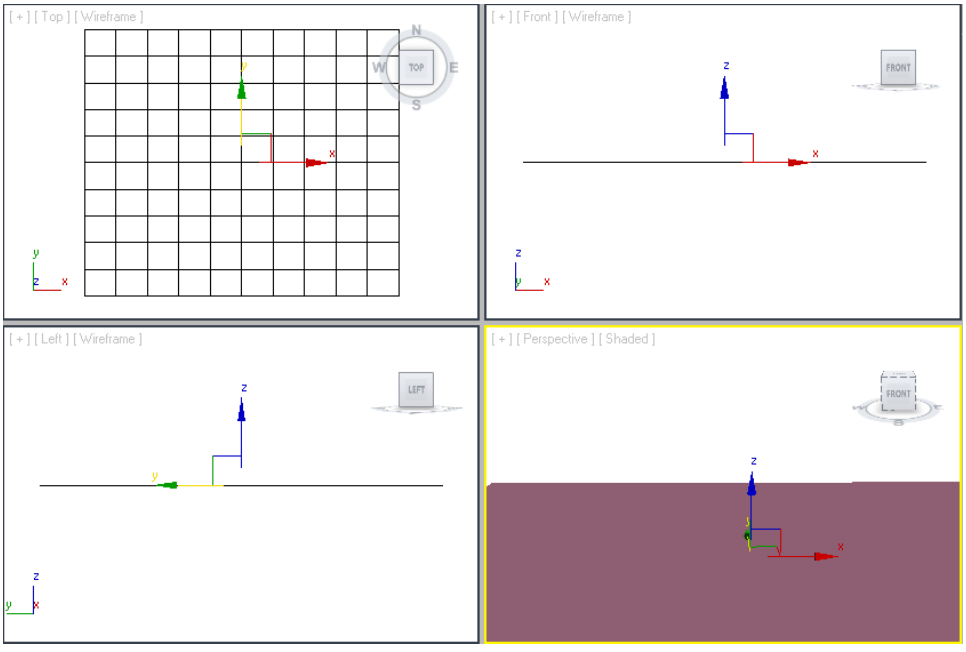

Figure 12-87 *The water surface in viewports*

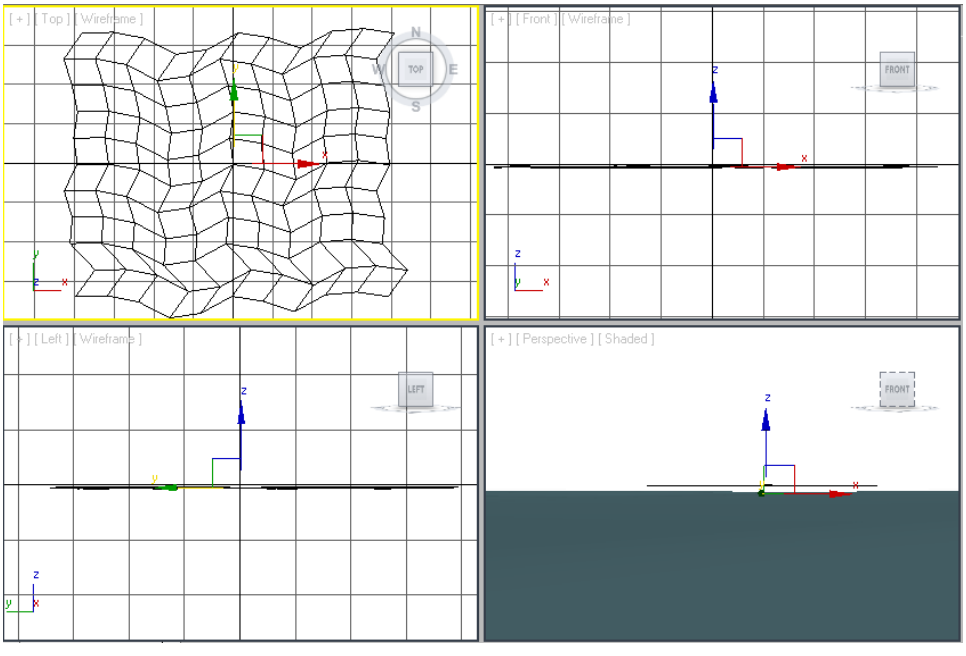

Figure 12-88 *The water surface displayed after entering the values in the* ***Parameters*** *rollout of the* ***Noise*** *modifier*

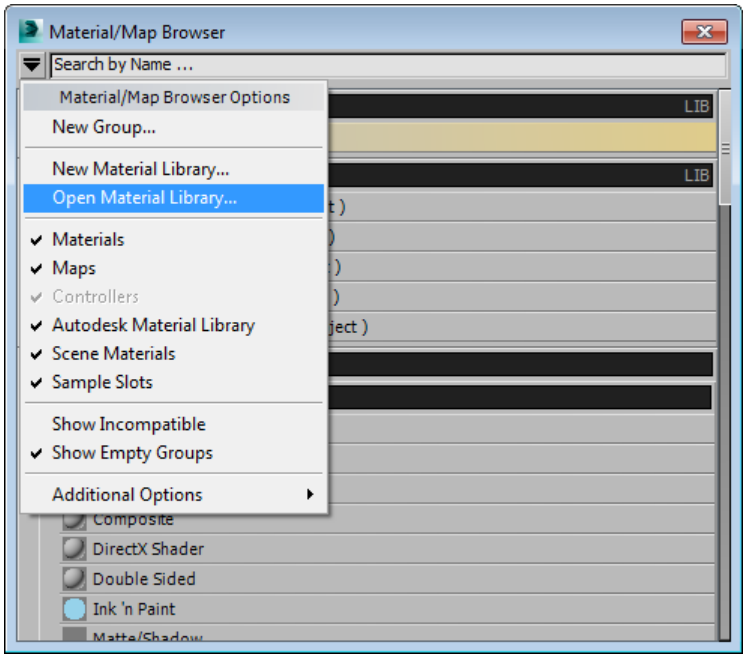

Figure 12-89 *Choosing the* ***Open Material Library*** *option from the flyout*

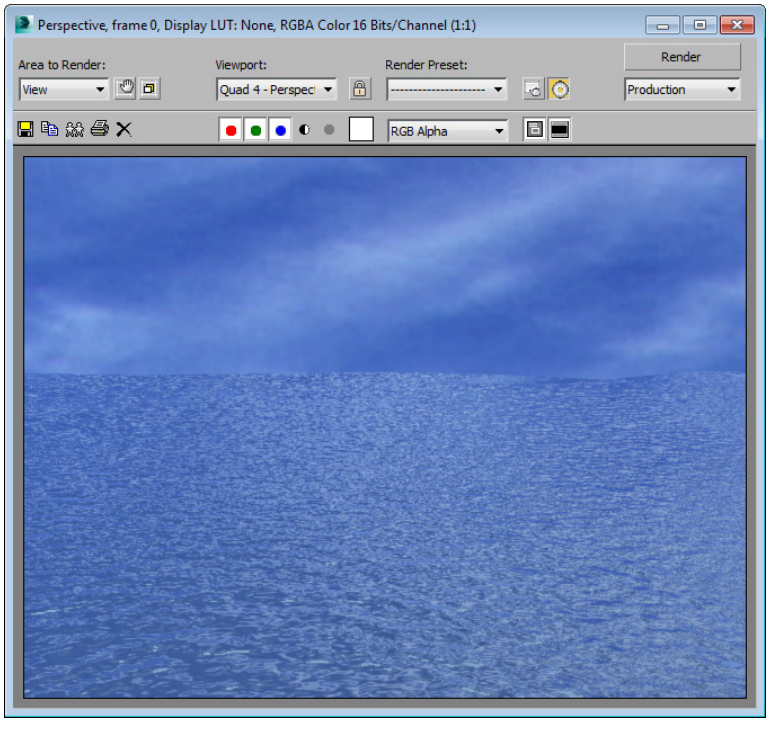

Figure 12-90 *The final output of the scene after rendering*

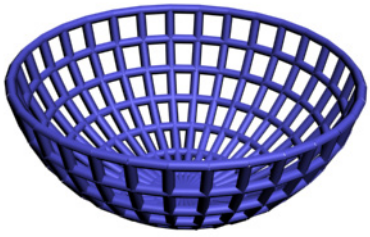

Figure 12-91 *The model of a basket*

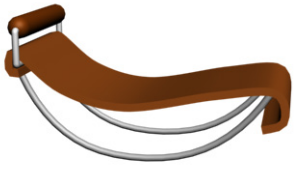

Figure 12-92 *The model of a chair*

Figure 12-93 *The model of a bowl*

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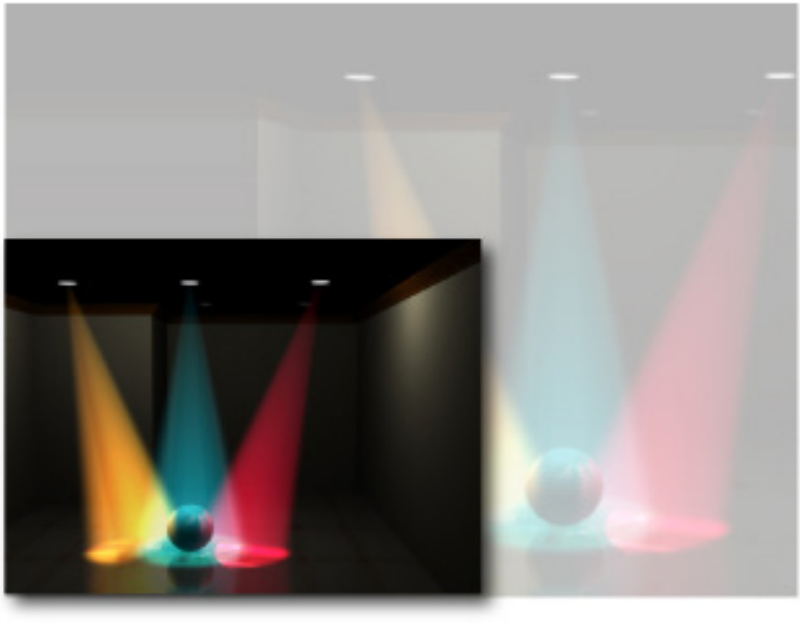
Lights and Cameras



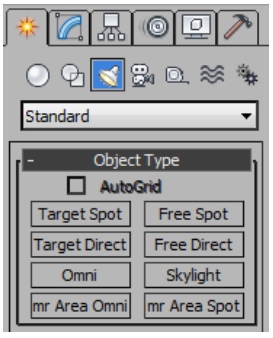


Figure 13-1 *The tools to create standard lights in the* ***Object Type*** *rollout*

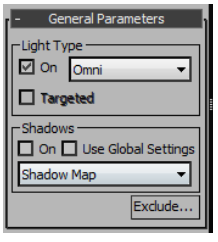


Figure 13-2 *The* ***General Parameters*** *rollout*

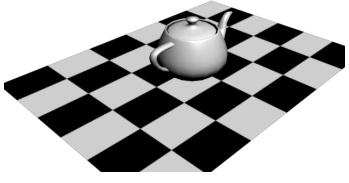


Figure 13-3 *The scene without any light*

Figure 13-4 *The scene with the omni lights applied*

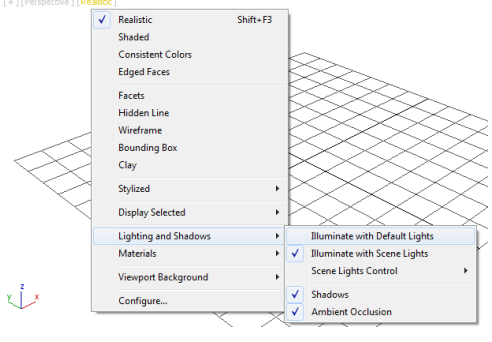


Figure 13-5 *The cascading menu displayed in the viewport*

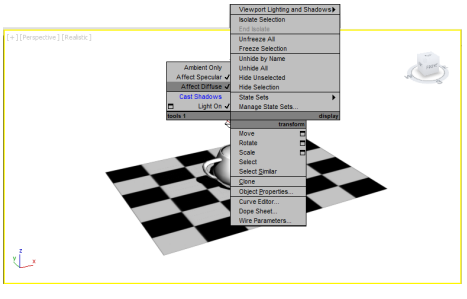


Figure 13-6 *The quad menu displayed in the viewport*

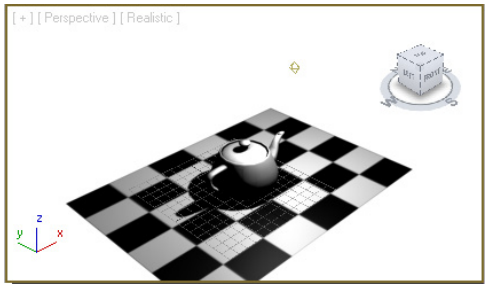


Figure 13-7 *The shadow of the object displayed in the Perspective viewport*

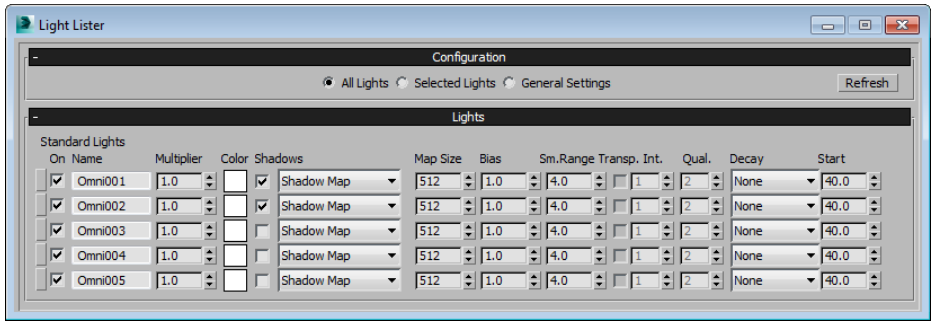


Figure 13-8 *The* ***Light Lister*** *dialog box*

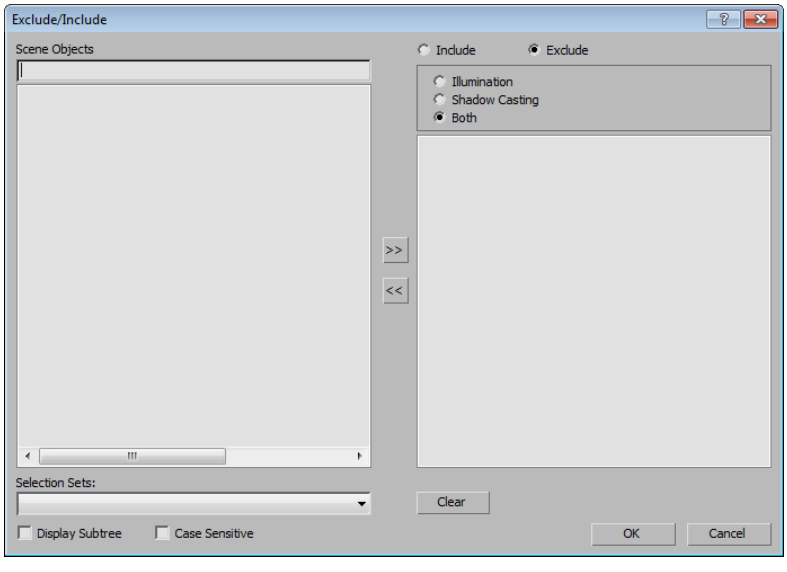


Figure 13-9 *The* ***Exclude/Include*** *dialog box*

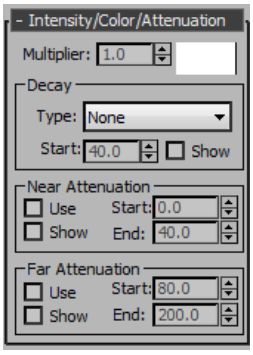


Figure 13-10 *The* ***Intensity/Color/Attenuation*** *rollout*

Figure 13-11 *The effect of light on selecting the* ***None*** *option*

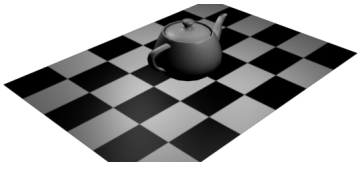


Figure 13-12 *The effect of light on selecting the* ***Inverse*** *option*

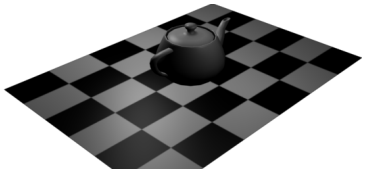


Figure 13-13 *The effect of light on selecting the* ***Inverse Square*** *option*

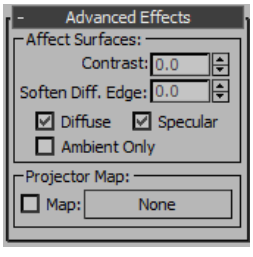


Figure 13-14 *The* ***Advanced Effects*** *rollout*

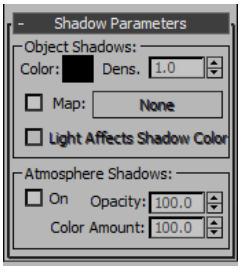


Figure 13-15 *The* ***Shadow Parameters*** *rollout*

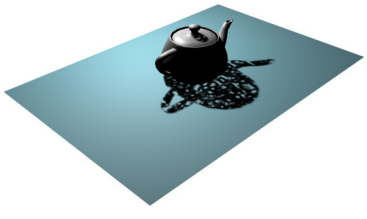


Figure 13-16 *A dent map used as a shadow map*

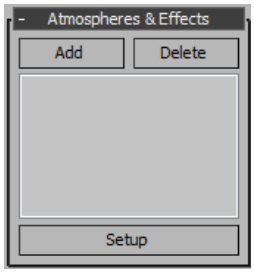


Figure 13-17 *The* ***Atmospheres & Effects*** *rollout*

Figure 13-18 *The lens effect applied to the omni light*

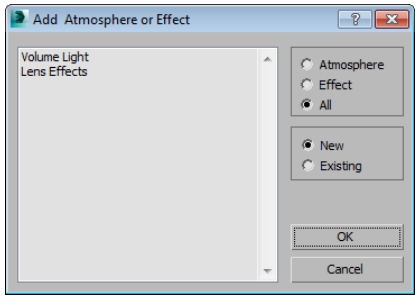


Figure 13-19 *The* ***Add Atmosphere or Effect*** *dialog box*

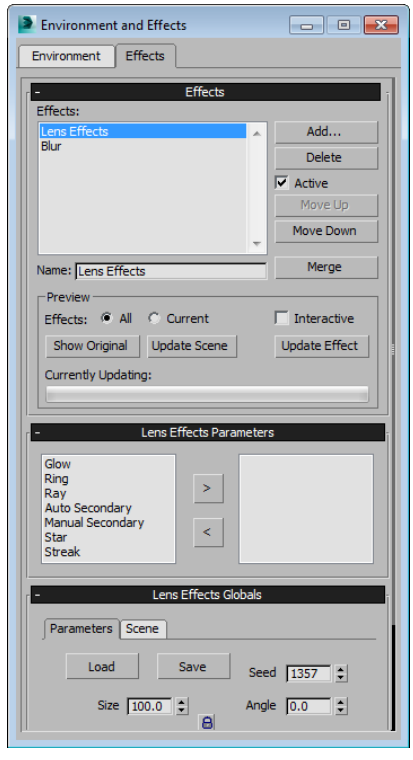


Figure 13-20 *The* ***Environment and Effects*** *dialog box*

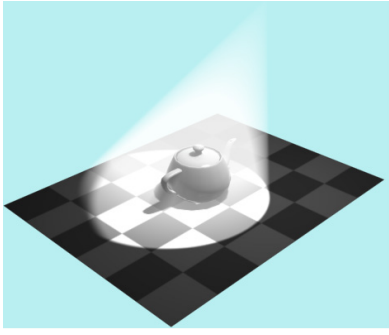


Figure 13-21 *The effect of the target spot light with the* ***Volume Light*** *effect*

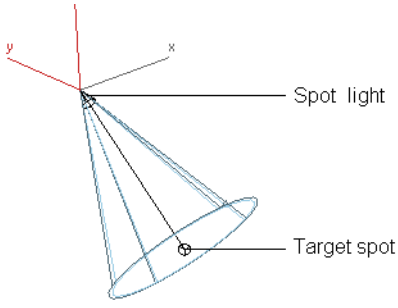


Figure 13-22 *The target spot light*

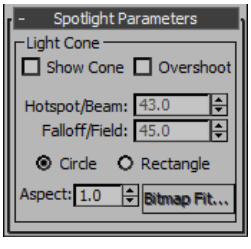


Figure 13-23 *The* ***Spotlight Parameters*** *rollout*

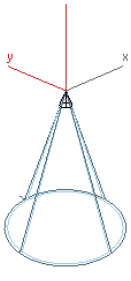


Figure 13-24 *The free spot light*

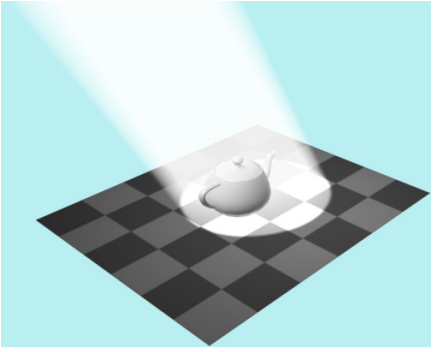


Figure 13-25 *The effect of the target direct light*

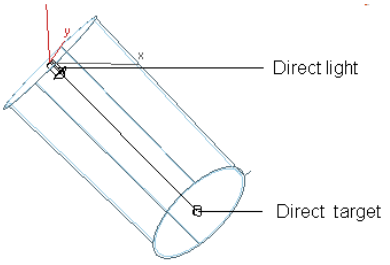


Figure 13-26 *The target direct light*

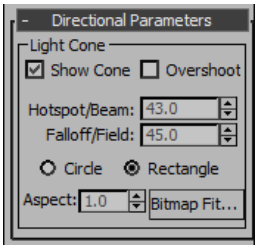


Figure 13-27 *The* ***Directional Parameters*** *rollout*

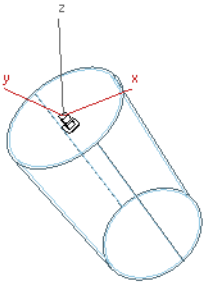


Figure 13-28 *The free direct light*

Figure 13-29 *The skylight*

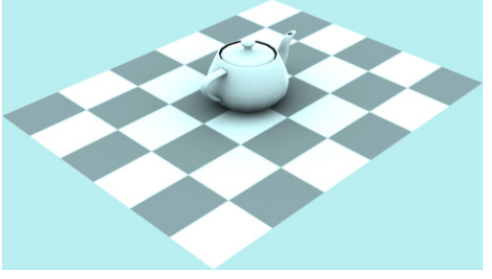


Figure 13-30 *The effect of the skylight*

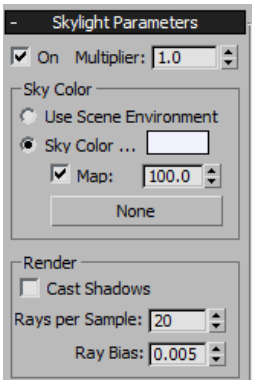


Figure 13-31 *The* ***Skylight Parameters*** *rollout*

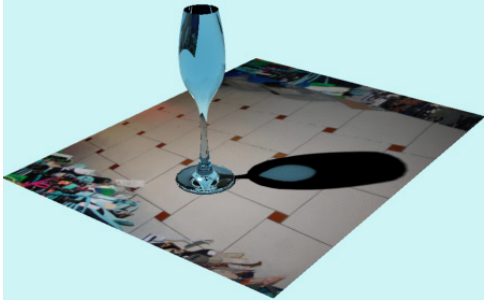


Figure 13-32 *The effect of the area omni light*

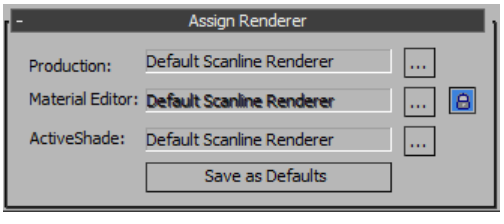


Figure 13-33 *The* ***Choose Renderer*** *button highlighted in the* ***Assign Renderer*** *rollout*

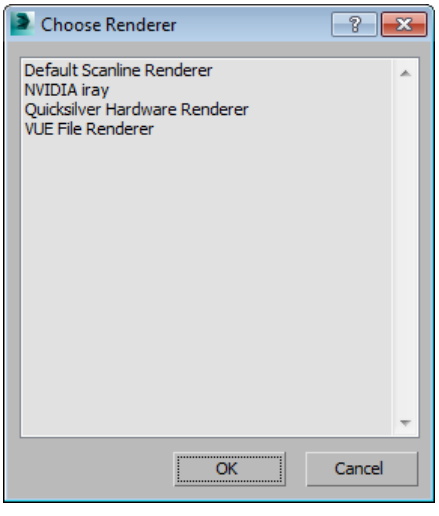


Figure 13-34 *The* ***Choose Renderer*** *dialog box*

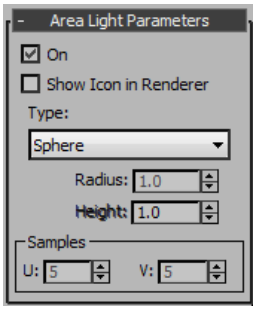


Figure 13-35 *The* ***Area Light Parameters*** *rollout*

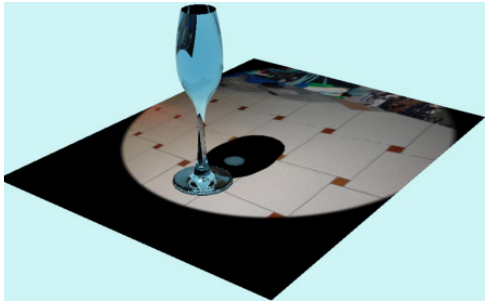


Figure 13-36 *The effect of the area spot light*

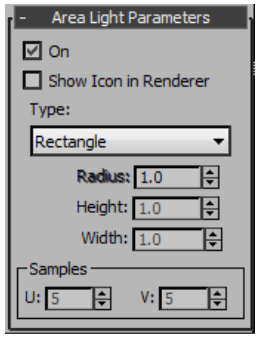


Figure 13-37 *The* ***Area Light Parameters*** *rollout*

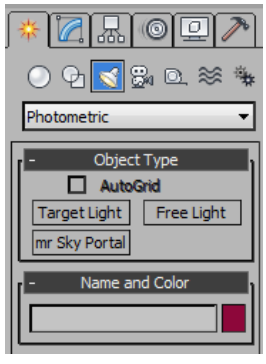


Figure 13-38 *Various tools to create* ***Photometric*** *lights*

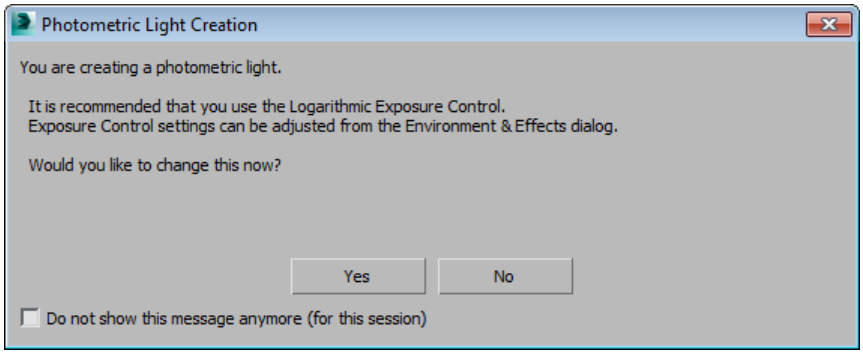


Figure 13-39 *The* ***Photometric Light Creation*** *message box*

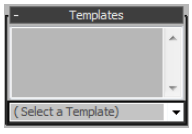


Figure 13-40 The **Templates** rollout

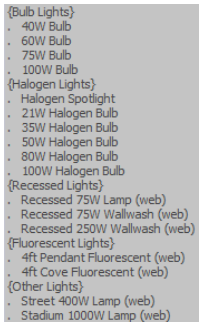


Figure 13-41 The drop-down list displayed to select the type of light

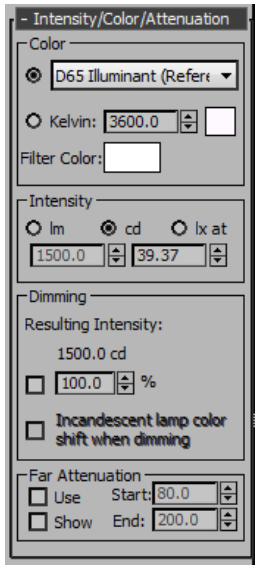


Figure 13-42 The **Intensity/Color/Attenuation** rollout

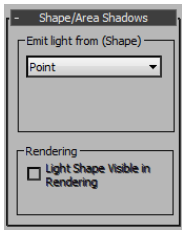


Figure 13-43 The **Shape/Area Shadows** rollout

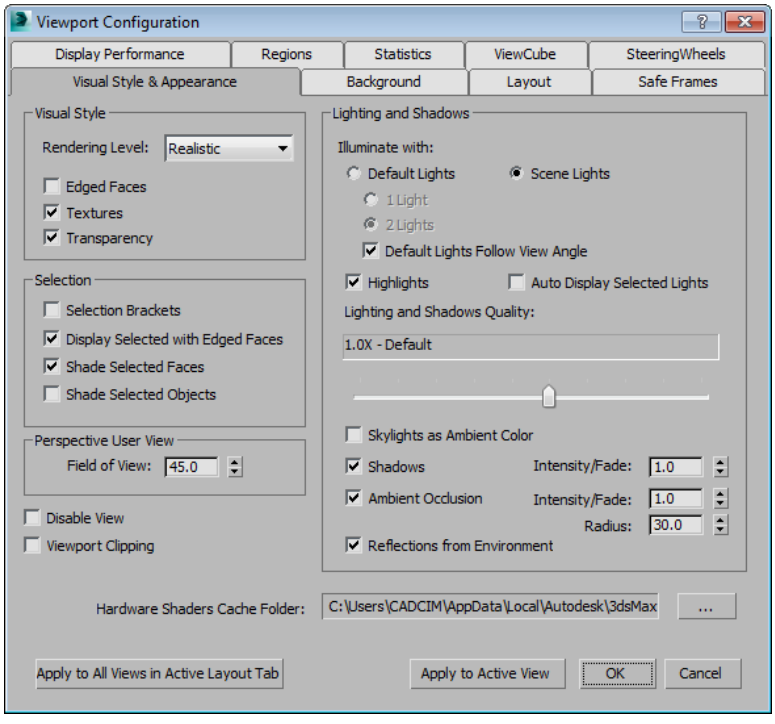


Figure 13-44 *The* ***Viewport Configuration*** *dialog box*

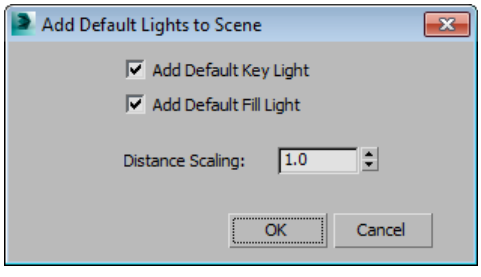


Figure 13-45 *The* ***Add Default Lights to Scene*** *dialog box*

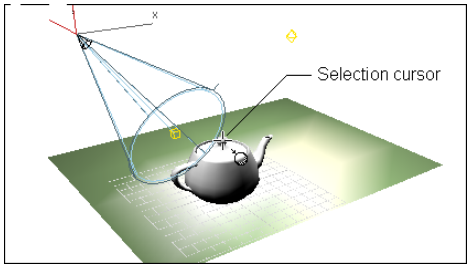


Figure 13-46 *The selection cursor displayed after invoking the* ***Place Highlight*** *tool*

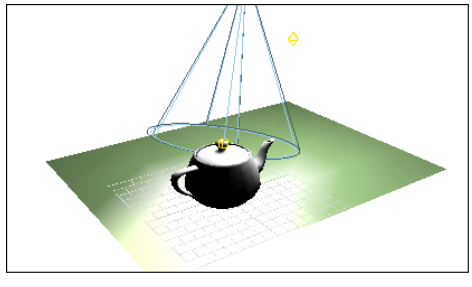


Figure 13-47 *The light aligned as per the selection of the face of the object*

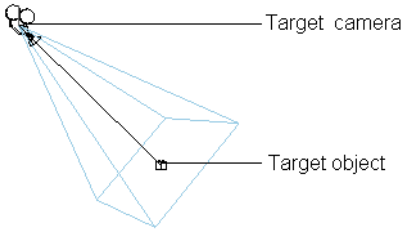


Figure 13-48 *The target camera*

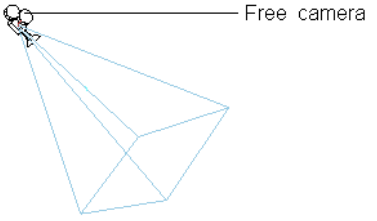


Figure 13-49 *The free camera*

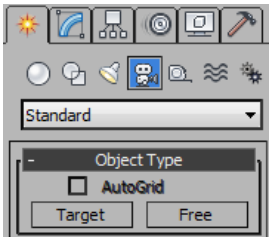


Figure 13-50 *The* ***Object Type*** *rollout with tools to create cameras*

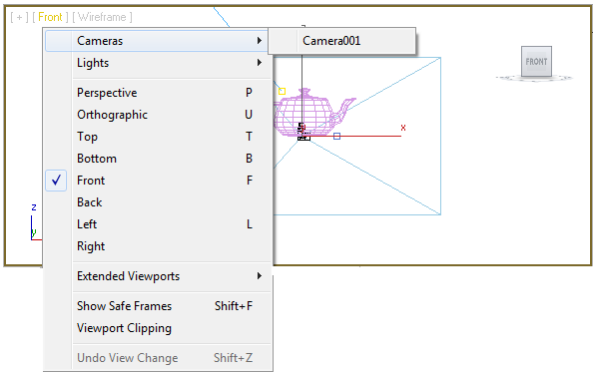


Figure 13-51 *The cascading menu displayed on choosing the* ***Cameras*** *option*

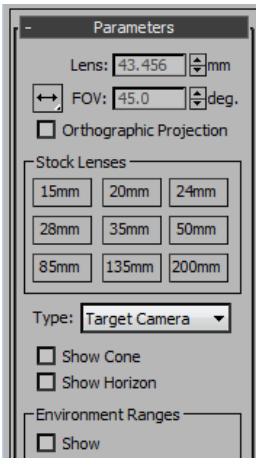


Figure 13-52 *Partial view of the* ***Parameters*** *rollout*

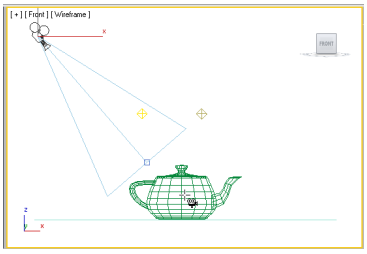


Figure 13-53 *The cursor displayed on the object to get the proper alignment*

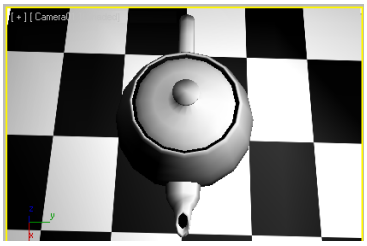


Figure 13-54 *The Camera viewport before alignment*

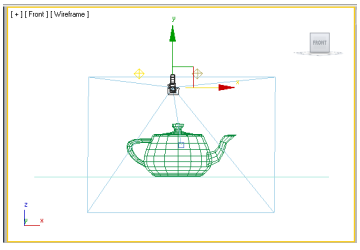


Figure 13-55 *The new position of the camera after using the* ***Align Camera*** *tool*

Figure 13-56 *The Camera viewport after using the* ***Align Camera*** *tool*

Figure 13-57 *The scene to be created*

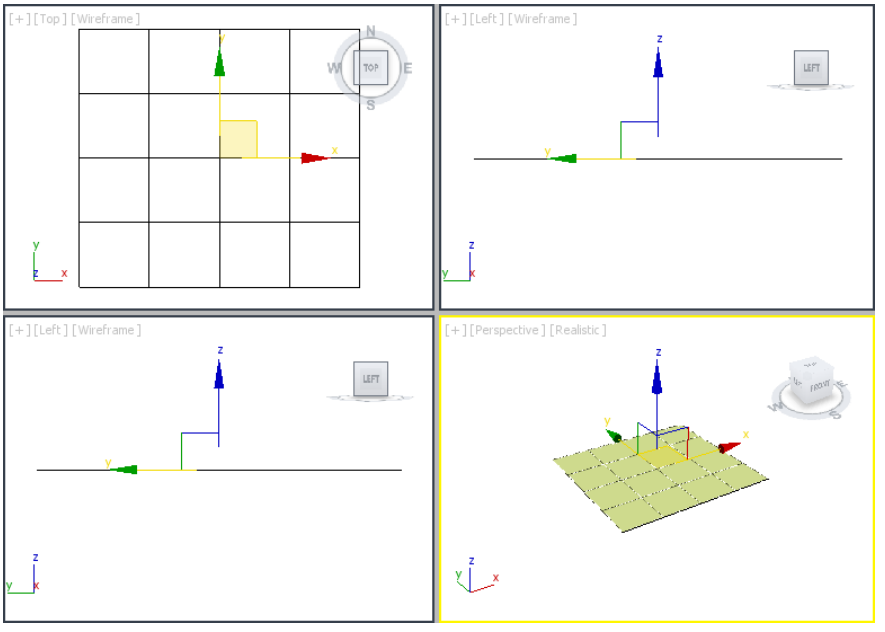


Figure 13-58 *A plane created for the water surface in viewports*

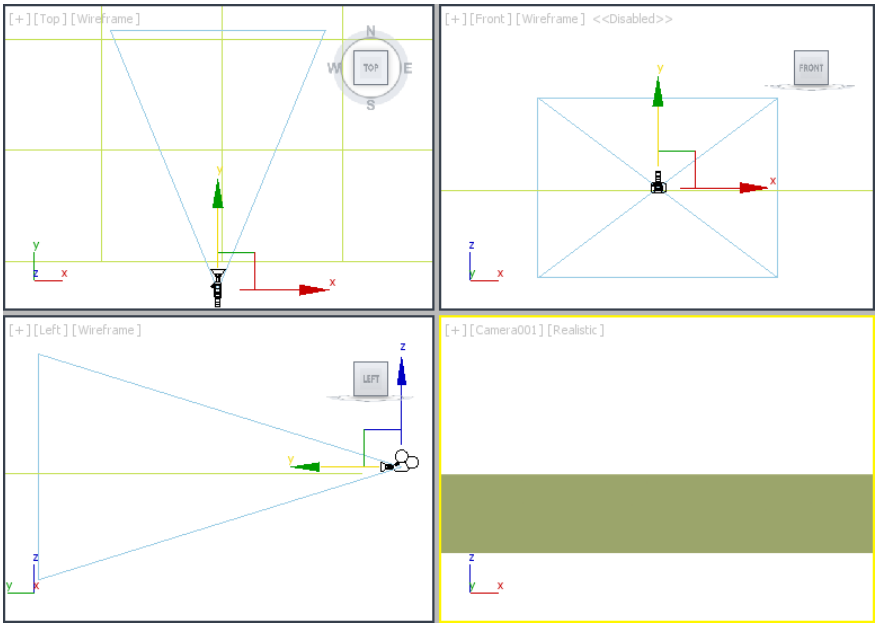


Figure 13-59 *Alignment of the Camera001 in viewports*

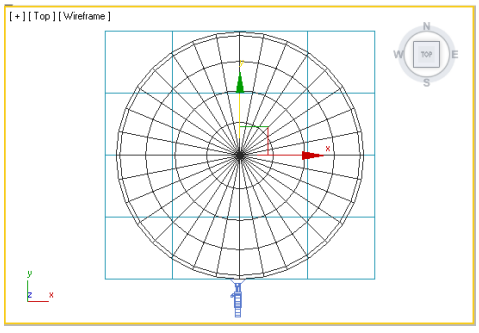


Figure 13-60 *The background after scaling*

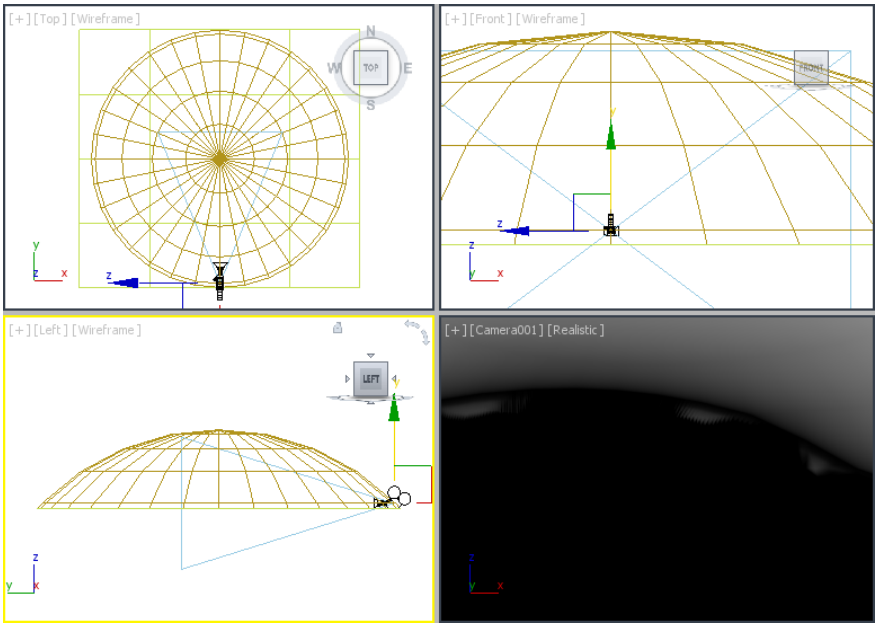


Figure 13-61 *Camera001 and background aligned in viewports*

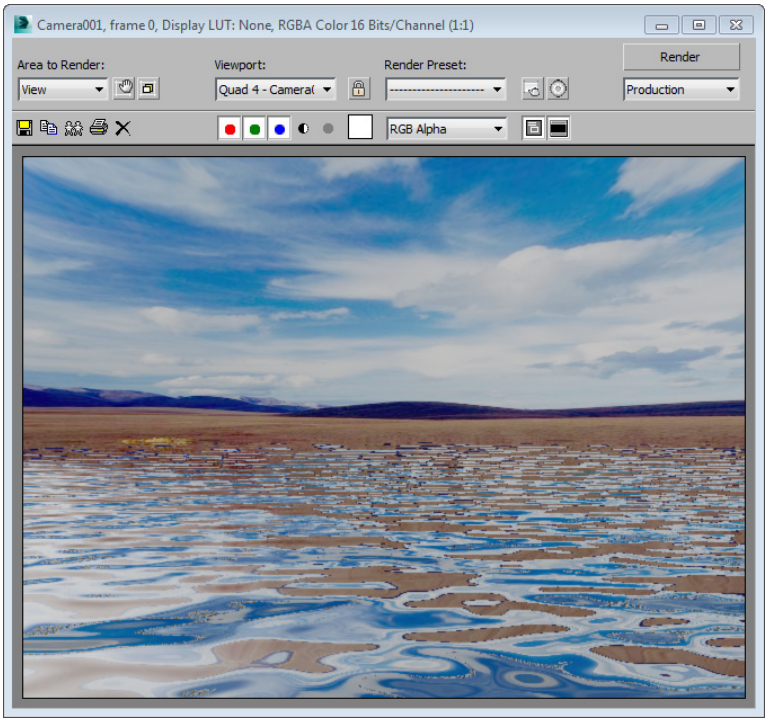


Figure 13-62 *The scene after rendering*

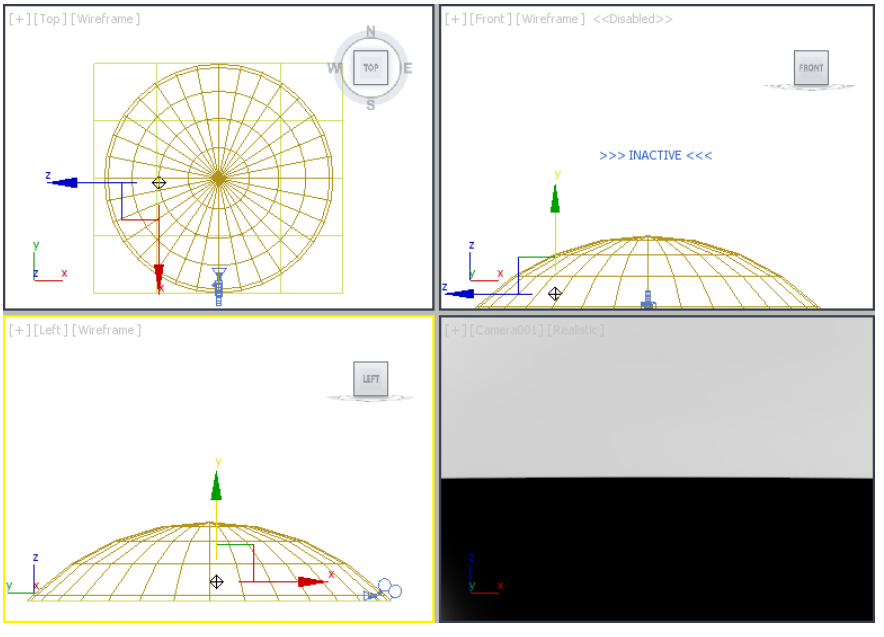


Figure 13-63 *Alignment of Omni001 in viewports*

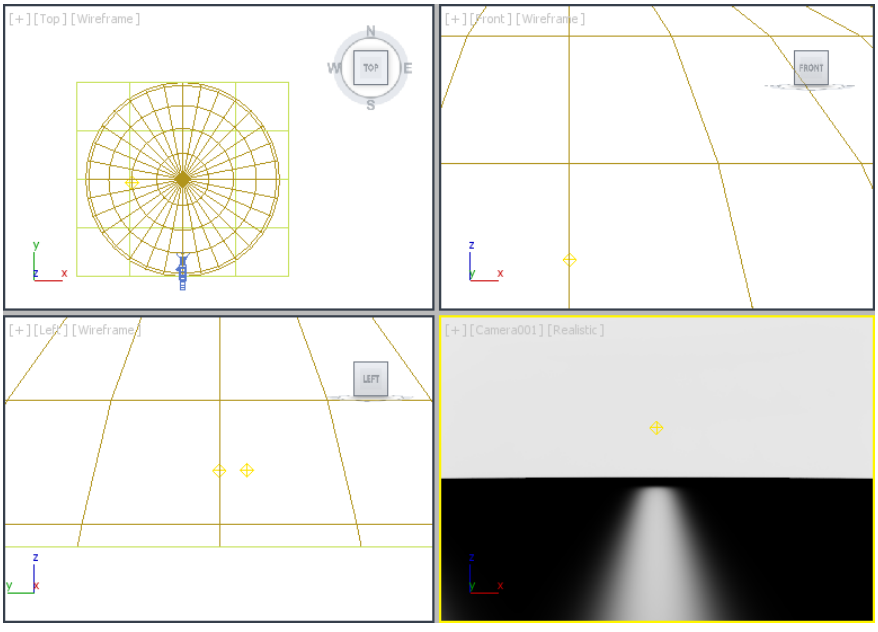


Figure 13-64 *Alignment of Omni002 in viewports*

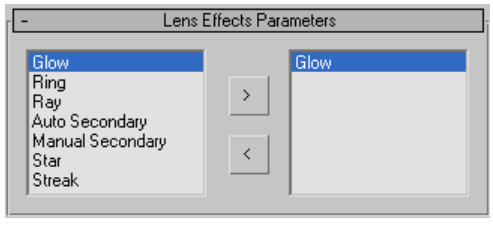


Figure 13-65 *The* ***Lens Effects Parameters*** *rollout*

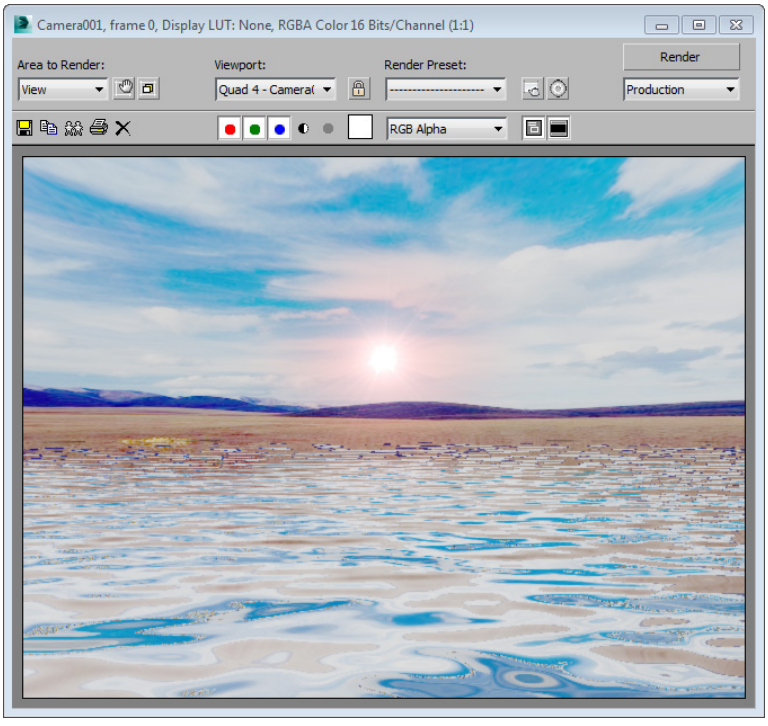


Figure 13-66 *The final output of the scene*

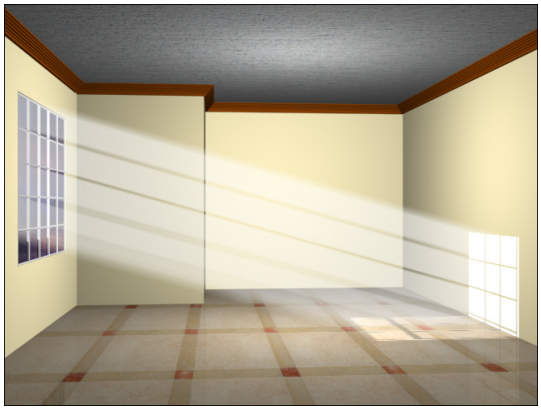


Figure 13-67 *The illuminated room*

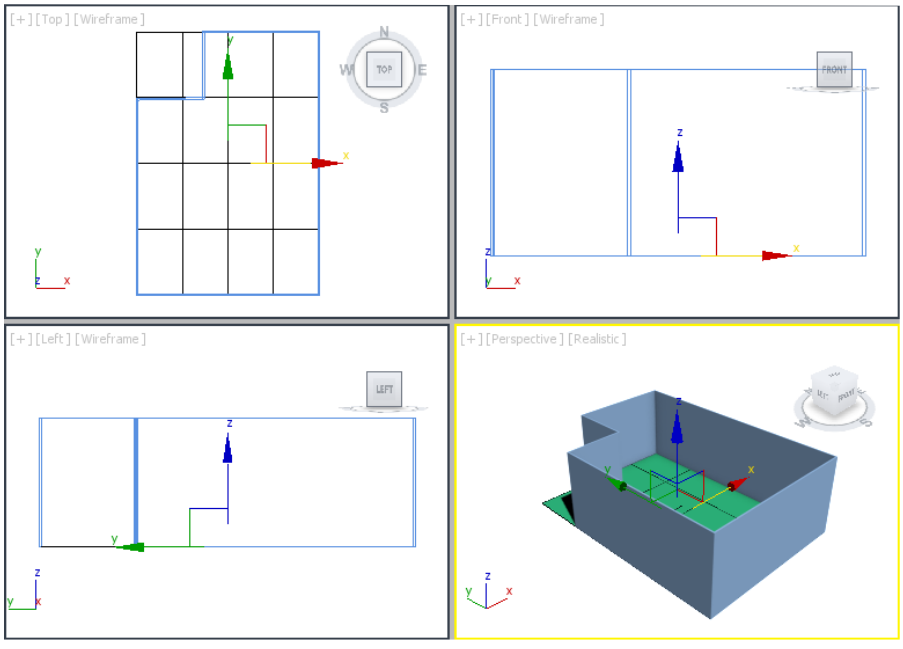


Figure 13-68 *The Wall001 geometry created in viewports*

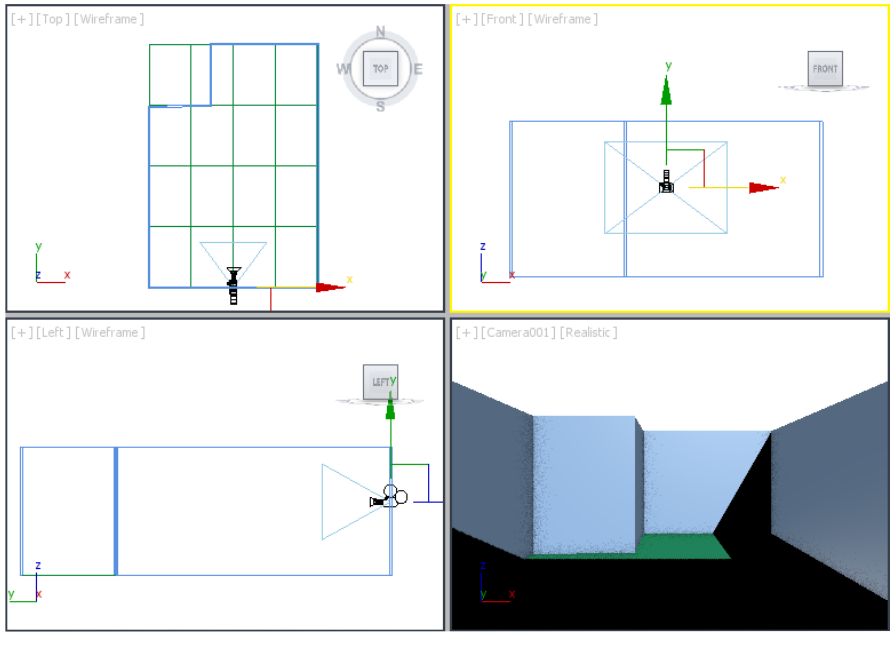


Figure 13-69 *Alignment of Camera001 in viewports*

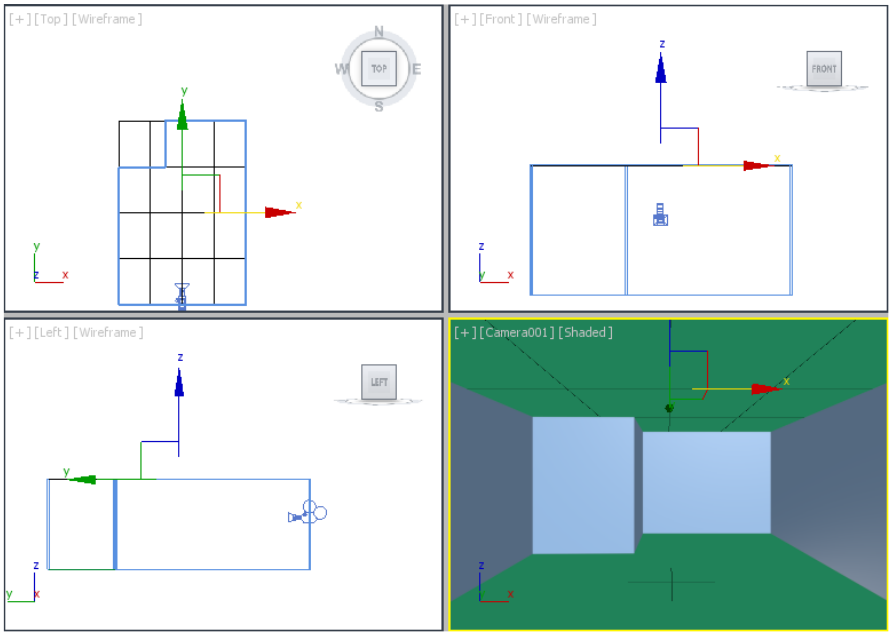


Figure 13-70 *The roof geometry aligned at the top of Wall001 in viewports*

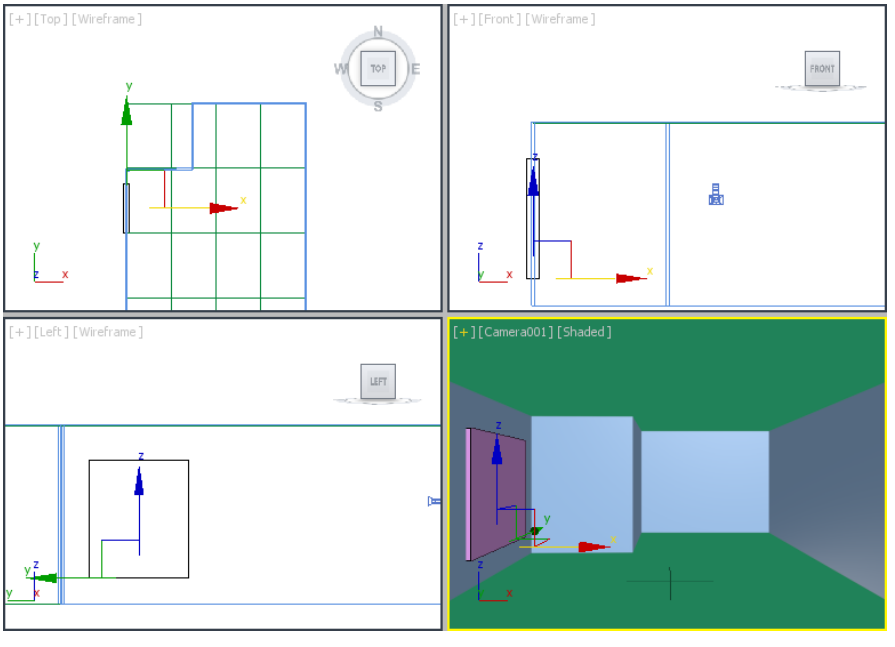


Figure 13-71 *Alignment of box with Wall001 in viewports*

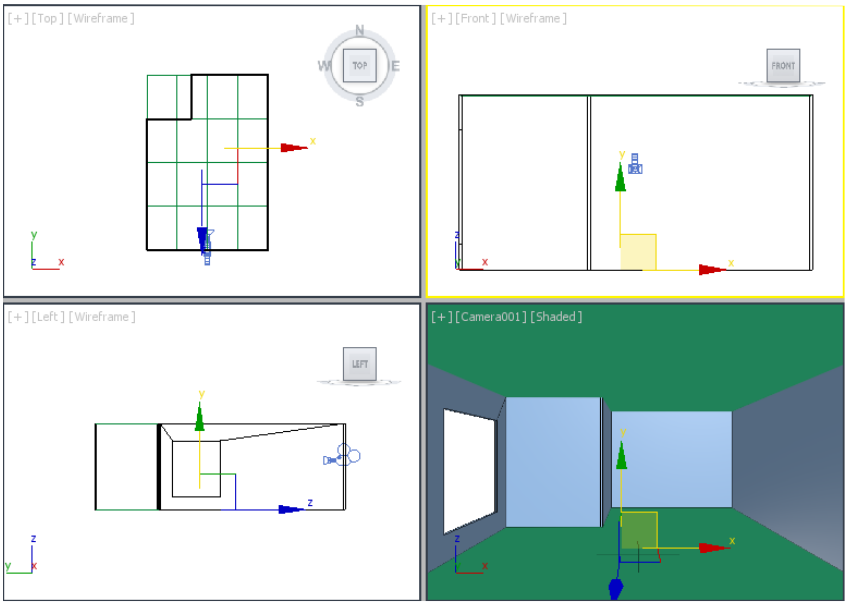


Figure 13-72 *A hole created in Wall001*

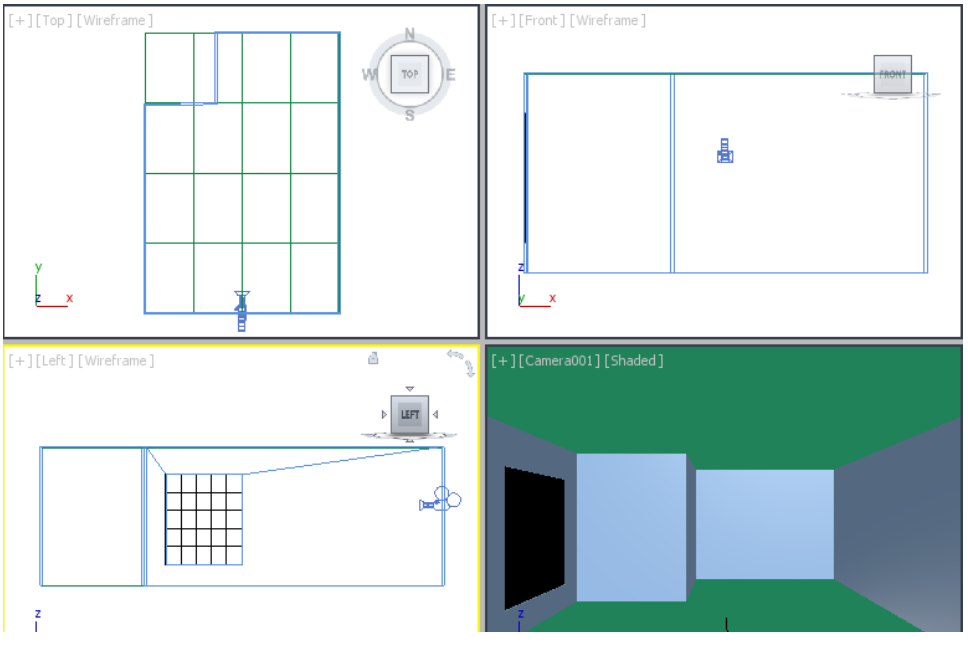


Figure 13-73 *Alignment of window in viewports*

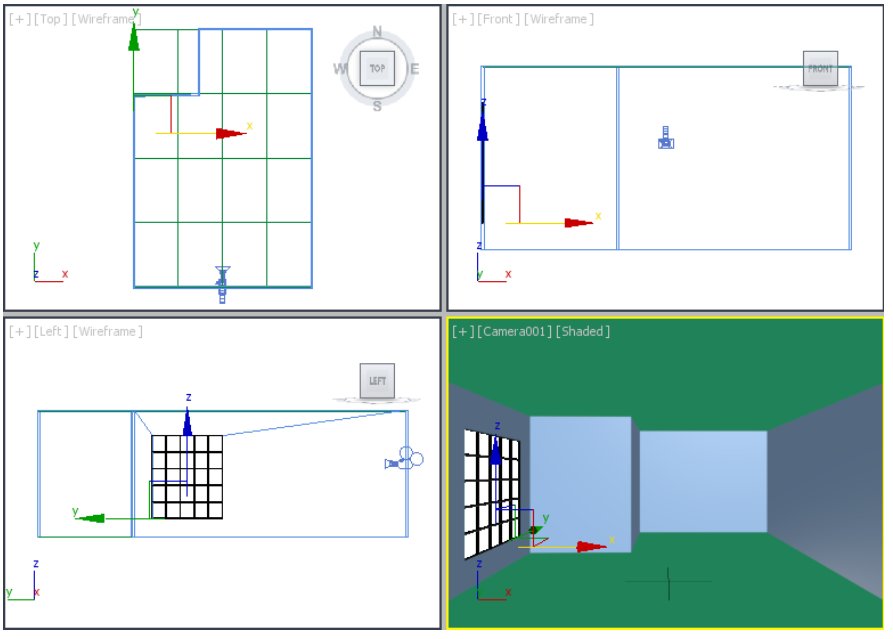


Figure 13-74 *The window geometry after applying the* ***Lattice*** *modifier*

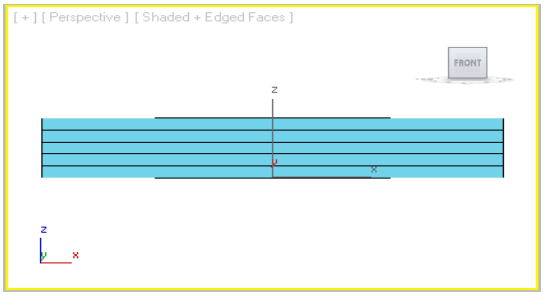


Figure 13-75 *The design01 geometry zoomed to its extent in the Perspective viewport*

