SmartSketch
Symbol Creation Workshop

Process, Power & Marine

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SmartSketch Symbol Creation

The Symbol Authoring Tools Add-In provides access to the Symbol Authoring Tools toolbar. These advanced tools allow users to define special features and behaviors for symbols. In this workshop we will cover how to modify default symbol behaviors as well as how to create different types of symbols, such as text-driven symbols, multi-representations, parametrics, lookup tables, and SmartLabels.

- Basic Symbol Creation – Taking the Defaults
- Different Types of Symbols
- Symbol Authoring Tools – Adding Symbol Intelligence
- Modifying Symbol Behaviors
- Multi-Representation Symbols
- Text-Driven Symbols
- Parametric Symbols
- Parametric Text-Driven Symbols
- Lookup Table Symbols
- SmartLabels

Basic Symbol Creation – Taking the Defaults

A SmartSketch symbol, like a group, is simply a container for graphic objects that can be used over and over again. The difference between symbols and groups is that symbols can be saved to disk and used in many different files and they provide a way to easily scale, rotate and mirror the contained graphics. You can build libraries of symbols and quickly create drawings using them.

Symbols reduce repetitive drawing and encourage standardization. They save time by eliminating the need to re-create information, as well as help maintain accurate graphical data throughout a project.

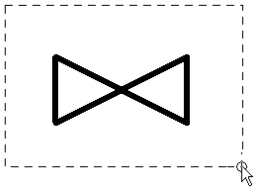
Default Symbol Behaviors

- 90° step rotation angle. Press the **left** and **right** arrow keys on the keyboard to rotate a symbol 90° while placing.
- One drag point at the origin point that is defined when a symbol is created.
- Scale, mirror, and rotate handles that display when a symbol is selected.
- Symbols drop as symbols.
- Symbols **do not** automatically align or lock to other objects when placed.

Steps to create a symbol

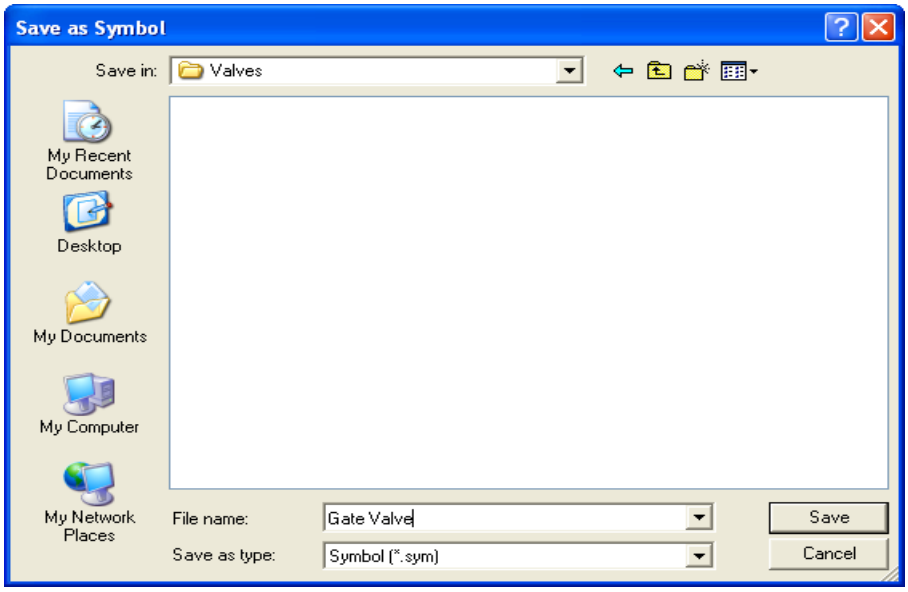
To create a symbol, select the desired geometry and click the **Create Symbol** icon on the **Draw** toolbar.

1. Using the **Select Tool**  , select the elements that the symbol is to be made from.



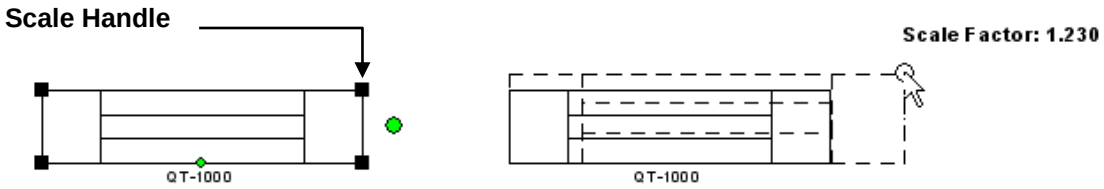
2. On the **Draw** toolbar, click the **Create Symbol**  icon.
3. Click a point on the drawing sheet to define the origin of the symbol.

4. In the **Save as Symbol** dialog box, select the directory where you want to save the symbol.
5. Type the symbol name. The software saves the document with a .sym extension. Click the **Save** button.



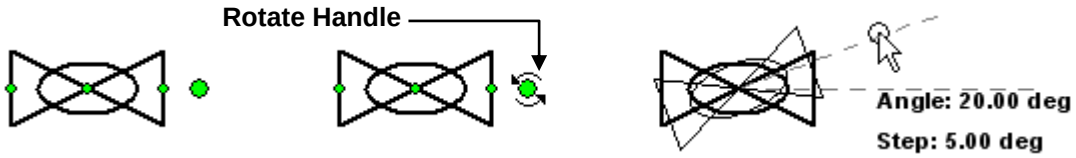
Scale Handles

Black solid boxes on the outside corners of the range box represent scale handles. You can drag a scale handle to resize the entire symbol uniformly in the X and Y directions.



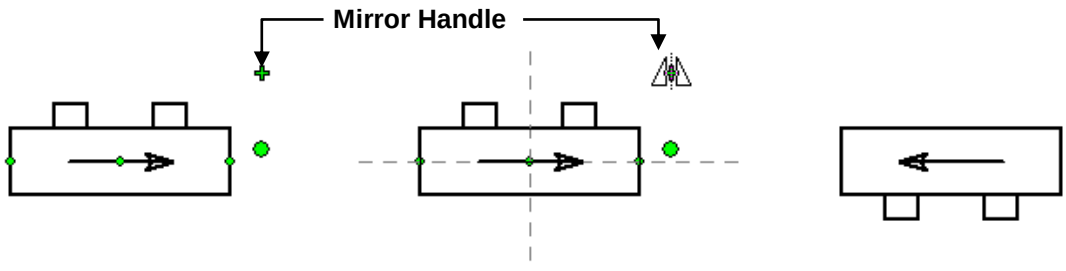
Rotate Handle

A large green circle represents a rotate handle. You can drag this handle to rotate the entire symbol. Specific increments are displayed while you rotate the symbol.



Mirror Handle

A green plus sign represents a mirror handle. You can drag the mirror handle across either the vertical or horizontal mirror line to mirror the symbol.



Types of Symbols

In addition to being a simple collection of graphical objects, SmartSketch allows you to add behaviors to symbols, so that they can become smarter than a simple collection of graphics. For example, you can set a property that tells the symbol to automatically align itself to an object that it is dragged onto, or you can have SmartSketch recognize the layers within the symbol that individual graphics are located on and use the Display Manager to control what elements within a symbol are displayed in your drawing. You can have the symbol drop itself to a group or to discrete objects when it is placed in a drawing. These behaviors are set using the Symbol Authoring Tools – Symbol Properties command.

Multiple Representation (Multi-Rep) Symbols

A multi-rep symbol is a symbol that has multiple representations. You can easily change which representation is displayed via the right mouse click menu in SmartSketch.

Traffic Light.sym, located in the *...\SmartSketch\Symbols\Diagramming\Directional Map* directory, is an example of a multi-rep symbol.

Text-Driven Symbols

A text-driven symbol is a symbol that automatically resizes to fit the text that is entered in the associated text box.

Auto-Size Box.sym, located in the *...\SmartSketch\Symbols\Diagramming\Flowchart* directory, is an example of a parametric text-driven symbol.

Parametric Symbols

A parametric symbol is a symbol that exposes dimensions that are used to drive the symbol drawing objects via parameters. This functionality allows you to create symbols that can reconfigure themselves based on user input.

2to1Parametric Tower.sym, located in the *...\SmartSketch\Symbols\Process\P&ID (Intergraph)\Equipment\Vessels\Towers* directory, is an example of a parametric symbol.

Lookup Table Symbols

Lookup table symbols are closely related to parametric symbols. A lookup table symbol allows you to define a parametric symbol and then 'hook up' the parameters of the symbol to a data source, such as an Excel spreadsheet. The user can then select a key for the symbol and the symbol reconfigures itself based on the settings in the data source.

All of the symbols located in the *...\SmartSketch\Symbols\AEC\Structural\Steel Sections* directory, with the exception of *Break Line.sym*, are examples of lookup table symbols.

SmartSymbols

A SmartSymbol is a symbol that can watch another graphical object and when the object that it is watching is modified, the SmartSymbol is also modified. For example, if you create a ball valve and set the Glue to Target property, the ball valve becomes a SmartSymbol. If the ball valve is placed on a pipe, and the pipe is subsequently moved, the ball valve will move with it.

Labels

A label is also a SmartSymbol, except instead of displaying only graphical objects, the label displays text as well. If you place a label on a pipe, just like the ball valve SmartSymbol, the label will maintain its relative position to the pipe if the pipe is moved. The user can enter text in the label just as if it were a textbox. Also, in addition to watching a graphical object, a label containing SmartText can watch an attribute value on the graphical object that it is placed on.

Planning a Symbol

After you have determined the need for a symbol, you need to decide how you want the symbol to behave. The goal is to create a symbol that performs as required for its specific function.

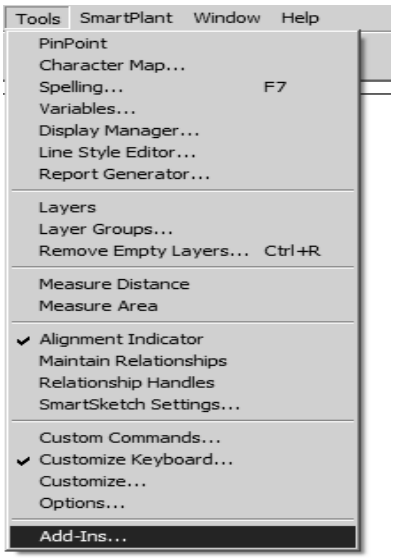
Checklist for Consideration

- Scale - When planning your symbol, the first item to consider is what template you want to use with the symbol. The scale of the template affects how the symbol looks when it is dragged into the document from the **Symbol Explorer**.
- Symbol Manipulation - The second item you should consider is what happens when you manipulate the symbol. Should the symbol resize, mirror, or rotate freely? Or should it be restricted from doing these operations? Do you want the symbol to move with an element? You can set different options on the **Symbol Properties** dialog box to define symbol behaviors. You can also create special points on a symbol to determine how the symbol attaches to connectors, other symbols, or elements in a document.
- Symbol Text - The next item for you to decide is what happens when you add/modify text in a symbol. You should consider the position and appearance of labels and text boxes. A SmartLabel can be associated with attributes that you define. You can also define symbols that resize as a user adds/modifies text in the symbol.
- Symbol Intelligence - How smart should you make the symbol? You can create symbols that have SmartText and parametric attributes, also called parameters. You can create SmartText attributes by clicking the **Edit SmartText** icon on the **Symbol Authoring Tools** toolbar. You can create parametric attributes by adding driving dimensions to the symbol graphics and then adding the dimensions to the **Parameters** tab on the **Symbol Properties** dialog box.
- Custom Actions - Do you want users to access special programs when they drag and drop a symbol? You can set options for these and more on the **Symbol Properties** dialog box.
- Multi-Representation Symbols - Do you want users to choose from a list of representations for the same symbol? You can accomplish this by clicking the **Symbol Representation** icon on the **Symbol Authoring Tools** toolbar.

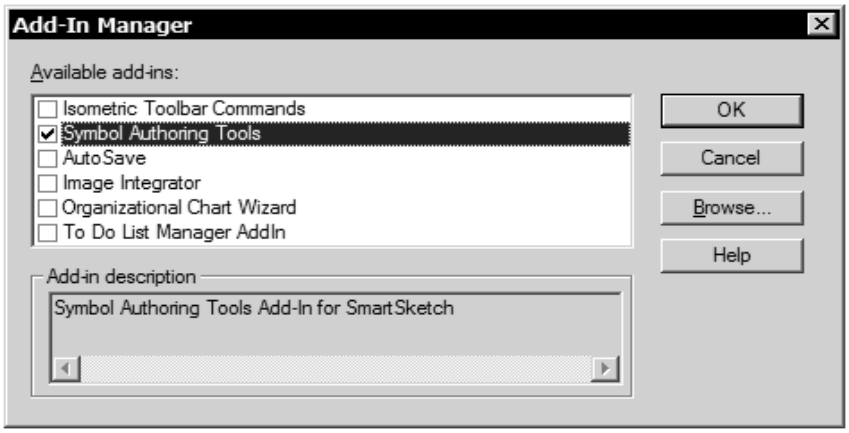
Symbol Authoring Tools – Adding Symbol Intelligence

Access the **Symbol Authoring Tools** via the **Add-In Manager (Tools > Add-Ins)**.

1. Select **Tools** > **Add-Ins**.



2. Select the **Symbol Authoring Tools** checkbox.



3. Click **OK** to complete the selection.

The **Symbol Authoring Tools** toolbar has now been added to SmartSketch and can only be accessed when a symbol file is open. In most cases, the **Symbol Authoring Tools** toolbar will automatically display when a symbol file is opened. If it does not display, it can be opened like any other toolbar.

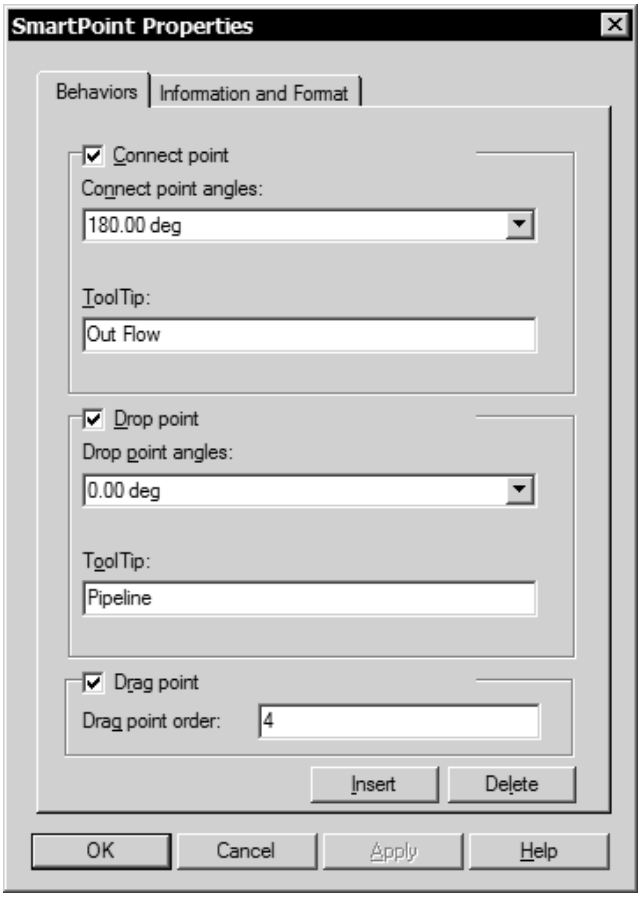
SmartPoint Properties

SmartPoints are points that can be placed on a symbol to define any, or all, of the following: connect points, drop points, and drag points.

