Create panel.

○ **Geometry**

1- ✷ **Create panel** ○ **(Geometry) Standard** ➡ **or Extended**
**Primitives Keyboard Entry** ➡ **rollout**

- This section describes the types of geometry you can create using the Create panel.

- You can create most geometric primitives from your keyboard using the Keyboard Entry rollout. In a single operation, you define both the initial size of an object and its three-dimensional position. 3ds Max automatically assigns the object's name and color.

- This method is generally the same for all primitives; differences occur in the type and number of parameters. The Hedra primitive, a complex and highly visual family of objects, is unsuited to this method and has no keyboard entry.

IN Defaults

Each standard primitive has the following parameters on its Keyboard Entry rollout.

| Primitive	Parameters	XYZ point
Box	Length, Width, Height	Center of base
Cone	Radius 1, Radius 2, Height	Center of base
Sphere	Radius	Center
GeoSphere	Radius	Center
Cylinder	Radius, Height	Center of base
Tube	Radius 1, Radius 2, Height	Center of base
Torus	Radius 1, Radius 2	Center
Pyramid	Width, Depth, Height	Center of base
Teapot	Radius	Center of base
Plane	Length, Width	Center

Extended Primitives
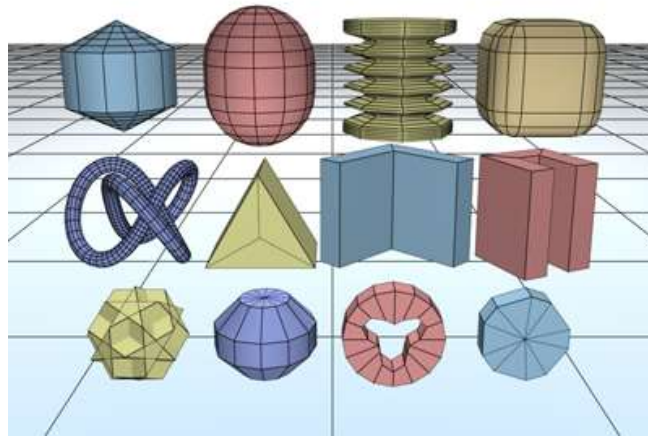
3ds Max includes a set of extended primitives. You can create the primitives with the mouse in the viewport, and most can be generated from the keyboard as well. These primitives are listed in the Object Type rollout
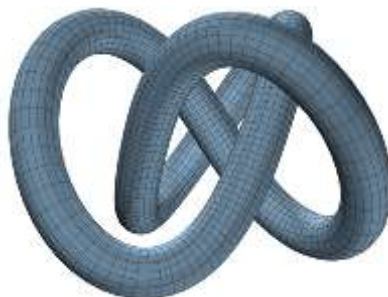
- **Hedra Extended Primitive**

Use Hedra to produce objects from several families of polyhedra.
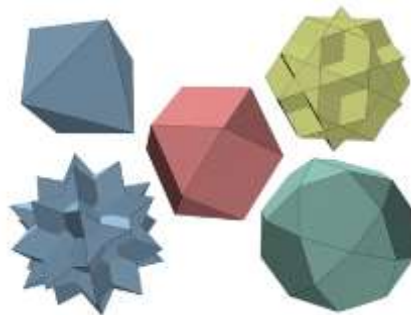
- **Torus Knot Extended Primitive**

Use Torus Knot to create a complex or knotted torus by drawing 2D curves in the normal planes around a 3D curve. The 3D curve (called the Base Curve) can be either a circle or a torus knot.
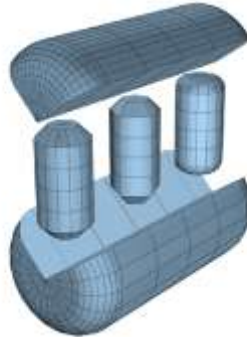
- [ChamferBox Extended Primitive](#)

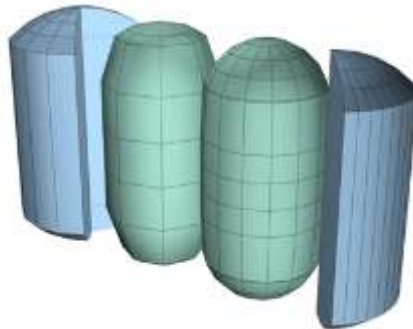Use ChamferBox to create a box with beveled or rounded edges.
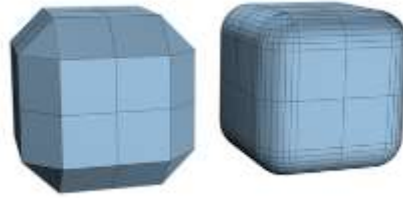
- [ChamferCyl Extended Primitive](#)

Use ChamferCyl to create a cylinder with beveled or rounded cap edges.
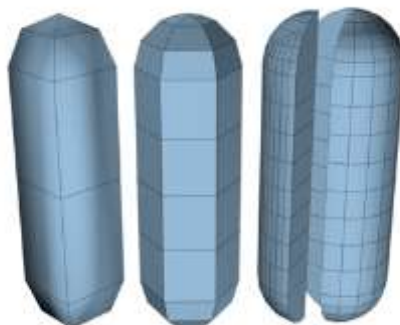
- [OilTank Extended Primitive](#)

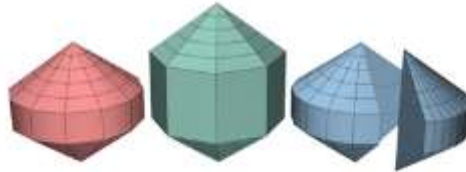Use OilTank to create a cylinder with convex caps.

- [Capsule Extended Primitive](#)

Use Capsule to create a cylinder with hemispherical endcaps.

- [Spindle Extended Primitive](#)

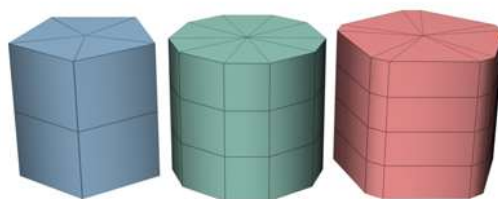Use the Spindle primitive to create a cylinder with conical caps.

- [L-Ext Extended Primitive](#)

Use L-Ext to create an extruded L-shaped object.

- [Gengon Extended Primitive](#)

Use Gengon to create an extruded, regular-sided polygon with optionally filleted side edges.

- [C-Ext Extended Primitive](#)

Use C-Ext to create an extruded C-shaped object.

- [RingWave Extended Primitive](#)

Use the RingWave object to create a ring, optionally with irregular inner and outer edges whose shapes can be animated.Use RingWave for various types of special-effects animation, for example, to depict the shock wave emanating from the explosion of a star or planet.
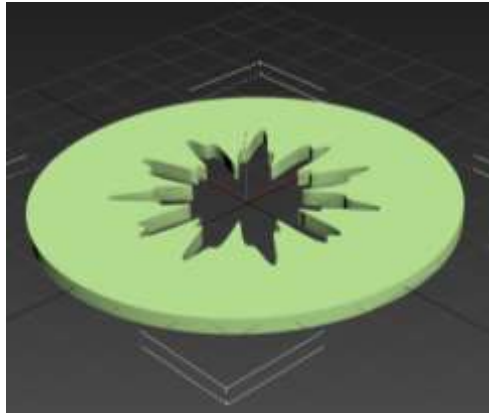
- [Prism Extended Primitive](#)

Use Prism to create a three-sided prism with independently segmented sides.

◻ **Shapes**

A shape is an object made from one or more curved or straight lines. 3ds Max includes the following shape types: splines and NURBS curves.

Using Shapes
Shapes are 2D and 3D lines and groups of lines that you typically use as components of other objects. Most of the default shapes are made from splines. You use these spline shapes to do the following:

Shapes are 2D and 3D lines and groups of lines that you typically use as components of other objects. Most of the default shapes are made from splines. You use these spline shapes to do the following:

- Render as is

- Generate planar and thin 3D surfaces

- Define loft components such as paths, shapes, and fit curves

- Generate extrusions and surfaces of revolution

- Define motion paths

3ds Max supplies 11 basic spline shape objects, two types of NURBS curves, and five extended splines. You can create these shapes quickly with mouse or keyboard entry and combine them to form compound shapes

AutoGrid
Lets you automatically create objects on the surface of other objects by generating and activating a temporary construction plane based on normals of the face that you click.

Topics in this section
- Line Spline

Use Line to create a free-form spline made of multiple segments.
- Rectangle Spline

Use Rectangle to create square and rectangular splines.
- Circle Spline

Use Circle to create closed circular splines made of four vertices.
- Ellipse Spline

Use Ellipse to create elliptical and circular splines.
- Arc Spline

Use Arc to create open and closed partial circles made of four vertices.
- <u>Donut Spline</u>

Use Donut to create closed shapes from two concentric circles. Each circle is made of four vertices.
- <u>NGon Spline</u>

Use NGon to create closed flat-sided or circular splines with any number (N) of sides or vertices.
- <u>Star Spline</u>

Use Star to create closed star-shaped splines with any number of points. Star splines use two radii to set the distance between the outer points and inner valleys.
- <u>Text Spline</u>

Use Text to create splines in the shape of text.
- <u>Helix Spline</u>

Use Helix to create open flat or 3D helices or spirals.
- <u>Egg Spline</u>

Use Egg to create an egg shape.
- <u>Section Spline</u>

Section is a special type of spline that generates shapes based on a cross-sectional slice through mesh objects

Enable In Renderer
When on, the shape is rendered as a 3D mesh using the Radial or Rectangular parameters set for Renderer.

Enable In Viewport
When on, the shape is displayed in the viewport as a 3D mesh using the Radial or Rectangular parameters set for Renderer.

Use Viewport settings
Lets you set different rendering parameters, and displays the mesh generated by the Viewport settings. Available only when Enable in Viewport is turned on.

Generate Mapping Coords
Turn this on to apply mapping coordinates. Default=off.
3ds Max generates the mapping coordinates in the U and V dimensions. The U coordinate wraps once around the spline; the V coordinate is mapped once along its length. Tiling is achieved using the Tiling parameters in the applied material. For more information, see <u>Mapping Coordinates</u>.

Real-World Map Size
Controls the scaling method used for texture mapped materials that are applied to the object. The scaling values are controlled by the Use Real-World Scale settings found in the applied material's <u>Coordinates rollout</u>. Default=off.

Viewport
Choose this to specify Radial or Rectangular parameters for the shape as it will display in the viewports when Enable In Viewport and Use Viewport Settings are on.

Available only when both Enable In Viewport and Use Viewport Settings are on.
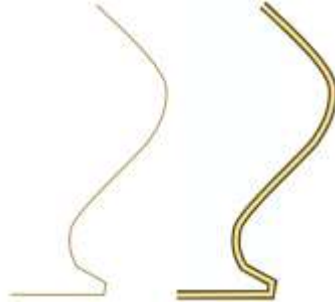
Renderer

Choose this to specify Radial or Rectangular parameters for the shape as it will display when rendered. These settings are also used for viewport rendering when Enable In Viewport is on but Use Viewport Settings is off.

Radial

Renders the shape with a circular cross-section.

Thickness

The diameter of the rendered spline mesh. Default=1.0. Range=0.0 to 100,000,000.0.

Splines rendered at thickness of 1.0 and 5.0, respectively

Sides

The number of sides (or facets) for the rendered spline mesh. For example, a value of 4 results in a square cross section.

Rectangular

Displays the spline's mesh shape as a rectangle.

Length

The size of the cross–section along the local *Y* axis.

Width

The size of the cross–section along the local *X* axis.

Creating a shape to create an object by turn on Enable In Renderer

Editable Spline

⁘ Vertices

Define points and curve tangents.

⟍ Segments

Connect vertices.

⋀ Splines

Are a combination of one or more connected segments

⁘ Vertices

choose a type from the shortcut menu. Each vertex in a shape can be one of four types:

- **Smooth:** Non adjustable vertices that create smooth continuous curves. The curvature at a smooth vertex is determined by the spacing of adjacent vertices.
- **Corner:** Non adjustable vertices that create sharp corners.
- **Bezier:** Adjustable vertex with locked continuous tangent handles that create a smooth curve. The curvature at the vertex is set by the direction and magnitude of the tangent handles.
- **Bezier Corner:** Adjustable vertex with discontinuous tangent handles that create a sharp corner. The curvature of the segment as it leaves the corner is set by the direction and magnitude of the tangent handles.
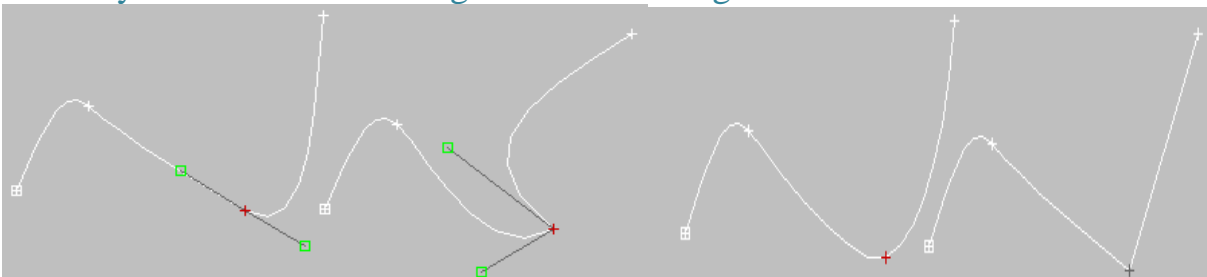
| Bezier | Bezier Corner | Smooth | Corner |

Refine

Lets you add vertices without altering the curvature values of the spline.

