Visio® 2000 Technical Edition

User Guide

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Contents

Welcome to Technical Edition

The Visio® 2000 Technical Edition drawing application gives you templates, stencils, shapes, wizards, and drawing tools to create precise 2-D (two-dimensional) technical drawings and diagrams. In this User Guide, you will find

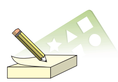
- Descriptions of new and improved features.
- Visio basics, including everything you need to know to start creating drawings quickly and efficiently.
- Conceptual discussions, step-by-step procedures, and helpful tips for quickly creating all types of technical drawings.

You can also view this guide online by installing the PDF files located in the Docs folder on the Visio 2000 CD.

Topics in this chapter

Finding the information you need

The Technical Edition User Guide covers the fundamentals of Visio 2000, and focuses on the drawing types and methods you're likely to use most often. The guide includes a glossary of commonly used terms. Glossary terms appear in ***bold italics*** the first time they're mentioned or discussed.



This symbol in the margin accompanies useful hints and how-tos.

In addition to this guide, the following resources offer a wide range of information about working with Visio products.

Installation

For information about installing your Visio 2000 program, refer to the Quick Reference card included in the product box.

Visio on the Web

To reach Visio Corporation and the Visio Knowledge Base using the World Wide Web, in Visio 2000 choose Help > Visio On The Web. The Visio Knowledge Base offers the latest tips on using Visio 2000 products and includes articles that answer frequently asked questions (FAQs).

The Visio Web site also contains information on service releases, support forums, and training opportunities. You'll find the Visio Web site at

- www.visio.com

Sources of other information

More resources for getting the answers you need to work efficiently in your Visio 2000 application are available.

- The *Developing Visio Solutions* manual contains information about building custom shapes or solutions with Visio applications. You can order the manual or view the online version on the Visio 2000 CD.
- For information about Technical Support, in Visio 2000 choose Help > Visio Help, and then on the Contents tab, look under the Technical Support heading.

Online Help

This guide provides the big-picture information for working in Visio 2000. More details and how-to information are just a click away in the online Help.

Throughout this book, this cross-reference icon indicates that more information on that topic is available in online Help. To see the additional information, just search online Help using the keywords provided.

To search online Help for a keyword

1. Press F1, and then click the Index tab. (If necessary, click the Show button.)
2. Under Type In The Keyword To Find, type the keyword you want to use. (Keywords are listed under the cross-reference icon.)
3. Click Display.

Navigating the Visio Help window

The first time you choose the Visio Help command, or click F1 or Shift+F1, the Visio Help window opens. You can use the following tabbed pages in the navigation pane of the Help window while you work:

- **Contents** contains headings with topics listed below. Click the plus sign (+) to expand the heading and see the topics.
- **Index** contains index terms. Click this tab to view and search index entries.
- **Favorites** contains topics you designate for quick reference.

The navigation pane appears by default the first time you open Help. You can open or close the navigation pane, select a tab in the navigation pane, and resize or reposition the Help window. Each time you open Help, the window appears in the same state as the last time you used it.

To hide the navigation pane

- Click the Hide button ( ) on the Help window toolbar.

To show the navigation pane

- Click the Show button ( ) on the Help window toolbar.

Get help quickly while you work

For help about	Do this
Concepts, terms, features	Press F1, click Search (if necessary, click the Show button), and then type your question to use the Visio intelligent search capability.
Shapes	Do one of the following: • Pause your pointer over the shape in the stencil window until a ScreenTip appears. • Press F1, click the Index tab (if necessary, click the Show button), type the name in the index text field, and then click Display. • Right-click a shape on the page or the stencil, and then choose Help.
Menu commands	Press F1, click the Index tab (if necessary, click the Show button), type the name in the index, and then click Display.
Dialog boxes	Click the Help button ( ) in the dialog box.
Automation, ShapeSheet® spreadsheet	Choose Help > Developer Reference, or press F1 in a ShapeSheet cell.

What's new in Visio 2000

New and powerful additions to Visio 2000 make it easier than ever to create technical drawings and diagrams.

Common tasks made easy

You can work faster and smarter using a core group of enhanced features that all of the Visio 2000 products share.

- Easily create custom data for shapes that you can later use for reports.
- Set tabs, margins, and hanging indents using a text editing ruler.
- Nudge selected shapes using the arrow keys for precise placement in your drawing.
- Easily navigate, rearrange, and rename pages using page tabs.
- Edit groups the same way you edit regular shapes.
- Edit stencils directly in the drawing window.
- Customize menus and toolbars.
- Perform tasks right in the drawing window using quick editing windows. The following table lists the window types and the tasks you can perform.

Quick editing windows in Visio 2000

Window type	Purpose
Pan & Zoom window	Easily zoom in or out with increased precision
Custom Properties window	View and edit a shape's custom properties
Size & Position window	Change a shape's size, position, or rotation
Document Explorer window	View all of the elements in your document

New and enhanced technical solutions

Visio 2000 offers new and enhanced technical solutions that make it easy to assemble drawings by dragging industry-standard shapes onto a page.

Precision drawing tools

- Draw shapes using the shape extension lines, which provide visual feedback about shape angles, tangents, and other geometric relationships.
- Position and align shapes instantly with the dynamic grid, which provides visual cues to help you align shapes.
- Snap lines to geometric points, such as end points, tangents, and line intersections, for more accurate drawing.

DWG and DGN support

- Insert CAD drawings created in Autodesk AutoCAD DWG or DXF format or Bentley MicroStation DGN format.
- Convert CAD drawings into Visio format more easily by using the new Convert Wizard.
- Choose an industry-standard scale for inserted CAD drawings that either matches the Visio drawing scale or is independent of the Visio drawing scale.
- Snap shapes, such as electrical outlets, HVAC ducts, and furniture shapes, to inserted CAD floor plans.

Process Engineering

- Draw P&IDs (piping and instrumentation diagrams) and PFDs (process flow diagrams) faster using intelligent pipeline connections that automatically reroute.
- Store specification data about process components in customizable datasheets.
- Quickly and easily generate component lists from the data stored in your diagrams.
- Convert your legacy CAD symbols or block libraries into intelligent Process Engineering shapes.
- *New* Print datasheets for many components at once.
- *New* Edit data for multiple components in the Datasheet window, which you can keep open for ease of data entry.

