Twist Modifier

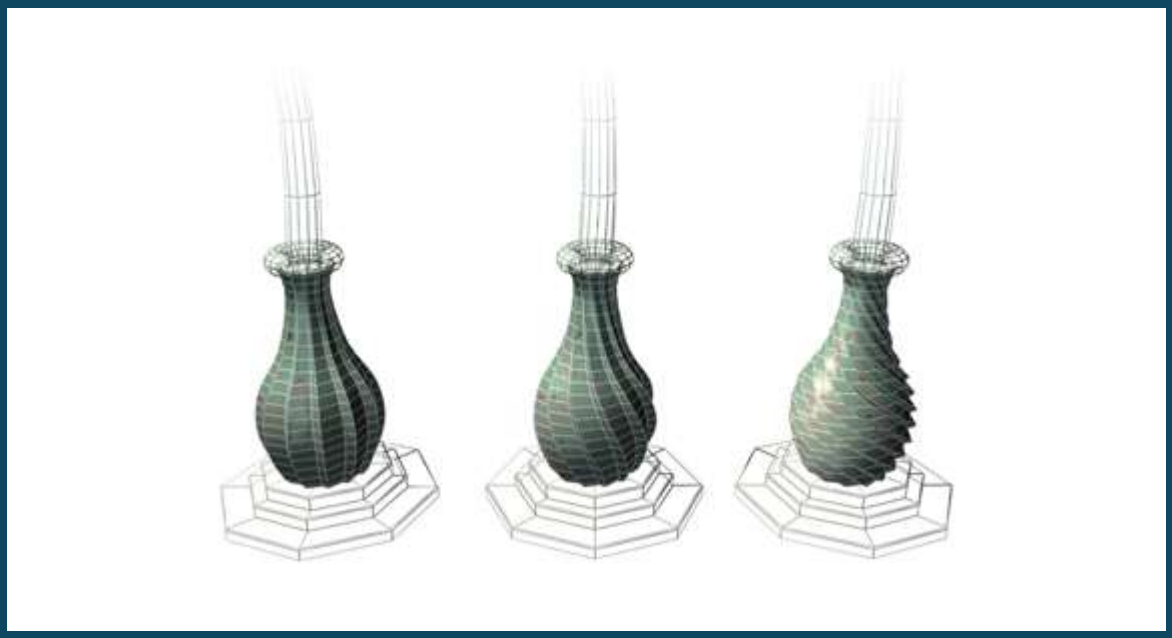
The Twist modifier produces a twirling effect (like wringing out a wet rag) in an object's geometry. You can control the angle of the twist on any of three axes, and set a bias that compresses the twist effect relative to the pivot point. You can also limit the twist to a section of the geometry.

 Modify panel > Make a selection. > Modifier List > Object-Space Modifiers > Twist

Default menu: Make a selection. > Modifiers menu > Parametric Deformers > Twist

Alt menu: Make a selection. > Modifiers menu > Geometry (Parametric) > Twist

Note: When you apply the Twist modifier, the Twist gizmo's center is placed at the object's pivot point, and the gizmo lines up with the object's local axis.



o twist an object:

1.  Select an object and  apply Twist.
2. On the Parameters rollout, set Twist Axis to X, Y, or Z. This refers to the axis of the Twist gizmo, not the axis of the selected object.

You can switch between axes at any time, but only one axis setting is carried with the modifier.

3. Set the angle of the twist. Positive values produce a clockwise twist, negative values a counterclockwise twist. An angle of 360 produces a complete revolution.

The object twists to this amount beginning at the lower limit (by default, the location of the modifier's center).

4. Set the bias of the twist.

A positive value compresses the twist at the end away from the pivot point, a negative value toward the pivot point.

To limit the twist:

1. Turn on Limits group ➤ Limit Effect.
2. Set values for the upper and lower limits. These are distances in current units above and below the modifier's center, which is at zero on the gizmo's Z axis. The upper limit can be zero or positive, the lower limit zero or negative. If the limits are equal, the result is the same as turning off Limit Effect.