Threshold

The threshold distance spinner is a proximity setting that controls how close vertices can be to one another before they are automatically welded. Default=6.0.
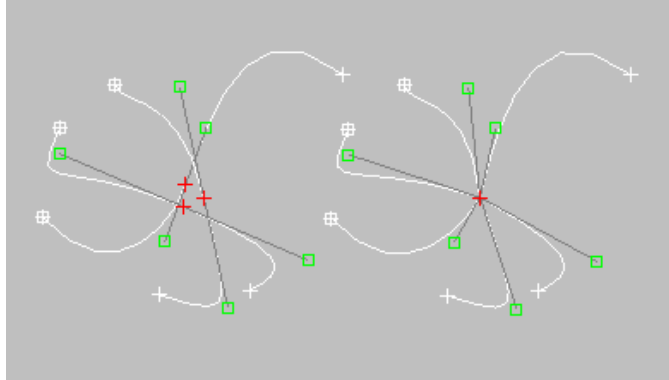
Weld

Converts two end vertices

Connect

Connects any two end vertices

Fuse

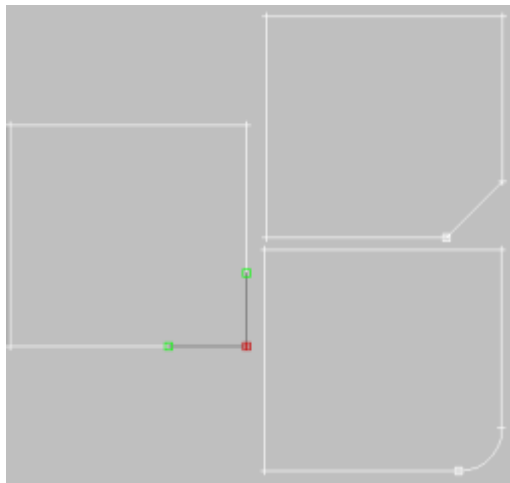Moves all selected vertices to their averaged center.

Fillet

Lets you round corners where segments meet, adding new control vertices. You can apply this effect by dragging vertices

Chamfer

Lets you bevel shape corners using a chamfer function.

Original rectangle (left), after applying Fillet (top right), and after applying Chamfer (bottom right)

> ➤ While creating a spline with the mouse, press and **hold Shift** to constrain new points to **90-degree-angle** increments from previous points.
> ➤ While creating a spline with the mouse, press and **hold Ctrl** to constrain new points **to angle increments determined** by the **current Angle Snap setting**.
> ➤ When you want to **deleting point** press **Backspace**
> ➤ When you want to **zoming point** press **I and scroll to zoom out /in**

Editable Spline (Segment)

Create Line

Adds more splines to the selected spline.

Attach

Attaches another spline in the scene to the selected spline.
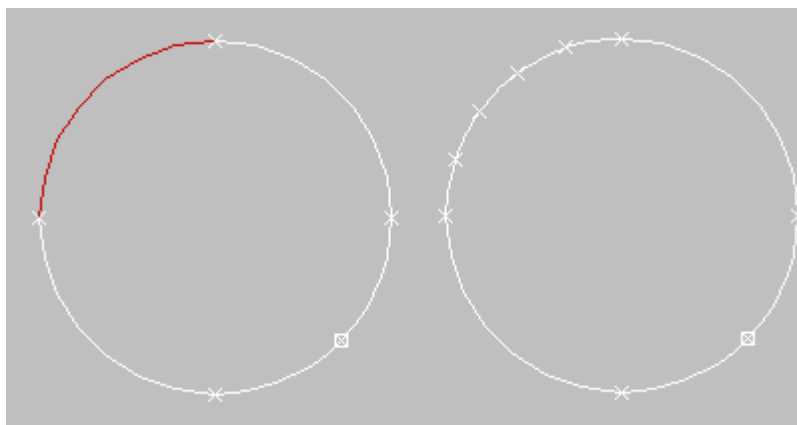
Delete

Deletes any selected segments in the current shape.
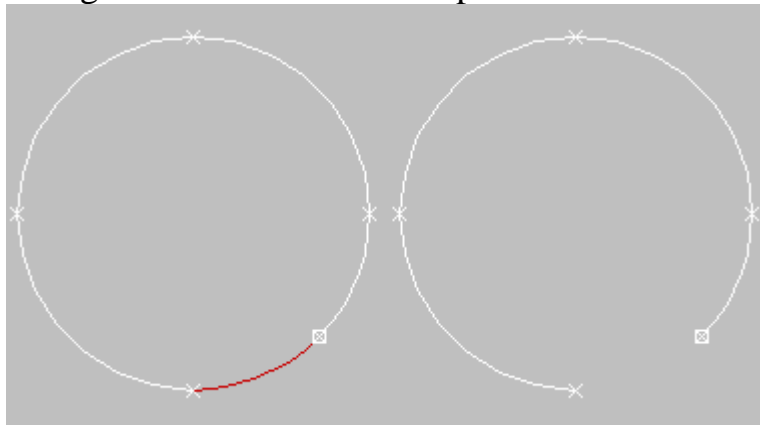
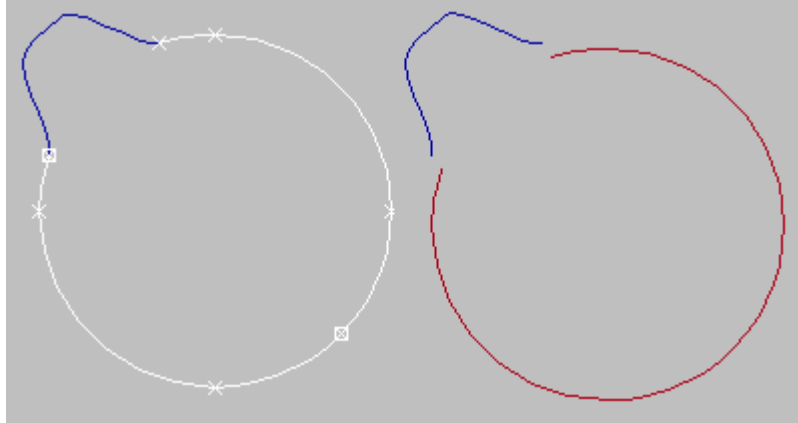
Selected and deleted segment

Divide

Subdivides the selected segment or segments by adding the number of vertices specified by the spinner. Select one or more segments

Selected and divided segment

Detach

Lets you select several segments in various splines and then detach them (or copy them) to form a new shape.

Original and detached splines

∧ Editable Spline (Spline)

Reverse

Reverses the direction of the selected spline. If the spline is open, the first vertex will be switched to the opposite end of the spline. Reversing the direction of a spline is usually done in order to reverse the effect of using the Insert tool at vertex selection level.
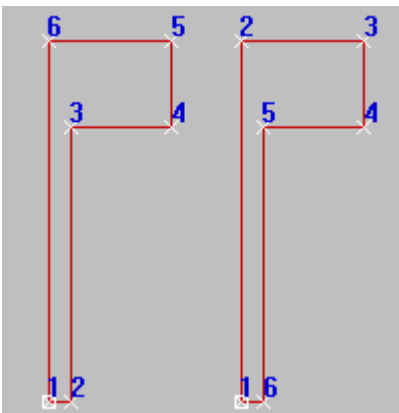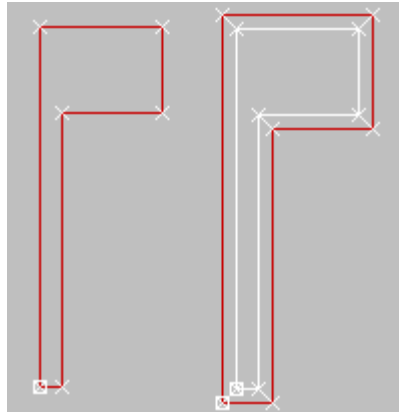

Original and reversed splines

Outline

Makes a copy of the spline, offset on all sides to the distance specified by the Outline Width spinner (to the right of the Outline button). Select one or more splines and then adjust the outline position dynamically with the spinner, or click Outline and then drag a spline. If the spline is open, the resulting spline and its outline will make a single closed spline.
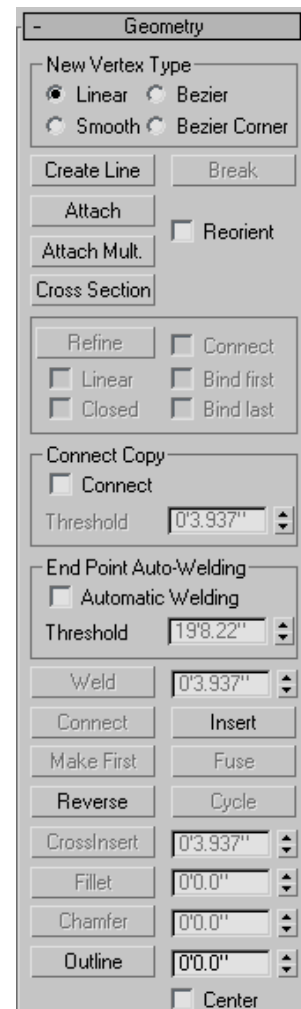
Original and outlined splines

NoteNormally, if using the spinner, you must first select a spline before using Outline. If, however, the spline object contains only one spline, it is automatically selected for the outlining process.

Center
When off (default), the original spline remains stationary and the outline is offset on one side only to the distance specified by Outline Width. When Center is on, the original spline and the outline move away from an invisible center line to the distance specified by Outline Width.
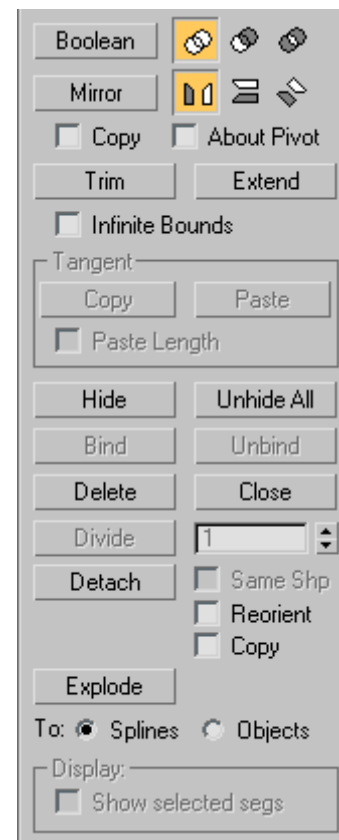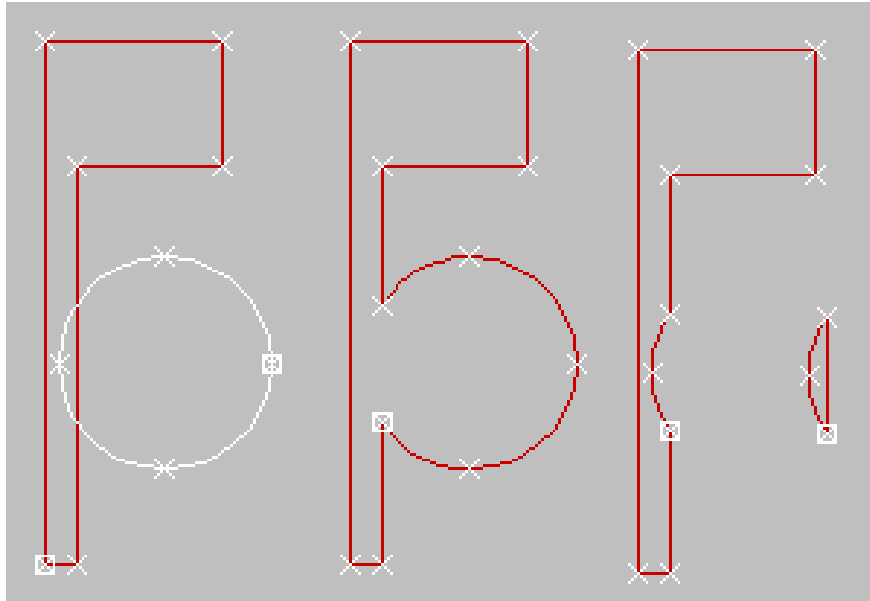
Boolean
Combines two closed polygons by performing a 2D Boolean operation that alters the first spline you select, and deletes the second one. Select the first spline, then click the Boolean button and the desired operation, and then select the second spline.
Note2D Booleans only work on 2D splines that are in the same plane.
There are three Boolean operations:

- **Union**Combines two overlapping splines into a single spline, in which the overlapping portion is removed, leaving non-overlapping portions of the two splines as a single spline.

- **Subtraction**Subtracts the overlapping portion of the second spline from the first spline, and deletes the remainder of the second spline.

- **Intersection**Leaves only the overlapping portions of the two splines, deleting the non-overlapping portion of both.

Original splines (left), Boolean Union, Boolean Subtraction, and Boolean Intersection, respectively

Mirror

Mirrors splines along their ◖◗ length, ≋ width, or ◈ diagonally. Click the direction you want to mirror first so it is active, then click Mirror.