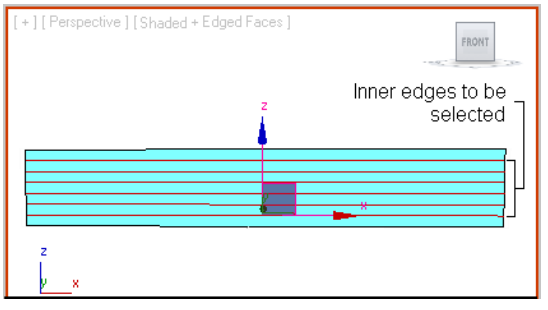


Figure 13-76 *The inner edges selected in design01*

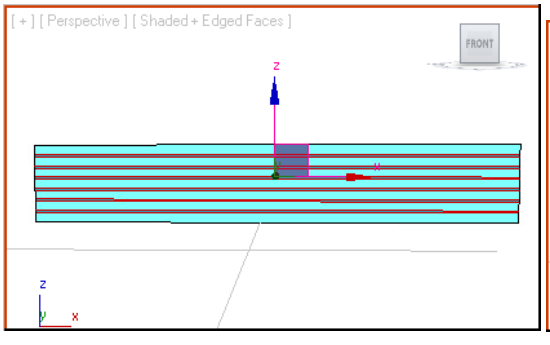


Figure 13-77 *The selected edges after chamfering*

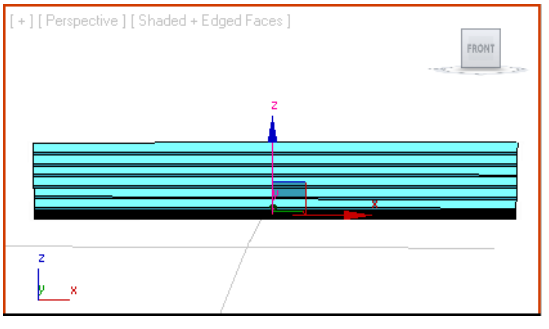


Figure 13-78 *The polygon selected to be extruded*

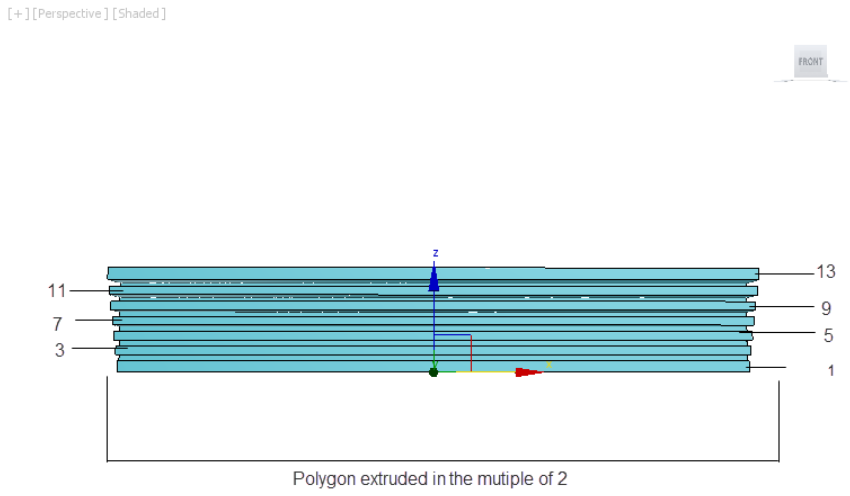


Figure 13-79 *The design01 displayed after extruding the alternate polygons*

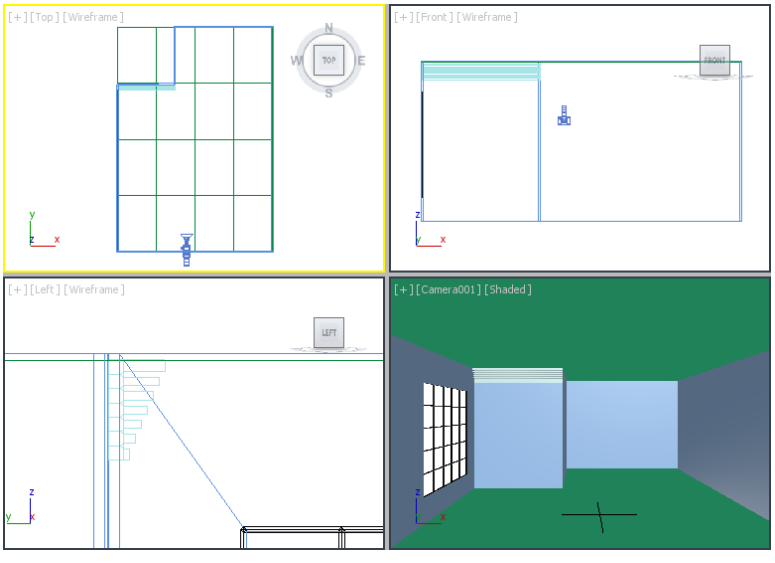


Figure 13-80 *Alignment of all designs in viewports*

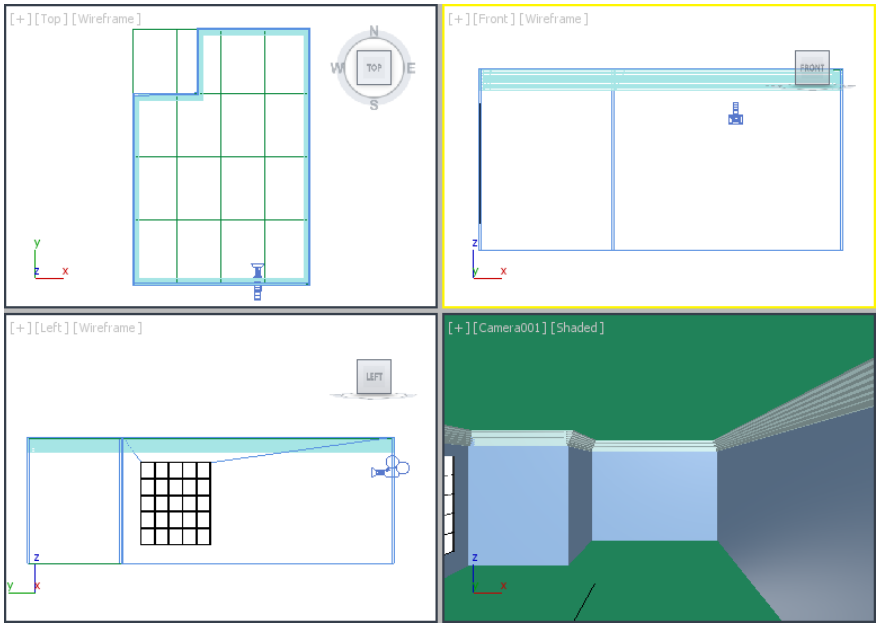


Figure 13-81 *Alignment of all designs at the joining point of the Wall001 and roof*

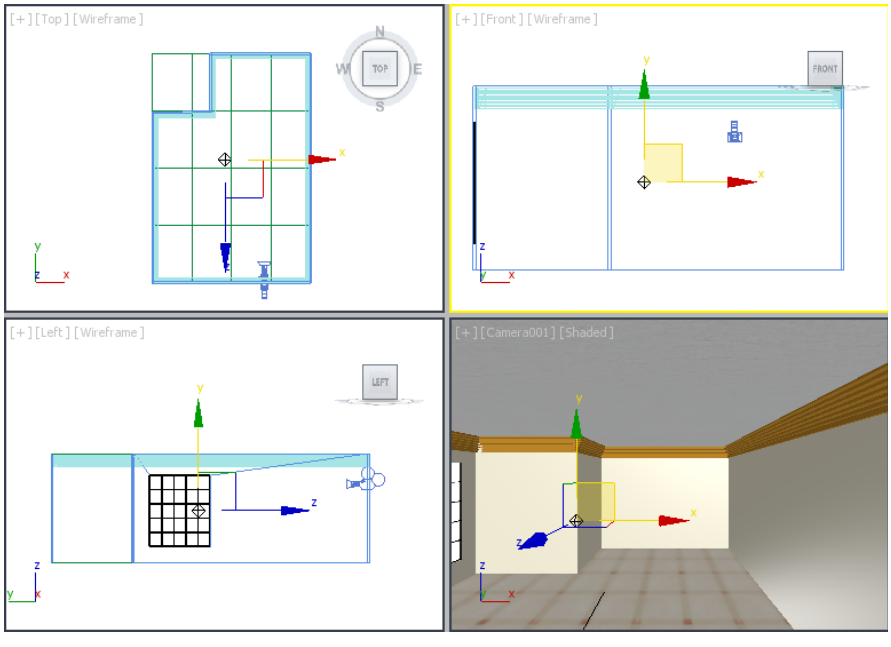


Figure 13-82 *The Omni001 light in viewports*

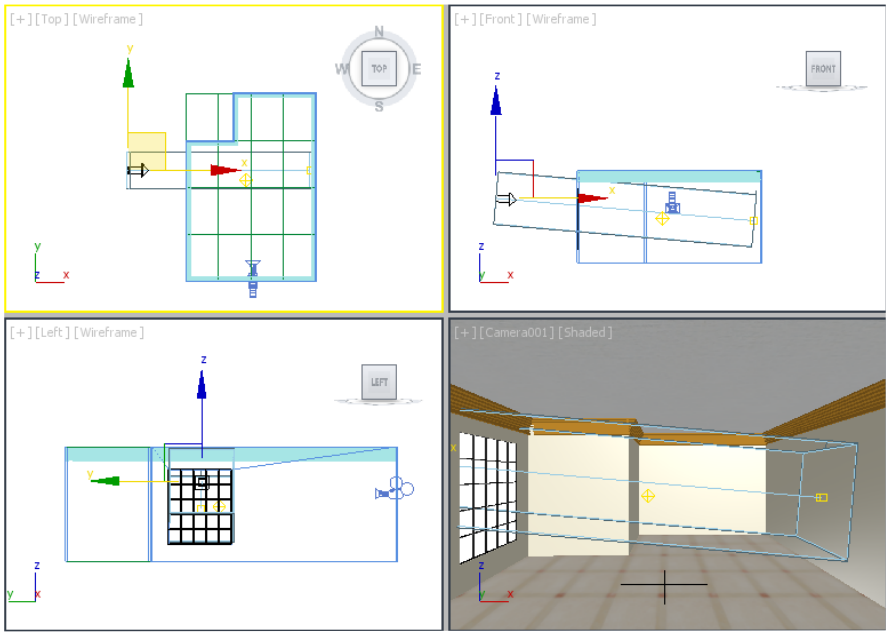


Figure 13-83 *Alignment of the Direct001 light in viewports*

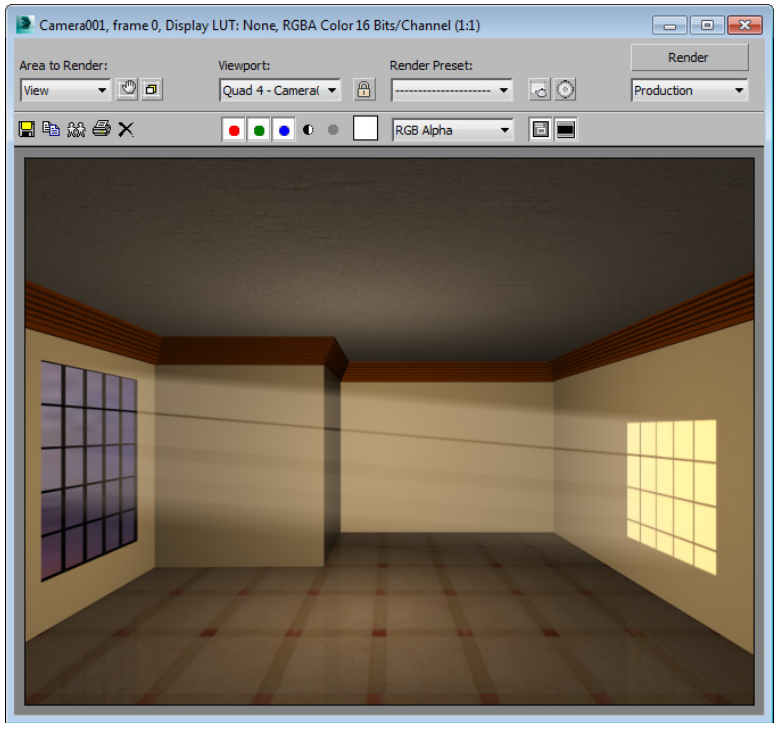


Figure 13-84 *The final output after rendering*

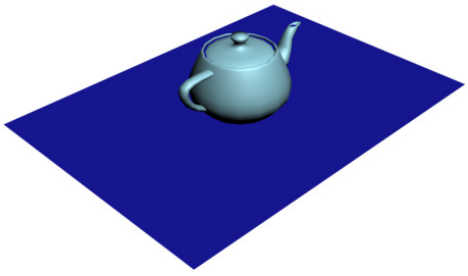


Figure 13-85 *The teapot model*

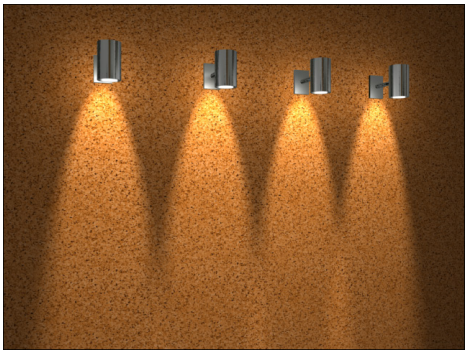


Figure 13-86 *The target spot lights illuminating the wall*

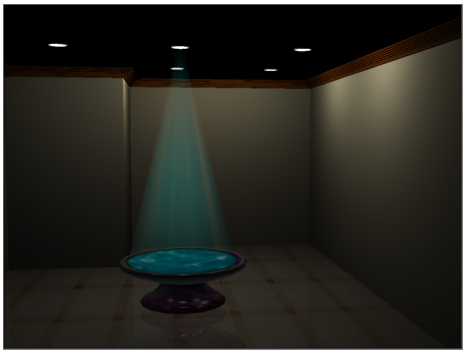


Figure 13-87 *Various lights illuminating the room*

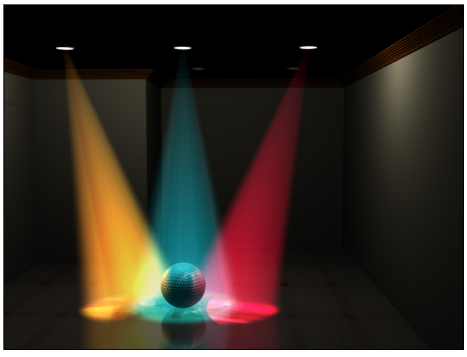


Figure 13-88 *The scene illuminated by the spot lights*

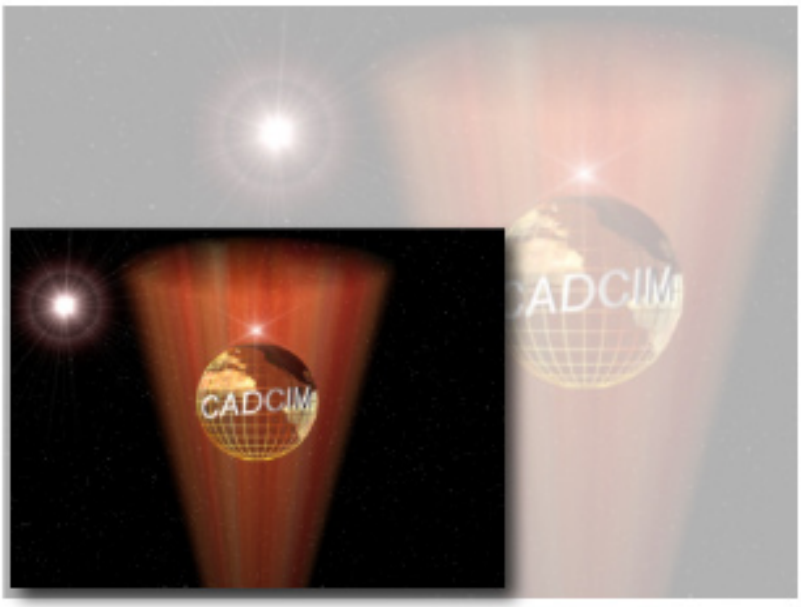
14

Animation Basics

Learning Objectives

After completing this chapter, you will be able to:

- *Work with the time slider*
- *Understand animation playback controls*
- *Understand animation and time controls*
- *Morph compound object*
- *Render and preview an animation*
- *Understand rendering effects*



INTRODUCTION

In 3ds Max, you can create different types of animation. You can create character animation and animation based on different types of motions that you see in real life. You can also create special lighting effects in your scene by animating lights and cameras.

The basic concept of computer animation is to define different positions, rotations, and scale of an object at different key points in a sequence in the time slider. These defined points are known as keyframes. The interpolation between the keyframes consists of the information of the actions performed between those keyframes. When you play the animation, the computer plays a series of frames quickly and the object seems to be moving. In 3ds Max, the standard frame rate is 30 frames per second. It means, if you want to create an animation for one minute, then you need to adjust about 1,800 frames. Therefore, before starting an animation, you need to calculate the frames according to the time limit.

TIME SLIDER AND ANIMATION PLAYBACK CONTROLS

3ds Max provides various options to animate the objects that you create in it. To do so, you need to be familiar with the animation playback controls and time slider. These controls enable you to play, pause, and stop an animation. They are available at the lower right corner of the 3ds Max interface and are discussed here briefly.

Time Slider

The time slider displays the current frame and the total number of frames in the current time segment, refer to Figure 14-1. You can view the animation at each frame by dragging the time slider.

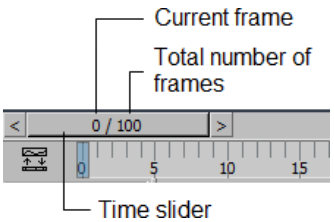


Figure 14-1 *The time slider*

Note

The time segment is the total range of frames that you can access using the time slider. By default, it ranges from 0 to 100. You can set the range using the ***Time Configuration*** *dialog box. You will learn about this dialog box in the later section.*

Animation Playback Controls

The animation playback controls are used to play and stop the animation in the active viewport. These controls are discussed next.

The **Play Animation** button is used to play or start the animation in the active viewport. When you click on the **Play Animation** button, it turns into a stop button.

The **Stop Animation** button is used to stop the animation. This button is displayed when you play the animation.

The **Go to Start** button is used to set the time slider at the first frame of the active time segment.

The **Go to End** button is used to set the time slider at the last frame of the active time segment.

The **Previous Frame** button is used to move the time slider one frame at a time in the reverse direction. You can view the current frame on the time slider when it moves from one frame to another.

The **Next Frame** button is used to move the time slider one frame at a time in the forward direction.

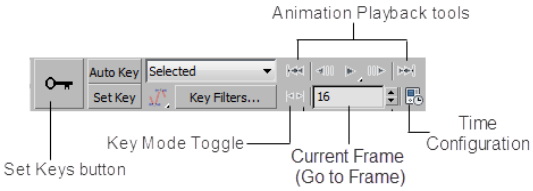


Figure 14-2 *The time control tools*

UNDERSTANDING ANIMATION AND TIME CONTROLS

In 3ds Max, different types of tools are available at the bottom of the screen to control animation and its time settings, refer to Figure 14-2. You have already learned about the time slider and the animation playback controls in the previous section. The other controls are discussed next.

Toggle Auto Key Mode

The **Toggle Auto Key Mode** button that is labeled as **Auto Key** is used to turn on the auto key animation mode. When you choose the **Toggle Auto Key Mode** button, it turns red. Also, the background of the time slider and the border of the active viewport turns red, indicating that you are in the animation mode. Now, if you make any changes in the object, the changes will be keyframed in the time slider.

To perform an animation using the **Toggle Auto Key Mode** button, first you need to make sure that the object that you want to animate is selected in the viewport. Choose the **Go to Start** button to set the time slider to the first frame. Next, choose the **Toggle Auto Key Mode** button to turn on the auto key animation mode; it will turn red. Now, drag the time slider to a frame other than 0 and animate the selected object by modifying its parameters or by transforming the object; a keyframe will be created on that frame and at frame 0 on the track bar below the time slider. Again, move the time slider to another frame and change the parameters. You can continue this process until you get all the keyframes in a sequential order for your animation. Next, choose the **Toggle Auto Key Mode** button again to turn it off. Choose the **Play Animation** button to view the animation of the selected object in the current viewport.

Toggle Set Key Mode

The **Toggle Set Key Mode** button that is labeled as **Set Key** is used to turn on the set key animation mode. In this mode, you need to set keys for the animation of the selected object by choosing the **Set Keys** button on the left side of the **Toggle Set Key Mode** button.

To perform an animation using the **Toggle Set Key Mode** button, select the object in the viewport that you want to animate. Choose the **Go to Start** button to set the time slider to the first frame. Next, choose the **Toggle Set Key Mode** button to turn on the set key animation mode; the button will turn red. Choose the **Set Keys** button; it will flash in red color and a keyframe will be set for the current position of the selected object. Now, drag the time slider to set a frame other than 0 and animate the selected object. Again, choose the **Set Keys** button; it will flash in red color and another keyframe will be set on the track bar for the changed position. You can continue this process until you get all the keyframes in a sequential order for your animation. Then, choose the **Toggle Set Key Mode** button to turn it off. Also, choose the **Play Animation** button to view the animation of the selected object in the current viewport.

Note

*If you transform an object when the **Toggle Set Key Mode** button is chosen, then the keyframe will be set only when you choose the **Set Keys** button.*

Current Frame (Go To Frame)

The value in this spinner shows the current frame number at which the time slider is positioned. While animating your scene, if you want to go to another frame, you can enter the frame number directly in the Current Frame (Go To Frame) spinner. As you drag the time slider, the value in the Current Frame (Go To Frame) spinner will change automatically according to its position.

Key Mode Toggle

By default, the **Key Mode Toggle** button is not activated. If activated, it allows you to jump between the keyframes directly. To understand the function of this button, you need to select the animated object in the viewport. Next, choose the **Key Mode Toggle** button; the **Previous Frame** and **Next Frame** buttons in the animation playback controls will be replaced with the **Previous Key** and **Next Key** buttons, refer to Figures 14-3 and 14-4. Choose the **Previous Key** or **Next Key** button to move the time slider from one keyframe to the other.

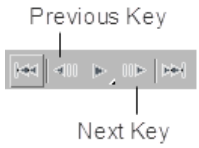


Figure 14-3 *Animation playback controls before choosing the **Key Mode Toggle** button*

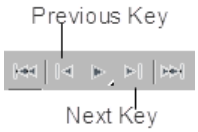


Figure 14-4 *Animation playback controls after choosing the **Key Mode Toggle** button*

Time Configuration

The **Time Configuration** button is used to set the length of an animation by defining the number of frames in the track bar. It is also used to set the frame rate, time display, and so on. To set these parameters, choose the **Time Configuration** button; the **Time Configuration** dialog box will be displayed, as shown in Figure 14-5. You need to use the options in this dialog box to set the animation length, frame rate, and time display. The options in this dialog box are discussed next.

Frame Rate Area

There are four radio buttons in this area, namely **NTSC**, **Film**, **PAL**, and **Custom**. These radio buttons are used to define a particular frame rate for the animation in frames per second. By default, the **NTSC** radio button is selected. On selecting the **Custom** radio button, the **FPS** spinner is activated wherein you can specify the frame rate in seconds for the animation.

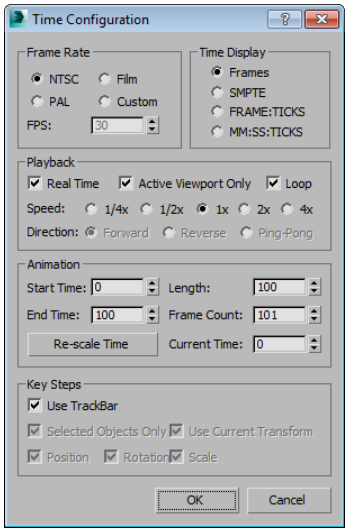


Figure 14-5 *The* ***Time Configuration*** *dialog box*

Time Display Area

The radio buttons in this area are used to define the method of time displayed in the time slider. The radio buttons in this area are **Frames**, **SMPTE**, **FRAME: TICKS**, and **MM:SS: TICKS**. By default, the **Frames** radio button is selected.

Playback Area

This area is used to specify the playback speed and the viewport that will be playing the animation. By default, the **Real Time** check box in this area is selected. As a result, animation is played at the selected playback speed and it skips the frames so that the animation synchronizes with the current frame rate settings. You can select one of the radio buttons such as **1/4x**, **1/2x**, and so on in the **Speed** group to define the speed of the animation. If you clear the **Real Time** check box, then the **Speed** group will be deactivated and the **Direction** group will be activated. The radio buttons in the **Direction** group are used to define the direction of the animation. The direction of the animation can be forward, reverse, or ping-pong. The ping-pong direction means that first the animation will be played in the forward direction and then in the reverse direction. The **Active Viewport Only** check box is selected by default and is used to play the animation only in the active viewport. If you clear this check box, then the animation will be played in all viewports, simultaneously. The **Loop** check box is also selected by default and is used to play the animation repeatedly.

Animation Area

The options in this area are used to set the length of animation. The default values in the spinners of this area specify the number of frames for the animation. The **Start Time** and **End Time** spinners are used to specify the current time segment in the time slider. The current time segment is the total range of frames that you can access using the time slider. The **Length** spinner is used to specify the total number of frames in the current time segment or the length of the animation. The **Frame Count** spinner is used to specify the number of frames that will be rendered. The **Current Time** spinner is used to specify the current frame number at which the time slider is positioned. If you choose the **Re-scale Time** button, the **Re-scale Time** dialog box will be displayed. You can specify the options in this dialog box to change the existing time segment to a new time segment.

Track Bar

The track bar lies between the time slider and the status bar. It shows a timeline with the frame numbers in it, as shown in Figure 14-6.

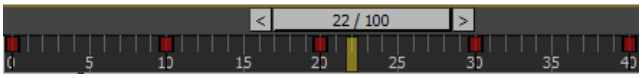


Figure 14-6 Partial view of the track bar

Track View

Menu bar:	Graph Editors > Track View - Curve Editor
	Graph Editors > Track View - Dope Sheet
Main Toolbar:	Curve Editor (Open)

The track view is used to control the animation keys in the animation created by you. You can also insert sound in the scene and create notes of it. The track view uses two different modes, **Curve Editor** and **Dope Sheet**. In the **Curve Editor** mode, the animation is displayed as the function curve on a graph, as shown in Figure 14-7. In the **Dope Sheet** mode, the animation is displayed as a spreadsheet of keys, as shown in Figure 14-8.

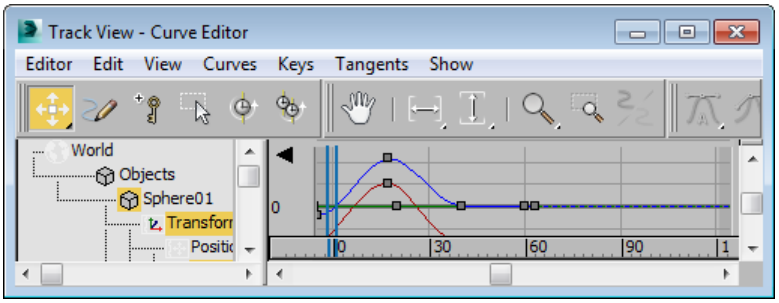


*Figure 14-7 The **Track View - Curve Editor** window*

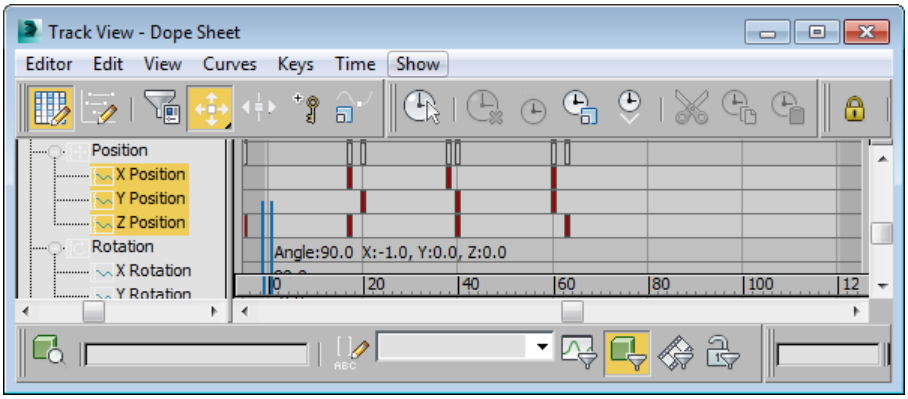


*Figure 14-8 The **Track View - Dope Sheet** window*

To edit the animation of an object using **Curve Editor**, select the animated object and invoke the **Curve Editor (Open)** tool from the **Main Toolbar**; the **Track View - Curve Editor** window will be displayed, refer to Figure 14-7. The pull-down menus on the top of this window are used to choose different options to edit the animation. The hierarchy on the left side of this window is used to display all objects of the scene. To view the sub-options in this tree, you need to click on the plus sign (+). The edit window on the right of the hierarchy tree is used

to edit the animation of the objects using the tangent handles available on the keys found on the curves.

Tip: *You can also invoke* ***Track View - Curve Editor*** *in place of the track bar. To do so, choose the* ***Open Mini Curve Editor*** *button on the left side of the track bar.*

To edit the animation of an object using **Dope Sheet**, select the animated object and choose **Graph Editors > Track View - Dope Sheet** from the menu bar; the **Track View - Dope Sheet** window will be displayed, refer to Figure 14-8.

In this window, you can view all the keys in a spreadsheet format. You need to select the keys and edit them according to the animation.

MORPH COMPOUND OBJECT

Menu bar:	Create > Compound > Morph
Main Toolbar:	Create > Geometry > Compound Objects > Object Type rollout > Morph

The **Morph** tool is used to create morphing in the objects. The morphing is an animation technique in which the morph object combines two or more objects by matching their vertices in a sequential form to produce the animation result. The original object is known as the base object and the other object into which the base object gets morphed is known as the target object. Note that to perform morphing, the base and target objects must be mesh, patch, or poly objects and they should have the same number of vertices.

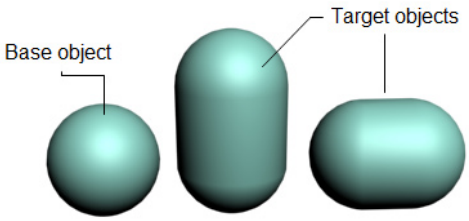


Figure 14-9 *The base and target objects for morphing*

To create a morph object, first create an object and convert it into an editable object. This object will be the base object. Next, create two copies of the object and modify their shapes by selecting the **Vertex** sub-object level, as shown in Figure 14-9. You can also give the shape of your choice to the objects. These objects will be the target objects. Now, choose the **Toggle Auto Key Mode** button to turn it on and choose the **Go to Start** button to move the time slider to frame 0. Select the base object and choose **Create > Compound > Morph** from the menu bar; the **Pick Targets** and **Current Targets** rollouts will be displayed in the modify panel. Next, set the value **35** in the Current Frame (Go To Frame) spinner to move the time slider to frame 35. In the **Pick Targets** rollout, choose the **Pick Target** button and move the cursor over the first target object; a selection cursor will be displayed. Select the first target object in the viewport. Similarly, set the value **70** in the Current Frame (Go To Frame) spinner to move the time slider to frame 70 and select the second target object. When you select the target objects in the viewport, the names of the base and target objects will be displayed in the **Morph Targets** area of the **Current Targets** rollout. Choose the **Toggle Auto Key Mode** button again to turn it off. Choose the **Play Animation** button to view the animation.

RENDERING AN ANIMATION

Menu bar:	Rendering > Render Setup
Main Toolbar:	Render Setup
Keyboard:	F10

Rendering is a process of generating a 2-dimensional image from a 3-dimensional scene. It shows the lighting effects, materials applied, background, and other settings that you set for the scene. In earlier chapters, you have already learned about the basic rendering for the still images. The advanced rendering used for the animated scene is discussed next.

To render the final animation, invoke the **Render Setup** tool; the **Render Setup: Default Scanline Renderer** dialog box will be displayed, as shown in Figure 14-10. The **Common** tab is chosen by default in this dialog box. Set the parameters in different rollouts displayed in the **Common** tab.Also, in the **View** drop-down list located at the bottom of this dialog box, select the viewport that you want to render. Next, choose the **Render** button; the **Perspective, frame 0, Display Gamma:2.2, RGBA Color 16 Bits/Channel (1:1)** dialog box and the **Rendering** dialog box will be invoked, displaying the rendering process, refer to Figure 14-11. Various rollouts in the **Render Setup: Default Scanline Renderer** dialog box are discussed next.

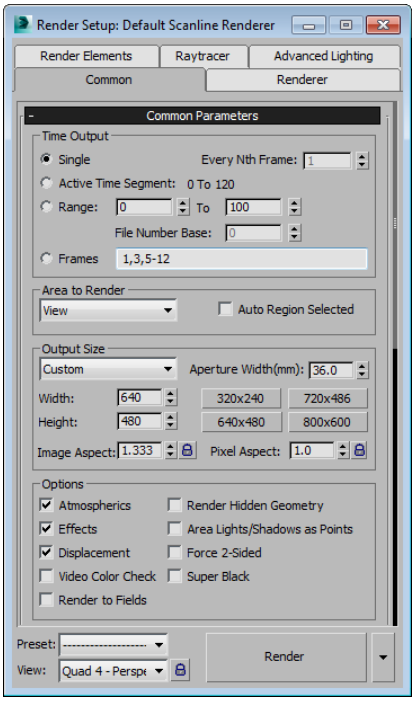


Figure 14-10 The ***Render Setup: Default Scanline Renderer*** *dialog box*

Common Parameters Rollout

There are different types of renderers to render the scene in 3ds Max such as **NVIDIA mental ray** renderer, **VUE File Renderer**, and so on. The options in this rollout are used to set the common parameters for all types of renderers. The commonly used areas in this rollout are discussed next.

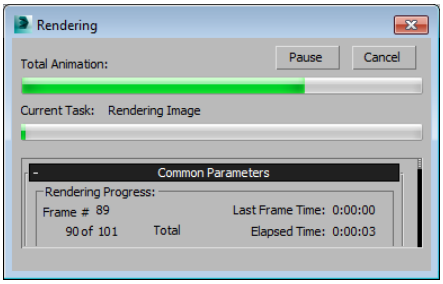


Figure 14-11 The ***Rendering*** *dialog box*

Time Output Area

This area is used to set the number of frames that you want to render. By default, the **Single** radio button is selected that enables you to render only a single frame. To render the animation, you need to select the **Active Time Segment** radio button. This radio button renders all the frames in the current time segment. Select the **Range** radio button to specify a range of frames for rendering by entering the start and end frame numbers in the spinners given on the right of this radio button. The **Frames** radio button allows you to render the frame numbers of your choice. To do so, select this radio button and enter the required frame number in the text box given on the right of this radio button.

Output Size Area

The options in this area are used to define the size of the rendered image. The drop-down list in this area is used to specify industry-standard film and video aspect ratios. You can choose one of the formats and then use the remaining group controls to set the output resolution. You can also set the aspect ratio and resolution of your choice by using the **Custom** option. Choose one of the default buttons, **320x240**, **640x480**, **720x486**, or **800x600** to define the size of the output window. When you choose any of these buttons, the corresponding values will be displayed in the **Width** and **Height** spinners. You can also set the values manually in the **Width** and **Height** spinners to define the size.

Options Area

The check boxes in this area are used to filter the options to render for the final output such as atmosphere, lighting effects, and so on.

Advanced Lighting Area

The check boxes in this area are used to select options for using advanced lighting or computing it on a per-frame basis when required.

Bitmap Performance and Memory Options Area

This area is used to decide whether 3ds Max will use the full resolutions maps or the proxies of the maps at rendering. To assign the settings, you need to choose the **Setup** button in this area; the **Global Settings and Defaults for Bitmap Proxies** dialog box will be displayed. You can set the required parameters in this dialog box.

Render Output Area

This area is used to specify a file where the rendered animation can be saved. To do so, choose the **Files** button; the **Render Output File** dialog box will be displayed. Enter the name of the file in the **File name** text box and then select the type of file from the **Save as type** drop-down list. Next, choose the **Save** button. If you have selected **AVI File (*.avi)** file type, the **AVI File Compression Setup** dialog box will be displayed. Use the default settings and choose the **OK** button; the **Save File** check box will get selected and the path of the file will be displayed just below the **Files** button in the **Render Output** area.

Assign Renderer Rollout

This rollout is used to set renderer for the scene. The **Production** option is used to assign a renderer for the graphics. The **Material Editor** option is used to assign a renderer for the sample slots in the **Material Editor** dialog box. The **ActiveShade** option is used to assign a renderer for the lighting effects in the scene, refer to Figure 14-12.

To assign the renderer, choose the **Choose Renderer** button on the right of the options given in this rollout; the **Choose Renderer** dialog box will be displayed, as shown in Figure 14-13. Select the renderer and choose the **OK** button; the name of the selected renderer will be displayed in the text box on the right of the selected option. Choose the **Save as Defaults** button in the **Assign Renderer** rollout to save the settings as default for further use.

Note

*If you install any additional renderer plug-ins in 3ds Max, the renderer types will be added in the **Choose Renderer** list.*

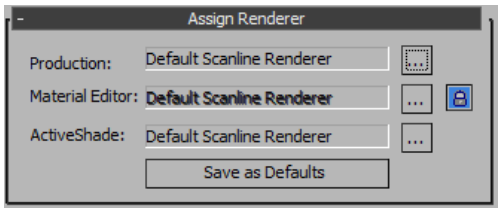


Figure 14-12 *The **Assign Renderer** rollout*

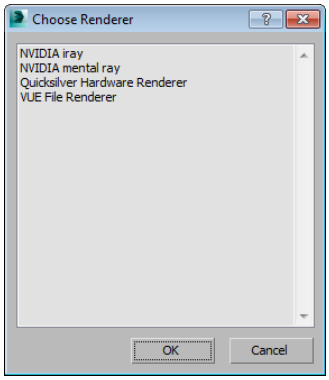


Figure 14-13 *The **Choose Renderer** dialog box*

PREVIEWING THE ANIMATION

If a scene has a large number of objects, lights, and special effects, it may take a longer time to render the final animation. In 3ds Max, you can preview the animation in low resolution so that you can check the animation. Note that in the preview rendering, only the diffuse color maps are displayed. Therefore, it takes lesser time to render. You can have a look at your animation before the final rendering.

To create a preview animation, choose **Tools > Preview - Grab Viewport > Create Preview Animation** from the menu bar; the **Make Preview** dialog box will be displayed, as shown in Figure 14-14. Alternatively, choose **Create Preview > Create Preview Animation** from the General viewport label menu to invoke the **Make Preview** dialog box, refer to Figure 14-15. Set the parameters for different options in this dialog box and select the viewport that you want to render from the **Render Viewport** drop-down list which is located at the bottom of the dialog box. Next, choose the **Create** button; the **Video Compression** dialog box will be displayed. Use the default settings and choose the **OK** button; the rendering of the preview will start. Once the preview has been created, it will automatically start in the Windows Media Player.

To view the last preview animation, choose **Tools > Preview - Grab Viewport > Play Preview Animation** from the menu bar; the animation will start playing in the Windows Media Player. Alternatively, choose **Create Preview > Play Preview Animation** from the General viewport label menu, refer to Figure 14-15.

RENDERING EFFECTS

The Rendering effects are the special effects assigned to a scene. These effects are visible only on rendering. To assign a rendering effect to a scene, choose **Rendering > Effects** from the menu bar; the **Environment and Effects** dialog box will be displayed, as shown in Figure 14-16. The **Effects** tab is chosen by default. In the **Effects** rollout of this tab, choose the **Add** button;

the **Add Effect** dialog box will be displayed, as shown in Figure 14-17. Select the rendering effect from the list given in this dialog box and choose the **OK** button; the selected rendering effect will be displayed in the **Effects** text area of the **Effects** rollout. Also, the rollouts related to the selected effect will be displayed in the **Environment and Effects** dialog box. Next, set the parameters for the selected rendering effect in these rollouts and close the dialog box. Now, render the final scene; the rendering effects will be displayed in the final rendered image.

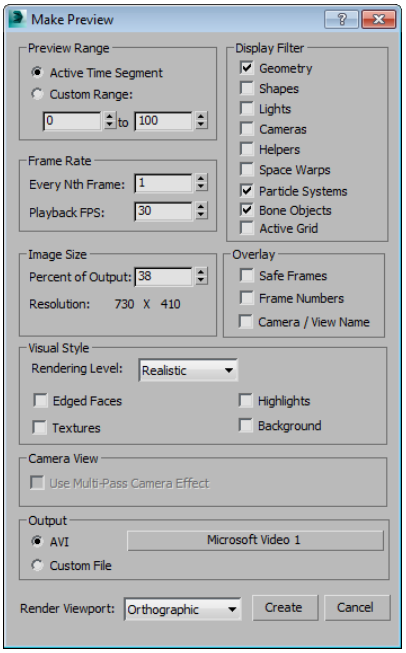


Figure 14-14 The ***Make Preview*** *dialog box*

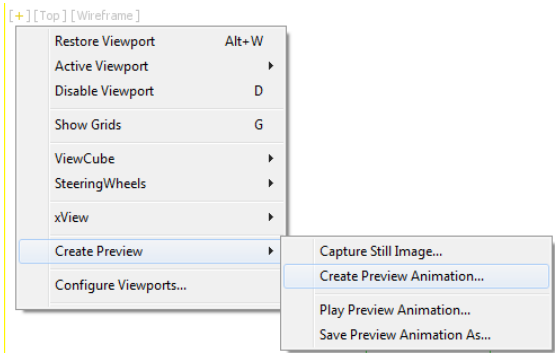


Figure 14-15 *The flyout and the cascading menu of the General viewport label*

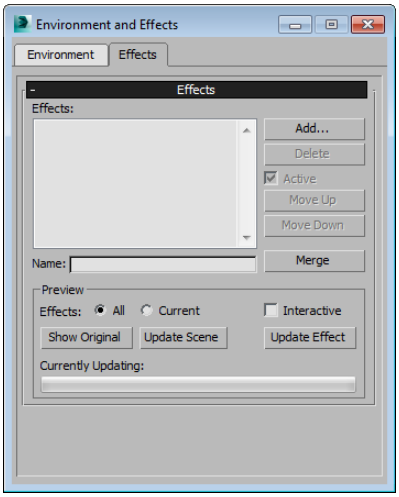


Figure 14-16 *The* ***Environment and Effects*** *dialog box*

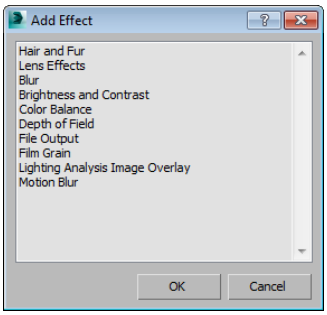


Figure 14-17 *The* ***Add Effect*** *dialog box*

TUTORIALS

Tutorial 1

In this tutorial, you will create a walkthrough animation in a water tunnel, refer to Figures 14-18 and 14-19. **(Expected time: 60 min)**

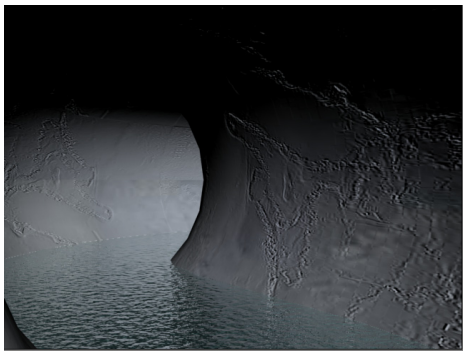


Figure 14-18 *Animated scene for cave at frame 600*

Figure 14-19 *Animated scene for cave at frame 920*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Download files.
c. Create a cave.
d. Create a camera.
e. Create water surface.
f. Create and assign materials to water surface.
g. Create walkthrough animation.
h. Rescale the active time segment.
i. Create animation in water.
j. Assign environment to the scene.
k. Save and render the scene.

Creating the Project Folder

Create a new project folder with the name *c14_tut1* at *\Documents\3dsmax2014* and then save the file with the name *c14tut1*, as discussed in Tutorial 1 of Chapter 2.

Downloading Files

Before starting the tutorial, you need to download the *c14_3dsmax_2014_tut.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2014: A Comprehensive Guide*

Extract the contents of the zipped file and copy the files *cave_material.jpg* and *ice_environment.jpg* at the location *\Documents\3dsmax2014\c14_tut1\sceneassets\images*.

Creating a Cave

To create a cave, you need to use various splines and the **Loft** tool from **Compound Objects**.

1. Activate the Front viewport. Choose **Create > Shapes** in the **Command Panel**; the **Splines** option is displayed by default in the drop-down list below the **Shapes** button. Invoke the **Donut** tool from the **Object Type** rollout.

2. Create a donut in the Front viewport. It is automatically named as *Donut001*. Now, set its parameters in the **Parameters** rollout as follows:

   Radius 1: **720.539** Radius 2: **848.293**

3. In the **Interpolation** rollout, set the value **20** in the **Steps** spinner.

4. Invoke the **Zoom Extents All** tool to view *Donut001* in viewports properly.

5. Activate the Top viewport. Invoke the **Zoom** tool and zoom out the viewport so that *Donut001* is visible only half of its original size.

6. Invoke the **Line** tool from **Create > Shapes > Splines > Object Type** rollout from the **Command Panel**. In the **Creation Method** rollout, select the **Smooth** and **Corner** radio buttons in the **Initial Type** and **Drag Type** areas, respectively.

7. Create a line in the Top viewport, as shown in Figure 14-20. It is automatically named as *Line001*.

   Next, you need to create a loft compound object.

8. Make sure *Line001* is selected in the Top viewport. Choose **Create > Geometry** in the **Command Panel**; the **Standard Primitives** option is displayed by default in the drop-down list below the **Geometry** button. Select the **Compound Objects** option from the drop-down list and invoke the **Loft** tool from the **Object Type** rollout.

9. In the **Creation Method** rollout of the **Loft** tool, choose the **Get Shape** button and move the cursor over *Donut001* in the Front viewport; the shape of the cursor changes, as shown in Figure 14-21. Click on *Donut001*; the shape of a cave is created in viewports. Right-click to exit the loft command. Invoke the **Zoom Extents All** tool to view the entire shape in the viewports, as shown in Figure 14-22.

Note

*If the shape displayed after performing the loft command is not similar to the cave, you need to modify the placement of vertices of Line001 spline at the **Vertex** sub-object level.*

10. The lofted object is automatically named as *Loft001*. Modify its name to *water tunnel*.

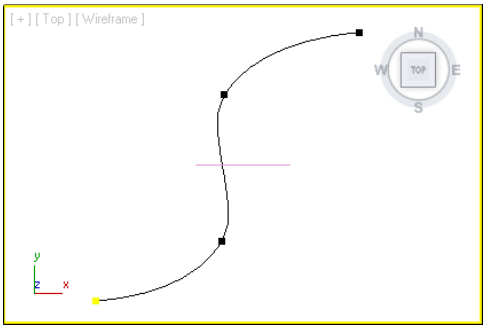


Figure 14-20 *A line created for the cave*

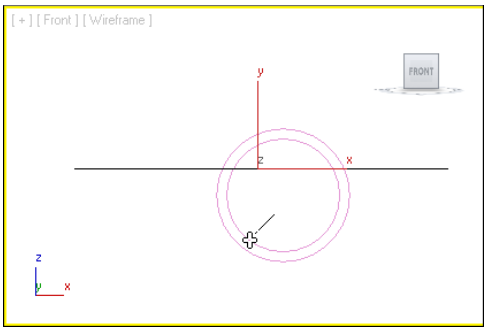


Figure 14-21 *The cursor displayed after moving it over Donut001*

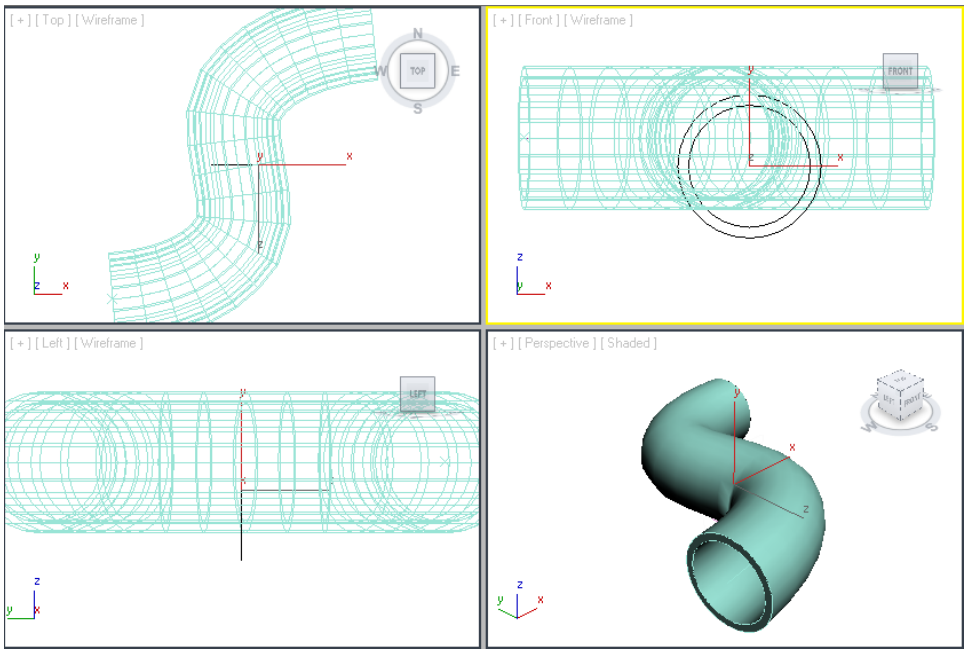


Figure 14-22 *The shape of the cave created in viewports using the* ***Loft*** *tool*

Creating a Camera

In this section, you will create a walkthrough animation inside *water tunnel by* using the **Target** camera tool.

1. Activate the Front viewport. Choose **Create > Cameras** in the **Command Panel** and then invoke the **Target** tool from the **Object Type** rollout.

2. In the Front viewport, create a target camera and align it in all viewports using the **Select and Move** and **Select and Rotate** tools, as shown in Figure 14-23. It is automatically named as *Camera001*.

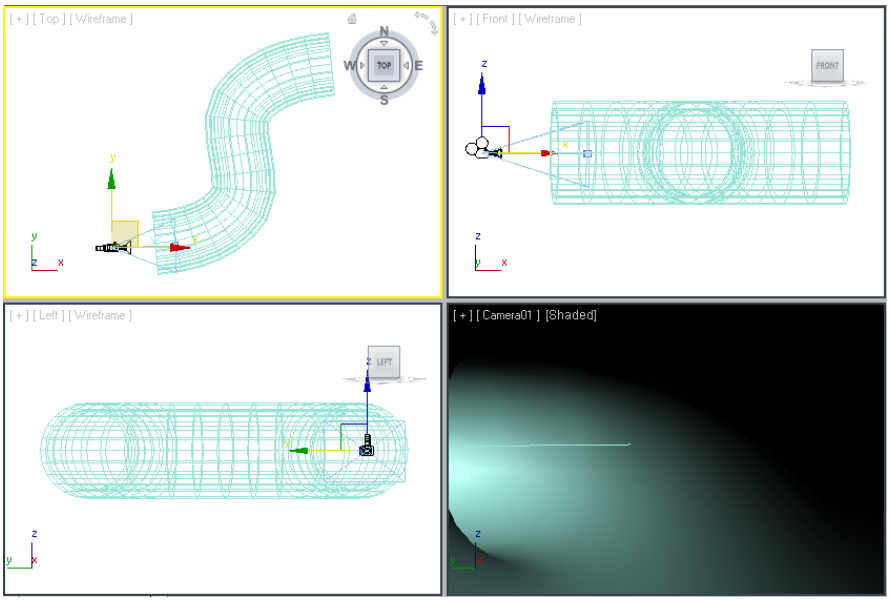


Figure 14-23 *Alignment of Camera001 in viewports*

Note

While aligning the target camera, make sure that the target of the camera is also selected along with Camera001.

3. Activate the Perspective viewport and press the C key to switch to the Camera001 viewport; the camera view is displayed, refer to Figure 14-23. Also, choose the **Shaded** option from the Shading viewport label menu of the Camera 001 viewport.

Creating Water Surface

In this section, you will create water surface by using the **Plane** tool.

1. Invoke the **Plane** tool from **Standard Primitives** in the **Command Panel**. Create a plane in the Top viewport.

2. In the **Parameters** rollout, set the values in the **Length** and **Width** spinners so that the plane covers the area around the cave, as shown in Figure 14-24. Also, set the values in the **Length Segs** and **Width Segs** spinners to **30**.

3. Name the plane in the **Name and Color** rollout as *water surface* and align it in viewports, refer to Figure 14-24.

   Next, you need to create and assign materials to *water tunnel* and *water surface*.

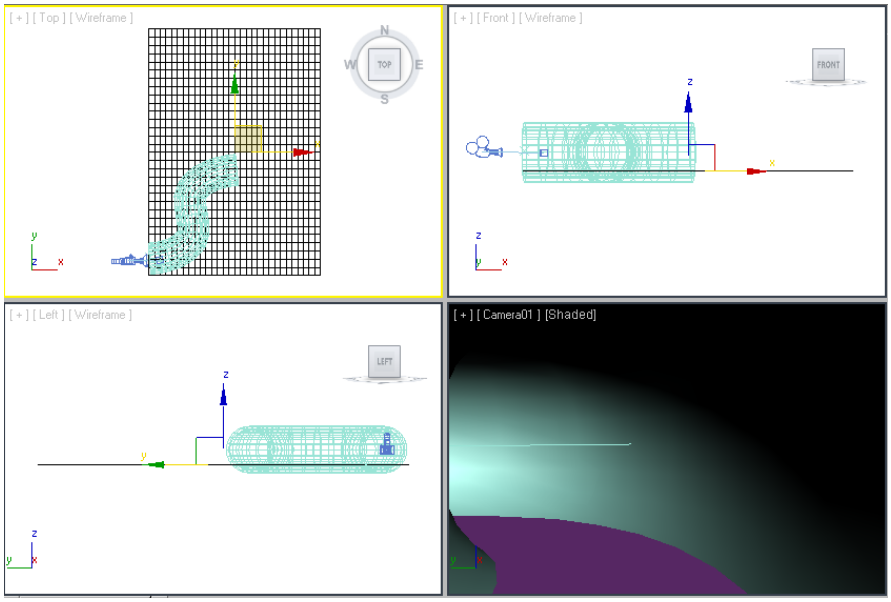


Figure 14-24 *The water surface created and aligned in viewports*

Creating and Assigning Materials to Water Surface

In this section, you will create materials for *water surface*.

1. Select *water surface* in any viewport and press the M key; the **Material Editor** dialog box is displayed.

2. Select the **01-Default** sample slot, if it is not already been selected, and then modify its name in the **Material Name** text box to **water surface material**.

3. Choose the **Material Type** button that is currently labeled as **Standard**; the **Material/Map Browser** dialog box is displayed. Select the **Raytrace** material from **Materials > Standard** and choose the **OK** button; the **Standard** material is replaced by the **Raytrace** material.

   Make sure in the **Raytrace Basic Parameters** rollout, the **Phong** shader is selected in the **Shading** drop-down list.

4. Choose the **Diffuse** color swatch; the **Color Selector: Diffuse** dialog box is displayed. Set the following values and then choose the **OK** button.

   Red: **136** Green: **210** Blue: **213**

5. Choose the **Reflect** color swatch; the **Color Selector: Reflect** dialog box is displayed. Set the following values and then choose the **OK** button.

   Red: **240** Green: **240** Blue: **240**

6. Choose the **Reflect** map button on the right of the **Reflect** color swatch; the **Material/Map Browser** dialog box is displayed. Select the **Falloff** map from the **Maps > Standard** rollout and choose the **OK** button; the **Falloff** map is displayed as sub-material. Use the default settings and choose the **Go to Parent** button to go back to the parent level.

Note

*The map assigned using the **Reflect** map button in the **Raytrace Basic Parameters** rollout is same as assigning the map using the **Reflect** map button in the **Maps** rollout.*

7. Select the **Bump** check box in the **Raytrace Basic Parameters** rollout. Next, choose the button on the right of the **Bump** spinner that is labeled as **None**; the **Material/Map Browser** dialog box is displayed. Select the **Noise** map and choose the **OK** button; the **Noise** map is displayed as sub-material.

8. In the **Noise Parameters** rollout, select the **Fractal** radio button and set the following parameters:

   Size: **30.0** High: **1.0** Low: **1.0**

9. Choose the **Go to Parent** button to go back to the parent level. Alternatively, you can select the **water surface material** option from the **Material Name** drop-down list.

10. Make sure that *water surface* is selected in the viewport, and then choose the **Assign Material to Selection** button; the **water surface material** is assigned to *water surface* in the viewport.

    Next, you need to create material for *water tunnel* to make it look more realistic.

11. Select the **02-Default** sample slot and modify its name in the **Material Name** text box to **water tunnel material**.

12. In the **Shader Basic Parameters** rollout, make sure that the **Blinn** shader is selected in the drop-down list.

    Next, you need to assign a map to the selected sample slot.

13. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** map button on the right of the **Diffuse** color swatch; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. As the project folder is already set, the *images* folder is displayed in the **Look in** drop-down list of this dialog box. Select the file *cave_material.jpg* and choose the **Open** button; the selected image is displayed in the sample slot.

14. Choose the **Go to Parent** button. Expand the **Maps** rollout and then select the **Bump** check box to make it available for material. Choose the **Bump** map button that is labeled as **None**; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map and

choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. Browse to the same image *(cave_material.jpg)* that you used for the **Diffuse** map and choose the **Open** button; various rollouts are displayed to modify the coordinates of the map.

15. In the **Coordinates** rollout, set the value to **4** in the **U Tiling** and **V Tiling** spinners. Next, choose the **Go to Parent** button to go back to the parent level; the name of the selected image is displayed over the **Bump** map button.

16. In the **Bump** spinner, set the value to **100**.

17. Make sure that *water tunnel* is selected in the viewport, and then choose the **Assign Material to Selection** button; the **water tunnel material** is assigned to *water tunnel* in the viewport.

18. Close the **Material Editor** dialog box.

19. Activate the Camera001 viewport and invoke the **Render Production** tool to view the maps and materials assigned to the objects. The scene is displayed, as shown in Figure 14-25.

Creating Walkthrough Animation

In this section, you will create a walkthrough animation.

1. Activate the Top viewport and invoke the **Maximize Viewport Toggle** tool to maximize it.

2. Create a line from the lower left side to the upper right side of the viewport according to the shape of the *water tunnel*, as shown in Figure 14-26. Alternatively, you can also use the *Line001* spline created earlier to loft the cave.

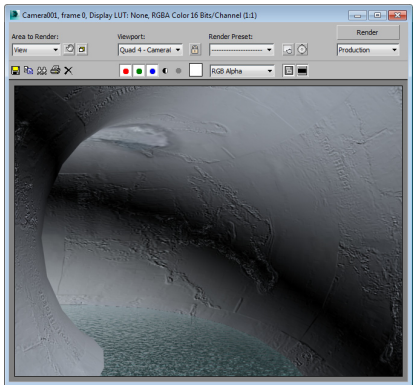


Figure 14-25 *The scene after assigning the materials*

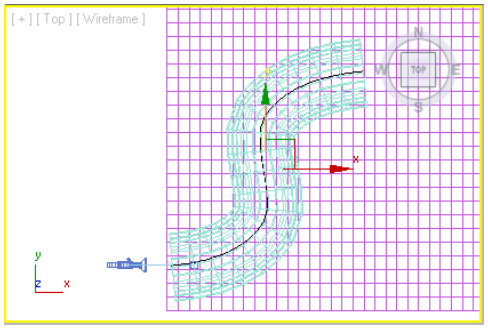


Figure 14-26 *A line created for the path*

3. Modify the name of the line as *path* and align it in viewports, as shown in Figure 14-27. Next, invoke the **Maximize Viewport Toggle** tool.

Next, you need to increase the number of frames in the track bar to create a smooth animation.

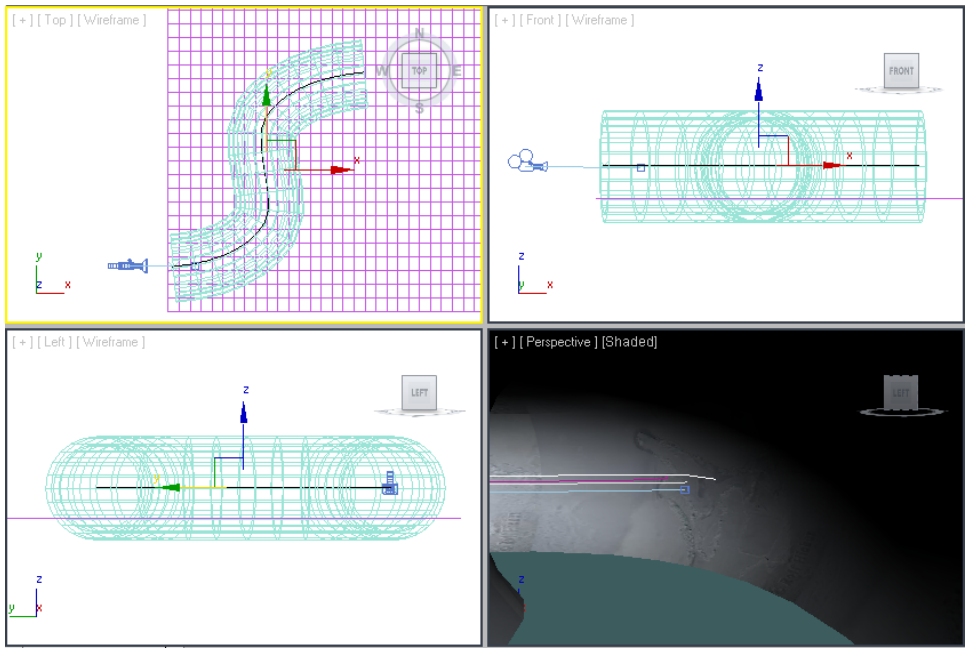


Figure 14-27 *The path aligned in viewports*

4. Choose the **Time Configuration** button at the bottom of the screen; the **Time Configuration** dialog box is displayed. In the **Animation** area of this dialog box, set the value **1000** in the **End Time** spinner and press the ENTER key; the number of frames increases in the track bar. Choose the **OK** button to exit the dialog box.