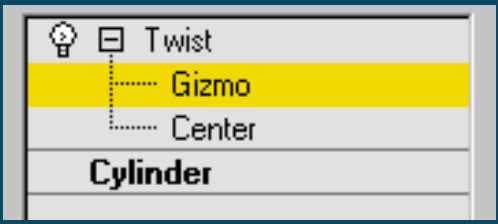
The twist offset is applied between these limits. The surrounding geometry, while unaffected by the twist itself, is moved to keep the object intact.

3. At the sub-object level, you can select and move the modifier's center.

The limit settings remain on either side of the center as you move it. This lets you relocate the twist area to another part of the object.

Interface

Modifier Stack

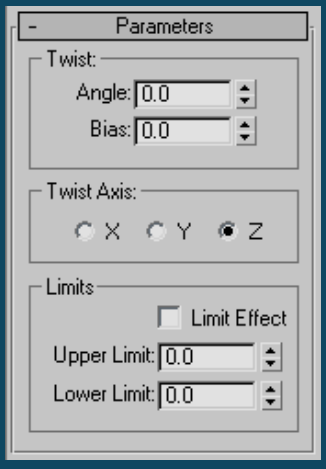


Gizmo

You can transform and animate the gizmo like any other object at this sub-object level, altering the effect of the Twist modifier. Translating the gizmo translates its center an equal distance. Rotating and scaling the gizmo takes place with respect to its center.

Center

You can translate and animate the center at this sub-object level, altering the Twist gizmo's shape, and thus the shape of the twisted object.



Angle

Determines the amount of twist around the vertical axis. Default=0.0.

Bias

Causes the twist rotation to bunch up at either end of the object. When the parameter is negative, the object twists closer to the gizmo center. When the value is positive, the object twists more away from the gizmo center. When the parameter is 0, the twisting is uniform. Range=100 to -100. Default=0.0.

Twist Axis group

X/Y/Z

Specify the axis along which the twist will occur. This is the local axis of the Twist gizmo. Default=Z.

Limits group

Applies the twist effect only to vertices that lie between the lower and upper limits. The two spinners represent distance along the gizmo's Z axis (Z=0 is at the gizmo's center). When they are equal, it is the same as disabling the twist effect.

Limit Effect

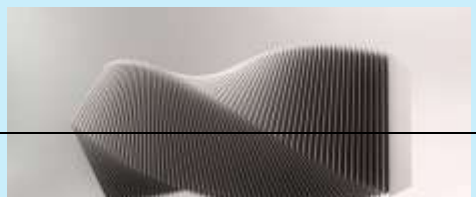
Applies limit constraints to the Twist modifier.

Upper Limit

Sets the upper limit for the twist effect. Default=0.

Lower Limit

Sets the lower limit for the twist effect. Default=0.
Now we're going to use the **Twist Modifier**.
This command allows us to create or extract a variety of twisted or helical shapes — for example, spiral columns, curved surfaces, or any geometry that needs a subtle rotational form.
The Twist modifier basically applies a controlled spiral deformation to the object, and we can adjust both the **angle** and the **axis** to achieve the exact amount and direction of twisting we want.