Connect Points are points at which a connector attaches to a symbol. You can place connect points in free space or on an element.

Drop Points designate predetermined points to connect a symbol with another symbol.

Drag Points are the points to which the mouse cursor attaches for dragging a symbol. If no drag points are specified, the symbol origin is used as the drag point.



Connect Point

When activated in the **SmartPoint Properties** dialog box, this option allows users to place or edit connect points on a symbol.

Connect point angles

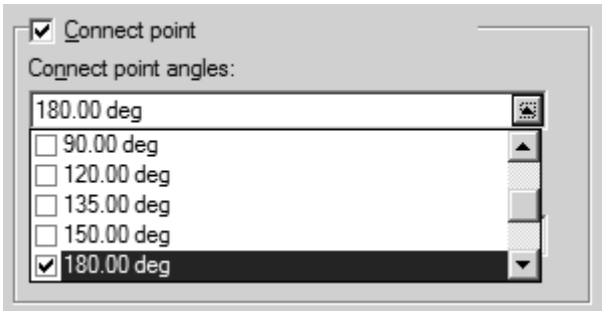
Used to determine the angles at which a connector should attach to the SmartPoint.

ToolTip

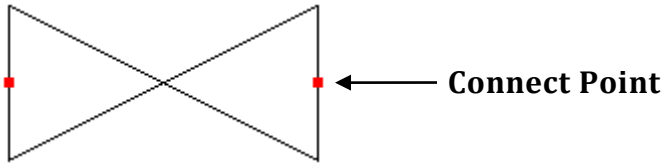
Used to specify the text that will display when a connector locates the SmartPoint on the symbol.

Create a SmartPoint with Connect Point attributes

1. Open a symbol document by double-clicking the symbol in the **Symbol Explorer**.
2. On the **Symbol Authoring Tools** toolbar, click  **SmartPoint Properties**.
3. Toggle on the **Connect point** check box.
4. In the **Connect point angles** drop-down list, select the angle(s) at which the connector should attach to the SmartPoint. An angle can also be specified by typing a value in the key-in field.

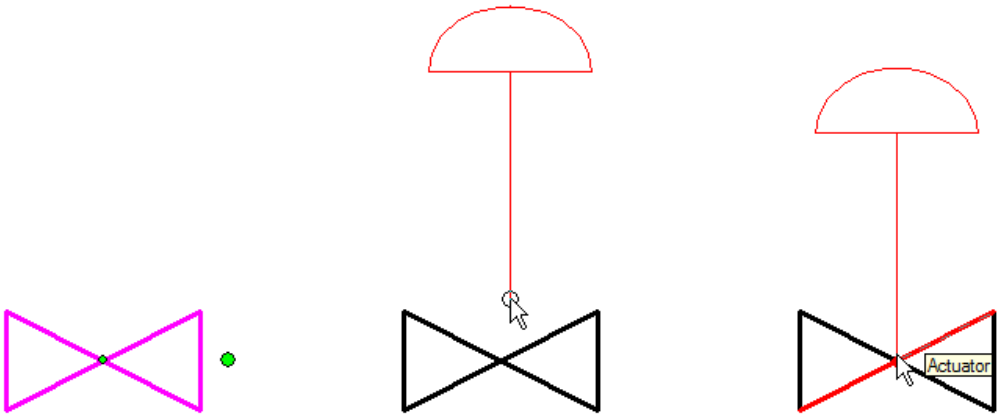


5. In the **ToolTip** box, enter the text you want for the ToolTip that displays when attaching a connector to the SmartPoint.
6. Click the **Insert** button and place the SmartPoint on the symbol at the desired location.
7. Continue placing connect points and then click the **Apply** button when done.



Drop Point

This option allows users to place or edit drop points on a symbol.

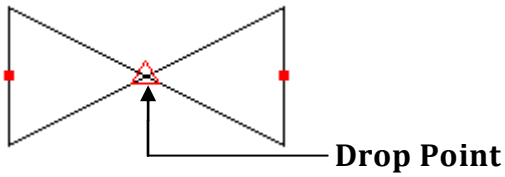


Note: When you drag a symbol over another symbol that contains a drop point, the ToolTip displays when you exactly align the drag point with the drop point.

Drop point angles

Used to determine the angles at which another symbol should attach to the drop point.

When the **SmartPoint Properties** dialog box is open, existing drop points appear as triangles.



ToolTip

Used to specify the ToolTip that appears on the drop point of a symbol when another symbol is dragged over it. The ToolTip is useful for quickly displaying information that you want a user to know about when attaching other symbols to the symbol.

Create a SmartPoint with Drop Point attributes

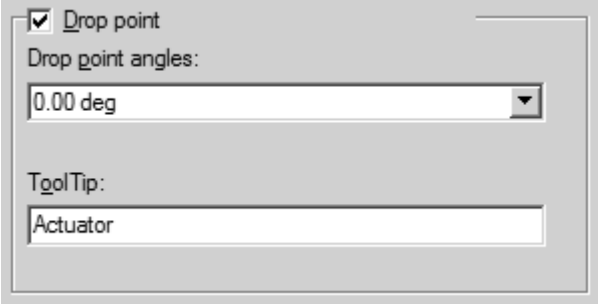
1. Open a symbol document by double-clicking the symbol in the **Symbol Explorer**.

2. On the **Symbol Authoring Tools** toolbar, click  **SmartPoint Properties**.

3. Toggle on the **Drop point** check box.

4. In the **Drop point angles** drop-down list, select the angle(s) at which another symbol may be dropped on the SmartPoint. An angle can also be specified by typing a value in the key-in field.

5. In the **ToolTip** box, enter the text you want for the ToolTip that displays when you drag another symbol over the SmartPoint on the symbol.

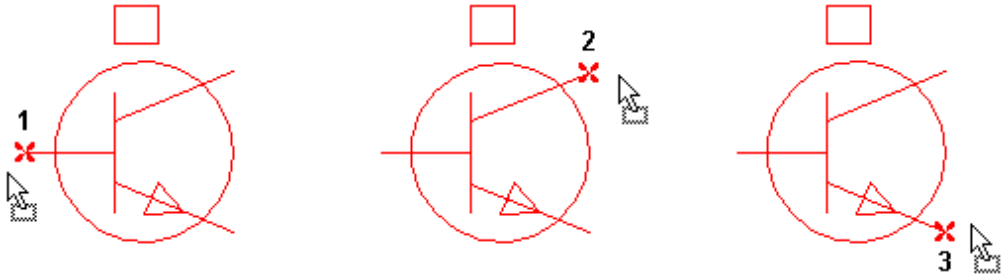


6. Click the **Insert** button and place the SmartPoint on the symbol at the desired location.

7. Click the **Apply** button.

Drag Point

A drag point is a point to which the mouse cursor attaches for dragging and dropping a symbol. A symbol can have multiple drag points which can be toggled, using the **Up** and **Down** arrow keys on the keyboard, as the symbol is dragged into the drawing.

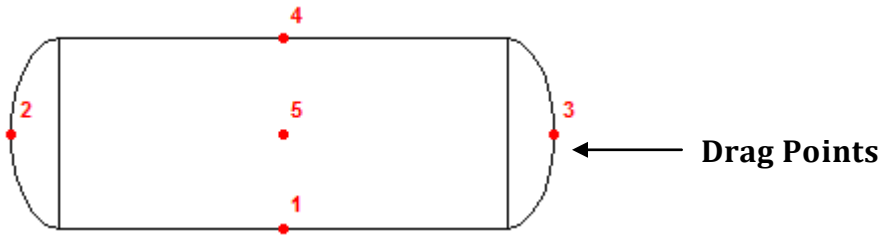


The **Drag point** option allows users to place or edit drag points on a symbol.

Drag Point Order

Allows you to define the order in which the drag points attach to the mouse cursor when dragging a symbol. You can cycle through the drag points when dragging a symbol by pressing the **Up** and **Down** arrow keys on the keyboard.

When the **SmartPoint Properties** dialog box is open, existing drag points appear as numbered dots.



Create a SmartPoint with Drag Point attributes

1. Open a symbol document by double-clicking the symbol in the **Symbol Explorer**.
2. On the **Symbol Authoring Tools** toolbar, click  **SmartPoint Properties**.
3. Toggle on the **Drag point** check box. Notice that the **Drag point order** field displays the next available drag point number.
4. Click the **Insert** button and place SmartPoints on the symbol at the desired locations.
5. Click the **Apply** button.

Edit SmartPoints for a Symbol

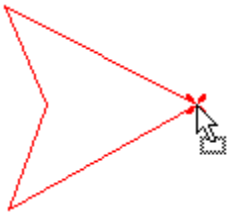
1. Open a symbol document by double-clicking the symbol in the **Symbol Explorer**.
2. On the **Symbol Authoring Tools** toolbar, click  **SmartPoint Properties**. Any existing SmartPoints will be displayed in the document.
3. Select a SmartPoint. The SmartPoint properties will display on the **SmartPoint Properties** dialog box. If there is more than one SmartPoint at the same location on the symbol, you may use **PickQuick** to select the appropriate SmartPoint to be modified.
4. Modify the properties for the SmartPoint as desired.
5. Click the **Apply** button.

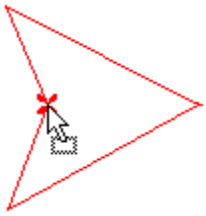
Notes

- The same steps may be used to delete a SmartPoint, simply select the SmartPoint to be deleted and click the **Delete** button on the **SmartPoint Properties** dialog box.
- A single SmartPoint can be created that contains Connect Point, Drop Point, and/or Drag Point attributes.
- You will have to save the symbol document in order to save the SmartPoints and SmartPoint edits that have been made to the symbol.

Symbol Origin

The symbol origin is the point that the mouse cursor attaches to when placing a symbol in a document. It is also the point that is used when dragging an existing symbol in a document. When creating a symbol, you are prompted to define the origin.



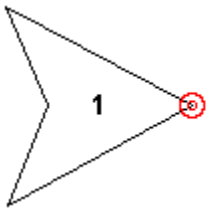


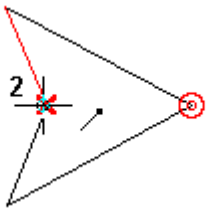
Symbol Origin Command

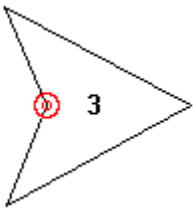
This command allows you to redefine the origin of the symbol. When you click the **Symbol Origin** icon, the symbol origin appears where it was originally placed. You can then click in free space or on an element to redefine the origin.

To redefine the origin of a symbol

1. Open a symbol document by double-clicking the symbol in the **Symbol Explorer**.
2. On the **Symbol Authoring Tools** toolbar, click the **Symbol Origin** icon. The current origin point displays. (**1**)
3. Click a point to redefine the origin of the symbol. (**2**)







4. Save and close the symbol document.

Point **3** displays the new origin point.

Note: If drag points are defined for a symbol, the drag points are used when dragging and dropping the symbol in a document, not the symbol origin. If necessary, the user can create a drag point at the same location as the symbol origin.

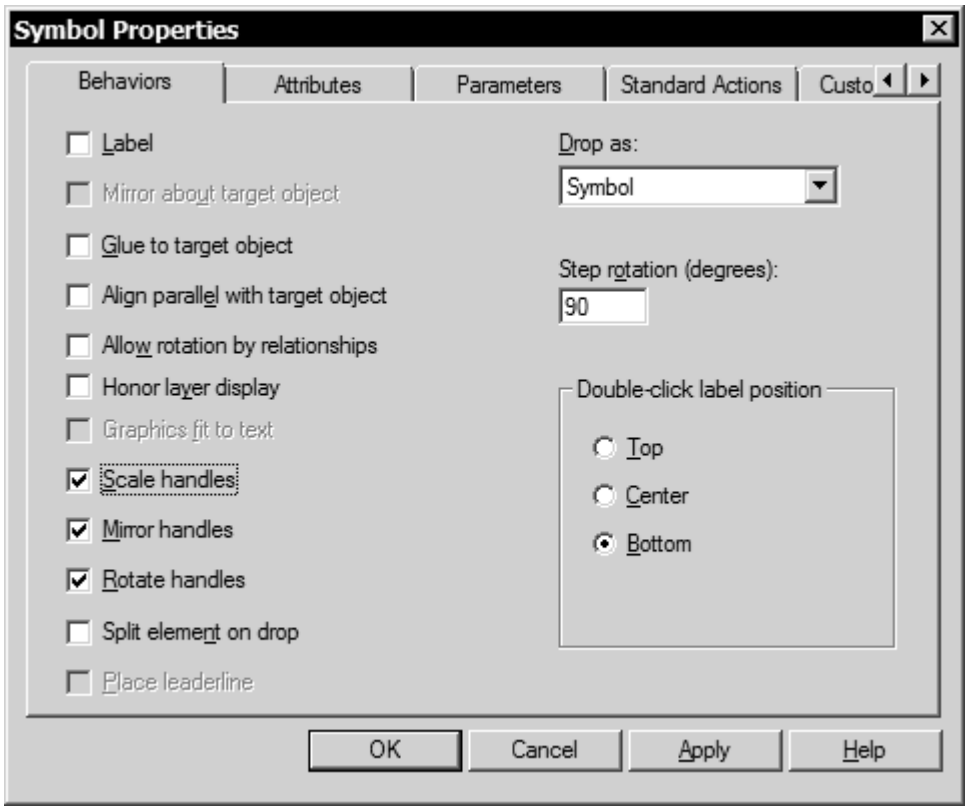
Symbol Properties

The **Symbol Properties** command allows the user to control the following:

- Symbol behaviors
- Symbol handle display
- Symbol parameters
- Custom macro that executes when the symbol is dropped in a document
- Custom macros that execute when actions are performed on the symbol
- Symbol icons that display in the **Windows Explorer** or the **Symbol Explorer**
- A special **Help** document for the symbol

Behaviors Tab

The **Behaviors** tab defines whether the object is a symbol or SmartSymbol, how the symbol will be dropped, what behaviors the symbol will have during and after placement, and the position of the double-click label.



Label

Allows the user to create a SmartSymbol that can watch another graphical object or an attribute value on the graphical object and when the object that it is watching is modified, the SmartSymbol is also modified.

Mirror about Target Object

Allows a symbol to mirror about the object to which it is being attached.

Glue to Target Object

Specifies that a symbol lock on and move with the object to which it is attached.

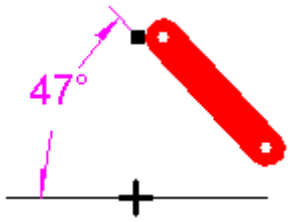
Align Parallel with Target Object

Allows a symbol to align parallel to the object to which it is being attached.

