

## **Datum Target**

When you drop this shape on the page, Visio prompts you to choose the type of target you want. To change target type at any other time, right-click the shape.

The bottom half of the circle indicates the labeled datum by its reference letter and target number. The top half, for data target areas only, specifies the size of the target area. To replace existing text, double-click the shape. To position text in the bottom half of the circle, place the insertion point at the beginning of the line of text, then press Enter. To resize the circles for target and target area, drag the corresponding control handle ■.

## Datum Feature Symbols

Use this symbol to indicate the position of a datum in a drawing. Place the symbol along the edge of another shape or along an extension line from the edge. To replace existing text, select a symbol, then type. The Datum (Old) shape widens to accommodate text as you type. To create an extension line attached to the Datum (New) shape, drag a control handle ■.

## **Datum Symbol**

Use this symbol to label a datum target in a drawing. The bottom half of the circle indicates the labeled datum by its reference letter and target number. The top half, for datum target areas only, specifies the size of the target area. To replace existing text, double-click the symbol. To position text in the bottom half of the circle, place the insertion point at the beginning of the line of text, then press Enter.

## **Text Block**

Use this shape to add special symbols or text to your drawing. To replace existing text, select the shape, then type. The shape resizes with text unless you manually resize or duplicate the shape.

## **Surface Finish**

To indicate the surface smoothness of a finished part, select the shape, then type a value. Position the shape so that the vertex touches the surface to which it refers.

## **Characteristic Symbols**


Use this symbol to indicate geometry and other characteristics in a drawing. To position these symbols inside a control frame, right-click the frame and choose Insert Symbols. Drag the symbols you want into the leftmost box of the control frame, then click the close box.

To change the letter in the Material Condition symbol, select the symbol, then type the letter you want (M for MMC, S for RFS, L for LMC, and so on).

## **Feature Control Frame**

To add symbols to a control frame, right-click the frame, then choose Insert Symbols. You may need to tile the windows so that the stencil remains visible. Drag the symbols you want onto the frame in the group window, then click the close box.

## Callout

Use to add textual notes to a drawing or to point to features that notations refer to. To connect a callout to another shape, glue the callout's endpoint to a connection point  on the shape. To add text, select the callout, then type. To change the callout's bend, select the callout, then drag the control handle

 .



## **Dimensioning Symbols**

Use to indicate special features or machining operations. To add text or replace existing text, select a shape, then type.


## **Basic Weld Symbol**


Use this shape with an arrow shape to specify welding joint types. To specify a joint type, right-click an arrow shape, choose Insert Symbols, then drag a welding symbol into the Arrow window. Glue weld symbols to the guides in the window so that symbols remain properly located if the arrow is resized.

## Arrow


Arrow shapes combine a reference line and arrow into one shape. To change the length of the reference line, drag a side selection handle. To indicate the weld type, right-click an arrow shape, choose Insert Symbols, then drag the desired symbols into the Arrow window. You may need to tile the windows so that the stencil remains visible.

To show or hide an arrow's tail or the weld all-around symbol, right-click the shape.

Control handles provide other shape actions. To see what a control handle  on a selected shape does, pause the pointer over the handle.

To connect an arrow to other shapes, glue the arrowhead's connection point  to a guide point or a joint's connection point.

## **Additional Arrow**

Use this shape to add an additional arrowhead to an Arrow or Arrow With Bend shape. To connect the Additional Arrow shape, glue its tail endpoint  on an arrow shape.

## **Text Block**

The shape includes three special symbols pre-typed for your convenience. To delete one or more symbols, double-click the shape, then select the symbols you want to delete. To replace existing text, select the shape, then type. The shape resizes with text unless you manually resize or duplicate the shape.

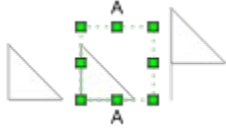
To group the notes with an arrow, right-click the arrow, choose Insert Symbols, then drag the Text Block shape into the Arrow window.

## **Contour Symbol**

Use this shape to specify the contour of a finished weld. Place contour symbols over other weld symbols. To change the contour type, right-click the shape, then select Choose Contour Type.