Next, you need to move *Camera001* along with *path*.

5. Select *Camera001* in any viewport and choose the **Motion** tab in the **Command Panel**. By default, the **Parameters** tab is chosen in this panel.

6. Expand the **Assign Controller** rollout in the **Parameters** tab and then choose the **Position : Position XYZ** option from it; the **Assign Controller** button is activated, as shown in Figure 14-28.

7. Choose the **Assign Controller** button; the **Assign Position Controller** dialog box is displayed. Choose the **Path Constraint** option and then choose the **OK** button to exit the dialog box; various rollouts are displayed below the **Assign Controller** rollout.

8. In the **Path Parameters** rollout, choose the **Add Path** button and select *path* in the viewport; the name of *path* is displayed in the **Target Weight** area, as shown in Figure 14-29. Also, *Camera001* is moved along with *path* in the viewport. Right-click to exit the command.

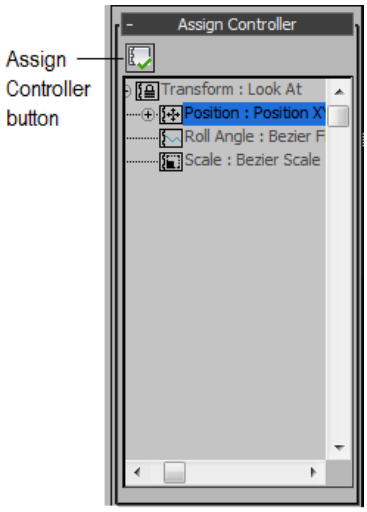


Figure 14-28 *The* ***Assign Controller*** *rollout*

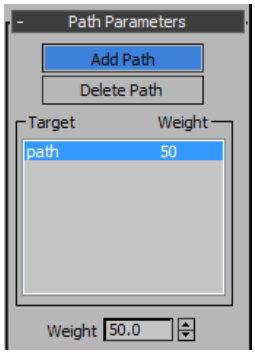


Figure 14-29 *Partial view of the* ***Path Parameters*** *rollout*

9. Activate the Top viewport and choose the **Play Animation** button from the time controls area; you will notice that *Camera001* moves along with *path* but the movement is not proper. To create a proper movement, you need to adjust the target of *Camera001* at different frames.

10. Choose the **Go to Start** button to drag the time slider to frame 0. Next, choose the **Toggle Auto Key Mode** button to turn on the animation mode.

11. Invoke the **Select by Name** tool; the **Select From Scene** dialog box is displayed. Select *Camera001.Target* and choose the **OK** button to exit the dialog box; *Camera001.Target* is selected in the viewport.
12. In the Top viewport, position *Camera001.Target* using the **Select and Move** tool, as shown in Figure 14-30.

Note

While aligning the Camera001.Target, you need to view Camera001 viewport simultaneously to make sure that the animation is proper.

13. Drag the time slider to frame 153 and move *Camera001.Target* along the path, as shown in Figure 14-31. To move the time slider to a particular frame, you can also enter the frame number in the Current Frame (Go to frame) spinner.

14. Move the time slider to frame 300 by entering the frame number in the Current Frame (Go to frame) spinner. Then, align *Camera001.Target*, as shown in Figure 14-32.

15. Move the time slider to frame 429 by entering the frame number in the **Current Frame (Go to frame)** spinner. Now, align *Camera001.Target* with *path*, as shown in Figure 14-33.

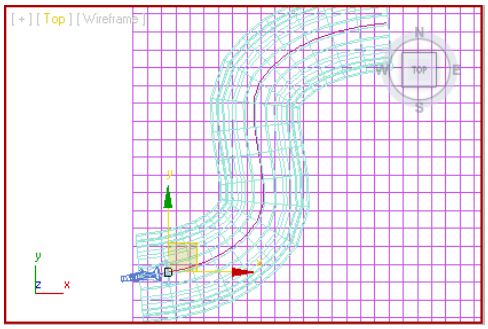


Figure 14-30 *The position of the Camera001.Target at frame 0*

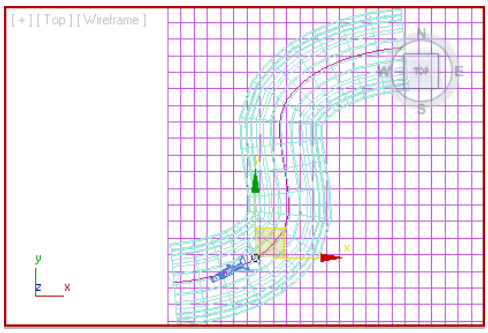


Figure 14-31 *The position of the Camera001.Target at frame 153*

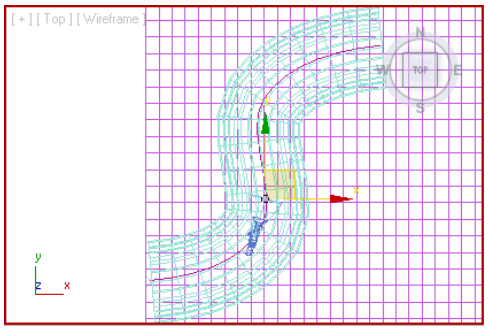


Figure 14-32 *The position of the Camera001.Target at frame 300*

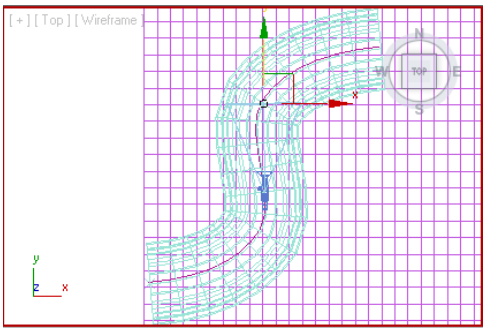


Figure 14-33 *The position of the Camera001.Target at frame 429*

16. Move the time slider to frame 581 and align *Camera001.Target*, as shown in Figure 14-34.

17. Move the time slider to frame 700 and align *Camera001.Target*, as shown in Figure 14-35.

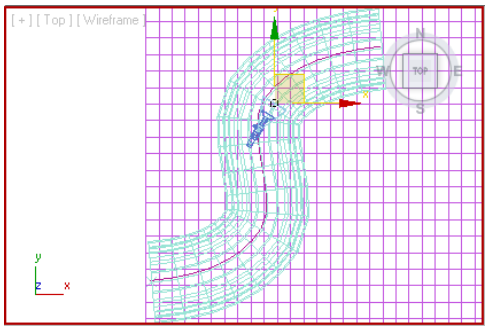


Figure 14-34 *The position of the Camera001.Target at frame 581*

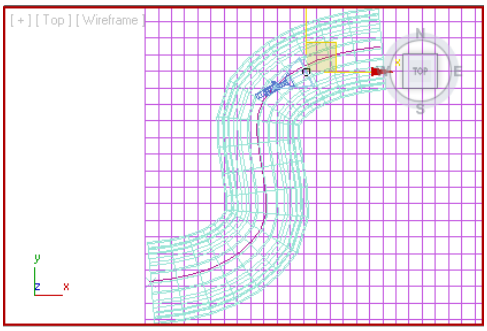


Figure 14-35 *The position of the Camera001.Target at frame 700*

18. Move the time slider to frame 801 and align *Camera001.Target*, as shown in Figure 14-36.

19. Move the time slider to frame 935 and align *Camera001.Target*, as shown in Figure 14-37.

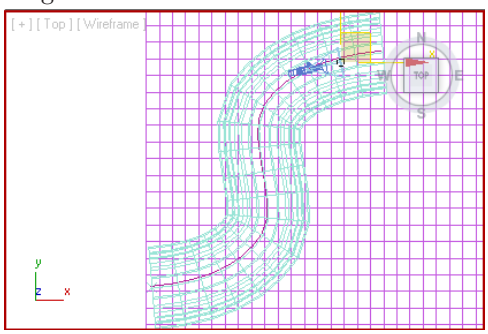


Figure 14-36 *The position of the Camera001.Target at frame 801*

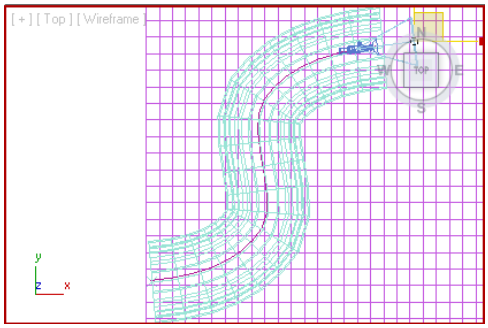


Figure 14-37 *The position of the Camera001.Target at frame 935*

20. Move the time slider to frame 1000 and align *Camera001.Target*, as shown in Figure 14-38. After creating the frame-by-frame animation, the frames are displayed in the track bar, as shown in Figure 14-39.

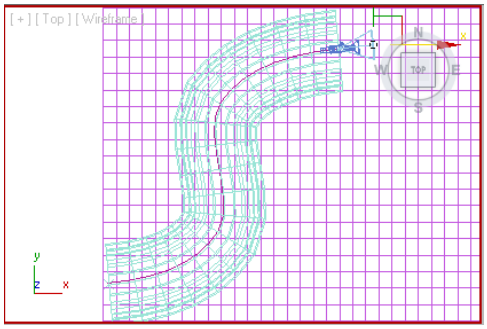


Figure 14-38 *The position of the Camera001.Target at frame 1000*

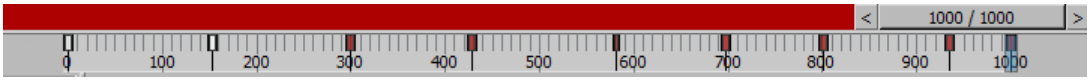


Figure 14-39 *The track bar after creating the animation*

21. Choose the **Toggle Auto Key Mode** button to turn off the animation mode and activate Camera001 viewport. Next, choose the **Play Animation** button; *Camera001* starts moving along *path* inside the cave.

Note

You can also use your own dimensions to align Camera001.Target at different frames.

Rescaling the Active Time Segment

While playing animation, if you feel that the pace of animation is very fast, you can increase the number of frames in the active time segment to make it slow and smooth.

1. Choose the **Time Configuration** button at the bottom of the 3ds Max screen; the **Time Configuration** dialog box is displayed. In the **Animation** area of this dialog box, choose the **Re-scale Time** button; the **Re-scale Time** dialog box is displayed.

2. In the **New** area, set a new value in the **End Time** spinner and choose the **OK** button to exit the dialog box; the active time segment and animation keys are adjusted accordingly. Choose the **OK** button in the **Time Configuration** dialog box to close it.

Creating Animation in Water

In this section, you will create animated waves on the water surface by using the **Compact Material Editor** tool.

1. Invoke the **Compact Material Editor** tool from the **Main Toolbar**; the **Material Editor** dialog box is displayed.

2. Select the **water surface material** sample slot. Now, in the **Raytrace Basic Parameters** rollout, choose the **Bump** map button that is labeled as **Map# X (Noise)**; various rollouts are displayed for the **Noise** modifier.

   Next, you need to set the keys on the parameters of the **Noise** modifier to animate *water surface*.

3. Choose the **Go to Start** button to drag the time slider to frame 0. Next, choose the **Toggle Auto Key Mode** button to turn on the animation mode; the selected sample slot is surrounded by a red border, which indicates that the animation mode is active.

4. In the **Noise Parameters** rollout, make sure that the value in the **Phase** spinner is 0.0 at frame 0. Next, choose the **Go to End** button to move the time slider to the end frame, and then set the value **7.0** in the **Phase** spinner and then press ENTER; the arrows of the spinner turn red.

5. Choose the **Toggle Auto Key Mode** button to turn off the animation mode and close the **Material Editor** dialog box.

Assigning Environment to the Scene

In this section, you will create environment to the scene.

1. Choose **Rendering > Environment** from the menu bar; the **Environment and Effects** dialog box is displayed.

2. The **Environment** tab is chosen by default. In the **Background** area of the **Common Parameters** rollout, choose the **Environment Map** button that is labeled as **None**; the **Material/Map Browser** dialog box is displayed.

3. Select the **Bitmap** map and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. Select *ice_environment.jpg* image and choose the **Open** button; the selected image is displayed as background after rendering. Close the **Environment and Effects** dialog box.

Note that when *Camera001* moves toward the end frames, then only the background of the scene is displayed in the animation.

Saving and Rendering the Scene

In this section, you will save the scene and then render it. You can also view the final rendered image sequence by downloading the file *c14_3dsmax_2014_rndr.zip* from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2014: A Comprehensive Guide*

1. Invoke the **Render Setup** tool from the **Main Toolbar**; the **Render Setup: Default Scanline Renderer** dialog box is displayed. In this dialog box, the **Common** tab is chosen by default. Also, various rollouts are displayed in the **Common** tab.

2. In the **Common Parameters** rollout, select the **Active Time Segment** radio button in the **Time Output** area.

3. In the **Output Size** area, choose the **640x480** button.

4. In the **Render Output** area, choose the **Files** button; the **Render Output File** dialog box is displayed. Enter a name for the file in the **File name** text box and then select the **AVI File (*.avi)** file type from the **Save as type** drop-down list and specify the desired location of the file in the **Save in** text box. Next, choose the **Save** button; the **AVI File Compression Setup** dialog box is displayed. Use the default settings and choose the **OK** button to exit the dialog box.

5. Choose **Save** from the **Application** menu.

6. Make sure the **Quad 4 - Camera001** option is selected in the **View** drop-down list at the bottom of the **Render Setup: Default Scanline Renderer** dialog box. Next, choose the **Render** button; both the **Camera001, frame#** window and the **Rendering** dialog box are displayed showing the rendering process.

   After the completion of the rendering process, the final output of the animation is saved at the specified location in the **.AVI* format. You can view the final output of the animation by opening the corresponding **.AVI* file.

Tutorial 2

In this tutorial, you will create an animated scene that contains light effects and animation of lights and objects, as shown in Figure 14-40. **(Expected time: 60 min)**

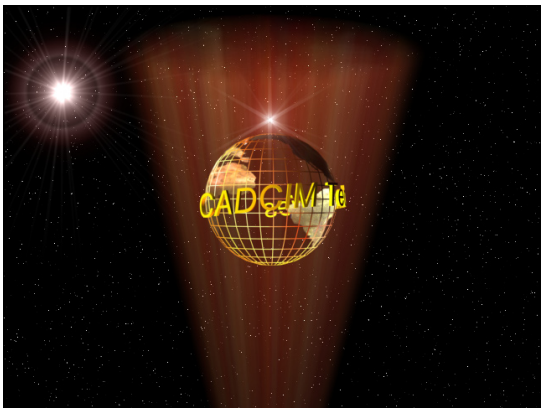


Figure 14-40 *The animated scene*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Create the wireframe earth sphere.
c. Create the text.
d. Assign the camera in the scene.
e. Create the animated space background.
f. Create and animate lights in the scene.
g. Animate the wireframe earth sphere and the text.
h. Save and render the scene.

Creating the Project Folder

Create a new project folder with the name *c14_tut2* at *\Documents\3dsmax2014* and then save the file with the name *c14tut2*, as discussed in Tutorial 1 of Chapter 2.

Creating the Wireframe Earth Sphere

In this section, you will create two spheres to create a wireframe earth sphere.

1. Invoke the **Sphere** tool from **Standard Primitives** in the **Command Panel** and create a sphere in the Top viewport.

2. Modify the name of the sphere to *earth sphere*. Set the value of the **Radius** spinner to **58.42** in the **Parameters** rollout.

3. Make sure that *earth sphere* is selected and then choose **Edit > Clone** from the menu bar; the **Clone Options** dialog box is displayed.

4. Select the **Copy** radio button in the **Object** area and enter *wireframe sphere* in the **Name** edit box. Next, choose the **OK** button to close the dialog box. In the **Parameters** rollout, set the radius of *wireframe sphere* to **58.0** in the **Radius** spinner.

   Next, you need to apply maps and material to the *earth sphere* and the *wireframe sphere*.

5. Navigate to the *c14_3dsmax_2014_tut* folder that you have downloaded from the CADCIM website in Tutorial 1. Next, copy *EarthMap_colored.jpg* and *EarthMap_b&w.jpg* at the location *\Documents\3dsmax2014\c14_tut2\sceneassets\images*.

6. Select *earth sphere* in any viewport and invoke the **Compact Material Editor** tool; the **Material Editor** dialog box is displayed.

7. Select the **01-Default** sample slot, if it is not already selected, and then modify its name in the **Material Name** text box to **earth map**.

8. In the **Shader Basic Parameters** rollout, make sure that the **Blinn** shader is selected in the drop-down list, and then select the **2-Sided** check box.

   Next, you need to assign a map to the shader.

9. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** map button on the right side of the **Diffuse** color swatch; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. As the project folder is already set, the *images* folder is displayed in the **Look in** drop-down list of this dialog box. Select the file *EarthMap_colored.jpg* and choose the **Open** button; the selected image is displayed in the sample slot. Also, various rollouts are displayed to modify the coordinates of the map.

10. Choose the **Go to Parent** button to go back to the parent level and then choose the **Opacity** map button in the **Blinn Basic Parameters** rollout; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. Select the *EarthMap_b&w.jpg* image and choose the **Open** button; the selected image is displayed in the sample slot, as shown in Figure 14-41.

Figure 14-41 *The earth map in the sample slot*

11. Choose the **Go to Parent** button again and make sure *earth sphere* is selected in the viewport. Next, choose the **Assign Material to Selection** button; *earth map* is assigned to the earth sphere in the viewport.

12. Choose the **Show Shaded Material in Viewport** button to view the assigned map in the viewport.

13. Render the Perspective viewport to view the map applied using the **Render Production** tool, as shown in Figure 14-42.

Next, you need to create material for *wireframe sphere*.

14. Select the **02-Default** sample slot and modify its name in the **Material Name** text box to **wireframe map**.

15. In the **Shader Basic Parameters** rollout, make sure that the **Blinn** shader is selected in the drop-down list and then select the **Wire** check box; wireframes are displayed in the sample slot, as shown in Figure 14-43.

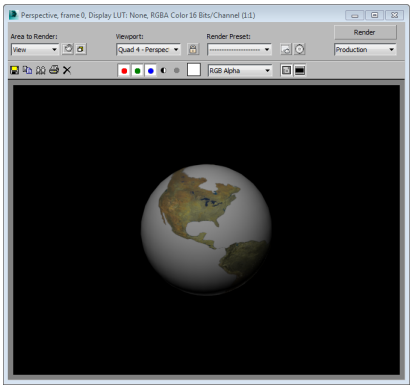


Figure 14-42 *The earth map applied to the earth sphere after rendering*

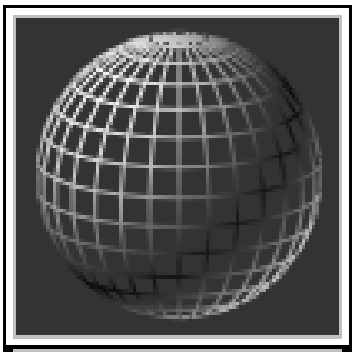


Figure 14-43 *Wireframes displayed in the sample slot*

16. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** color swatch; the **Color Selector: Diffuse Color** dialog box is displayed. Set the values in the **Red**, **Green**, and **Blue** spinners as given below and choose the **OK** button to exit the dialog box.

    Red: **239** Green: **106** Blue: **18**

17. In the **Specular Highlights** area, set the value **53** in the **Specular Level** spinner.

18. Select *wireframe sphere* in the viewport and then choose the **Assign Material to Selection** button; the **wireframe map** is assigned to *wireframe sphere* in the viewport.

19. Choose the **Show Shaded Material in Viewport** button to view the assigned map in the viewport. Close the **Material Editor** dialog box.

20. Invoke the **Zoom Extents All** tool to view both the spheres in viewports.

    Next, you need to align *wireframe sphere* with *earth sphere*.

21. Select *wireframe sphere* in the viewport and invoke the **Align** tool from the **Main Toolbar**; the shape of the cursor changes. Next, select *earth sphere* in the viewport; the **Align Selection (earth sphere)** dialog box is displayed.

22. In the **Align Position (World)** area, make sure the **X Position**, **Y Position**, and **Z Position** check boxes are selected. Next, select the **Pivot Point** radio button both in the **Current Object** and **Target Object** areas. Then, choose the **OK** button to close the dialog box.

23. Invoke the **Zoom Extents All** tool; *wireframe sphere* is aligned with *earth sphere* in viewports, as shown in Figure 14-44.

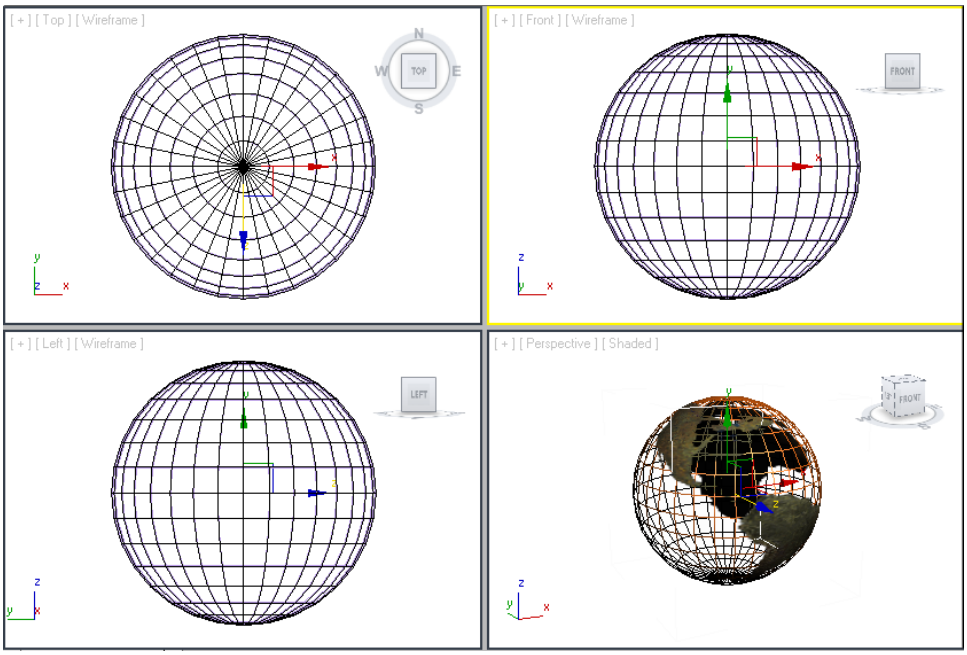


Figure 14-44 *Alignment of the wireframe and the earth sphere in viewports*

24. Activate the Perspective viewport. Choose the **Render Production** tool from the **Main Toolbar**; the rendered sphere is displayed in the **Rendered Frame** window, as shown in Figure 14-45.

25. Select *wireframe sphere* and *earth sphere* in the viewport, simultaneously and then group them as *wireframe earth sphere*.

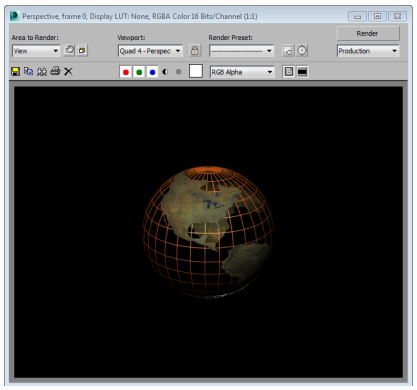


Figure 14-45 *The sphere at rendering*

Creating the Text

In this section, you will create the text around the *wireframe earth sphere* by using the **Text** tool.

1. Invoke the **Text** tool from **Create > Shapes > Splines > Object Type** rollout in the **Command Panel**. In the **Parameters** rollout, set the values as follows:

Select the **Arial Italic** font type from the drop-down list located on the top of the rollout.

Make sure that the left alignment button is chosen.
Size: **30.0**

Text area
Enter **CADCIM Technologies**.

2. Click in the center of Front viewport; the **CADCIM Technologies** text is displayed in viewports. It is automatically named as *Text001*.

3. Invoke the **Zoom Extents All** tool and align *Text001* in viewports, as shown in Figure 14-46.

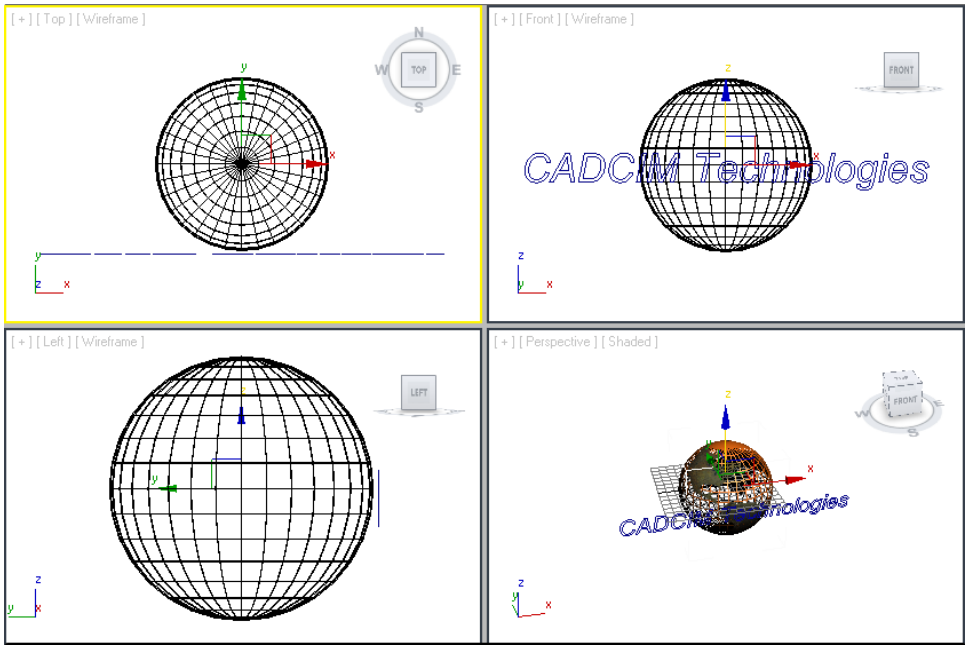


Figure 14-46 *Alignment of Text001 in viewports*

Now, you need to apply the **Extrude** modifier to add depth to the text.

4. Make sure that *Text001* is selected in the viewport. Choose the **Modify** tab in the **Command Panel**. Next, select the **Extrude** modifier from the **Modifier List** drop-down list; the **Extrude** modifier is displayed in the modifier stack.

5. In the **Parameters** rollout of the **Extrude** modifier, set the value **3.0** in the **Amount** spinner.

Next, you need to apply material to *Text001*.

6. Invoke the **Material Editor** tool; the **Material Editor** dialog box is displayed. Select the **03-Default** sample slot and modify its name in the **Material Name** text box to **text material**.

7. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** color swatch; the **Color Selector: Diffuse Color** dialog box is displayed. Set the following values in the **Red**, **Green**, and **Blue** spinners and then choose the **OK** button to exit the dialog box.

   Red: **253** Green: **185** Blue: **2**

8. Make sure *Text001* is selected in the viewport and then choose the **Assign Material to Selection** button; the **text material** is assigned to *Text001* in the viewport. Close the **Material Editor** dialog box.

   Next, you need to apply the **Bend** modifier to *Text001* to bend it around *wireframe earth sphere*.

9. Make sure *Text001* is selected in the viewport and then choose the **Modify** tab in the **Command Panel**. Next, select the **Bend** modifier from the **Modifier List** drop-down list; the **Bend** modifier is displayed in the modifier stack.

10. In the **Parameters** rollout of the **Bend** modifier, set the values as follows:

    Bend area
    Angle: **237.5**

    Bend Axis area
    Select the **X** radio button.

11. Align *Text001* in viewports, as shown in Figure 14-47.

Assigning Camera in Scene

In this section, you will assign camera in the scene.

1. Invoke the **Zoom All** tool and zoom out in all viewports, simultaneously to make a proper room around *wireframe earth sphere*.

2. Invoke the **Free** tool from **Create > Cameras** in the **Command Panel** and click in the Front viewport; a free camera is displayed in all viewports and is automatically named as *Camera001*.

3. Align *Camera001* in viewports to view the front side of the scene and then press the C key in the Perspective viewport to activate the Camera001 viewport, as shown in Figure 14-48.

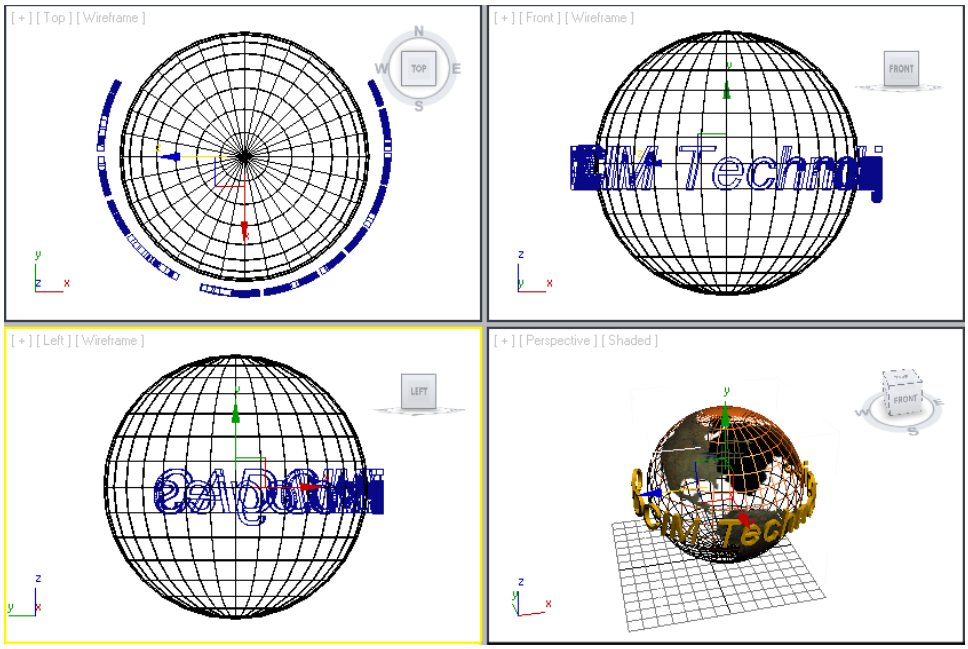


Figure 14-47 *The Text001 aligned in viewports after applying the* ***Extrude*** *and* ***Bend*** *modifiers*

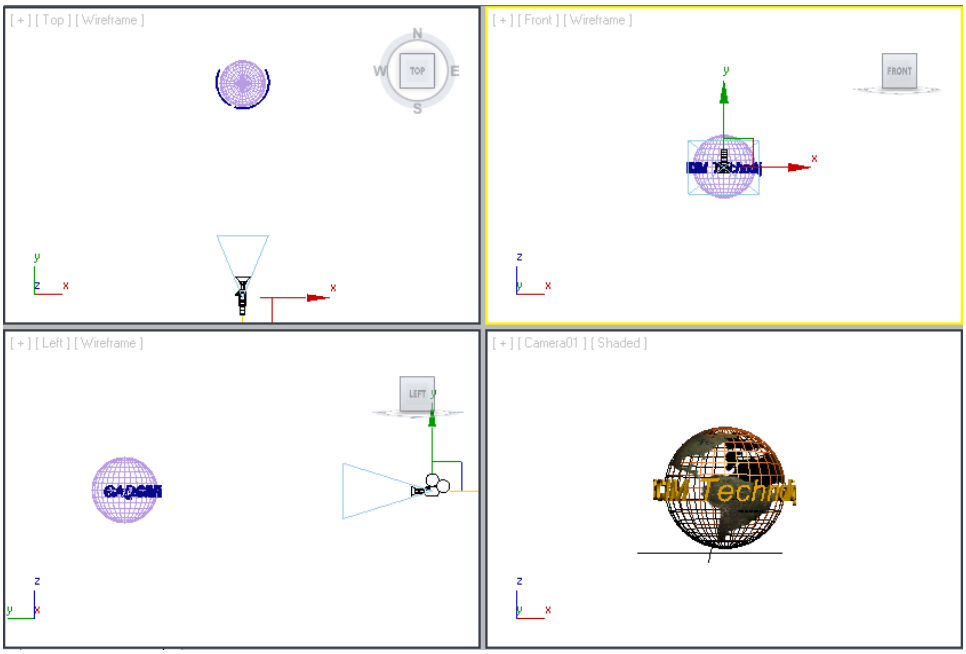


Figure 14-48 *The Camera001 aligned in viewports*

Creating Animated Space Background

In this section, you will create background for the scene.

1. Choose **Rendering > Environment** from the menu bar; the **Environment and Effects** dialog box is displayed with the **Environment** tab chosen by default. Also, various rollouts are displayed in the **Environment** tab.

2. In the **Common Parameters** rollout, choose the **Environment Map** button in the **Background** area; the **Material/Map Browser** dialog box is displayed. Select the **Noise** map from the **Maps > Standard** rollout and choose the **OK** button; the **Noise** map is displayed on the **Environment Map** button and applied as the background.

   Next, you need to set the parameters of the **Noise** map.

3. Press the M key to invoke the **Material Editor** dialog box. Select the **04-Default** sample slot.

4. In the **Environment and Effects** dialog box, move the cursor over the **Environment Map** button, press and hold the left mouse button, drag it to the **04-Default** sample slot in the **Material Editor** dialog box, and release the left mouse button; the **Instance (Copy) Map** dialog box is displayed. Select the **Instance** radio button and choose the **OK** button; the **04-Default** sample slot is displayed, as shown in Figure 14-49. Also, various rollouts to modify the **Noise** map are displayed.

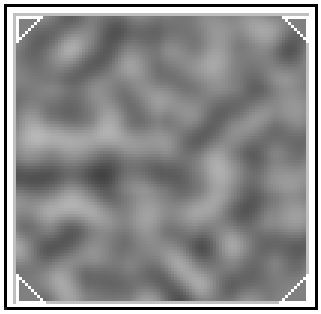


Figure 14-49 *The sample slot with the* ***Noise*** *environment*

5. Modify the name of the sample slot in the **Material Name** text box to **space environment map**.

   Next, you need to modify the parameters of the **Noise** map.

6. In the **Noise Parameters** rollout, set the values as given below:

   Select the **Fractal** radio button in the **Noise Type** area.

   Size: **0.2** High: **0.8**
   Low: **0.7** Levels: **3.0**

7. Render the Camera001 viewport; the scene is displayed with *space environment map*, as shown in Figure 14-50.

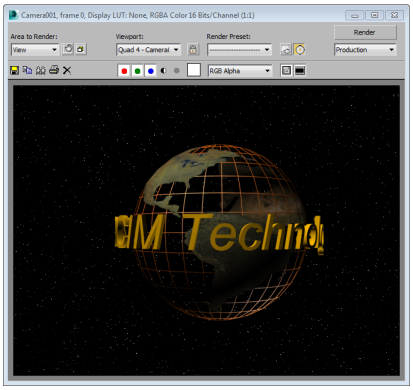


Figure 14-50 *The scene with the* ***space environment map***

   Next, you need to animate the stars in *space environment map*.

8. Choose the **Time Configuration** button; the **Time Configuration** dialog box is displayed. In the **Animation** area of this dialog box, set the value **1000** in the **End Time** spinner and press the ENTER key; the number of frames in the active time segment increases to 1000. Choose the **OK** button to exit the dialog box.

9. Choose the **Toggle Auto Key Mode** button to turn on the animation mode and then choose the **Go to Start** button to move the time slider to frame 0. In the **Noise Parameters** rollout of the **Material Editor** dialog box, make sure that the value in the **Phase** spinner is 0.0 at frame 0.

10. Choose the **Go to End** button to move the time slider to frame 1000. In the **Noise Parameters** rollout, set the value **7.0** in the **Phase** spinner. The stars in *space environment map* appear to be blinking in the final output at rendering.

11. Choose the **Toggle Auto Key Mode** button to turn off the animation mode and then close the **Material Editor** dialog box. Also, close the **Environment and Effects** dialog box.

Creating and Animating Lights in the Scene

To create light in the scene, you need to create omni and spot lights in the scene.

1. Invoke the **Zoom** tool and zoom out the Top, Front, and Left viewports to create proper room around *wireframe earth sphere*, refer to Figure 14-51.

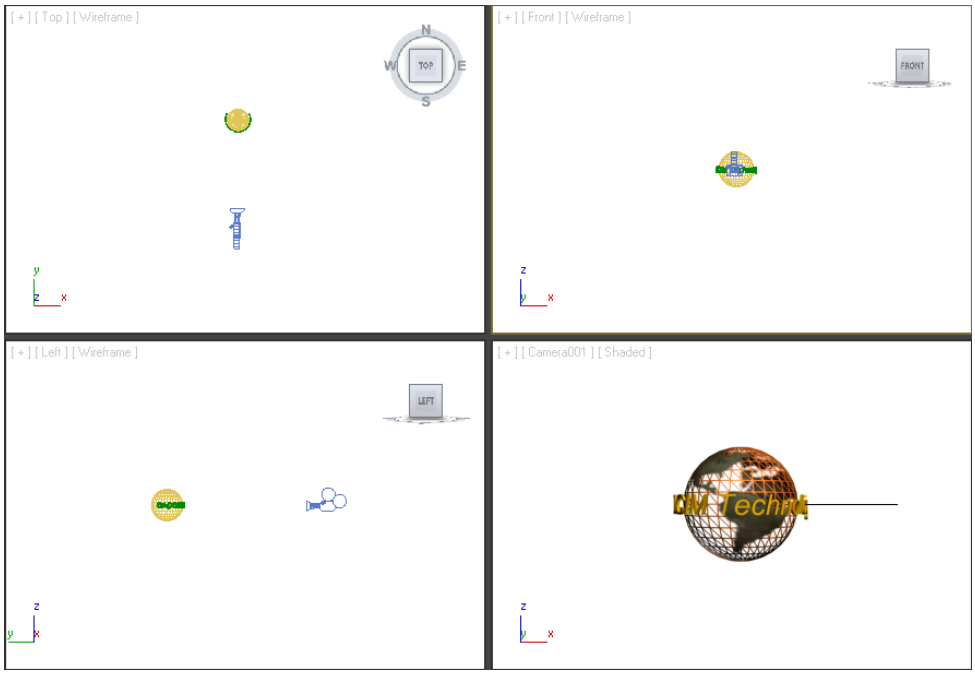


Figure 14-51 *The wireframe earth sphere zoomed out*

2. Activate the Top viewport and invoke the **Omni** tool from **Create > Lights > Standard > Object Type** rollout in the **Command Panel**. In the Top viewport, click at the center of *wireframe earth sphere*; an omni light is displayed in all viewports. It is automatically named as *Omni001*. Right-click to exit the command.

3. Align *Omni001* light in all viewports, refer to Figure 14-52.

4. Create four copies of *Omni001* light and align all lights, as shown in Figure 14-52.

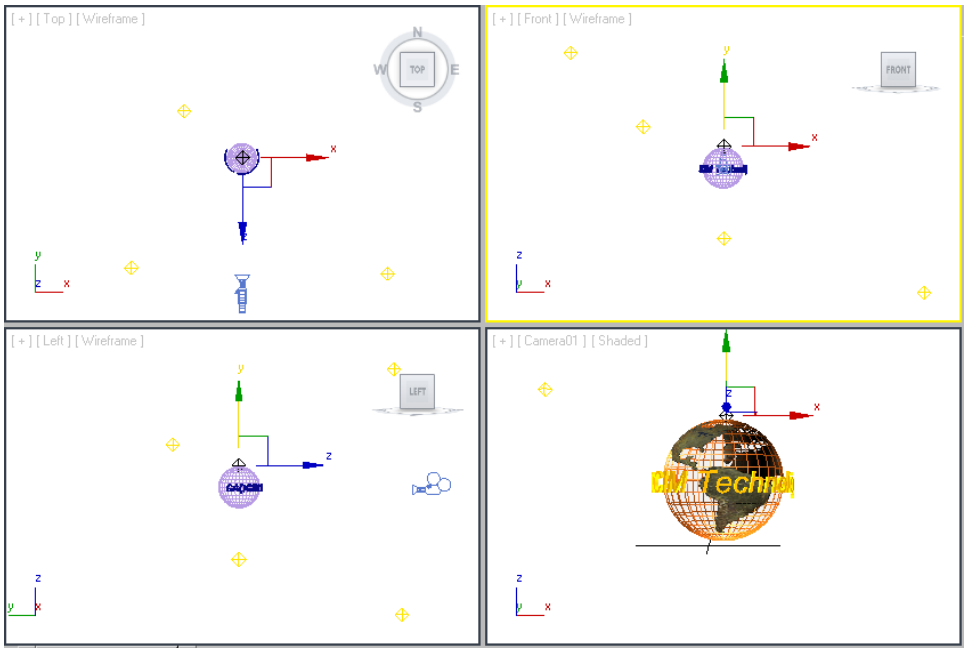


Figure 14-52 *Omni lights aligned in viewports*

Note

*If your scene has more lighting effects, then choose the **Modify** tab in the **Command Panel** and set the intensity of omni lights. To do so, you need to modify the value in the **Multiplier** spinner of the **Intensity/Color/Attenuation** rollout.*

Next, you need to add advance effects to omni lights.

5. In the Front viewport, select the omni light that is placed on the left side of *wireframe earth sphere*, as shown in Figure 14-53.

6. Choose the **Modify** tab in the **Command Panel** and expand the **Atmospheres & Effects** rollout. Choose the **Add** button; the **Add Atmospheres or Effect** dialog box is displayed. Select the **Lens Effects** option and choose the **OK** button to exit the dialog box; the **Lens Effects** option is displayed in the **Atmospheres & Effects** rollout.
Next, you need to set the parameters for the **Lens Effects**.

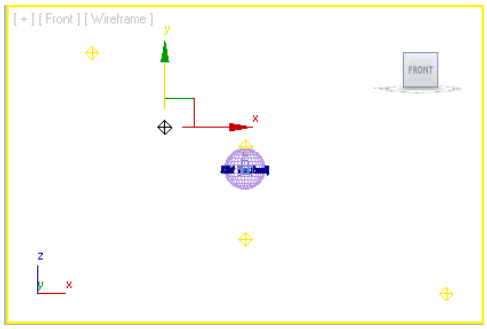


Figure 14-53 *Omni light selected to add the advance effects*

7. Select the **Lens Effects** option in the **Atmospheres & Effects** rollout and choose the **Setup** button; the **Environment and Effects** dialog box is displayed with the **Effects** tab chosen. Also, various rollouts are displayed in this tab.

8. In the **Lens Effects Parameters** rollout, select the **Glow** option and choose the arrow that is pointing toward the right; the **Glow** effect is now available for the omni light at rendering. Also, the **Glow Element** rollout is displayed in the **Environment and Effects** dialog box to modify the parameters of the **Glow** effect.

9. In the **Glow Element** rollout, set the values as follows:

   Size: **10.0** Intensity: **150.0**

10. In the **Lens Effects Parameters** rollout, select **Ray** and then choose the arrow that is pointing toward the right; the **Ray** effect is now available for the omni light at rendering. Also, the **Ray Element** rollout is displayed in the **Environment and Effects** dialog box to modify the parameters of the **Ray** effect.

11. In the **Ray Element** rollout, set the values as follows:

    Size: **50.0** Intensity: **10.0** Num: **50**

    Use the default values for other options.

12. To animate rays in the scene, choose the **Toggle Auto Key Mode** button to turn on the animation mode. Next, choose the **Go to Start** button to move the time slider to frame 0. In the **Ray Element** rollout, make sure that the value in the **Angle** spinner is 0.0 at frame 0.

13. Choose the **Go to End** button to move the time slider to frame 1000, and set the value in the **Angle** spinner to **180.0**. The rays appear to be rotating in the final output after rendering.

14. Choose the **Toggle Auto Key Mode** button to turn off the animation mode.

15. In the **Lens Effects Parameters** rollout, select the **Ring** option and then choose the arrow that is pointing toward the right side; the **Ring** effect becomes available for the omni light at rendering. Also, the **Ring Element** rollout is displayed in the **Environment and Effects** dialog box to modify the parameters of the **Ring** effect.

16. In the **Ring Element** rollout, set the values as follows:

    Size: **3.0** Intensity: **15.0**

    Use the default values for other options.

17. Close the **Environment and Effects** dialog box and render the Camera001 viewport; the omni light is displayed, as shown in Figure 14-54.

Note

If you are not able to view the Omni Light in your render, move Camera001 so that you can see the Omni light in your render.

18. In the Front viewport, select the omni light that is placed just above *wireframe earth sphere*. Align it at the top of *wireframe earth sphere*, as shown in Figure 14-55. Next, add the **Lens Effects** as described above and set the parameters of different effects in the **Environment and Effects** dialog box as follows:

    Glow effect
    Size: **3.0** Intensity: **150.0**

    Ray effect
    Size: **10.0** Intensity: **30.0** Num: **10**

    Star effect
    Size: **10.0** Intensity: **50.0** Width: **1.0**

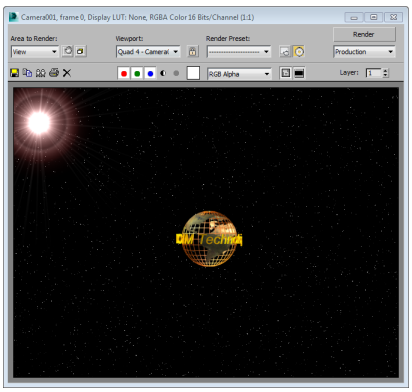


Figure 14-54 *The effect of the omni light displayed at rendering*

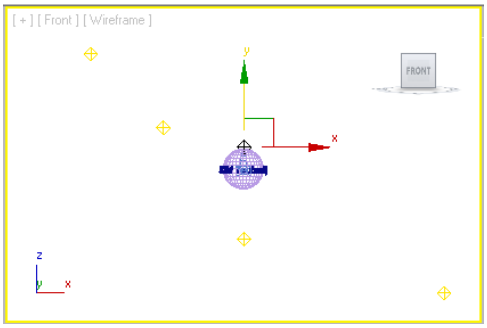


Figure 14-55 *The omni light aligned just above the wireframe earth sphere*

19. To animate the effects of this omni light in the scene, choose the **Toggle Auto Key Mode** button to turn on the animation mode. Now, choose the **Go to Start** button to move the time slider to frame 0. Also, in the **Star Element** rollout, make sure that the value in the **Angle** spinner is 0.0 at frame 0.

20. Choose the **Go to End** button to move the time slider to frame 1000 and set the value in the **Angle** spinner to **90.0**. The stars appear to be rotating in the final output after rendering.

21. Choose the **Toggle Auto Key Mode** button to turn off the animation mode.

    After applying the effects, the omni light with the lens effect is displayed after rendering, as shown in Figure 14-56.

    Next, you need to add spot lights to the scene.

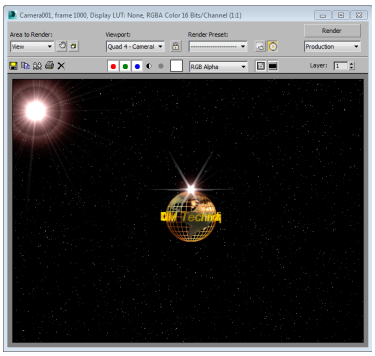


Figure 14-56 *The omni light with the lens effect on rendering*

22. Invoke the **Target Spot** tool from **Create > Lights > Standard > Object Type** rollout in the **Command Panel** and then create a spot light in the Front viewport, as shown in Figure 14-57. Also, create another spot light in the Top viewport, as shown in Figure 14-58.

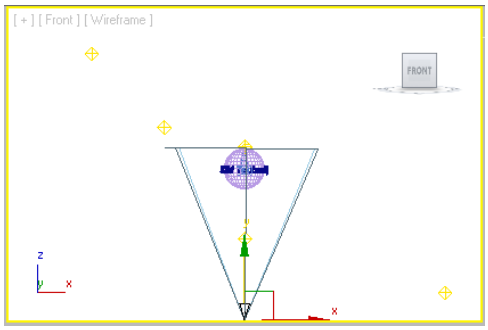


Figure 14-57 *Spot light created in the Front viewport*

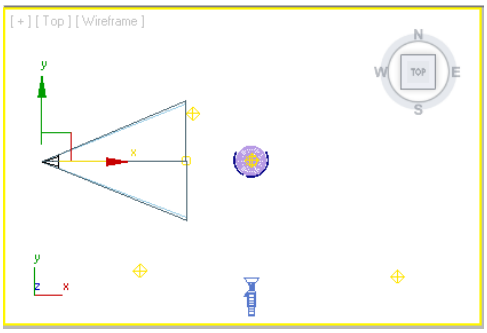


Figure 14-58 *Spot light created in the Top viewport*

The spotlights are automatically named as *Spot001* and *Spot002*.

Now, you need to modify the parameters of the spot lights.

23. Select *Spot001* that you created in the Front viewport and choose the **Modify** tab in the **Command Panel**; various rollouts are displayed to modify the parameters of the spotlight.

24. In the **Spotlight Parameters** rollout, set the values as follows:

    Hotspot/Beam: **25.3** Falloff/Field: **30.0**

25. In the **Atmospheres & Effects** rollout, add the **Volume Light** effect, select the **Volume Light** option in the rollout, and choose the **Setup** button; the **Environment and Effects** dialog box is displayed. In the **Volume** area of the **Volume Light Parameters** rollout, set the value in the **Density** spinner to **1.5**. Close the **Environment and Effects** dialog box.

26. Render the Camera001 viewport; the scene is displayed, as shown in Figure 14-59.

27. In the **Advance Effects** rollout of the Modify panel, select the **Map** check box in the **Projector Map** area. Then, choose the **Projector Map** button labeled as **None** and assign a bitmap image of your choice to this map to give a more realistic effect to the **Volume Light** at rendering, refer to Figure 14-60.

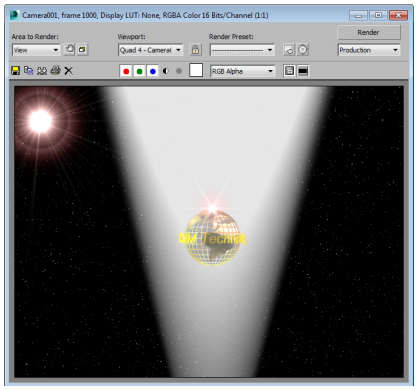


Figure 14-59 *The scene at rendering after applying the* ***Volume Light*** *effect in the Spot001 light*

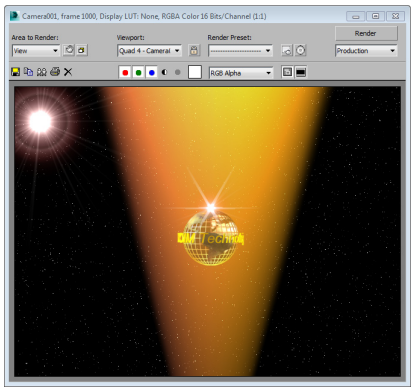


Figure 14-60 *The scene at rendering after assigning a map to* ***Projector Map***

28. After rendering, you will notice that the **Volume Light** is visible up to the infinite distance. To control the distance of the **Volume Light**, set the parameters in the **Far Attenuation** area in the **Intensity/Color/Attenuation** rollout as follows:

    Select the **Use** and **Show** check boxes.
    Start: **10** End: **850**

Note

You may need to adjust the values in the ***Start*** *and* ***End*** *spinners as the values may differ depending on the placement of the light in the scene.*

29. Render the Camera001 viewport; the scene is displayed, as shown in Figure 14-61.

30. Select *Spot002* in the viewport and choose the **Modify** tab in the **Command Panel**; all rollouts are displayed to modify the parameters of the selected light.

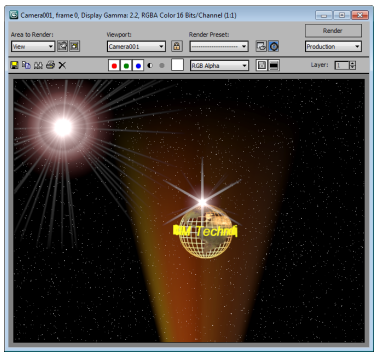


Figure 14-61 *The scene displayed at rendering after setting the parameters in the* ***Far Attenuation*** *area*

31. In the **Spotlight Parameters** rollout, set the values as follows:

    Hotspot/Beam: **5.0** Falloff/Field: **7.0**

32. Invoke the **Zoom Extents All** tool and align *Spot002* in viewports, as shown in Figure 14-62.

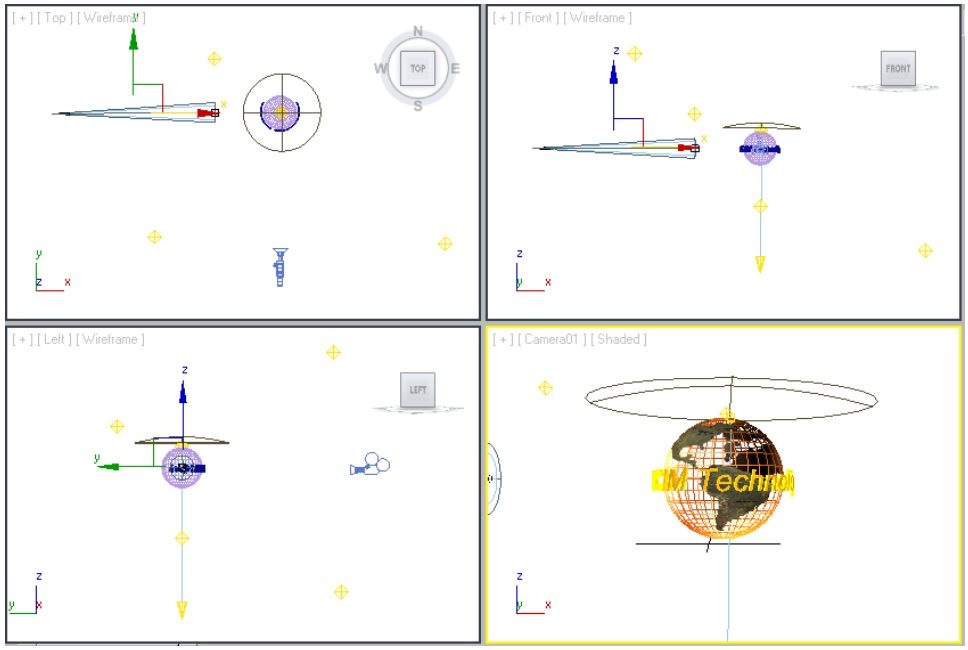


Figure 14-62 *The Spot002 light aligned in viewports*

Next, you need to animate *Spot001*.

33. Invoke the **Select by Name** tool and select *Spot001* and *Spot001.Target* in the Top viewport. Next, invoke the **Zoom Extents All Selected** tool to view the selected light properly.

34. Choose the **Toggle Auto Key Mode** button to turn on the animation mode and then choose the **Go to Start** button to move the time slider to frame 0.

35. Choose the **Go to End** button to move the time slider to frame 1000 and invoke the **Select and Rotate** tool. Next, in the Top viewport, move the cursor over the X-axis and rotate the *Spot001* and *Spot001.Target* in the clockwise direction until the value in the **Z** spinner becomes **-360** in the coordinate display.

36. Choose the **Toggle Auto Key Mode** button to turn off the animation mode.

Animating Wireframe Earth Sphere and Text

In this section, you will animate *wireframe earth sphere* and *Text001* in the opposite directions.

1. Activate the Top viewport and select *wireframe earth sphere*. Then, invoke the **Zoom Extents All Selected** tool; *wireframe earth sphere* is zoomed in all viewports, as shown in Figure 14-63.

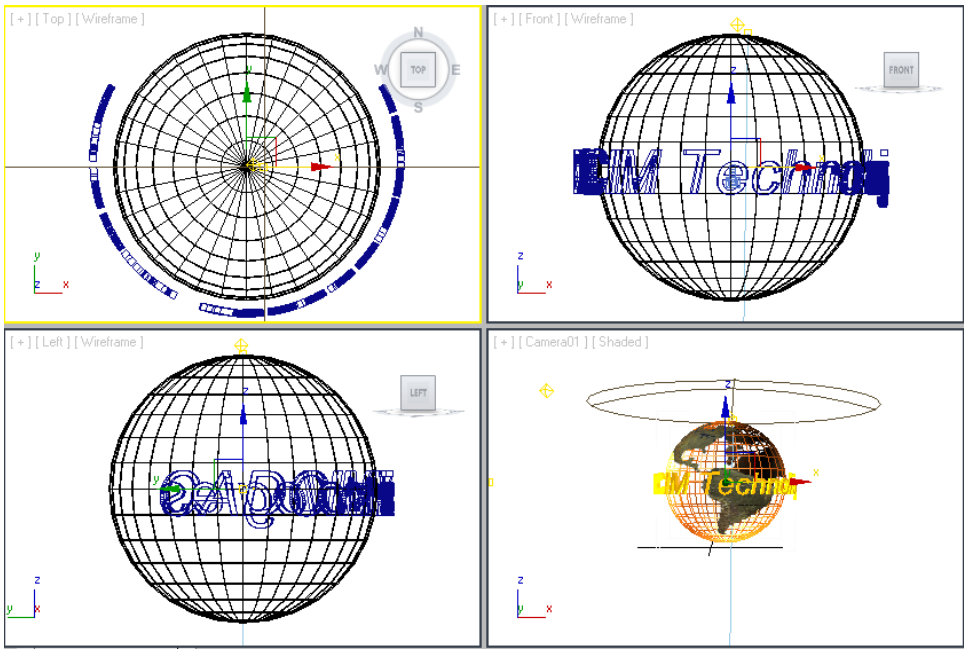


Figure 14-63 *The wireframe earth sphere zoomed in viewports*

Note

When you invoke a tool from the viewport navigation controls, it does not affect the Camera001 viewport.

2. Choose the **Toggle Auto Key Mode** button to turn on the animation mode and choose the **Go to Start** button to move the time slider to frame 0.

3. Choose the **Go to End** button to move the time slider to frame 1000 and then invoke the **Select and Rotate** tool. In the Top viewport, move the cursor over the X-axis and rotate *wireframe earth sphere* in the counterclockwise direction until the value in the **Z** spinner becomes **360** in the coordinate display.

4. Choose the **Toggle Auto Key Mode** button to turn off the animation mode.

   Next, you need to animate *Text001* around *wireframe earth sphere*.

5. Select *Text001* in the Top viewport and choose the **Hierarchy** tab in the **Command Panel**. In the **Adjust Pivot** rollout, choose the **Affect Pivot Only** button; the pivot point of *Text001* is displayed in the viewport, as shown in Figure 14-64.

6. Align the pivot point of *Text001* at the center of *wireframe earth sphere*, as shown in Figure 14-65. Then, choose the **Affects Pivot Only** button again to deactivate it.

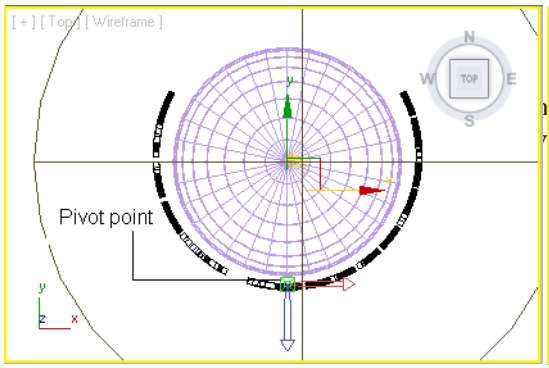


Figure 14-64 *The pivot point of the Text001 displayed in the Top viewport*

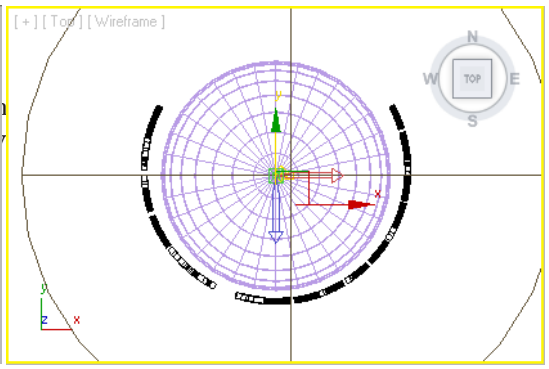


Figure 14-65 *The pivot point of the Text001 aligned in the Top viewport*

7. Invoke the **Select and Rotate** tool and rotate *Text001* in the Top viewport along the Z-axis until the value in the **Z** spinner becomes **-180** in the coordinate display. Next, invoke the **Select and Move** tool and align *Text001*, as shown in Figure 14-66.

8. Right-click on the **Select and Rotate** tool; the **Rotate Transform Type-In** dialog box is displayed. Enter **10** in the **Z** spinner of the **Offset:Screen** area and press the ENTER key; *Text001* rotates in the Front viewport, as shown in Figure 14-67.

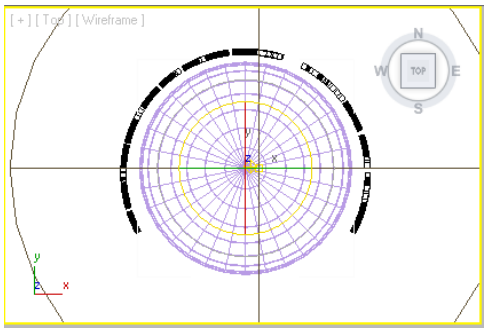


Figure 14-66 *The Text001 rotated in the Top viewport*

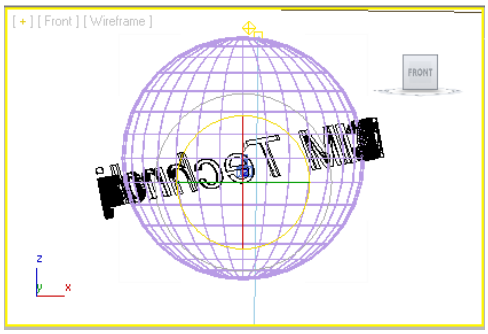


Figure 14-67 *The Text001 rotated in the Front viewport*

9. Choose the **Toggle Auto Key Mode** button to turn on the animation mode. Choose the **Go to End** button to move the time slider to frame 1000 and make sure that *Text001* is selected. Activate the Front viewport. Right-click on the **Select and Rotate** tool; the **Rotate Transform Type-In** dialog box is displayed. Enter **-360** in the **Y** spinner of the **Offset:Screen** area and press the ENTER key.

10. Choose the **Toggle Auto Key Mode** button to turn off the animation mode and choose the **Play Animation** button to view the animation.

Saving and Rendering the Scene

In this section, you will save the scene and then render it. You can also view the final rendered image sequence by downloading the file *c14_3dsmax_2014_rndr.zip* from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2014: A Comprehensive Guide*

1. Choose **Save** from the **Application** menu.

2. To view the final output of the scene that contains all movements, textures, lights, and animations, you need to render the scene. To do so, follow the procedure described in Tutorial 1 of this chapter.