Facilities Management

- Graphically manage office moves and track your facilities assets and employees.
- View relational information about your facilities in the easy-to-navigate Visio CAFM Explorer, which can now be docked so that you can view the Explorer and your drawing at the same time.
- Easily add configured Steelcase 9000 furniture to your facility plan.
- *New* Link to enterprise data in existing corporate databases.

Building Architecture

- Quickly lay out a floor plan by using room and space shapes that you can easily convert to fully dimensioned walls.
- Quickly add dimension lines and guides to any wall, and resize rooms by dragging guides.
- Use space shapes inside rooms to show the room area, which you can update with a single command when you resize the room.

Building Services

- Create HVAC diagrams by using ductwork shapes that automatically rotate, align, and snap to each other.

Office layouts

- Quickly lay out office floor plans by using room and space shapes to automatically create walls and dimension lines.

1

Visio basics

While each Visio® 2000 Technical Edition template contains a unique set of shapes, tools, and styles, some tasks are common to all types of Visio drawings or diagrams. This chapter explains the drawing tasks that can get you started using the Visio program in minutes, regardless of the type of drawing you're creating.

This chapter begins with an overview of the drawing process, and then describes how you can

- Create your drawing.
- Work with stencils and shapes.
- Add and edit text.
- Work with groups of shapes.
- Work with multiple pages.

Subsequent chapters focus on creating specific types of drawings, such as floor plans, facility plans, and P&IDs (piping and instrumentation diagrams).

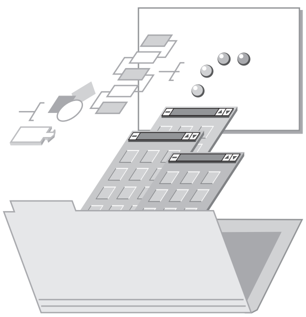
Topics in this chapter

The big picture

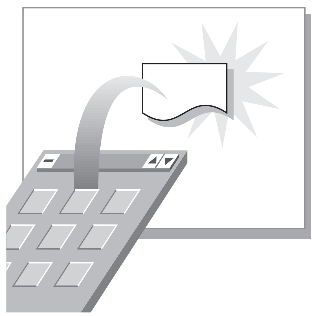
The Visio 2000 products share a core set of features. This means that you can use common methods to work with all of the Visio 2000 programs to create your drawings—whether they are business drawings or diagrams you create with Standard Edition, such as flowcharts or block diagrams; technical drawings you create with Technical Edition, such as P&IDs or electrical schematics; or database design and modeling drawings you create with Professional Edition or Enterprise Edition, such as Web site schematics or object role modeling diagrams.

The illustration below shows five steps all Visio 2000 drawings have in common. The following page shows the actual ***workspace*** you'll use to create Visio drawings.

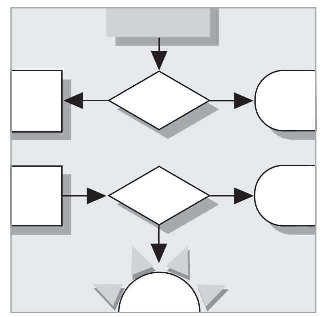
Five steps to making a Visio drawing



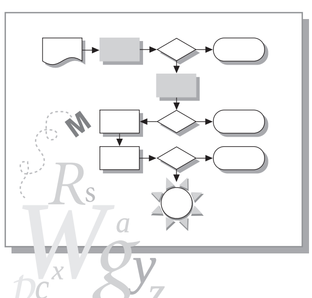
1 Start a drawing or diagram by opening a drawing type, or template.



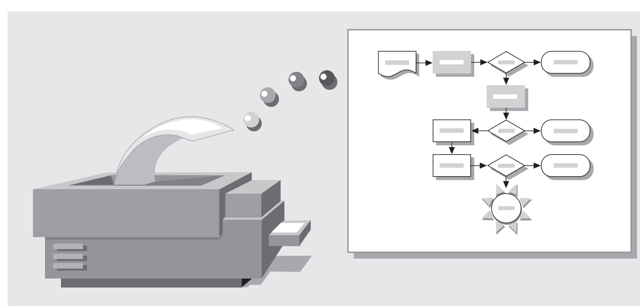
2 Add shapes by dragging them from the stencil and dropping them onto the drawing page.



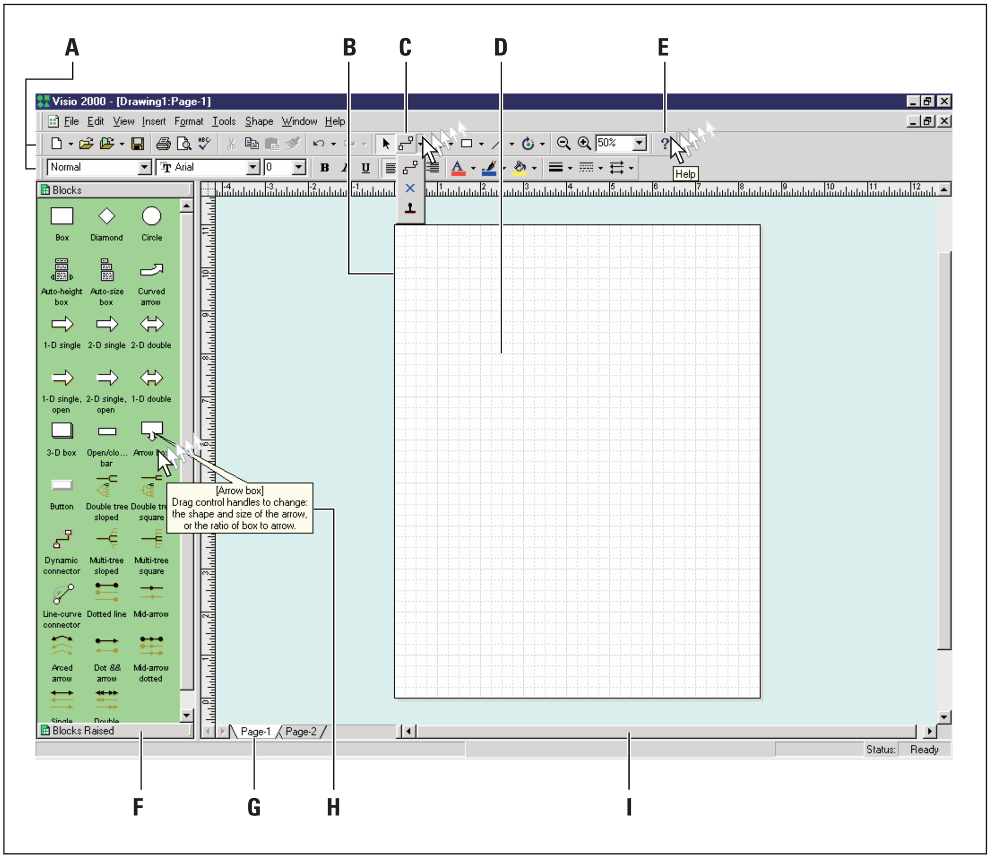
3 Connect the shapes in your drawing.