## Combination Weld Symbol

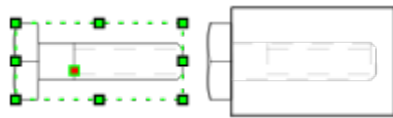
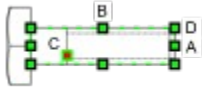
Use this shape with arrow shapes to specify welding joint types. To specify a joint type, right-click an arrow shape, choose Insert Symbols, then drag a welding symbol into the Arrow window. Glue weld symbols to the guides in the window so that symbols remain properly located if the arrow is resized.



A Drag to increase the height of some symbols so that other weld symbols fit beneath or beside them. Displays an extension line that grounds the symbols to the arrow reference line.

## Bolt Side Views

When you drop the shape on the page, Visio prompts you for the thread diameter, shaft length, and thread length. To set the dimensions at any other time, right-click the shape. To unlock the selection handles and resize the shape manually, right-click the shape. Hidden detail on some bolt side views is indicated by dashed lines. To hide the hidden detail, right-click the shape. To illustrate the stem inside a piece of material, subselect the stem, then apply the Hidden Thread style from the Line style list on the Shape toolbar.



- A Drag to resize the screw length.
- B Drag to resize the thread diameter.
- C Drag to resize the threaded section of the screw.
- D Drag to resize the shape proportionally.



## **Nut Top Views**

The size of the dashed green line corresponds to the size of the bolt that fits the nut.

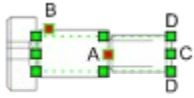
To specify a standard metric size or enter nut dimensions, right-click the shape.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**. To resize proportionally, drag any selection handle.

## Shoulder Fasteners

To specify a standard metric size or enter fastener dimensions, right-click the shape.

To hide the details represented by the dashed black lines on the Hex Shoulder, right-click the shape, then choose Hide Hidden Details. To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles.

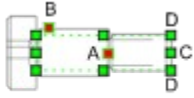


- A Drag to change the length of the threaded portion.
- B Drag to change the diameter of the shoulder portion.
- C Drag to change shape length.
- D Drag to resize shape proportionally.

## Shoulder Fasteners

When you drop the shape on the page, Visio prompts you for the diameter, shoulder diameter, length, and threaded length. To set the dimensions at any other time, right-click the shape.

To hide the details represented by the dashed black lines on the Hex Shoulder, right-click the shape, then choose Hide Hidden Details. To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles.



- A Drag to change the length of the threaded portion.
- B Drag to change the diameter of the shoulder portion.
- C Drag to change shape length.
- D Drag to resize shape proportionally.

## **Bolt and Screw Top Views**

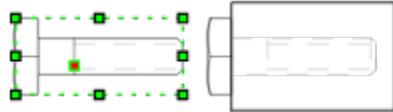
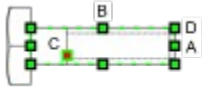
When you drop the shape on the page, Visio prompts you for the diameter. To set the diameter at any other time, right-click the shape. Dashed circles represent the major and minor thread diameters of the fastener stems. The size of the dashed green line corresponds to the dashed circle representing the major thread diameter. To hide the dashed circles, right-click the shape, then choose Hide Hidden Detail. To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To resize proportionally, drag any selection handle.

## **Nut Side Views**

When you drop the shape on the page, Visio prompts you for the diameter and thickness. To set the dimensions at any other time, right-click the shape. To unlock the selection handles and resize the shape manually, right-click the shape. Hidden detail on some nut side views is indicated by dashed lines. To hide the hidden detail, right-click the shape.

## Bolt Side Views

To specify a standard metric size or enter bolt dimensions, right-click the shape and choose Set Dimensions. To unlock selection handles for resizing, right-click the shape, then choose Resize With Handles. To illustrate the stem inside a piece of material, subselect the stem, then apply the Hidden Threads style from the Line style list.



- A Drag to resize the screw length.
- B Drag to resize the thread diameter.
- C Drag to resize the threaded section of the screw.
- D Drag to resize the shape proportionally.

## **Nut Side Views**

To specify a standard metric size or enter nut dimensions, right-click the shape.

Hidden detail on nut side views is indicated by dashed lines. To hide the hidden detail, right-click the shape.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**. To resize proportionally, drag any selection handle.