- **Copy**When selected, copies rather than moves the spline as it is mirrored.
- **About Pivot**When on, mirrors the spline about the spline object's pivot point (see [Pivot](#)). When off, mirrors the spline about its geometric center.
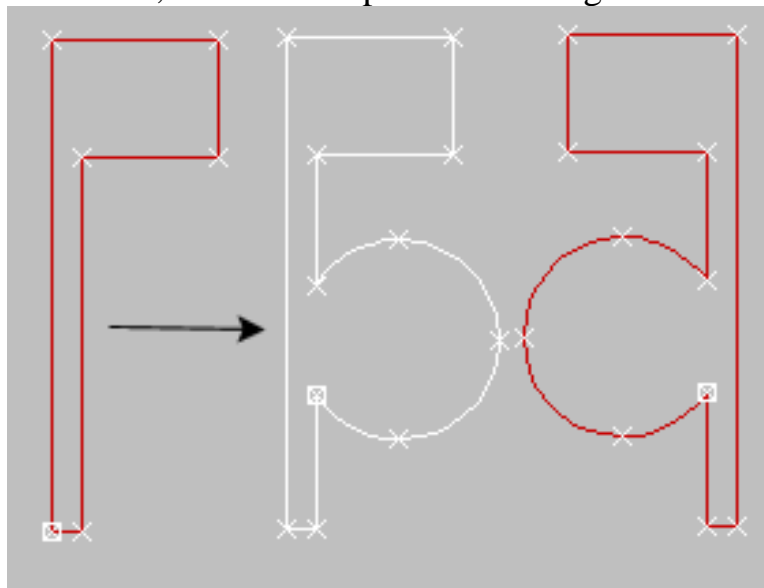
Mirrored splines

Trim

Use Trim to clean up overlapping segments in a shape so that ends meet at a single point. To trim, you need intersecting splines.

Extend

Use Extend to clean up open segments in a shape so that ends meet at a single point. To extend, you need an open spline.

Infinite Bounds

For the purposes of calculating intersections, turn this on to treat open splines as infinite in length. For example, this lets you trim one linear spline against the extended length of another line that it doesn't actually intersect.

Hide

Hides selected splines. Select one or more splines, and then click Hide.

Unhide All

Displays any hidden sub-objects.

Delete

Deletes the selected spline.

Close

Closes the selected spline by joining its end vertices with a new segment.

Detach

Copies selected splines to a new spline object, and deletes them from the currently selected spline if Copy is clear.

- **Reorient**The spline being detached is moved and rotated so that its creation local coordinate system is aligned with the creation local coordinate system of the selected spline.
- **Copy**When selected, copies rather than moves the spline as it is detached.

Explode

Breaks up any selected splines by converting each segment to a separate spline or object. This is a time-saving equivalent of using Detach on each segment in the spline in succession.

Extruded and Lathed Shapes

You can apply modifiers to a shape to create a 3D object. Two such modifiers are Extrude and Lathe. Extrude creates a 3D object by adding height to a shape, while Lathe creates a 3D object by rotating a shape about an axis

Lathe

Lathe creates a 3D object by rotating a shape or NURBS curve about an axis.
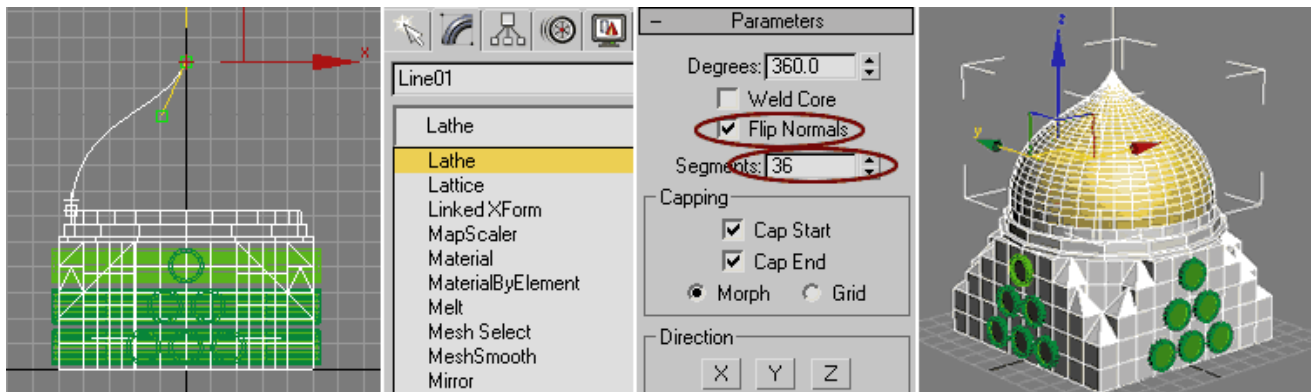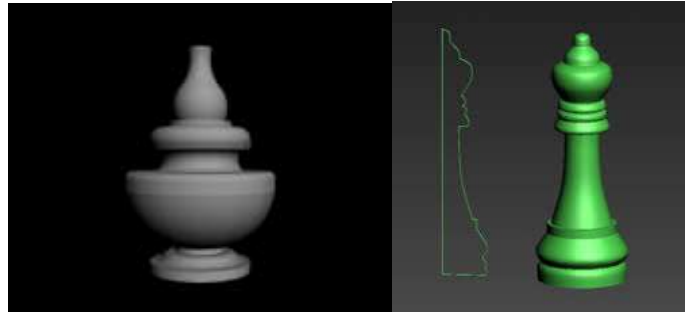
Object/ Forms can be made from lathe

Extruded

The Extrude modifier adds depth to a shape and makes it a parametric object.

Amount

Sets the depth of the extrusion.

Segments

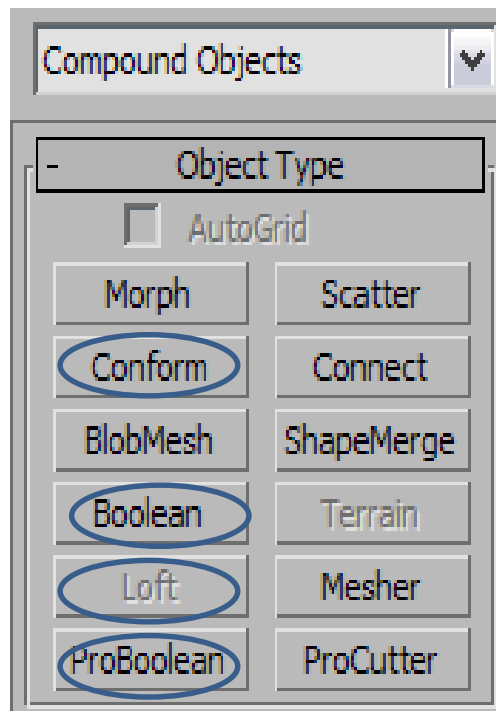Specifies the number of segments that will be created in the extruded obje
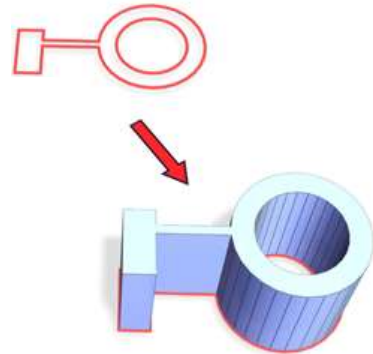
Above: Spline before extrusion

Below: Extruded spline

Compound objects typically combine two or more existing objects into a single object.
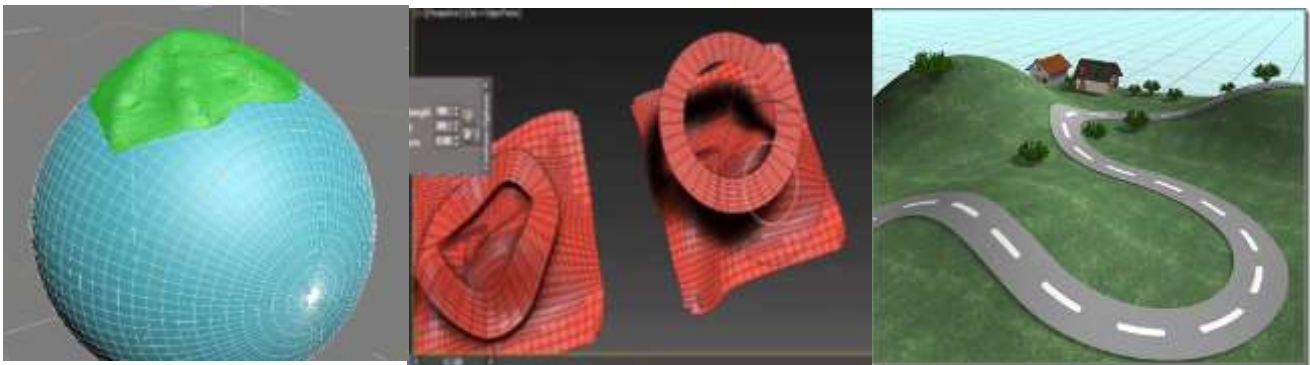

COMPOUND OBJECTS THAT WILL BE STUDY JUST IN BLUE

1- Conform Compound Object

Select an object. ➤ **Create panel** ➤ **(Geometry)** ➤ **Compound Objects** ➤ **Object Type rollout** ➤ **Conform**

Select an object. ➤ **Create menu** ➤ **Compound** ➤ **Conform**

Conform is a compound object created by projecting the vertices of one object, called the Wrapper, onto the surface of another object, called the Wrap-To. There is also a space-warp version of this function;

    A. Position two objects, one of which will be the Wrapper, and the other the Wrap-To. (For this example, create a box as the Wrap-To object, and then create a larger sphere that completely surrounds it. The sphere will be the Wrapper.

Object/ Forms can be made
from Conform

2- Boolean/ ProBoolean Compound Object

Select an object. ➤ **Create panel** ➤ **(Geometry)** ➤ **Compound Objects** ➤ **Object Type rollout** ➤ **Boolean**

Select an object. ➤ **Create menu** ➤ **Compound** ➤ **Boolean/ProBoolean**

A Boolean object combines two other objects by performing a Boolean operation on them

Tip

ProBoolean is an improved, up-to-date, and more-complete implementation of the Boolean compound object. In general, it is recommended that you use ProBoolean rather than Boolean for combining 3D objects.
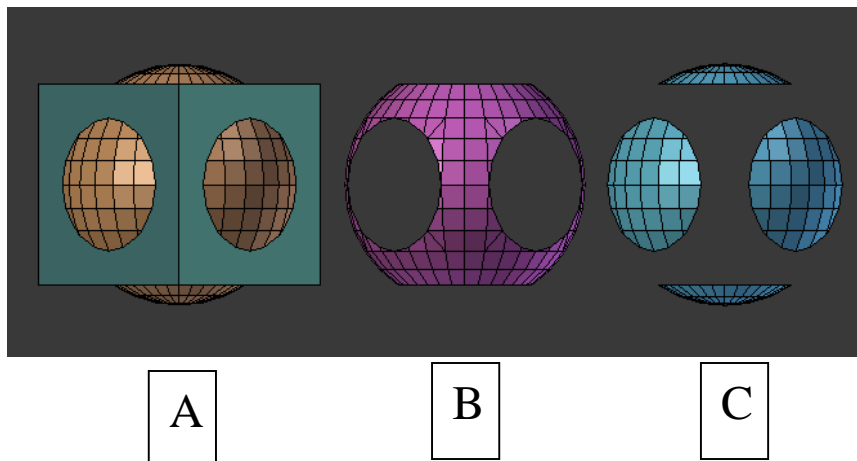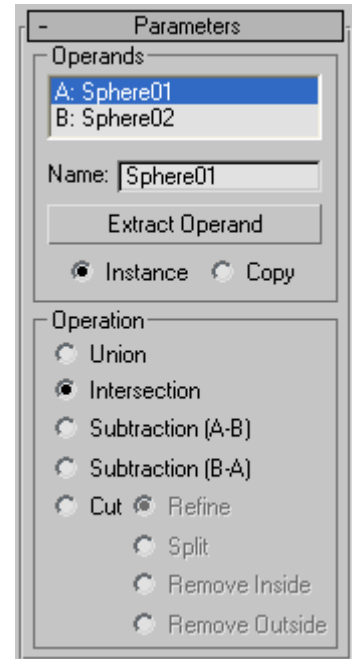
A. Union,

The Boolean object contains the volumes of both original objects. The intersecting or overlapping portion of the geometry is removed.

B. Intersection,

The Boolean object contains only the volume common to both original objects (in other words, where they overlapped).