4 Add text to shapes in your drawing, and add independent text for titles.



5 Publish your drawing to the Web, or print your drawing to share it with others.



The Visio 2000 workspace

Each drawing type opens with stencils, shapes, and toolbars appropriate to that drawing type.

A Tools are grouped in functional sets on toolbars. You can specify which toolbars you want to display by choosing View > Toolbars.

B The drawing page opens with size, orientation, scale, grid, and measurements appropriate for the drawing type.

C You can find additional related tools by clicking the arrows next to the buttons.

D You can use the drawing page grid to align shapes to each other.

E ScreenTips appear when you pause the mouse pointer over a toolbar button.

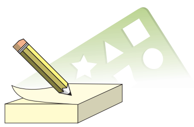
F Stencils, or collections of masters, dock to the left of the drawing page, by default.

G With page tabs you can quickly insert new pages, navigate multiple-page drawings, delete pages, rename pages, and reorder pages.

H Masters are shapes you can add to your drawings. To quickly view information about a shape, pause the mouse pointer over the shape.

I When your drawing has multiple pages, you can move the horizontal scroll bar to view all of the page tabs.

Creating a drawing



To locate a specific shape quickly, use the ***Shape Explorer***™ *to find it. Choose Tools > Macros > Shape Explorer.*

When you base a drawing or diagram on a Visio ***drawing type*** (also called a ***template***) in Visio 2000, you automatically get all the tools and features you need to create that particular type of drawing.

For example, to create an organization chart, you open the Organization Chart drawing type.

To start an organization chart

1. Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Organization Chart.

   You can see a preview of the drawing types in the Drawing Type box.
3. In the Drawing Type box, double-click Organization Chart.

   A drawing page appears, with the stencils and tools you need to begin your drawing.

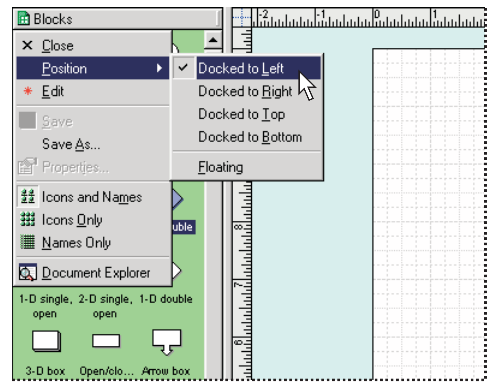
Working with stencils

When you start a new drawing or diagram by opening a template, Visio 2000 opens one or more task-related ***stencils***. Stencils contain ***shapes*** you can drag onto the drawing ***page*** to create your drawing. You can arrange, resize, and connect the shapes in your drawing to create the drawing you want.

To move stencils within the Visio window

1. Click the icon ( ) on the stencil title bar.

   A menu appears.
2. Choose Position, and then choose the stencil placement you want from the submenu.



You can dock or "float"—make movable—stencils as you work on your drawing.

TIP *For quick access to stencil menu commands use the Stencil toolbar. Choose View > Toolbars > Stencil.*

To open additional stencils

- Choose File > Stencils > Open Stencil, choose the stencil you want to open, and then click OK.

Adding shapes to your drawing

The easiest way to create a drawing or diagram is to drag shapes from a stencil onto the drawing page. When you drop a shape onto the drawing page, Visio 2000 ***snaps*** the shape to the nearest ***grid*** line so you can position it precisely in your drawing.

TIP *You can use a dynamic grid (dashed lines) to indicate the location for the center of the next shape you drag onto the page, based on the location of shapes already on the page. Choose Tools > Snap & Glue, and then check Dynamic Grid.*

To add a shape to your drawing

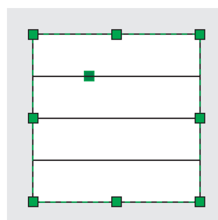
1. Choose the pointer tool ( ) from the Standard toolbar, located just below the menu bar.
2. In the stencil, select the shape you want.
3. Hold down the left mouse button and drag the shape onto the drawing page.
4. Release the mouse button to drop the shape onto the drawing page.

NOTE *If you make a mistake, you can use the Undo toolbar button ( ) to cancel your most recent actions, and the Redo button ( ) if you change your mind.*

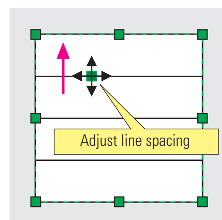
Using shape handles

Visio shapes have handles you can use to resize or move the shape, or to change the shape's appearance, position, or behavior. You use ***selection handles*** ( ) to resize shapes, and ***control handles*** ( ) to perform actions that are unique to the particular shapes on which they appear.

For example, you might use a control handle to adjust the position of a shape or move a line in a shape. To display a ***ScreenTip*** about what the control handle does, pause the mouse pointer over the control handle.