Self-Evaluation Test

Answer the following questions and then compare them to those given at the end of this chapter:

1. Which of the following buttons is used to turn on the animation mode?

   (a) **Toggle Auto Key Mode** (b) **Toggle Set Key Mode**
   (c) Both a and b (d) None of these

2. Which of the following tools is used to control the animation keys in an animation?

   (a) **Track View** (b) **Key Mode Toggle**
   (c) **Play Animation** (d) **Time Configuration**

3. Which of the following modifiers is used to create morphing in objects?

   (a) **Morph** (b) **Scatter**
   (c) **Mesher** (d) **Terrain**

4. Which of the following options is used to add special effects on rendering in the **Rendering** pull-down menu?

   (a) **Render** (b) **Material Editor**
   (c) **Effects** (d) None of these

5. In the set key animation mode, you need to set the keys for the animation of the selected object by choosing the **Set Keys** button. (T/F)

6. To move the time slider to another frame, you can enter the frame number directly in the **Current Frame (Go to frame)** spinner. (T/F)

7. The **Time Configuration** button is used to set the animation length by defining the number of frames in the track bar. (T/F)

8. The _____ button is used to jump between the keyframes directly.

9. The _____ displays the timeline with the frame numbers in it.

10. To render the final animation, you need to invoke the _____ tool in the **Main Toolbar**.

Review Questions

Answer the following questions:

1. Which of the following effects can be assigned to the rendered scene from **Rendering > Effects** in the menu bar?

   (a) **Blur** (b) **Lens Effects**
   (c) **Motion Blur** (d) All of these

2. Which of the following options in the **Animation** pull-down menu is used to create a preview animation?

   (a) **View Preview** (b) **Make Preview**
   (c) **Rename Preview** (d) None of these

3. Which of the following areas in the **Render Setup** dialog box is used to decide whether Autodesk 3ds Max will use the full resolution maps or the proxies of maps at rendering ?

   (a) **Render Output** (b) **Time Output**
   (c) **Advanced Lighting** (d) **Bitmap Performance and Memory Options**

4. In the **Curve Editor** mode of the track view, the animation is displayed as a spreadsheet of keys. (T/F)

5. The options in the **Frame Rate** area of the **Time Configuration** dialog box are used to define a particular frame rate for animation in frames per second. (T/F)

6. The **Playback** area in the **Time Configuration** dialog box is used to slow down the speed of the animation. (T/F)

7. To assign the **NVIDIA mental ray** renderer for rendering the animation, you need to invoke the **Quick Render (Production)** tool in the **Main Toolbar**. (T/F)

8. To create the preview of an animation, select the _____ option from the _____ pull-down menu.

9. To save the rendered animation, you need to define a file with the _____ extension in the _____ area of the **Render Setup** dialog box.

10. The _____ button is used to play the animation of an object in the viewport.

EXERCISES

The rendered output of the scene used in the following exercises can be accessed by downloading the *c14_3dsmax_2014_exr.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2014: A Comprehensive Guide*

Exercise 1

Start 3ds Max 2014 and then perform the following operations:

Create different primitives at some distance in the Top viewport and try the following steps:

1. Create a free camera in the viewport. Next, create an animation of the camera using the auto key animation mode such that it touches the top of all primitives one by one. Also, create the same animation using the set key animation mode and notice the difference.

2. Create an omni light in the scene, choose the **Modify** tab, and expand the **Atmospheres & Effects** rollout. Then, add atmospheric effects to the light to view special effects on rendering.

3. Select the free camera in the viewport and invoke the **Curve Editor** tool in the **Main Toolbar**; the **Track View - Curve Editor** dialog box is displayed. Next, edit the keys in the edit window and notice the effect in your animation.

4. Invoke the **Render Scene Dialog** tool; the **Render Scene** dialog box is displayed. In the **Assign Renderer** rollout, set the **NVIDIA mental ray** renderer to render the Camera001 viewport and view the difference in the final output.

5. Select the **Make Preview** option from the **Animation** pull-down menu; the **Make Preview** dialog box is displayed. Set the parameters for different options and choose the **Create** button to create the preview of the animation.

6. Choose **Rendering > Effects** from the menu bar and add special effects to the scene.

Exercise 2

Create the early morning scene and animate the sea water, refer to Figure 14-68.

(Expected time: 30 min)

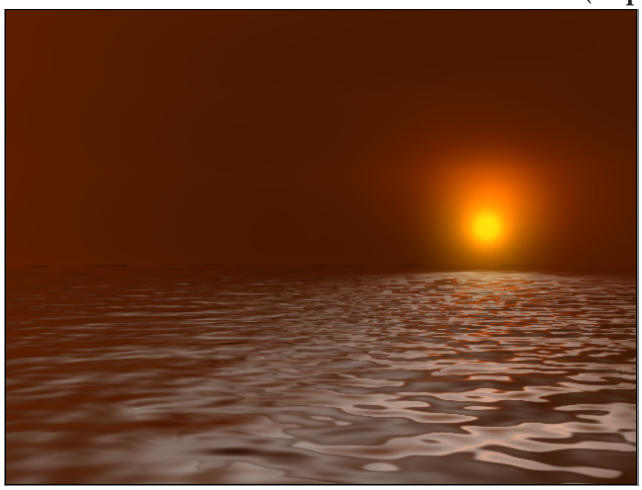


Figure 14-68 *The morning scene*

Hints:

1. Create an omni light for the sun effect and use the **Lens** effects in it.
2. Create water as discussed in Tutorial 1 of this chapter.

Exercise 3

Create the solar system using the standard primitives and lights, as shown in Figure 14-69.

(Expected time: 60 min)

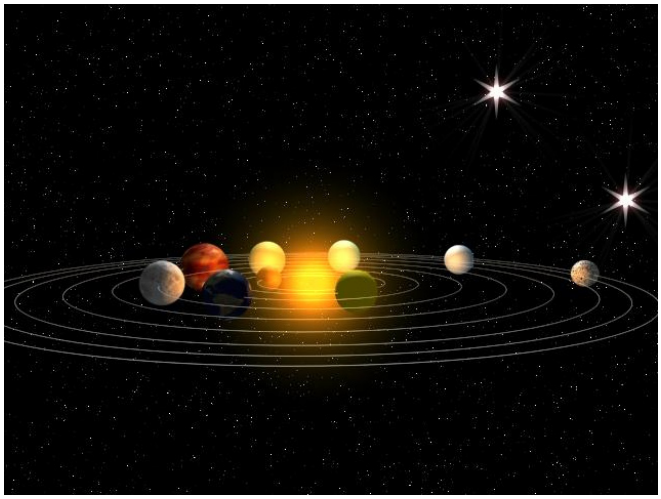


Figure 14-69 *The solar system*

Answers to Self-Evaluation Test

1. c, **2.** a, **3.** a, **4.** c, **5.** T, **6.** T, **7.** T, **8. Key Mode Toggle**, **9.** track bar, **10. Render Production**

15

Systems, Hierarchy, and Kinematics

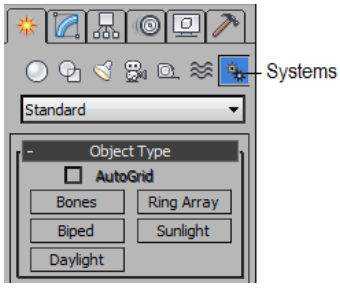


Figure 15-1 *The* ***Systems*** *in the* ***Command Panel***

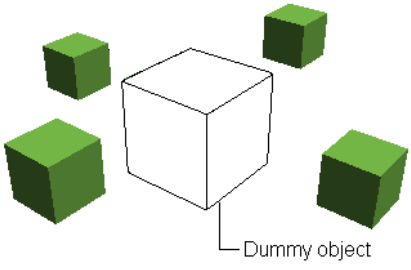


Figure 15-2 *The Ring Array system*

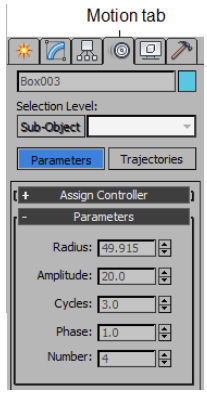


Figure 15-3 *The* ***Parameters*** *rollout in the* ***Motion*** *tab*

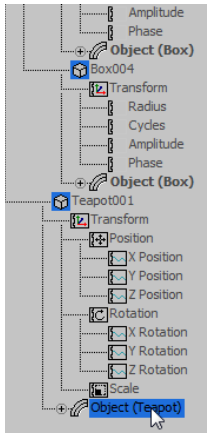


Figure 15-4 *The object selected in the hierarchy tree to replace the boxes of the Ring Array system*

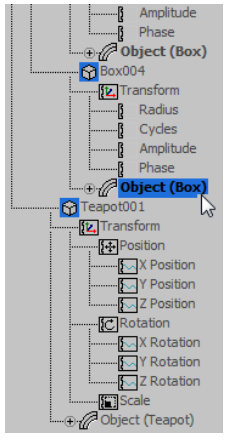


Figure 15-5 *The box selected in the hierarchy tree to be replaced with the object*

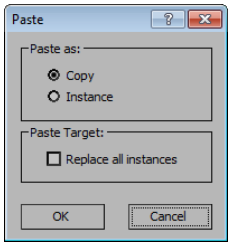


Figure 15-6 *The* ***Paste*** *dialog box*

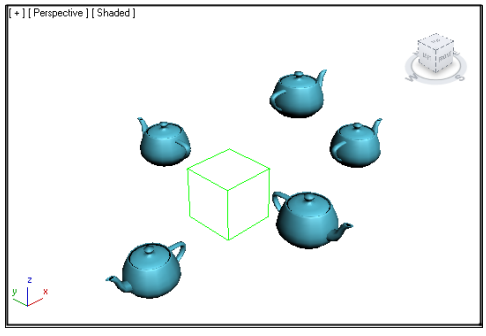


Figure 15-7 *The boxes of the Ring Array system replaced with the object (teapot)*

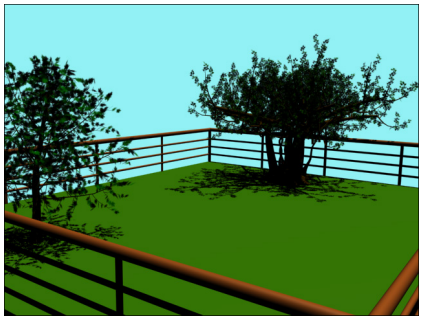


Figure 15-8 *The scene after creating the Sunlight system*

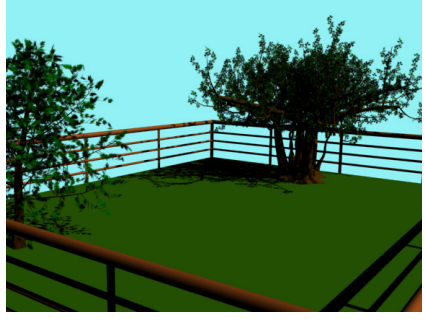


Figure 15-9 *The scene after changing the position of the sun*

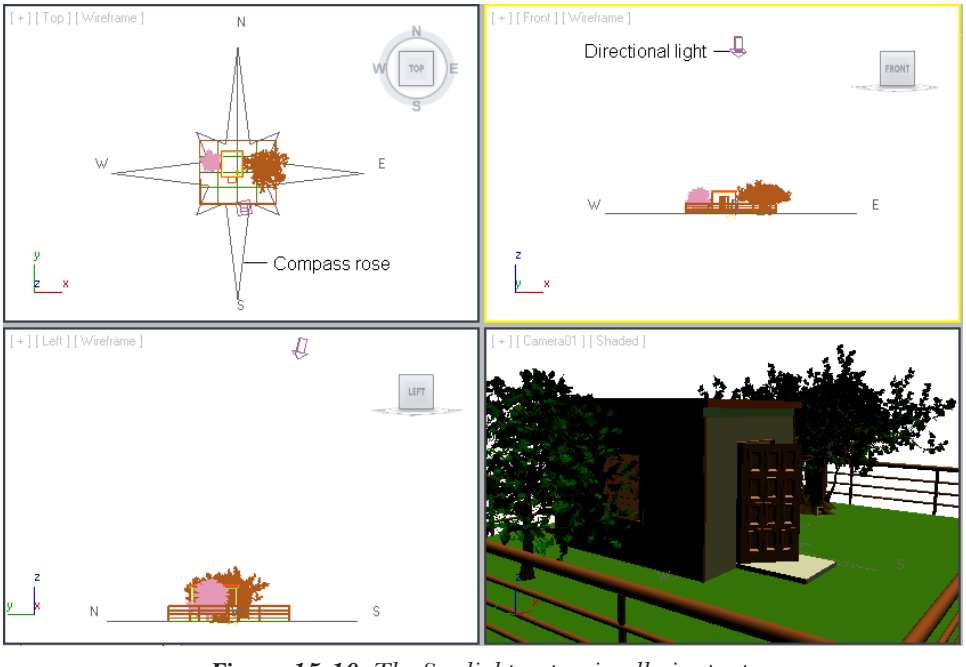


Figure 15-10 *The Sunlight system in all viewports*

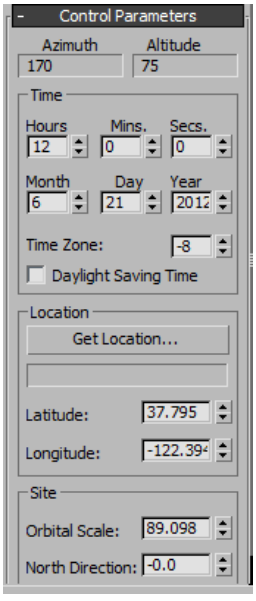


Figure 15-11 *The* ***Control Parameters*** *rollout*

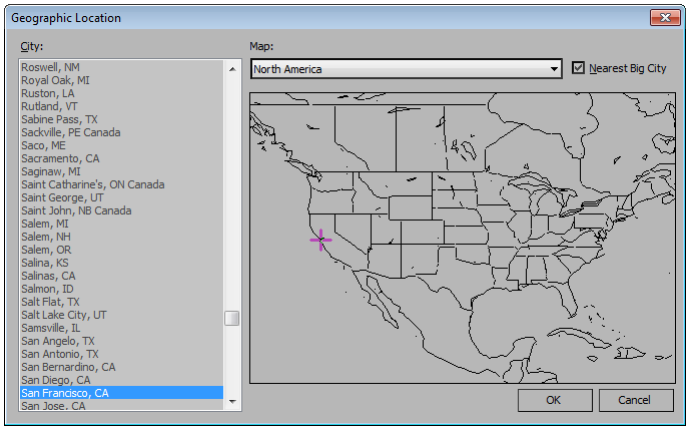


Figure 15-12 *The* ***Geographic Location*** *dialog box*

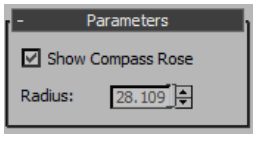


Figure 15-13 *The* ***Parameters*** *rollout*

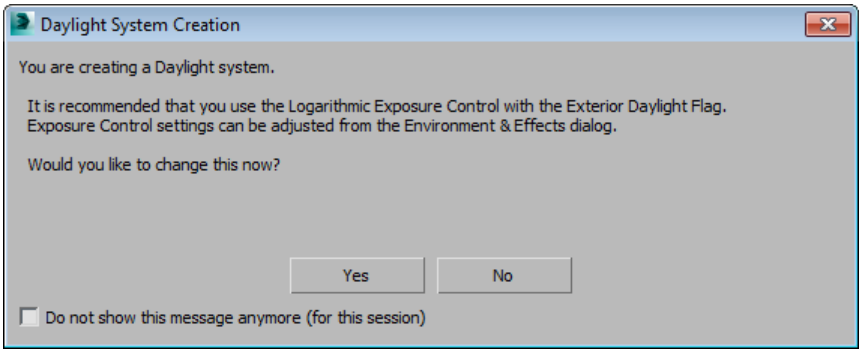


Figure 15-14 The ***Daylight System Creation*** *message box*

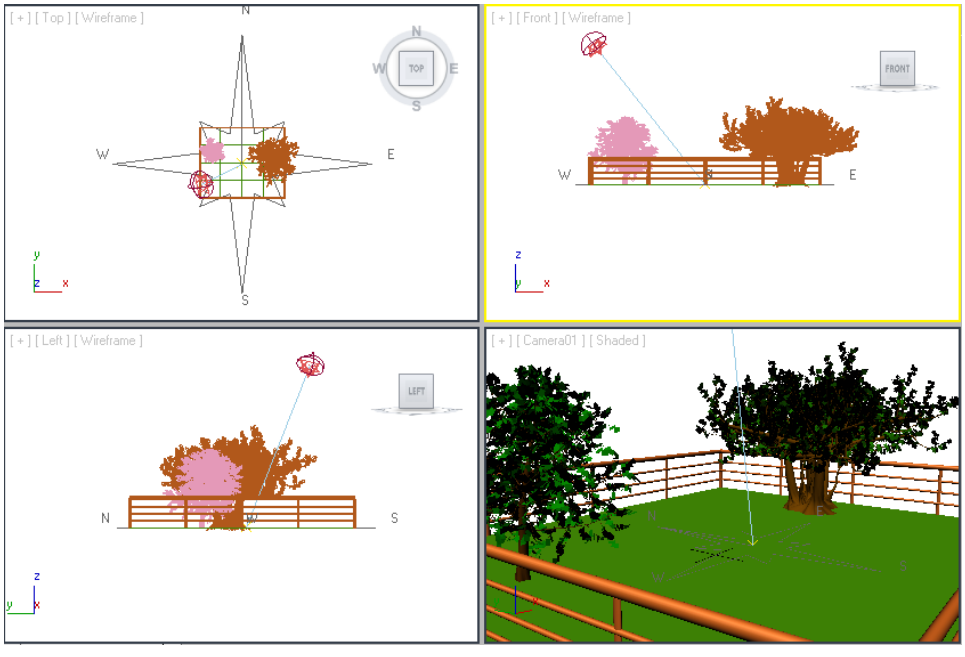


Figure 15-15 The Daylight system created in viewports

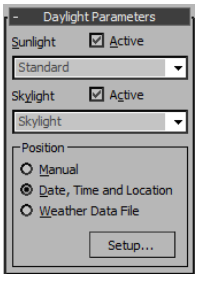


Figure 15-16 The ***Daylight Parameters*** *rollout*

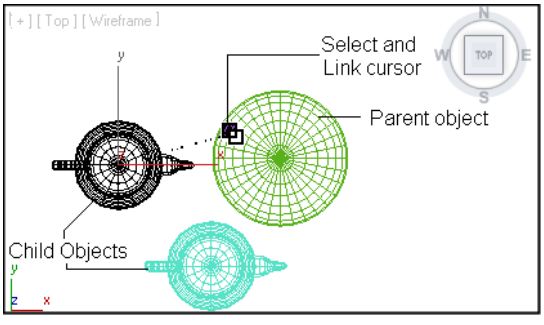


Figure 15-17 *The child object linked to the parent object using the* ***Select and Link*** *tool*

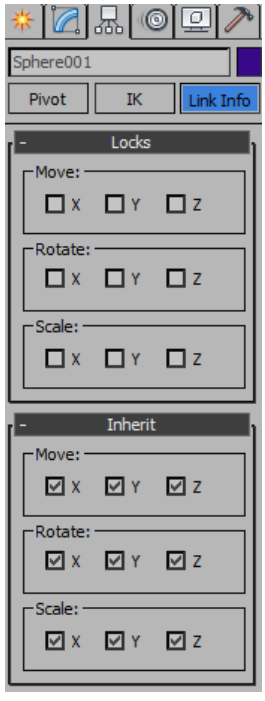


Figure 15-18 *The* ***Link Info*** *button chosen in the* ***Hierarchy*** *tab*

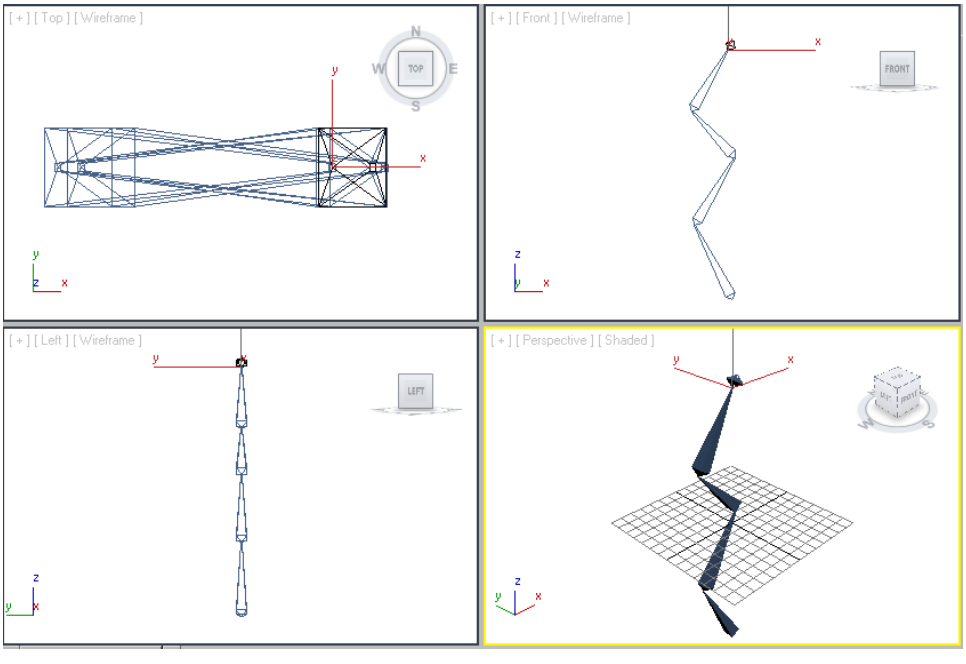


Figure 15-19 *The hierarchy of bones created*

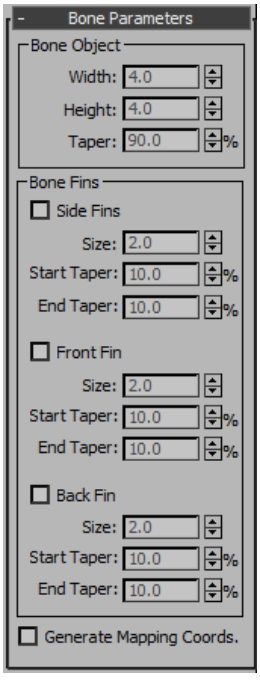


Figure 15-20 *The* ***Bones Parameters*** *rollout*

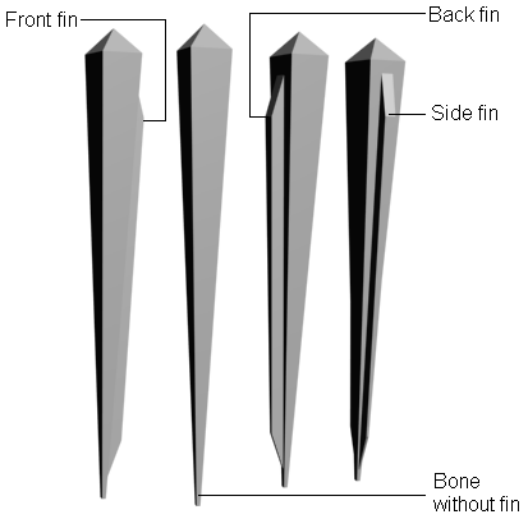


Figure 15-21 *The bones with the fins added to them*

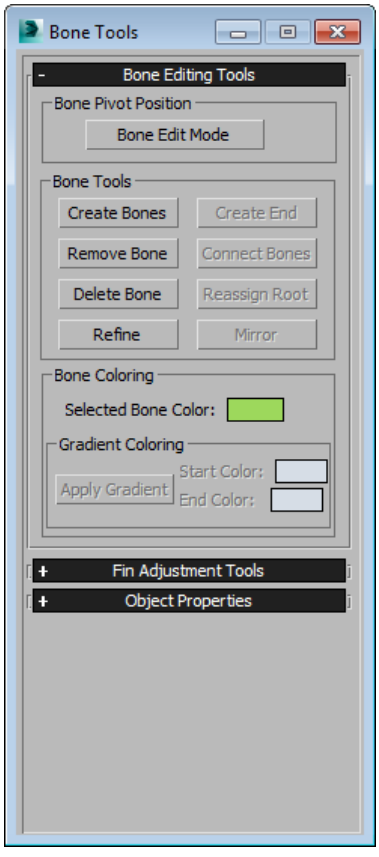


Figure 15-22 *Partial view of the* ***Bone Tools*** *dialog box*

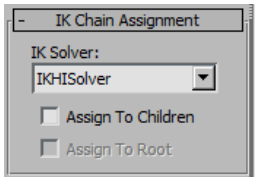


Figure 15-23 *The* ***IK Chain Assignment*** *rollout*

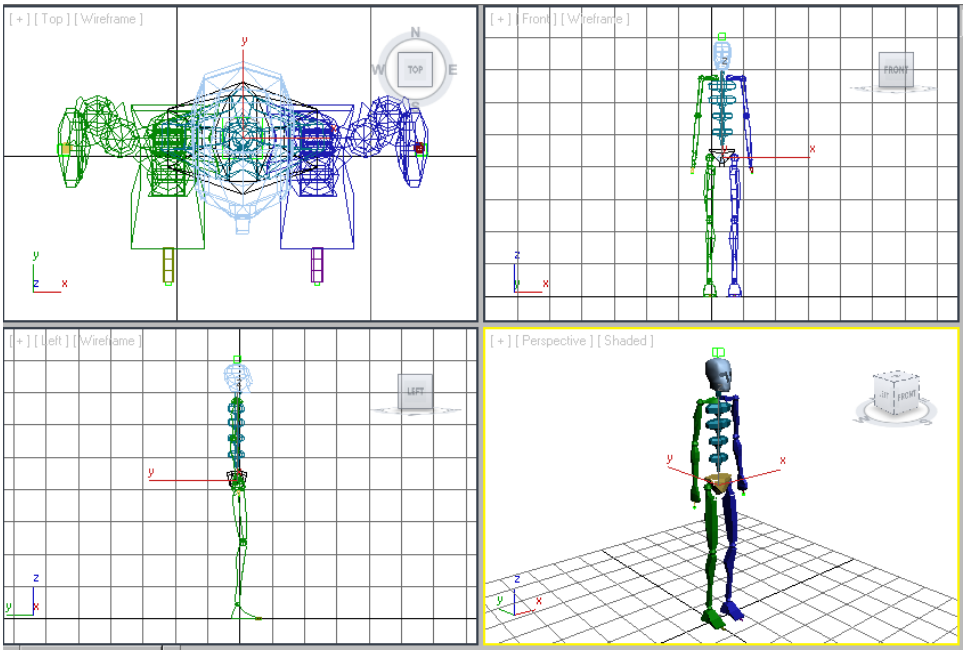


Figure 15-24 *The biped model displayed in viewports*

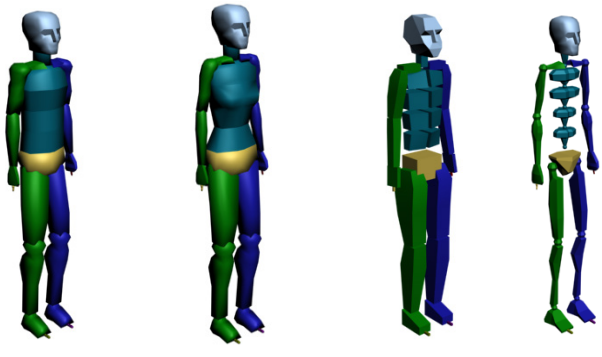


Figure 15-25 *The male, female, classic, and skeleton type biped models*

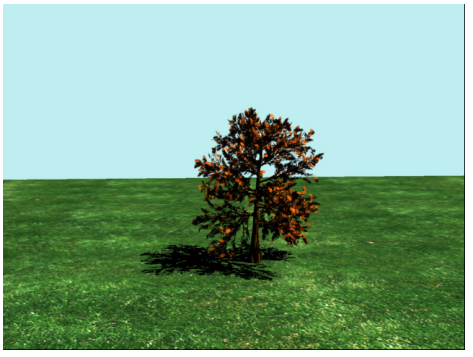


Figure 15-26 *The shadow pattern in the scene*

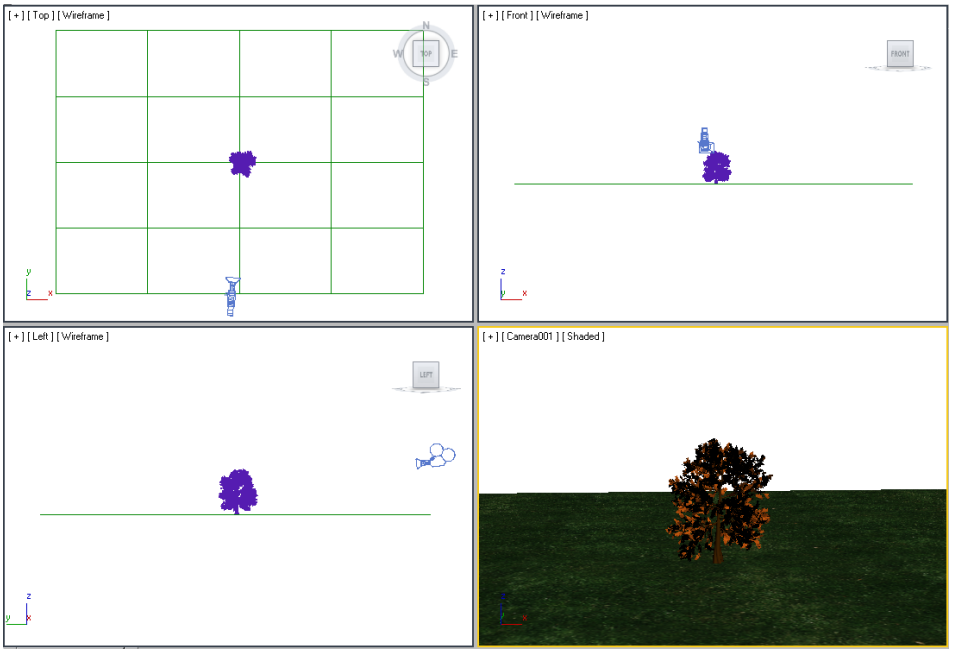


Figure 15-27 *Alignment of the Camera001 in viewports*

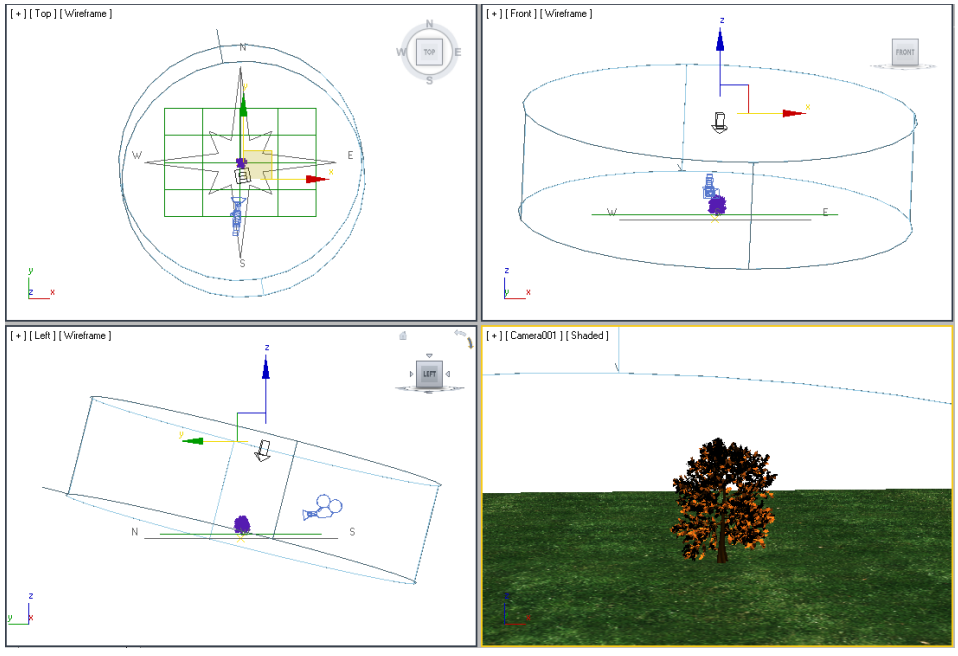


Figure 15-28 *The Sunlight system created in viewports*

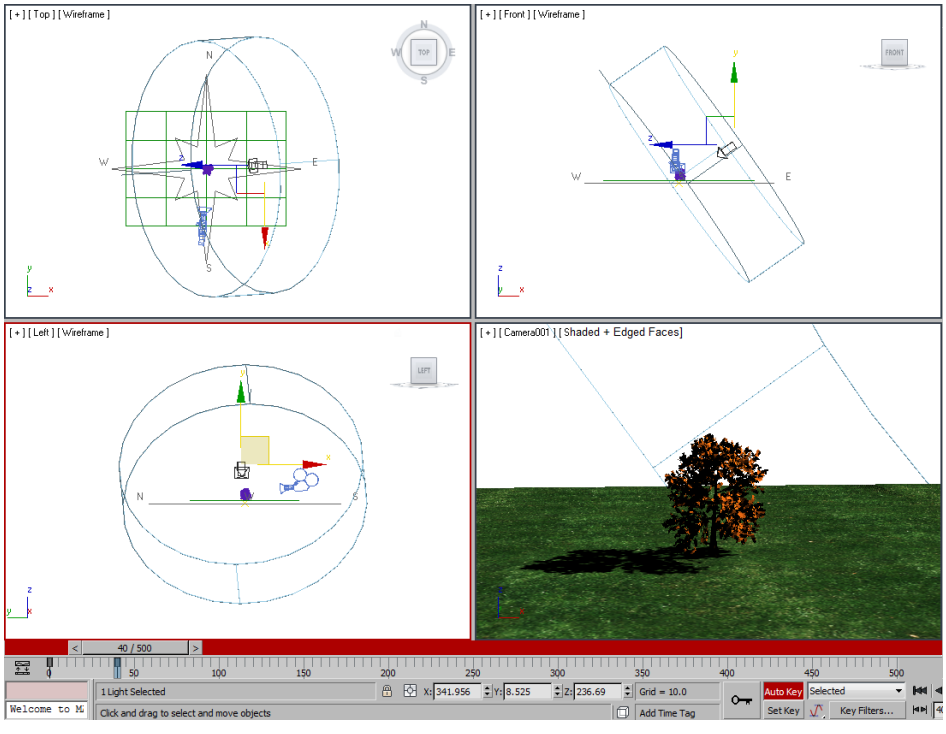


Figure 15-29 *The time slider at frame 40*

Figure 15-30 *The biped model animation*

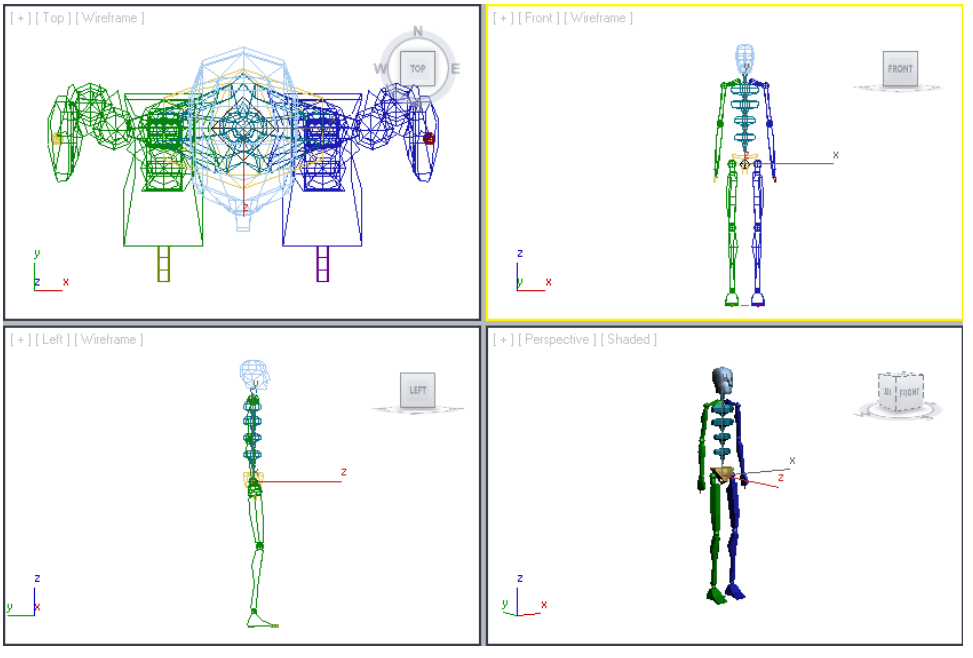


Figure 15-31 *The biped model displayed in viewports*

Figure 15-32 *The rollouts displayed after choosing the* ***Footstep Mode*** *button*

Figure 15-33 *The Top viewport after using the* ***Zoom*** *and* ***Pan*** *tools*

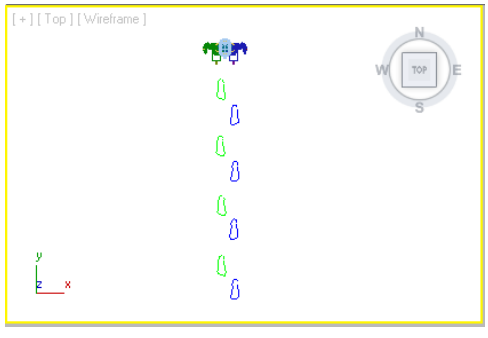


Figure 15-34 *The footsteps created in the Top viewport*

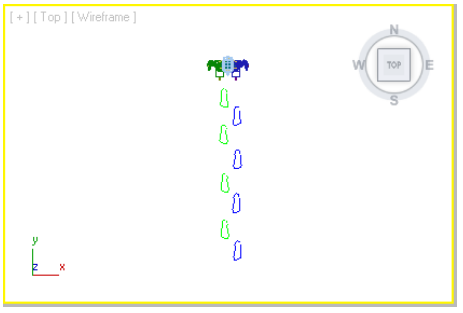


Figure 15-35 *The footsteps aligned using the* ***Select and Move*** *tool*

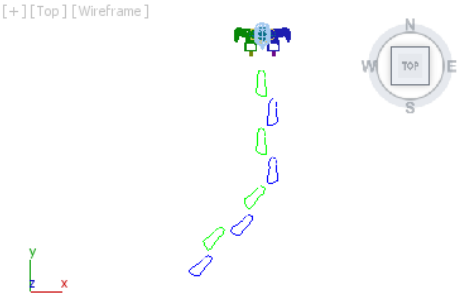


Figure 15-36 *The footsteps after rotating them in the Top viewport*

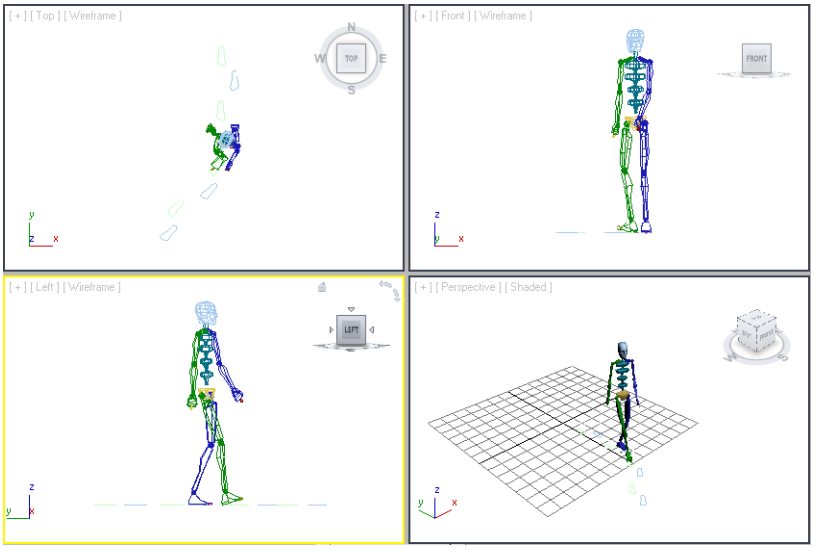


Figure 15-37 *The biped model moving after choosing the* ***Play Animation*** *button*

Figure 15-38 *New footsteps created in the Top viewport*

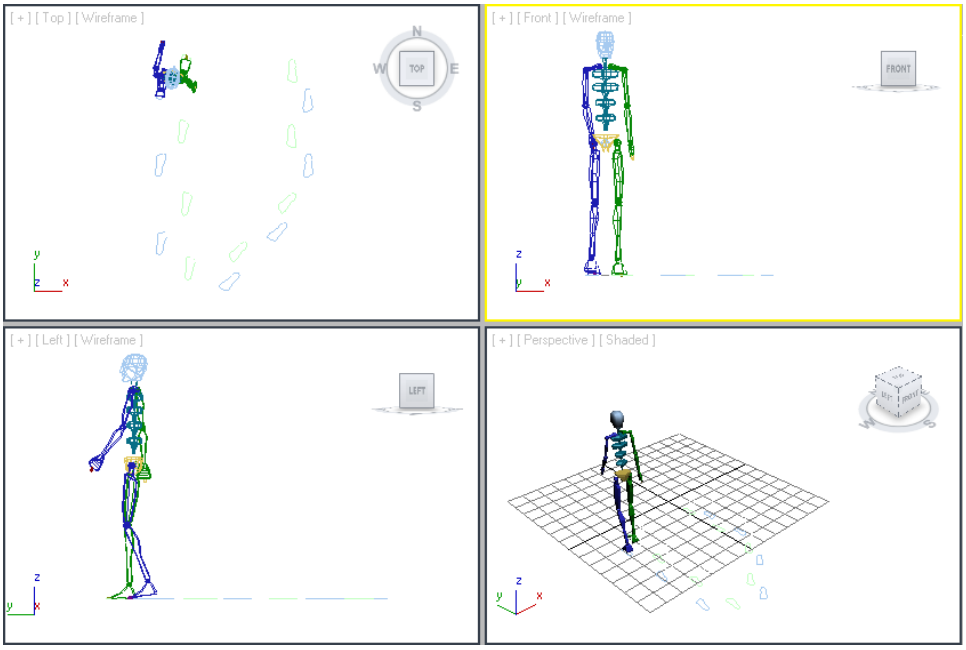


Figure 15-39 *The biped model moving according to the newly created footsteps*

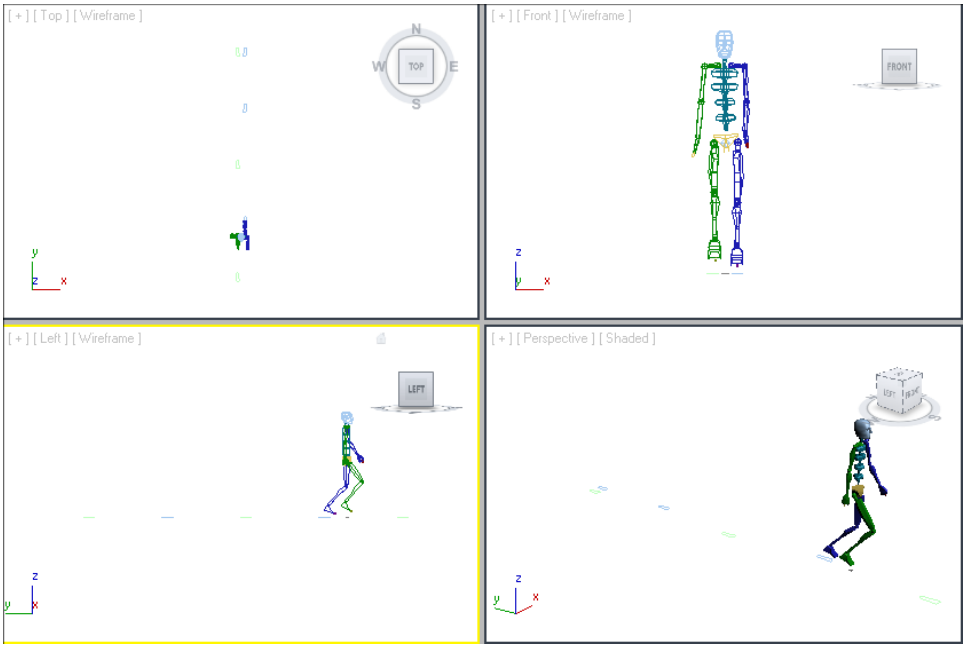


Figure 15-40 *The running biped model in viewports*

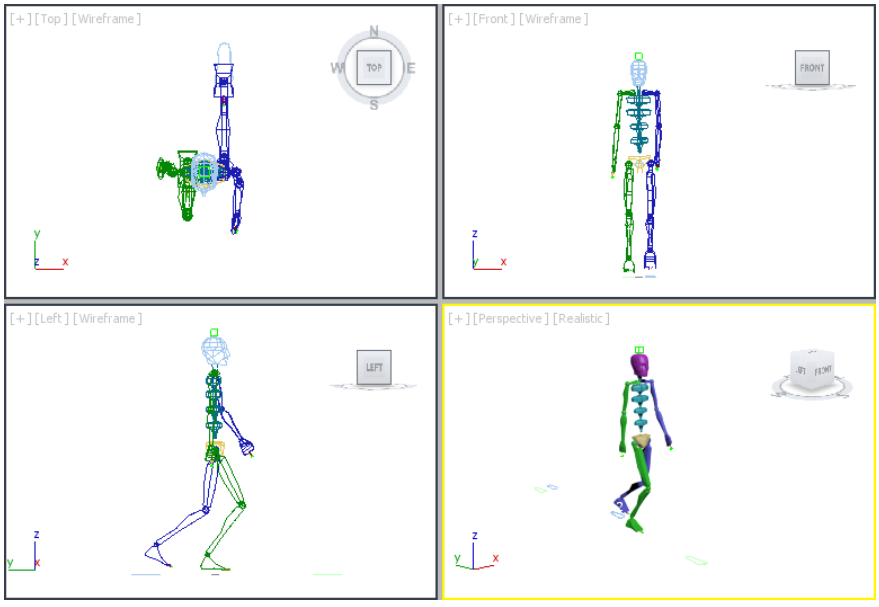


Figure 15-41 *The Bip001 in running position after loading the Run.bip file*

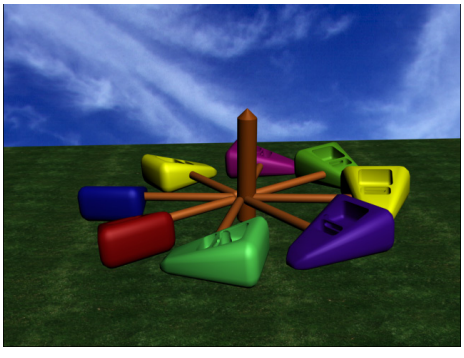


Figure 15-42 *Model to be created in Exercise 1(view 1)*

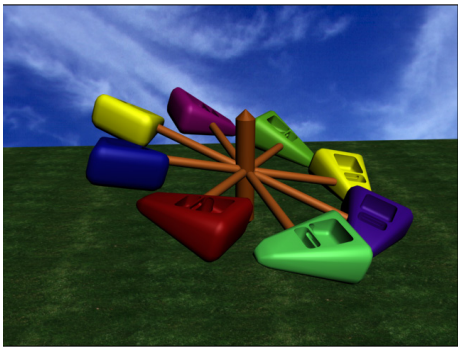


Figure 15-43 *Model to be created in Exercise 1(view 2)*

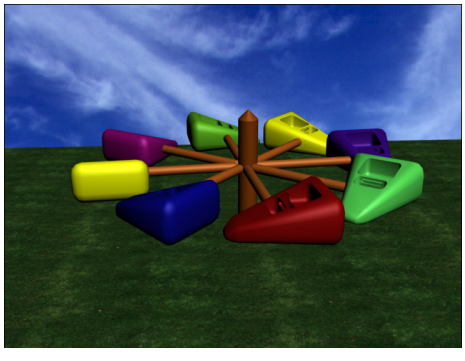
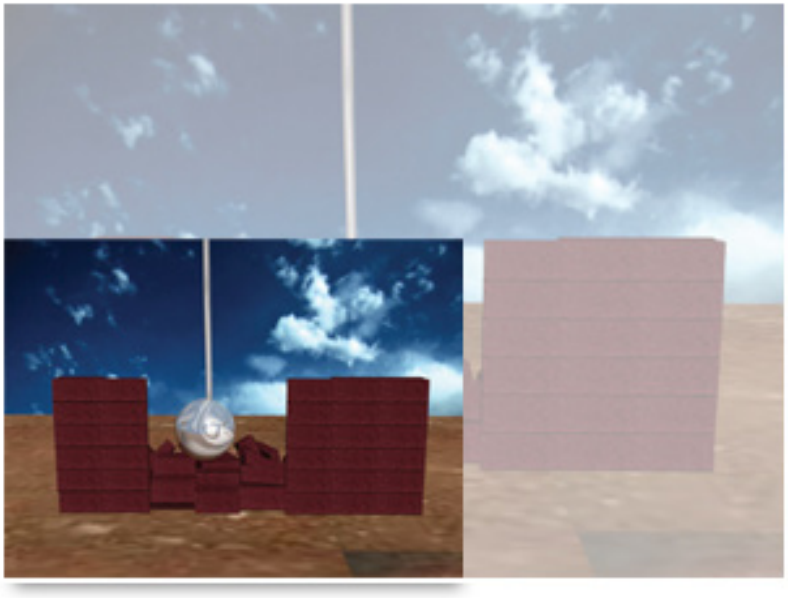


Figure 15-44 *Model to be created in Exercise 1 (view 3)*

16

Rigid Body Dynamics and Helpers



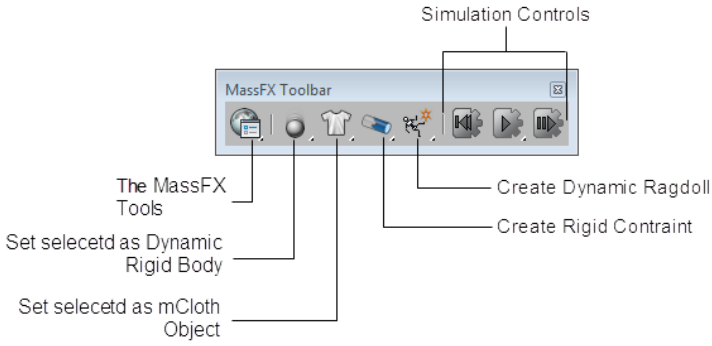


Figure 16-1 *The* ***MassFX Toolbar***

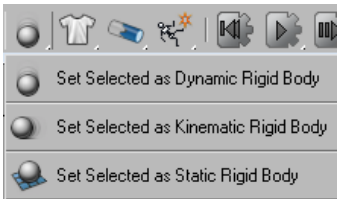


Figure 16-2 *Various options displayed in the flyout*

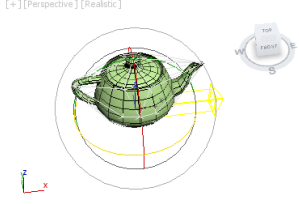


Figure 16-3 *The rigid body with the* ***Initial Velocity*** *sub-object level selected*

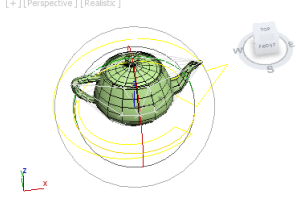


Figure 16-4 *The rigid body with the* ***Initial Spin*** *sub-object level selected*

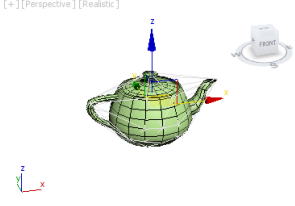


Figure 16-5 *The rigid body with the* ***Center of Mass*** *sub-object level selected*

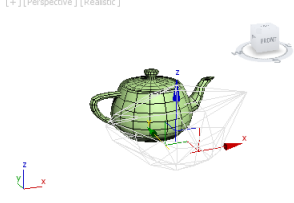


Figure 16-6 *The rigid body with the* ***Mesh Transform*** *sub-object level selected*

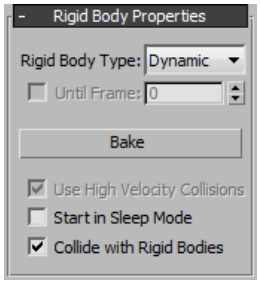


Figure 16-7 *The* ***Rigid Body Properties*** *rollout*

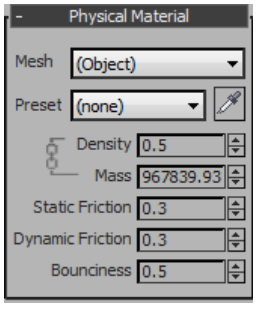


Figure 16-8 *The* ***Physical Material*** *rollout*

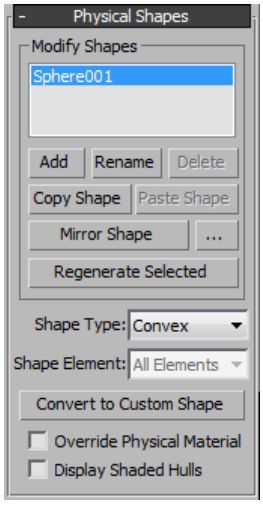


Figure 16-9 *The* ***Physical Shapes*** *rollout*

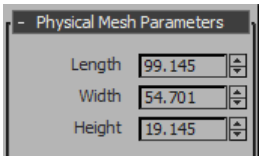


Figure 16-10 *The* ***Physical Mesh Parameters*** *rollout for the* ***Box*** *mesh type*

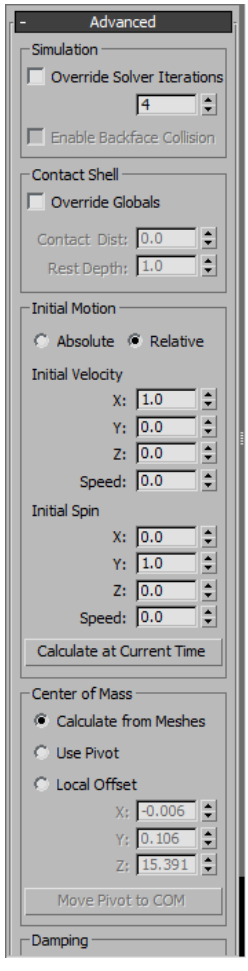


Figure 16-11 *The* ***Advanced*** *rollout*

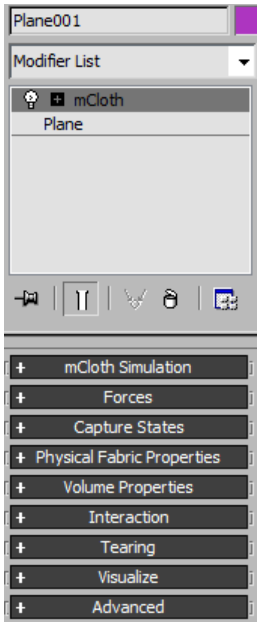


Figure 16-12 *The* ***mCloth*** *modifier in the Modify panel*

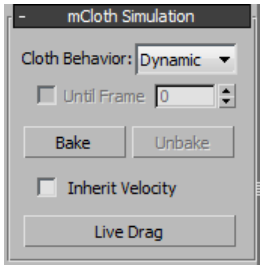


Figure 16-13 *The* ***mCloth Simulation*** *rollout*

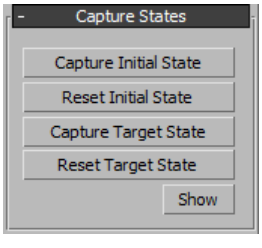


Figure 16-14 *The* ***Capture States*** *rollout*

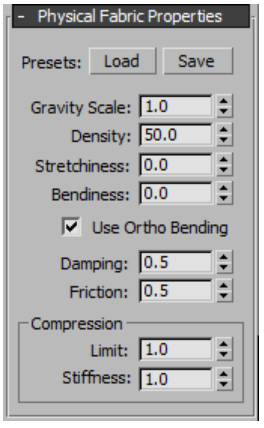


Figure 16-15 *The* ***Physical Fabric Properties*** *rollout*

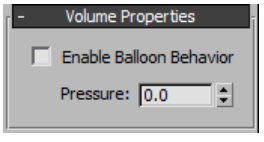


Figure 16-16 *The* ***Volume Properties*** *rollout*

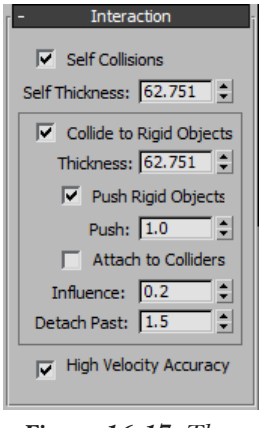


Figure 16-17 *The* ***Interaction*** *rollout*

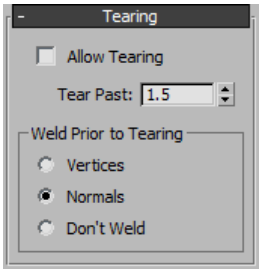


Figure 16-18 *The* ***Tearing*** *rollout*

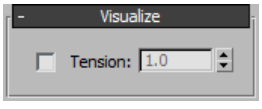


Figure 16-19 *The* ***Visualize*** *rollout*

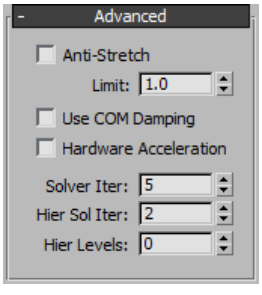


Figure 16-20 *The* ***Advanced*** *rollout*

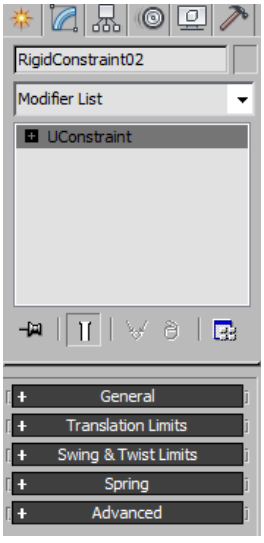


Figure 16-21 *The rollouts of rigid constraint in the Modify panel*

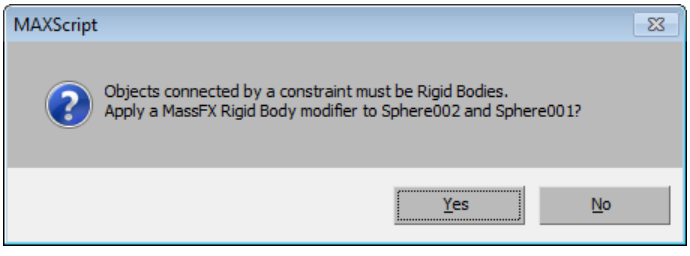


Figure 16-22 *The* ***MAXScript*** *message box*

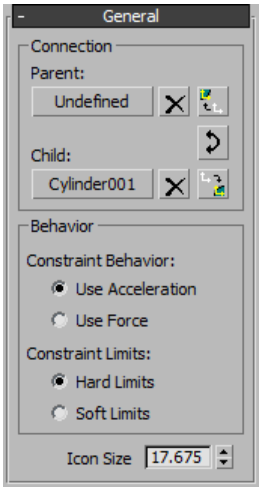


Figure 16-23 *The* ***General*** *rollout*

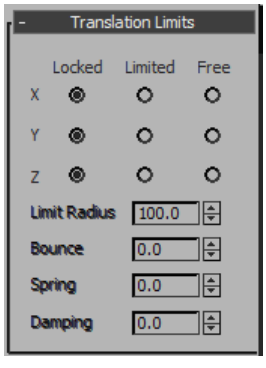


Figure 16-24 *The* ***Translation Limits*** *rollout*

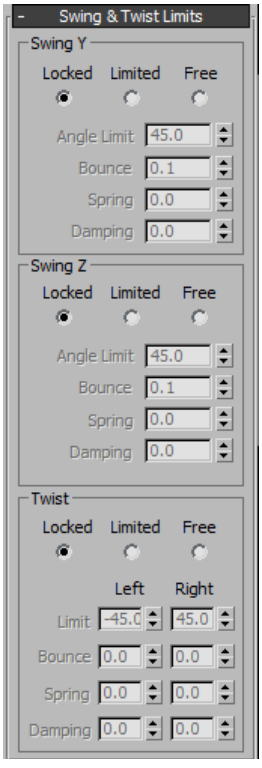


Figure 16-25 The ***Swing & Twist Limits*** *rollout*

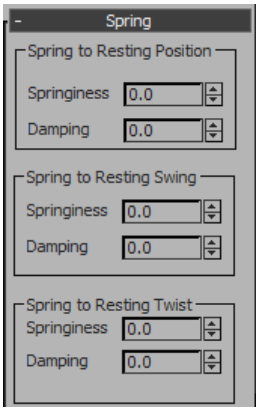


Figure 16-26 The ***Spring*** *rollout*

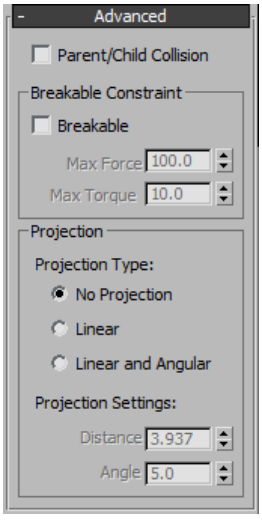


Figure 16-27 The ***Advanced*** *rollout*

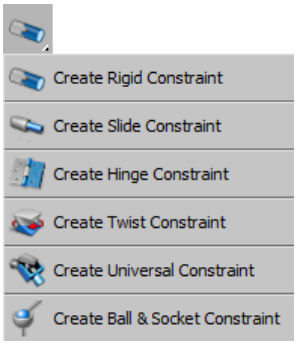


Figure 16-28 *Various options in the flyout*

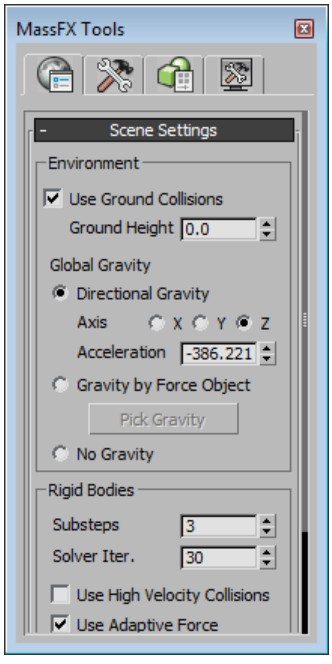


Figure 16-29 *Partial view of the* ***MassFX Tools*** *dialog box*

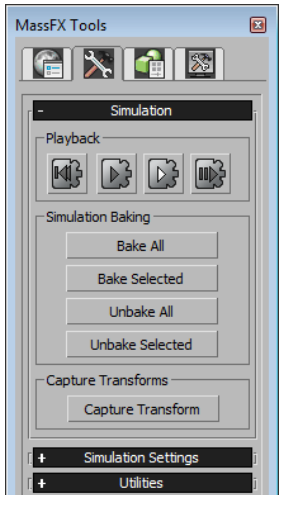


Figure 16-30 *The* ***Simulation***, ***Simulation Settings***, *and* ***Utilities*** *rollouts in the* ***Simulation Tools*** *tab*