C. Subtraction (or difference),

The Boolean object contains the volume of one original object with the intersecting volume removed. The two original objects are designated operands A and B.

|	Parameters
Operands	
A: Sphere01	
B: Sphere02	
Name: Sphere01	
Extract Operand	
⦿ Instance ○ Copy	
Operation	
○ Union	
⦿ Intersection	
○ Subtraction (A-B)	
○ Subtraction (B-A)	
○ Cut ⦿ Refine	
○ Split	
○ Remove Inside	
○ Remove Outside	

A   B   C

- Subtraction (A-B)Subtracts the intersection volume of operand B from operand A. The Boolean object contains the volume of operand A with the intersection volume subtracted from it.
- Subtraction (B-A)Subtracts the intersection volume of operand A from operand B. The Boolean object contains the volume of operand B with the intersection volume subtracted from it.
- Cuts operand A with operand B, but doesn't add anything to the mesh from operand B. This works like the Slice modifier, but instead of using a planar gizmo, Cut uses the shape of operand B as the cutting plane.
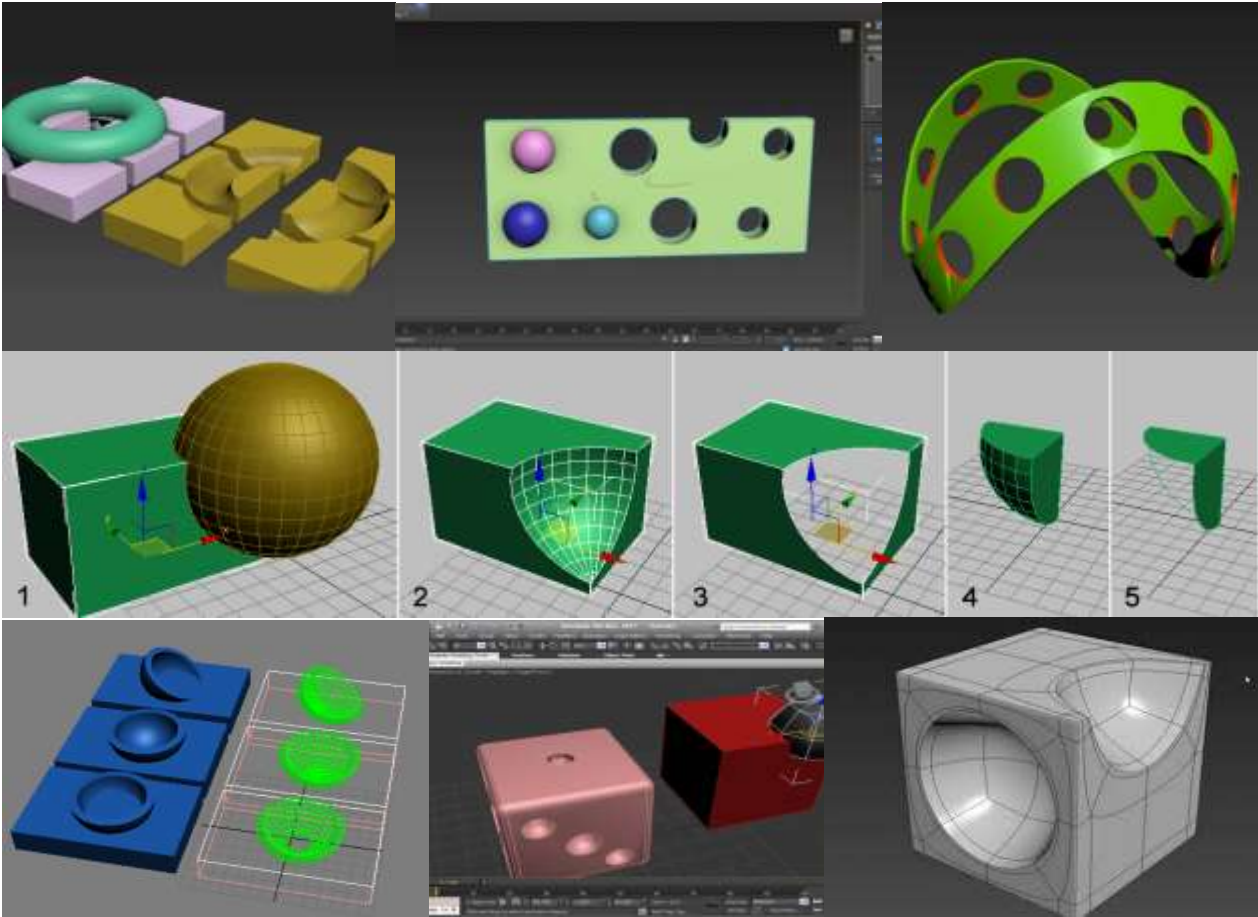
Object/ Forms can be made from Boolean/ProBoolean

- ProBoolean

1. A Boolean object combines two or more other objects by performing a Boolean operation or operations on them. ProBoolean adds a range of functionality to the traditional 3ds Max Boolean object, such as the ability to combine multiple objects at once, each using a different Boolean operation.
2. ProBoolean can also automatically subdivide the Boolean result into quadrilateral faces, which lends itself well to smoothing edges
3. ProBoolean supports Union, Intersection, Subtraction, Merge, Attach, and Insert.
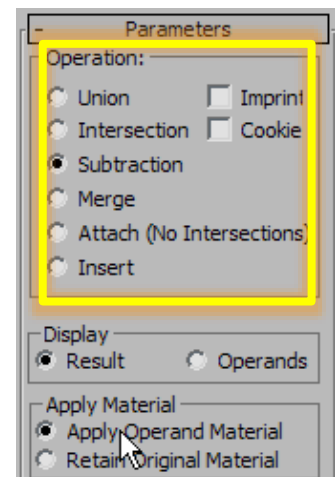
- **Union, Intersection, Subtraction** like in Boolean(the first three operations work similarly to their counterparts in the standard Boolean compound object)
- **The Merge operation** intersects and combines two meshes without removing any of the original polygons.
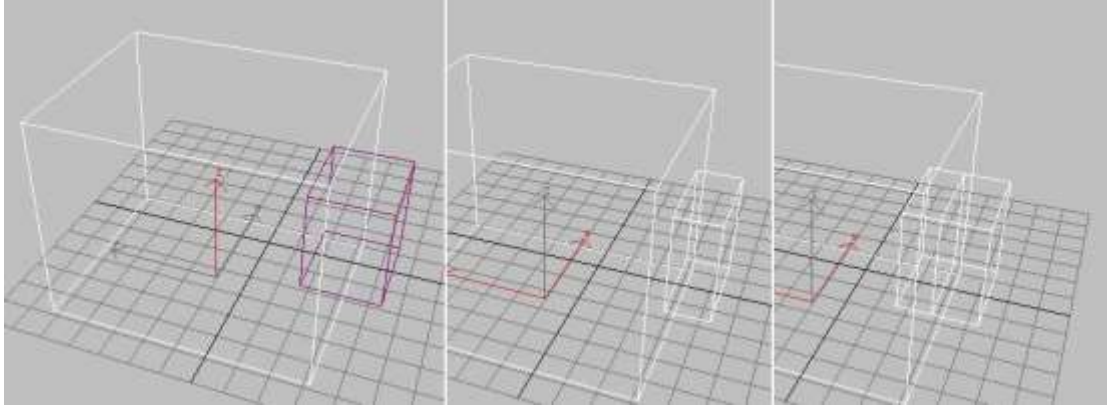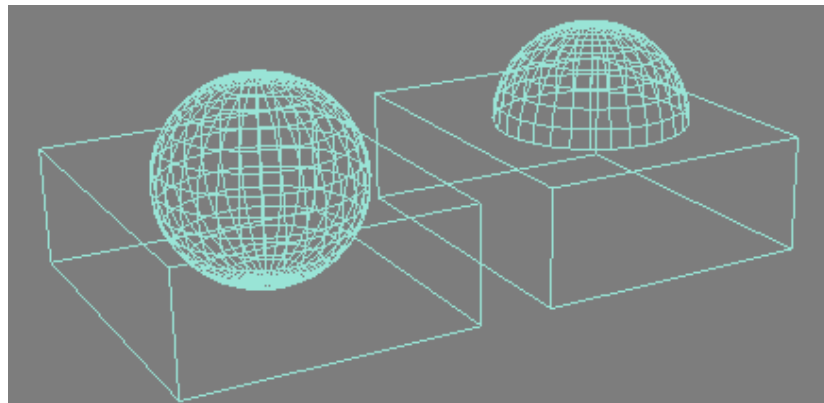
Left: Original object (box) and operand (small box)

Center: Union operation; part of the smaller box is removed.

Right: Merge operation, showing new edges at intersection

- **The Attach operation combines** multiple objects into one without affecting their topology


Box and sphere primitives combined with Attach (left) and Union (right)

- **The Insert operation s**ubtracts the bounding shape of operand A from operand B, and then replaces the cut-out part with operand A
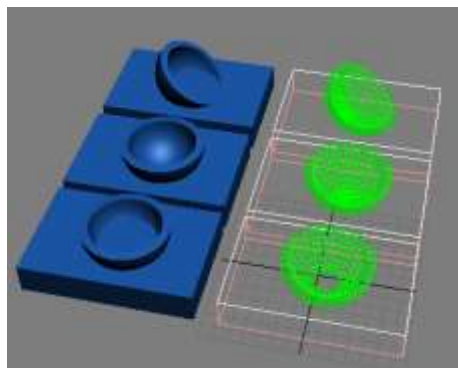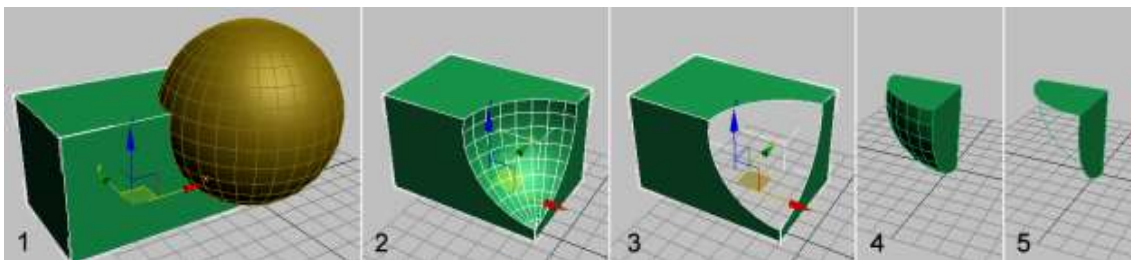

A bowl inserted in liquid; if the bowl has a hole in it or is tilted, the liquid enters its cavity

- **Imprint** Prints the outline of the shape (or intersection edges) onto the original mesh object.
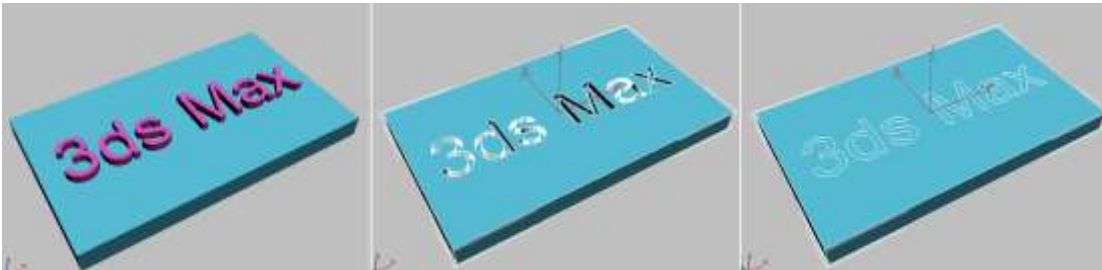
Cookie

Cuts the faces of the original mesh shape, affecting only those faces. The faces of the selected operand are not added to the Boolean result.

1.Original object (box) and operand (sphere)
2. Standard Subtraction operation
3. Subtraction with Cookie on
4. Standard Intersection operation
5. Intersection with Cookie on

Select a path or shape. ➤ ✳ **Create panel** ➤ ◯ **(Geometry)** ➤ **Compound Objects** ➤ **Object Type rollout** ➤ **Loft**

Loft objects are two-dimensional shapes extruded along a third axis. You create loft objects from two or more existing spline objects. One of these splines serves the path. The remaining splines serve as cross-sections, or shapes, of the loft object. As you arrange shapes along the path, 3ds Max generates a surface between the shapes.

1- You can choose between a shape or a path for creating the loft object using the Creation Method rollout, as well as the type of action for the loft object.

On the Creation Method rollout, you determine whether to use a shape or path for creating the loft object, and the type of action you want for the resulting loft object.

Note 3ds Max builds the loft at the location of the first object you select: if you select a path and use Get Shape, it appears at the location of the path, and if you select a shape and use Get Path, it appears at the location of the shape.
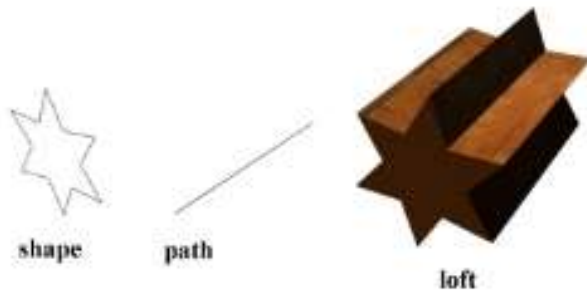
select a path and use Get Shape, it appears at the location of the path
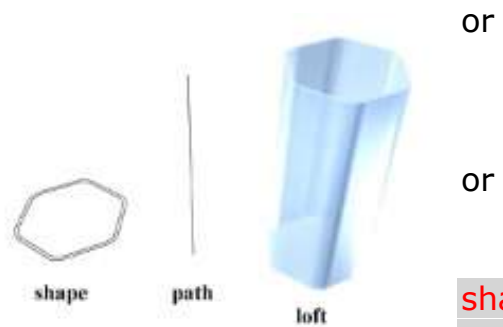
Get Path

Assigns a path to the selected shape or changes the current assigned path.

Get Shape

Assigns a shape to the selected path or changes the current assigned shape.

Tip
Hold down **Ctrl** while getting the shape to flip the direction of the shape's Z axis.

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Using the Modify Panel

1. ⬚ Select an object in your scene.
2. Click ⬚ (the Modify tab) to display the Modify panel.

The name of the selected object appears at the top of the Modify panel, and fields change to match this object.

The object's creation parameters appear in rollouts on the Modify panel, below the modifier stack display. You can use these rollouts to change the creation parameters for an object. As you change them, the object updates in the viewports.

3. Apply a modifier to an object (described in the next procedure).

After you apply a modifier, it becomes active, and rollouts below the modifier stack display settings specific to the active modifier.

To drag a modifier to an object:

1. ⬚ Select an object that already has a modifier you would like to use on another object.
2. To copy the modifier without instancing it, drag the modifier's name from the stack display to the object in a viewport that you want to use the same modifier. To move the modifier, use **Shift**+drag; this removes it from the original object and applying it to the new one. To instance the modifier, use **Ctrl**+drag; this creates an instanced modifier applied to both the original object and the new one.

Edit Modifiers and Editable Objects

To achieve highly detailed modeling effects, you can directly transform, modify, and align the geometry of objects at a sub-object level, using the Modify panel.