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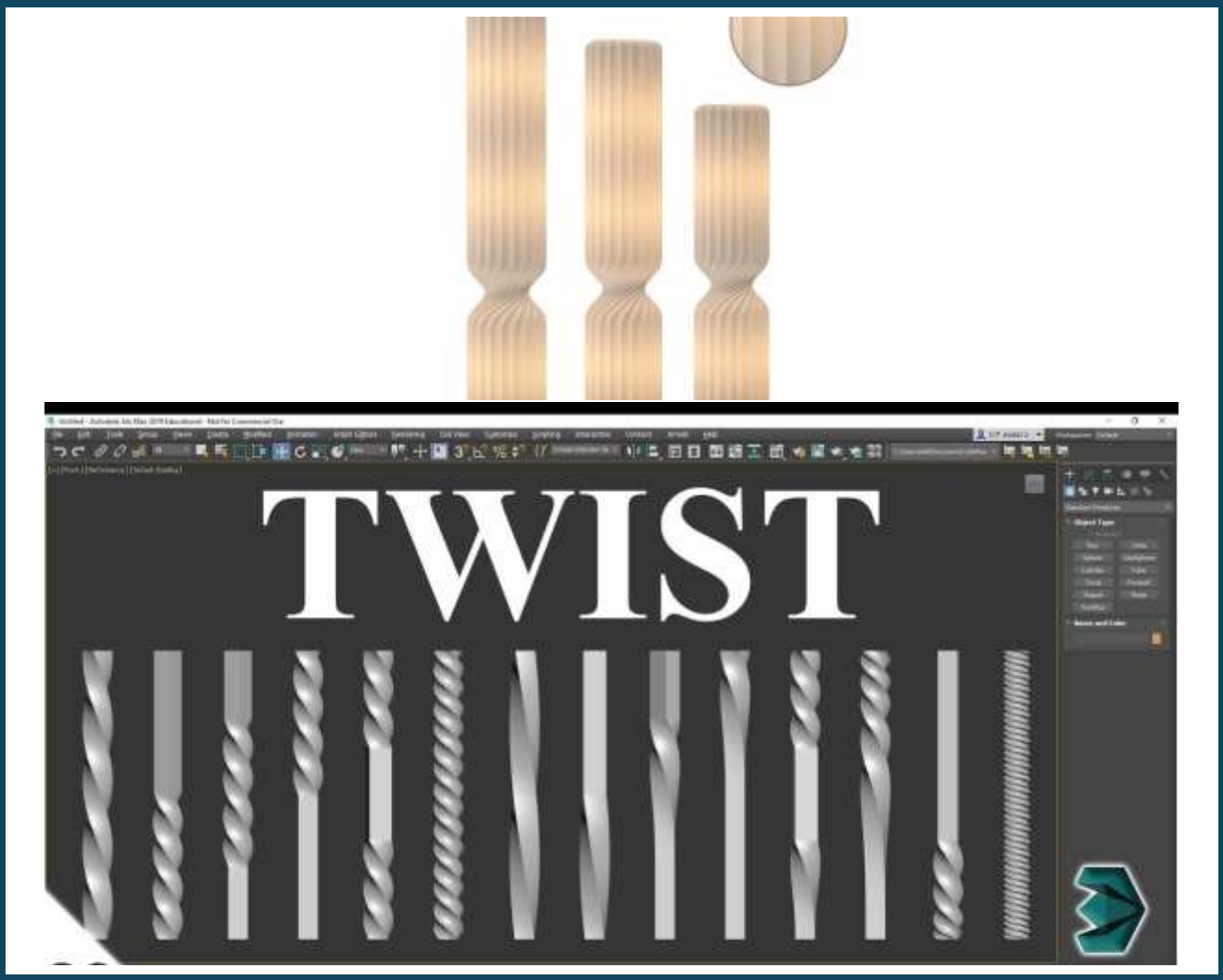
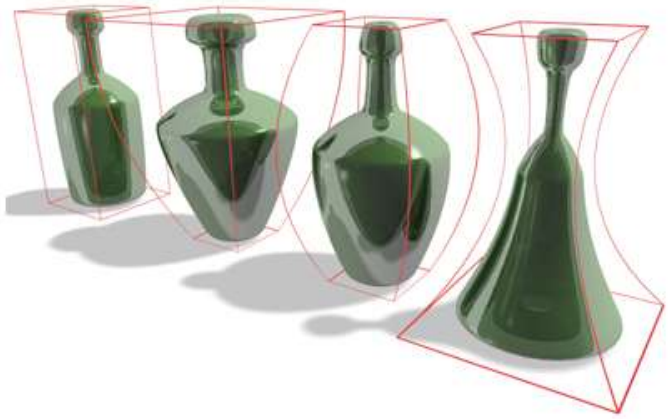


Taper Modifier

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.

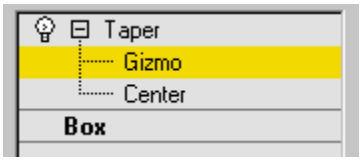
- Modify panel > Make a selection. > Modifier List > Object-Space Modifiers > Taper
- Default menu: Make a selection. > Modifiers menu > Parametric Deformers > Taper
- Alt menu: Make a selection. > Modifiers menu > Geometry (Parametric) > Taper