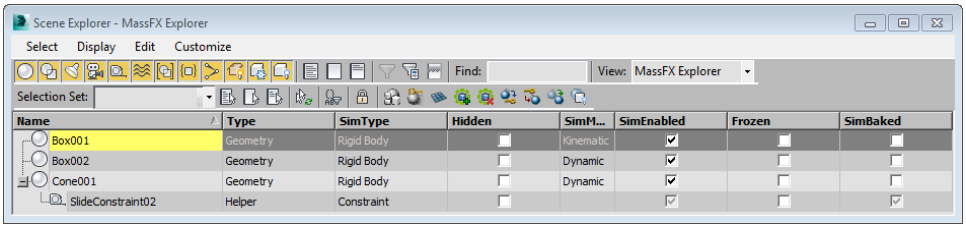


Figure 16-31 *The* ***Scene Explorer - MassFX Explorer*** *window*

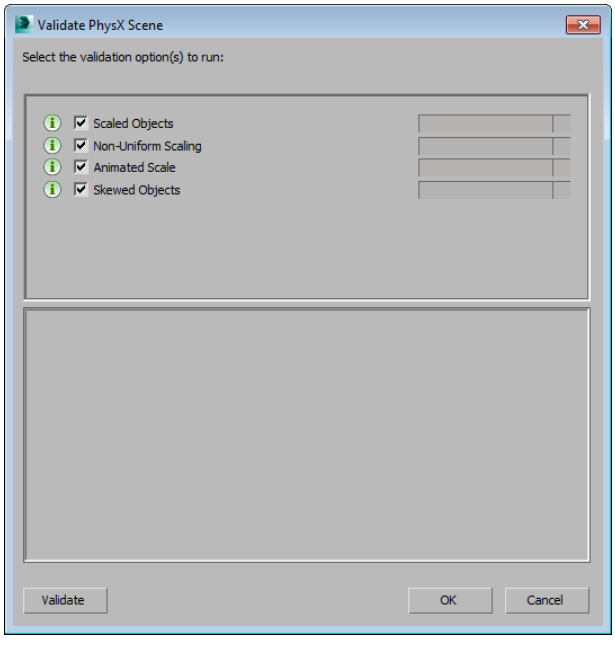


Figure 16-32 *The* ***Validate PhysX Scene*** *dialog box*

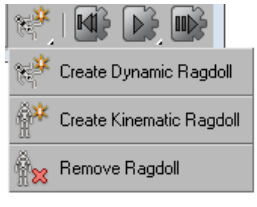


Figure 16-33 *Various options displayed in the Ragdoll flyout*

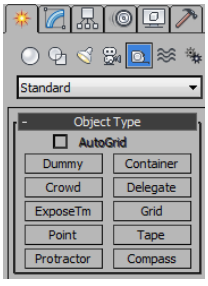


Figure 16-34 *The* ***Helpers*** *button chosen in the* ***Command Panel***

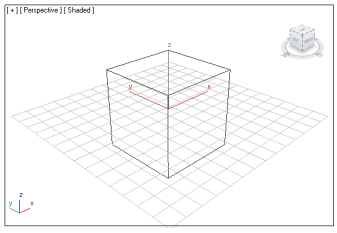


Figure 16-35 *A dummy helper object in the Perspective viewport*

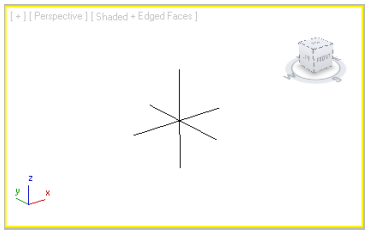


Figure 16-36 *A point helper object*

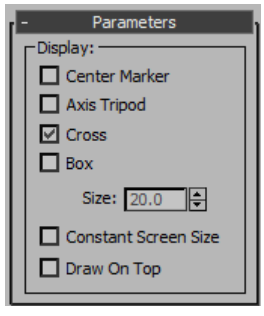


Figure 16-37 *The* ***Parameters*** *rollout*

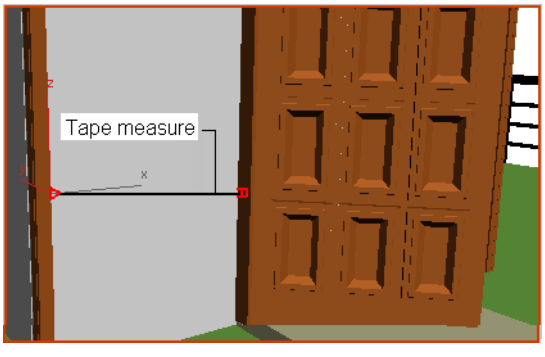


Figure 16-38 *A tape measure created in a scene*

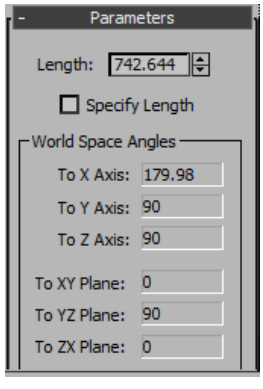


Figure 16-39 *The* ***Parameters*** *rollout*

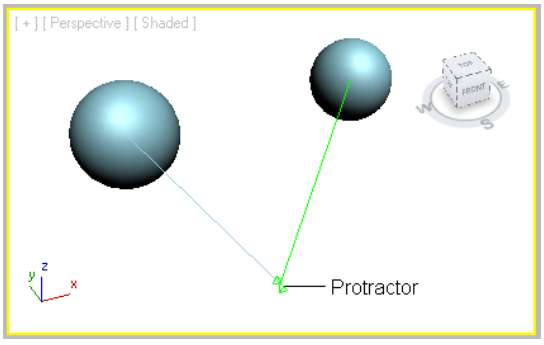


Figure 16-40 *A protractor helper object*

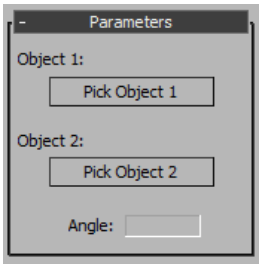


Figure 16-41 *The* ***Parameters*** *rollout*

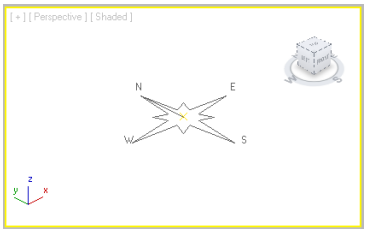


Figure 16-42 *A compass rose*

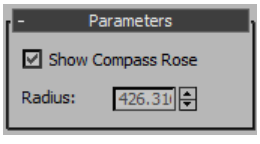


Figure 16-43 *The* ***Parameters*** *rollout*

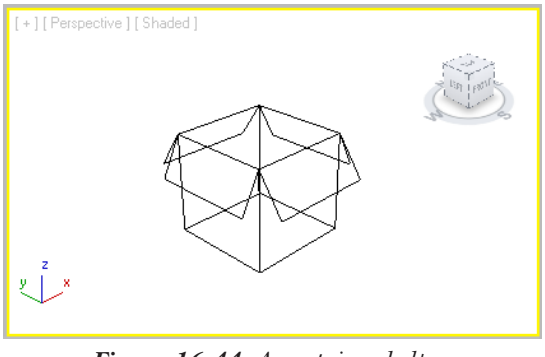


Figure 16-44 *A container helper*

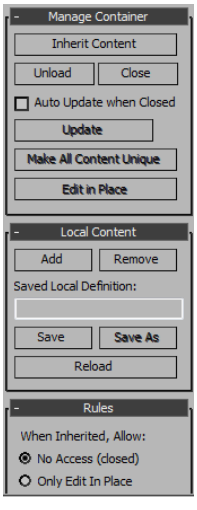


Figure 16-45 *Partial view of various rollouts displayed for the container helper*

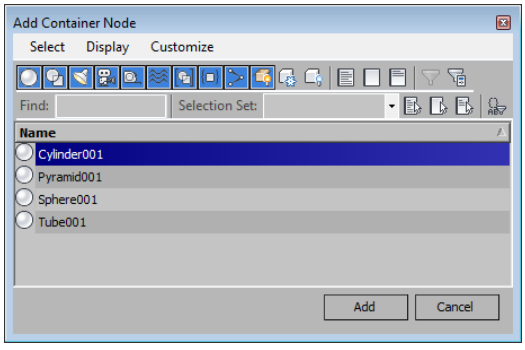


Figure 16-46 *The* ***Add Container Node*** *dialog box*

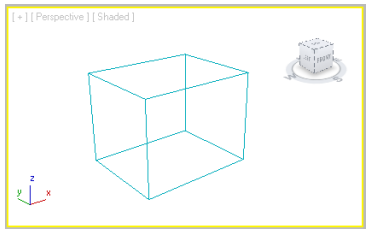


Figure 16-47 *A BoxGizmo helper*

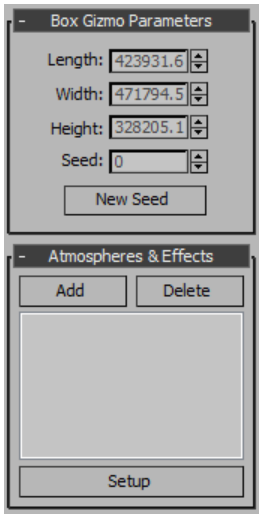


Figure 16-48 *The rollouts for modifying the BoxGizmo helper in the Modify panel*

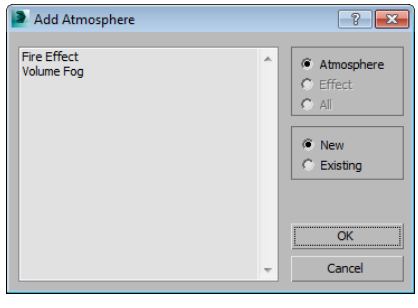


Figure 16-49 *The* ***Add Atmosphere*** *dialog box*

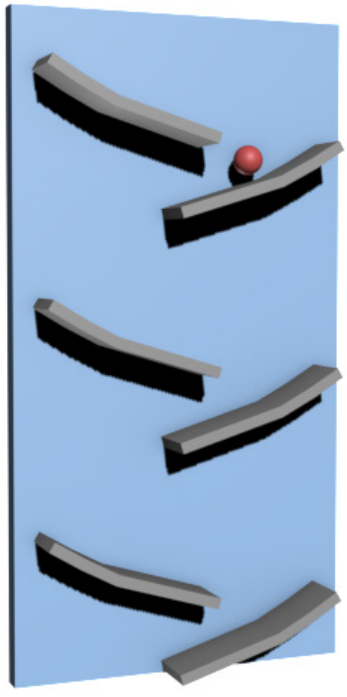


Figure 16-50 *The ball falling on sliders at frame 42*

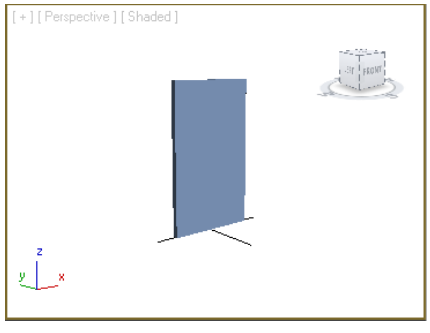


Figure 16-51 *Alignment of back support with the grid*

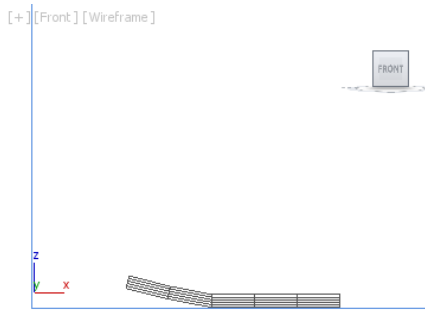


Figure 16-52 *The slider1 geometry after aligning the polygons*

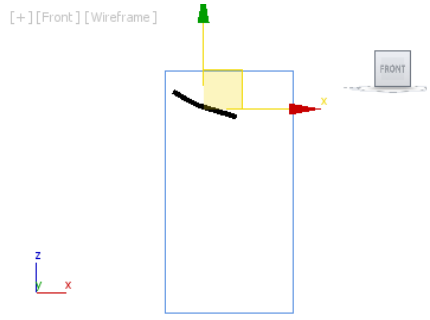


Figure 16-53 *Alignment of the slider1 in the Front viewport*

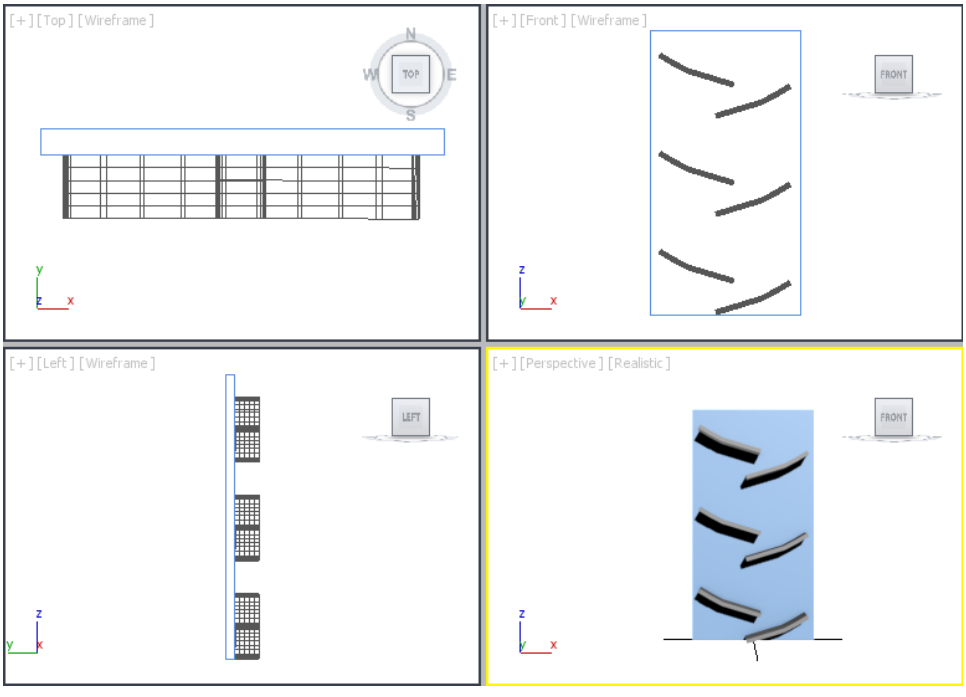


Figure 16-54 *The sliders aligned in the Front viewport*

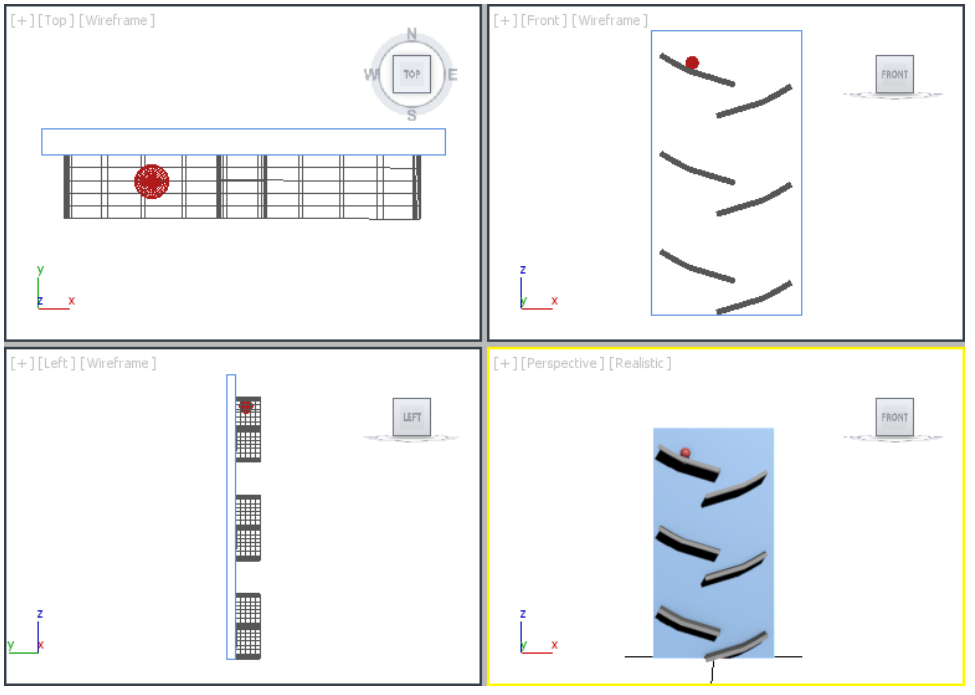


Figure 16-55 *Alignment of ball in viewports*

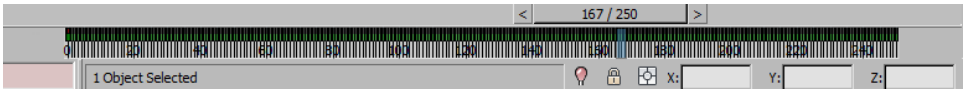


Figure 16-56 *Key animation of ball are baked*

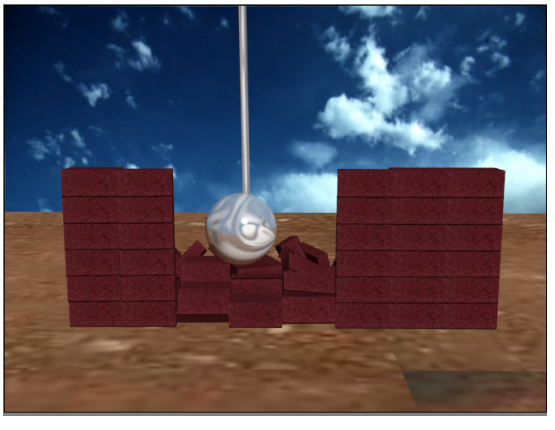


Figure 16-57 *The scene for Tutorial 2*

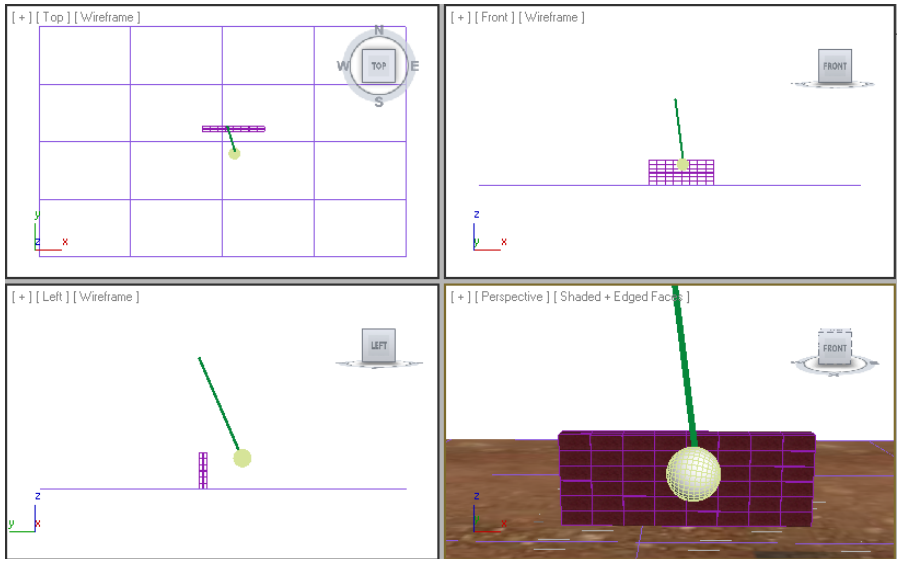


Figure 16-58 *The brick wall with a metal ball and metal rod in viewports*

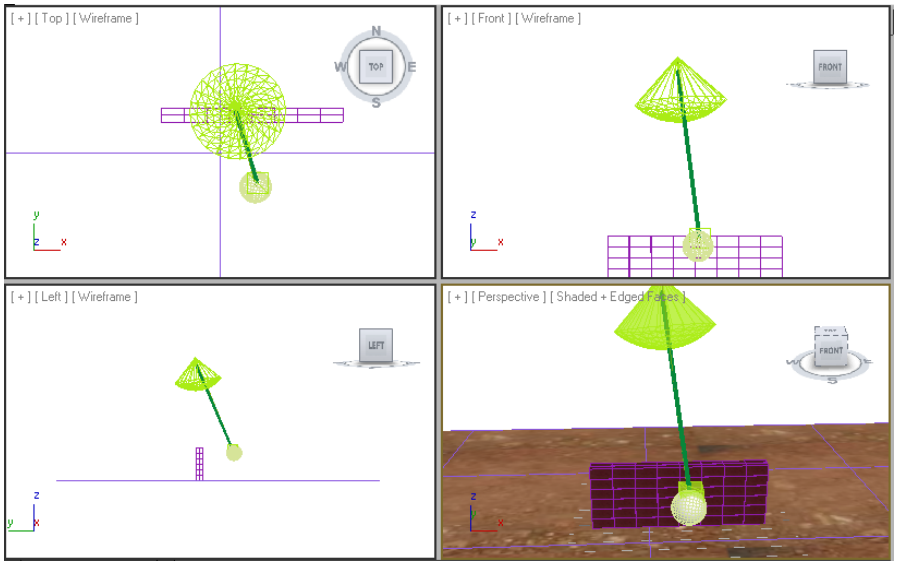


Figure 16-59 *Universal constraint aligned in viewports*

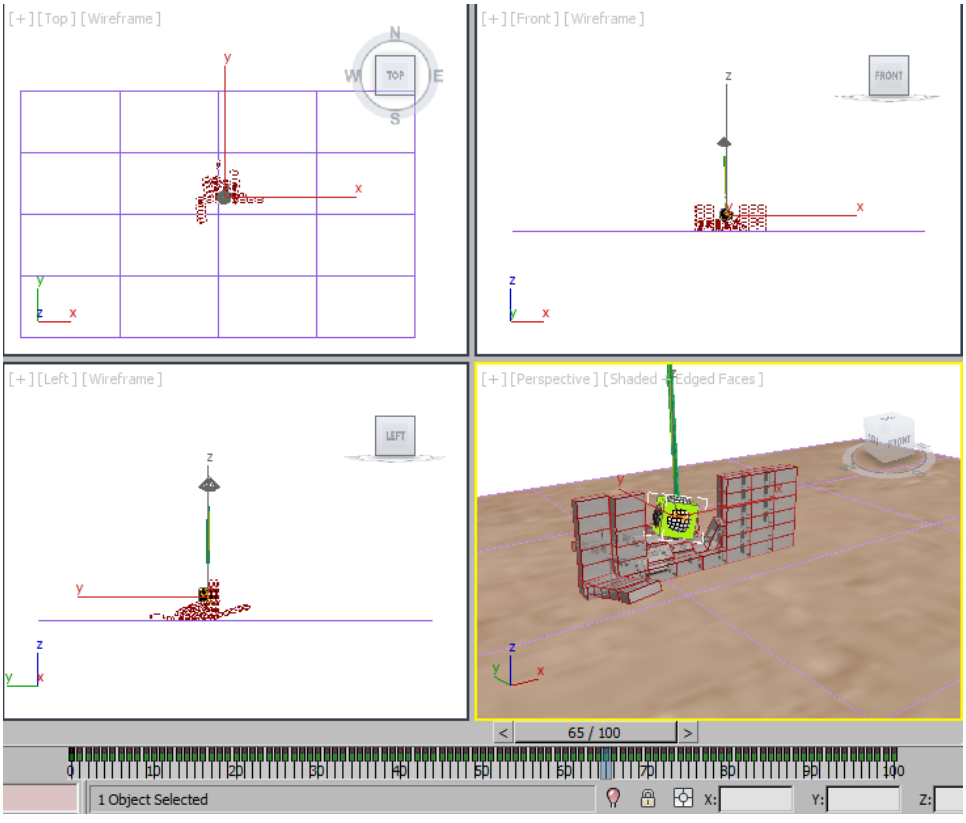


Figure 16-60 *Baked keyframe in the track bar*

Figure 16-61 *Scene for Exercise 1*

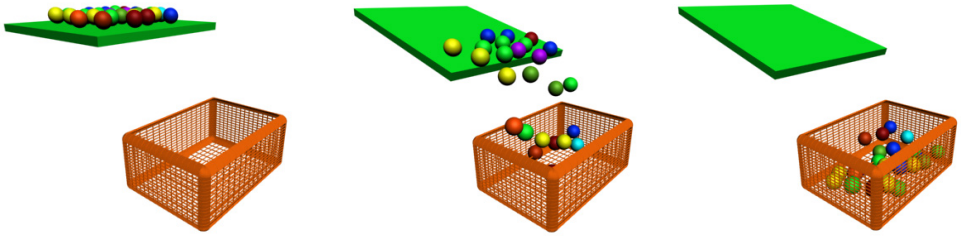


Figure 16-62 *Simulation of falling balls at different frames*

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Particle Flow

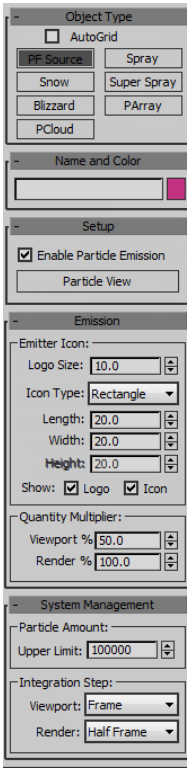

Figure 17-1 *The* ***PF Source*** *tool in the* ***Object Type*** *rollout*

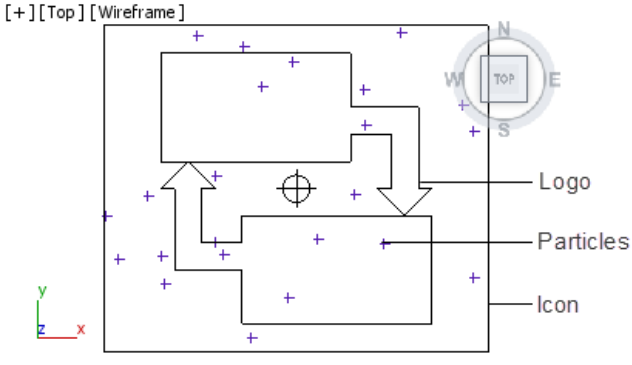

Figure 17-2 *The* ***Particle*** *emitter*

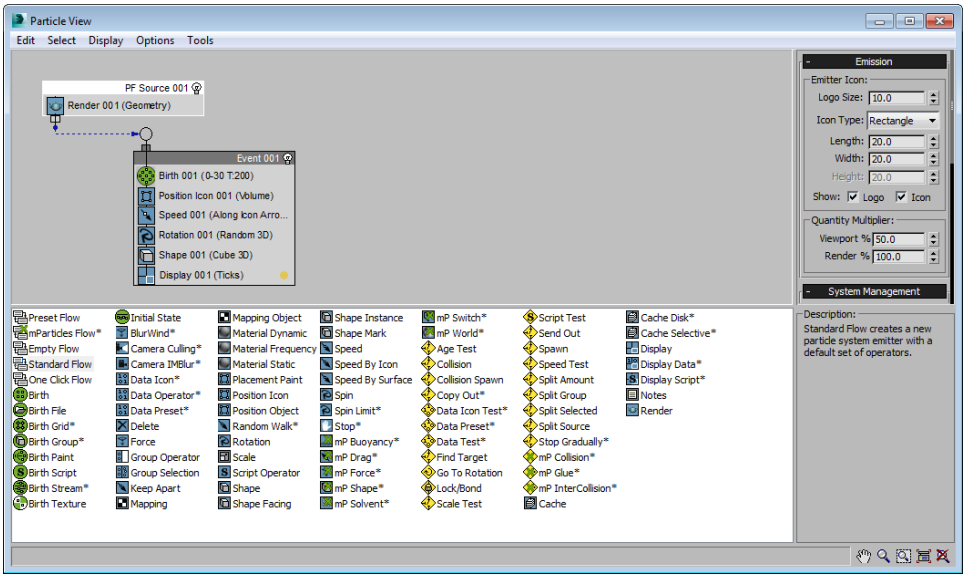

Figure 17-3 The ***Particle View*** *window*

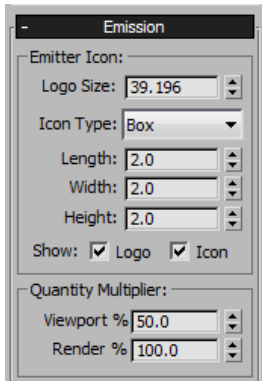

Figure 17-4 *The* ***Emission*** *rollout*

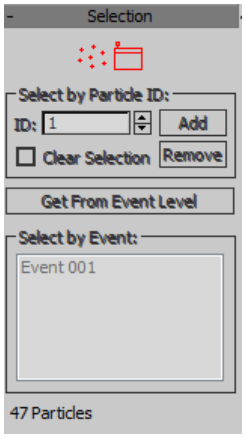

Figure 17-5 *The* ***Selection*** *rollout*

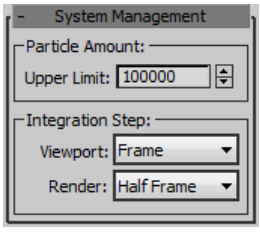

Figure 17-6 *The* ***System Management*** *rollout*

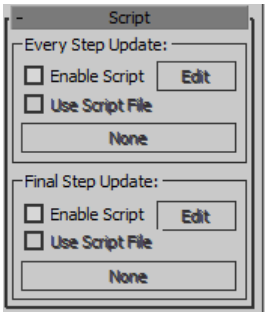

Figure 17-7 *The* ***Script*** *rollout*

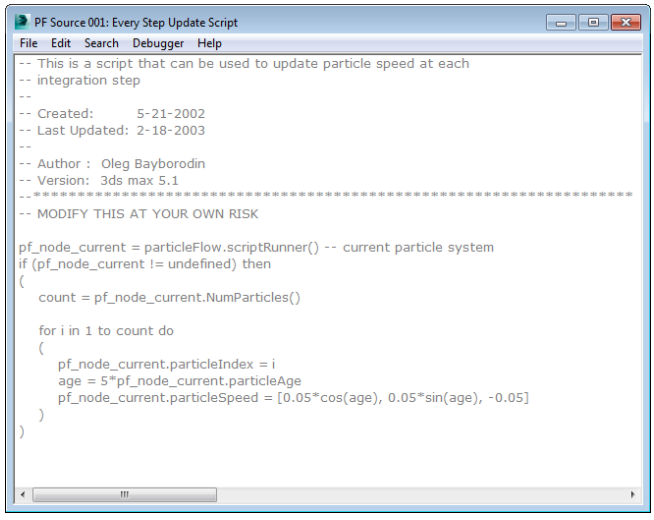

Figure 17-8 The ***PF Source 001: Every Step Update Script*** *window*

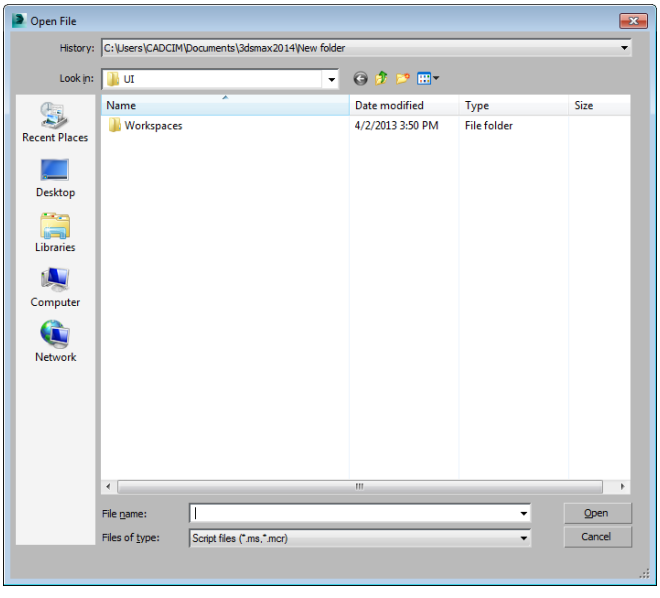

Figure17-9 *The* ***Open File*** *dialog box*

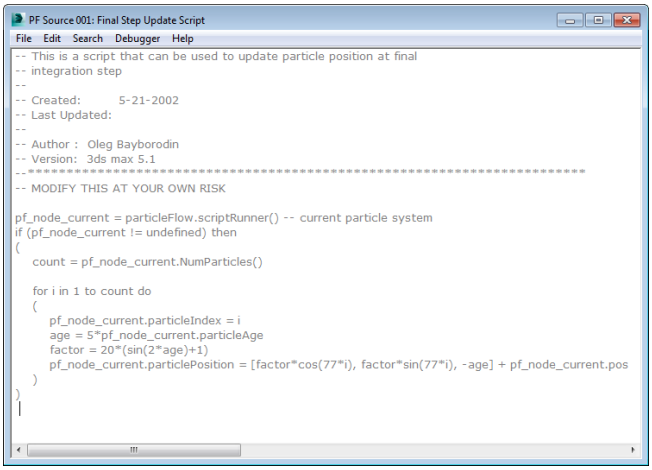

Figure 17-10 The ***PF Source 001: Final Step Update Script*** *window*

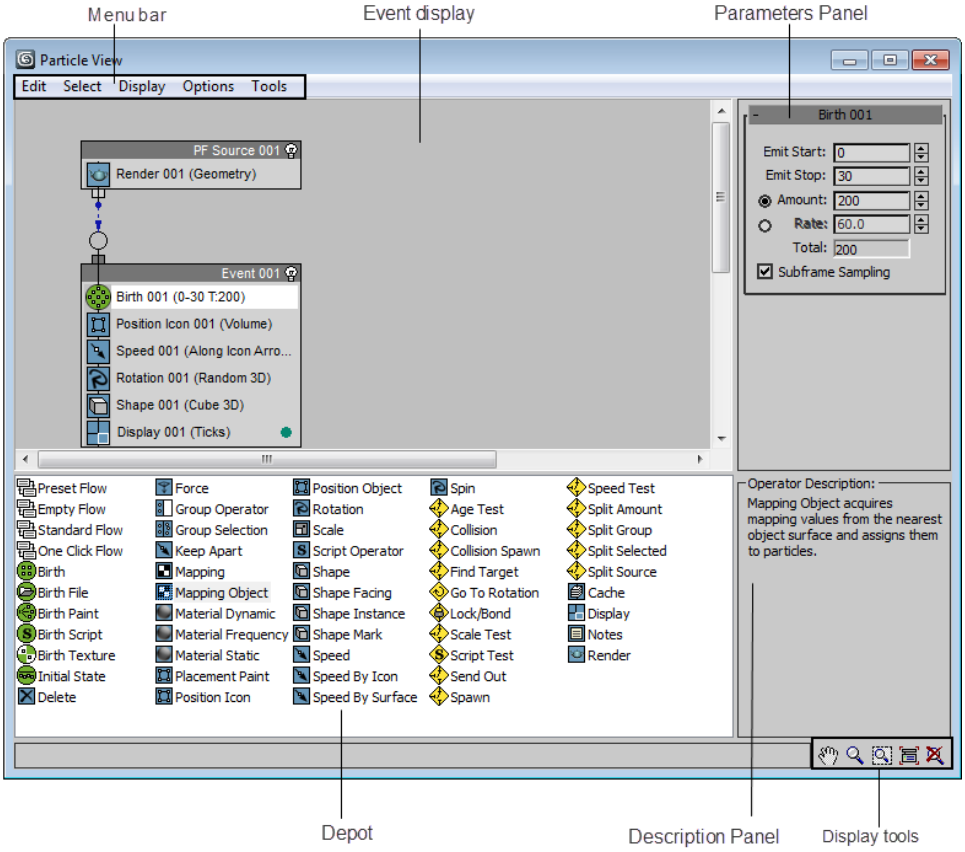

Figure 17-11 The ***Particle View*** *window*

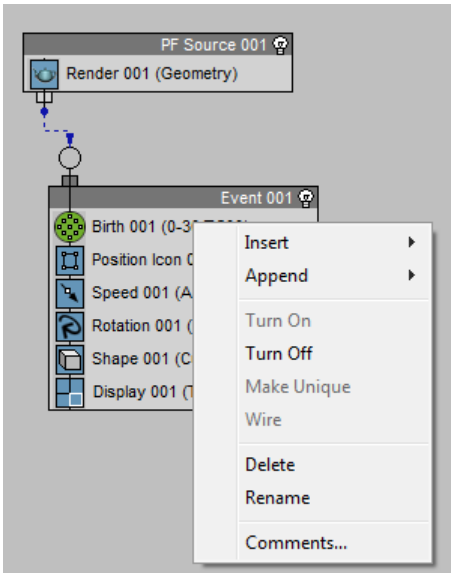

Figure 17-12 *The shortcut menu*

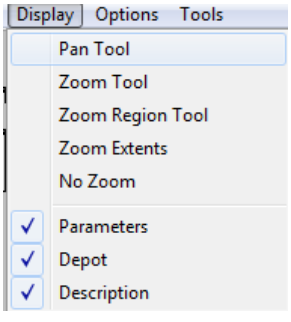

Figure 17-13 *The Display tools in the* ***Display*** *menu*

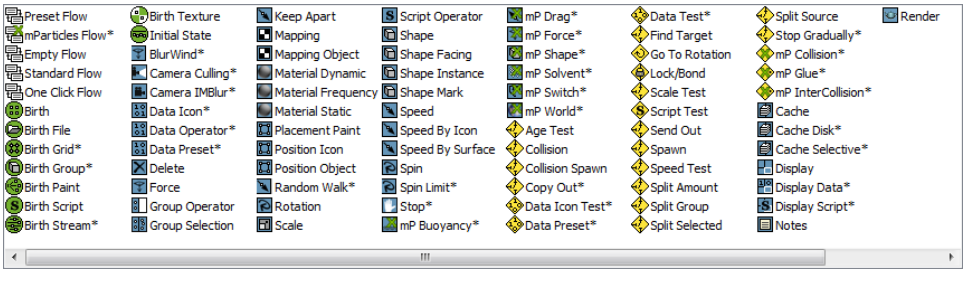

Figure 17-14 *The* ***Depot*** *area with Particle Flow actions*

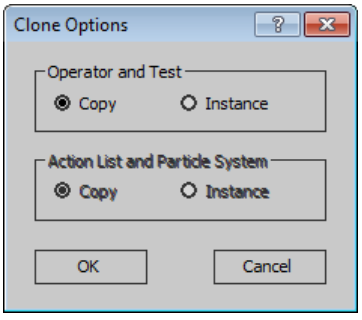

Figure 17-15 *The* ***Clone Options*** *dialog box*

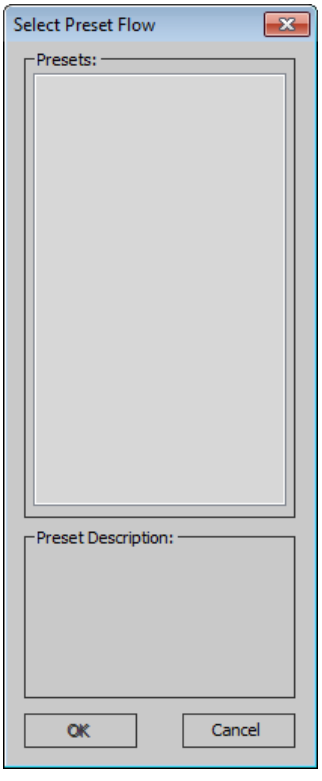

Figure 17-16 *The* ***Select Preset Flow*** *dialog box*

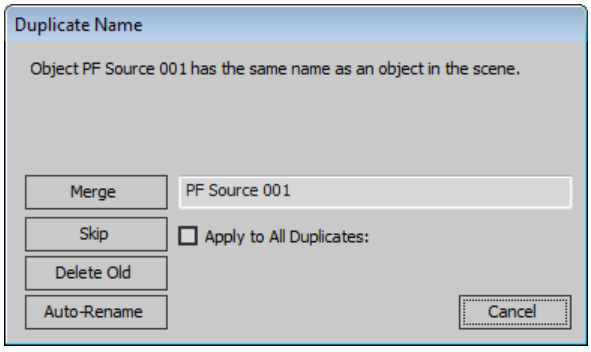

*Figure 17-17 The **Duplicate Name** dialog box*

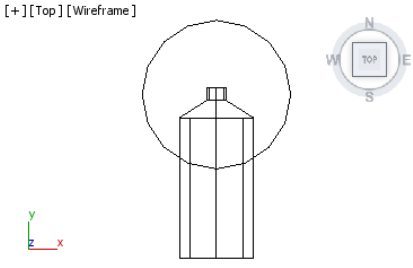

*Figure 17-18 The **Particle Paint** helper*

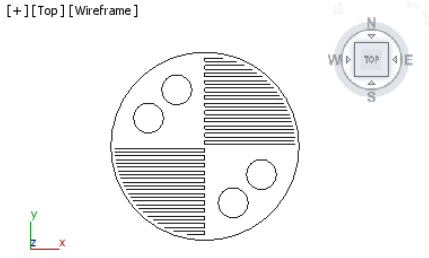

*Figure 17-19 The **Birth Texture** icon*

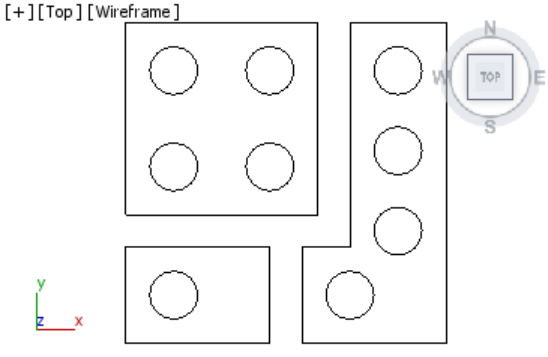

*Figure 17-20 The **Group Selection** icon*

Figure 17-21 *The sandman dispersing in sand*

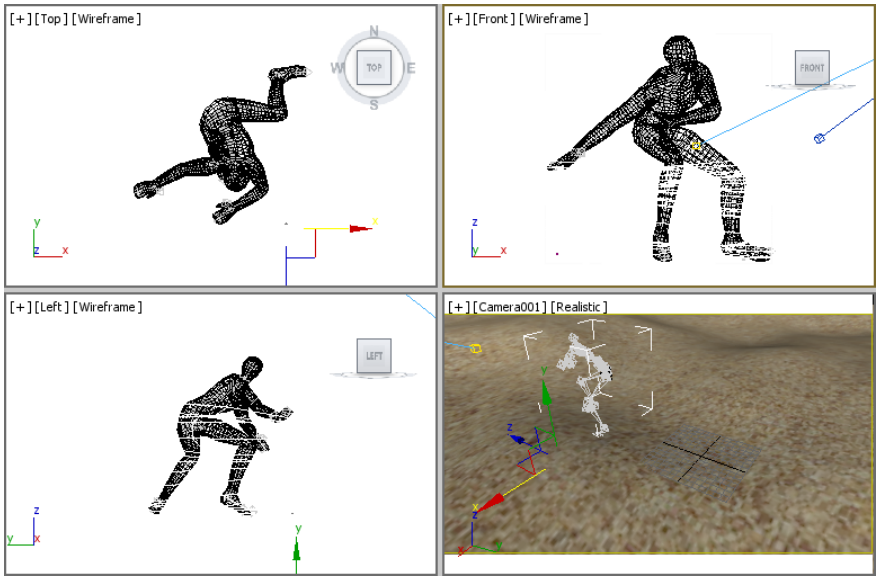

Figure 17-22 *The c17_tut1_start.max file displayed*

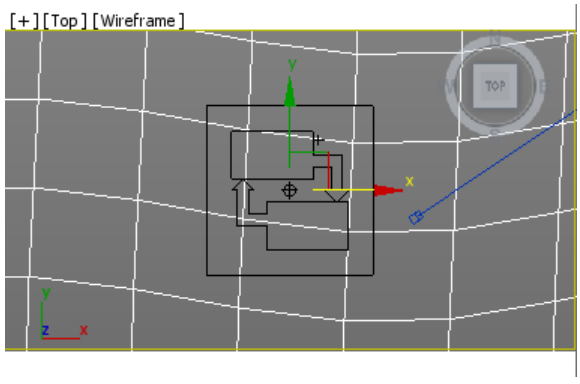

Figure 17-23 *The PF source icon*

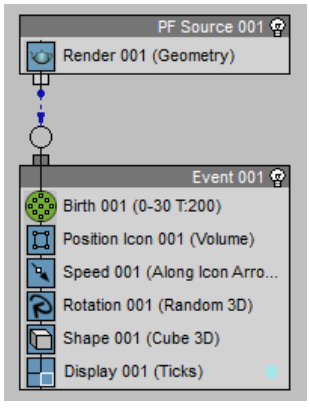

Figure 17-24 *The Standard Flow*

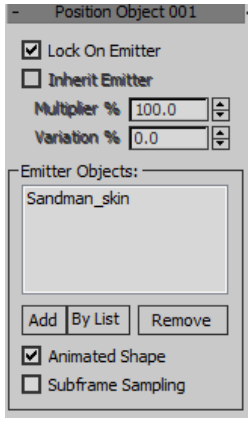

Figure 17-25 *The* ***Sandman_skin*** *added to the* ***Emitter Objects*** *area*

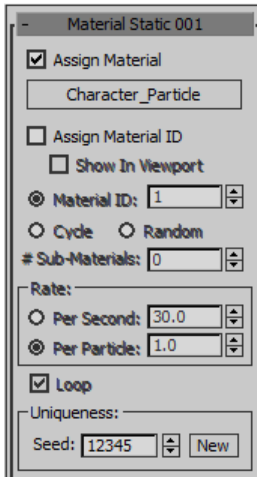

Figure 17-26 *The* ***Material Static 001*** *rollout*

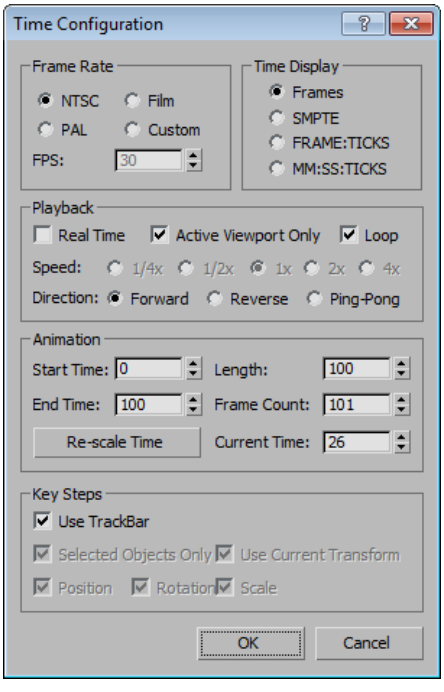

Figure 17-27 *The* ***Time Configuration*** *dialog box*

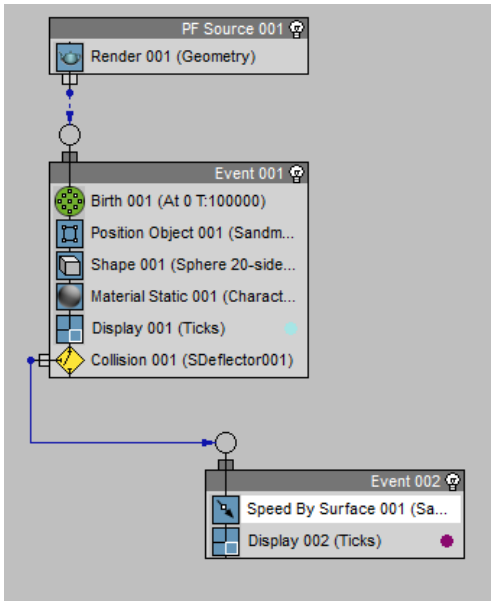

Figure 17-28 *The* ***Event 002*** *wired to the* ***Collision 001*** *test*

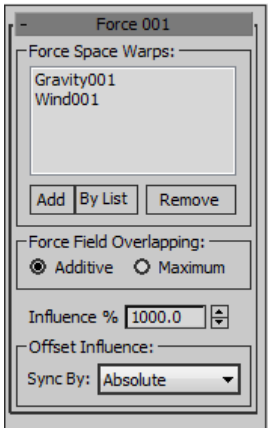

Figure 17-29 *The* ***Force 001*** *rollout*

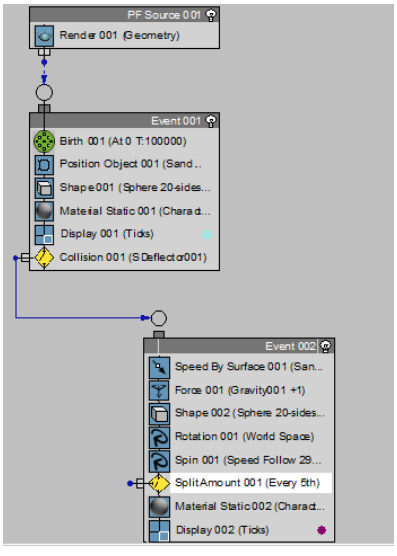

Figure 17-30 *The* ***Split Amount 001 test*** *added to the* ***Event 002***

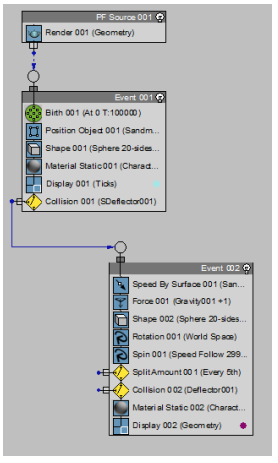

Figure 17-31 *The Particle Flow*

Figure 17-32 *The Particles emitting from the character*

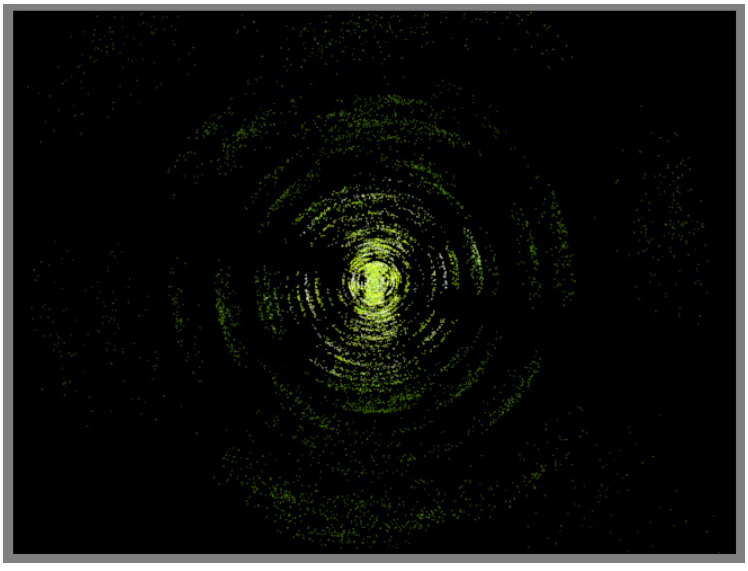

Figure 17-33 *Particles emitting as the sound is played at frame 118*

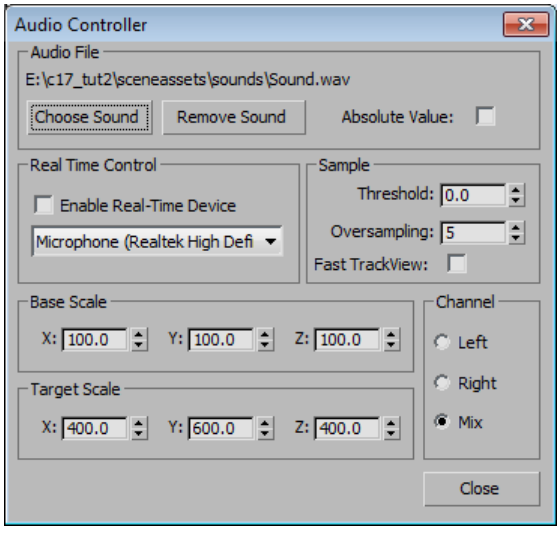

Figure 17-34 *The value of the* ***Oversampling*** *spinner set to* ***5*** *in the* ***Audio Controller*** *dialolg box*

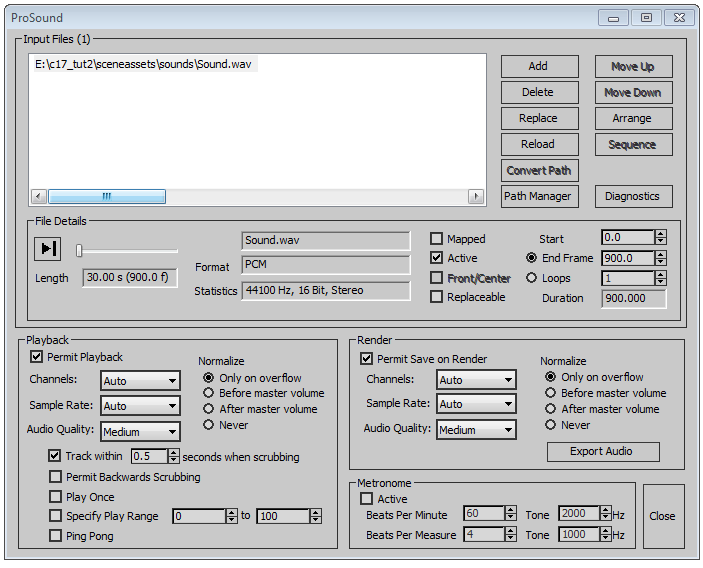

Figure 17-35 *The* ***ProSound*** *dialog box*

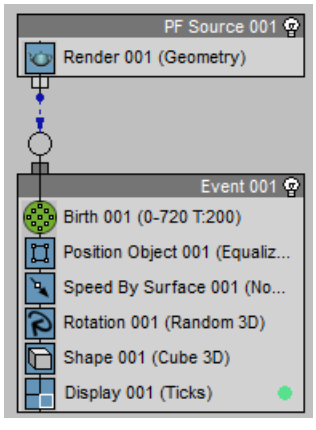

Figure 17-36 *The* ***Speed by Surface 001 (None)*** *operator in the* ***Event Display*** *area*

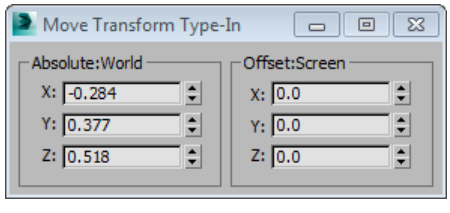

Figure 17-37 *The* ***Move Transform Type-In*** *dialog box*

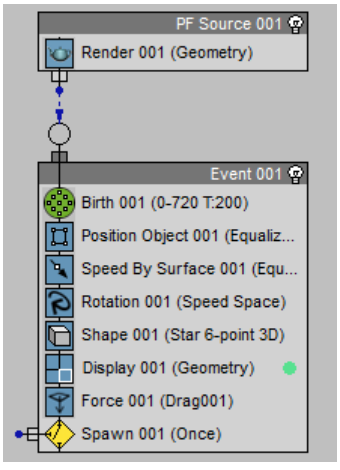

Figure 17-38 *The* ***Spawn*** *test in* ***Event 001***

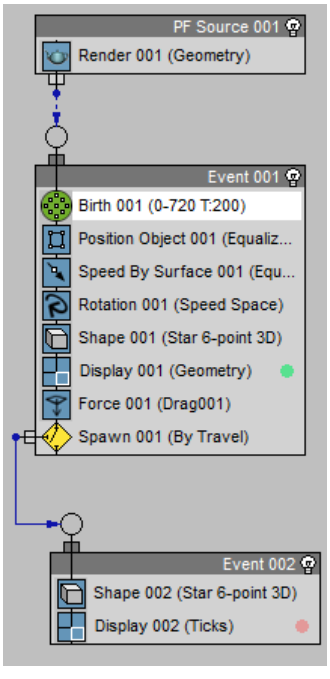

Figure 17-39 *The* ***Spawn*** *test linked* ***Event 001***

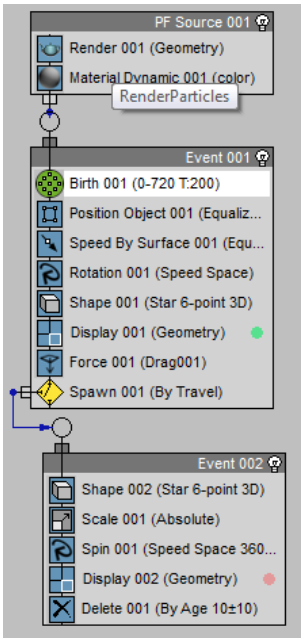

Figure 17-40 *The* ***Material Dynamic*** *operator in* ***PF Source 001***

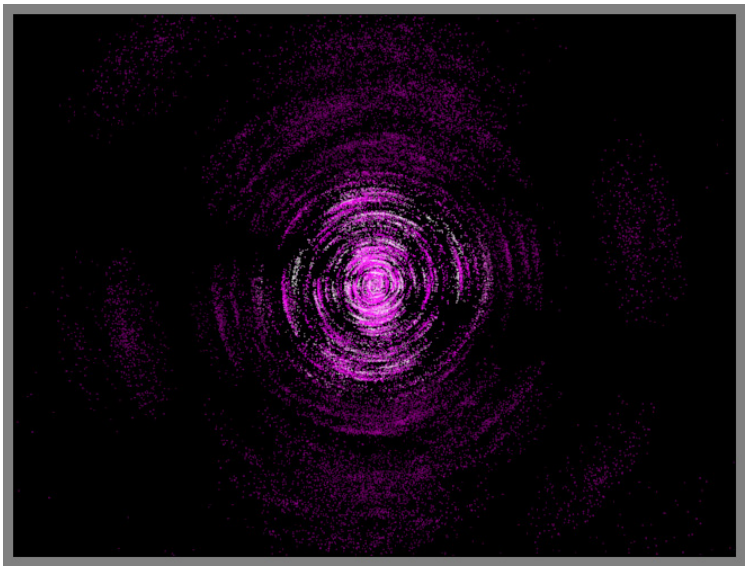

Figure 17-41 *Particles animating on frame 259*

Figure 17-42 *Leaves simulation*

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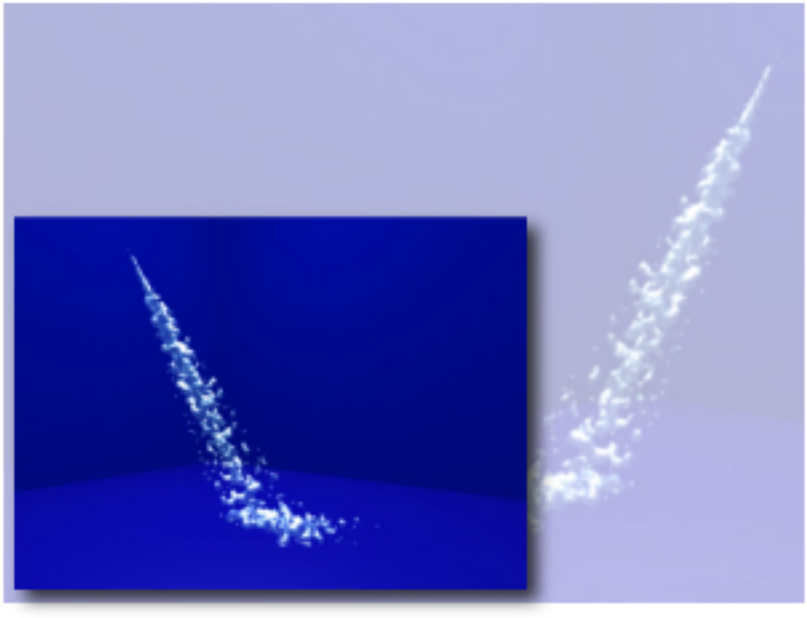
Particle Systems and Space Warps-I



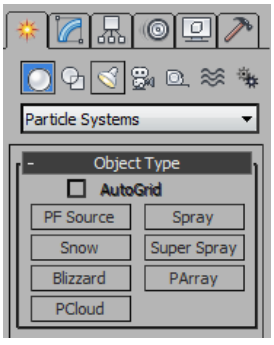


Figure 18-1 *Various tools displayed to create particle systems*

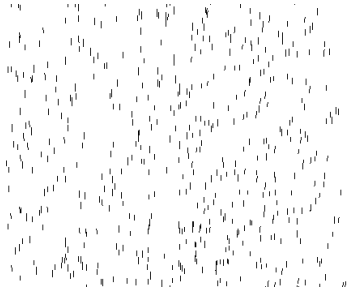


Figure 18-2 *The Spray particle system*

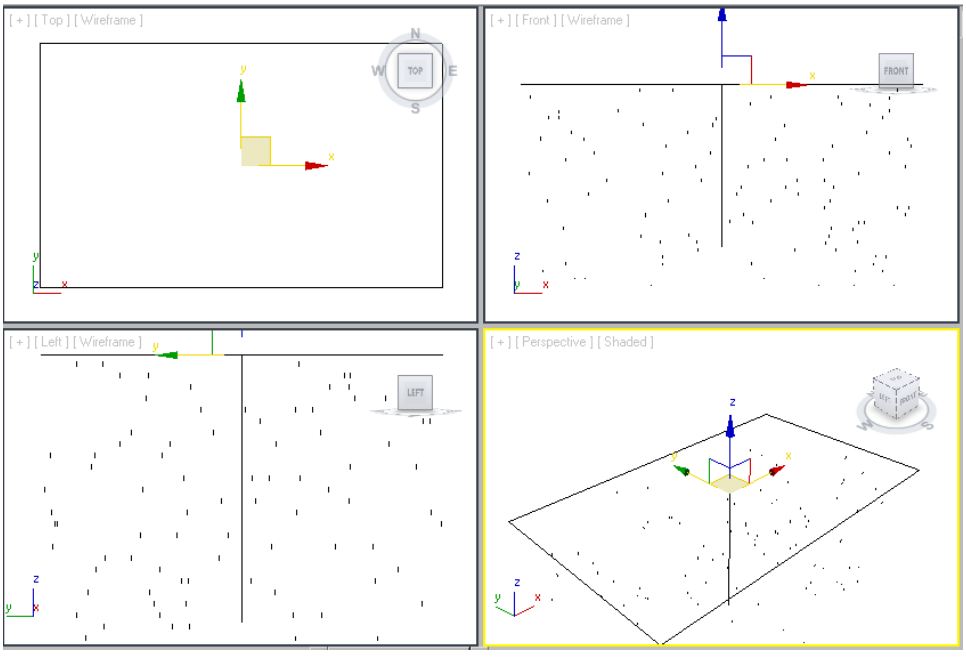


Figure 18-3 *The emitter displayed in all viewports for the Spray particle system*