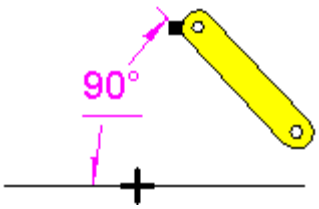
Allow Rotation by Relationships

Allows a symbol to change its orientation on the drawing sheet according to the relationships applied to it. If this checkbox is cleared, the symbol does not change its orientation regardless of the way its relationships are changed. The checkbox is cleared by default.

In the following example, the lower end of the symbol is grounded in place with a lock relationship. A driven dimension is placed between the line and the symbol. A driving dimension cannot be placed because the **Allow rotation by relationships** checkbox is cleared.

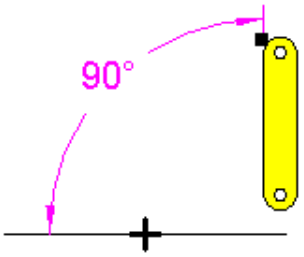


If you edit the value of the dimension, the symbol does not change its orientation on the drawing sheet. The driven dimension changes to a dimension that is not to scale, as indicated by the underlined dimensional value.



If the **Allow rotation by relationships** checkbox is set, the symbol changes orientation on the drawing sheet according to the relationships applied to it. In the example, a driving dimension can now be placed between the line and the symbol.

If you edit the dimensional value of the driving dimension, the symbol changes orientation on the drawing sheet, maintaining the dimensional relationship.



Honor Layer Display

Allows the display of individual symbol layers to be turned on or off when the symbol is placed in a file. For example, if a symbol is created with multiple layers and the **Honor layer display** checkbox is set, any symbol layer can be turned on/off so that the items on that layer display/do not display. Additionally, the layers are created if they do not exist in the file in which the symbol is placed.

Graphics Fit to Text

Allows a symbol to be defined that automatically resizes to fit the text that is entered in the associated text box. This checkbox is available only when the **Label** checkbox is selected.

Scale Handles

Displays handles on the symbol that can be used to scale the entire symbol uniformly in the X and Y directions.

Mirror Handles

Displays a handle on the symbol that can be used to mirror the symbol when it is placed or selected in a document.

Rotate Handles

Displays a handle on the symbol that can be used to rotate the symbol when it is placed or selected in a document.

Split Element on Drop

Allows the symbol to split elements on which it is placed. This behavior is intended primarily to split connectors when placing an inline symbol, but it will also split other elements. When the symbol is placed, the element is trimmed back to the range of the symbol. If the symbol contains connect points and the symbol is placed on a connector, the connector is trimmed back to the nearest connect points and the symbol will stay connected to the connector when it is moved.

Place Leaderline

Allows a symbol to be defined that automatically places a leaderline from the symbol to the object on which it is placed. This property is only valid when the symbol contains a text box object. In cases involving multiple text box objects, the leaderline is attached to the first text box placed in the symbol. This checkbox is available only when the **Label** checkbox is selected.

Drop As

Defines what happens to a symbol when it is placed in a document. If **Symbol** is selected, the symbol remains and behaves as a symbol when placed in a document. If **Group** is selected, the symbol changes to a group of objects when placed in a document. This removes the necessity for users to have to 'Convert' it later. If **Discrete Objects** is selected, the symbol is converted into individual objects that can be manipulated separately.

Step Rotation

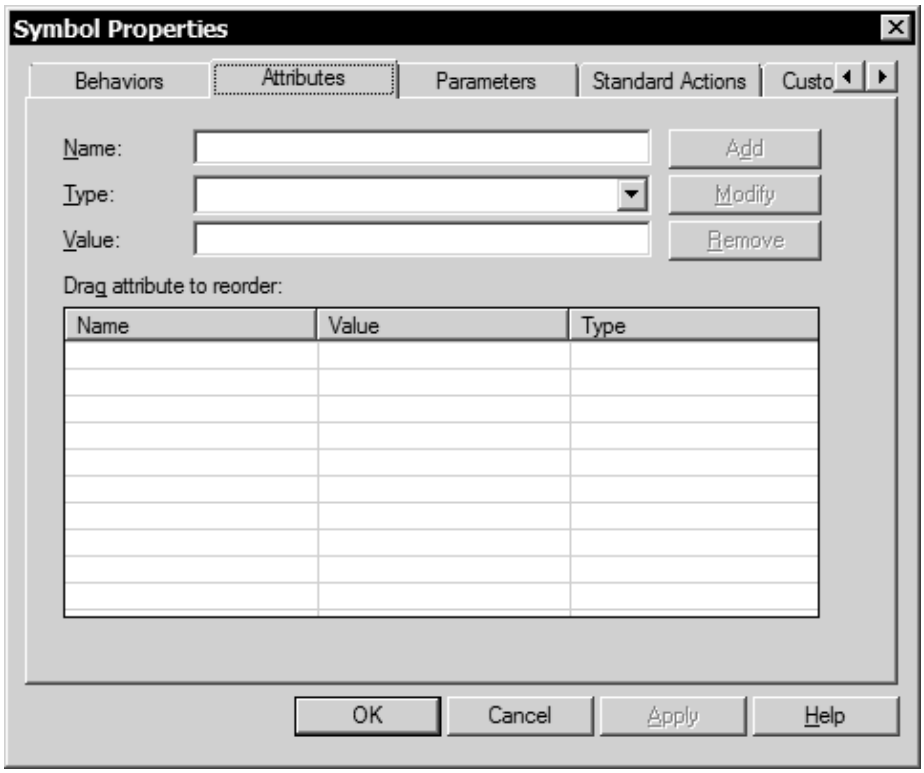
Determines the increment for rotating a symbol when it is dragged in a document while pressing the Left and Right arrow keys on the keyboard. If 0 is entered in the box, the symbol cannot be rotated with the Left and Right arrow keys when dragging it in a document.

Double-Click Label Position

Defines where the blinking cursor appears when a user double-clicks a symbol to add a label to it. For example, if the **Top** option button is selected, the blinking cursor appears above the symbol when a user double-clicks the symbol to place a label.

Attributes Tab

Allows the user to add attributes to a symbol. An attribute is a user-defined property that is assigned to an object that usually defines a characteristic about the object.



Name

Defines a name for the attribute.

Type

Defines the type of data you can enter in the **Value** box. Select either **Text**, **Date**, **Number**, **Boolean**, or **Money**.

Value

Sets a default value for the attribute.

Add

Adds the attribute.

Modify

Allows you to modify the **Type** and **Value** of an attribute and updates these fields in the attribute list. The **Name** field cannot be modified.

Remove

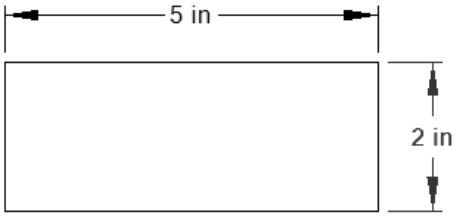
Clears the information displayed in the **Name**, **Type**, and **Value** fields in the attribute list and removes the attribute.

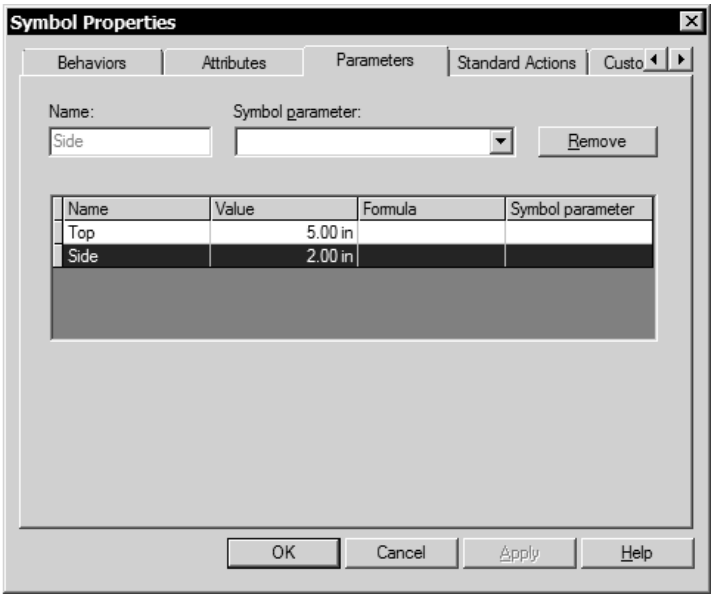
Notes

- For the **Number** type, to specify an integer value, enter a numeric value without a decimal point. To specify a double value, enter a numeric value containing a decimal point. The decimal value entered should be greater than zero. For example, the user should enter .1 instead of .0 or .01 instead of .00. If a decimal value of zero is entered, the next time the Symbol Properties dialog box is invoked, the decimal value is no longer displayed and the attribute will be treated as an integer when the next symbol instance is placed in a file.
- For the **Money** type, if a dollar sign ($) is specified, it will not be displayed in the Attribute Viewer and it will not be displayed the next time the Symbol Properties dialog box is invoked. The Money type currently displays up to 4 decimal positions.
- To modify the value of a **Boolean** type in the Attribute Viewer, 0 equals False and any other numeric value equals True. The user can also enter *True* or *False*.
- To modify the value of a **Date** type in the Attribute Viewer, different date formats may be entered. For example, the user can enter *April 20, 1996*, *10-20-03*, *Jan 1, 2008*, *12/22/85*, etc.

Parameters Tab

The **Parameters** tab automatically displays all dimensions in the symbol document. You can use this tab to assign symbol parameters to driving dimensions. You can also use this tab to define parametric handles for resizing a symbol after it is placed in a document.





The information that appears in the **Value** and **Symbol Parameter** columns also appears in the **Value** and **Name** columns in the **Attribute Viewer**. The **Attribute Viewer** displays this information when you place or select a symbol in a document.

Name

Displays the name of the dimension or variable that you select in the table. You can select a row in the table by clicking the row.

If you want to see which dimension in the symbol document corresponds to the selected row, you can move the dialog box to one side of the document window. The corresponding dimension is highlighted in red.

Symbol Parameter

Allows the user to assign a symbol parameter to a dimension. To assign a symbol parameter, you must first click a row in the table. You can then type in your own name for the parameter or select one from the dropdown list.

Note: If you want to create a symbol with parametric handles for resizing the symbol, you must assign one or more of the following symbol parameters to dimensions in the symbol document: Top, Bottom, Right, or Left.

Name Column

Displays the name of a dimensional value or variable in the symbol document.

Value Column

Displays a dimensional value or variable value in the symbol document.

Formula Column

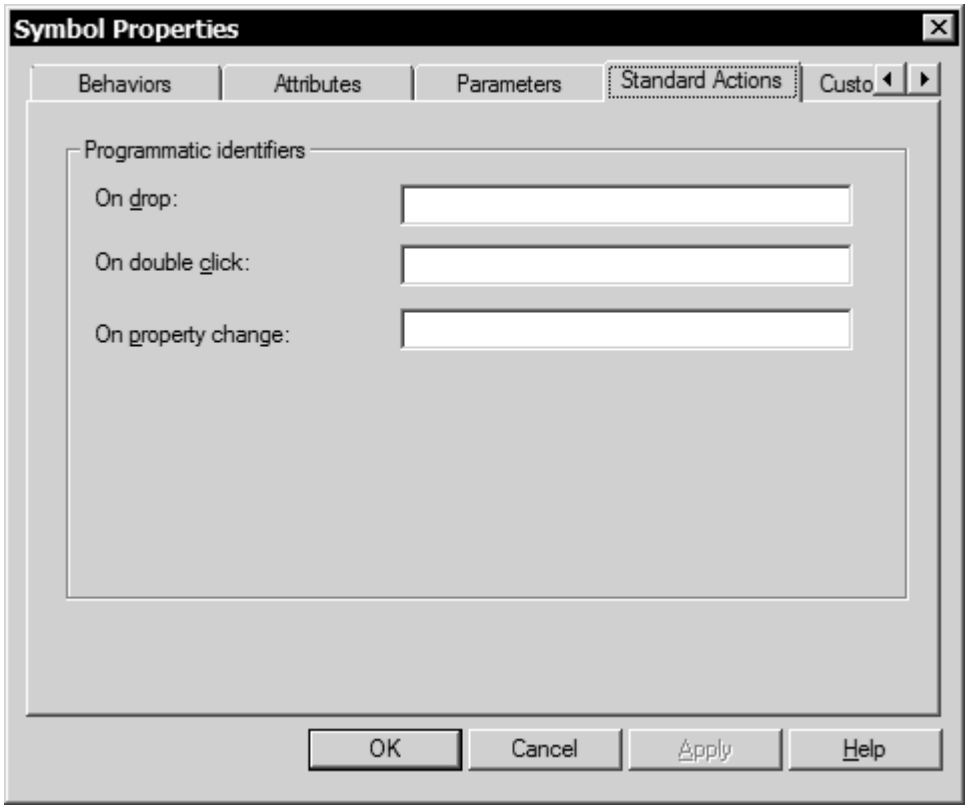
Displays a formula for calculating the dimensional value.

Symbol Parameter Column

Displays the name of the symbol parameter that you assigned to the dimension.

Standard Actions Tab

The **Standard Actions** tab allows you to define an executable that can be invoked when dropping a symbol in a document or selecting a symbol in a document and then performing actions on the symbol, such as double-clicking it or editing a symbol property.

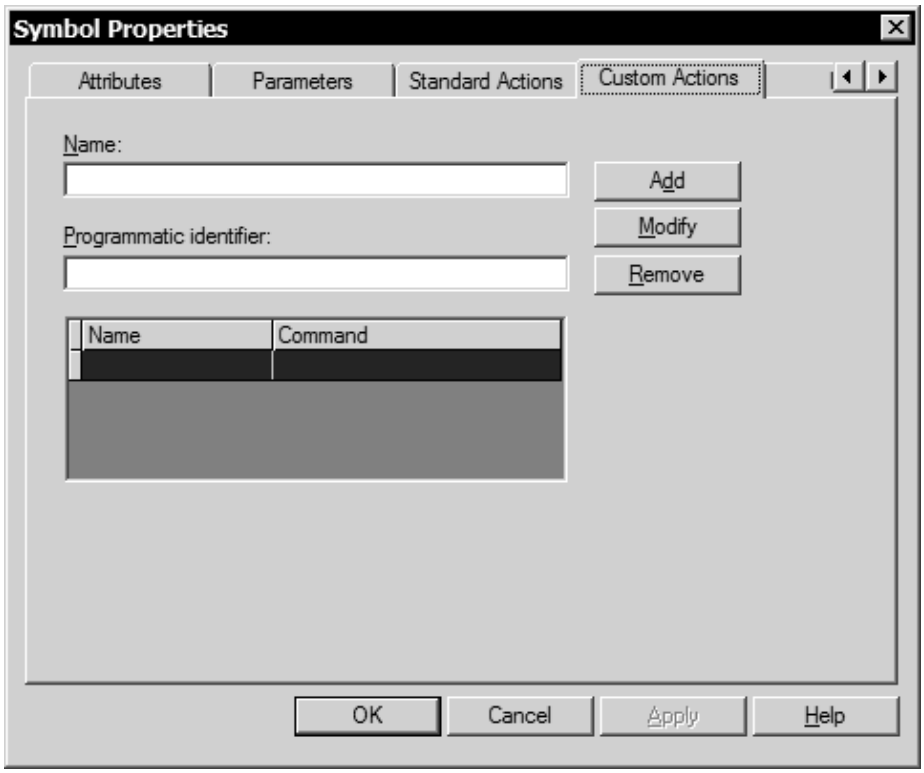


Enter the ProgID or the executable filename (.dll, .ocx, .exe) in the appropriate **Programmatic identifier** field and then click the **Apply** or **OK** button. You must specify the directory path when entering an executable filename.