## **Nut Top Views**

When you drop the shape on the page, Visio prompts you for the diameter. To set the diameter at any other time, right-click the shape. The size of the dashed green line corresponds to the size of the bolt that fits the nut. To unlock the selection handles and resize the shape manually, right-click the shape. To resize proportionally, drag any selection handle.



## **Bolt and Screw Top Views**

Dashed circles represent the major and minor thread diameters of the fastener stems. The size of the dashed green line corresponds to the dashed circle representing the major thread diameter. To hide the dashed circles, right-click the shape, then choose Hide Hidden Detail.


To choose a standard metric size or enter fastener dimensions, right-click the shape.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To resize proportionally, drag any selection handle.

## **Taper Pin**

To choose a standard metric size or enter taper pin dimensions, right-click the shape. To set the tapering factor, right-click the shape, then choose Set Taper.

To hide the details represented by the dashed black lines, right-click the shape, then choose Hide Hidden Detail.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To resize the center portion, drag the control handle . To resize the taper pin, drag a selection handle.

## **Screw Top Views**

Dashed circles represent the thread diameters of the fastener stems. To hide the dashed circles, right-click the shape, then choose Hide Hidden Detail.

To choose a standard metric size or enter screw dimensions, right-click the shape.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To resize proportionally, drag any selection handle.

## **Rivet Symbols**

Radial lines indicate information about the rivets and the riveting operation. Single, double, triple, or crossed lines indicate rivet type. The line location indicates which side of the joint will be riveted. To change line location, right-click the shape, then choose the appropriate command.

## **Set Screws**

To specify a standard metric size or enter screw dimensions, right-click the shape. To change point type, right-click the shape, then choose Set Point.

To hide screw details represented by dashed black lines, right-click the shape, then choose Hide Hidden Detail.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To change the shape's length or width, drag side selection handles. To resize proportionally, drag a corner selection handle.

## **Set Screws**

When you drop the shape on the page, Visio prompts you for the diameter and length. To set the dimensions at any other time, right-click the shape. To change the point type, right-click the shape, then choose Set Point.

To hide screw details represented by dashed black lines, right-click the shape, then choose Hide Hidden Detail.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To change the shape's length or width, drag side selection handles. To resize proportionally, drag a corner selection handle.

## **Screw Top Views**

When you drop the shape on the page, Visio prompts you for the diameter. To set the diameter at any other time, right-click the shape. Dashed circles represent the thread diameters of the fastener stems. To hide the dashed circles, right-click the shape, then choose Hide Hidden Detail. To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To resize proportionally, drag any selection handle.

## **Ball Plunger**

When you drop the shape on the page, Visio prompts you for the thread diameter, shaft length, and plunger length. To set the dimensions at any other time, right-click the shape. To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**. To resize, drag any selection handle. To change the extent by which the ball/rod protrudes from the stem, drag the control handle ■.



## **Ball Plunger**


To choose a standard metric size or enter ball plunger dimensions, right-click the shape.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**. To resize, drag any selection handle. To change the extent to which the ball/rod protrudes from the stem, drag the control handle ■.

## **Stud**


When you drop the shape on the page, Visio prompts you for the thread diameter, stud length, and hidden length. To set the dimensions at any other time, right-click the shape.

To hide the details represented by the dashed black lines, right-click the shape, then choose Hide Hidden Detail.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To resize the center portion, drag the control handle . To resize the stud, drag a selection handle.

## Washer

Position between nut and bolt shapes. When you drop the shape on the page, Visio prompts you for outside and inside diameter. To set the dimensions at any other time, right-click the shape. Dashed lines on some washers represent the size of the hole. To hide the dashed lines, right-click the shape, then choose Hide Hidden Detail.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To resize the washer, drag the control handle .

## **Rivet**

To specify a standard metric size or enter rivet dimensions, right-click the shape.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**. To change rivet length or width, drag a side selection handle. To resize a rivet proportionally, drag a corner selection handle.

To create a whole rivet, position two rivet shapes end to end, then group the shapes. To illustrate the part of the rivet inside a piece of material, subselect the part, then apply the **Hidden Thread** style from the **Line** style list on the **Shape** toolbar.