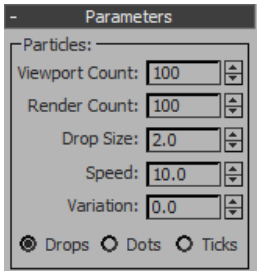


Figure 18-4 *The* ***Particles*** *area in the* ***Parameters*** *rollout*

Figure 18-5 *The* ***Render*** *area*

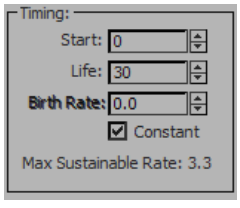


Figure 18-6 *The* ***Timing*** *area*

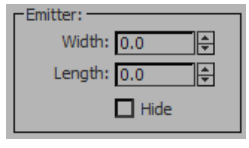


Figure 18-7 *The* ***Emitter*** *area*

Figure 18-8 *The snow particles on rendering*

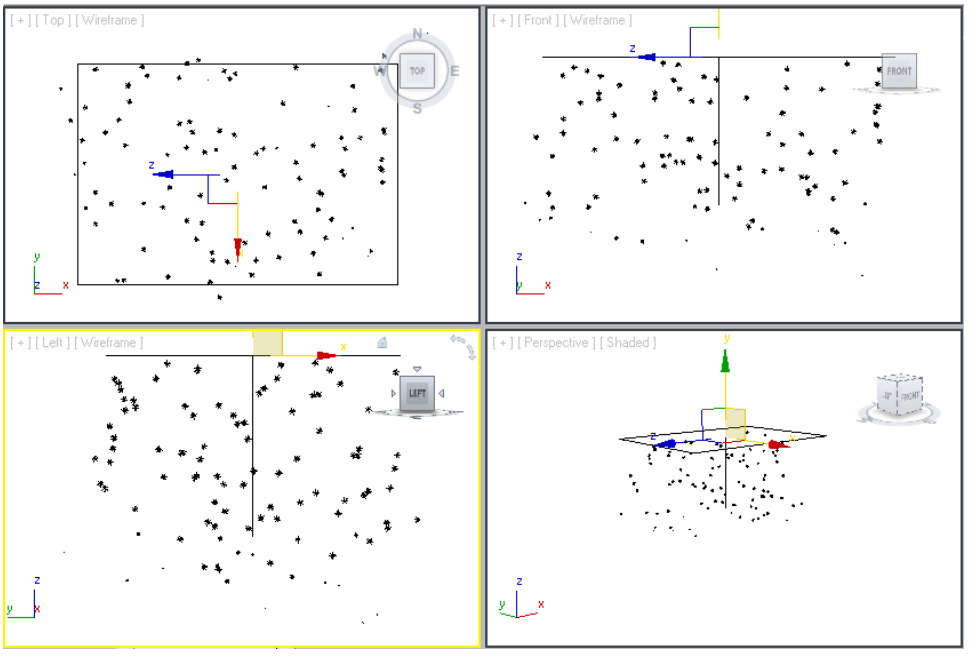


Figure 18-9 *The particles displayed in all viewports for the Snow particle system*

Figure 18-10 *The triangular snow particles*

Figure 18-11 *The facing snow particles*

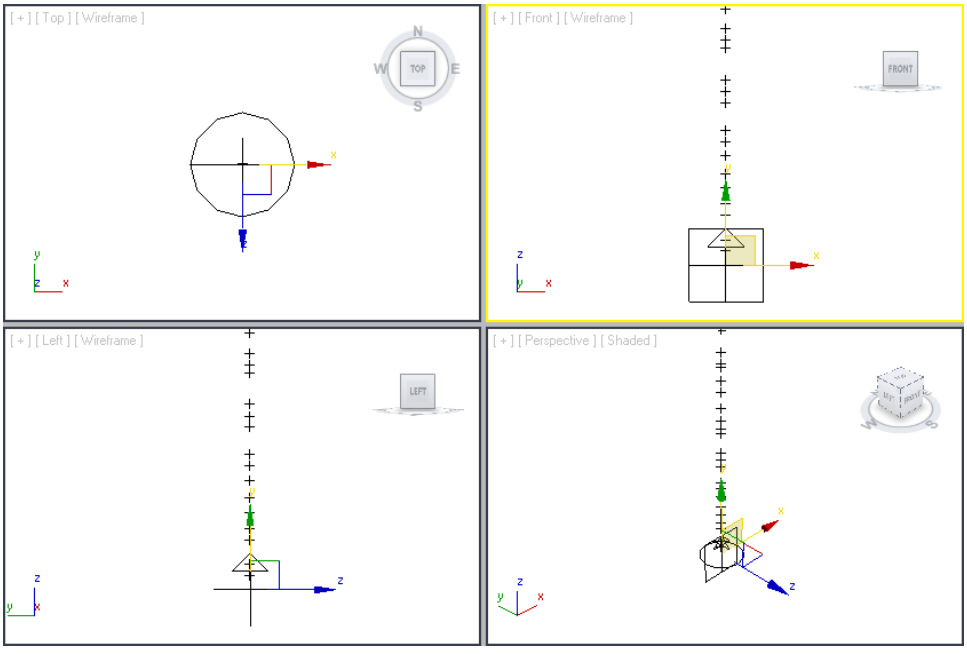


Figure 18-12 *The particles generated for the Super Spray particle system*

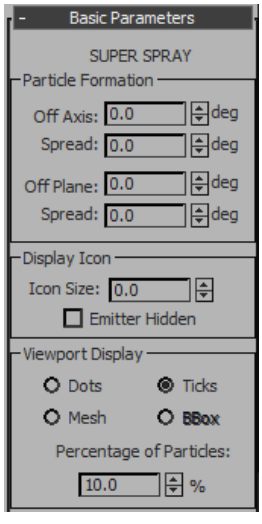


Figure 18-13 *The* ***Basic Parameters*** *rollout*

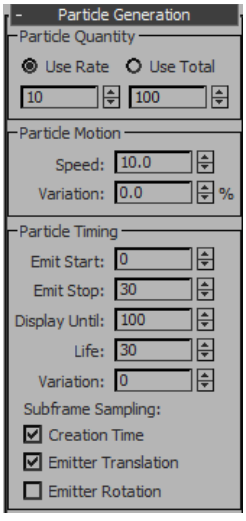


Figure 18-14 *Partial view of the* ***Particle Generation*** *rollout*

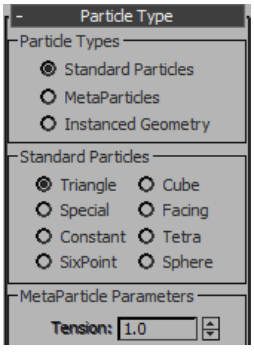


Figure 18-15 *Partial view of the* ***Particle Type*** *rollout*

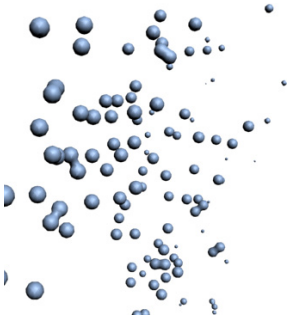


Figure 18-16 *The meta particles*

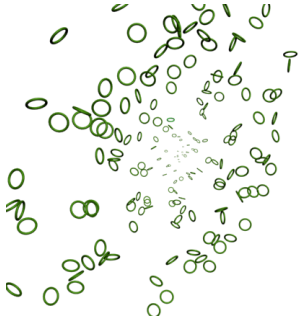


Figure 18-17 *The torus object selected to create the instance particles*

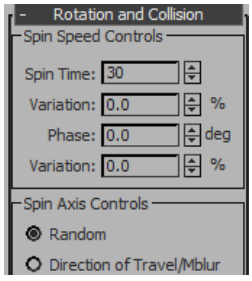


Figure 18-18 *Partial view of the* ***Rotation and Collision*** *rollout*

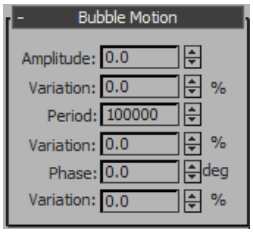


Figure 18-19 *The* ***Bubble Motion*** *rollout*

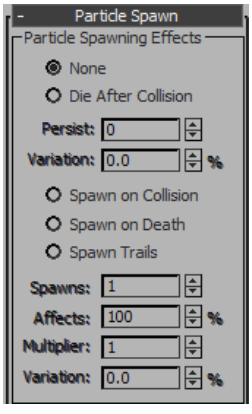


Figure 18-20 *The* ***Particle Spawn*** *rollout*

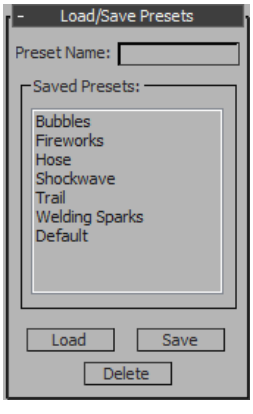


Figure 18-21 *The* ***Load/ Save Presets*** *rollout*

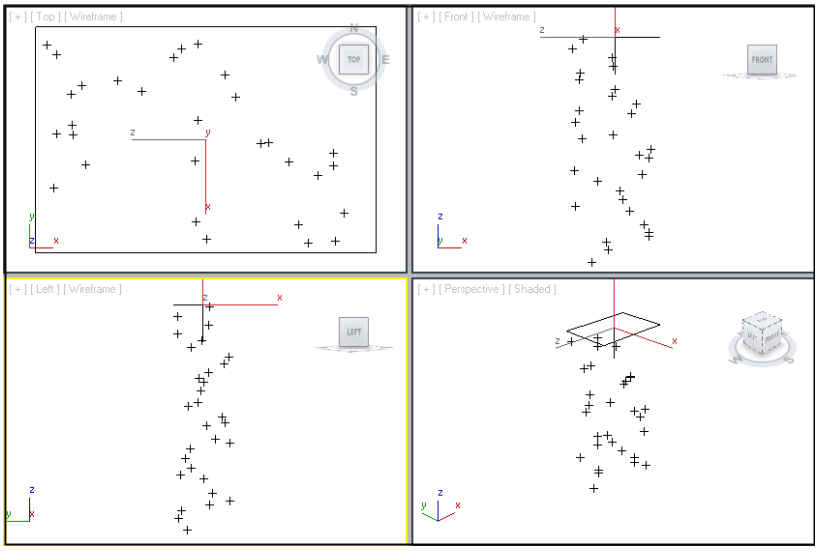


Figure 18-22 *The particles generated for the Blizzard particle system*

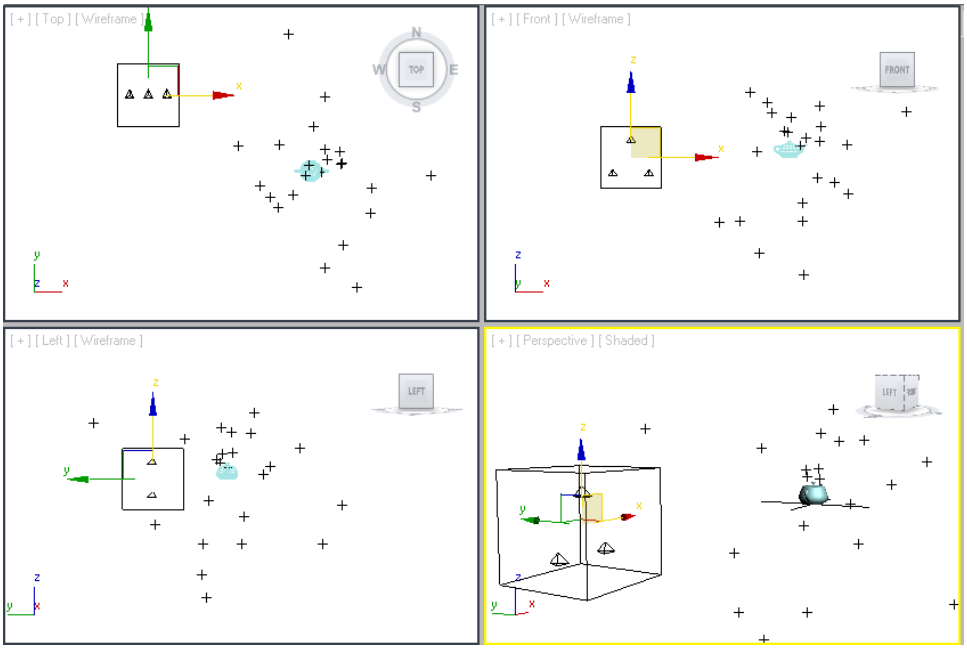


Figure 18-23 *The particles generated from the distribution object (teapot) in viewports*

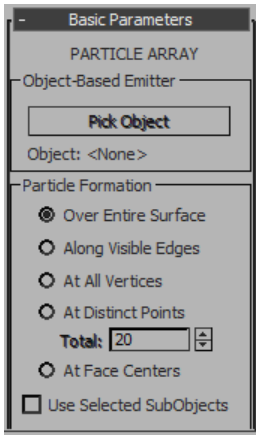


Figure 18-24 *Partial view of the* ***Basic Parameters*** *rollout*

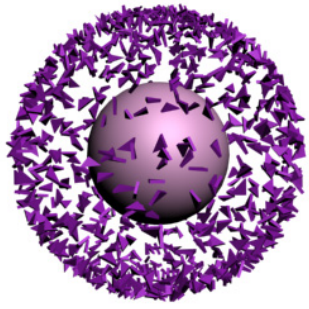


Figure 18-25 *The PArray particle system with the* ***Object Fragments*** *particle type*

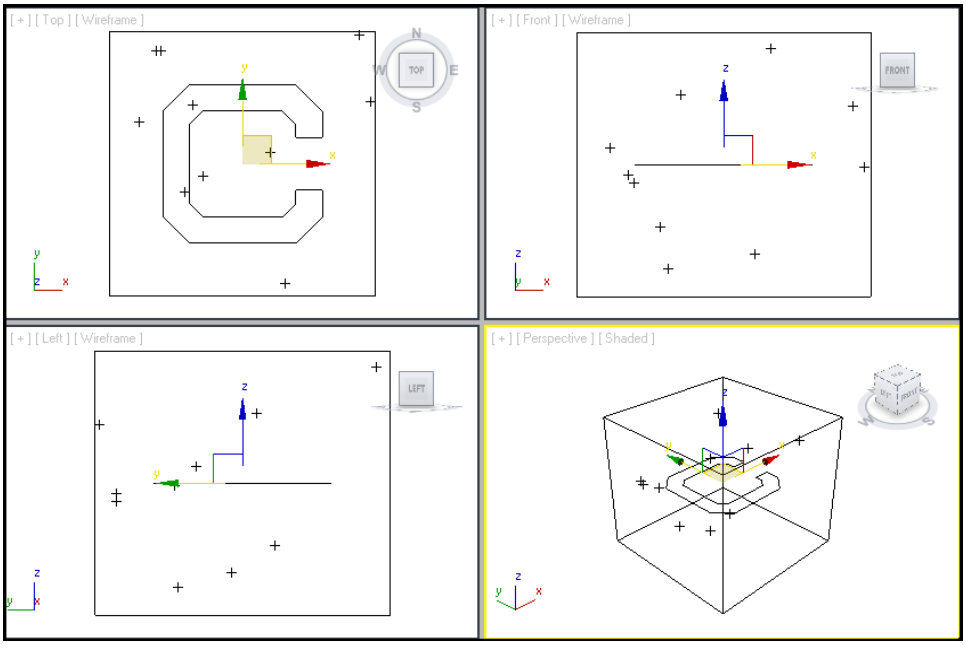


Figure 18-26 *The emitter created for the PCloud particle system*

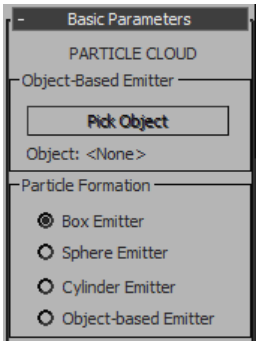


Figure 18-27 *The* ***Particle Formation*** *area in the* ***Basic Parameters*** *rollout*

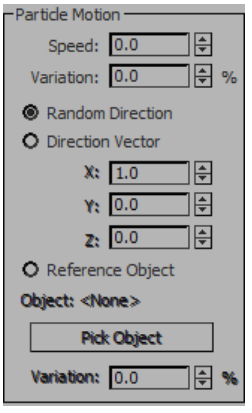


Figure 18-28 *The* ***Particle Motion*** *area in the* ***Particle Generation*** *rollout*

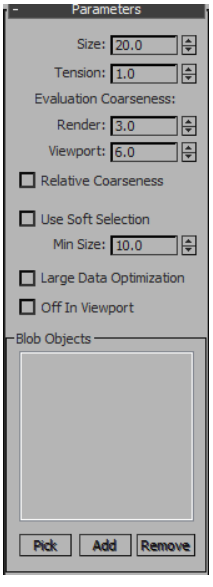


Figure 18-29 *The* ***Parameters*** *rollout*

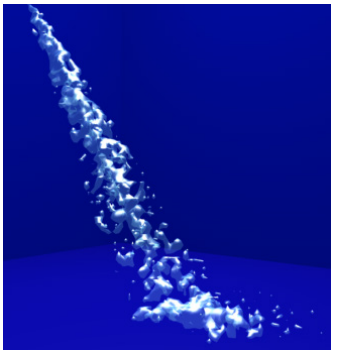


Figure 18-30 *The BlobMesh object created from the blob mesh compound object*

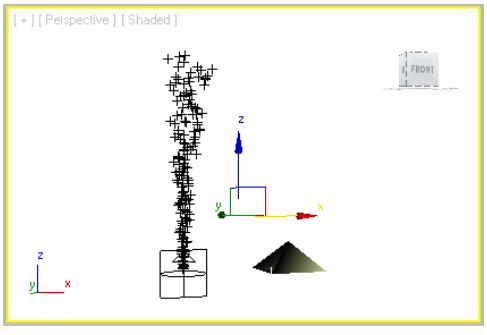


Figure 18-31 *The mesher object in the Perspective viewport*

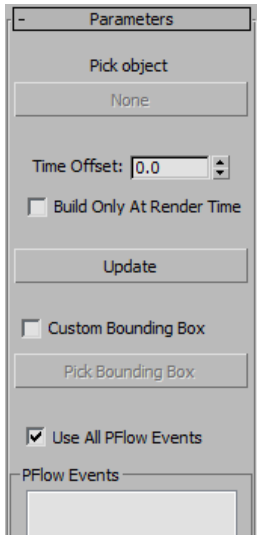


Figure 18-32 *The **Parameters** rollout*

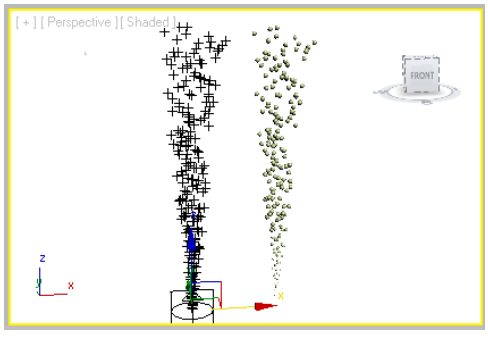


Figure 18-33 *The instance of the particle system displayed*

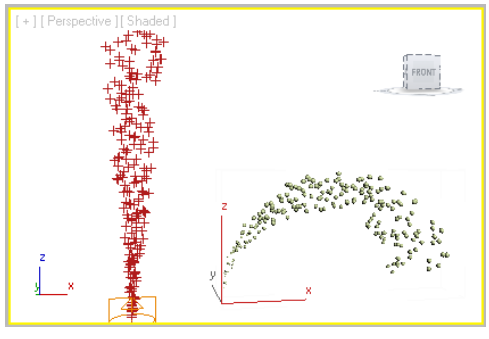


Figure 18-34 *The **Bend** modifier assigned to the instanced particle system*

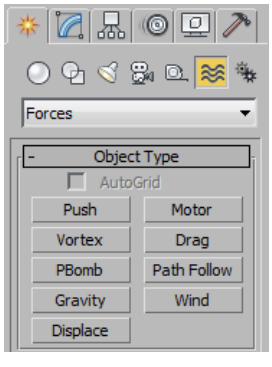


Figure 18-35 *The **Forces** category selected in the drop-down list*

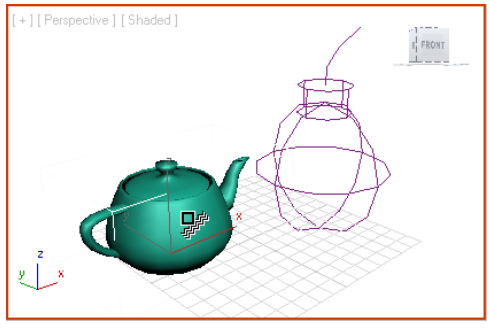


Figure 18-36 *The cursor displayed on invoking the **Bind to Space Warp** tool*

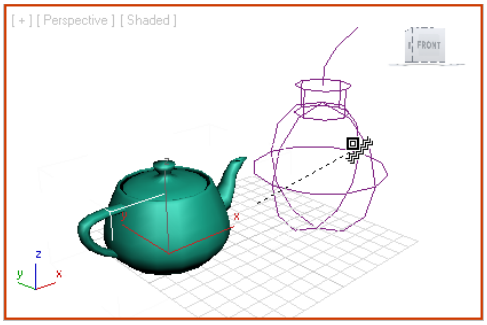


Figure 18-37 *A dotted line displayed from the selected object to the space warp object*

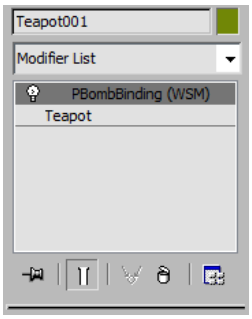


Figure 18-38 *The space warp object displayed in the* ***Command Panel***

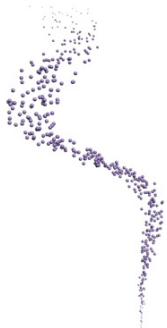


Figure 18-39 *The effect of Push space warp on the particle system*

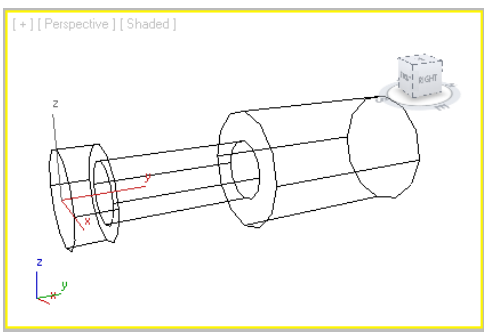


Figure 18-40 *The Push space warp icon*

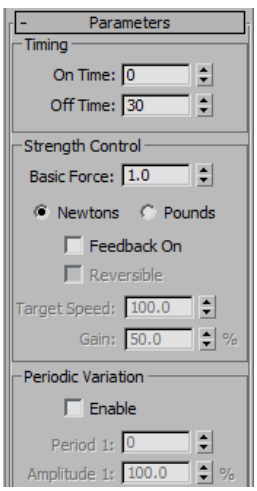


Figure 18-41 *Partial view of the* ***Parameters*** *rollout for Push space warp*

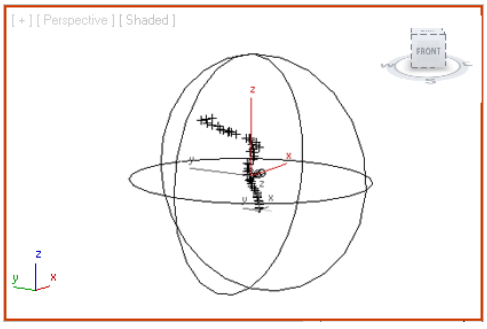


Figure 18-42 *The spherical shape of the Push space warp*

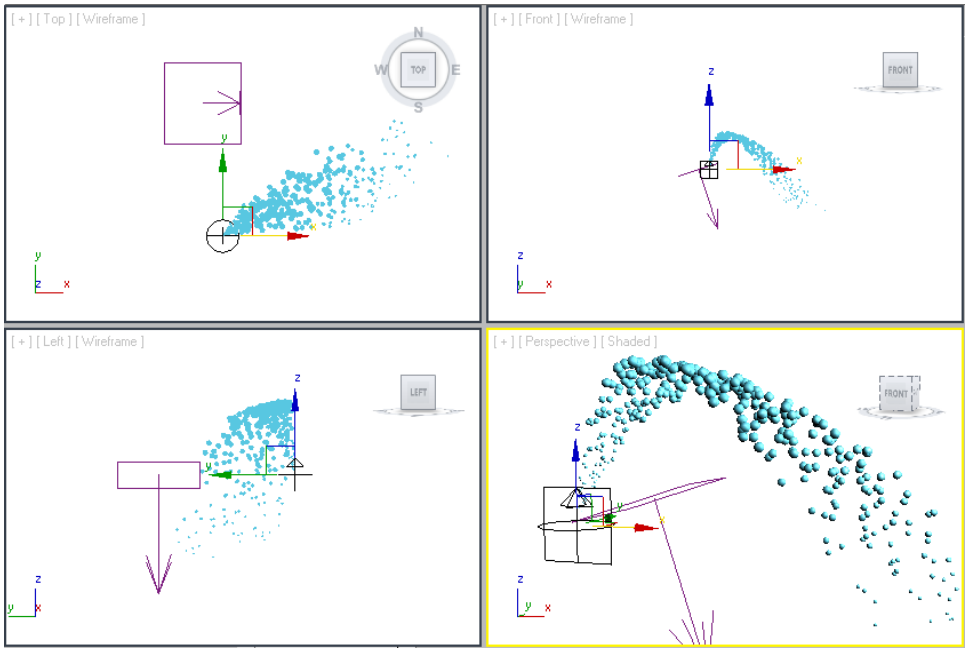


Figure 18-43 *The particle system with the Gravity space warp*

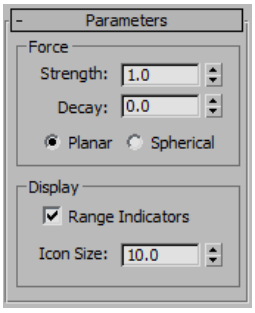


Figure 18-44 *The* ***Parameters*** *rollout for the Gravity space warp*

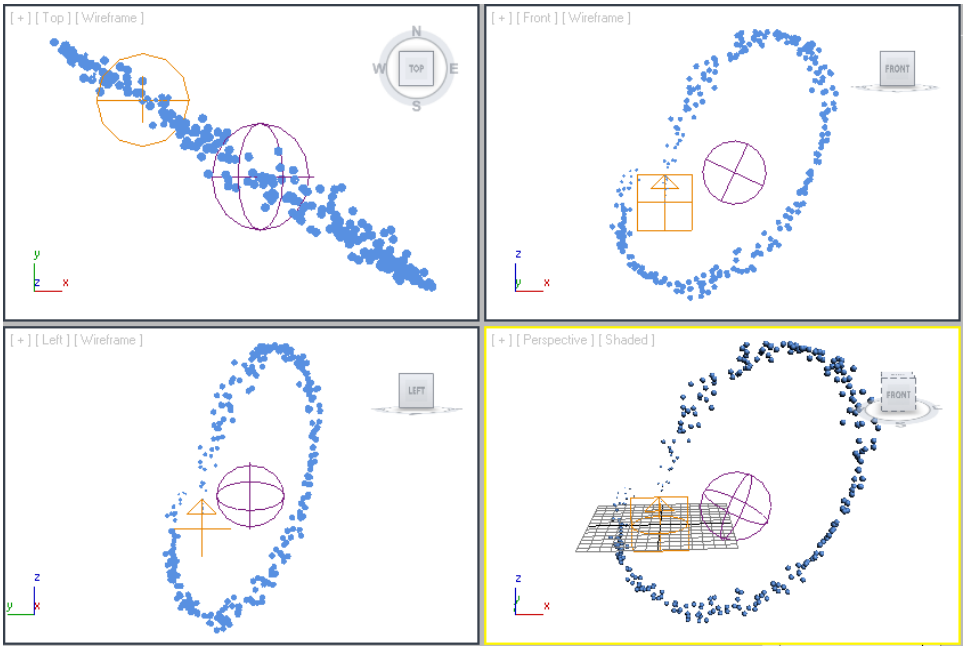


Figure 18-45 *The particle system with the spherical Gravity space warp*

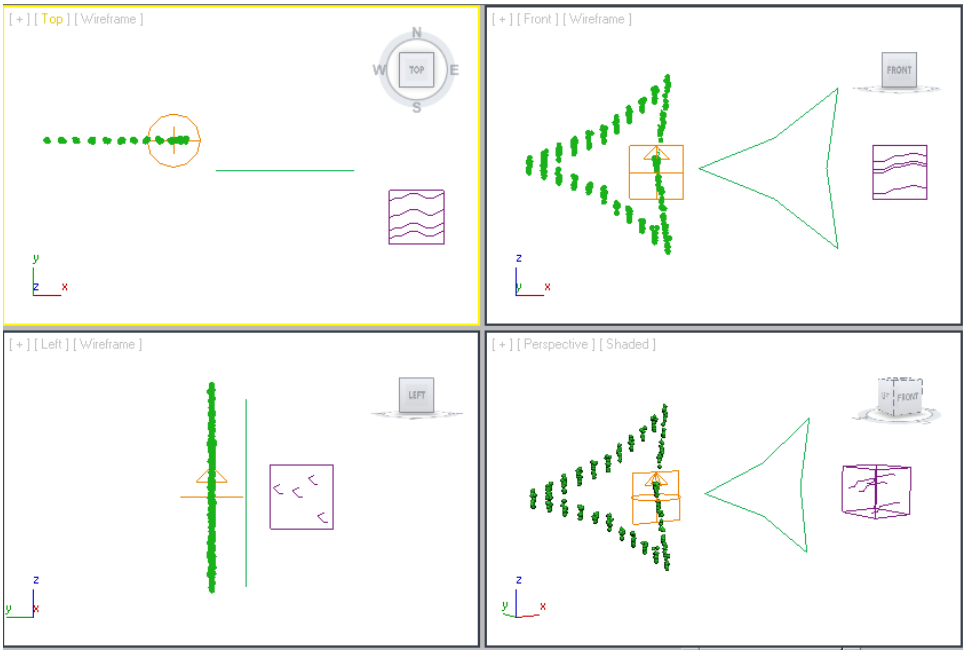


Figure 18-46 *The particle system with the Path Follow space warp*

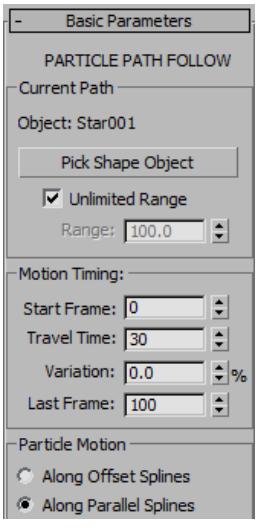


Figure 18-47 *Partial view of the* ***Basic Parameters*** *rollout*

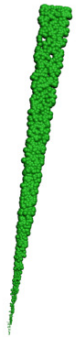


Figure 18-48 *The particles with the stream taper effect*

Figure 18-49 *The particles with the stream swirl effect*

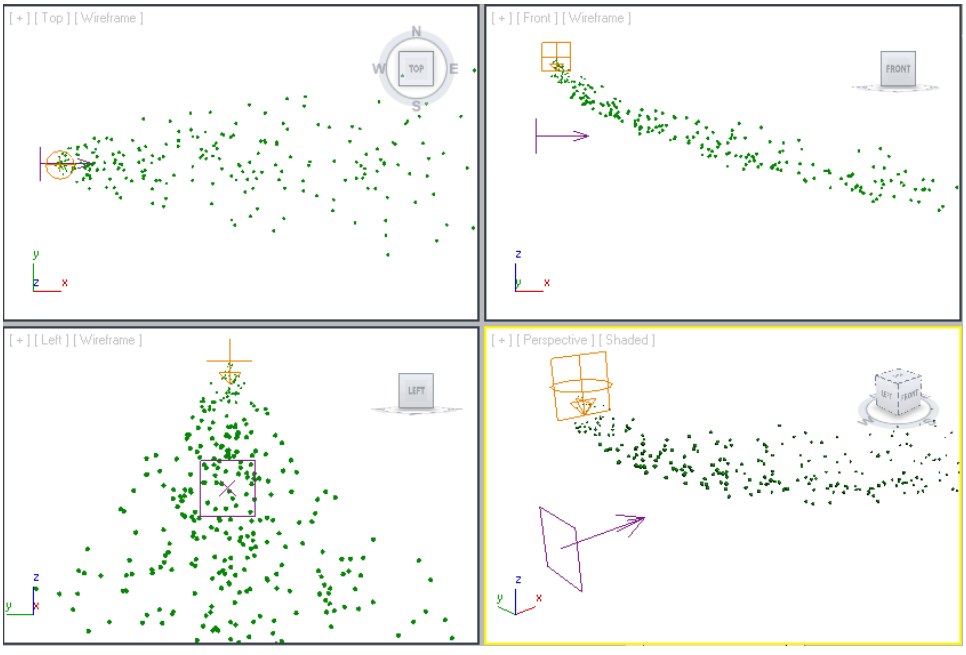


Figure 18-50 *The effect of the Wind space warp on the particle system*

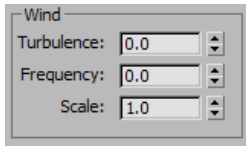


Figure 18-51 *The* ***Wind*** *area in the* ***Parameters*** *rollout*

Figure 18-52 *The effect of the PBomb space warp on a sphere at a single frame at rendering*

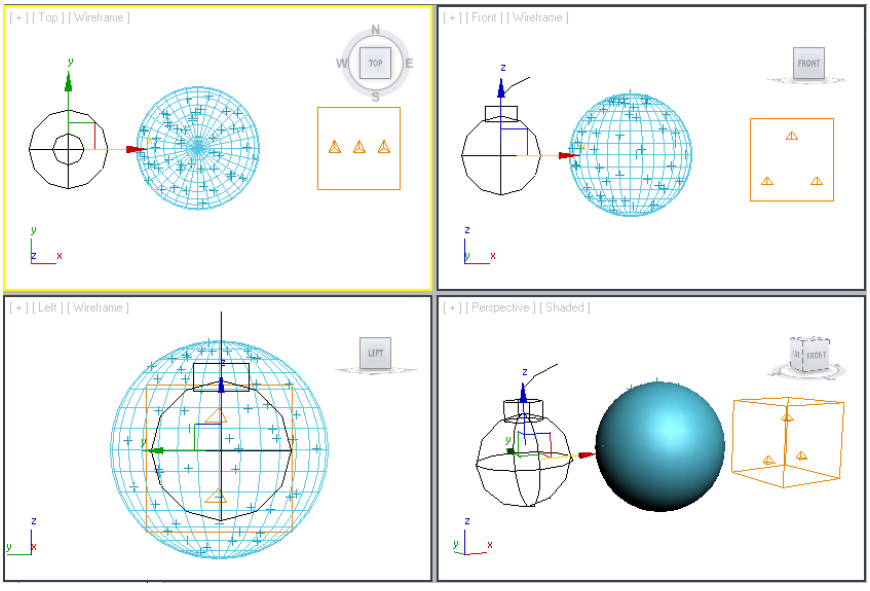


Figure 18-53 *The PBomb space warp icon in the viewport*

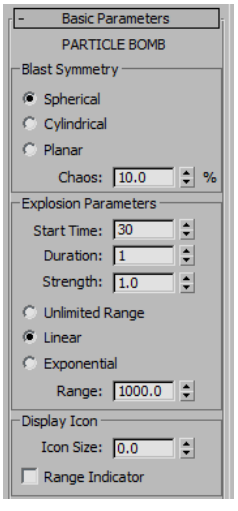


Figure 18-54 *The* ***Basic Parameters*** *rollout for the PBomb space warp*

Figure 18-55 *The PBomb icon after selecting the* ***Cylindrical*** *radio button*

Figure 18-56 *The effect of the PBomb space warp on a sphere after selecting the* ***Cylindrical*** *radio button at rendering*

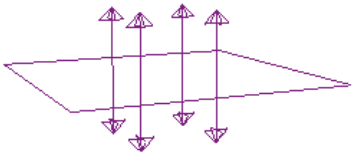


Figure 18-57 *The PBomb icon after selecting the* ***Planar*** *radio button*

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Particle Systems and Space Warps-II

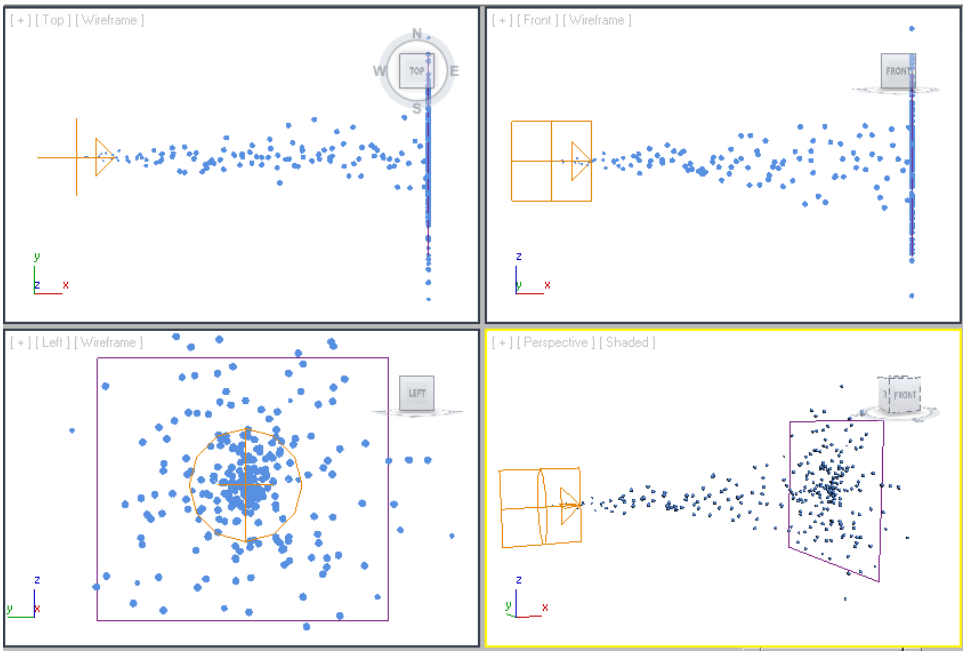

Figure 19-1 *The particles affected by the Deflector space warp*

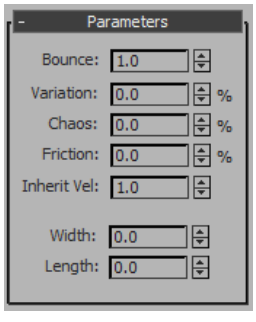

Figure 19-2 *The* ***Parameters*** *rollout for the Deflector space warp*

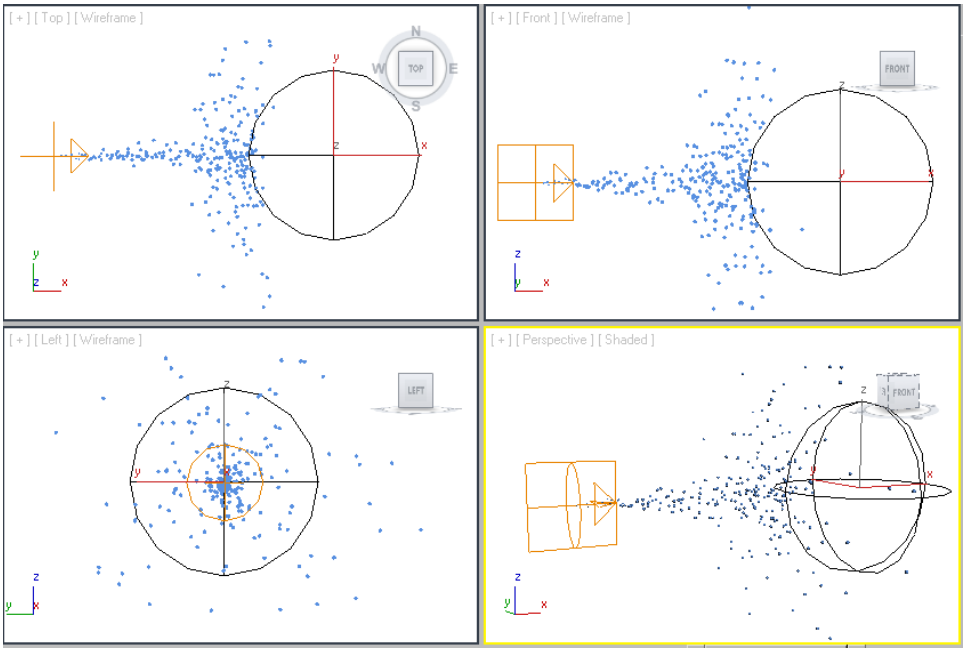

Figure 19-3 *The particles affected by the SDeflector space warp*

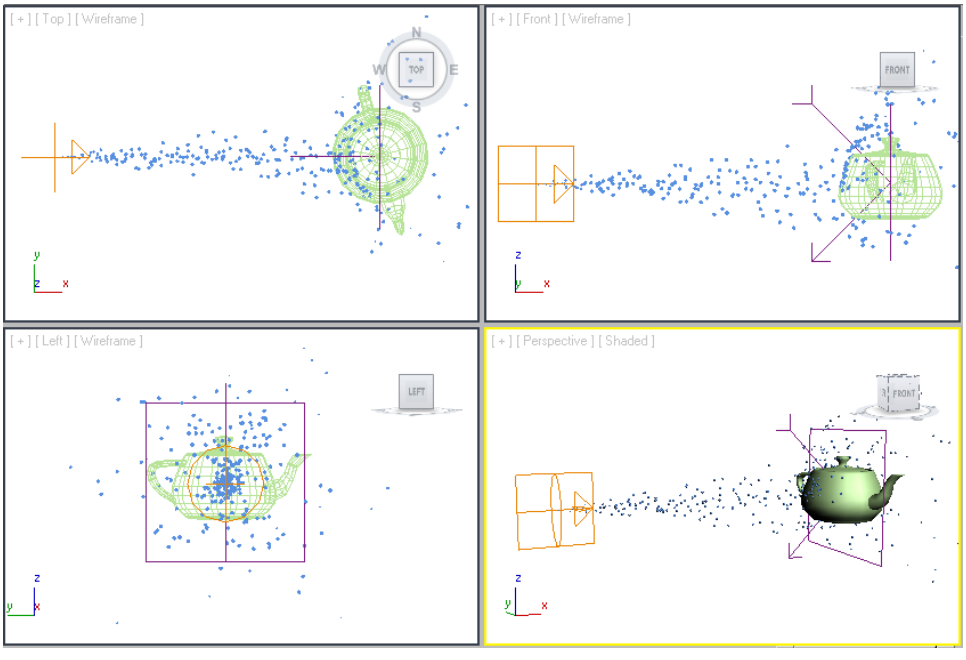

Figure 19-4 *The particles affected by the UDeflector space warp*

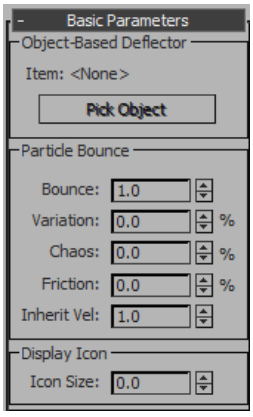

Figure 19-5 *The* ***Basic Parameters*** *rollout of the UDeflector space warp*

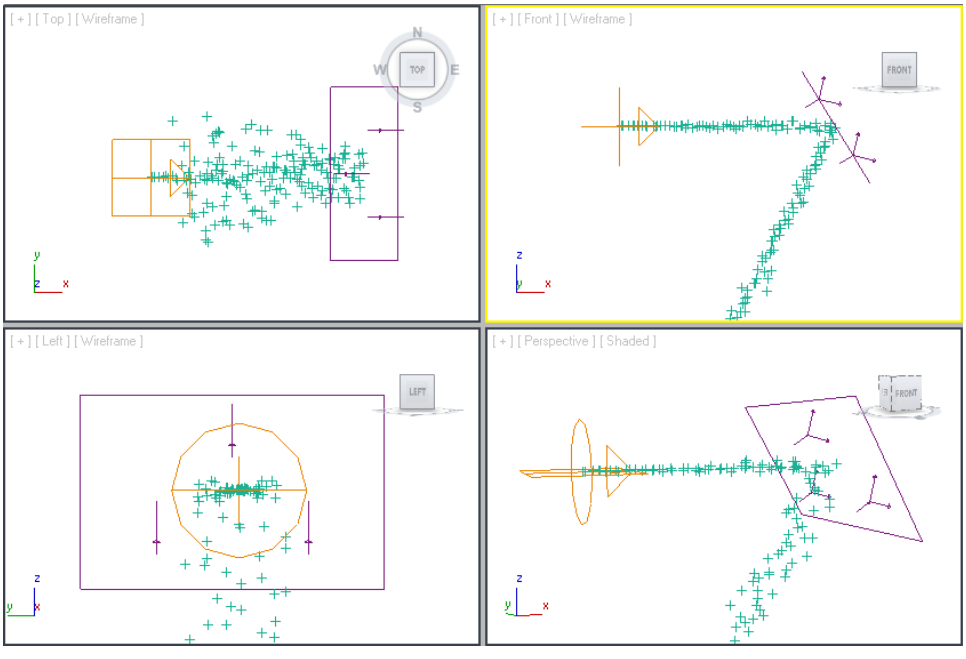

Figure 19-6 *The particles affected by the POmniFlect space warp*

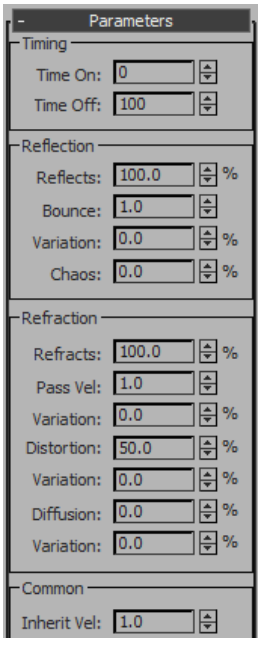

Figure 19-7 *Partial view of the* ***Parameters*** *rollout*

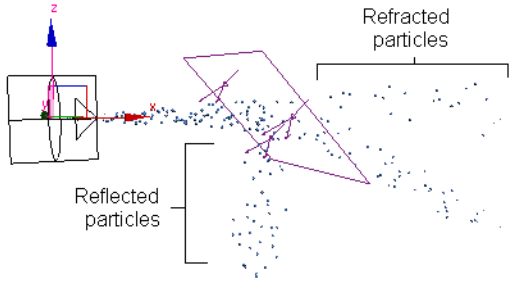

Figure 19-8 *The particles refracted and reflected by the space warp*

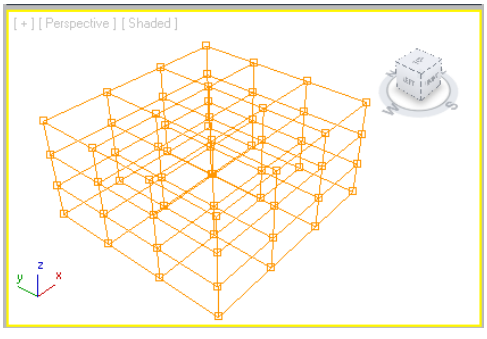

Figure 19-9 *The FFD(Box)*

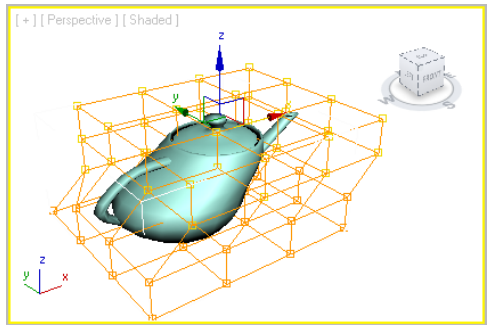

Figure 19-10 *The control points moved to modify the shape of the bound object*

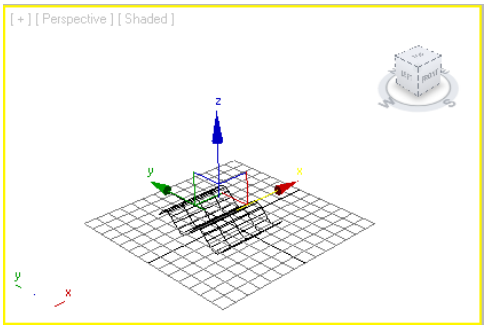

Figure 19-11 *The space warp icon for the Wave space warp*

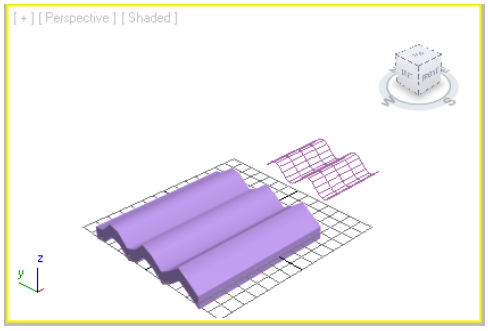

Figure 19-12 *The effect of the Wave space warp*

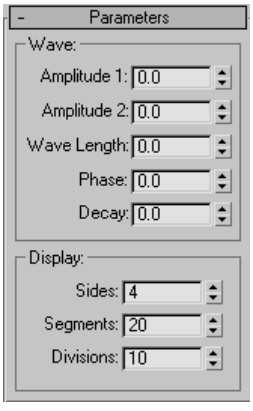

Figure 19-13 *The* ***Parameters*** *rollout*

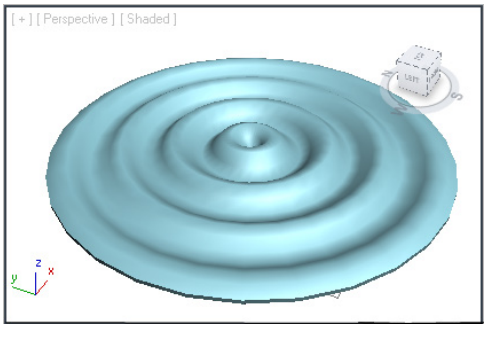

Figure 19-14 *The effect of the Ripple space warp*

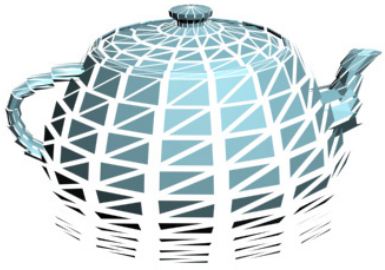

Figure 19-15 The effect of the Bomb space warp at one frame

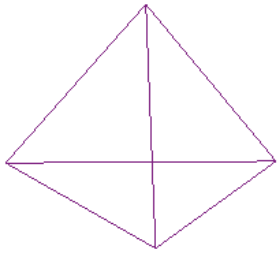

Figure 19-16 The icon of the Bomb space warp

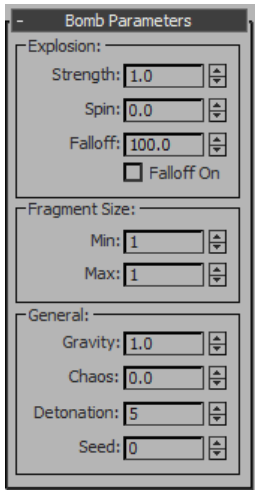

*Figure 19-17 The **Bomb Parameters** rollout*

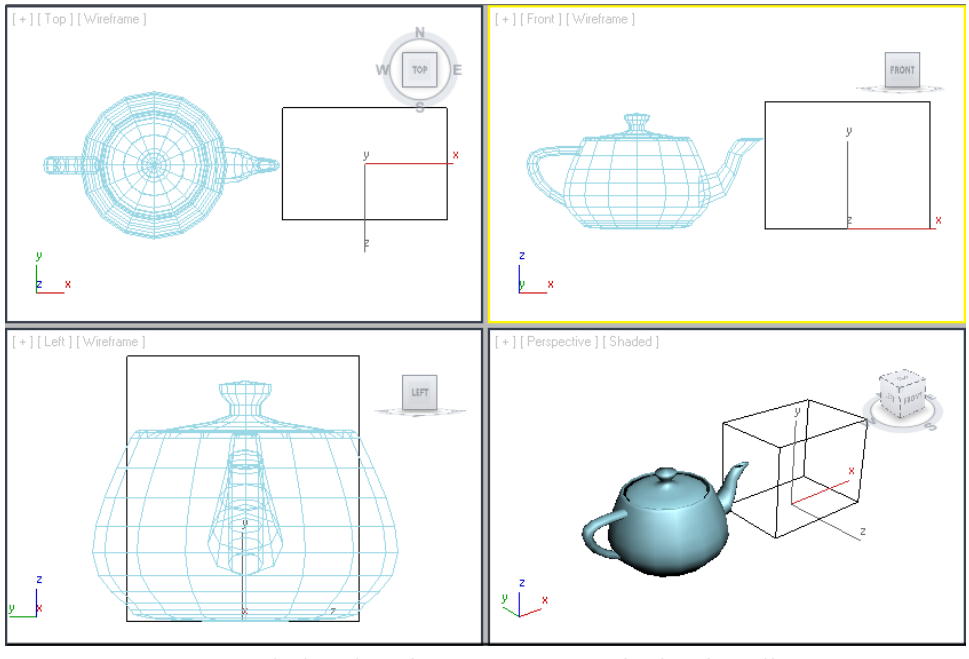

Figure 19-18 The box shaped space warp gizmo displayed in all viewports

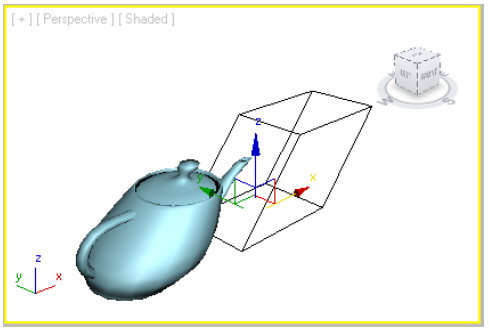

Figure 19-19 *The effect of the Skew space warp*

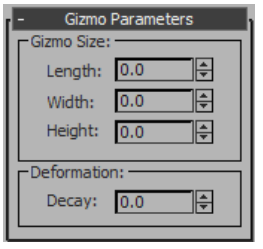

Figure 19-20 *The* ***Gizmo Parameters*** *rollout*

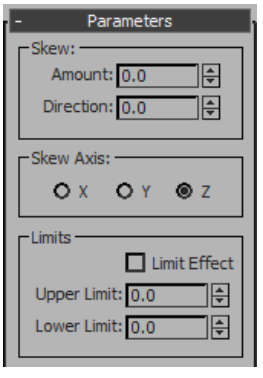

Figure 19-21 *The* ***Parameters*** *rollout*

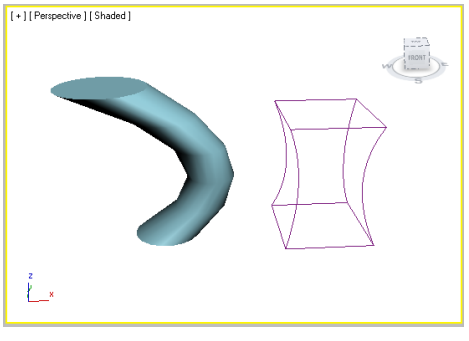

Figure 19-22 *The effect of the Stretch space warp*

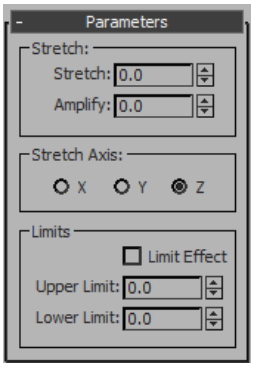

Figure 19-23 *The* ***Parameters*** *rollout*

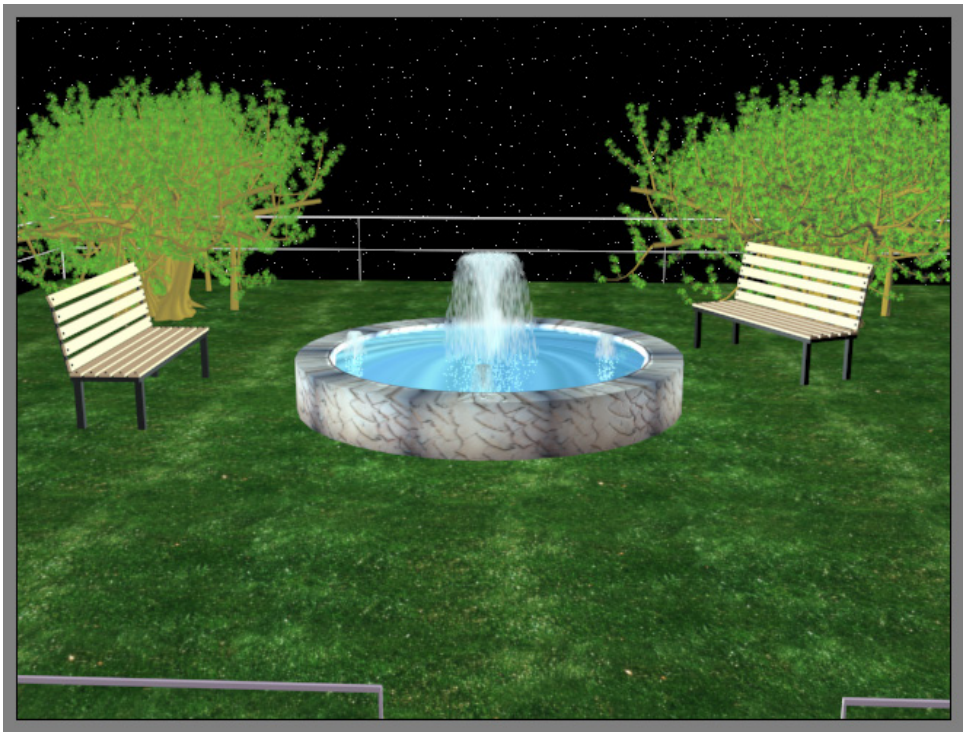

Figure 19-24 *The animated fountains in the scene*

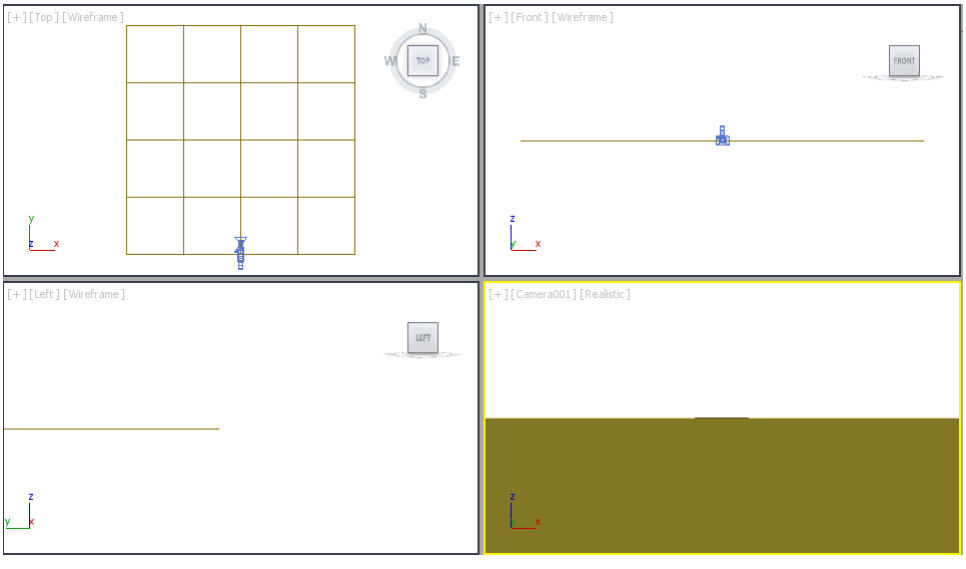

Figure 19-25 *The Camera001 aligned in viewports*

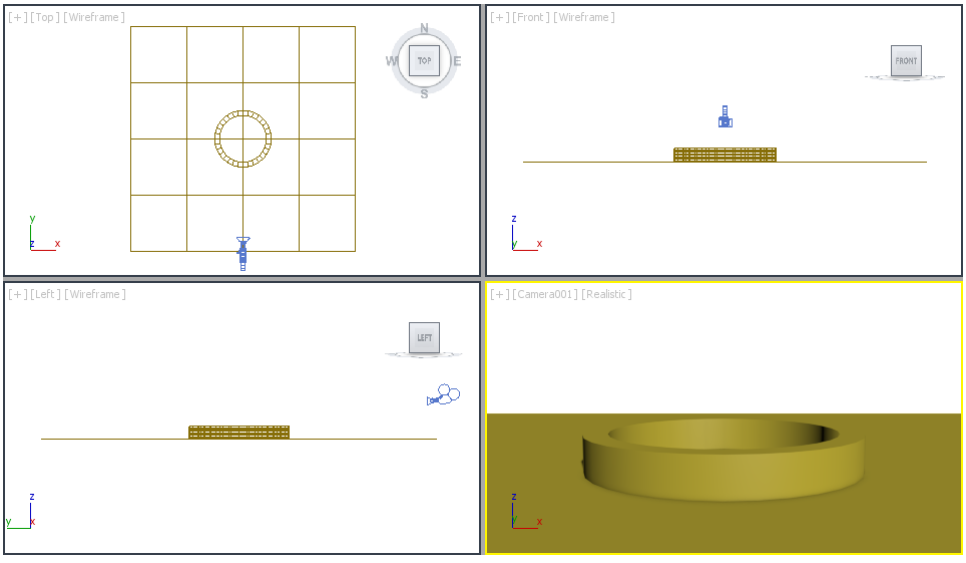

Figure 19-26 *The scene after aligning the Camera001 in viewports*

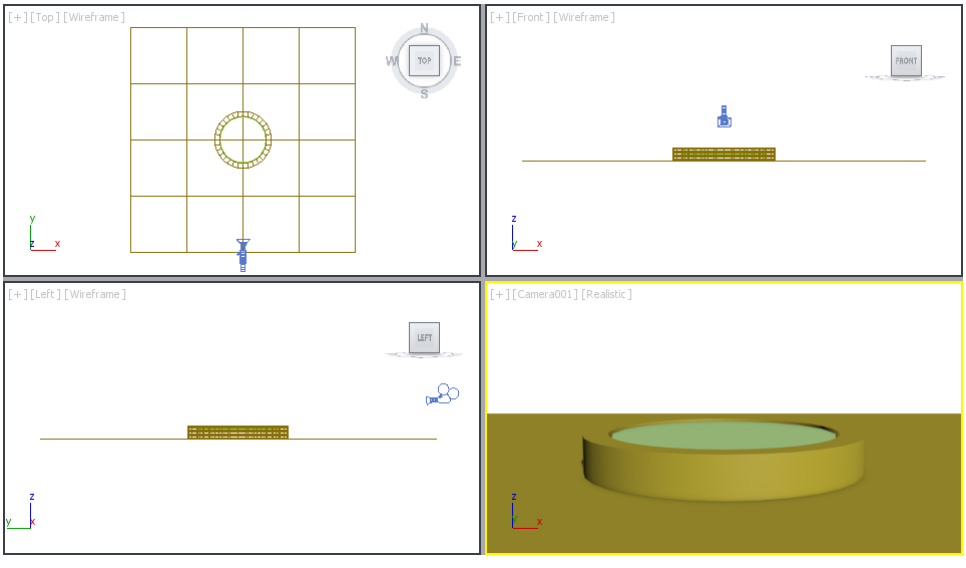

Figure 19-27 *The cylinder for creating the water surface*

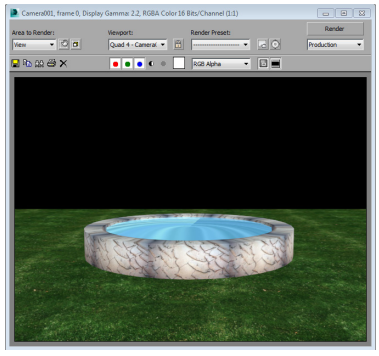

Figure 19-28 *The objects displayed at rendering after assigning the materials*

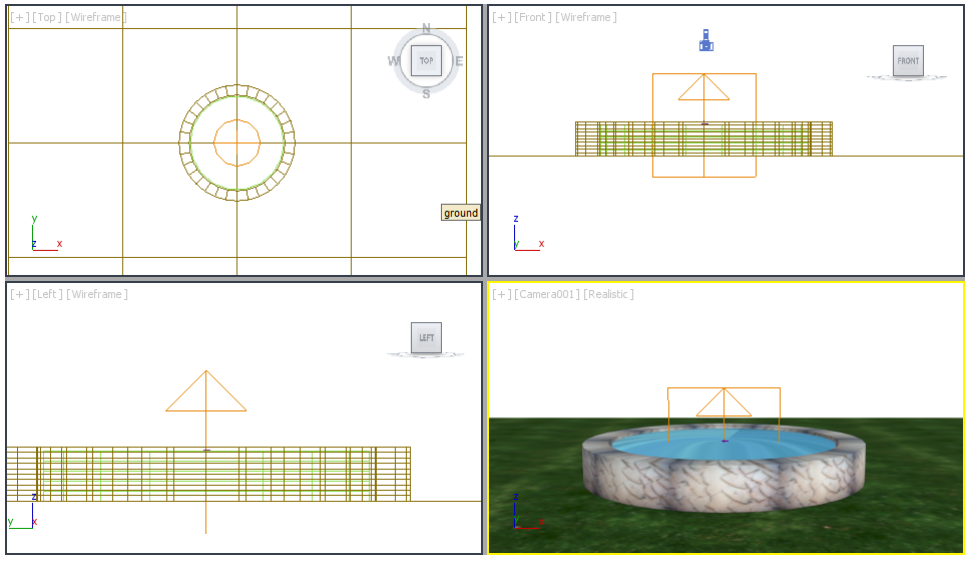

Figure 19-29 *The emitter aligned in viewports*

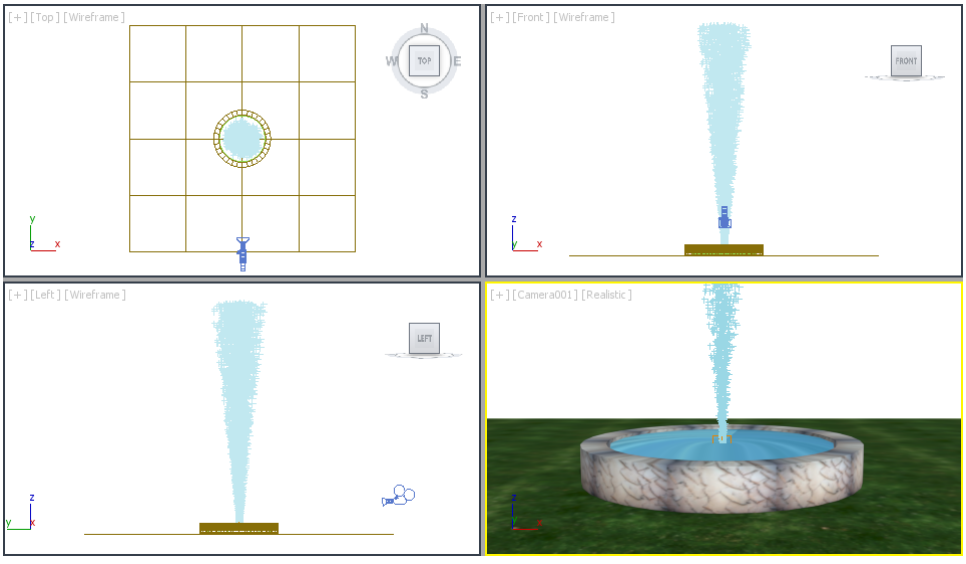

Figure 19-30 *The particle simulation displayed in all viewports after playing the animation*