- Examples of default tapers

- Interface

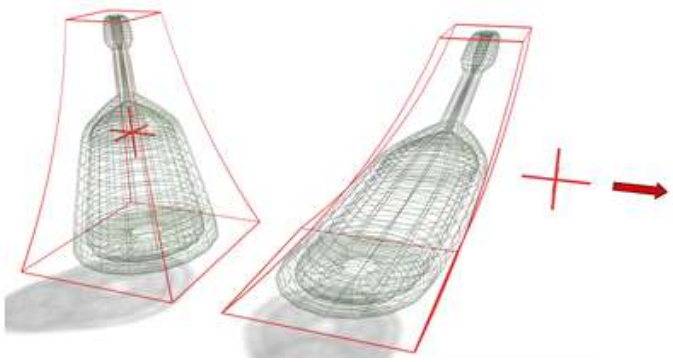
- Modifier Stack



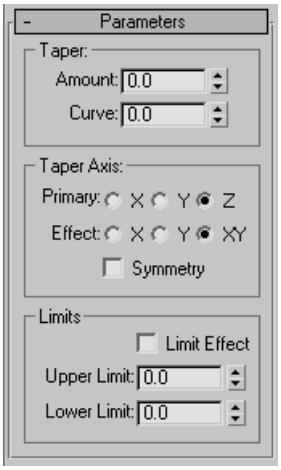
- **Gizmo**

- At this sub-object level, you can transform and animate the gizmo like any other object, altering the effect of the Taper modifier. Translating the gizmo translates its center an equal distance. Rotating and scaling the gizmo takes place with respect to its center.

- **Center**

- At this sub-object level, you can translate and animate the center, altering the Taper gizmo's shape, and thus the shape of the tapered object.
- For more information on the stack display, see Modifier Stack.
- 
- Moving the modifier's center changes the gizmo shape.

Parameters rollout

- 

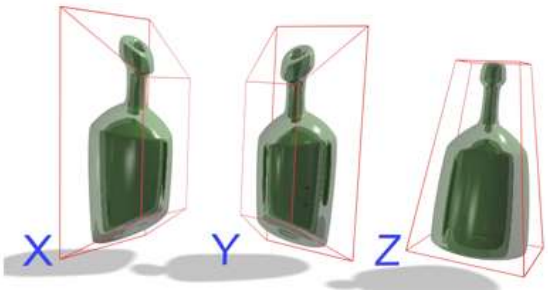
- The Taper modifier provides two sets of axes and a symmetry setting in the Taper Axis group box of the Parameters rollout. As with other modifiers, these axes refer to the Taper gizmo, not the object itself.

Taper group

- **Amount**
- The extent to which the ends are scaled. Amount is a relative value with a maximum of 10.
- **Curve**

- Applies a curvature to the sides of the Taper gizmo, thus affecting the shape of the tapered object. Positive values produce an outward curve along the tapered sides, negative values an inward curve. At 0, the sides are unchanged. Default=0.

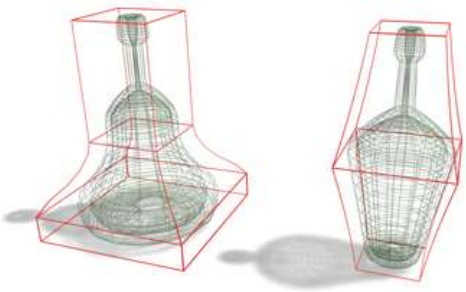
- Taper Axis group
- **Primary**
- The central axis or spine of the taper: X, Y, or Z. Default=Z.
- **Effect**
- The axis, or pair of axes, indicating the direction of the taper from the primary axis. The available choices are determined by the choice of primary axis. The effect axis can be either of the two remaining axes, or their combination. If the primary axis is X, the effect axis can be Y, Z, or YZ. Default=XY.
- **Symmetry**
- Produces a symmetrical taper around the primary axis. A taper is always symmetrical around the effect axis. Default=off.



- Changing the effect axis changes the effects of the modifier.