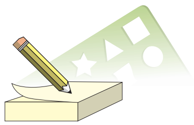
The control handle looks just like a selection handle, but has darker shading.



To see a ScreenTip for what a control handle does, pause the pointer over the control handle.

For details, use these online Help keywords:

- *Shape basics*
- *Guides and guide points*
- *Handles*



*To **nudge** a shape slightly in one direction, select the shape, and then click the up, down, left, or right arrow key.*

Moving and resizing shapes

Moving Visio shapes is as easy as selecting the shapes and then dragging the ***selection*** to the new location in your drawing or diagram. You can resize shapes quickly by simply dragging selection handles.

To move or resize a shape

1. To move the shape, select the shape with the pointer tool ( ), hold the left mouse button while dragging the shape to the location you want in your drawing, and then release.

   The pointer turns white when the shape is movable.

2. To resize a selected shape, point to a selection handle ( ) until the pointer changes to a four-headed arrow ( ), and then drag the handle to change the size.

To move multiple shapes

1. Click to select a shape, hold down the Shift key, and then click the other shapes you want to select.

2. Move the pointer over one of the shapes until the pointer turns white.

   The shape is movable when the pointer changes from a black arrow to a white arrow.

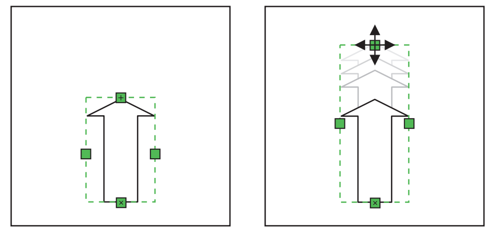
3. Drag the shape to its new position.

   All selected shapes move, and retain their original spatial relationship.

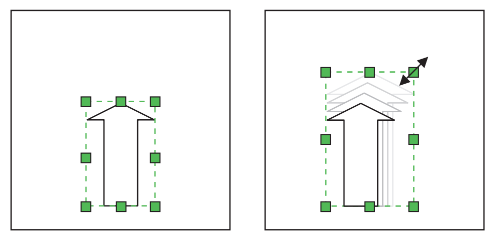
TIP *To limit the movement of shapes to horizontal or vertical, hold the Shift key while dragging.*

Using 1-D and 2-D shapes

Visio shapes can be ***one-dimensional (1-D)*** or ***two-dimensional (2-D)***.



1-D shapes behave like lines and display ***endpoints*** you can drag to resize the shapes when you select them with the pointer tool.



2-D shapes have corner handles you can drag to resize the shapes proportionally, and side selection handles you can drag to resize them horizontally or vertically.

Connecting shapes

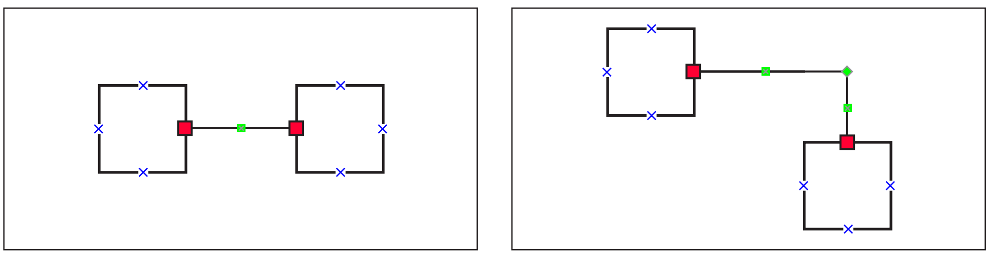
Flowcharts, organization charts, block diagrams, and network diagrams are all connected drawings—drawings that show relationships between shapes.

In a Visio connected drawing, a ***connector*** is any 1-D shape that connects 2-D shapes. Connected shapes stay connected when one of the shapes is moved. When you attach a connector to a ***connection point*** (✕) on a shape or to the shape itself, you ***glue*** the connector to the shape.

You can use two types of connections in Visio 2000, ***shape-to-shape*** and ***point-to-point***. The type of connection you use depends on how much control you want over your drawing.

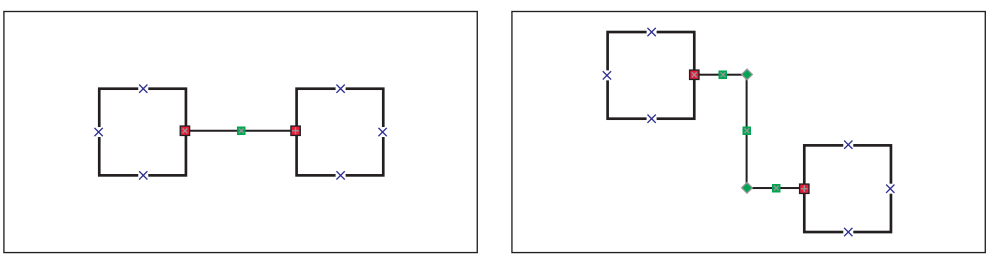
With shape-to-shape connections, Visio 2000 maintains the most direct connection between the shapes. This means that the actual points of connection might change when you move the connected shapes in relation to each other.

With point-to-point connections, the actual points of connection stay the same no matter how you move the connected shapes.



Shape-to-shape connections

When you move shapes that have shape-to-shape connections, the connector attaches at the closest points between the shapes, which might be different from the original connection points.



Point-to-point connections

When you move shapes that have point-to-point connections, no matter how you arrange the shapes in relation to each other on the drawing page, the shapes maintain their original connection points.

To connect shapes automatically, shape-to-shape

1. Click the connector tool ( ) on the Standard toolbar.
2. Drag a shape from a stencil onto the drawing page.
3. While the shape is still selected, drag another shape from a stencil onto the drawing page.

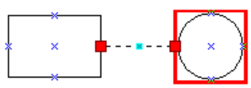
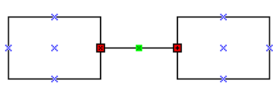
   The shapes are automatically connected shape-to-shape.