For example, the Report symbols were built using this feature. When one of these symbols is dropped in a document, an Excel spreadsheet of symbol attributes is placed in the file.

Custom Actions Tab

The **Custom Actions** tab allows you to specify executables that can be invoked when you select a symbol, click the right mouse button, and then click a custom command on the shortcut menu. The command names of the custom actions that you define appear at the top of the shortcut menu. The command associated with a custom action can be a .dll, .ocx, or .exe.



For example, if you create a symbol for a storage tank, you might want to place a *Calculate Volume* command on the shortcut menu. The shortcut menu displays when you place the storage tank symbol in a document, select it, and click the right mouse button. The *Calculate Volume* command appears on the shortcut menu. When you click the *Calculate Volume* command, a Visual Basic program is executed that allows you to calculate the volume of the storage tank.

Name

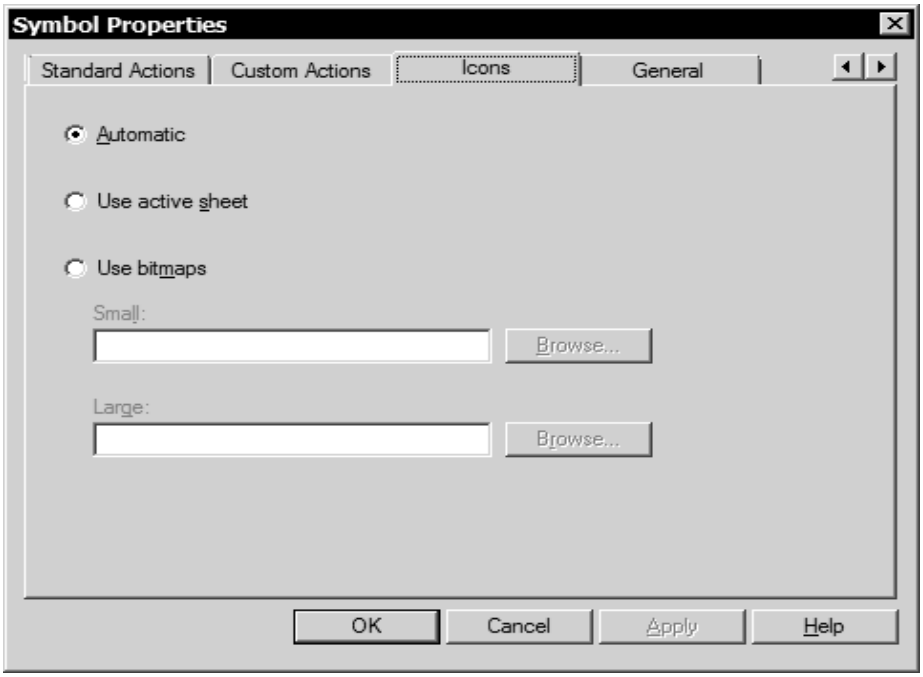
Specifies the name of the custom command that appears on the shortcut menu.

Programmatic Identifier

Specifies the ProgID or the filename of the executable (.dll, .ocx, .exe) that is invoked when the custom command is selected on the shortcut menu. You must specify the directory path when entering an executable filename.

Icons Tab

The **Icons** tab defines the symbol icon that you see in the **Windows Explorer** or the **Symbol Explorer**.



Automatic

Uses the symbol objects to create the graphics for the symbol icon. These are the objects on the first sheet tab listed in the symbol document. This is handy if you want to see what the symbol looks like without opening it.

Use active sheet

Uses the objects on the active sheet in the symbol document to create the graphics for the symbol icon.

Use bitmaps

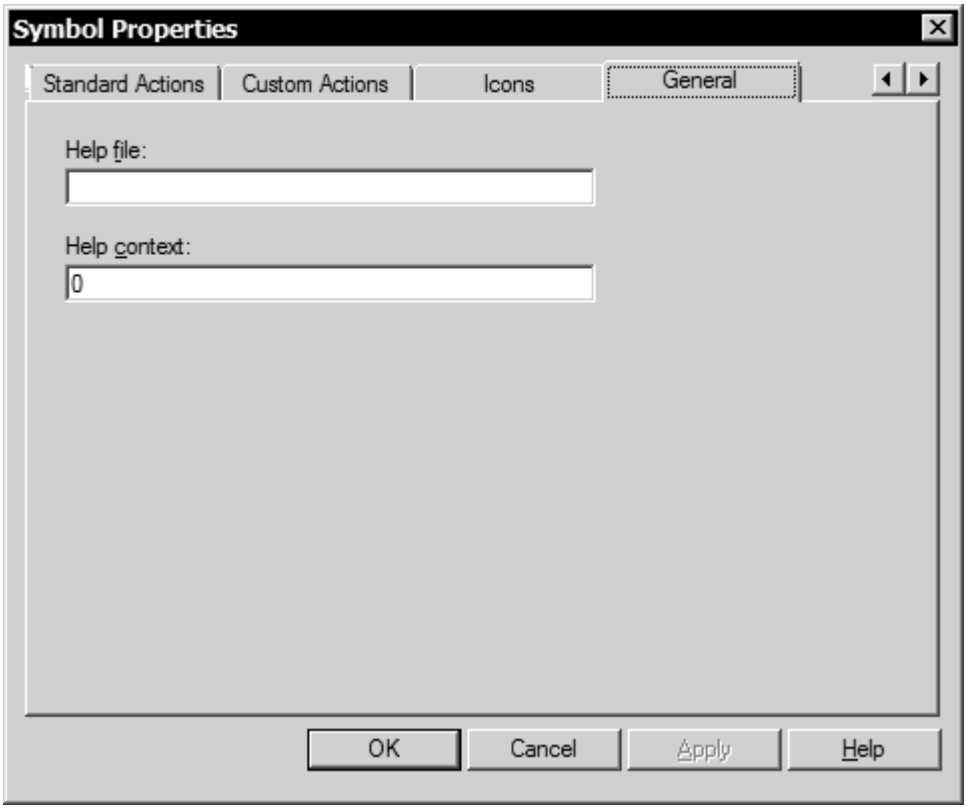
Allows you to select a bitmap document to display as the symbol icon. You can choose to save a small and/or large icon.

Notes

- In order for the bitmaps to display on the icon, the small bitmap must be created with 16x16 pixels and the large bitmap must be created with 32x32 pixels.
- Once the Symbol Properties dialog box has been dismissed, the next time it is invoked, the bitmap values specified on the Icons tab are no longer set and the Automatic option is automatically selected; therefore, if the user changes any properties/options on any tab of the dialog box and clicks the Apply or OK button, the bitmaps no longer display in the Symbol Explorer.

General Tab

The **General** tab allows a topic in a **Help** file to be associated with a symbol.



Help file

Specifies a Help file (.CHM) that you can use to display information about a symbol. For example, you could use a Help file to explain different ways to place a high-pressure valve symbol in a P&ID drawing.

Help context

Defines a Help context identifier for invoking a specific topic in a Help file. The Help file must be compiled with the Help context identifier mapped to the Help topic.

Notes

- You can access the Help topic by right mouse clicking on the symbol and selecting **Help** on the shortcut menu.
- For more information on mapping context IDs and creating compiled Help files, see the Microsoft HTML help authoring tools available from the Microsoft website.

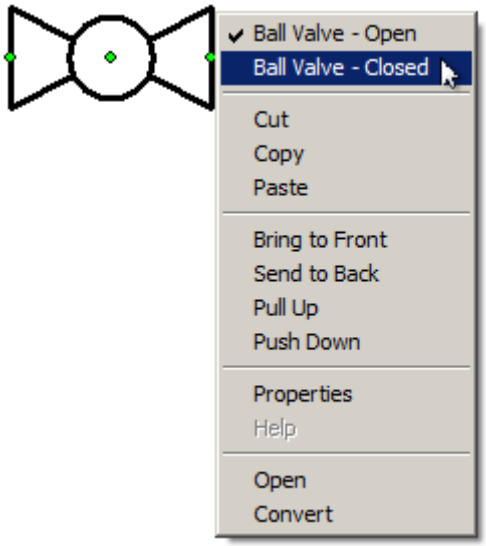
Multiple Representation (Multi-Rep) Symbols

Symbols can have multiple representations. This functionality allows you to consolidate your symbol collection into a more easily managed library. For example, instead of having two symbols for a ball valve, one open and one closed, you might have a symbol of a ball valve that has both an open and closed representation. You can easily change which representation is displayed via the right mouse click menu in SmartSketch.

An example of a multiple representation symbol is located in the following directory:

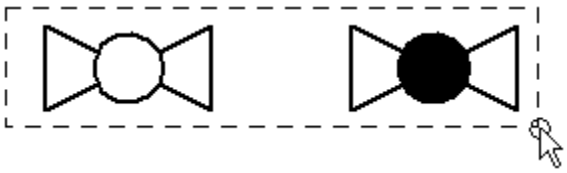
…*SmartSketch**Symbols**Diagramming**Directional Map****Traffic Light.sym**.

To define several representations of a symbol in one document



1. Create a new SmartSketch document and draw the different representations that will be included in the symbol.

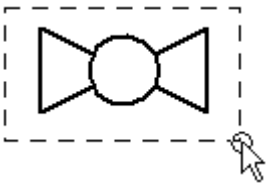
2. Using the **Select Tool** select all of the representations.



3. Select the **Create Symbol**  icon to create one symbol out of the selected objects. Click anywhere to define the origin. It will be redefined later.

4. Open the new symbol file. The new symbol can be opened from the **File** menu or by double-clicking the symbol in the **Symbol Explorer**.

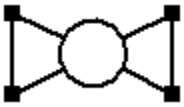
5. Select the objects that you want to display as one representation of the symbol.



6. On the **Change** toolbar, click the **Group**  icon.

Note: You cannot place one object in more than one group. To include the same object in different representations, you must copy the object and include it in a different group.

7. Define a separate group for each representation that you want to save in the symbol document.



Group 1

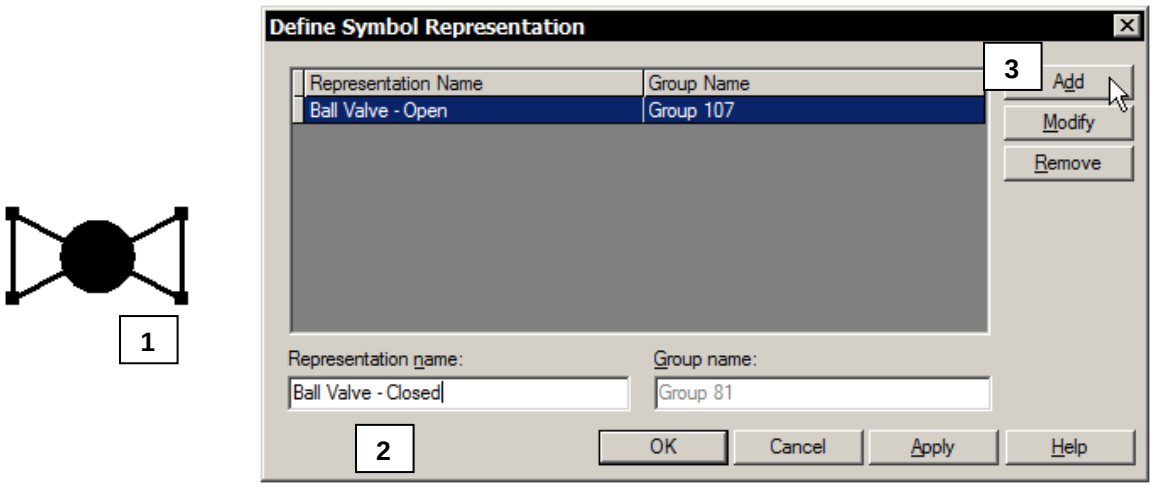
Group 2

Note: You can create the representations more easily if you keep each group in a separate section of the document at this point in the procedure. Do not allow the groups to overlap. You can define a common origin for all of the groups later.

8. On the **Symbol Authoring Tools** toolbar, click the **Symbol Representation**  icon.

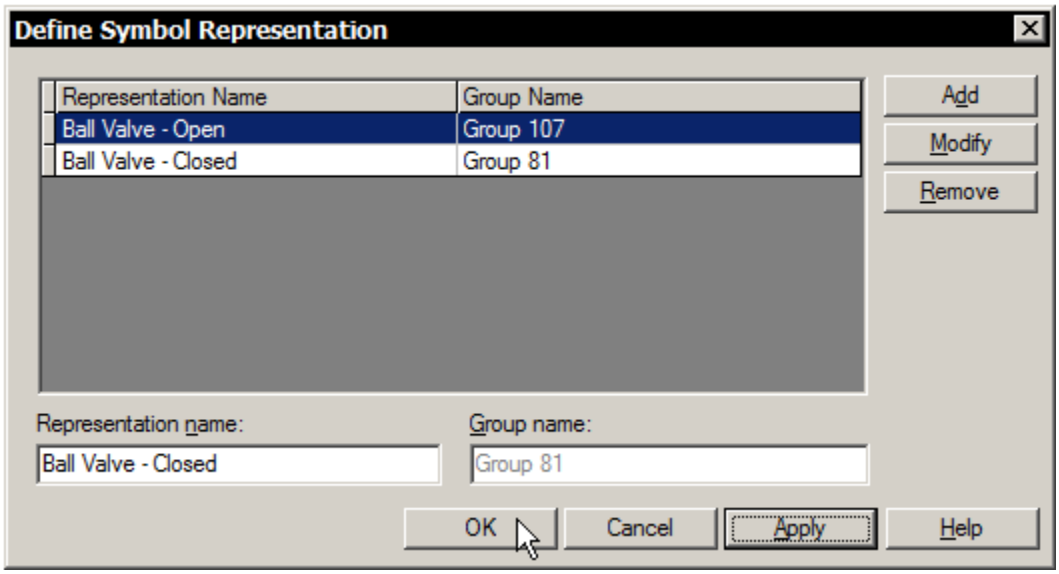
9. Select a group (**1**) that you want to display as a representation. The name of the group automatically appears in the **Group name** box on the **Define Symbol Representation** dialog box. The software automatically generates the Group name.

10. In the **Representation name** box, enter a name for the representation. (**2**) This is the name that appears as a command on the shortcut menu when you select the symbol in a document.



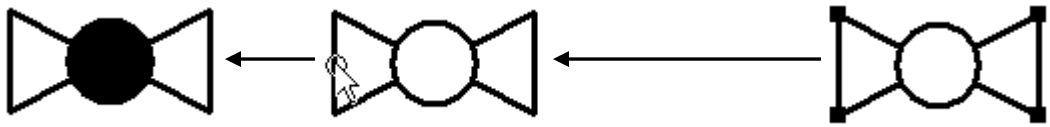
11. Click the **Add** button (**3**) to enter the name in the table.