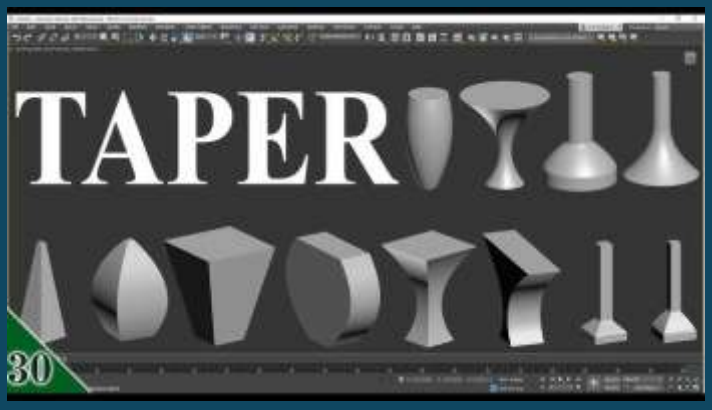
- Limits group
- The taper offset is applied between the upper and lower limits. The surrounding geometry, while unaffected by the taper itself, is moved to keep the object intact.
- **Limit Effect**
- Enables upper and lower limits for the taper effect.
- **Upper Limit**
- Sets the upper limit boundaries in world units from the taper center point, beyond which the taper no longer affects the geometry.

- **Lower Limit**
- Sets the lower limit boundaries in world units from the taper center point, beyond which the taper no longer affects the geometry.



- **Left: Limiting the effect of the taper**
- **Right: Using symmetry**

This command allows us to create or extract a variety OBJECTES



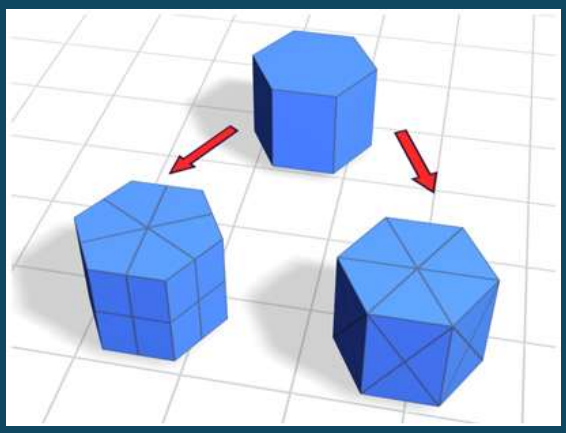
Tessellate Modifier

The Tessellate modifier subdivides faces in the current selection. It's particularly useful for smoothing curved surfaces for rendering, and creating additional mesh resolution for other modifiers to act on. If the stack selection level is Vertex or Edge/Border, Tessellate affects only on faces or polygons that use selected vertices or edges. If no sub-object selection has been passed up the stack, then the entire object is tessellated.

- Modify panel > Make a selection. > Modifier List > Object-Space Modifiers > Tessellate
- Default menu: Make a selection. > Modifiers menu > Mesh Editing > Tessellate

- Alt menu: Make a selection. > Modifiers menu > Geometry (Convert to Mesh) > Tessellate

This modifier lets you tessellate polygonal faces; the tessellation available in an editable mesh does not (it works on faces, even at the Polygon selection level). Also, the Tension setting lets you apply convexity or concavity to the subdivided surface.



Top: Original mesh object

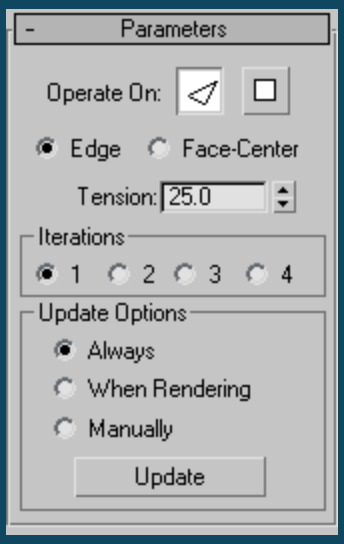
Lower left: Polygonal tessellation applied to edges

Lower right: Polygonal tessellation applied to polygon centers (Face-Center option)

Warning: Tessellating an object retains any UVW mapping that exists in the stack before the Tessellate modifier. However, in some cases, the mapping might be altered, depending on the type of mapping and the tessellation settings. Typically, this happens when the applied mapping uses extreme compound angles.

Interface

Parameters rollout



Operate On

Perform the tessellation on the triangular faces or on the polygonal facets (the areas bound by visible edges):

-  **Faces** Treats the selection as a set of triangular faces.
-  **Polygons** Divides the polygonal facets. For example, using the polygonal method on the side of a box results in cross-shaped edges using the Edge method, and X-shaped edges using the Face-Center method.