Object Type	Sub-Object Geometry
Poly	Vertex, Edge, Border, Polygon, Element

Editable Poly (Vertex)

Break

Creates a new vertex for each polygon attached to selected vertices, allowing the polygon corners to be moved away from each other where they were once joined at each original vertex. If a vertex is isolated or used by only one polygon, it is unaffected.
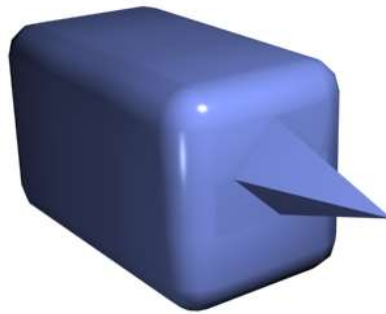
Extrude

Lets you extrude vertices manually via direct manipulation in the viewport. Click this button, and then drag vertically on any vertex to extrude it.

Extruding a vertex moves it along a normal and creates new polygons that form the sides of the extrusion, connecting the vertex to the object. The extrusion has the same number of sides as the number of polygons that originally used the extruded vertex.

Following are important aspects of vertex extrusion:

- When over a selected vertex, the mouse cursor changes to an Extrude cursor.
- Drag vertically to specify the extent of the extrusion, and horizontally to set the size of the base.
- With multiple vertices selected, dragging on any one extrudes all selected vertices equally.
- You can drag other vertices in turn to extrude them while the Extrude button is active. Click Extrude again or right-click in the active viewport to end the operation.
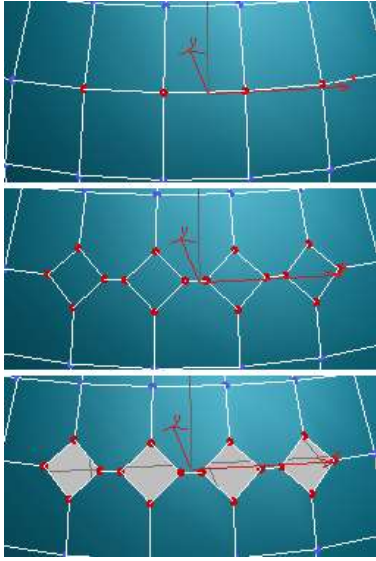

Chamfer box showing extruded vertex

Weld

Combines contiguous, selected vertices that fall within the tolerance specified in Weld Vertices caddy. All edges become connected to the resulting single vertex.
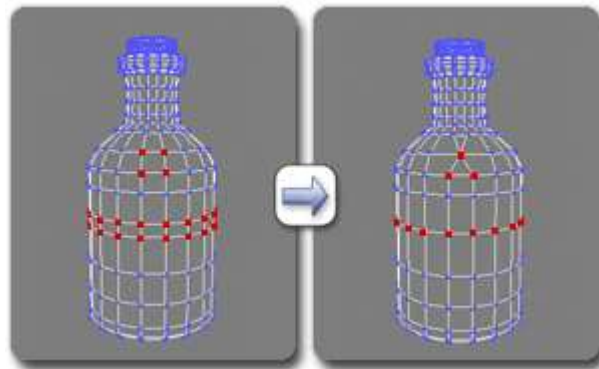
Using Weld at the Vertex level

Chamfer

Click this button and then drag vertices in the active object. To chamfer vertices numerically, click the Chamfer Settings button and use the Chamfer Amount value.

01 If you chamfer multiple selected vertices, all of them are chamfered identically. If you drag an unselected vertex, any selected vertices are first deselected.

Each chamfered vertex is effectively replaced by a new face that connects new points on all edges leading to the original vertex

Alternatively, you can create open space around the chamfered vertices; for details,

Top: The original vertex selection

Center: Vertices chamfered

Bottom: Vertices chamfered with Open on

Target Weld

Allows you to select a vertex and weld it to a neighboring target vertex. Target Weld works only with pairs of contiguous vertices; that is, vertices connected by a single edge. In Target Weld mode, the mouse cursor, when positioned over a vertex, changes to a + cursor.

Connect

Creates new edges between pairs of selected vertices.
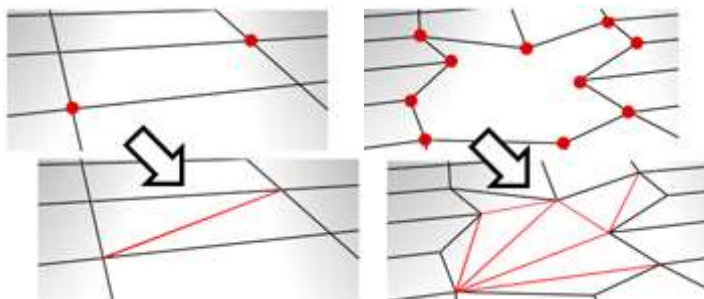
Editable Poly (Edge) ◁

An edge is a line connecting two vertices that forms the side of a polygon. An edge can't be shared by more than two polygons.

In the Perspective viewport, create a Plane object. This object is available from the ☀ Create panel ➤ ◯ (Geometry) ➤ Standard Primitives ➤ Object Type rollout.

By default, the Plane object is divided into 4 x 4 polygons. If you don't see the polygons in the Perspective viewport, press **F4** to activate Edged Faces view mod

Edit Edges rollout
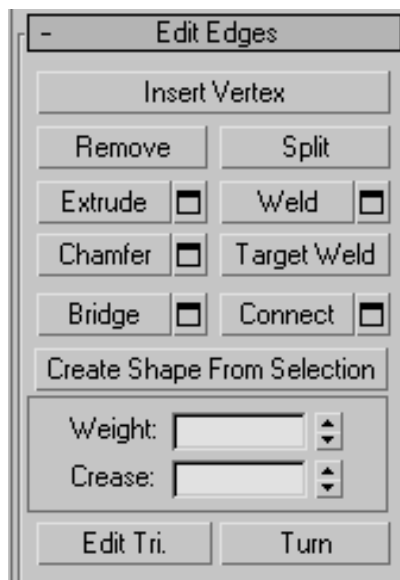
This rollout includes commands specific to edge editing.

Remove
- Deletes selected edges and combines the polygons that use them.
- Edges with the same polygon on both sides usually can't be removed.
- **Removing one edge is like making it invisible.**
- To delete the associated vertices when you remove edges, press and hold **Ctrl** while executing a Remove operation, either by mouse or with the **Backspace** key. This option, **called Clean Remove**, ensures that the remaining polygons are planar.
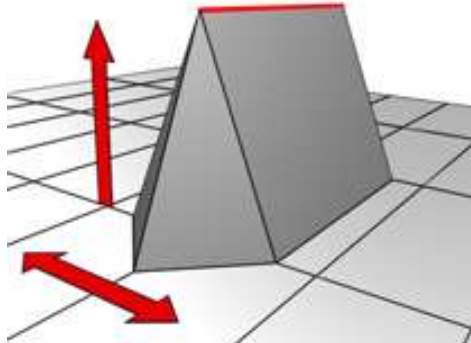
Warning Use of Remove can result in mesh shape changes and non-planar polygons.

2- **Split**

Divides the mesh along the selected edges.

3- **Extrude**

Lets you extrude edges manually via direct manipulation in the viewport. Click this button, and then drag vertically on any edge to extrude it.

When extruding a vertex or edge interactively in the viewport, you set the extrusion height by moving the mouse vertically and the base width by moving the mouse horizontal

Chamfer

An edge chamfer "chops off" the selected edges, creating two or more new edges for each chamfered edge. It also creates one or more polygons connecting the new edges
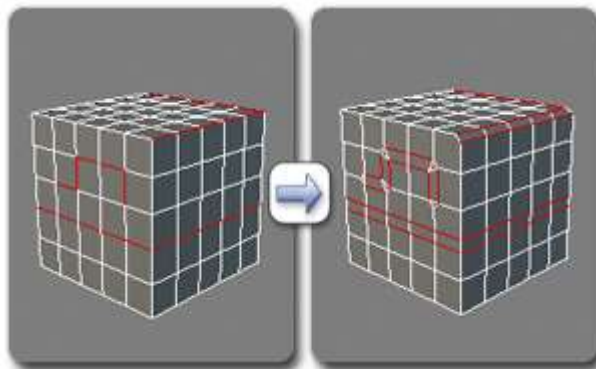

Bridge

Connects border edges on an object with a polygon "bridge." Bridge connects only border edges; that is, edges that have a polygon on only one side. This tool is particularly useful when creating edge loops or profiles.
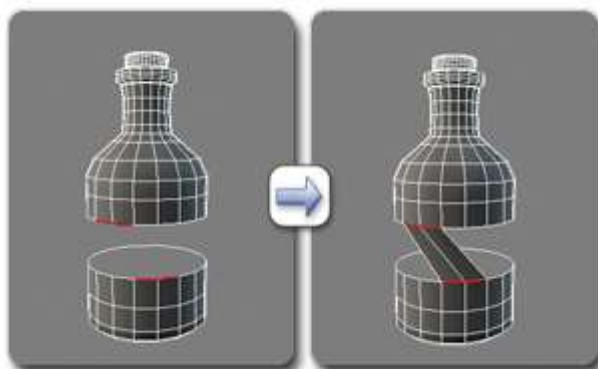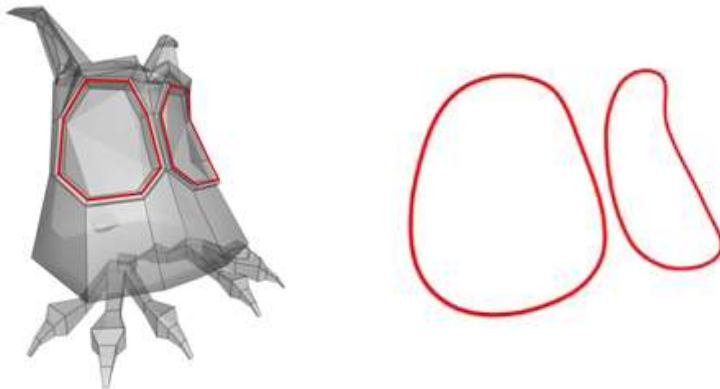
Connect

Creates new edges between pairs of selected edges using the current Connect Edges settings. Connect is particularly useful for creating or refining edge loops.
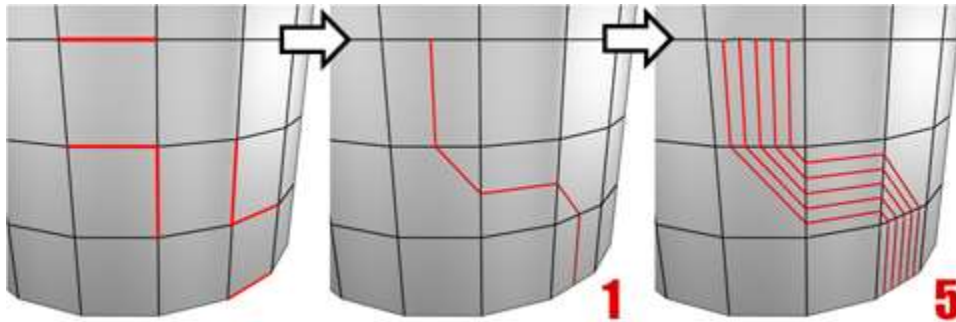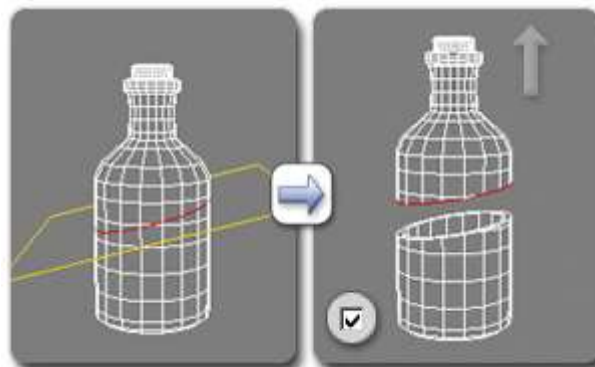

Create Shape From Selection

After selecting one or more edges, click this button to create a spline shape from the selected edges
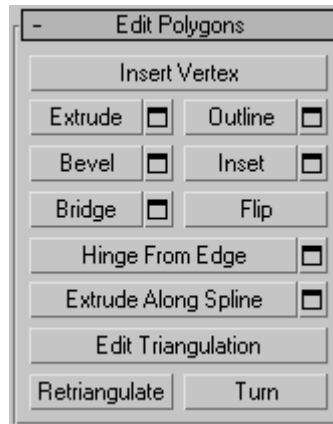

Slice (sub-object levels only)

Performs the slice operation at the location of the slice plane. Available only when Slice Plane is on. This tool slices the poly just like the "Operate On: Polygons" mode of the Slice modifier.

Left: Using Slice; Right: After slicing and moving the pieces apart
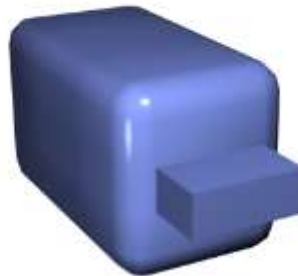Reset Plane (sub-object levels only)

Edit Poly (Polygon/Element)

This rollout includes commands specific to **Polygon/Element** editing.

Extrude

Lets you perform manual extrusion via direct manipulation in the viewport. Click this button, and then drag vertically on any polygon to extrude it.
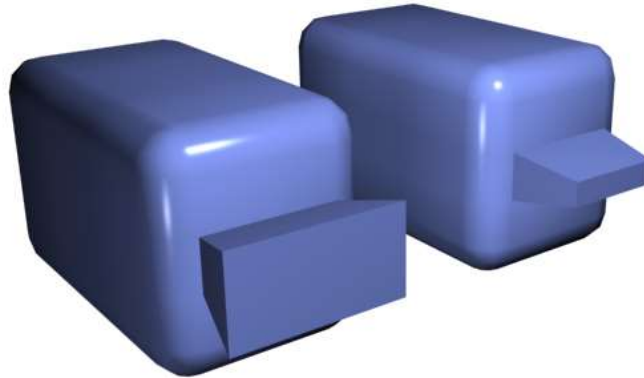

Outline

Lets you increase or decrease the outside edge of each contiguous group of selected polygons.
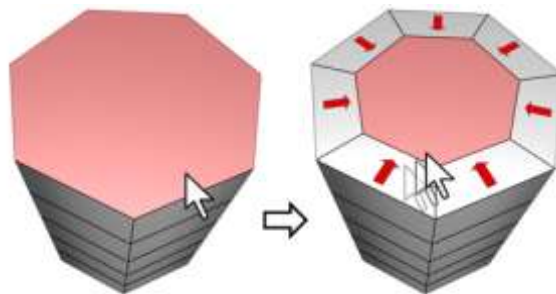
Bevel

Lets you perform manual beveling via direct manipulation in the viewport.