To connect shapes on the drawing page, shape-to-shape

1. Use the pointer tool ( ) to drag two shapes, one at a time, from a stencil onto the drawing page.
2. From the Standard toolbar, click the connector tool ( ), and then position the connector tool over the center of the first shape until a red box appears around the entire shape. Hold down the mouse button and drag to draw a connector.
3. While holding the mouse button, position the connector tool over the center of the shape to which you want to connect until a red box appears around the entire shape, and then release the mouse button.

   The shapes are connected shape-to-shape.

Using connections

Connection type	When to use it	How
Shape-to-shape 	To connect shapes when their specific points of connection don't matter.	Click the connector tool ( ), and then drag shapes you want to connect onto the drawing page. The shapes are connected shape-to-shape by default.
Point-to-point 	To control where the connector attaches to the 2-D shape.	Drag a connector shape onto the drawing page, and then drag the endpoint of the connector shape to the point on the 2-D shape to which you want to connect.

To connect shapes point-to-point

1. Use the pointer tool to drag two shapes, one at a time, from a stencil onto the drawing page.
2. From the Standard toolbar, click the connector tool, and then drag from the connection point on the first shape to a connection point on the second shape.

   The connection points turn red, and the shapes are connected point-to-point.

To add a connection point to a shape

1. Click the arrow next to the connector tool on the Standard toolbar, and then click the connection point tool ().
2. Hold down the Ctrl key, and then click the shape where you want to add the connection point.

   The new connection point appears (in magenta) on the shape.

To change a connection from shape-to-shape to point-to-point

- Drag a red (glued) connector endpoint () away from the shape and then back to one of the shape's connection points.

  When you drag the endpoint back to the shape, a box appears only around the connector endpoint.

Modifying shapes

You can use Visio tools to flip and rotate shapes in your drawings or diagrams, as well as to add color and change line styles.

You can use Visio tools on the Action toolbar to modify shapes.

To view the Action toolbar

- Choose View > Toolbars > Action.

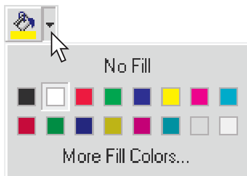
Flip and rotate shapes with Action tools

Action	Tool
Flip a shape horizontally	
Flip a shape vertically	
Rotate a shape right	
Rotate a shape left	

You can add color and shadows to shapes and instantly make your drawings more visually dynamic. You can also change the format of lines and line ends in your drawings. By applying line ends, you can turn any line into an arrow.

To view the fill color palette

- Click the arrow next to the Fill Color button on the Format toolbar.



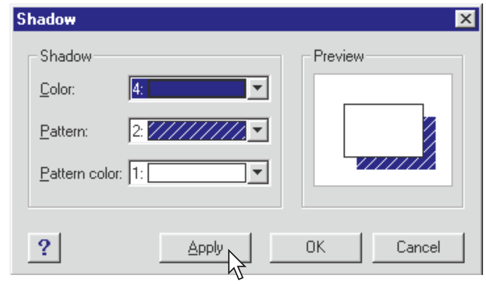
The fill color palette. Click More Fill Colors for additional colors.

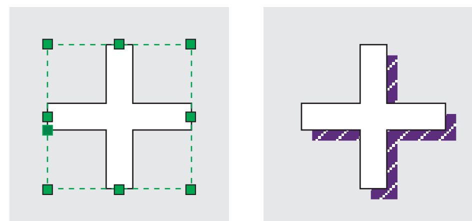
To apply color to a shape

- Select the shape and choose the ***fill*** color you want to use from the fill color palette on the Format toolbar.

To apply or remove a shadow

1. Select the shape.
2. Choose Format > Shadow.
3. In the Shadow dialog box, choose the options you want to apply from the Color, Pattern, and Pattern Color lists.
4. Click Apply to view the options you chose before closing the dialog box, or click OK to apply the formatting and close the dialog box.
5. To remove a shadow, choose None from the Pattern list in the Shadow dialog box.





Use the Shadow dialog box to add, change, or delete shadows for shapes in your drawings.

To format a line style

- Select the shape and choose the Line Weight, Line Pattern, and Line Ends buttons on the Format toolbar to select the formatting you want to use.

For details about drawing your own shapes, see Chapter 9, “Go further: Creating shapes, styles, and templates.”

Adding and changing text

Text can clarify the meaning of your Visio drawings or diagrams, and you can use text to document changes you or other Visio users make to a drawing. You can use text to

- Describe the process a shape represents in a process flow drawing.
- Add title blocks and bulleted lists to your drawings.
- Annotate a drawing.

Most Visio shapes, including connectors, are designed so that you can add text to them. You can also edit the text in a shape by double-clicking the shape, and then editing the ***text block***.

In addition, you can create text-only shapes—shapes that have no lines or fill—to add notes, titles, and lists to a drawing.

NOTE *Text for some shapes, such as the Wall shape in the Office Layout template, is generated automatically from data in the shape's custom properties. Also, some shapes, such as the Switch shape (also in the Office Layout template), are locked against adding text. The Visio program displays a message letting you know that text cannot be added to locked shapes.*

To add text to a shape

1. Select the shape, and then type the text you want.
2. When you finish typing, press the Esc key or click outside the shape.

TIP *To quickly select text in shapes, double-click the shape. You can change the default behavior for the double-click action by choosing Format > Behavior. Click the Double-Click tab, and then select the option you want.*

To delete text from a shape

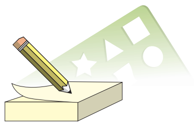
1. Choose the text tool ( ) from the Standard toolbar, located just below the menu bar.
2. Click the shape containing the text you want to delete.
3. Select the text you want to delete, and then press the Delete key.
4. Click outside the text block to close it.

To edit existing text

1. Double-click the shape to open the shape's text block, and then type. You can also click the Text tool ( ) on the Standard toolbar, click the text, and then type.
2. Click in the text block where you want to place the insertion point, and then type the text you want.
3. When you finish typing, click outside the shape.

For details, use these online Help keywords:

- *Text and text blocks*



To find and change text in large drawings, use the Find And Replace dialog box. Choose Edit > Replace, and then type the replacement text.

