Job No: 06   **Duration:** 16H

Job Title: Apply and Edit Modifiers

Objective:

To understand that a modifier can be applied to a 2D shape to turn it into a 3D object, and that the modifier's parameters can be adjusted in the modify panel to edit the 3D object. That's only the beginning of the power of modifiers in 3ds Max.

Students should be able to understand the usage of the following:

- Apply the Bend Modifier
- Apply the Taper Modifier
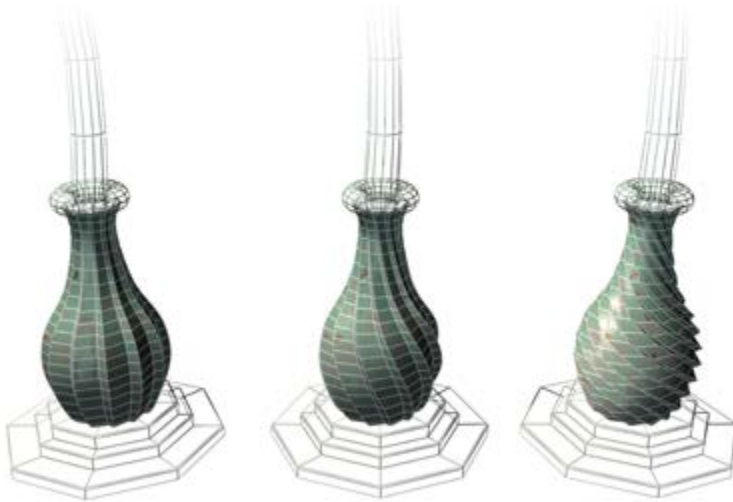- Apply the Twist Modifier
- Edit the Modifiers

Introduction:

Each modifier contains a set of parameters that operate on the case object independent of all other modifiers and the base object's own parameters. There are no technical limits on the number of modifiers and the base object's own parameters. There are no technical limits on the number of modifiers that can be applied to a single object, but the order in which modifiers are applied can greatly affect the end result.

Working with modifiers is a very dynamic editing process that provides students with the means to make experimental changes without destroying the underlying object or any effects of other modifiers.

Using the modifiers:

Modifiers provide a way for you to sculpt and edit objects. They can change the geometry of an object, and its properties.

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Example: effects of the Twist modifier on an object

The modifiers you apply to an object are stored in a stack. By navigating up and down the stack, you can change the effect of the modifier, or remove it from the object. Or you can choose to "collapse" the stack and make your changes permanent.

There are other general things to know about using modifiers:

- You can apply an unlimited number of modifiers to an object or part of an object.

- When you delete a modifier, all its changes to the object disappear.

- You can move and copy modifiers to other objects using controls in the modifier stack display.

- The order or sequence in which you add modifiers is important. Each modifier affects those that come after it. For instance, adding a Bend modifier before a Taper can give you distinctly different results than if you first added the Taper followed by the Bend.

Modifiers, as the name implies, modify an object's geometrical structure, deforming it in some way. When you apply a taper modifier to the end of a cylinder, for example, the vertices near the end move closer together. Modifiers make changes in the geometry that stay in effect until you adjust or delete the modifier.
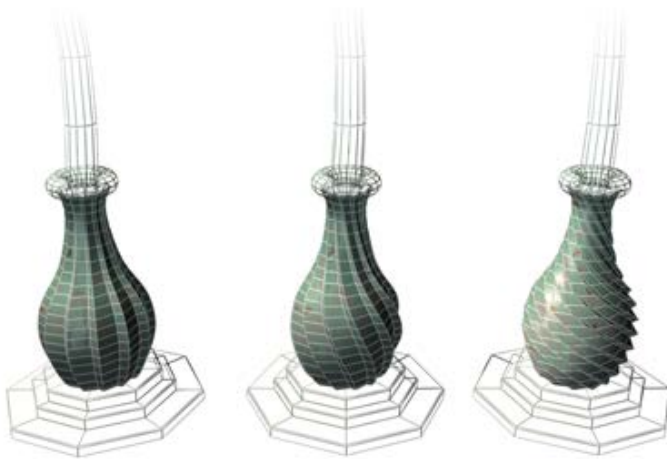
Example: effects of the twist modifier on an object