12. Repeat steps 9 through 11 for each representation that you want to appear on the shortcut menu. When done, click the **Apply** or **OK** button.



Note: The order in which the names appear in the table above is the order in which the commands appear on the shortcut menu.

13. Select each group and move it to a position that is on top of the other groups. You should position each group so that they share a common origin.



14. Define the symbol origin by selecting the **Symbol Origin**  icon on the **Symbol Authoring Tools** toolbar and then click the new symbol origin location.

15. Save and close the symbol file.

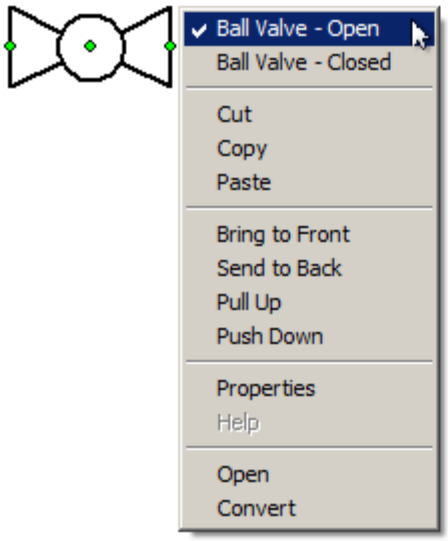
Once placed in a document, right mouse click over the symbol and select the desired representation from the shortcut menu.

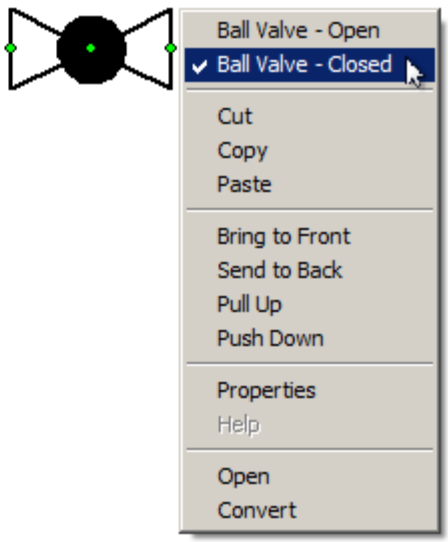
Notes

- The group listed first in the table is the default symbol representation when the symbol is placed in a document.
- The graphics of the default symbol representation determines the picture that is displayed in the **Symbol Explorer**.
- You can change the name of a representation by clicking a row in the table, entering a new name in the **Representation name** box, and clicking the **Modify** button.

Test the symbol

After saving the symbol, you should test the different representations that you defined. Drag the symbol from the **Symbol Explorer** into a new document. Select the symbol and click the right mouse button. Choose the desired representation.





Text-Driven Symbols

A text-driven symbol is a symbol that automatically resizes to fit the text that is entered in the associated text box. A standard text-driven symbol must be composed of a circle, rectangle, or ellipse.

Symbol Properties: **Label** and **Graphics fit to text**

In the example below, the same symbol was placed several times. The ellipse automatically resized based on what was entered in the text box.

To create a text-driven symbol

1. Turn on **Maintain Relationships** on the **Tools** menu.
2. Create a symbol document from a rectangle, circle, or ellipse.
3. Open the symbol document by double-clicking the symbol in the **Symbol Explorer**.
4. On the **Draw** toolbar, click the **Text Box** command.
5. In the **Ribbon** bar, change text box properties such as font, font size, color, etc.
6. Click the center of the rectangle, circle, or ellipse to place a text box.
7. On the **Draw** toolbar, click the **Select Tool** and select the text box.
8. Click **Edit** > **Properties**.
9. In the **Text Box Properties** dialog box, set the options that indicate the directional flow for text that is entered in the text box.

   If you want the text to grow from the center of the object, you can set the following options:

   - On the **Info** tab, set **Horizontal** and **Vertical** in the *Justification* section to **Text Center**.
   - On the **Info** tab, set **Horizontal** and **Vertical** in the *Text alignment* section to **Center**.
   - On the **Paragraph** tab, set **Alignment** in the *Spacing* section to **Center**.

10. On the **Symbol Authoring Tools** toolbar, click the **Symbol Properties**  icon.

11. On the **Behaviors** tab, select the **Label** and **Graphics fit to text** checkboxes. Turn off **Scale handles** and **Mirror handles**. Click the **OK** button.

12. Save and close the symbol file.

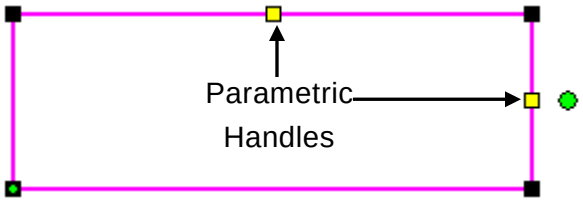
Notes

- A standard text-driven symbol must be composed of a circle, rectangle, or ellipse. Connected objects, such as a series of lines or arcs, cannot be used.
- To create a symbol from a series of connected objects that automatically resizes based on text that is entered in a text box, the user can create a parametric text-driven symbol.
- If the **Label** property is set and the symbol contains a text box, the **Scale handles** and **Mirror handles** settings are ignored and the symbol is placed without scale and mirror handles.

Parametric Symbols

In a SmartSketch drawing, you can use dimensions to drive the length and angle of objects in the drawing. Symbols can encapsulate this same functionality and expose the dimensions used to drive the drawing objects via parameters. This functionality allows you to create symbols that can reconfigure themselves based on user input. For example, you could create a symbol for a cross section of a pipe and the user can change the diameter and wall thickness of the pipe using parameters.

Parametric symbols can resize when text is entered. You can also determine how users resize a symbol by specifying parametric handles or scale handles.



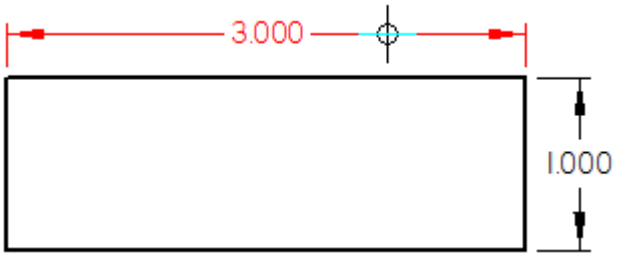
An example of a parametric symbol is located in the following directory: *...\SmartSketch\Symbols\Process\P&ID(Intergraph)\Equipment\Vessels\Towers* ***2to1Parametric Tower.sym***.

Create a symbol with driving dimensions

1. Click **File > New**.
2. Turn on **Maintain Relationships** on the **Tools** menu.
3. Draw four horizontal/vertical endpoint connected lines.
4. Select the graphics and create a symbol.
5. Open the symbol document by double-clicking the symbol in the **Symbol Explorer**.
6. Select **Tools** > **Layers**. In the **Layer** ribbon bar create a layer called *Hidden*.
7. On the **Main** toolbar, click the **Dimension**  icon.
8. On the **Dimension** toolbar, click the **SmartDimension**  icon.
9. On the ribbon bar verify that the **Driving/Driven**  button is pressed (turned on).

Note: You can use any of the dimension commands on the **Dimension** toolbar to place dimensions.

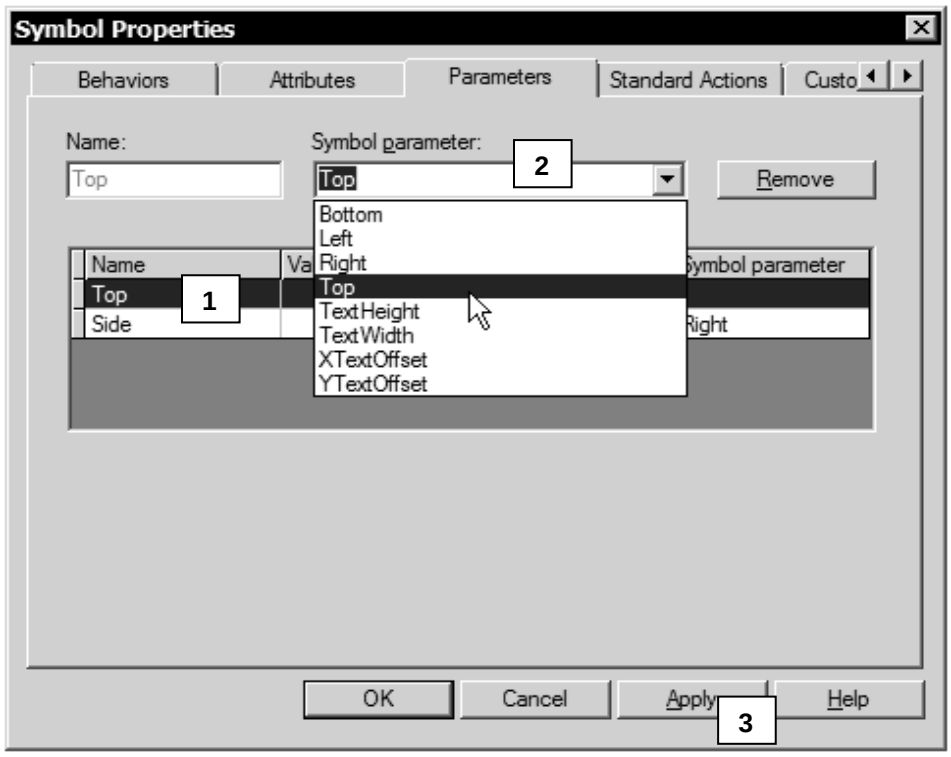
10. Place two driving dimensions. One along the top edge of the shape and a second dimension along the right edge of the shape. These dimensions will be used to create the parametric handles for the width and height of the parametric symbol.



Set up parametric handles on the symbol

11. On the **Symbol Authoring Tools** toolbar, click the **Symbol Properties** icon.

12. Click the **Parameters** tab.



The **Parameters** tab on the **Symbol Properties** dialog box automatically displays the dimensions in the symbol document.

13. On the **Parameters** tab, select the driving dimension in the table that is associated with the top edge of the shape. (**1**)

    If you move the **Symbol Properties** dialog box to one side of the document window, you can see the dimension that you selected in the table highlighted in the document.

14. In the **Symbol Parameter** box, select from the dropdown list to apply a **Top** parametric handle to the symbol. (**2**)

15. Click the **Apply** button. (**3**)

16. On the **Parameters** tab, select the driving dimension in the table that is associated with the right edge of the shape.

17. In the **Symbol Parameter** box, select from the dropdown list to apply a **Right** parametric handle to the symbol.

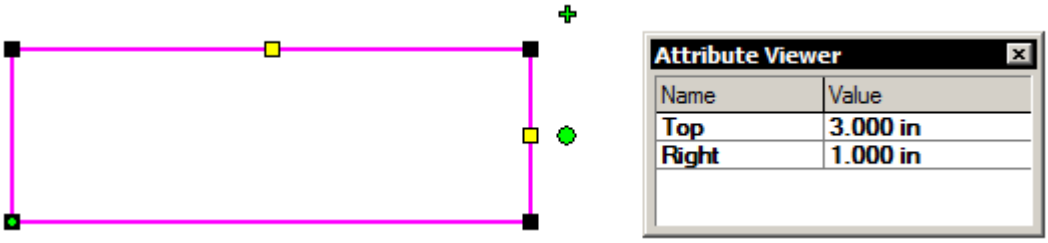
18. Click the **Apply** button.

19. Click the **OK** button when finished defining parameters.

    Note: There is a limit of four parametric handles.

20. Click **File** > **Save**.

This procedure creates parametric handles that appear as square yellow handles on the symbol's range box. You can place the symbol and use the parametric handles to scale the symbol in a manner defined when the symbol was created. Typing a new value in the **Value** field in the **Attribute Viewer** also changes the parameters.



Notes

- When assigning symbol parameters to dimensions, a parameter name can be specified by either selecting a value from the symbol parameter dropdown list or entering a value directly in the field.
- To create a parametric text-driven symbol that resizes when text is added/modified in a text box, you must identify the two primary dimensions as **TextHeight** and **TextWidth**.

Parametric Text-Driven Symbols

A parametric text-driven symbol is composed of a parametric symbol and a text box that drives the graphics in the parametric symbol. The parameters of the two primary dimensions in the parametric symbol must be defined as **TextHeight** and **TextWidth**.

An example of a parametric text-driven symbol is located in the following directory:
*...\SmartSketch\Symbols\Diagramming\Flowchart**Auto-Size Box.sym***

Create a parametric symbol

1. Click **File > New**.

2. Turn on **Maintain Relationships** on the **Tools** menu.

3. Draw four horizontal/vertical endpoint connected lines.

4. Select the graphics and create a symbol.

5. Open the symbol document by double-clicking the symbol in the **Symbol Explorer**.

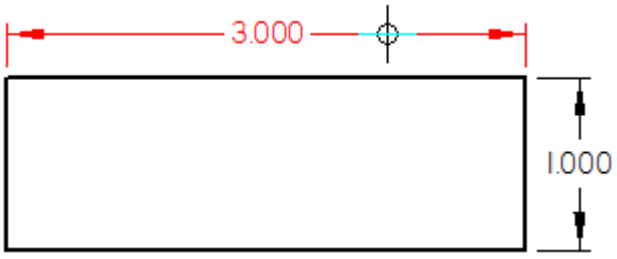
6. Select **Tools** > **Layers**. In the **Layer** ribbon bar create a layer called *Hidden*.

7. On the **Main** toolbar, click the **Dimension**  icon.

8. On the **Dimension** toolbar, click the **SmartDimension**  icon.

9. On the ribbon bar verify that the **Driving/Driven**  button is pressed.

10. Place two driving dimensions. One along the top edge of the shape and a second dimension along the right edge of the shape. These dimensions will be used to drive the symbol graphics when the contents of the text box is modified.



11. Place a point in the center of the four connected lines. Use the midpoints of the lines and alignment indicators to get the exact center.

12. Apply Horizontal/Vertical relationships between the point and the four midpoints of the lines.
13. Apply a Lock relationship on the point.
14. On the **Symbol Authoring Tools** toolbar, click the **Symbol Properties**  icon.
15. On the **Parameters** tab, select the driving dimension in the table that is associated with the top edge of the shape.
16. In the **Symbol Parameter** box, select **TextWidth** from the dropdown list.
17. Click the **Apply** button.
18. Select the driving dimension in the table that is associated with the right edge of the shape.
19. In the **Symbol Parameter** box, select **TextHeight** from the dropdown list.
20. Click the **OK** button when finished defining parameters.
21. Save and close the symbol document.

Create a symbol that contains the parametric symbol and a text box

1. Draw any graphic object. Select the object and create a symbol.
2. Open the symbol document by double-clicking the symbol in the **Symbol Explorer**.
3. Select the object and delete it. The object was used to create the symbol document.
4. From the **Symbol Explorer**, drag the parametric symbol into the document.
5. On the **Draw** toolbar, click the **Text Box** command.
6. In the **Ribbon** bar, change text box properties such as font, font size, color, etc.
7. Click the center of the parametric symbol to place a text box.
8. On the **Draw** toolbar, click the **Select Tool** and select the text box.
9. Click **Edit** > **Properties**.