To format text, do one of the following

- Use the commands on the Format menu or the tools on the Format toolbar to apply formatting to the selected text.
- Use the Text style lists on the Format toolbar to apply a style to the selected text.

To create a text-only shape

1. From the Standard toolbar, click the text tool (A).
2. Click the drawing page where you want the text to begin, and then type.

   Or, drag the mouse until the text block is the size you want, release the mouse button, and then type.

3. When you finish typing, press the Esc key or click outside the text block.

Using the text ruler

You can turn on the text ruler to help you ***format*** text in a shape as you edit it. The ruler shows the initial settings for the indents and tab stops of the selected paragraph.

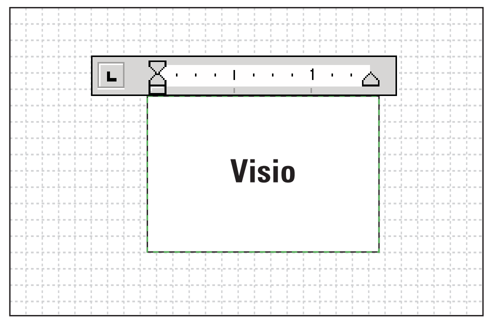
You can quickly change the settings for the selected text by dragging the tab stops and indent markers to the location on the scale you want in the text edit window.

To turn on the text ruler

1. Double-click a shape to open the shape's text block, or click the text using the text tool (A) on the Standard toolbar.
2. Right-click the shape with its text block selected, and then choose Text Ruler from the shortcut menu.

   The text ruler appears above the shape.

   The text ruler appears for all subsequent shapes when you edit their text. To turn off the text ruler, right-click the shape in text-edit mode, and then choose Text Ruler.



The text ruler appears directly above the text edit window.

Grouping shapes in your drawings

You can ***group*** shapes so they function as a unit. It is useful to group shapes when you regularly use them together. For example, when you create an office layout, you can group office shapes with cubicles, and then you can duplicate the group and use it over and over again or move it easily to a different location in your drawing.

Creating groups of shapes

You can group any combination of Visio shapes, including those you draw yourself, other groups, and shapes from other programs. After you create a group, you can add and delete shapes from the group.

To create a group

1. Drag the shapes you want to group, one at a time, from a stencil onto the drawing page.
2. Select the first shape, hold down the Shift key, and then click to select the other shapes one at a time.
3. Choose Shape > Grouping > Group.

Modifying groups and shapes in groups

You can modify groups just as you would any individual shape. You can select, move, resize, or rotate a group as a single shape, but its members retain their original appearance and properties.

You can also select and modify the individual shapes that make up the group.

To select a group of shapes

- Click one of the shapes in the group.

  A dashed line appears around the grouped shapes.

NOTE *The pointer tool turns from black ( ) to white ( ) when positioned over an individual shape in a group.*

For details, use these online Help keywords:

- *Groups*
- *Shapes*

To select an individual shape in a group

1. Select the group by clicking a shape with the pointer tool.
2. Click the shape you want to modify in the group.

   Make any changes you want to the shape, and then click anywhere outside the shape.

The following table provides a quick summary of how you can work with shapes and groups of shapes.

Methods for working with groups

To	Do this
Group shapes	Select the shapes you want to group, and then choose Shape > Grouping > Group.
Ungroup shapes	Select the group, and then choose Shape > Grouping > Ungroup.
Modify individual shapes in a group	Select the group, and then click the shape you want to modify.
Delete a shape from a group	Select the group, click the shape you want to delete, and then press the Delete key.
Add a shape to a group	Select the group. Shift+click any other shapes you want to add to the group, and then choose Shape > Grouping > Add To Group.
Move a group	Select the group, and then drag it to the location you want.

Working with pages

For some drawing projects, you might want your ***drawing file*** to contain many drawing pages. For example, a file could represent a management project with a high-level timeline for the project on one drawing page, a flowchart of the processes in the project on another page, and the plan for staffing and resources on another page. You can change the orientation and size of your page using the Page Setup dialog box.

You can also add, delete, rename, and reorder pages easily using the page tab controls located at the bottom of the drawing window.

Setting page orientation

If you want to change drawing page settings, such as orientation or size, as you create your drawing, you can use the Page Setup dialog box to verify that your printer page settings work with the new drawing page settings you specified.

To set page orientation

1. Display the drawing page you want to change, and then choose File > Page Setup.
2. In the Page Setup dialog box, click the Page Size tab, and then select the page orientation you want.

To set printed page orientation

1. Display the drawing page you want to change, and then choose File > Page Setup.
2. On the Print Setup tab, choose the paper orientation you want (Portrait or Landscape), and then click OK.

Adding and deleting drawing pages

When you add a new drawing page to your diagram, the new page inherits the size, orientation, ***scale,*** measurement unit, shadow offset, and grid settings of the page currently displayed.

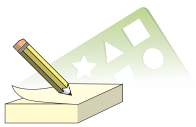
You can change these settings using the Page Setup dialog box when you insert the page, or at any time.

You can also delete pages you no longer use. If you delete the last page in a file, Visio replaces that page with a blank page.

TIP *To view all the page tabs for multiple-page drawings, you might have to move the horizontal scroll bar. Pause the cursor over the slider box ( ) until it changes to a two-headed arrow, and then drag it to the right. You can also click the scroll arrows to the left of the page tabs.*

For details, use these online Help keywords:

- *Pages*
- *Drawing scales*
- *Background pages*



To quickly resize your drawing page, hold down the Ctrl key and use the pointer tool to drag the edge of the drawing page to the size you want.

To add a drawing page

1. Right-click the page tab at the bottom of the drawing page window, and then choose Insert Page from the shortcut menu.
2. In the Page Setup dialog box, click the Page Properties tab, and then type a name for the page, or use the default name.

   You can also double-click the page tab, and then type, to quickly change the page name.

TIP *Add a* ***background*** *page to your drawing file when you want the same shape(s) to appear on more than one drawing page, such as your company logo on all pages of a mutiple-page drawing. For details about backgrounds, see “Using background pages to display common page elements” on page 129.*

To delete a drawing page

- Right-click the page tab, located at the bottom of the drawing page window, for the page you want to delete, and then choose Delete Page from the shortcut menu.