## **Stud**


To choose a standard metric size or enter stud dimensions, right-click the shape.

To hide the details represented by the dashed black lines, right-click the shape, then choose Hide Hidden Detail.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To resize the center portion, drag the control handle ■. To change stud size, drag a selection handle.

## Washers

Position between nut and bolt shapes. To choose a standard metric size or enter washer dimensions, right-click the shape. Dashed lines on some washers represent the size of the hole. To hide the dashed lines, right-click the shape, then choose Hide Hidden Detail.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To resize the washer, drag the control handle .

## **Rivet**

When you drop the shape on the page, Visio prompts you for the diameter and length. To set the dimensions at any other time, right-click the shape. To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**. To change rivet length or width, drag a side selection handle. To resize a rivet proportionally, drag a corner selection handle.

To create a whole rivet, position two rivet shapes end to end, then group the shapes. To illustrate the part of the rivet inside a piece of material, subselect the part, then apply the **Hidden Thread** style from the **Line** style list on the **Shape** toolbar.

## **Taper Pin**


When you drop the shape on the page, Visio prompts you for the thread diameter, stud length, and hidden length. To change the dimensions at any other time, right-click the shape. To set the tapering factor, right-click the shape, then choose Set Taper.

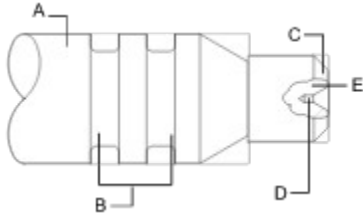
To hide the details represented by the dashed black lines, right-click the shape, then choose Hide Hidden Detail.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose Resize With Handles. To resize the center portion, drag the control handle ■. To resize the taper pin, drag a selection handle.



## Undercut

Position this shape on a shaft to show an undercut. Glue this shape's endpoints to connection points  or selection handles on the shaft. To change the fillet radius, right-click the shape, choose Set Fillet Radius, then type a radius amount. To change undercut width, drag the selection handle. To change undercut length, drag an endpoint.



- A Spindle End
- B Undercut
- C Chamfer
- D Centring Bore
- E Cutaway

## **Round Key**

To set key dimensions, right-click the shape. To resize the shape with handles, right-click the shape, then choose **Resize With Handles**. To change key length or width, drag a side selection handle. To resize proportionally, drag a corner selection handle.

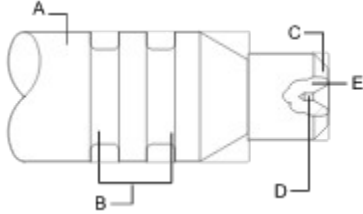
## **Tapered Key**

To set key dimensions or to change the amount the key tapers, right-click the shape. To remove or add the gib head, right-click the shape.

To resize the shape with handles, right-click the shape, then choose **Resize With Handles**. To change key length or width, drag a side selection handle. To resize proportionally, drag a corner selection handle.

## Centering Bore

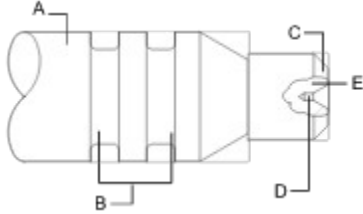
Position this shape at the end of a shaft to show a centering bore hole. Glue the endpoints on this shape to connection points ☒ or selection handles on other shapes. To deepen the bore, drag the selection handle. To widen it, drag an endpoint.



- A Spindle End
- B Undercut
- C Chamfer
- D Centring Bore
- E Cutaway

## Spindle End

Position this shape at the end of a shaft to show a spindle end. Glue this shape's endpoints to connection points ☒ or selection handles on the shaft. To indicate a hollow shaft, right-click the spindle end, then choose Show Bore. To widen the spindle end, drag the selection handle. To lengthen it, drag an endpoint.



- A Spindle End
- B Undercut
- C Chamfer
- D Centring Bore
- E Cutaway

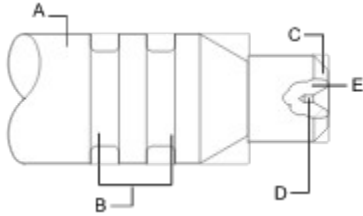
## **Tapered Shaft**

To set shaft dimensions or to change the amount the shaft tapers, right-click the shape.