Edge/Face-Center

- **Edge** Divides the face or polygon from its center to the middle of each edge. When applied to a triangular face, it also divides unselected faces that share edges with the selected faces.
- **Face-Center** Divides the face or polygon from the center to the corner vertices.

Tension

Determines whether the new faces are flat, concave, or convex after Edge tessellation. A positive value rounds faces by pushing vertices outward. A negative value creates concave faces by pulling vertices inward. A setting of 0 keeps the faces flat. Also works with the Edge/Polygon method. Default=25.

Iterations group

The number of times to apply the tessellation. For example, setting Iterations to 2 is similar to clicking the Tessellation button twice in an editable mesh, except that you can easily back out at any time while using the Tessellate modifier. To obtain additional iterations, apply another Tessellate modifier.

Update Options group

- **Always** Tessellation updates whenever the base geometry changes.
- **When Rendering** Tessellation updates only when the object is rendered.
- **Manually** Tessellation updates only when you click Update.

Sweep Modifier

Use the Sweep modifier to extrude a cross-section along an underlying spline or NURBS curve path.

You can work with a series of pre-made cross-sections such as angles, channels and wide flanges, and can also use your own splines or NURBS curves as custom sections.

This modifier is also very useful for creating structural steel details, molding details, or in any situation where you need to extrude a section along a spline. It is similar to the Loft compound object but is more efficient.

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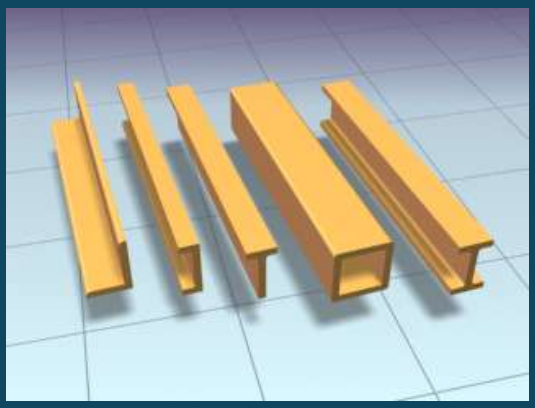
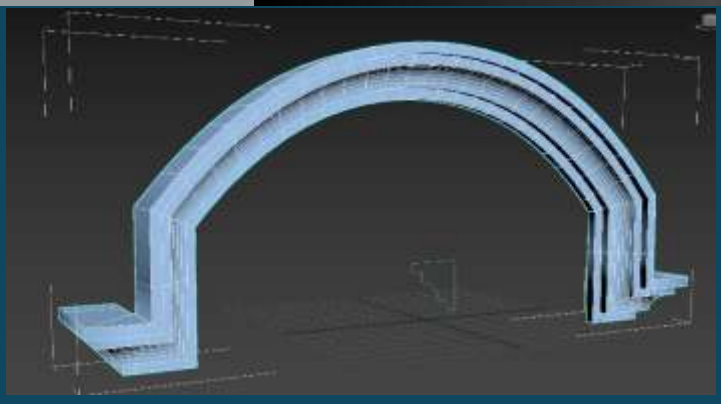
Note: The Sweep modifier is similar to the Extrude modifier in that once the Sweep is applied to a spline, the end result is a 3D mesh object. Both sections and paths can contain multiple splines or multiple NURBS curves.