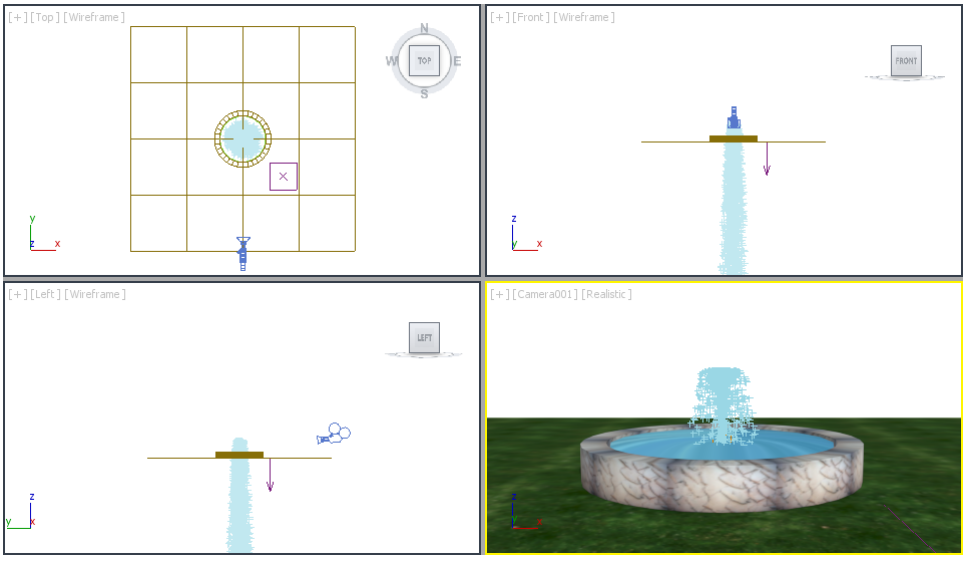

Figure 19-31 *The particles after applying the Gravity space warp*

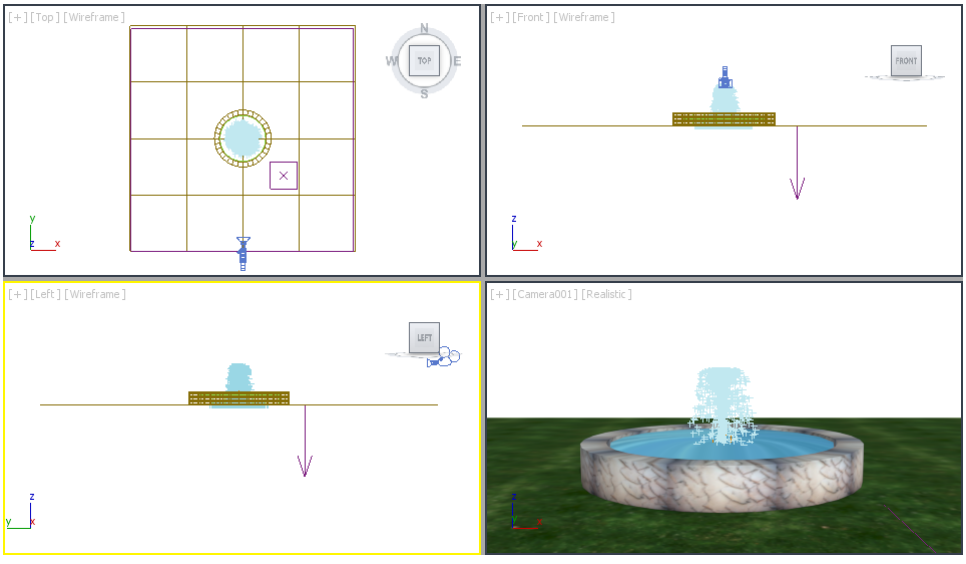

Figure 19-32 *The particles after applying the* ***Deflector*** *space warp*

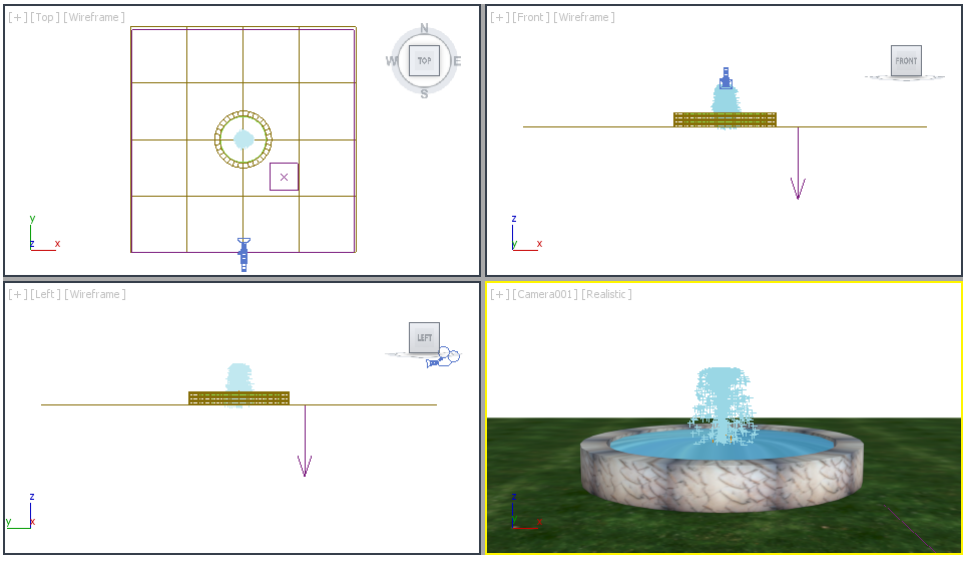

Figure 19-33 *The particles after modifying the settings of the* ***Deflector*** *space wrap*

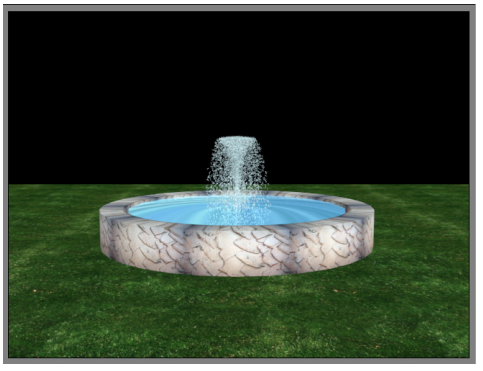

Figure 19-34 *The scene after rendering*

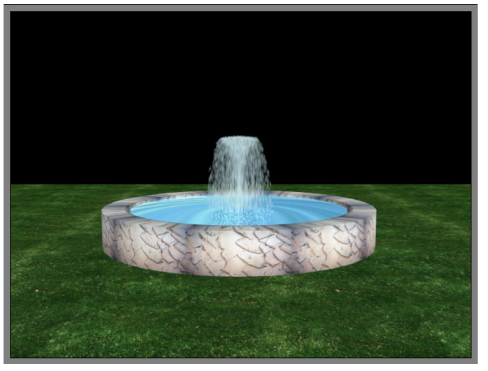

Figure 19-35 *The rendered scene after applying the motion blur effect*

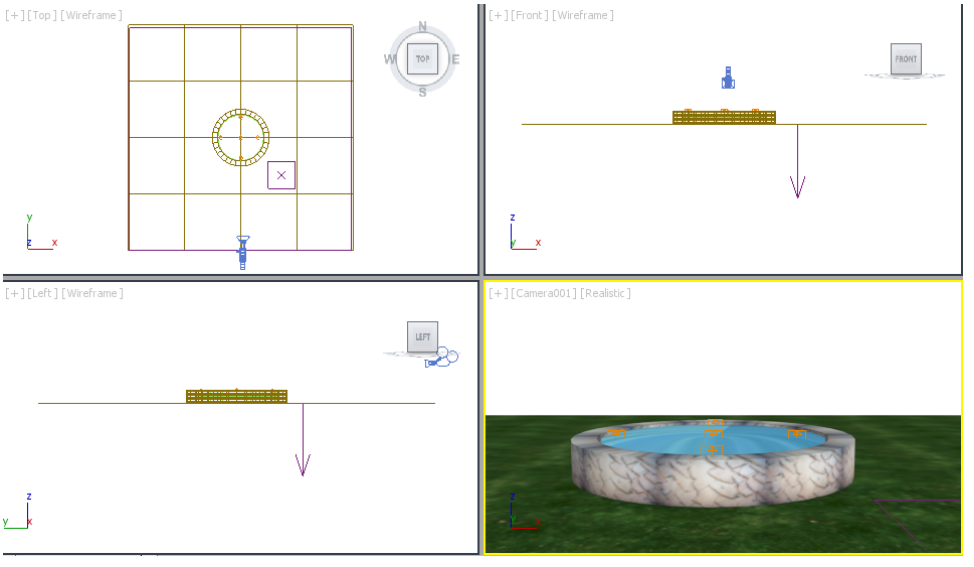

Figure 19-36 *The four copies of the fountain01 after alignment*

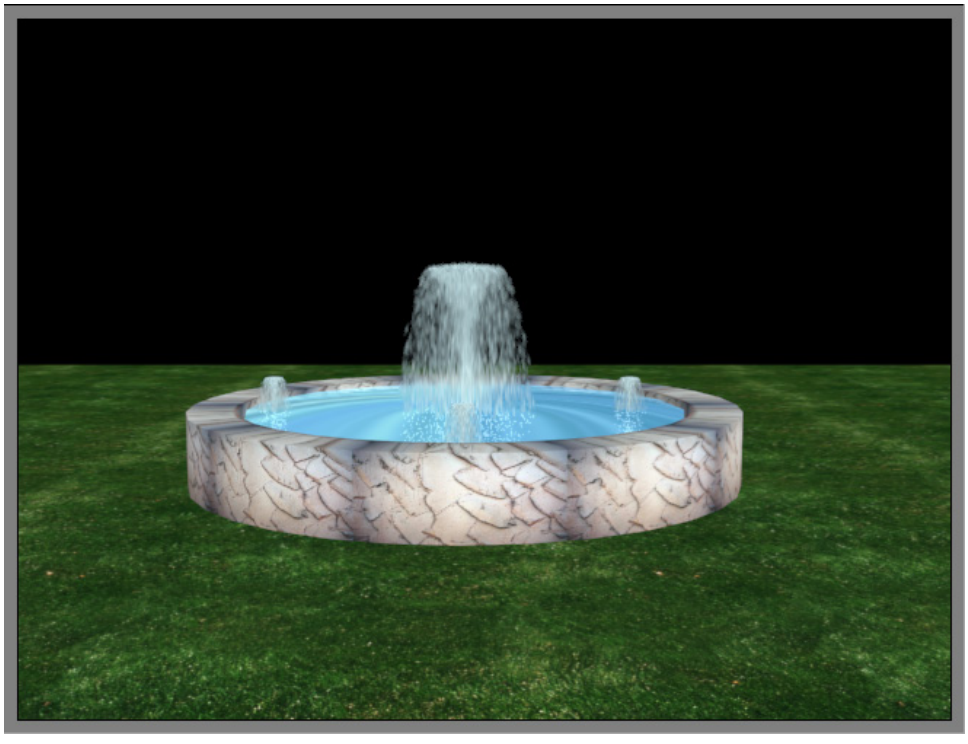

Figure 19-37 *The scene after rendering*

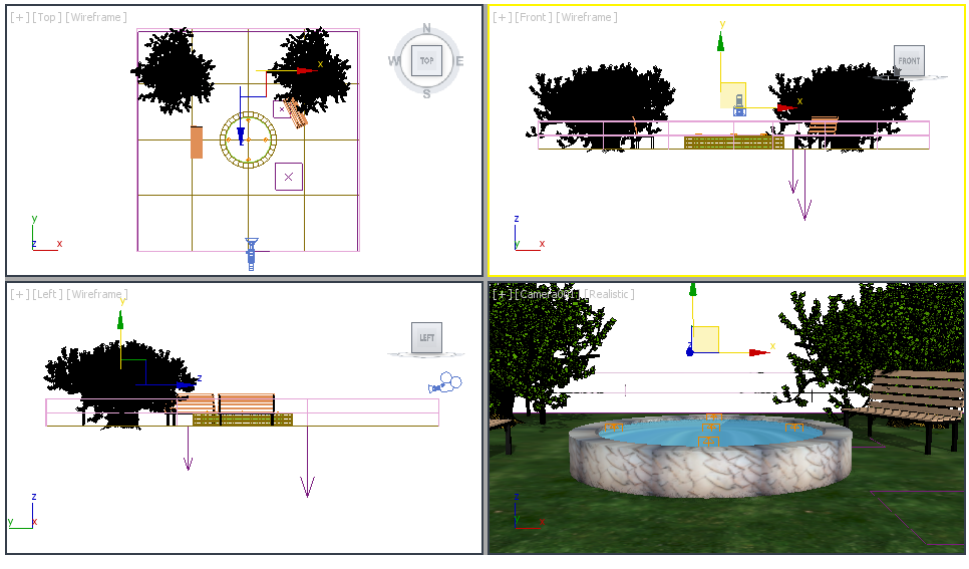

Figure 19-38 *The plants, railings, and park benches in the scene after the alignment*

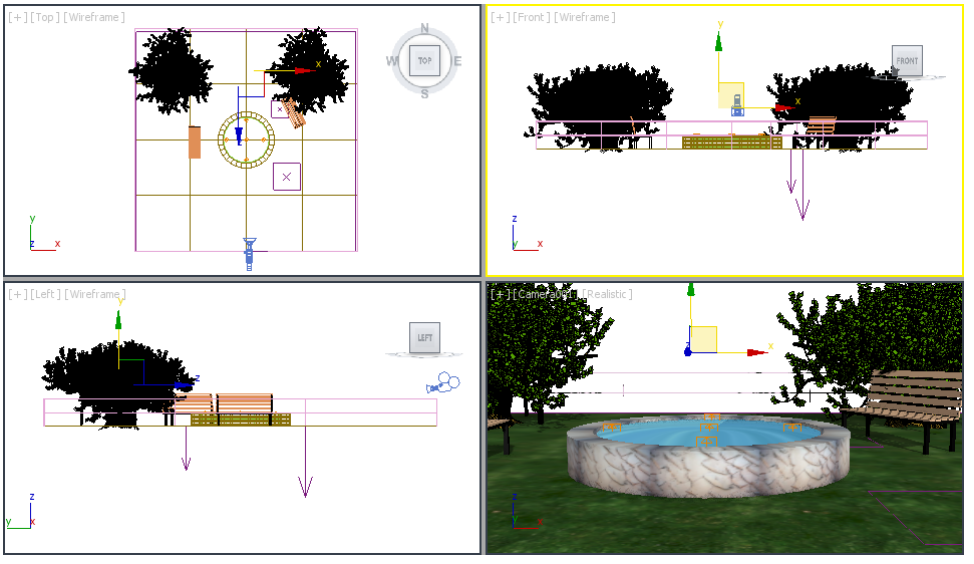

Figure 19-39 *The Omni01 light in viewports after the alignment*

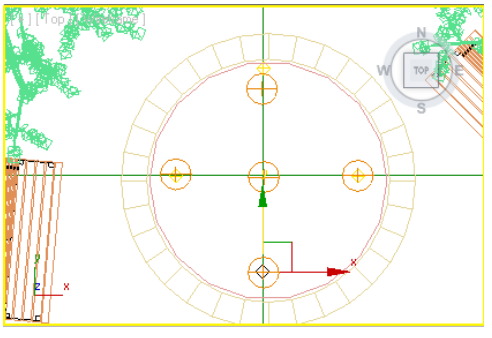

Figure 19-40 *All omni lights aligned in the Top viewport*

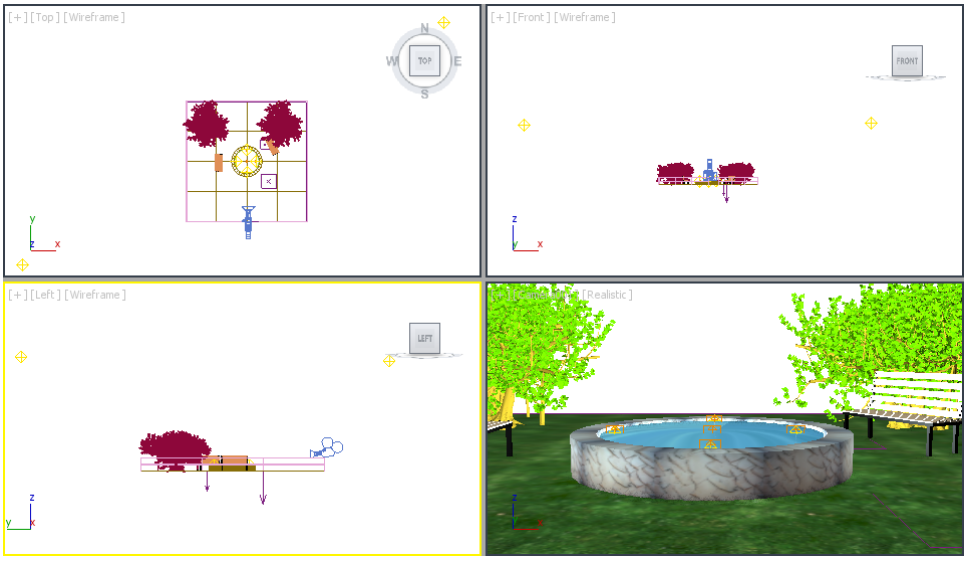

Figure 19-41 *The omni lights in viewports after the alignment*

Figure 19-42 *The scene at rendering after assigning the lights*

Figure 19-43 *The scene with the environment after rendering*

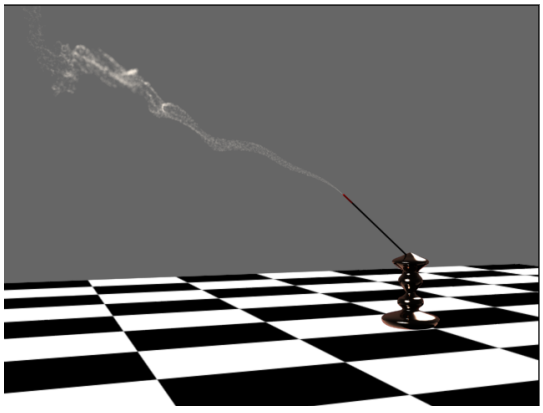

Figure 19-44 *The smoke rising from an incense stick*

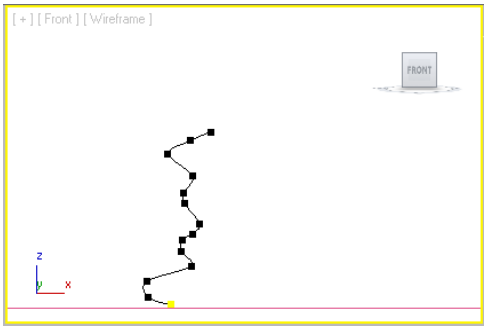

Figure 19-45 *A line for creating the incense stick stand*

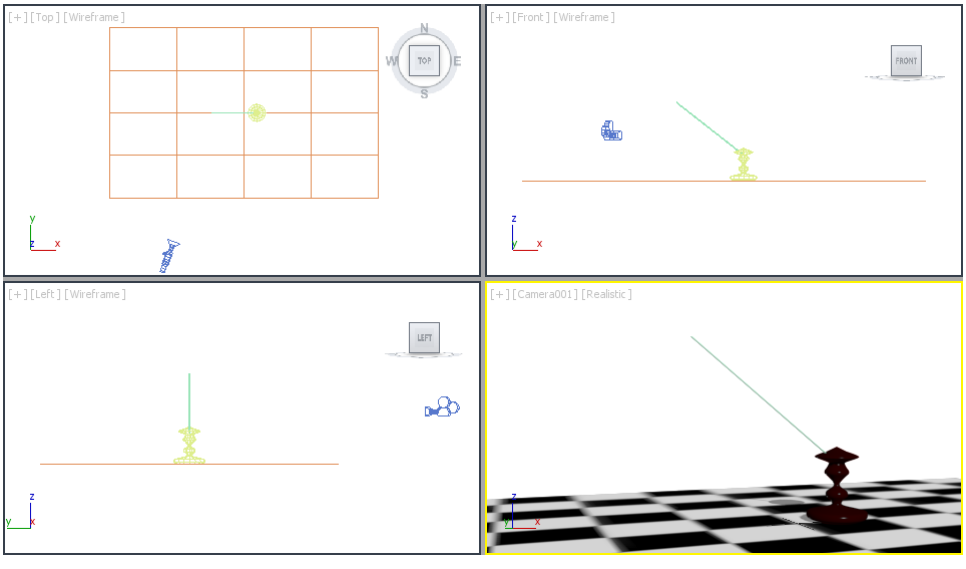

Figure 19-46 *The incense stick stand and the free camera aligned in viewports*

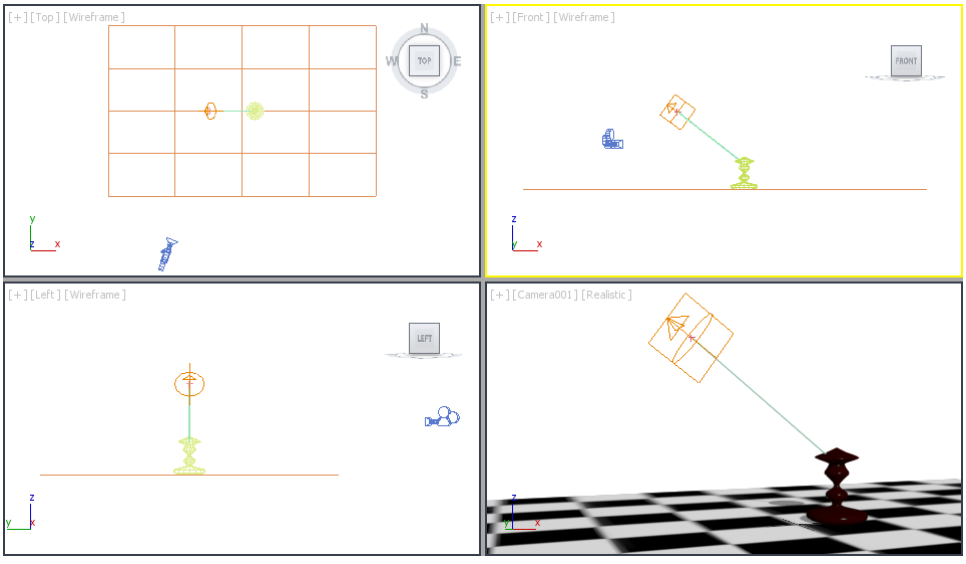

Figure 19-47 *The emitter for Super Spray particle system aligned in viewports*

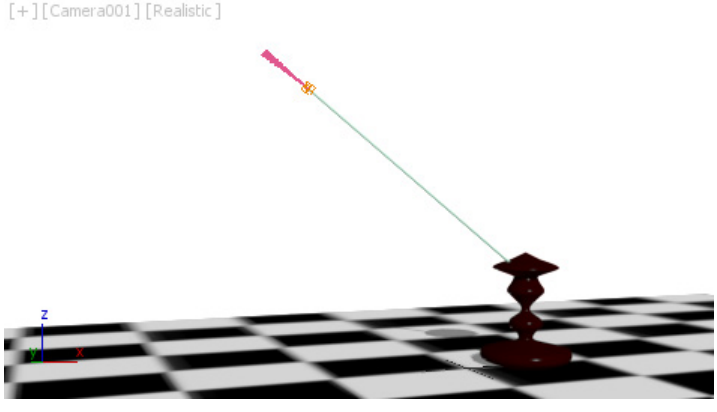

Figure 19-48 *The particles in the Camera001 viewport at one frame*

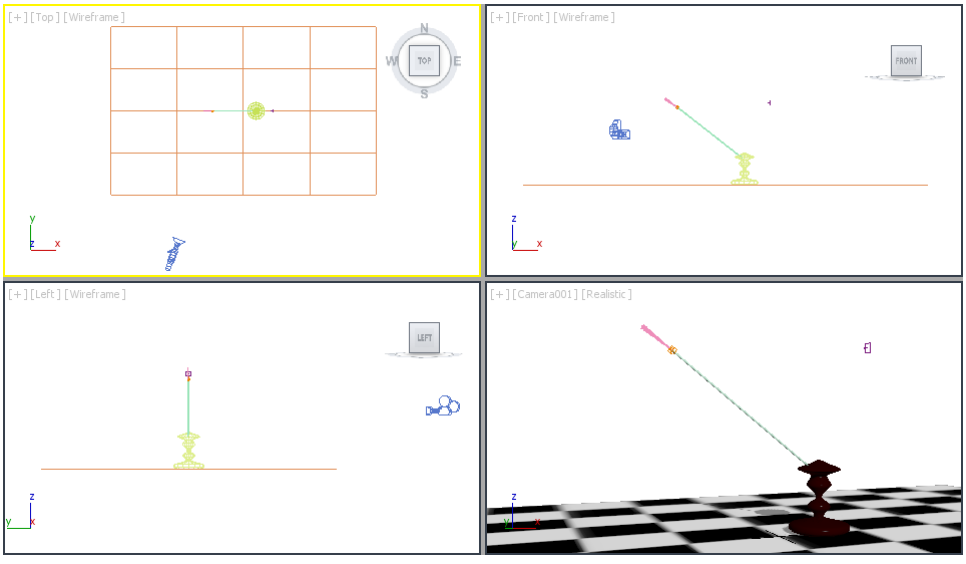

Figure 19-49 *The Wind space warp icon aligned in viewports*

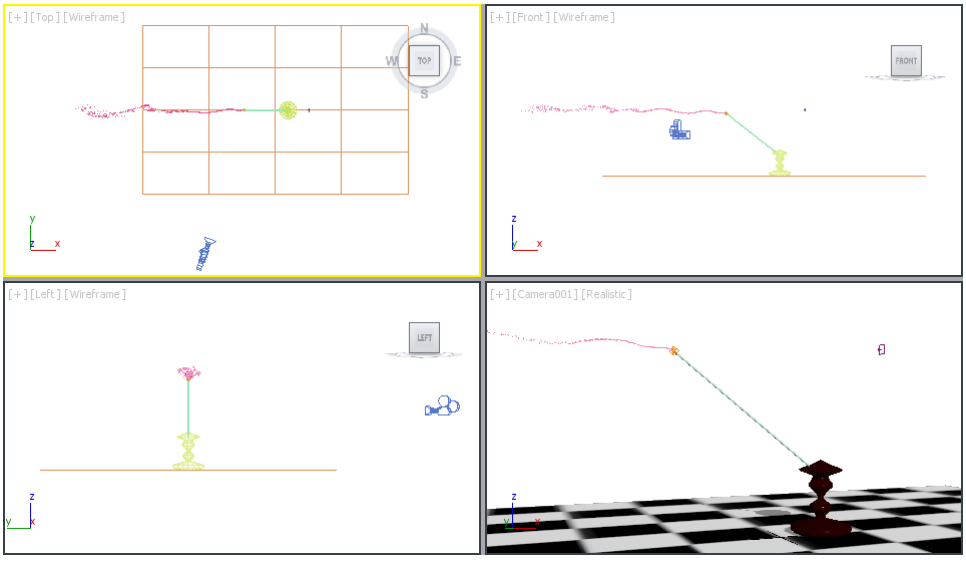

Figure 19-50 *The smoke after binding with the Wind Space Warp icon in viewports*

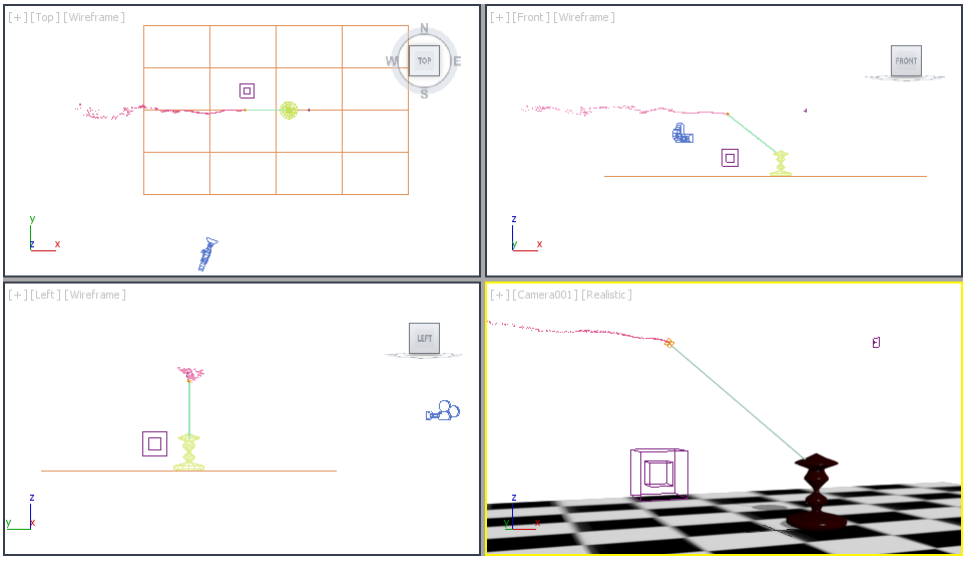

Figure 19-51 *The Drag space warp icon aligned in viewports*

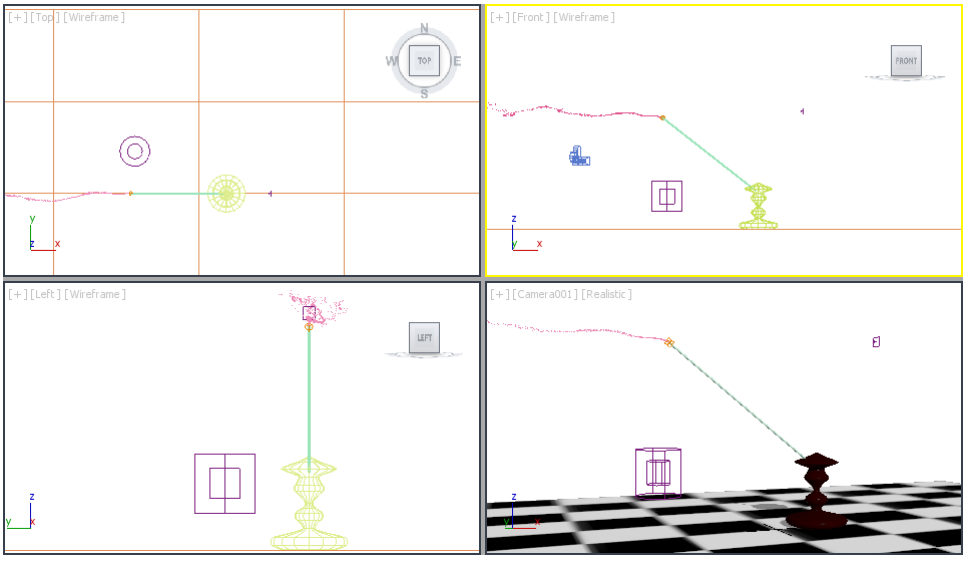

Figure 19-52 *The smoke after binding with the Drag space warp icon in viewports*

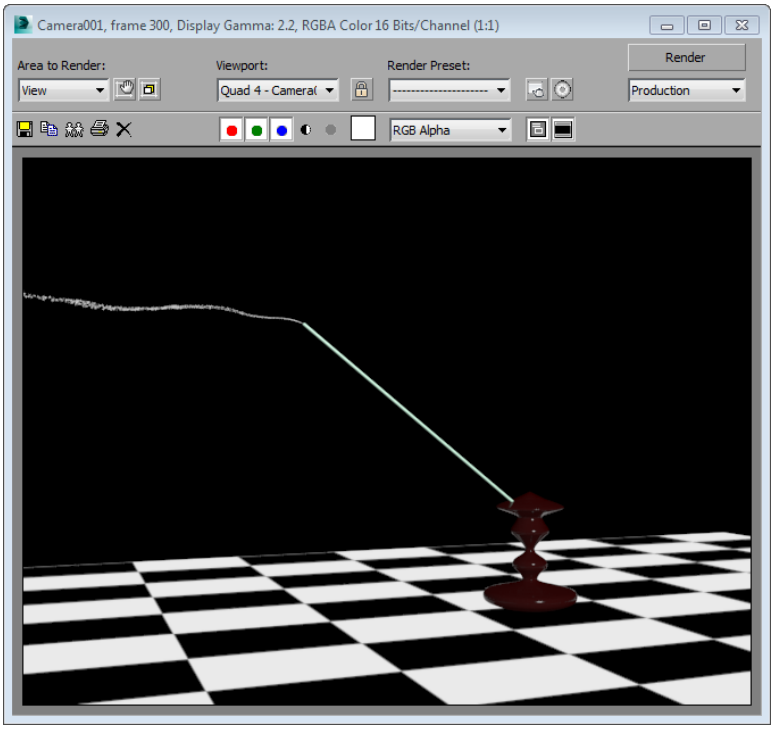

Figure 19-53 *The scene after rendering*

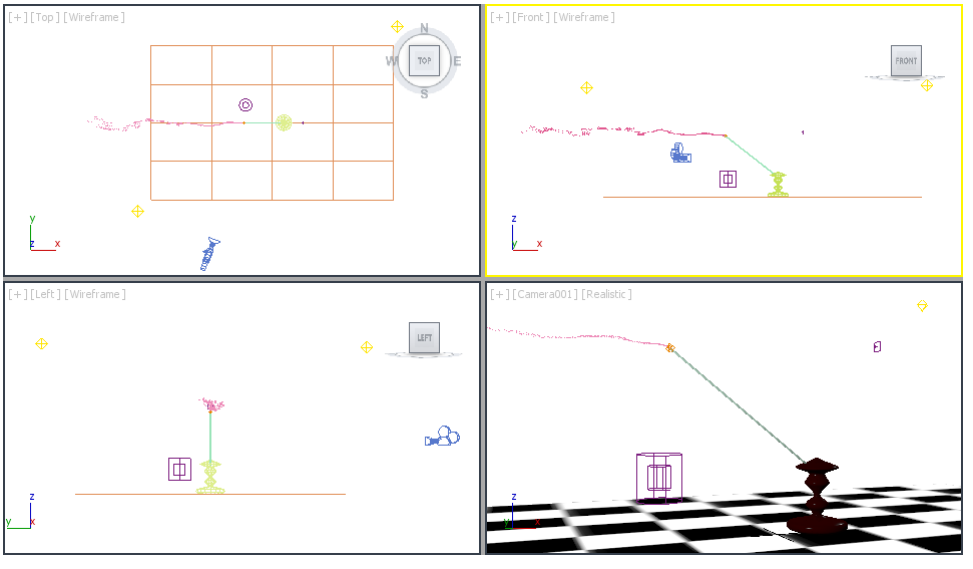

Figure 19-54 *The omni lights aligned in viewports*

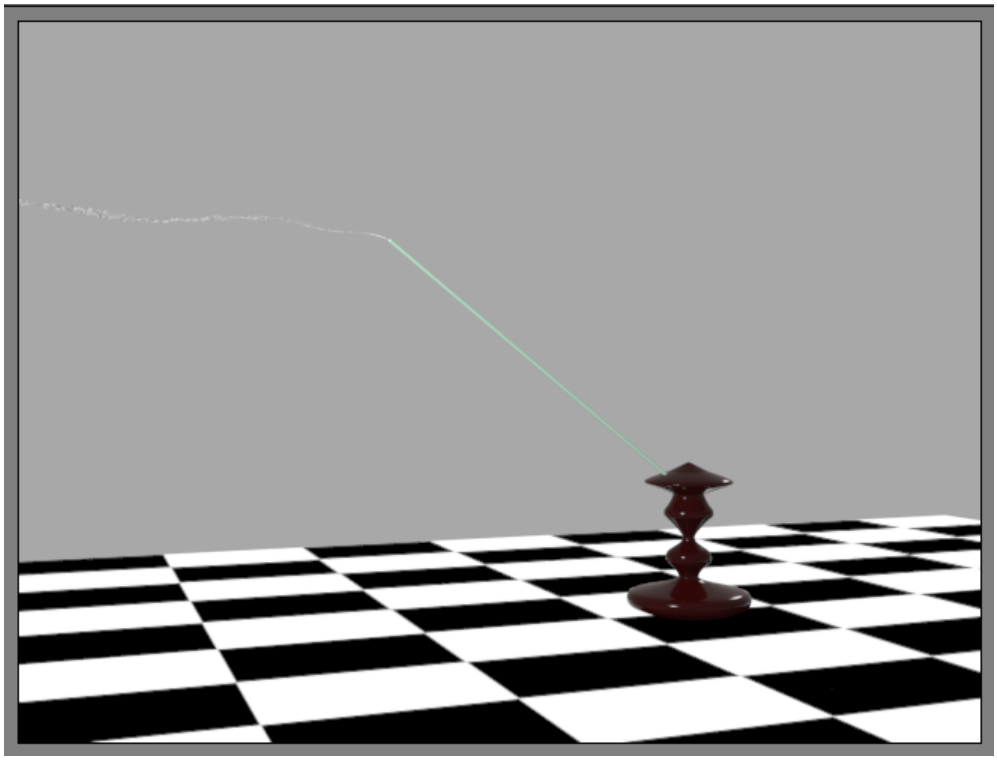

Figure 19-55 *The scene at rendering after modifying the color of the environment*

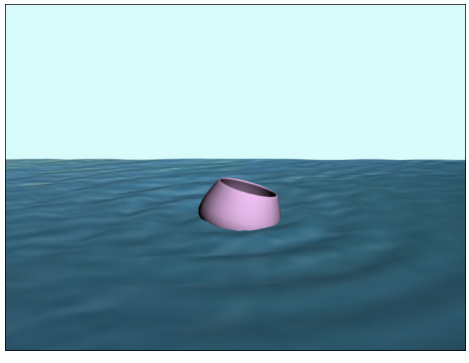

Figure 19-56 *The object floating on the sea*

Figure 19-57 *The rainy effect*

Project 1

Figure P1-1 *The model of the logo*

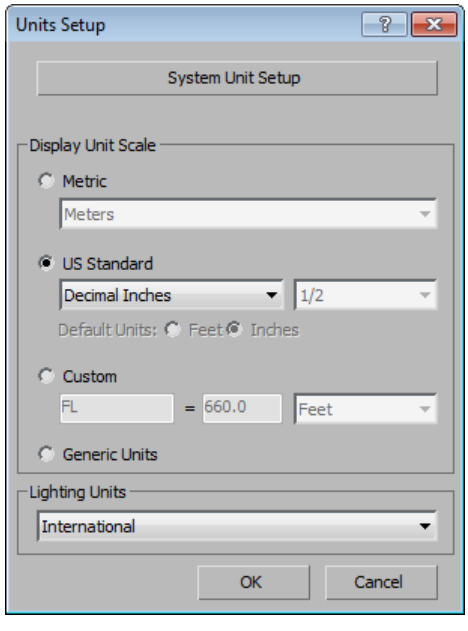

Figure P1-2 *The* ***Units Setup*** *dialog box*

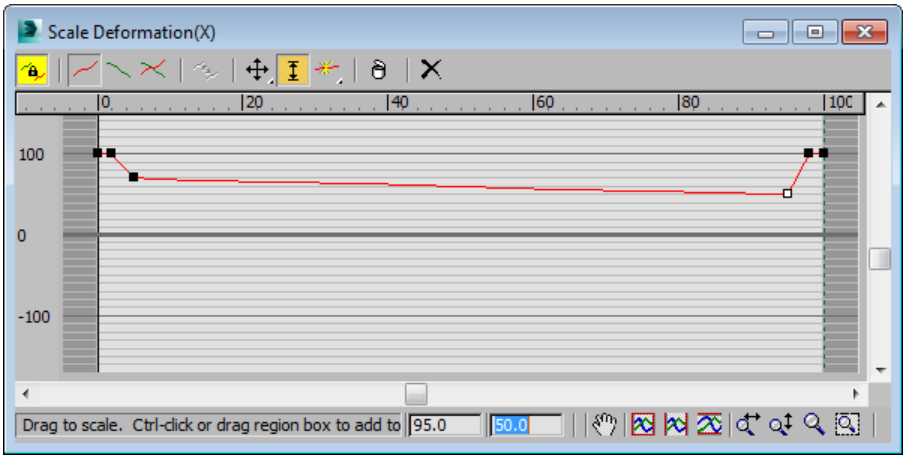

Figure P1-3 *The* ***Scale Deformation(X)*** *dialog box after scaling at different points*

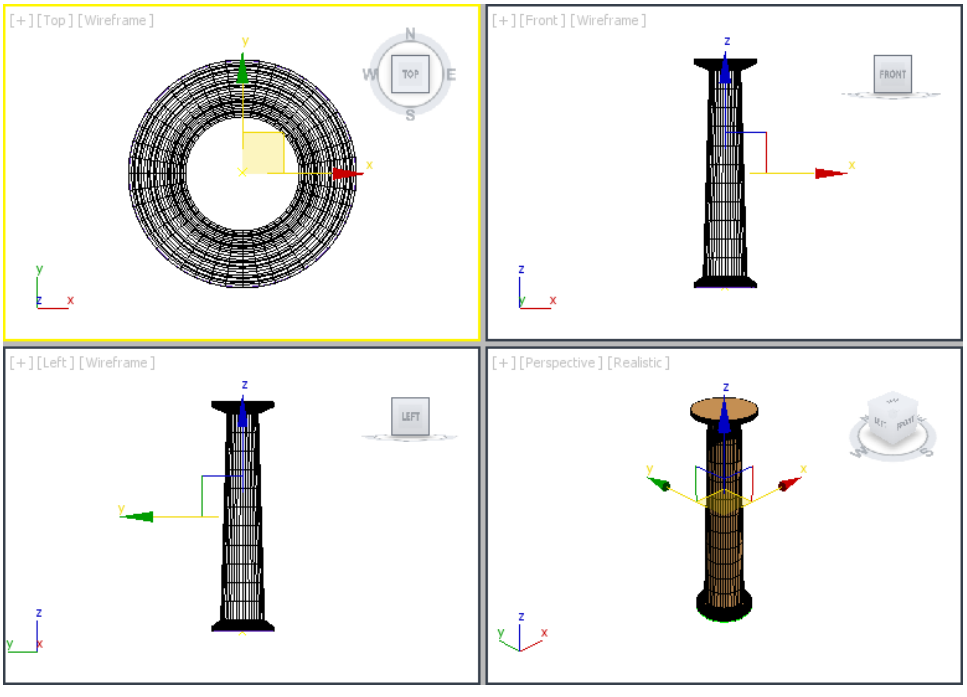

Figure P1-4 *Column01 modified using the* ***Scale Deformation(X)*** *dialog box*

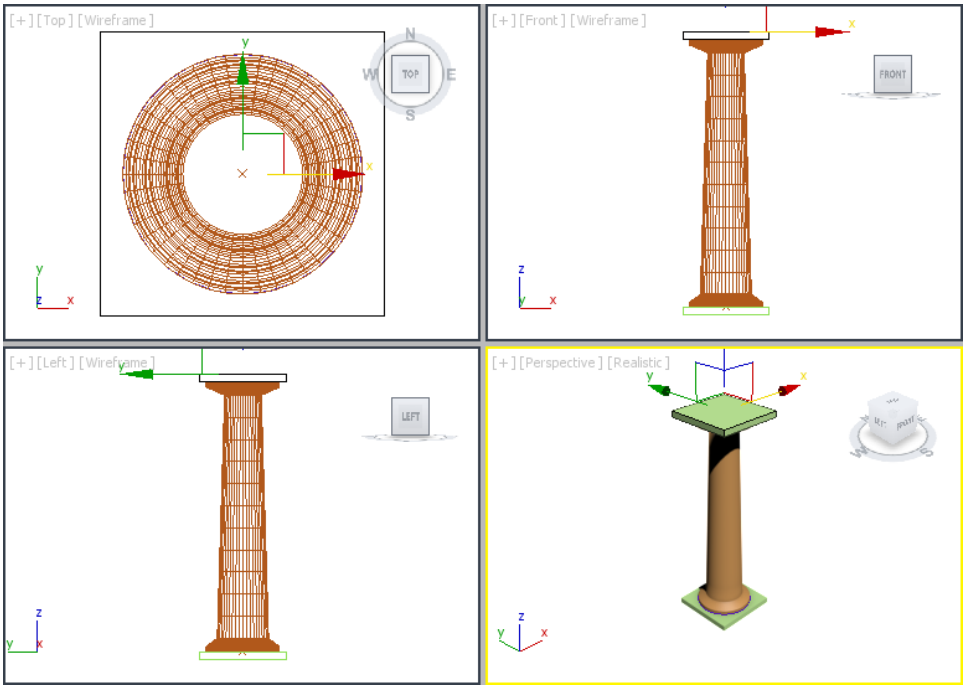

Figure P1-5 *Column01Top is aligned with the top of Column01*

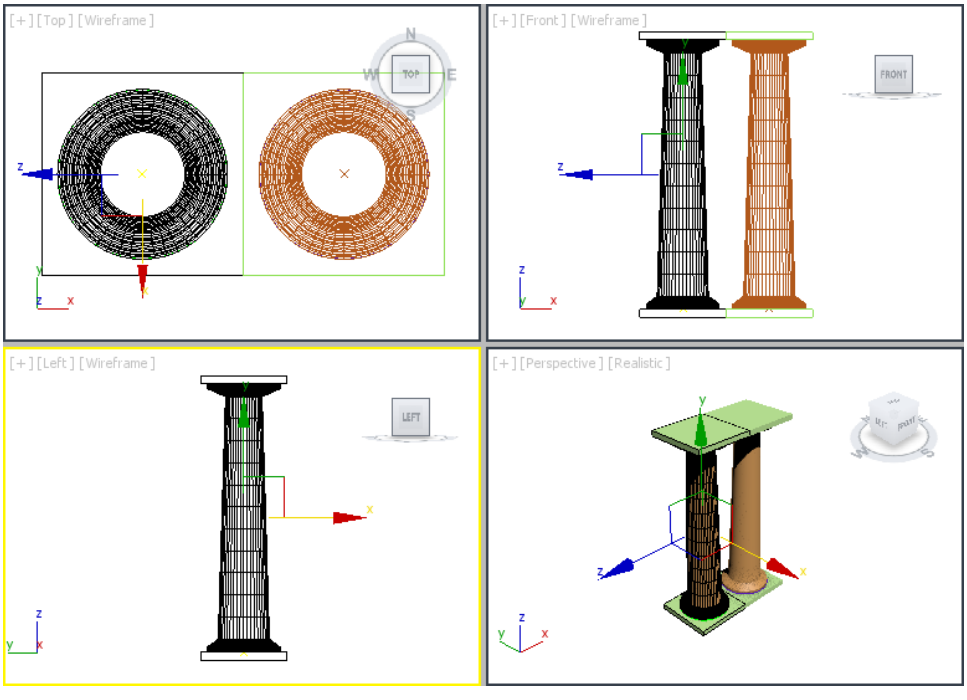

Figure P1-6 *Column02 Assembly created*

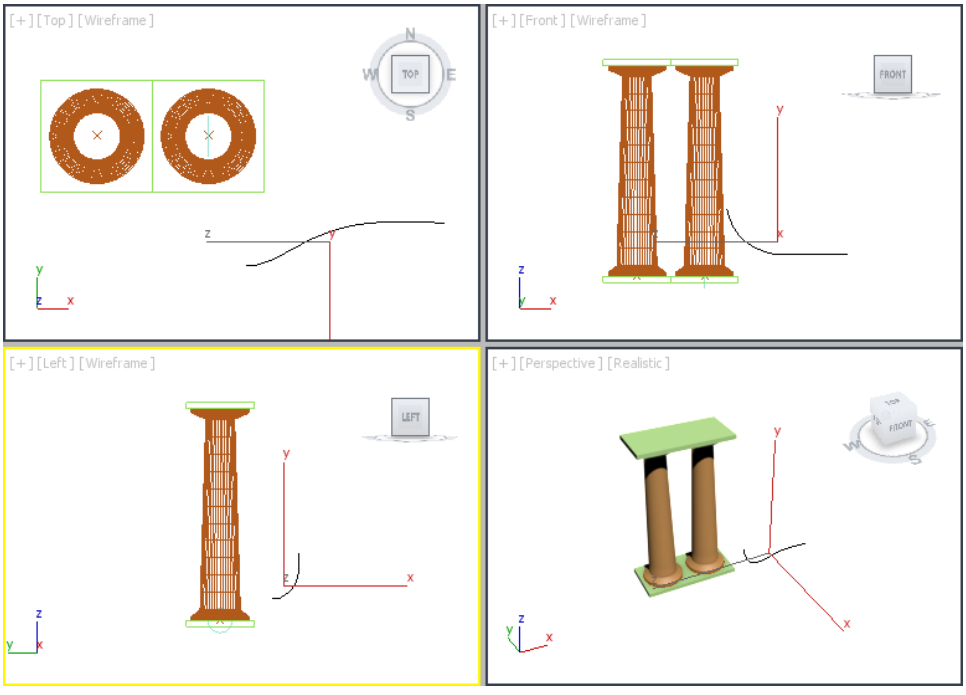

Figure P1-7 *The path for the left-hand horn created*

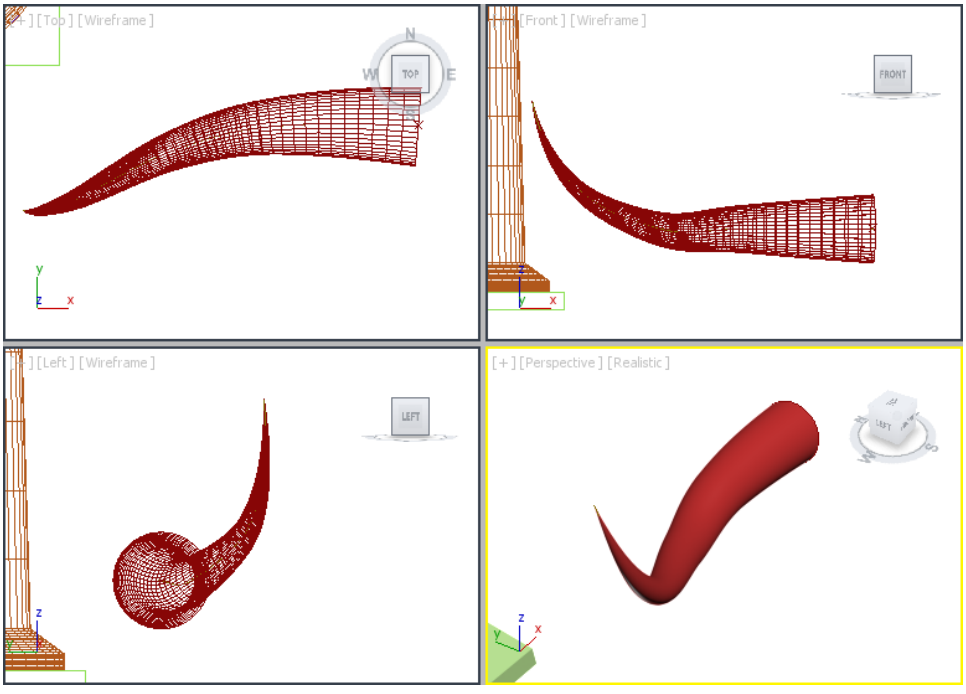

Figure P1-8 *Horn-Left modified using the* ***Scale Deformation(X)*** *dialog box*

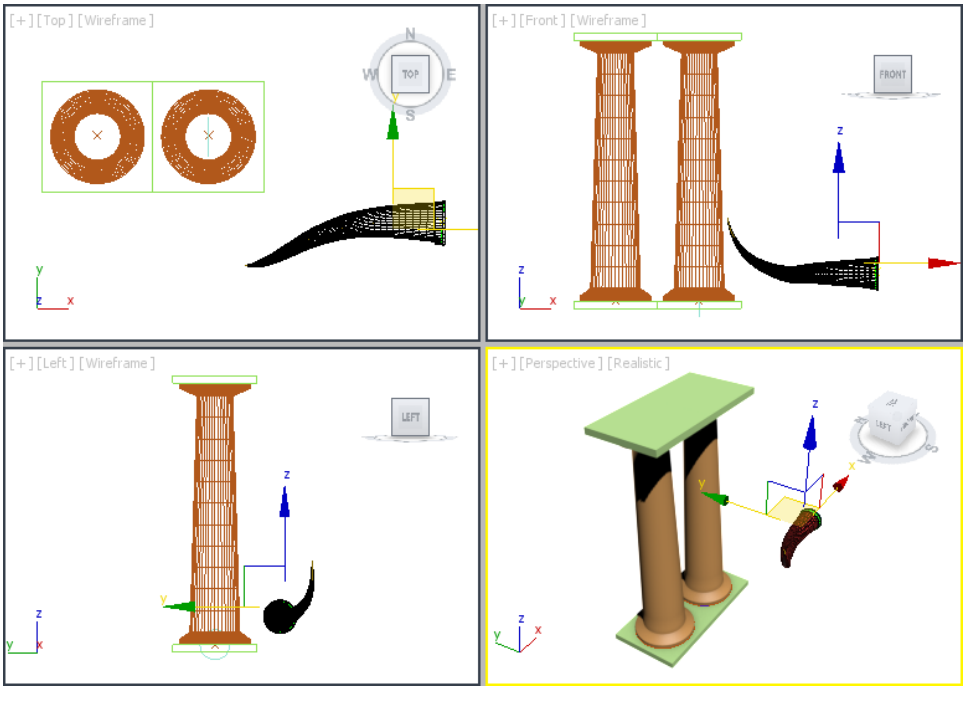

Figure P1-9 *HornAssemblyLeft created*

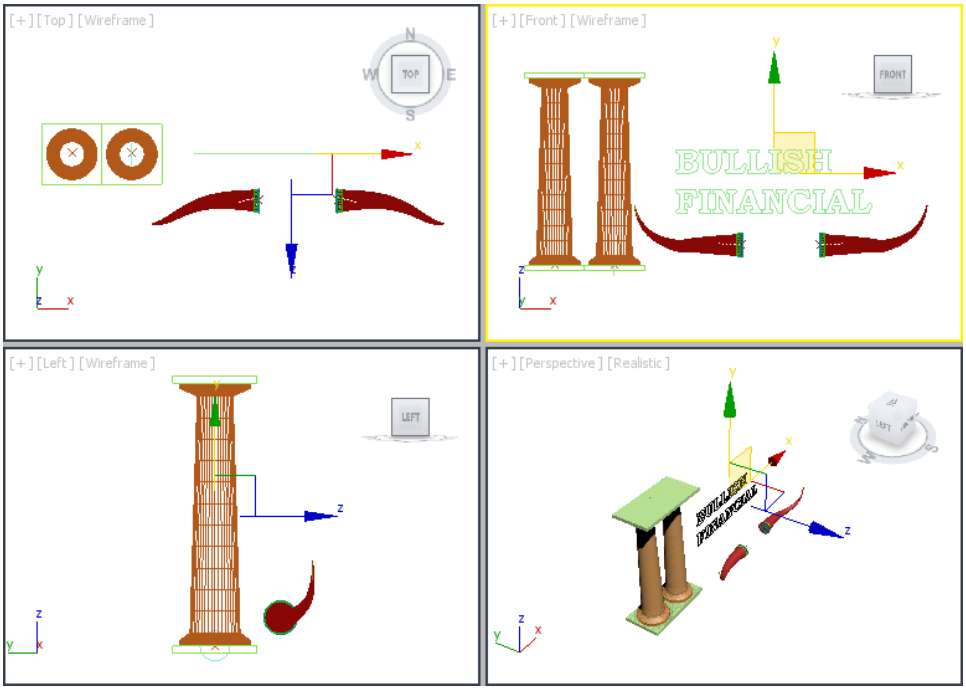

Figure P1-10 *The text displayed as a single object*

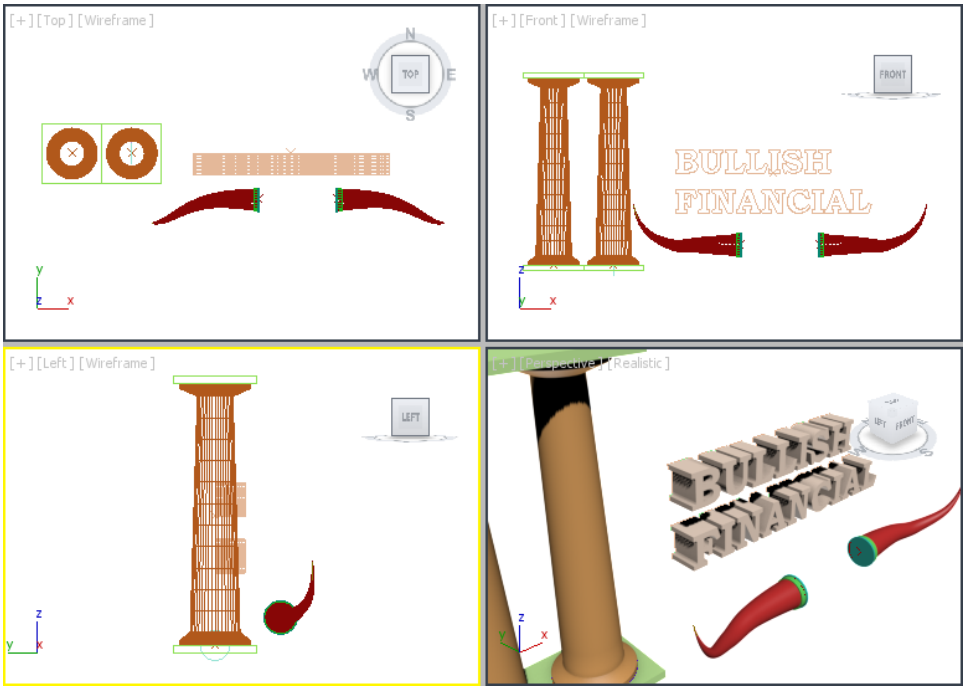

Figure P1-11 *The logo text created*

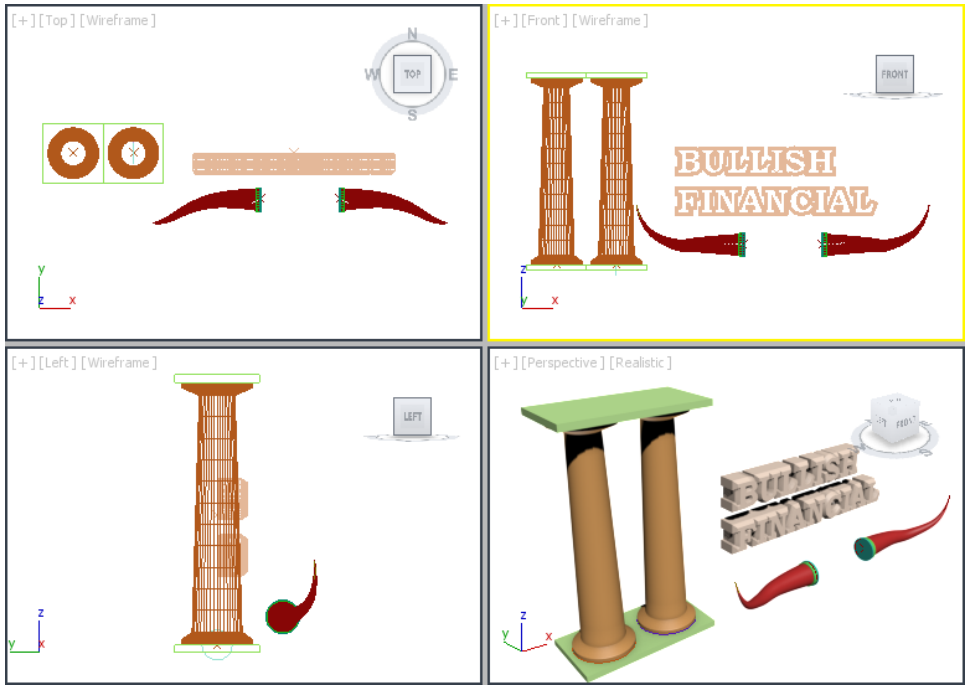

Figure P1-12 *A bevel deformation applied to Logo Text and the text centered over the horns*