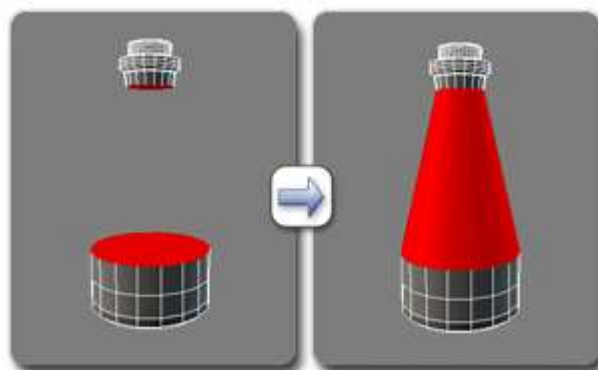Polygon beveled outward (left) and inward (right)

Inset

Performs a bevel with no height; that is, within the plane of the polygon selection. Click this button, and then drag vertically on any polygon to inset it.

Bridge

Connects two polygons or polygon selections on an object with a polygon "bridge.
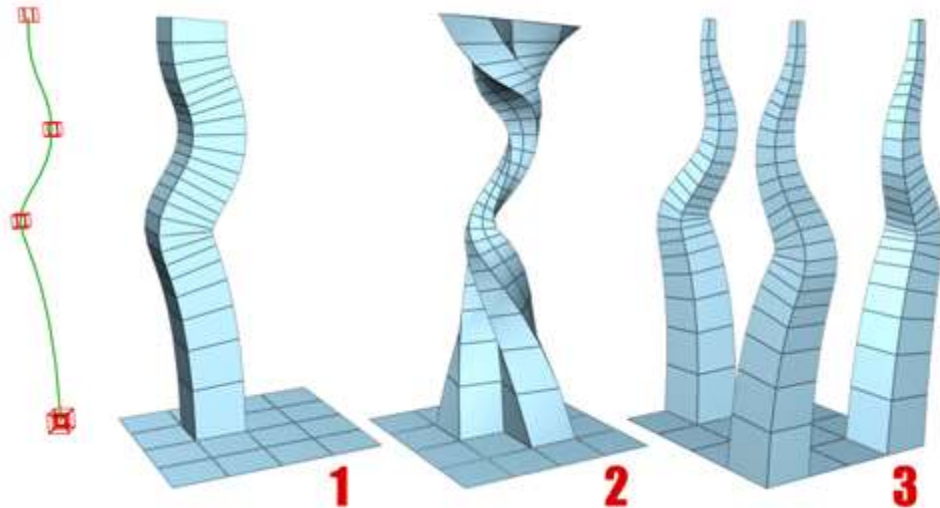

Note Bridge always creates a straight-line connection between polygon pairs. To make the bridge connection follow a contour, apply modeling tools as

Extrude Along Spline

Extrudes the current selection along a spline.

You can extrude a single polygon (1) or a selection of contiguous (2) or non-contiguous polygons (3). Extrusion 2 uses Taper Curve and Twist (available via Settings). Extrusion 3 uses Taper Amount; each extrusion has a different curve rotation.

Make a selection, click Extrude Along/On Spline, and then select a spline in the scene. The selection is extruded along the spline, using the spline's current orientation, but as though the spline's start point were moved to the center of each polygon or group.

Hinge From Edge

Lets you perform a manual hinge operation via direct manipulation in the viewport. Make a polygon selection, click this button, and then drag vertically on any edge to hinge the selection. The mouse cursor changes to a cross when over an edge.
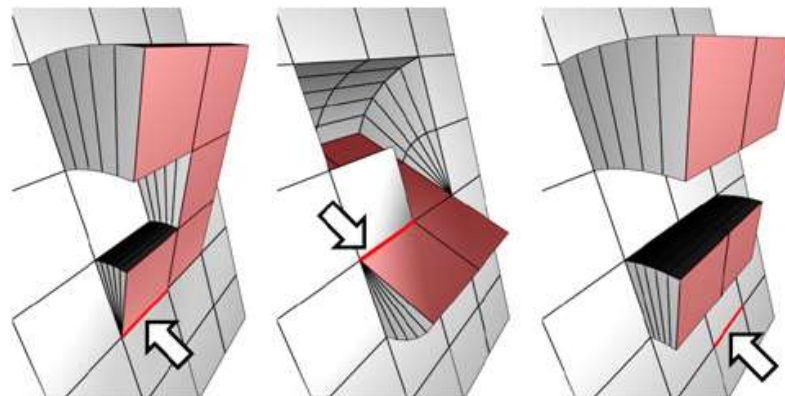
The hinge edge needn't be part of the selection. It can be any edge of the mesh. Also, the selection needn't be contiguous.

Edit Triangulation

Lets you modify how polygons are subdivided into triangles by drawing internal edges.
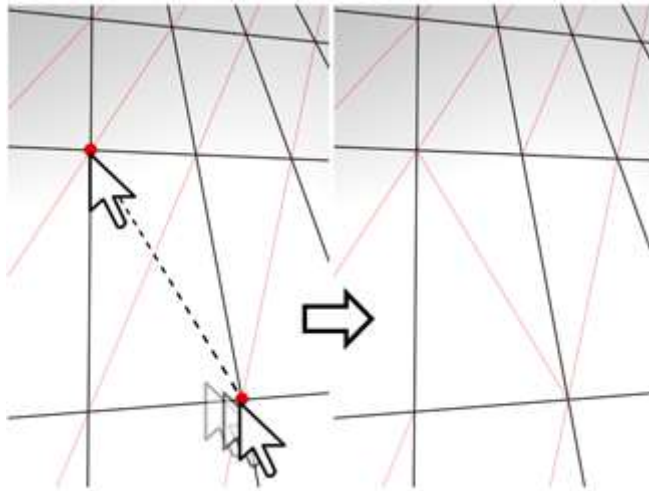
In Edit Triangulation mode, you can see the current triangulation in the viewport, and change it by clicking two vertices on the same polygon.

Retriangulate

Lets 3ds Max automatically do its best triangulation on the polygon or polygons currently selected.
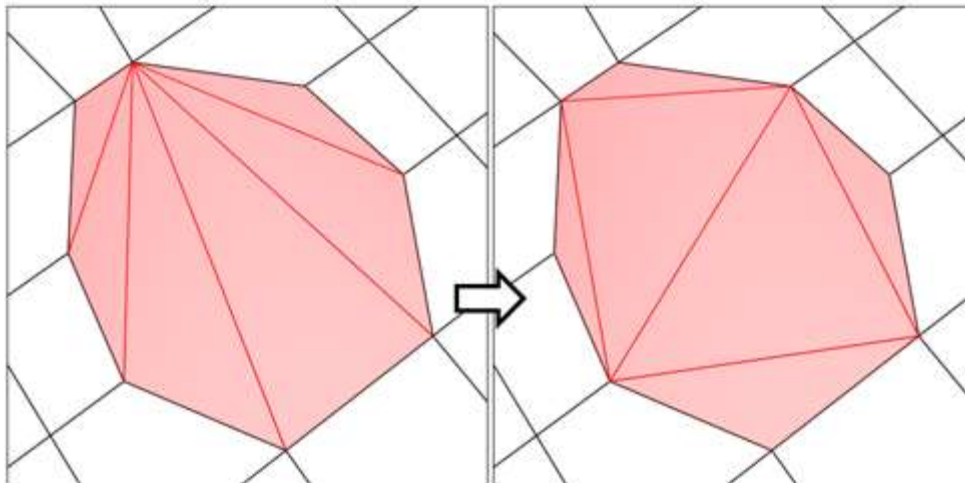

Retriangulate attempts to optimize how selected polygons are subdivided into triangles

Edit Poly (Border) ⟳

A border is a linear section of a mesh that can generally be described as the edge of a hole. This is usually a sequence of edges with polygons on only one side. And also has:-

Extrude / Chamfer/ Bridge/ Connect/ Create Shape

NoteBridge always creates a straight-line connection between border pairs. To make the bridge connection follow a contour, apply modeling tools as appropriate *after* creating the bridge. For example, bridge two borders, and then use <u>Bend</u>.


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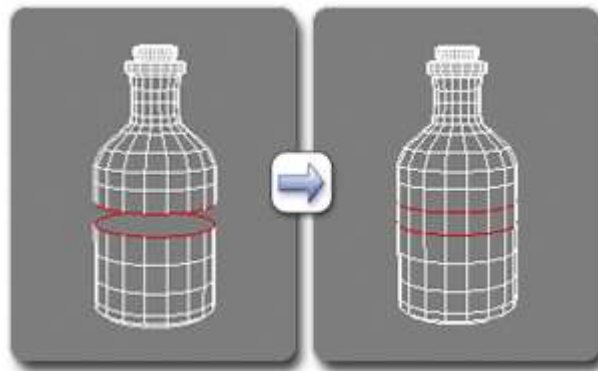
Detach in poly

NoteWhen you detach a vertex or an edge, any adjacent polygons are detached as well. Also, a detached item remains in its original location.

Bend Modifier

The Bend modifier lets you bend the current selection up to 360 degrees about a single axis, producing a uniform bend in an object's geometry. You can control the angle and direction of the bend on any of three axes. You can also limit the bend to a section of the geometry
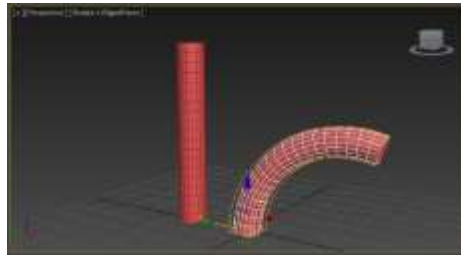

Bevel Modifier

The Bevel modifier extrudes shapes into 3D objects and applies a flat or round bevel to the edges. A common use for this modifier is to create 3D text and logos, but you can apply it to any shape.
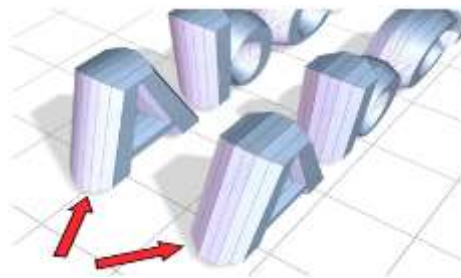
Cap Holes Modifier

The Cap Holes modifier builds faces in the holes in a mesh object. A hole is defined as a loop of edges, each of which has only one face. For example, one or more missing faces from a sphere would produce one or more holes. The modifier works best on reconstructing planar holes, but can do a reasonable job on non-planar holes as well.
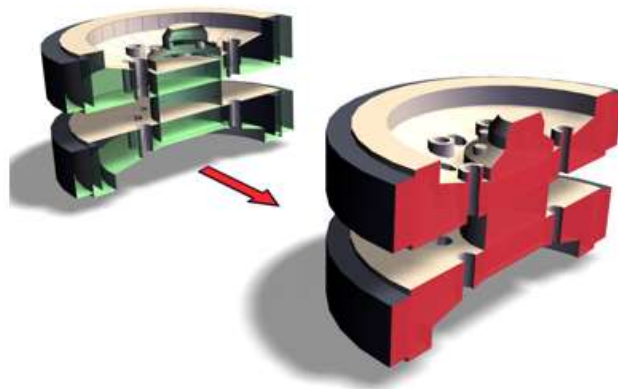
Cap Holes used to make the wheel appear solid

CrossSection Modifier

The CrossSection modifier creates a "skin" across multiple splines. It works by connecting the vertices of 3D splines to form a skin. The resulting object is another spline object that can be used with the Surface modifier to create a patch surface. These two modifiers, when used together, are sometimes referred to collectively as "Surface Tools."
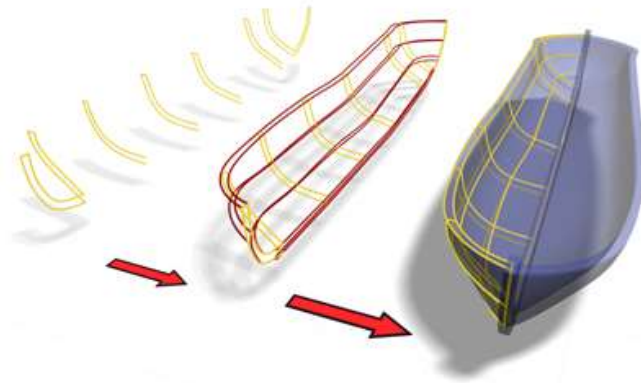
CrossSection uses splines to create a model of a boat.

Displace Modifier

The Displace modifier acts as a force field to push and reshape an object's geometry. You can apply its variable force directly from the modifier gizmo, or from a bitmapped image.

FFD (Free-Form Deformation) Modifiers

FFD stands for Free-Form Deformation. Its effect is used in computer animation for things like dancing cars and gas tanks. You can use it as well for modeling rounded shapes such as chairs and sculptures.