Apply the Taper Modifier:

Modify panel ➤ Make a selection. ➤ Modifier List ➤ Object-Space Modifiers ➤ Taper

Standard menu: Make a selection. ➤ Modifiers menu ➤ Parametric Deformers ➤ Taper

Enhanced menu: Make a selection. ➤ Modifiers menu ➤ Geometry (Parametric) ➤ Taper

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.
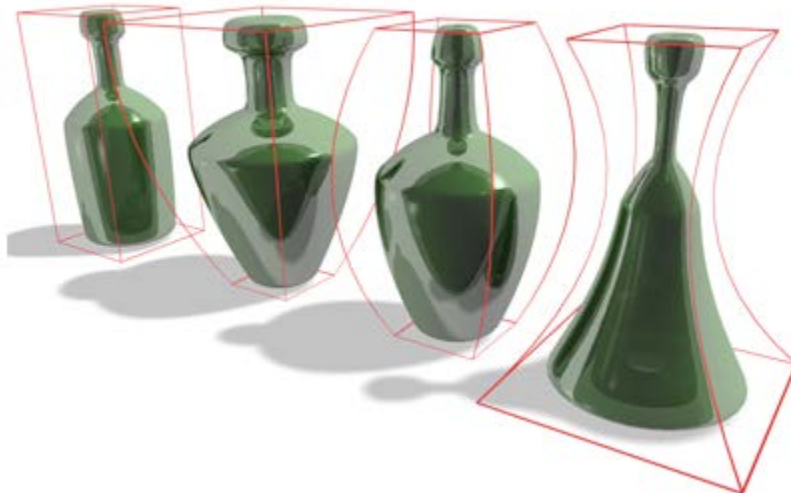
Examples of default tapers

Interface

Modifier Stack
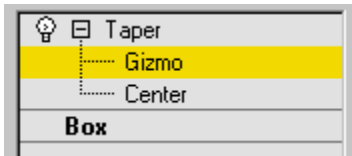
Gizmo

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.
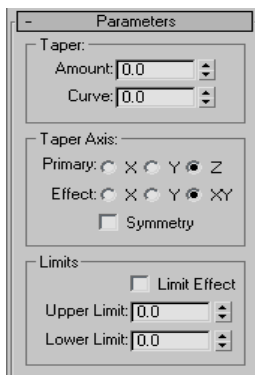
Center

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.
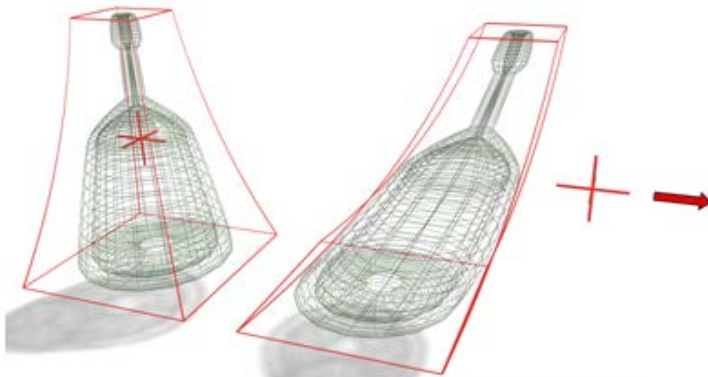
Moving the modifier's center changes the gizmo shape.

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.
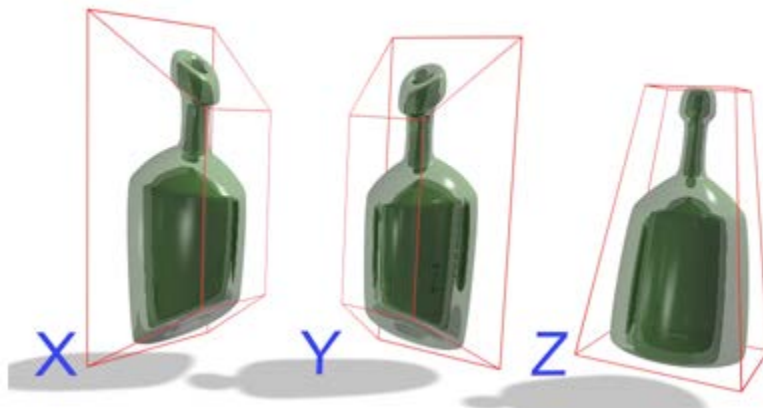
Taper Axis group