Examples of extrusions created with the Sweep modifier

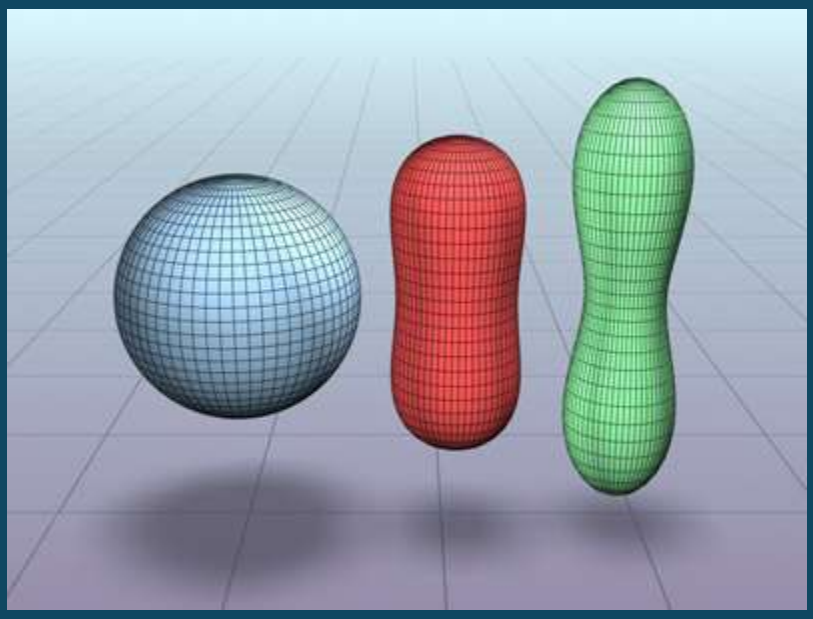
Topics in this section



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.

-  Modify panel > Make a selection. > Modifier List > Object-Space Modifiers > Squeeze
- Default menu: Make a selection. > Modifiers menu > Parametric Deformers > Squeeze
- Alt menu: Make a selection. > Modifiers menu > Geometry (Parametric) > Squeeze

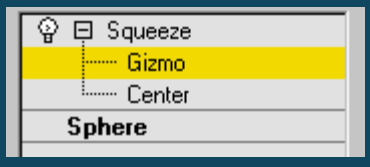


Left: Original object

Middle and Right: Varying squeeze amounts

Interface

Modifier Stack



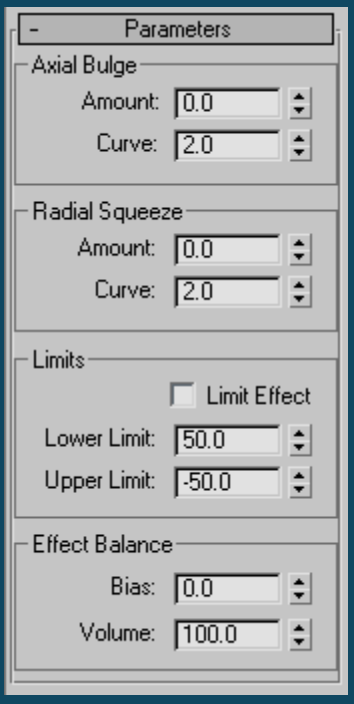
Gizmo

At this sub-object level, you can transform and animate the gizmo like any other object, altering the effect of the Squeeze modifier. Translating the gizmo translates its center an equal distance. Rotating and scaling the gizmo takes place with respect to its center.

Center

At this sub-object level, you can translate and animate the center, altering the Squeeze gizmo's shape, and thus the shape of the squeezed object.

Parameters rollout



Axial Bulge group

These controls let you apply a bulge effect along the Squeeze gizmo's local Z axis, which is aligned by default with the object's local Z axis.

Amount

Controls the magnitude of the bulging effect. Higher values effectively elongate the object and cause the ends to curve outward.

Curve

Sets the degree of curvature on the bulging ends. You can use this to control whether the bulge is smooth or pointy.

Radial Squeeze group

These controls let you apply a squeeze effect around the Squeeze gizmo's local Z axis, which is aligned by default with the object's local Z axis.

Amount

Controls the magnitude of the squeezing action. Values larger than zero tend to constrict the "waist" of the object, and values less than zero tend to bulge the waistline out, as if the object had been stepped on.

Curve

Sets the degree of curvature into the squeeze. Low values cause a sharp squeezing effect, while high values create a gradual, less pronounced squeeze.

Limits group

These controls let you limit the squeeze effect's extents along the local Z axis.

Limit Effect

Limits the extent of the squeeze effect as defined by the Lower and Upper Limit settings.

Lower Limit

Sets the limit in the positive direction along the Z axis.

Upper Limit

Sets the limit in the negative direction along the Z axis.

Effect Balance group

Bias

Changes the relative amounts of bulge and squeeze while retaining a constant object volume.

Volume

Increases or decreases the effects of both Squeeze and Bulge in parallel.