NOTE *If you change your mind after you delete a page, you can click the Undo button ( ) on the Standard toolbar to retrieve it.*

To navigate between pages

- Click the page tab at the bottom of the drawing window for the page to which you want to navigate.

  If any of the page tabs are hidden, use the arrow buttons and scroll bar to display multiple page tabs.

Click page tabs to navigate between pages. Right-click page tabs to view page menu commands.

Resizing pages

Resizing pages enables you to enlarge a page where you need it and remove empty space you do not need, both without changing the ***drawing scale***.

To resize a page

1. Choose File > Page Setup.

   The Page Setup dialog box appears.
2. Click the Page Size tab, type the page dimensions you want under Custom Size, or select a page size option, such as Size To Fit Drawing Contents, and then click OK.

For details about page setup, see “Printing your drawings” on page 116.

Enhancing your drawing

You can use color and style ***formats*** to make your drawing a more powerful communication tool, or simply to make it more aesthetically appealing.

Add a ***color scheme*** to your drawing, or use ***styles*** to modify the look of lines, colors, and text.

NOTE *Color schemes are available for all drawing types except Directional Map and Office Layout.*

To apply a color scheme

1 Open the drawing for which you want to create a color scheme.

2 Choose Tools > Macros > Visio Extras > Color Schemes.

3 In the Color Schemes dialog box, select the color scheme you want to use, and then click OK.

To apply a style

1 Open the drawing for which you want to apply a style.

2 Select one or more shapes you want to format.

3 Choose Format > Style, and then select the style you want from the lists. All the styles available in a drawing, both those predefined in a template and those you define yourself, are listed in the Style dialog box.

For details about creating your own styles, see "Defining and editing styles" on page 128.

For details, use these online Help keywords:

- *Color schemes*
- *Styles*

Saving and printing your work

You should frequently save drawings or diagrams as you work. You should also be sure to save any stencil and template files that you change.

The first time you save a drawing, Visio 2000 prompts you for document properties, such as whether to save a preview, a small thumbnail version of the drawing. The properties you specify appear in the Open dialog box when you select the drawing file name.

You can print your drawings by choosing a menu command or toolbar button.

To save a drawing for the first time

1 Choose File > Save or Save As.

2 For File Name, type a name for the drawing file.

3 Under Save In, open the folder in which you want to save the file.

4 Click Save.

5 In the Properties dialog box, enter the information you want, and then click OK.

6 Click Save.

To print your drawing, do one of the following

- Click the Print button () on the Standard toolbar.
- Choose File > Print.

For details about printing and delivering your drawings, see Chapter 8, “Sharing your drawings with others.”

2

Drawing precisely

Engineering and architectural diagrams and drawings require accurate measurements and precise positioning of shapes. Visio® 2000 Technical Edition provides drawing and positioning tools that are easy to use but powerful enough for the most complex drawings.

This chapter describes how you can

- Set the drawing scale and choose measurement units.
- Add dimension lines to shapes.
- Position shapes precisely by using grids, guides, and snap options.
- Position shapes by using coordinates.
- Work with large drawings.

Topics in this chapter

Measuring and dimensioning

You can set up your Visio drawings with the drawing scale and measurement units you need to create a wide range of engineering and architectural drawings.

Setting the drawing scale

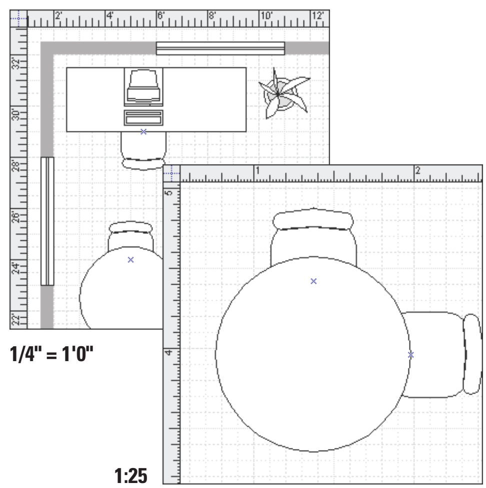
Many engineering or architectural drawings require a drawing scale that makes it possible to represent very large or very small objects on a sheet of paper. The drawing scale is a ratio that compares the size of the drawn object to the actual size of the object the drawing represents. For example, in an architectural floor plan, the drawing scale might be 1/8" = 1'0", where 1/8 inch on the drawing page represents 1 foot in the real world. In a drawing of a bolt, the scale might be 10:1, where 10 millimeters on the drawing page represents 1 millimeter of the actual bolt.

When you start a measured drawing in Visio 2000, the drawing page opens with a default drawing scale. For example, floor plans have a drawing scale of 1/8" = 1'0". Some schematic diagrams, such as electrical diagrams, have a scale of 1:1. You can change the drawing scale at any time, and you can set a different drawing scale for each page of your drawing.

To change the drawing scale for a page

1. Display the page whose scale you want to set.
2. Choose File > Page Setup, and then click the Drawing Scale tab.
3. Click Pre-Defined Scale, and then select an engineering or architectural scale. Or, click Custom Scale, and then type a custom scale.

   When you type a custom scale, enter the measurement units, or select the appropriate measurement units on the Page Properties tab.
4. Click OK.



As the drawing scale changes, shapes take up more or less space on the page. The rulers in each drawing show the actual size of the objects the drawing represents in the measurement units you have chosen.

Setting measurement units

Measurement units are the measurements that appear on the ruler and in dimensions. Measurement units represent sizes in the real world. For example, in an architectural drawing, the measurement units might be feet and inches.

Selecting a predefined drawing scale automatically sets the measurement units. If you are creating a custom scale, you might need to specify the measurement units. For example, if you want 1 inch on a landscape layout to represent 3 yards in the real world, set your measurement units to yards.