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.
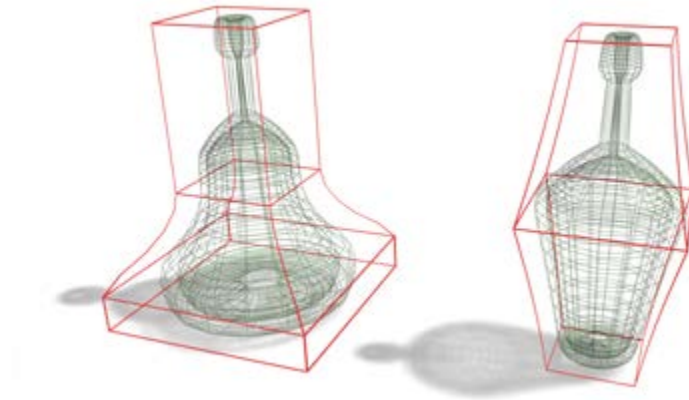
Limit Effect

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.

Apply the Twist Modifier:

Modify panel ➤ Make a selection. ➤ Modifier List ➤ Object-Space Modifiers ➤ Twist
Standard menu: Make a selection. ➤ Modifiers menu ➤ Parametric Deformers ➤ Twist

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.
NoteWhen 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.
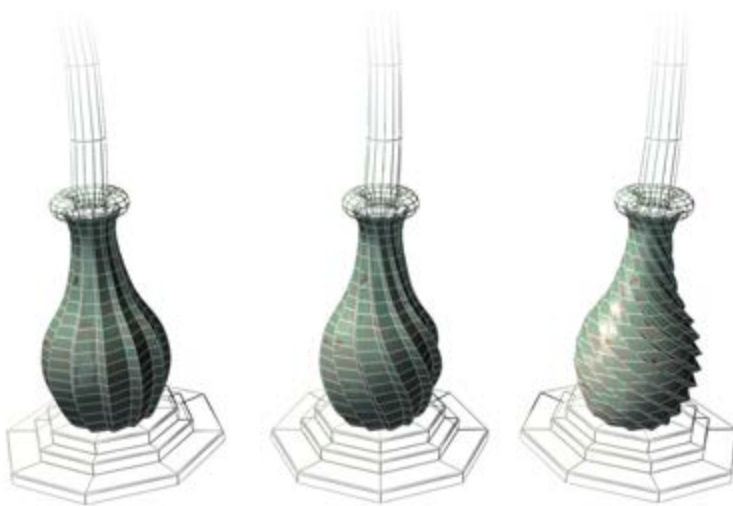
Left: Original model
Middle: A moderate twist
Right: An extreme twist

Procedures

To 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
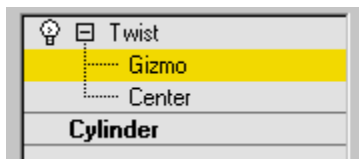
Gizmo

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.

For more information on the stack display, see Modifier Stack.

Twist Parameters rollout
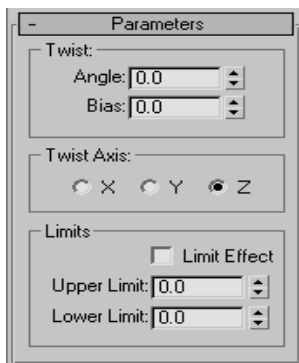
Twist group

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
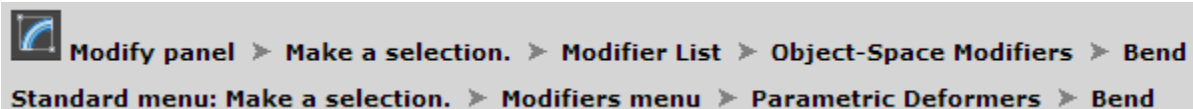
Applies limit constraints to the Twist modifier.