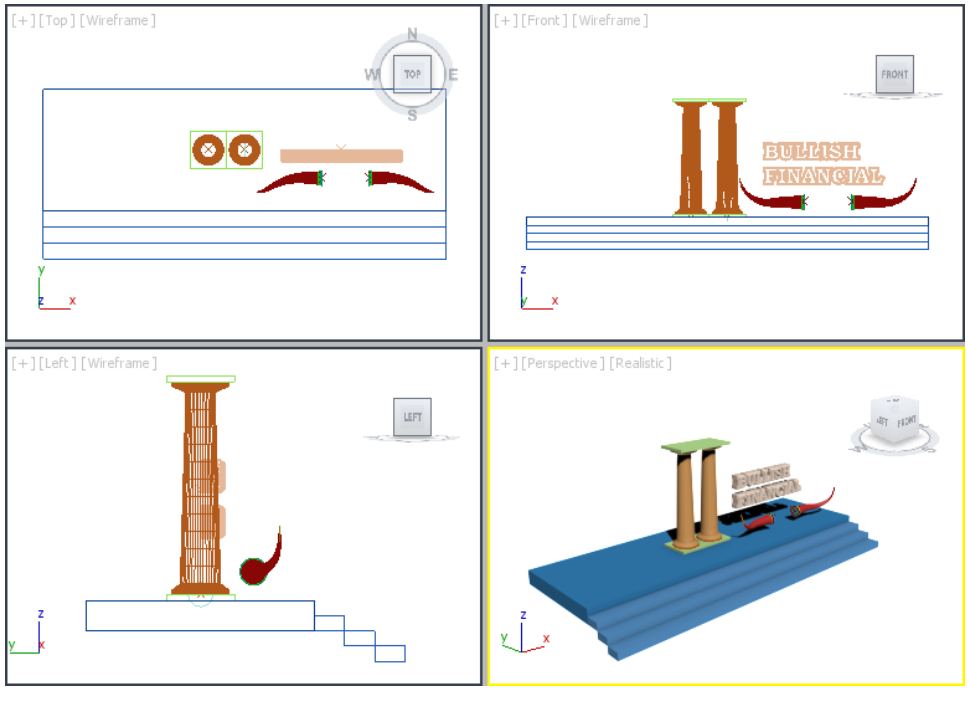

Figure P1-13 *The floor and three stairs created and aligned*

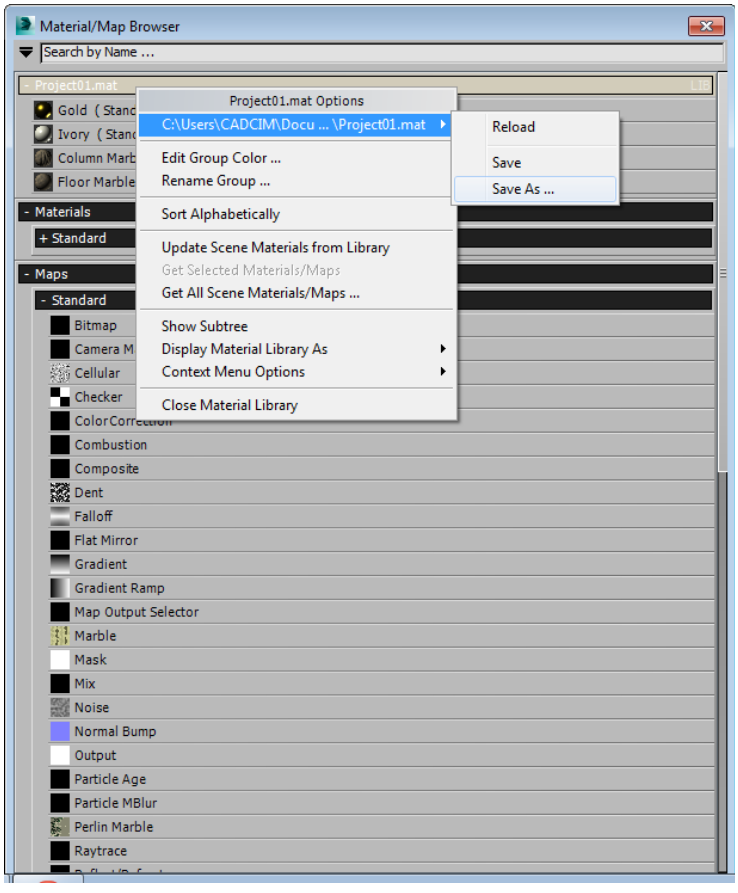

Figure P1-14 *Saving the material library*

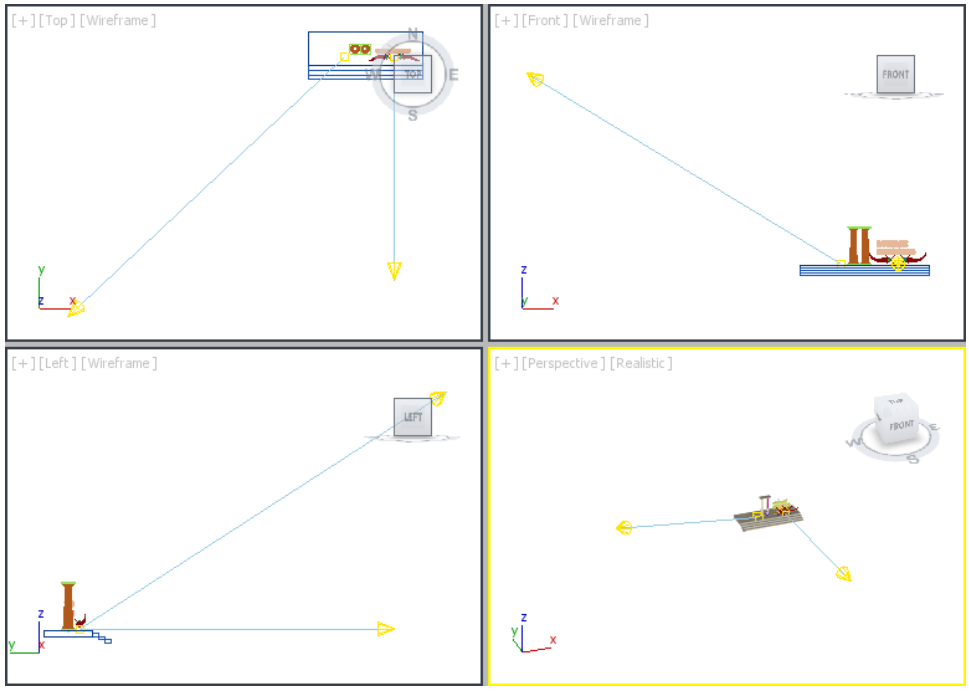

Figure P1-15 *The spotlights created and positioned*

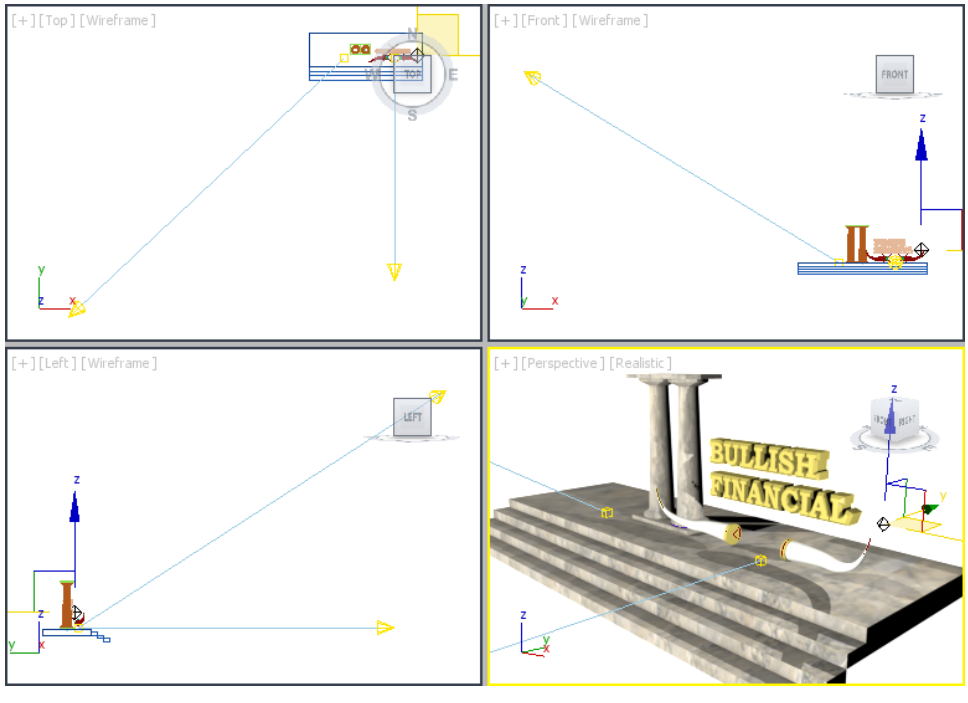

Figure P1-16 *The omni light positioned*

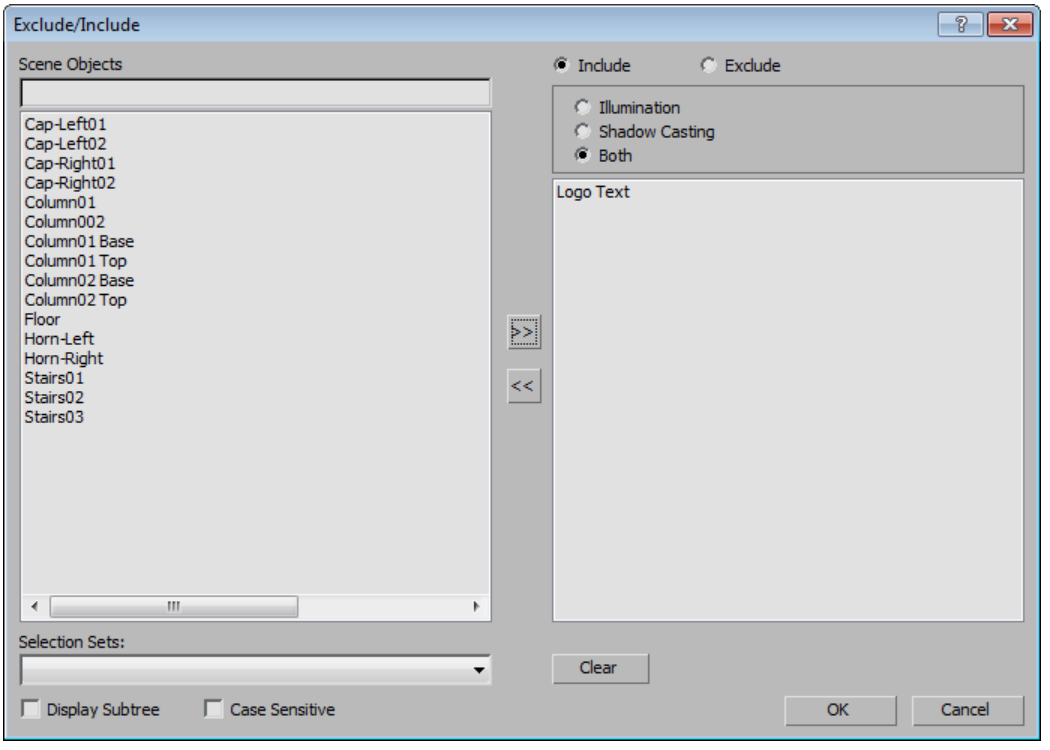

Figure P1-17 *The* ***Exclude/Include*** *dialog box*

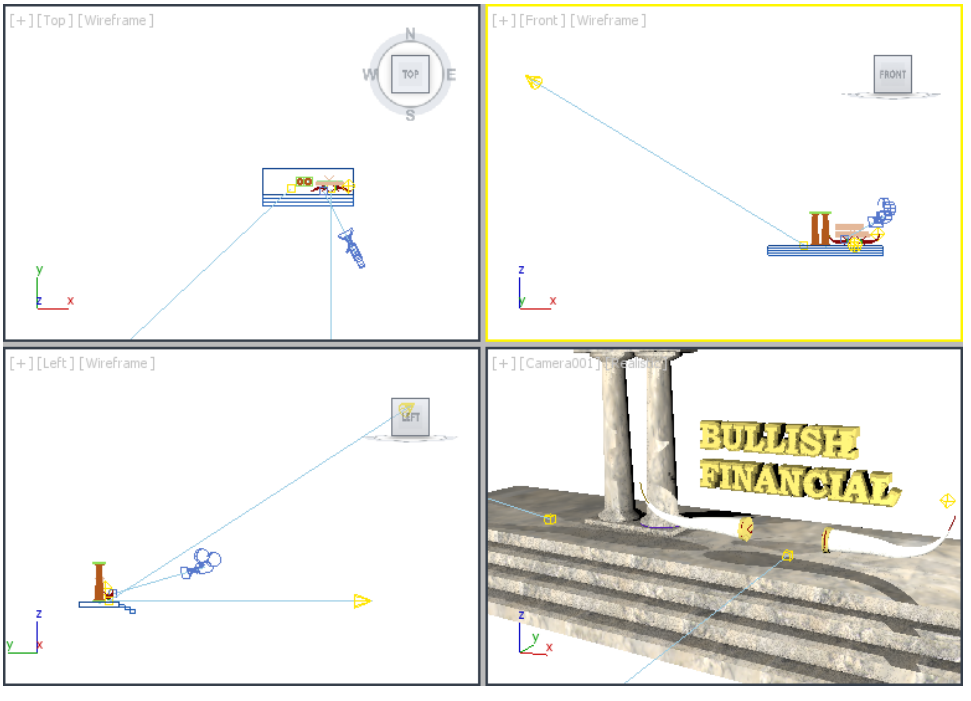

Figure P1-18 *The camera created and aligned*

Figure P1-19 *The scene rendered after creating the lights and camera*

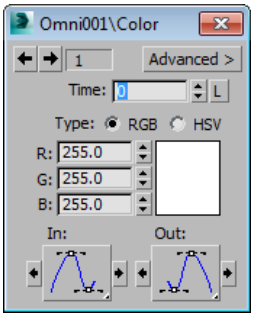

Figure P1-20 *The* ***Omni001\Color*** *dialog box*

Figure P1-21 *A rendered image of the final animation at frame 0*

Project 2

Creating a Diner

Figure P2-1 *The scene of the diner*

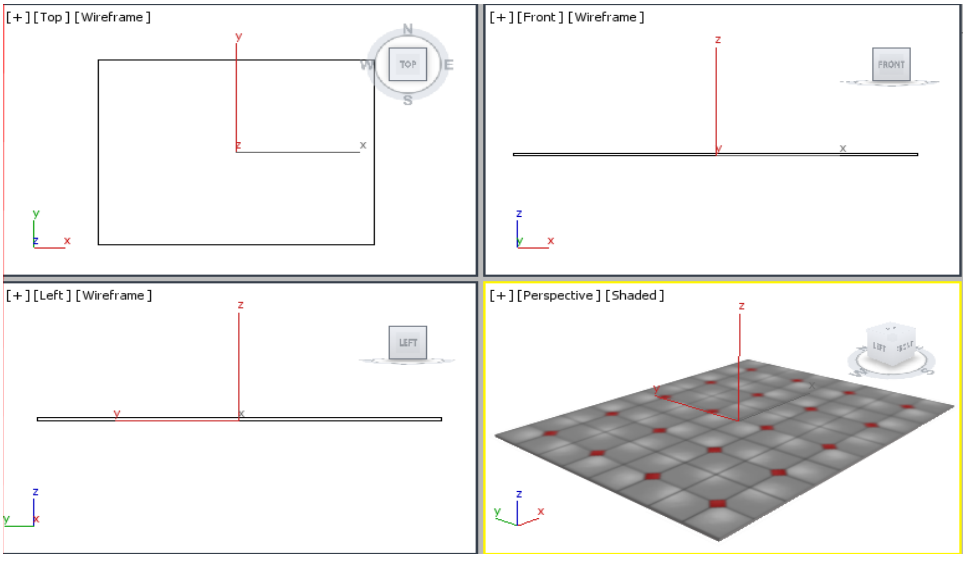

Figure P2-2 *Floor created and a material assigned to it*

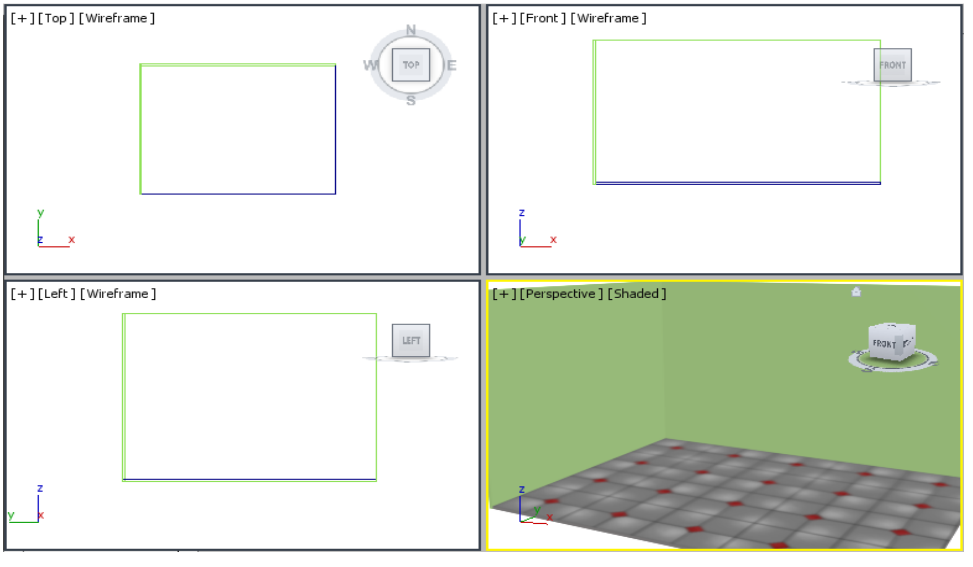

Figure P2-3 *The Wall02 geometry is aligned with the end of Floor*

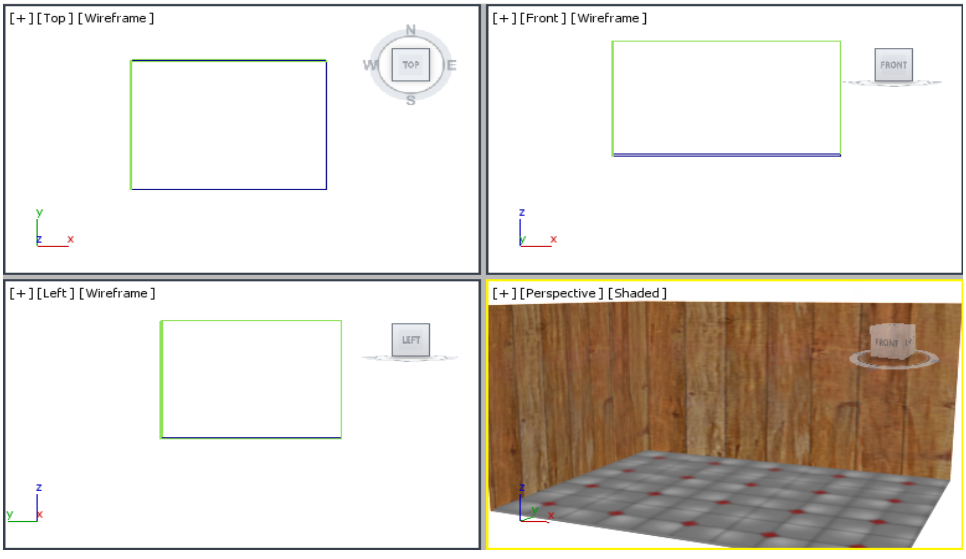

Figure P2-4 *Material assigned to Wall01 and Wall02*

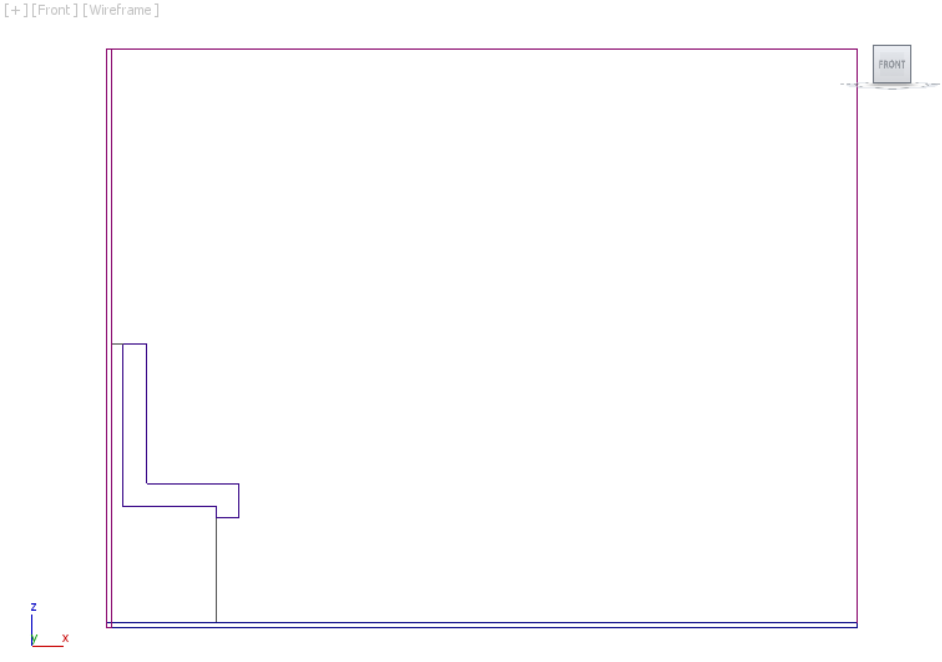

Figure P2-5 *The profile of seat created*

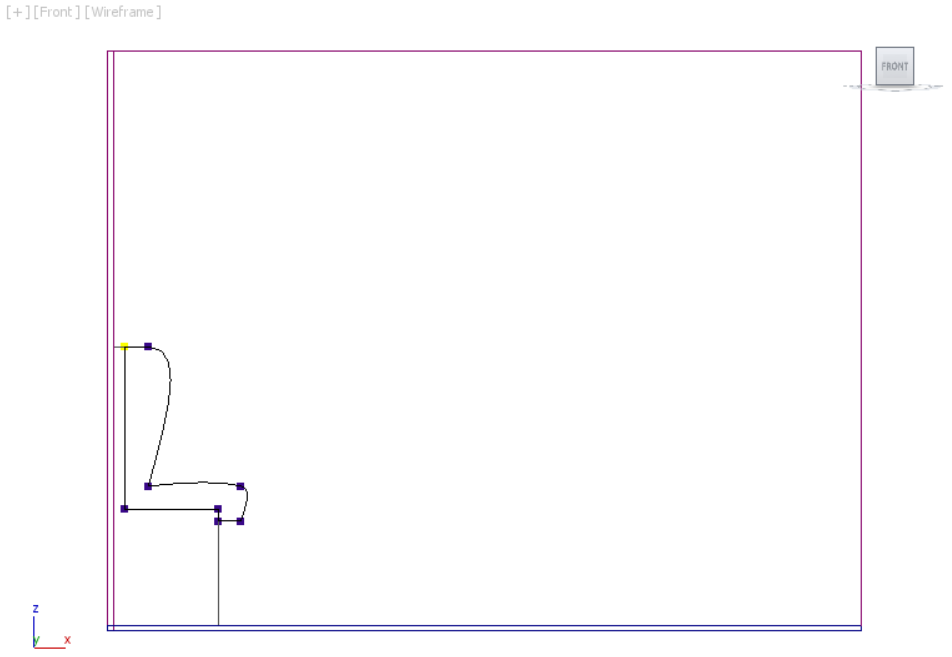

Figure P2-6 *The vertices of Seat modified to create a curved back and bottom*

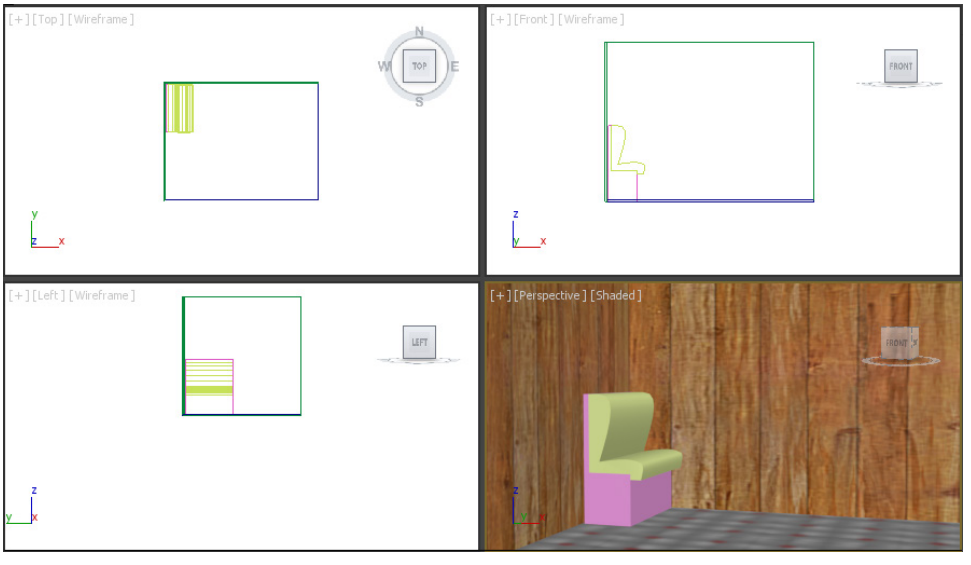

Figure P2-7 *Booth and Seat created in the viewport*

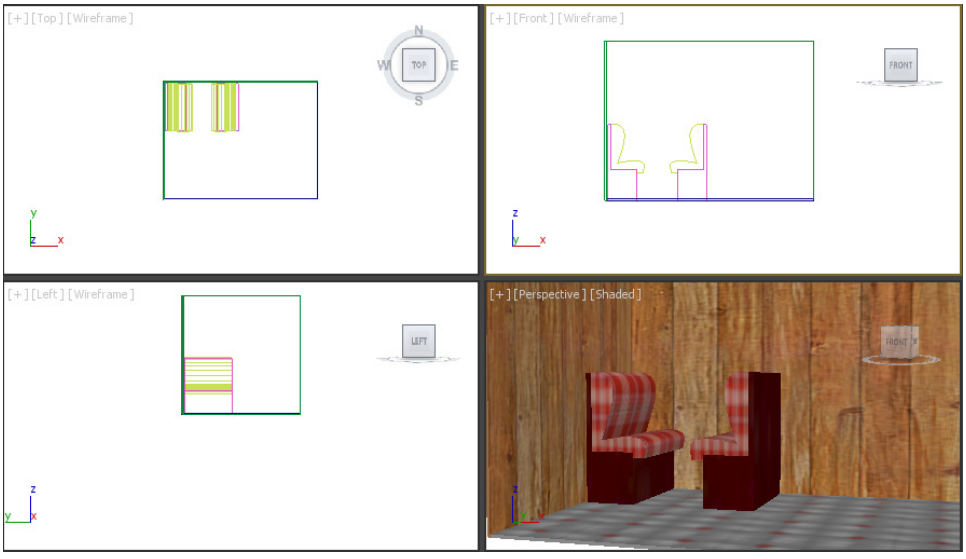

Figure P2-8 *Mirror image is created 40 units to the right of Booth01*

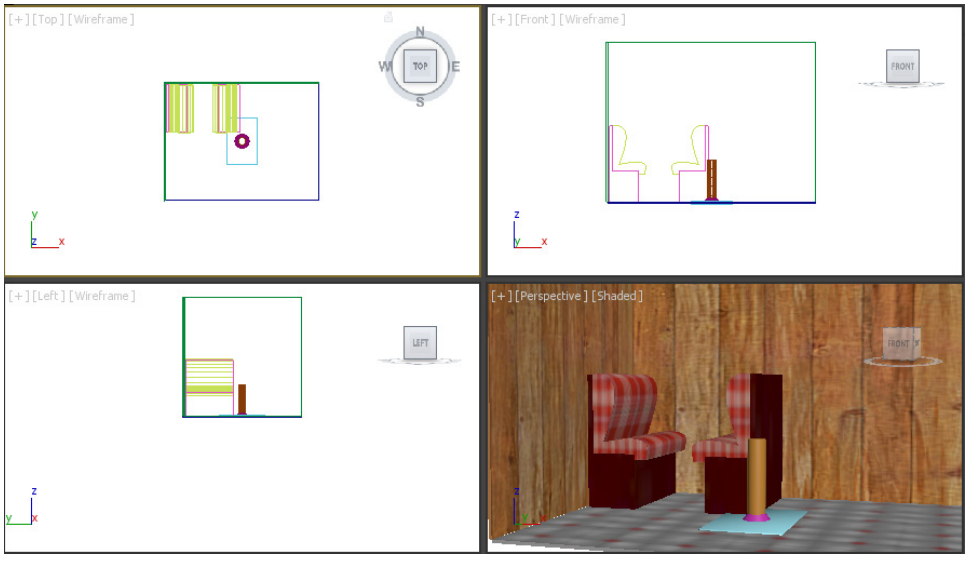

Figure P2-9 *Top of the table created*

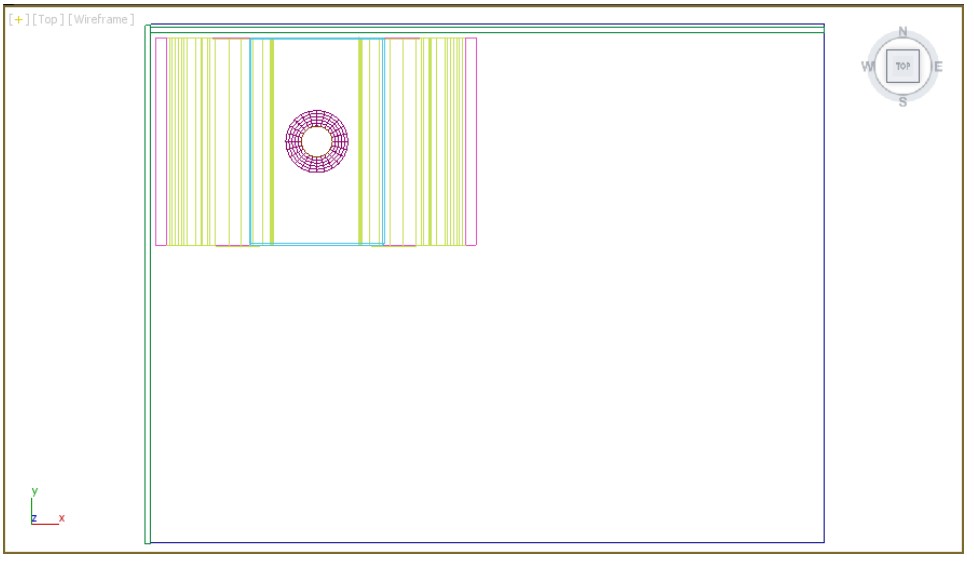

Figure P2-10 *The table components aligned*

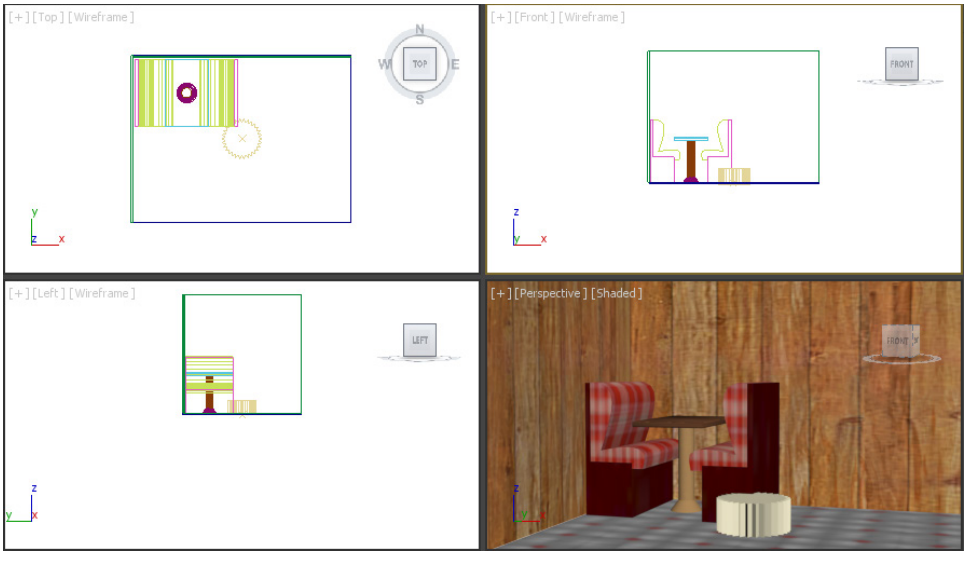

Figure P2-11 *The lofted star shape*

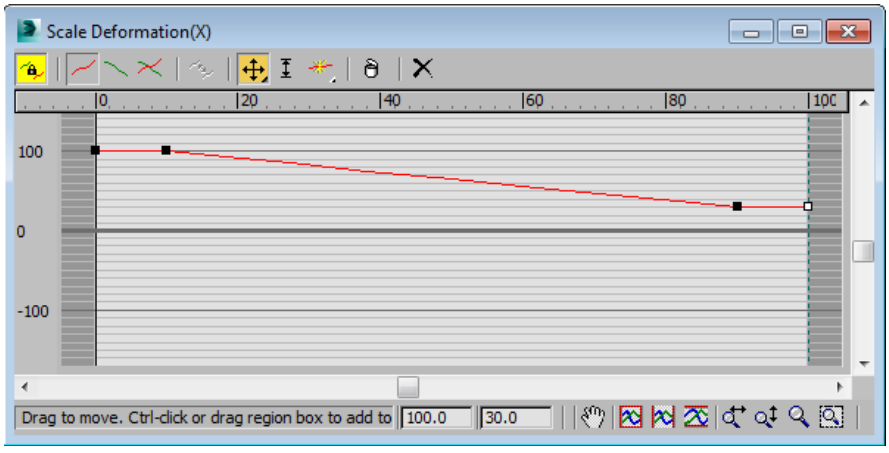

Figure P2-12 *The vertices created and moved in the* ***Scale Deformation****(X) dialog box*

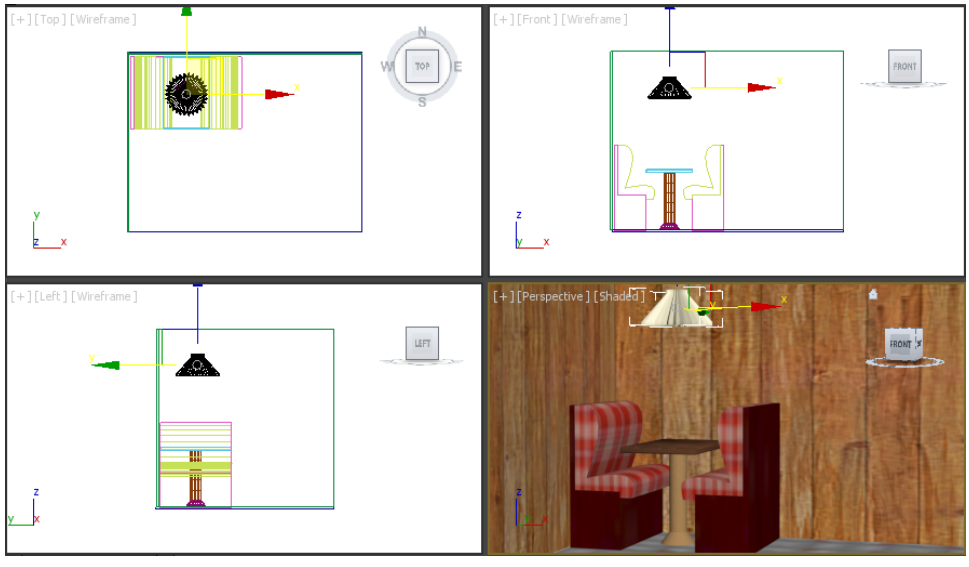

Figure P2-13 *Shade moved into position*

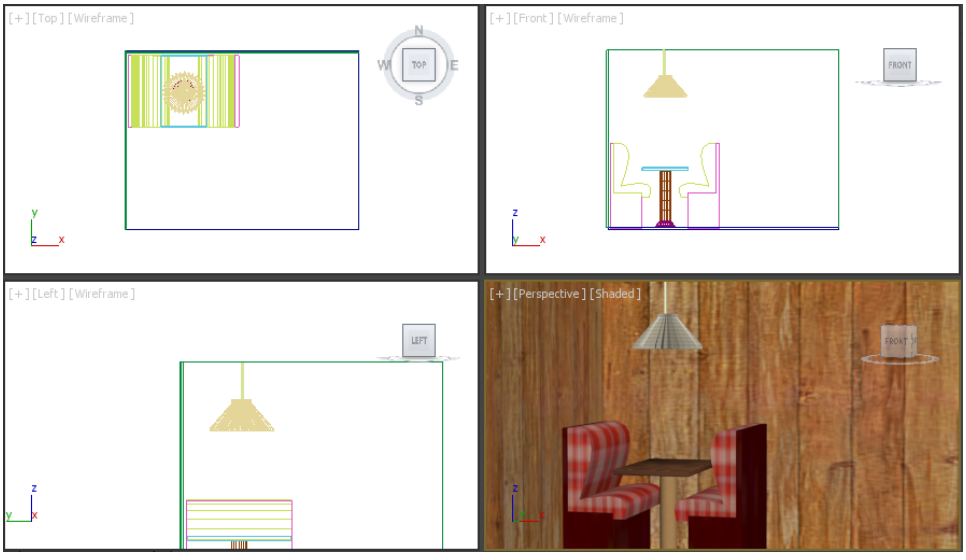

Figure P2-14 *A suspension cylinder created*

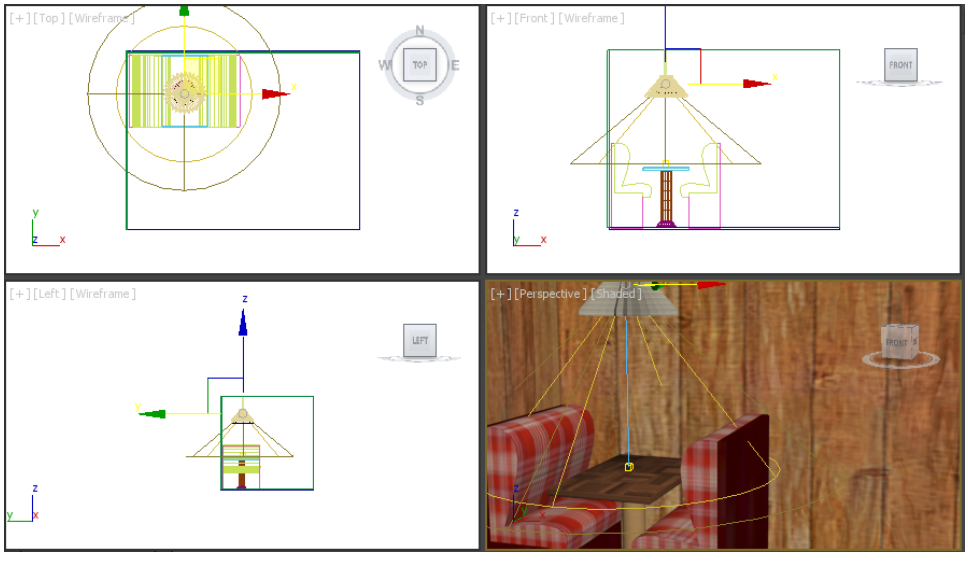

Figure P2-15 *A light placed inside the lamp shade*

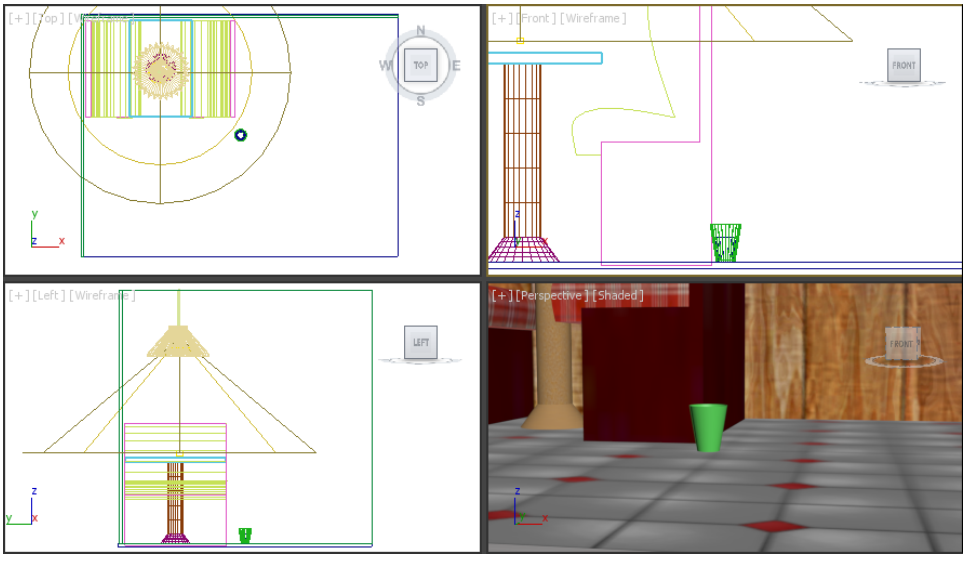

Figure P2-16 *A glass with water created*

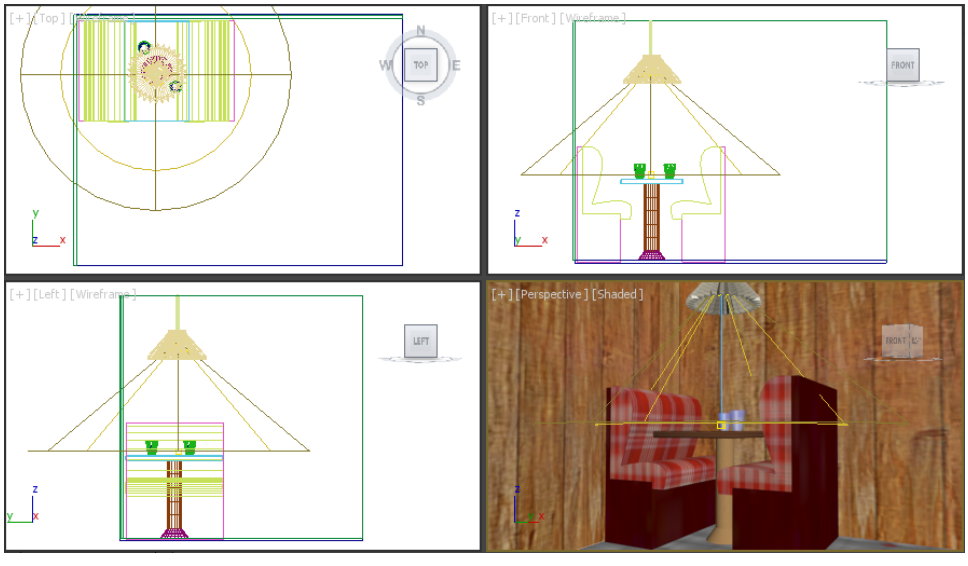

Figure P2-17 *Drink02 created and positioned*

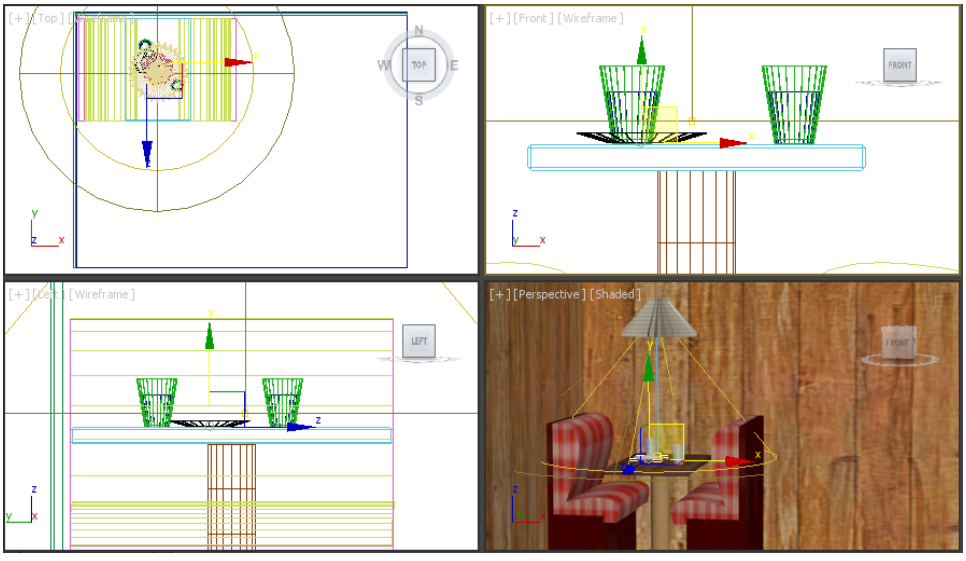

Figure P2-18 *Plate01 created and positioned*

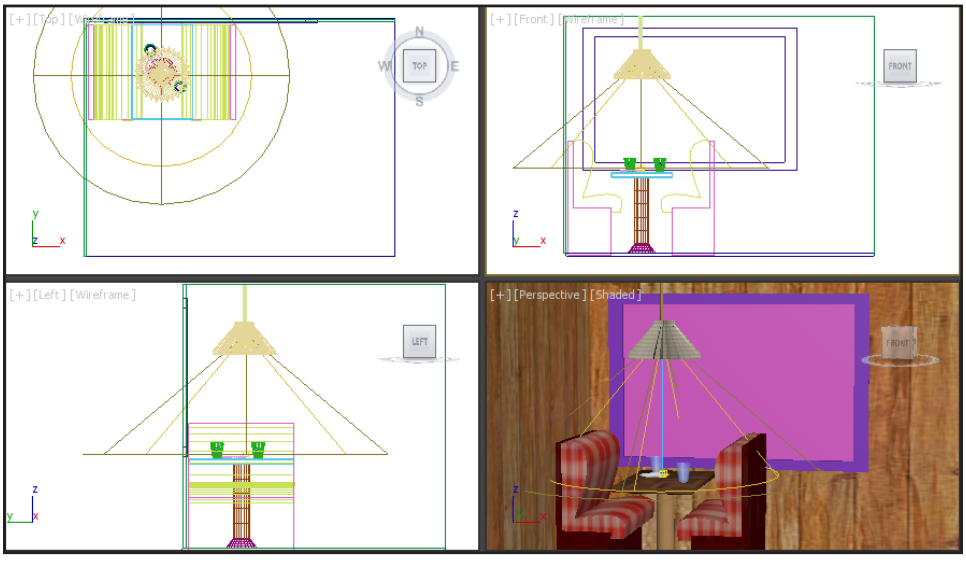

Figure P2-19 *The window placed on the wall*

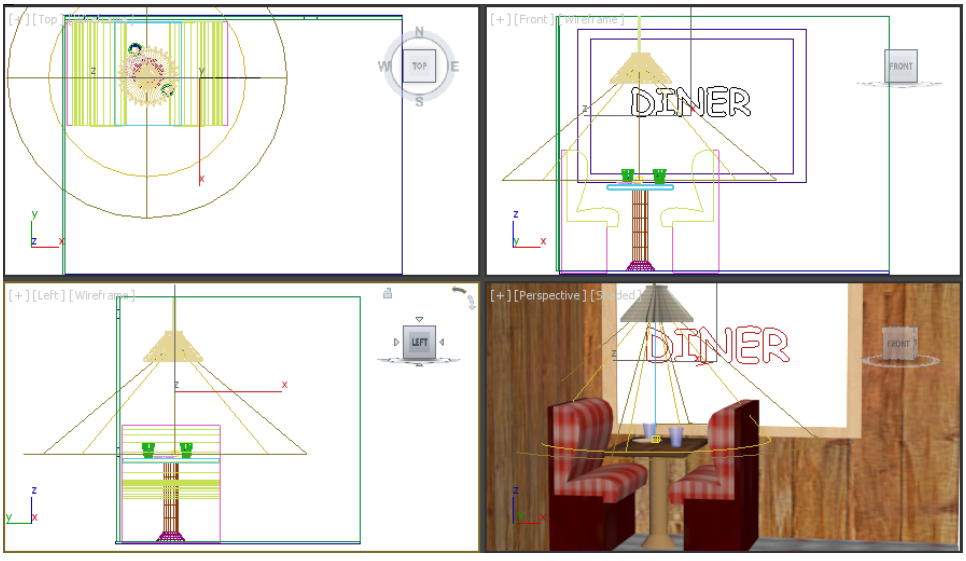

Figure P2-20 *The text for the sign created*

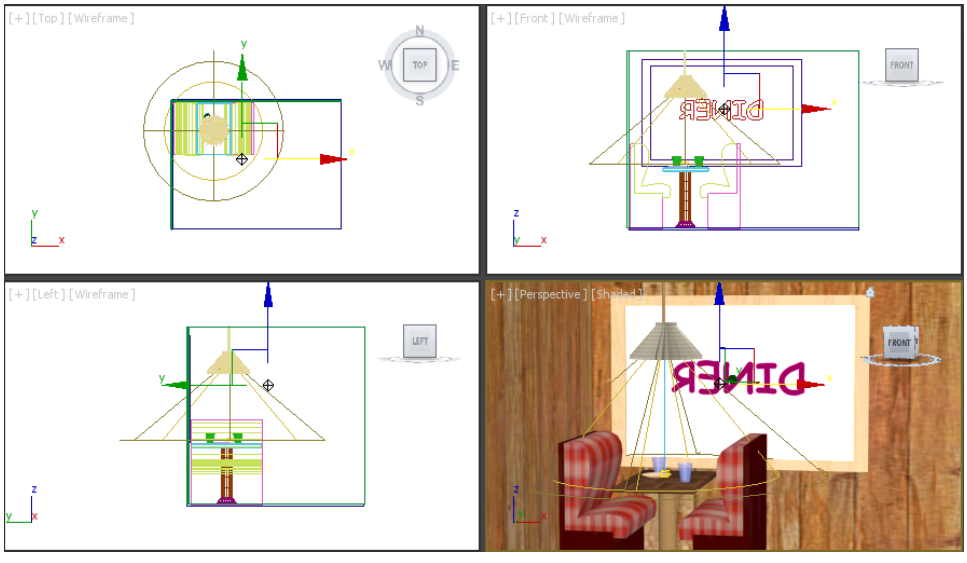

Figure P2-21 *Omni01 light created and positioned*

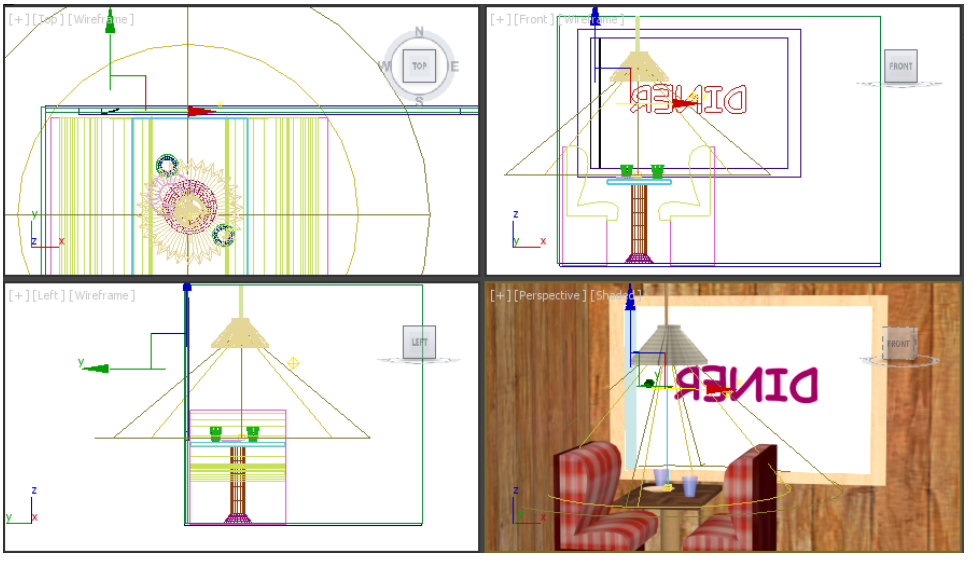

Figure P2-22 *Blind01 created and positioned*

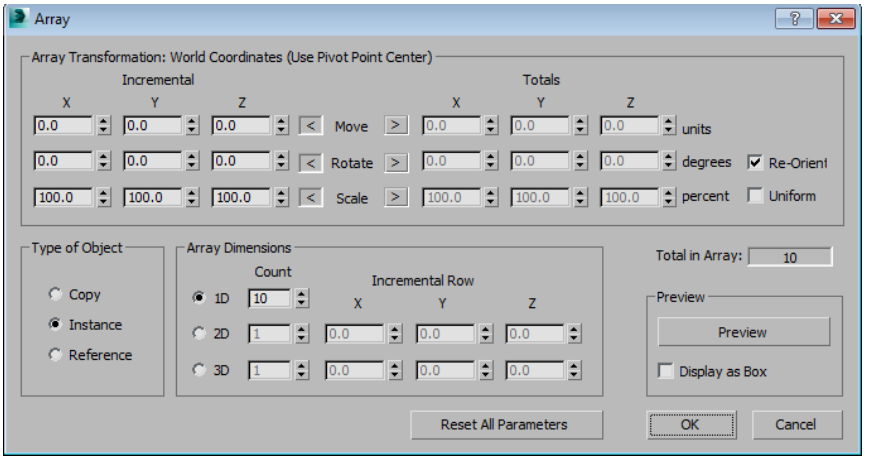

Figure P2-23 *The* ***Array*** *dialog box*

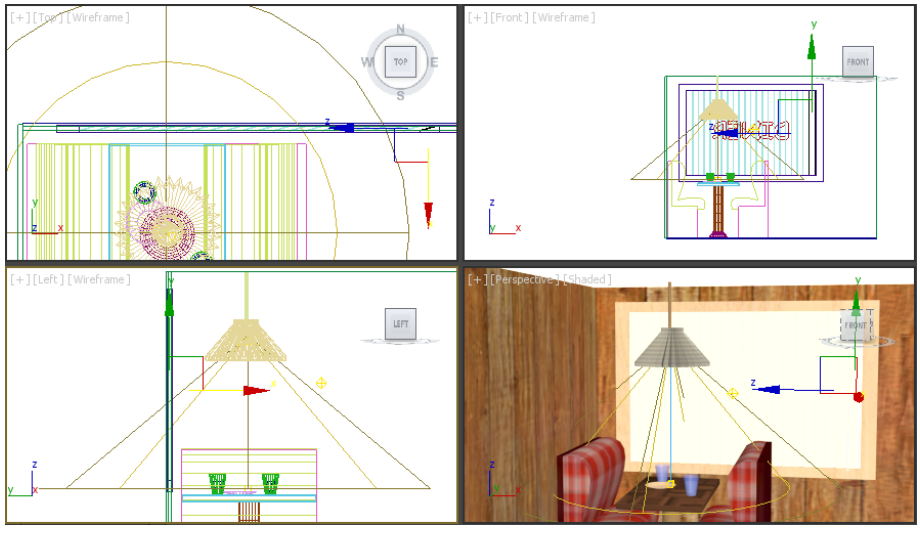

Figure P2-24 *The blinds created using the* ***Array*** *tool*

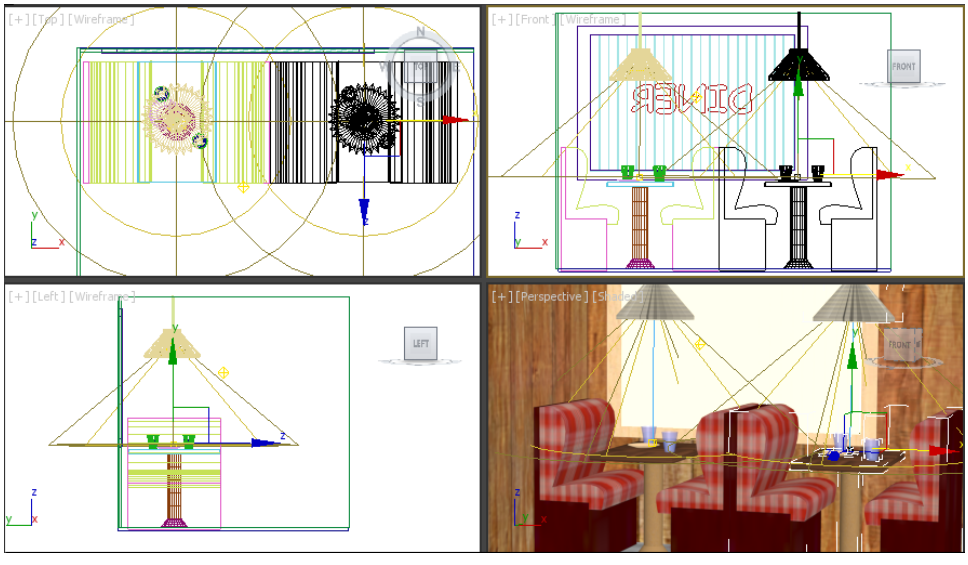

Figure P2-25 *The selected objects copied and positioned*

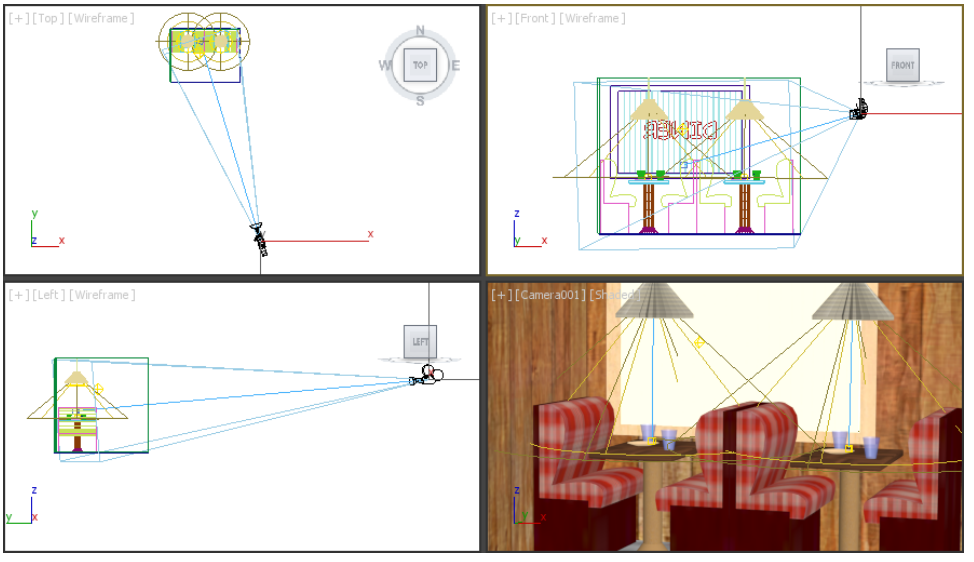

Figure P2-26 *Aligning objects in the center of the Camera001 viewport*

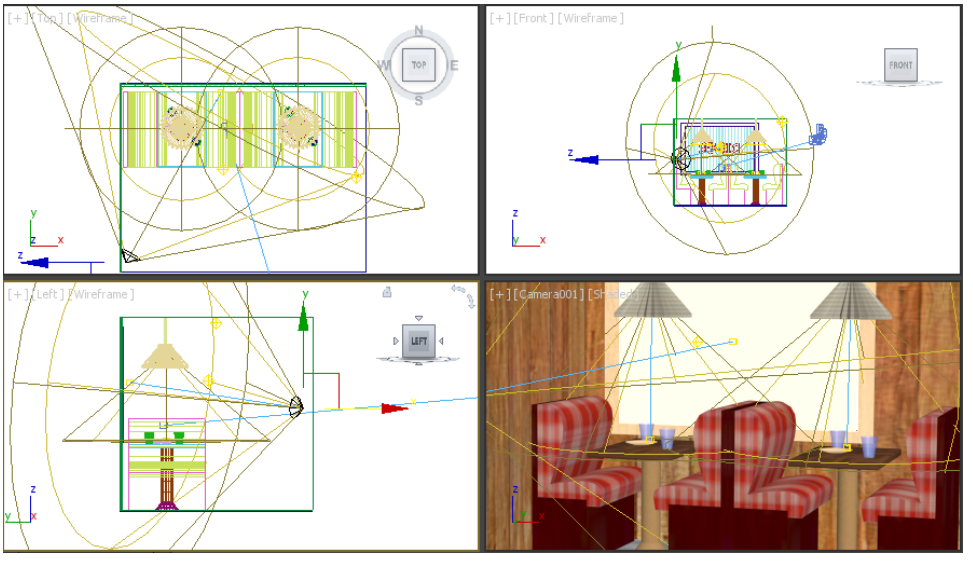

Figure P2-27 *The Spot003.Target moved and placed in the middle of the window*

Figure P2-28 *The rendered view of the scene*

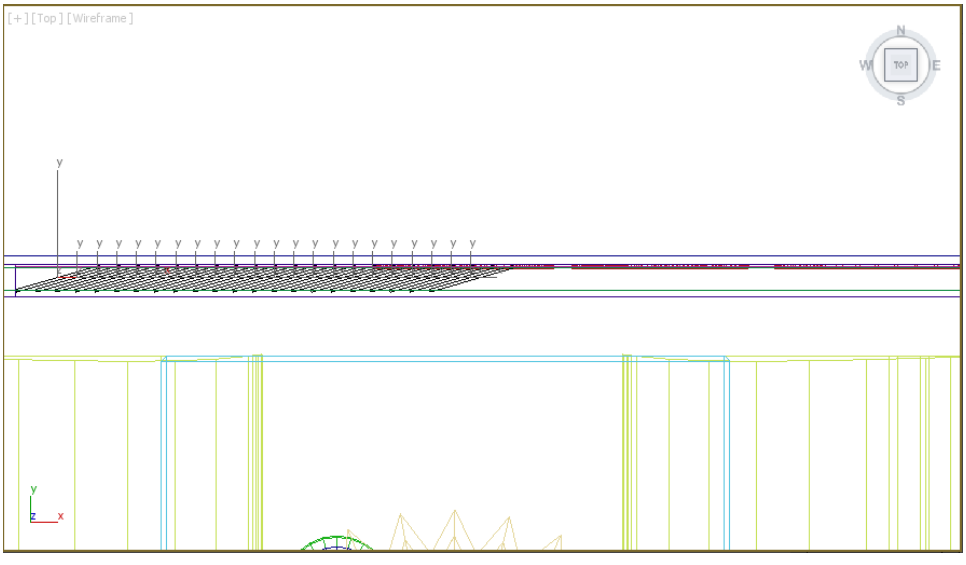

Figure P2-29 *The blinds at the midpoint of the animation*