10. In the **Text Box Properties** dialog box, set the options that indicate the directional flow for text that is entered in the text box.

    If you want the text to grow from the center of the parametric symbol, you can set the following options:

    - On the **Info** tab, set **Horizontal** and **Vertical** in the *Justification* section to **Text Center**.
    - On the **Info** tab, set **Horizontal** and **Vertical** in the *Text alignment* section to **Center**.
    - On the **Paragraph** tab, set **Alignment** in the *Spacing* section to **Center**.

11. On the **Symbol Authoring Tools** toolbar, click the **Symbol Properties**  icon.

12. On the **Behaviors** tab, select the **Label** and **Graphics fit to text** checkboxes.

13. Turn off **Scale handles** and **Mirror handles** and click the **OK** button.

14. On the **Symbol Authoring Tools** toolbar, click the **Symbol Origin**  icon.

15. Click the center of the parametric symbol to redefine the symbol origin.

16. Save and close the symbol file.

Note: When the symbol is placed in a file, the connected objects will automatically resize based on the text that is entered in the text box.

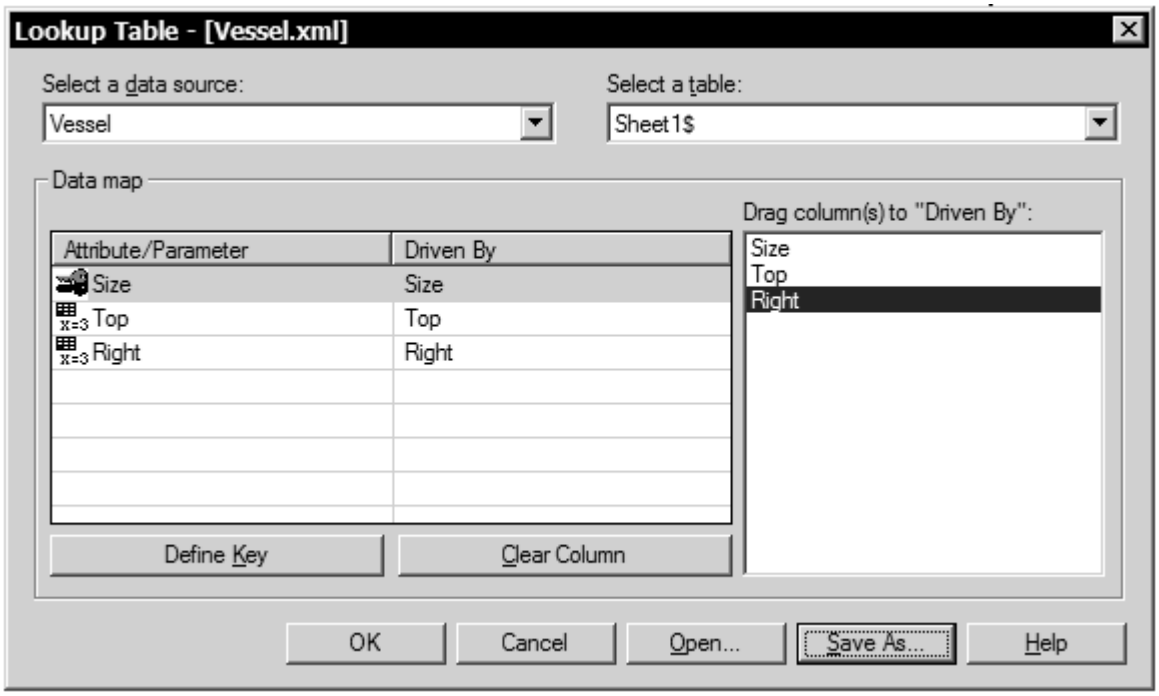
Lookup Table Symbols

Lookup table symbols are closely related to parametric symbols. These symbols allow you to define a parametric symbol and then 'hook up' the parameters of the symbol to an ODBC data source, such as an Excel spreadsheet or Access database. The user then selects a key for the symbol and the symbol reconfigures itself based on the settings in the data source. For example, SmartSketch delivers steel section symbols that are configured with lookup tables. If the user places an I-Beam symbol and then selects a specific I-Beam from the dropdown list in the **Attribute Viewer**, the symbol will reconfigure itself to match the specifications for that specific I-Beam. Those specifications might include height, width, steel thickness, etc.

Examples of lookup table symbols can be found in the following directory:
...\SmartSketch\Symbols\AEC\Structural\Steel Sections.
You can also create a new file from the AEC template, *Structural Steel Sections.igr*, and this directory will automatically be displayed in the **Symbol Explorer**.

Lookup Table Command

The **Lookup Table** command takes a snapshot of the specified table in the data source and generates an .xml file containing the information from the data source. Once the .xml file has been generated, the user can then modify a particular set of values for the selected symbol by selecting a value from the key dropdown list in the **Attribute Viewer**.



Select a Data Source

Specifies the Open Database Connectivity (ODBC) data source.

Select a Table

Specifies the table from the ODBC data source.

Attribute/Parameter

Lists the attributes and parameters for the symbol.

Driven By

Displays the columns from the table in the data source that drive the attributes/parameters.

Drag Column(s) to "Driven By"

Lists the columns in the specified data source. You can drag the column names to the **Driven By** column to map symbol attributes/parameters to columns in the data source.

Define Key

Defines the unique **Key Column** that is used to differentiate among the various symbol parameter sets.

Clear Column

Deletes the selected value in the **Driven By** field.

Open

Opens an existing .xml file and displays the information in the **Lookup Table** dialog box for editing.

Save As

Saves the information from the data source to a new .xml file.

OK

Saves the information from the data source to an .xml file.

Cancel

Closes the **Lookup Table** dialog box without saving the information.

Help

Displays **Help** for the dialog box.

Create a Lookup Table Symbol using Microsoft® Excel

Step 1 – Set up a Database (Excel Spreadsheet)

1. Open a blank Excel spreadsheet.

2. Key in the values displayed in the example below.
Row 1 is the key row. It contains the name of the key column (Size) and the symbol parameters that will be driven by the key (Top and Right). Rows 2 through 5 contain different sets of values for the symbol parameters.

	A	B	C
1	**Size**	**Top**	**Right**
2	**1.0 in**	**1**	**1**
3	**2.0 in**	**2**	**2**
4	**4.0 in**	**4**	**4**
5	**5.5 in**	**5.5**	**5.5**

3. Save the spreadsheet and exit the application.

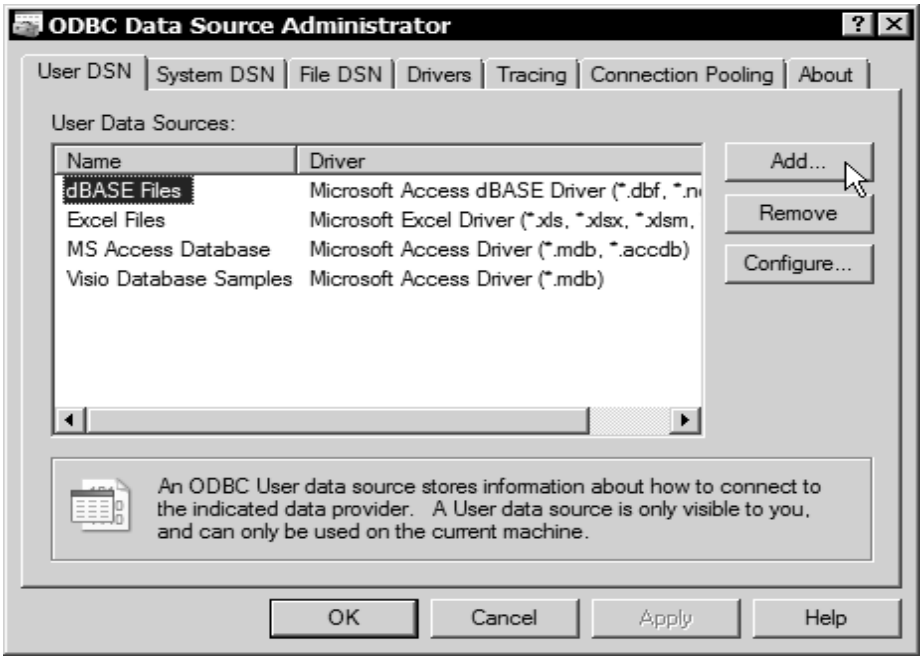
Step 2 - Set up an ODBC Data Source

An ODBC data source stores information about how to connect to the indicated data provider/database.

1. From the **Start** menu select **Settings** > **Control Panel**.

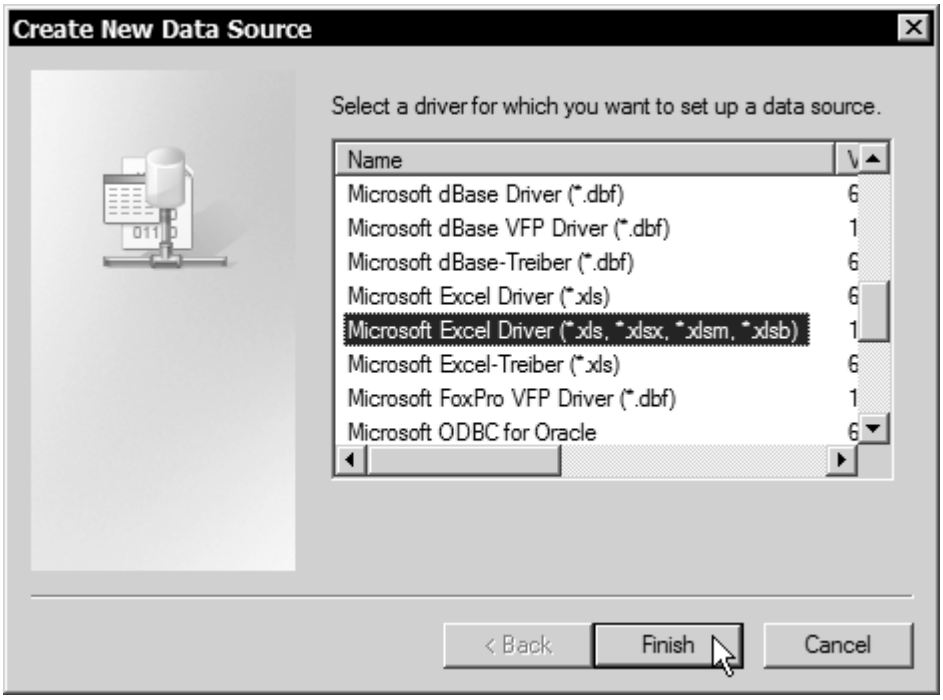
2. On the **Control Panel** window, double-click **Administrative Tools.**

3. On the **Administrative Tools** window, double-click **Data Sources (ODBC)**. The **ODBC Data Source Administrator** dialog box displays.



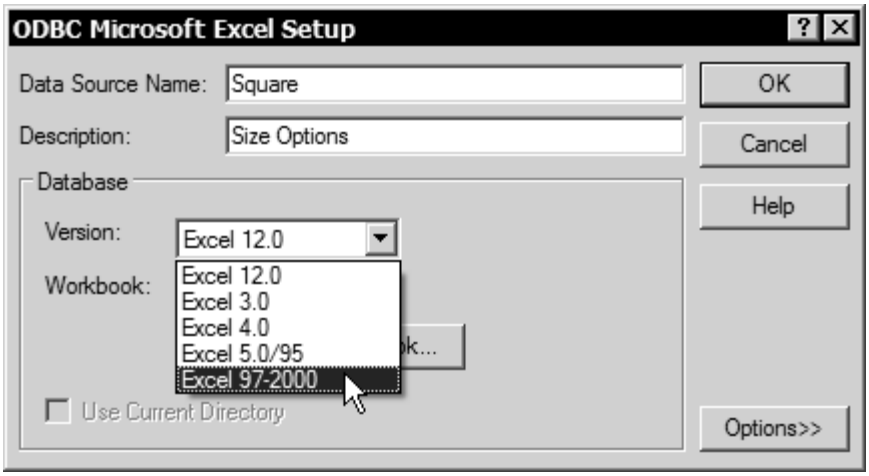
4. On the **ODBC Data Source Administrator** dialog box, click the **User DSN** tab.

5. Press the **Add** button to open the **Create New Data Source** dialog box.



6. Select **Microsoft Excel Driver** to designate an Excel spreadsheet as the data source for the symbol.

7. Click the **Finish** button to open the **ODBC Microsoft Excel Setup** dialog box.



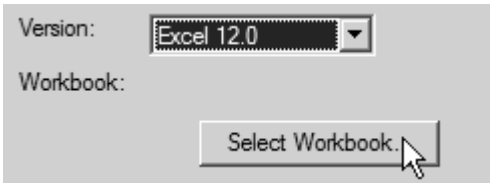
8. Enter the necessary information on the dialog box:

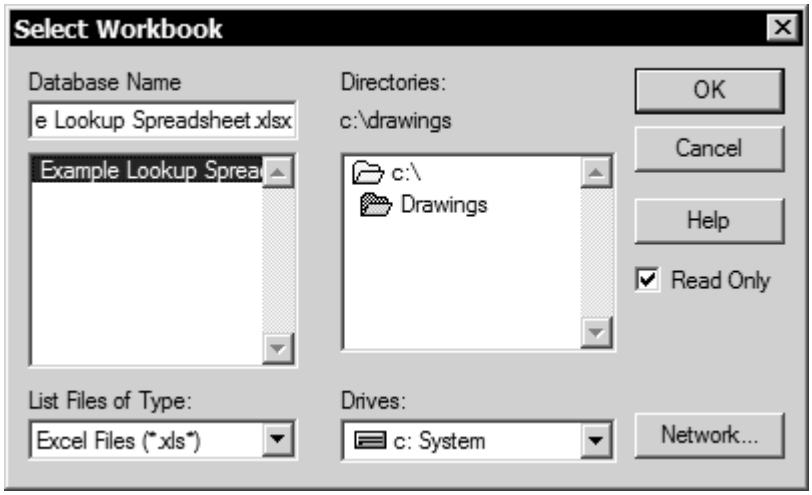
   a. Data Source Name: **Square**

   b. Description: (optional)

   c. Database Version: **Excel 12.0** (Excel 2007) or **Excel 97-2000**.