The FFD modifier surrounds the selected geometry with a lattice. By adjusting the control points of the lattice, you deform the enclosed geometry.
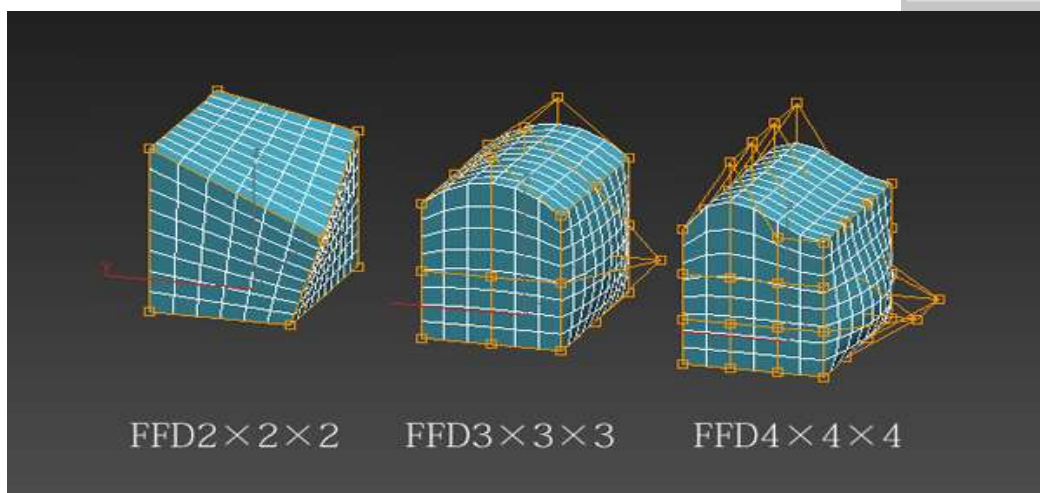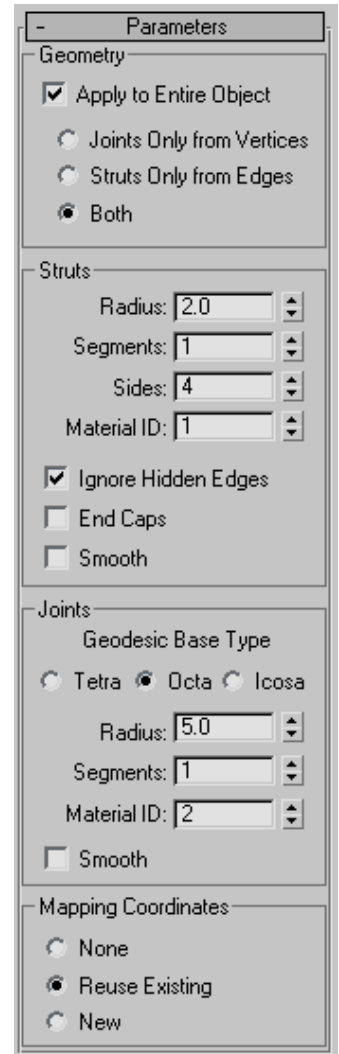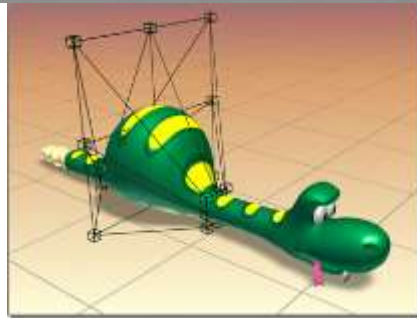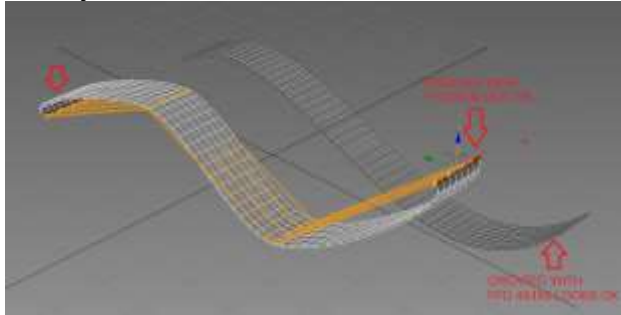
Lattice Modifier

The Lattice modifier converts the segments or edges of a shape or object into cylindrical struts with optional joint polyhedra at the vertices. Use this either to create renderable

structural geometry based on the mesh topology, or as an alternate method to achieve a rendered wireframe effect.
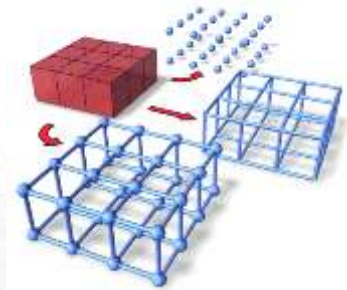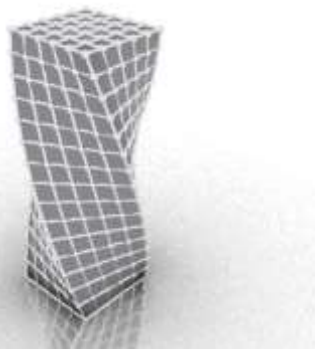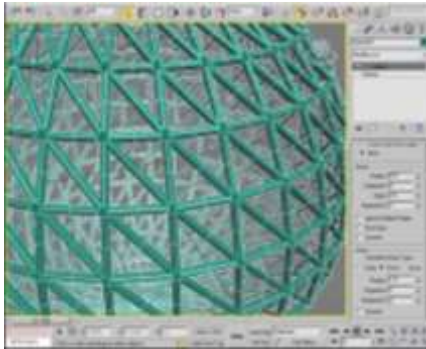

Top: Joints only
Middle: Struts only
Bottom: Both (joints and struts)

- **Joints Only From Vertices**
  Displays only the joints (polyhedra) generated by the vertices of the original mesh.
- **Struts Only From Edges**
  Displays only the struts (cylinders) generated by the segments of the original mesh.
- **Both**
  Displays both struts and joints
- **Radius**
  Specifies the radius of the struts.
- **Segments**
  Specifies the number of segments along the struts. Increase this value when you need to deform or distort the struts with subsequent modifiers.
- **Sides**
  Specifies the number of sides around the perimeter of the struts.
- **Ignore Hidden Edges**
  Generates struts only for visible edges. When turned off, generates struts for all edges, including the invisible edges. Default=on.
- **End Caps**
  Applies end caps to the struts.
- **Smooth**
 Applies smoothing to the struts.

Melt Modifier
The Melt modifier lets you apply a realistic melting effect to all types of objects, including editable patches and NURBS objects, as well as to sub-object selections passed up the stack. Options include sagging of edges, spreading while melting, and a

customizable set of substances ranging from a firm plastic surface to a jelly type that collapses in on itself.
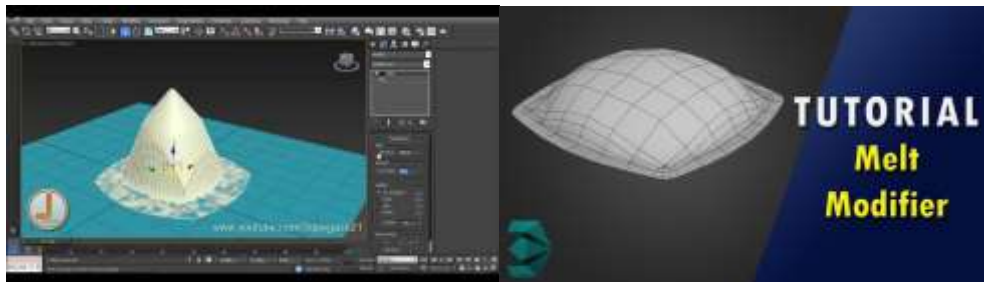
[Twist Modifier](#)

The Twist modifier produces a twirling effect (like wringing out a wet rag) in an object's geometry. You can control the angle of the twist on any of three axes, and set a bias that compresses the twist effect relative to the pivot point. You can also limit the twist to a section of the geometry.
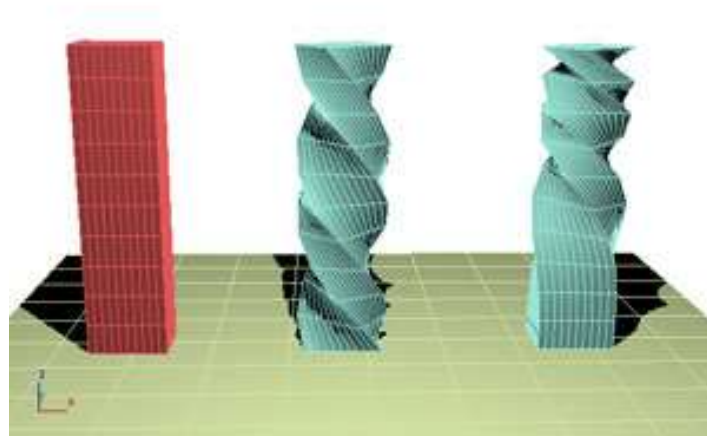
[Wave Modifier](#)

The Wave modifier produces a wave effect in an object's geometry. You can use either of two waves, or combine them. Wave uses a standard gizmo and center, which you can transform to increase the possible wave effects.

The [Wave](#) space warp has similar features, and is useful for applying effects to a large number of objects
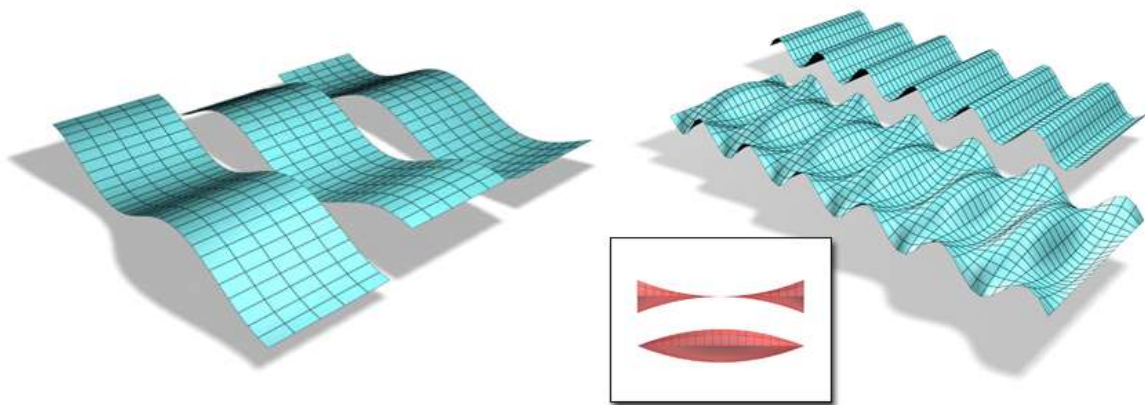
The Mirror modifier

The Mirror modifier provides a parametric method of mirroring an object or a sub-object selection. You can apply the Mirror modifier to any type of geometry, and you can animate the mirror effect by animating the modifier's gizmo
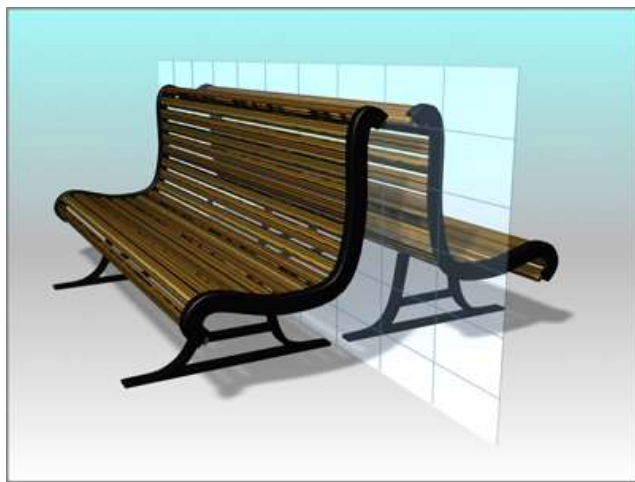
The Relax modifier

The Relax modifier changes the apparent surface tension in a mesh by moving vertices closer to, or away from, their neighbors. The typical result is that the object gets smoother and a little smaller as the vertices move toward an averaged center point. You can see the most pronounced effects on objects with sharp corners and edges.
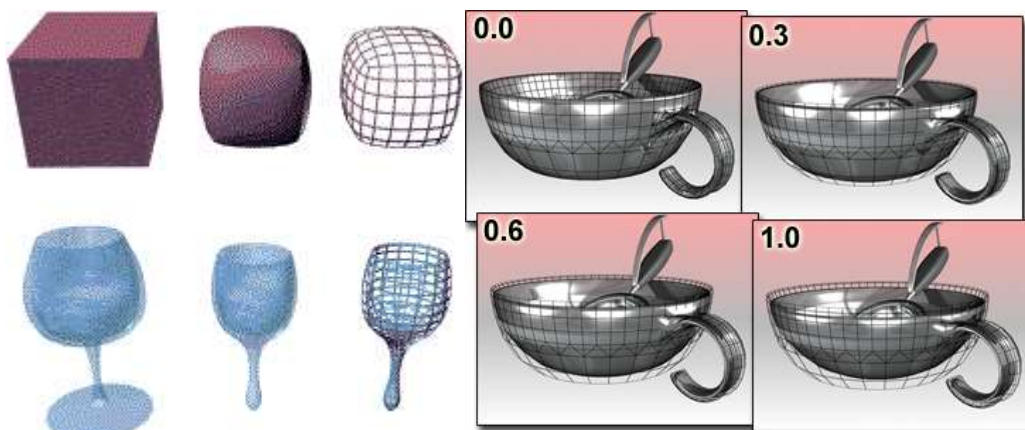
Original objects compared to relaxed objects

The Shell modifier

The Shell modifier "solidifies" or gives thickness to an object by adding an extra set of faces facing the opposite direction of existing faces, plus edges connecting the inner and outer surfaces wherever faces are missing in the original object. You can specify offset distances for the inner and outer surfaces, characteristics for edges, material IDs, and mapping types for the edges.
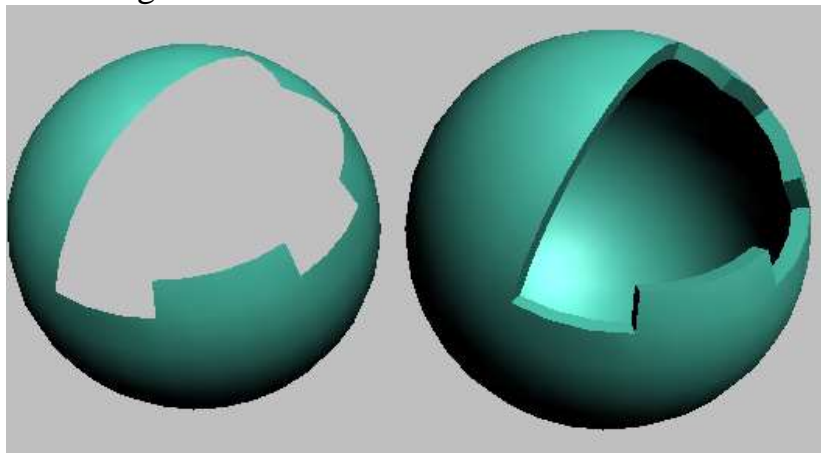

## The Slice modifier

The Slice modifier lets you use a cutting plane to slice through a mesh, creating new vertices, edges and faces based on the location of the slice plane gizmo. The vertices can either refine (subdivide) or split the mesh, and you can also remove the mesh from one side of the plane.