Upper Limit

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

Lower Limit

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

Apply the Bend Modifier:

Modify panel ➤ Make a selection. ➤ Modifier List ➤ Object-Space Modifiers ➤ Bend
Standard menu: Make a selection. ➤ Modifiers menu ➤ Parametric Deformers ➤ Bend
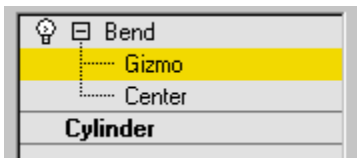
The Bend modifier lets you bend the current selection up to 360 degrees about a single axis, producing a uniform bend in an object's geometry. You can control the angle and direction of the bend on any of three axes. You can also limit the bend to a section of the geometry.

Bend applied to a streetlight model

Interface

Modifier Stack

Gizmo sub-object

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

Center sub-object

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

For more information on the stack display, see Modifier Stack.

Parameters rollout
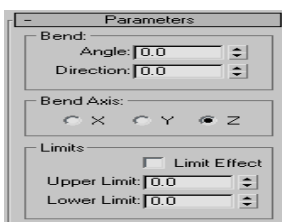
Bend group

Angle

Sets the angle to bend from the vertical plane. Range=-999,999.0 to 999,999.0.

Direction

Sets the direction of the bend relative to the horizontal plane. Range=-999,999.0 to 999,999.0.

Bend Axis group

X/Y/Z

Specifies the axis to be bent. Note that this axis is local to the Bend gizmo and not related to the selected entity. Default=Z.

Limits group

Limit Effect

Applies limit constraints to the bend effect. Default=off.

Upper Limit

Sets the upper boundary in world units from the bend center point beyond which the bend no longer affects geometry. Default=0. Range=0 to 999,999.0.

Lower Limit

Sets the lower boundary in world units from the bend center point beyond which the bend no longer affects geometry. Default=0. Range=-999,999.0 to 0.

Edit the Modifiers:

Command panels ➤ Modify panel

From the Create panel of 3ds Max, you place basic objects in your scene, including 3D geometry, 2D shapes, lights and cameras, space warps, and helpers. Each object you add has its own set of creation parameters, which define its geometry and other characteristics, depending on the type of object. Once placed in a scene, objects carry their creation parameters with them. You can change these parameters on the Modify panel.

You also use the Modify panel to assign modifiers. Modifiers are tools for reshaping an object. While they mold the final appearance of the object, modifiers do not change its underlying creation parameters.

You use the Modify panel to:

- Change the creation parameters for existing objects.

- Apply modifiers to adjust the geometry of an object or a set of objects.

- Change the parameters of modifiers and choose their components.

- Delete modifiers.

- Convert a parametric object to an editable object

Procedures

To use the Modify panel:

1. Select an object.

2. On the Command panel, click the Modify tab to display the Modify panel.

   The name of the object appears at the top of the Modify panel, and the remainder of the panel displays settings for the object or the modifier at the top of its stack.

3. You can now do any of the following:

   - Change the parameters for the object. As you change these parameters, the object updates in the viewports.

   - Apply a modifier to the object.

- Change the parameters for a modifier. As you change these parameters, the object updates in the viewports.

- Collapse the stack to create an editable surface such as an editable mesh.

To apply a modifier from the Modify panel:

1. Select an object.

2. On the Command panel, click the Modify tab to display the Modify panel. On the Modify panel, click the Modifier List to open the list of modifiers.

3. Scroll through the list to find the modifier you want. You can use any standard method:

- From the keyboard, press Up Arrow or Down Arrow to scroll one item at a time, or press Page Up or Page Down to scroll in screen-height increments, or use Home or End to jump to the top or bottom of the list. The name of the chosen modifier is highlighted, and the name appears at the top of the list.

   TipIf you know the modifier name, you can jump to its section by pressing the keyboard key corresponding to first letter of the name. To cycle through all modifiers starting with that letter, press the key repeatedly.

- With the mouse, slide the scroll bar on the right side of the list, or turn the mouse wheel.

4. Apply the modifier. If using the keyboard, press Enter to apply the highlighted modifier. If using the mouse, simply click the modifier name to apply it.