To resize the shape with handles, right-click the shape, then choose **Resize With Handles**. To change shaft length or width, drag a side selection handle. To resize proportionally, drag a corner selection handle.

## Chamfer

Position this shape at the end of a shaft to show a chamfer. Glue the endpoints on this shape to connection points ■ or selection handles on the shaft. To set the chamfer angle, right-click the shape. To make the chamfer the appropriate shape for placing over a drilled hole, right-click the shape, then choose Hole Chamfer.



- A Spindle End
- B Undercut
- C Chamfer
- D Centring Bore
- E Cutaway

## Helical Spring

To set spring properties, such as number of coils and wire diameter, right-click the shape. To set ending types for the beginning and end of the spring, right-click the shape, then choose Set Finish Types. To use the Helical Spring with a Spring Hook, set the ending type to Open.

To resize the shape with handles, right-click the shape, then choose Resize With Handles. To change spring length or width, drag a side selection handle. To resize proportionally, drag a corner selection handle. To change the second diameter of the spring, drag the control handle ■.

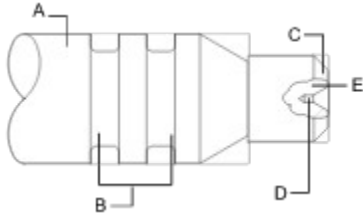


## Keyway

To resize the shape proportionally, drag a selection handle. To change the dimensions of the keyway itself, drag the control handle ■ at the corner.

## Centering Bore

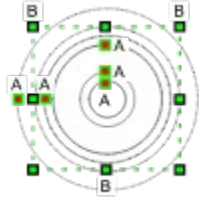
Position this shape at the end of a shaft to show a centering bore hole. Glue the endpoints on this shape to connection points ■ or selection handles on other shapes. To deepen the bore, drag the selection handle. To widen it, drag an endpoint. To change the angle of the bore hole, right-click the shape and choose Set Bore Angle.



- A Spindle End
- B Undercut
- C Chamfer
- D Centering Bore
- E Cutaway

## Gear

The dashed lines represent the outside, root, and pitch circles of a gear. Solid lines represent the web and hub circles. The selection rectangle corresponds to the pitch circle, that is, the imaginary circle along which two gears mesh. Join gear shapes in a drawing by aligning their pitch circles.



- A Drag to resize each circle. Drag to the center to hide a circle.
- B Drag to resize the gear without affecting the distance between the outside, root, and pitch circles.

## **Gear**

To resize the gear proportionally, drag a selection handle. The dashed circle represents the pitch circle diameter and resizes when you resize the gear. To resize the outer diameter of the gear separately from the pitch circle, drag the control handle ■ on the outer diameter. The central circles represent the web and hub. To resize a circle, drag its control handle.

## **Through Hole**

When you drop the shape on the page, Visio prompts you for the diameter and length. To set the dimensions at any other time, right-click the shape. The thin outer line represents the major thread diameter.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**. To resize proportionally, drag a corner selection handle. To change shape length or width, drag a side selection handle.

## **Through Hole**

The outer (thin) line represents the major thread diameter. To specify a standard metric size or type through-hole dimensions, right-click the shape.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**. To resize proportionally, drag a corner selection handle. To change shape length or width, drag a side selection handle.

## **Threaded Hole 2**

When you drop the shape on the page, Visio prompts you for the thread diameter, hole length, and thread length. To set the dimensions at any other time, right-click the shape.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**.

## **Hole**

The inner solid line represents a drilled hole. The thin broken line represents the major diameter of the threads tapped into the hole. The outer solid line on the Countersunk Hole represents the start of the countersunk bevel.


When you drop the shape on the page, Visio prompts you for the diameter. To set the dimensions at any other time, right-click the shape.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**. To resize proportionally, drag any selection handle.



## Threaded Hole 2

To specify a standard metric size or set threaded-hole dimensions, right-click the shape.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**. To change the depth of the threaded section, drag the control handle .

## Hole

The inner solid line represents a drilled hole. The thin broken line represents the major diameter of the threads tapped into the hole. The outer solid line on the Countersunk Hole represents the start of the countersunk bevel.