Right: Original object
Middle: Object without top
Left: Object without bottom

Noise Modifier

The Noise modifier modulates the position of an object's vertices along any combination of three axes. This important animation tool simulates random variations in an object's shape.
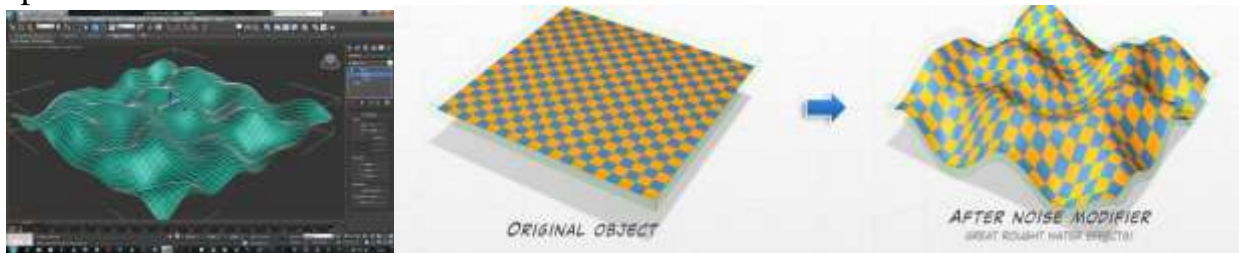
[Optimize Modifier](#)

The Optimize modifier lets you reduce the number of faces and vertices in an object. This simplifies the geometry and speeds up rendering while maintaining an acceptable image. A Before/After readout gives you exact feedback on the reduction as you make each change.

Optimize simplifies a smooth model with a high number of faces without greatly changing the model's appearance.

[Squeeze Modifier](#)

The Squeeze modifier lets you apply a squeezing effect to objects, in which the vertices closest to the object's [pivot point](#) move inward. The squeeze is applied around the Squeeze gizmo's local Z axis. You can also use Squeeze to create a bulge on the vertical axis, to accentuate the squeeze effect.

SQUEEZE IN 3DS MAX
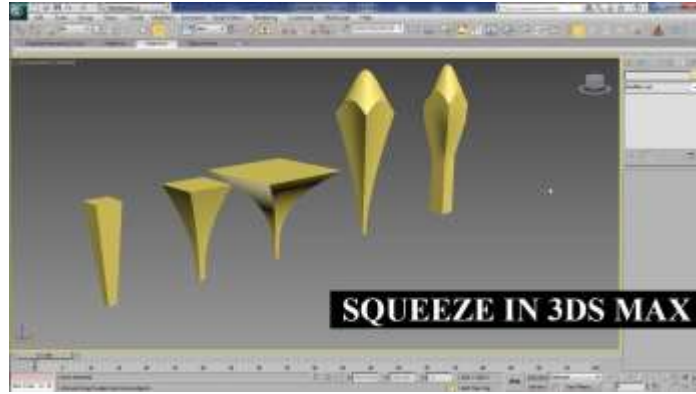
UVW Map Modifier

By applying mapping coordinates to an object, the UVW Map modifier controls how mapped and procedural materials appear on the surface of an object. Mapping coordinates specify how bitmaps are projected onto an object. The UVW coordinate system is similar to the XYZ coordinate system. The U and V axes of a bitmap correspond to the X and Y axes. The W axis, which corresponds to the Z axis, is generally only used for procedural maps. A bitmap's coordinate system can be switched in the Material Editor to VW or WU, in which case the bitmap is rotated and projected so that it is perpendicular to the surface.
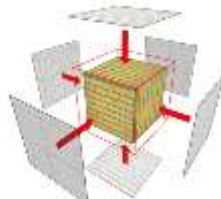
Determines the type of mapping coordinates used. Different kinds of mapping are distinguished by how the map is geometrically projected onto the object and how the projection interacts with the object's surfaces
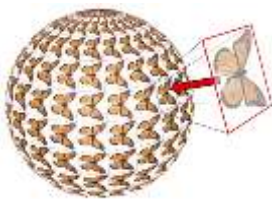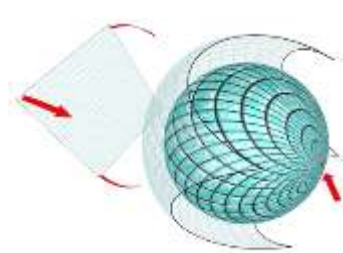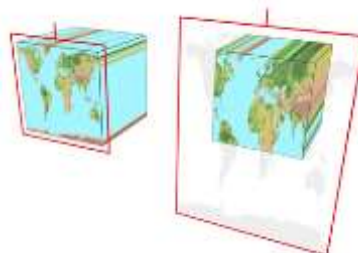

| Face | Spherical | box | Cylindrical |

| Shrink Wrap | planar |

Taper Modifier

The Taper modifier produces a tapered contour by scaling both ends of an object's geometry; one end is scaled up, and the other is scaled down. You can control the amount and curve of the taper on two sets of axes. You can also limit the taper to a section of the geometry.
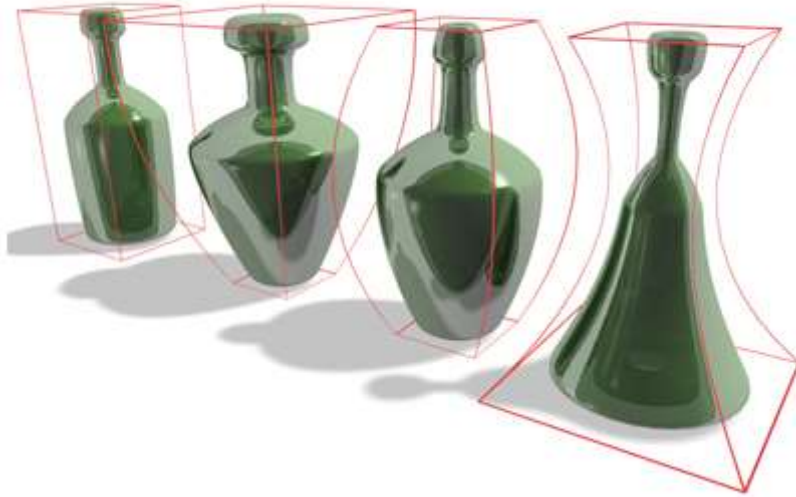
Examples of default tapers

The TurboSmooth modifier

The TurboSmooth modifier, like MeshSmooth, smoothes geometry in your scene. The differences between the two are as follows:

- TurboSmooth is considerably faster and more memory-efficient than MeshSmooth. TurboSmooth also has an option for Explicit Normals, unavailable in MeshSmooth.
- TurboSmooth lets you subdivide the geometry while interpolating the angles of new faces at corners and edges, and apply a single smoothing group to all faces in the object. The effect of TurboSmooth is to round over corners and edges as if they had been filed or planed smooth. Use TurboSmooth parameters to control the size and number of new faces, and how they affect the surface of the object.

turbosmooth   turbosmooth
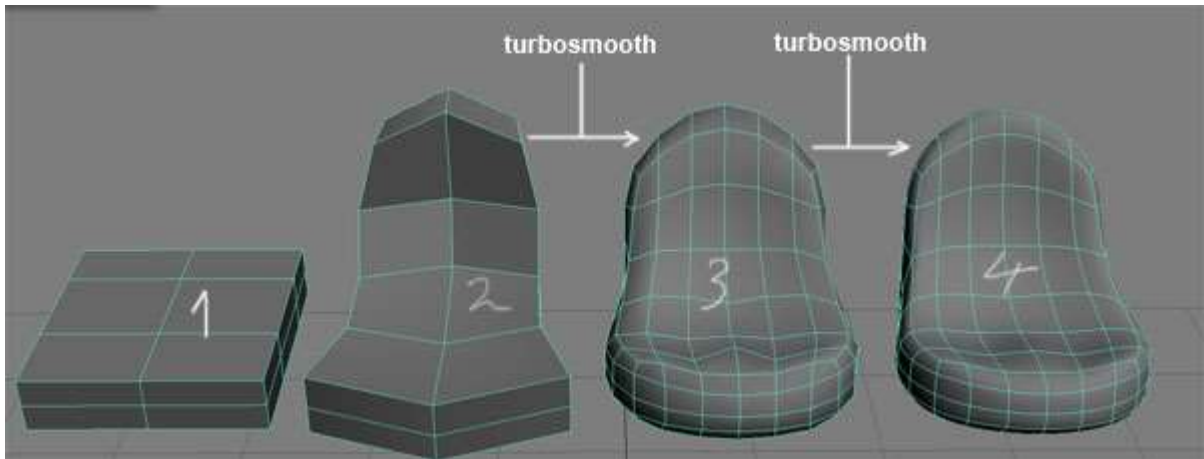
General user interface

Open file	CTRL+O (LETTER "O")
Save file	CTRL+S
Redo scene operation	CTRL+Y
Undo scene operation	CTRL+Z
Delete objects	DELETE
Top view	T
Bottom view	B
Left view	L
Front view	F
Camera view	C
Isometric user view	U
List view	V
Snaps	S
Angle snap	A
Maximize viewport toggle	ALT+W
Shade selected faces	F2
Wireframe / smooth toggle	F3
Activate edged faces view mod	F4
Material editor	M
Expert mode	CTRL+X
Show tab panel toggle	Y
Hide cameras toggle	SHIFT+C
Hide lights toggle	SHIFT+L
Hide grids toggle	G

Go to end frame	***END***
Go to start frame	***HOME***
Forward time one unit	***. (PERIOD)***
Back time one unit	***, (COMMA)***
Play animation	***/ (FORWARD SLASH)***
Auto key toggle	***N***
Render last	***F9***
Show cordient	***X***
Render scene	***F10***
Select all	***CTRL+A***
Select invert	***CTRL+I (LETTER ???I???)***
Select none	***CTRL+D***
Show safe frames	*SHIFT+F*
Create camera from view	*CTRL+C*
Select-by-name dialog	***H***
Select	***Q***
Move	***W***
Rotate	***E***
Scale	***R***
Transform gizmo toggle	***X***
Transform type-in dialog	***F12***
Align	***ALT+A***
Zoom extents selected all	***Z***
Zoom region mode	***CTRL+W***
Maximise viewport	*Alt+W*

Editable Poly

1	**Vertex level**
2	Edge level
3	Border level
4	Poly level
5	Element level
Shift+E	Extrude mode
Ctrl+Shift+B	Bevel mode
Ctrl+Shift+C	Chamfer mode

Ctrl+Shift+E	Connect
Shift+X	Edge constaint
Ctrl+Shift+W	Target weld
Alt+C	Cut
Ctrl+Shift+Q	Quickslice
Alt+H	Hide
Alt+I	Hide unselected
Alt+U	Unhide all

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Material Editor

(Go to Parent

(Show End Result).)

Show Shaded Material in Viewport

(Assign Material to Selection)

(Get Material

(Select By Material)

(Material Editor Options)

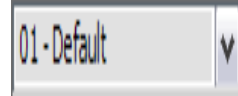**(Put Material to Scene)**

(Reset Map/Mtl to Default Settings)

(Make Material Copy)

(Pick Material From Object)

01 - Default **Material Name field**

(Make Unique) (Compact Material Editor)

Display Thumbnails

When on, the hierarchy displays thumbnails. Default=on.

Display Materials

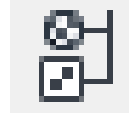When on, the hierarchy includes materials. Default=on.

Display Maps

When on, the hierarchy includes maps. Default=on.

Note For most scenes, the effect of this isn't apparent unless you also turn on Display Sub-Materials/Maps.

Display Objects

When on, the hierarchy includes objects. Default=on.

Display Sub-Materials/Maps

When on, the hierarchy includes sub-materials and maps applied to material channels. Default=off.

Display Unused Map Channels

When on, the hierarchy includes unused map channels. Default=off.

Sort By Object / Sort By Materials

These two options toggle each other.