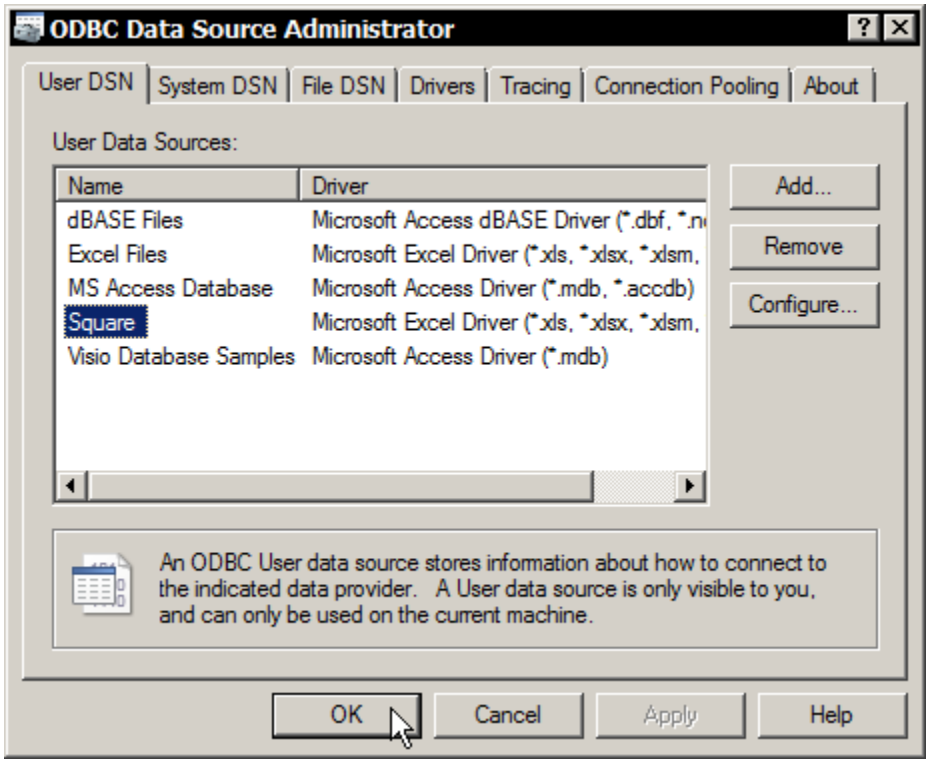
9. Press the **Select Workbook** button on the dialog box to identify the Excel spreadsheet that was created earlier. Click **OK** to close the dialog box.





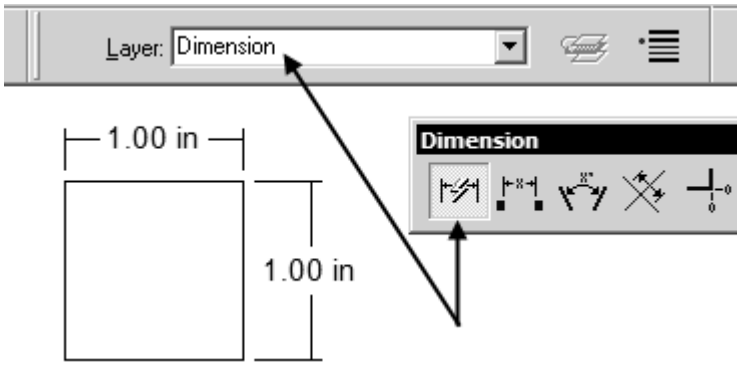
10. On the **ODBC Microsoft Excel Setup** dialog box, click **OK** to save the changes and close the dialog box.

11. On the **ODBC Data Source Administrator** dialog box, click **OK** to close the dialog box.



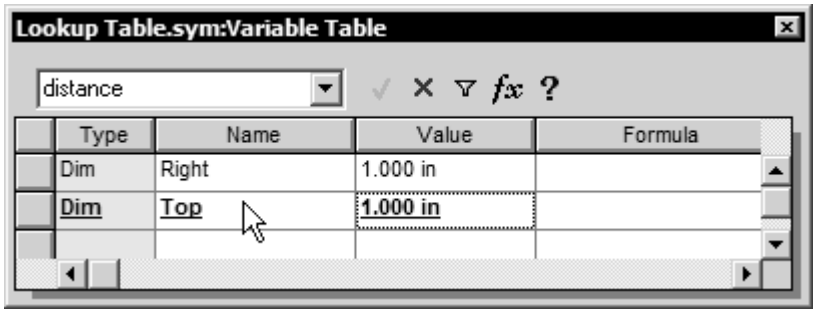
Step 3 – Draw Symbol Graphics and Define Symbol Properties

1. Open SmartSketch. Turn on **Maintain Relationships** on the **Tools** menu.
2. Using the **Line/Arc Continuous** command, create a square that is 1 inch x 1 inch. Do not use the Rectangle command.
3. Select **Tools** > **Layers** and create a layer called *Dimension*.
4. Use the **SmartDimension** command to dimension the top and right sides of the square.

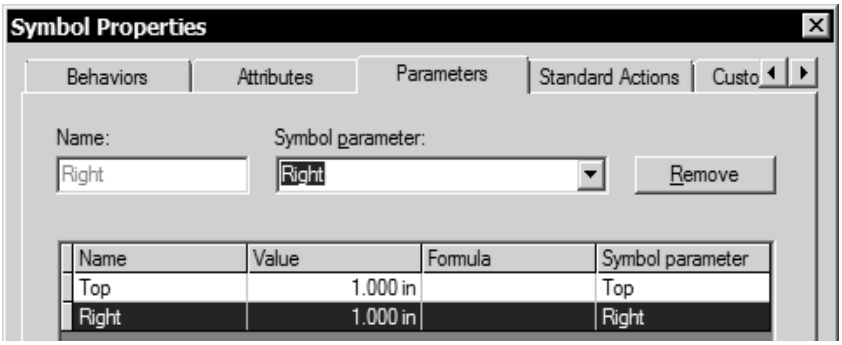


5. Create a symbol from the square and dimensions. Double-click the symbol document in the **Symbol Explorer** to open it.
6. Select **Tools > Variables** and assign meaningful variable names to the top and right dimensions.

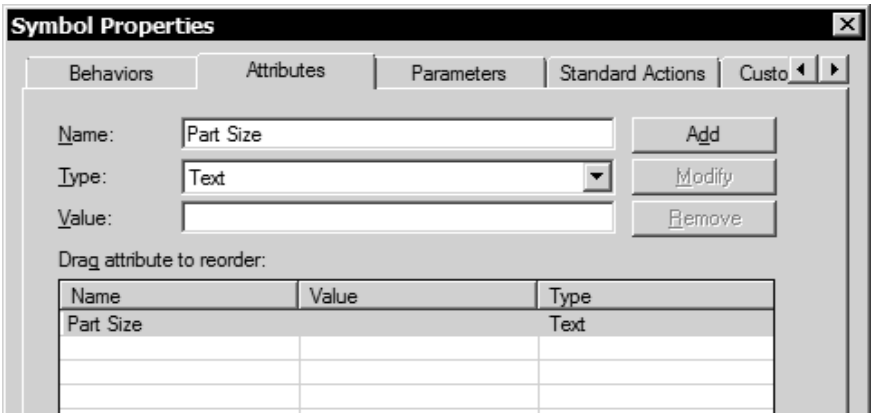
   Note: Assigning variable names to dimensions is optional.



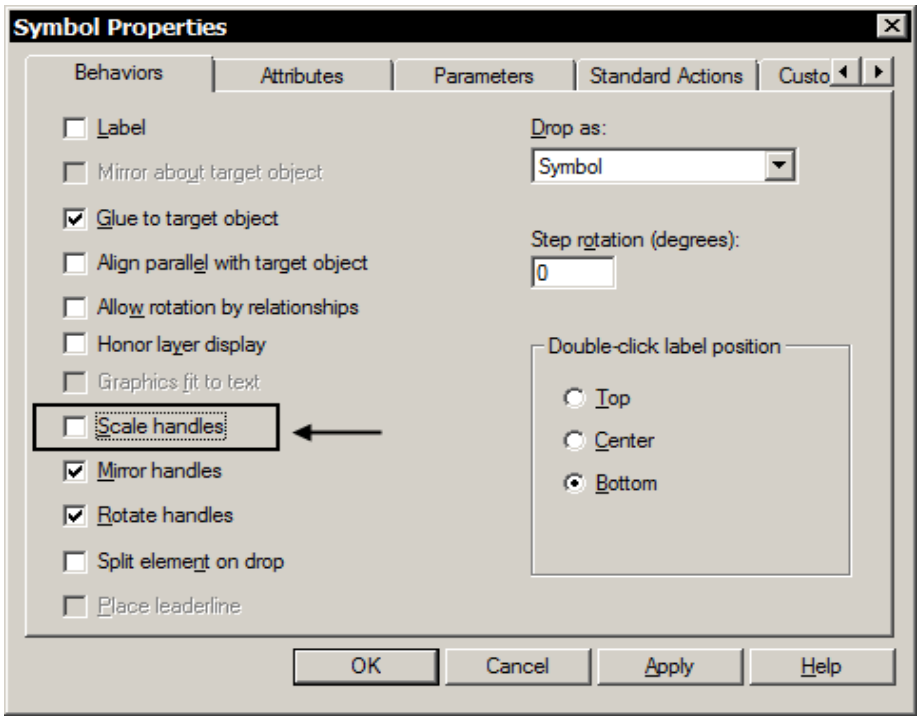
7. From the **Symbol Authoring Tools** toolbar open the **Symbol Properties** dialog box. Activate the **Parameters** tab and assign the **Top** and **Right** symbol parameters to the top and right dimensions. Click the **Apply** button to complete the parameter assignment.



8. Select the **Attributes** tab. Create an attribute named **Part Size** with a type of **Text**. Click the **Add** button to add the attribute and then click the **Apply** button. This attribute will be used as the key for the Lookup Table.



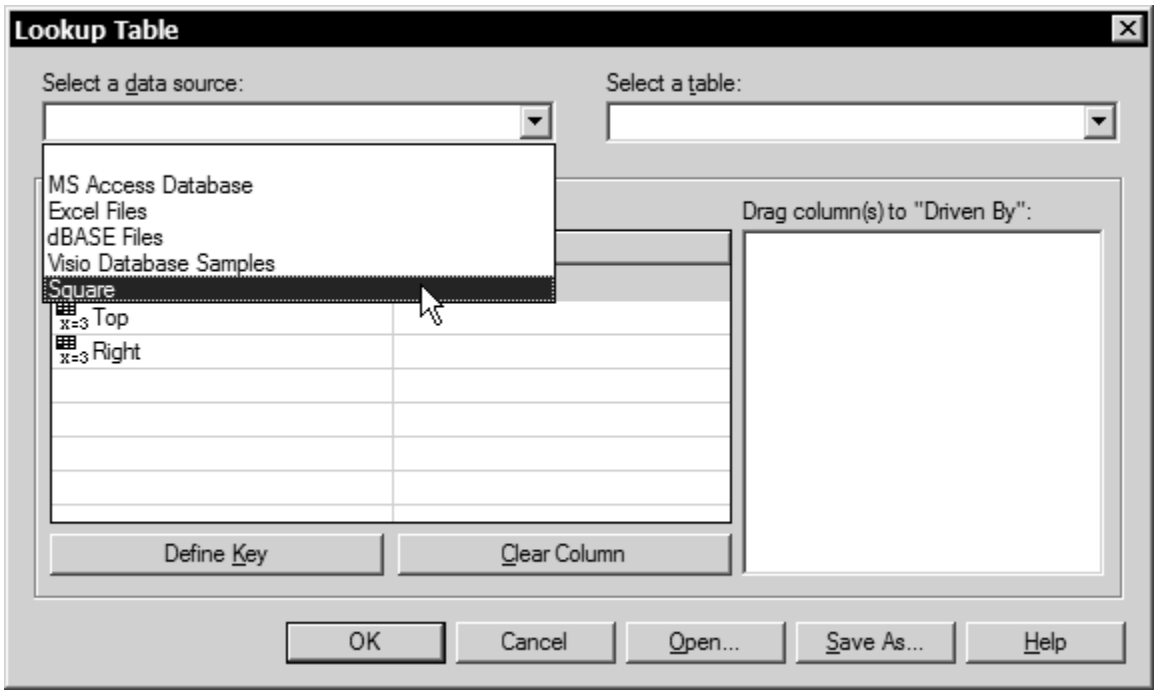
9. Select the **Behaviors** tab. Toggle off the **Scale handles** setting for the symbol and click the OK button. Since this is a parametric symbol you do not want the user to be able to scale the symbol using scale handles.



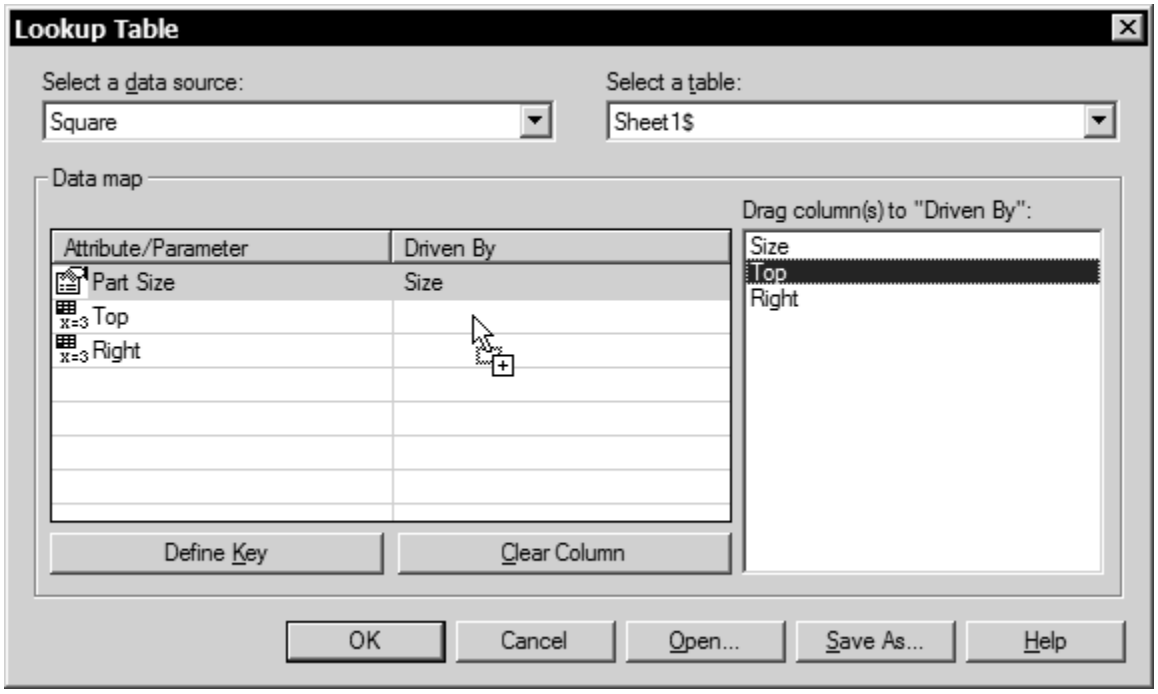
Step 4 – Generate a Lookup Table

1. Select the **Lookup Table** icon from the **Symbol Authoring Tools** toolbar.

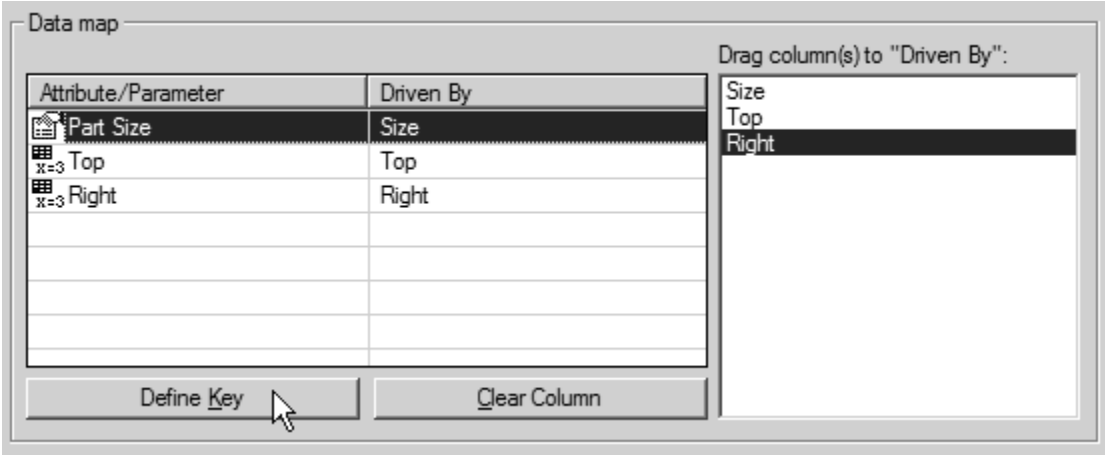
2. In the **Lookup Table** dialog box, select the data source that you created in the previous steps (**Square**) from the **Select a data source** dropdown list. Once the data source has been selected, the active sheet is listed for the table. Also, the values listed in the key row of the spreadsheet are displayed.