To specify a standard metric size or set hole dimensions, right-click the shape.

To unlock the selection handles and resize the shape manually, right-click the shape, then choose **Resize With Handles**. To resize proportionally, drag any selection handle.

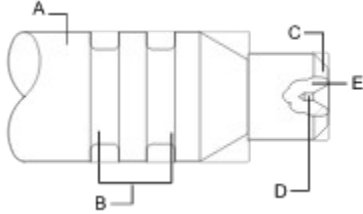
## **Bearings**

When you drop this shape on the page, Visio prompts you to set the bearing dimensions you want. To change dimensions at any other time, right-click the shape, then choose **Resize With Handles**. To resize the shaded area, drag the control handle ■. To resize the bore, drag the selection handle adjacent to the shaded area.

## Cutaway


Position this shape on a drawing to show a cutaway portion for revealing some detail. Glue cutaway endpoints to connection points ■ or selection points on the other shape.

To change cutaway length, drag an endpoint. To change the cutaway's shape, drag a control handle ■.



- A Spindle End
- B Undercut
- C Chamfer
- D Centring Bore
- E Cutaway

## Spring Hook

Glue the endpoint on the spring hook to a connection point  on the end of a helical spring. (Set the helical spring ending type to Open). To set wire diameter, right-click the shape.

## **Mechanical Parts Master Shape**

Creates a part from the Mechanical Parts Library. For more information, click Help in the Mechanical Parts Library Hardware Editor.

When you drop this shape, the Mechanical Parts Library Hardware Editor opens and prompts you to set custom properties (standard, dimensions, length, type, perspective, or thread style). To change settings at any other time, right-click the shape, then choose Change Dimensions > Settings > Standard or View or Thread Details, or choose Change Dimensions and click the Size, Length, or Type list.

To quickly copy a shape, select it, then Ctrl+drag the shape to a new location.

## **Mechanical Parts Master Shape**

Creates a part from the Mechanical Parts Library. For more information, click Help in the Mechanical Parts Library Hardware Editor.

When you drop this shape, the Mechanical Parts Library Hardware Editor opens and prompts you to set custom properties (standard, dimensions, length, type, perspective, or thread style). To change settings at any other time, right-click the shape, then choose Change Dimensions > Settings > Standard or View or Thread Details, or choose Change Dimensions and click the Size, Length, or Type list.

To quickly copy a shape, select it, then Ctrl+drag the shape to a new location.

## **Mechanical Parts Master Shape**

Creates a part from the Mechanical Parts Library. For more information, click Help in the Mechanical Parts Library Hardware Editor.

When you drop this shape, the Mechanical Parts Library Hardware Editor opens and prompts you to set custom properties (standard, dimensions, length, type, perspective, or thread style). To change settings at any other time, right-click the shape, then choose Change Dimensions > Settings > Standard or View or Thread Details, or choose Change Dimensions and click the Size, Length, or Type list.

To quickly copy a shape, select it, then Ctrl+drag the shape to a new location.



## **Mechanical Parts Master Shape**

Creates a part from the Mechanical Parts Library. For more information, click Help in the Mechanical Parts Library Hardware Editor.

When you drop this shape, the Mechanical Parts Library Hardware Editor opens and prompts you to set custom properties (standard, dimensions, length, type, perspective, or thread style). To change settings at any other time, right-click the shape, then choose Change Dimensions > Settings > Standard or View or Thread Details, or choose Change Dimensions and click the Size, Length, or Type list.

To quickly copy a shape, select it, then Ctrl+drag the shape to a new location.

## **Mechanical Parts Master Shape**

Creates a part from the Mechanical Parts Library. For more information, click Help in the Mechanical Parts Library Hardware Editor.

When you drop this shape, the Mechanical Parts Library Hardware Editor opens and prompts you to set custom properties (standard, dimensions, length, type, perspective, or thread style). To change settings at any other time, right-click the shape, then choose Change Dimensions > Settings > Standard or View or Thread Details, or choose Change Dimensions and click the Size, Length, or Type list.

To quickly copy a shape, select it, then Ctrl+drag the shape to a new location.