3. Drag columns from the **Drag column(s) to "Driven By"** list to the appropriate **Driven By** column in the data map section of the dialog box. The symbol attributes/parameters will be driven by the values in the associated columns in the spreadsheet.



4. Double-click **Part Size** in the **Attribute/Parameter** column to specify it as the unique **Key** (or select **Part Size** and press the **Define Key** button).



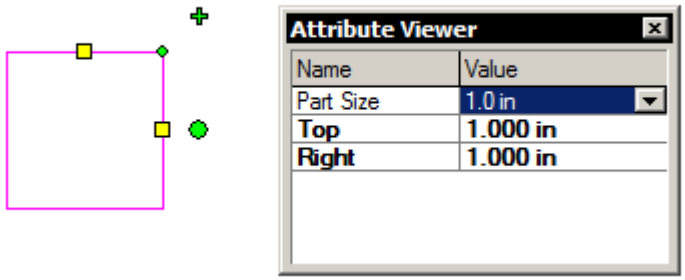
5. Save the information in an .xml file by clicking the **Save As** button. Enter **Square** for the filename. By default, the file will be saved in the *...\SmartSketch\Lookup Tables* directory.

6. Click **OK** to close the **Lookup Table** dialog box.

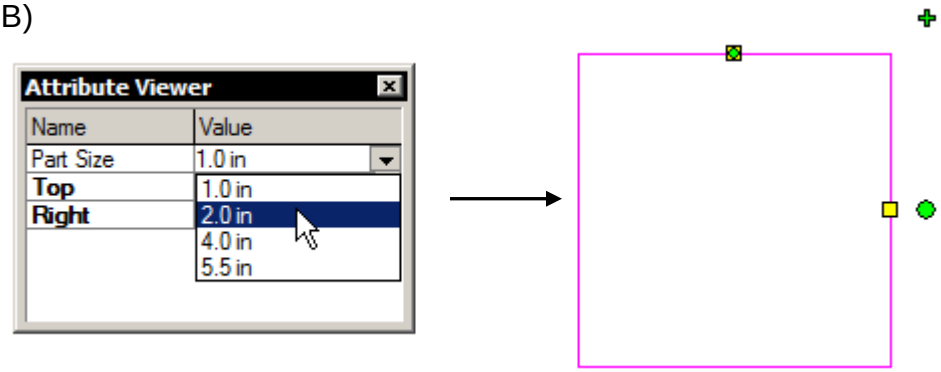
7. Turn off the dimension layer. Save and close the symbol file.

8. Test the symbol in a SmartSketch document.

A)


Attribute Viewer
Name
Value
Part Size
1.0 in
Top
1.000 in
Right
1.000 in

B)


Attribute Viewer
Name
Value
Part Size
1.0 in
Top
Right
1.0 in
2.0 in
4.0 in
5.5 in

SmartLabels

A ***SmartSymbol*** is a symbol that can watch another graphical object and when the object that it is watching is modified, the SmartSymbol is also modified. A ***label*** is an instance of a SmartSymbol, except instead of displaying only graphical objects, the label displays text as well. If you place a label on the pipe, the label will maintain its relative position to the pipe if the pipe is moved. The user can also enter text in the label just as if it were a textbox.

In addition to watching a graphical object, a label containing SmartText can watch an attribute value on the graphical object that it is placed on. This allows the label to display the value of the attribute in a textbox and change the displayed text when the attribute value is changed. This type of label is called a ***SmartLabel***.

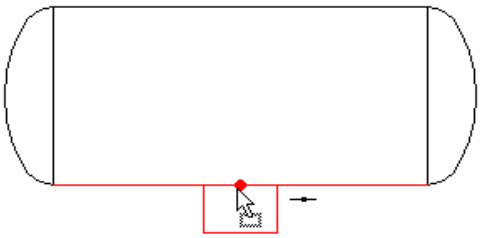
SmartLabels can have multiple textboxes and can watch multiple attributes on the graphical object that it is connected to.

Examples of SmartLabels can be found in the following directory:
...\SmartSketch\Symbols\Diagramming\Network\Access Units.

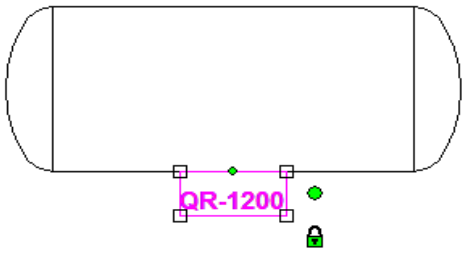
Place the symbol, *Token Ring LAN Access Unit BBOX035C.sym*, in a file. Select one of the SmartLabel symbols from the *Access Units* directory and drag it on the Token Ring symbol.

Drop a SmartLabel on a Symbol

1. Drag a SmartLabel from the **Symbol Explorer** and touch a symbol.



2. If the symbol contains the specified attribute(s), the attribute value is displayed in the SmartLabel. If the symbol does not contain the specified attribute, the attribute is added to the symbol and the default value is displayed in the SmartLabel.

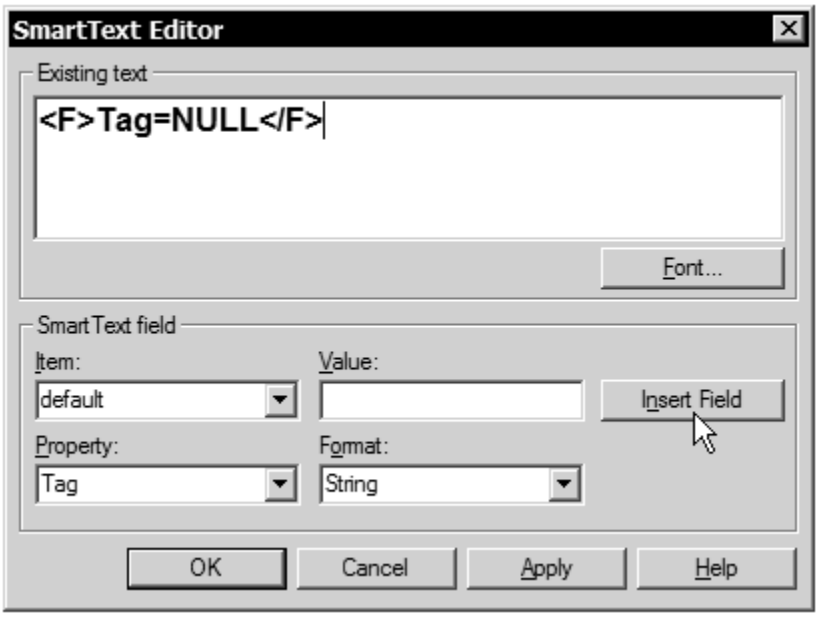


Edit SmartText Command

The **Edit SmartText** command is used to define the contents of a SmartLabel that is associated to attribute names and values. The symbol must be defined as a Label (see the **Behaviors** tab on the **Symbol Properties** dialog box). One or more attributes can be associated to a SmartLabel. The values of the attributes can be predefined or null. When a SmartLabel is dragged and dropped onto an object or symbol that does not contain the specified attributes, the attributes in the SmartLabel will be added to the object or symbol. When a SmartLabel is dropped onto an object or symbol that has the same attribute names, the values will be read from the target object or symbol and be displayed in the SmartLabel during placement.

SmartText Editor Dialog Box

Places and edits SmartText in a symbol. When you create SmartText in a symbol, you are defining attributes. When the symbol is placed in a document, you can edit the values of the attributes in the **Attribute Viewer**. SmartText is typically used to create SmartLabels.



SmartText Editor Box - Existing Text

Specifies the text that appears in the label. You can type in plain text or insert a field by defining information in the **Property**, **Value**, and **Format** boxes.

Item

Currently not used.

Property

Specifies the attribute on the object that you want to label.

Value

Identifies the value of the attribute based on what appears in the **Format** box.

Format

Identifies the format of the attribute. The format can be any format supported by Visual Basic.

Insert Field

Enters the information that you specify in the **Property**, **Value**, and **Format** boxes into the **SmartText Editor Box**.

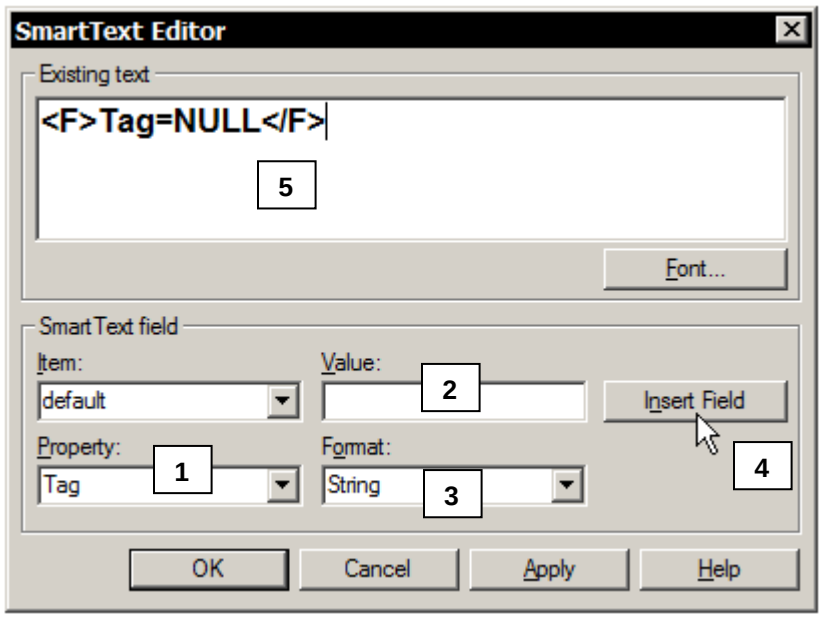
If you want to remove a field, you must select the field in the **SmartText Editor Box** and press the **Delete** key. You can then define a new field.

Font

Determines the format of the characters that appear in the SmartLabel. For example, you can select Arial Bold 12 Point.

To define SmartText Attributes for a SmartLabel

1. Draw any graphic object. Select the object and create a symbol.
2. Open the symbol document by double-clicking the symbol in the **Symbol Explorer**.
3. Select the object and delete it. The object was used to create the symbol document.
4. On the **Symbol Authoring Tools** toolbar, click the **Edit SmartText**  icon.



5. Enter an attribute name in the **Property** (**1**) box and press the **Tab** key.

The property is an attribute of the object that you want to label such as Manufacturer, Cost, Location, Description, etc.

6. Enter an attribute value in the **Value** (**2**) box and press the **Tab** key. Attribute values can be predefined or they can remain null.

7. Select the format of the value in the **Format** (**3**) box and press the **Tab** key. The format can be any format supported by Visual Basic.

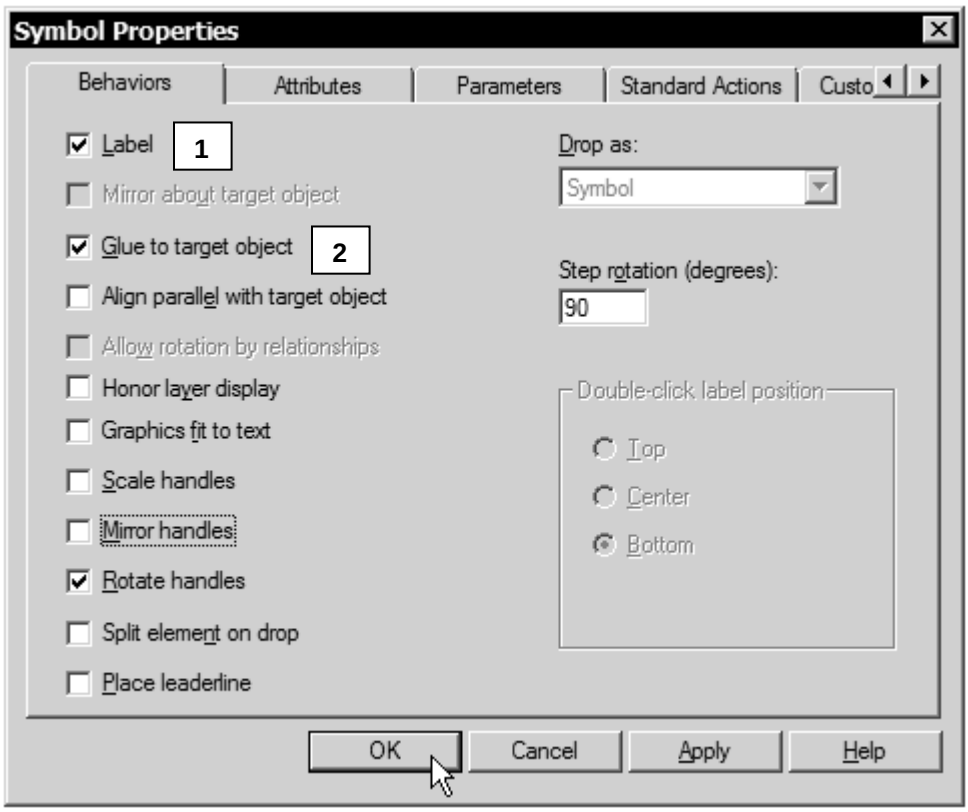
8. Click the **Insert Field** button. (**4**)

The information displays in the **SmartText Editor Box**. (**5**)

9. Repeat steps 5 through 8 to add additional attributes.

10. Click the **OK** button when finished.

11. Select the **Symbol Properties**  icon from the **Symbol Authoring Tools** toolbar.



12. On the **Behaviors** tab of the **Symbol Properties** dialog box, select the **Label** checkbox (**1**) and **Glue to Target Object** checkbox (**2**). Click the **OK** button.

13. Save and close the symbol file.

14. Test the SmartLabel by dragging it from the **Symbol Explorer** and dropping it on a symbol or object.

Notes:

- When the SmartLabel is placed on an object, it displays the value of the attribute that is assigned to the object or the default value if the object does not contain the attribute.
- The **Font** button in the **SmartText Editor** dialog box determines the format of the characters that appear in the SmartLabel.
- If you want to remove a field, you can select the field in the **SmartText Editor Box** and press the **Delete** key. You can then define a new field. You cannot select individual characters between the angle brackets of a SmartText field. You can only select the entire field.