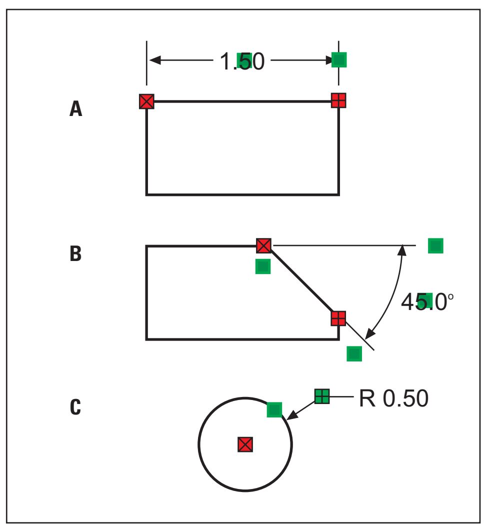
To set measurement units for a page

1. Display the page for which you want to change the measurement units.
2. Choose File > Page Setup, and then click the Page Properties tab.
3. From the Measurement Units list, select the units you want.

Showing size by using dimension lines

Engineering and architectural drawings frequently show the dimensions of shapes in the drawing. Visio 2000 provides dimension lines that calculate and display linear and angular dimensions. When you resize a shape that has attached dimension lines, the dimensions are automatically updated.

You dimension a shape by dragging a dimension shape onto your drawing and connecting the dimension shape's endpoints to geometric points on the shape you want to measure. You can choose from a wide variety of dimensioning shapes, including horizontal and vertical baselines, horizontal and vertical outside dimensions, and diameter and radius dimensions.



A Linear dimension line
B Angle dimension line
C Radius dimension line

For details, use these online Help keywords:

- *Drawing scales*
- *Measurements*
- *Dimensions of shapes*

Positioning shapes precisely

When you are positioning shapes on a drawing page, speed and precision count. You can easily align shapes with other shapes or with locations indicated by guides, rulers, or grids. For example, you can ***snap*** cabinet shapes to wall shapes, or you can snap Process Engineering shapes to grid lines to align them with the grid and make it easier to draw pipelines between them.

You can also position a shape by typing its exact location in a coordinate system.

Snapping to grids, guides, and guide points

To position shapes quickly and accurately, you can snap them into position. Snapping pulls shapes to rulers, grids, or guides and is useful for positioning and aligning shapes.

To set snap settings for grids, guides, and rulers

1. Choose Tools > Snap & Glue.
2. Under Currently Active, make sure Snap is checked.
3. Under Snap To, check Ruler Subdivisions, Grid, and Guides, and then click OK.

Snapping to shapes

You can snap to geometric points on shapes, such as the endpoints of lines or the center point of circles, or to shape handles. Snapping to shapes is useful when you want to position a shape at an exact point on another shape without knowing that point's coordinates. For example, you can snap a line to a quadrant on a circle.

Snapping to geometric points is similar to using object snaps in Autodesk AutoCAD.

To set snap settings for shapes

1. Choose Tools > Snap & Glue.
2. Under Currently Active, make sure Snap is checked.
3. Under Snap To, check Shape Handles (selection handles), Shape Vertices, and Connection Points, and then click OK.

Positioning shapes by using the dynamic grid

When you turn on the ***dynamic grid***, dotted lines show the most desirable position of a shape in relation to the shapes near it. The grid lines help you align shapes at their center points. For example, if you are positioning a chair shape near a desk shape, the dynamic grid indicates when the centers of the two shapes are aligned.

To turn on the dynamic grid

1 Choose Tools > Snap & Glue.

2 Under Currently Active, check Dynamic Grid, and then click OK.

Positioning shapes by using coordinates

You can position shapes at exact *x*- and *y*-coordinates in your drawing. The *x*- and *y*-coordinate values determine the position of a shape's reference point, or pin, on the page. You can change the location of a reference point on a shape. For example, the reference point of a desk could be the center point or the lower-left point of the desk.

To position a shape by using coordinates

1 Drag a shape to the approximate location you want on the page.

2 Choose View > Windows > Size & Position, or double-click the status bar.

3 To change the shape's reference point, click in the Pin Pos box, and then select a location from the list.

4 To position the shape at an exact location, enter values for the new location in the X and Y boxes.

5 Click OK to position the shape.

For details, use these online Help keywords:

- *Snapping shapes into place*
- *Guides and guide points*
- *Grid lines*
- *Positioning shapes*

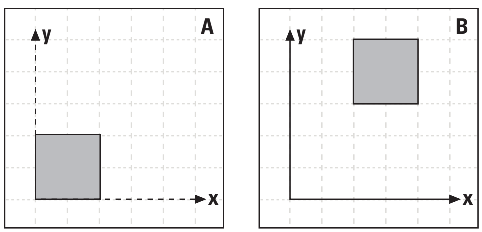
For details, use these online Help keywords:

- *Move tool*

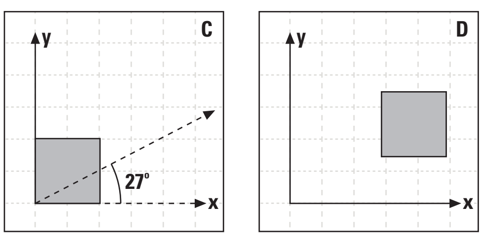
Moving a shape a specified distance

You can move a shape by simply selecting the shape and dragging it to a new location on the drawing page. To move a shape a small amount in one direction, use the arrow keys to nudge the shape.

If you want to move a shape a specified distance, use the Move command. By using this command, you can specify the distance along the *x*- and *y*-axes, or the distance and the angle of the move.



Move a shape by specifying the distance along the *x*- and *y*-axes of the page.



Move a shape by specifying the distance and angle of the move.

To move a shape a specified distance along the *x*- and *y*-axes of the page

1. Select the shape you want to move.
2. Choose Tools > Macros > Visio Extras > Move.
3. Under Relative To, click Page.
4. Under Coordinates, click X-Y.
5. In the X and Y boxes, specify the horizontal and vertical distances you want to move the shape. For example, to move a shape 1 inch to the right and 2 inches up on the page, type *1 inch* in the X box and *2 inches* in the Y box.
6. Click OK to move the shape.

Drawing shapes by using shape extension lines

When you are drawing shapes, you can snap to points on other shapes by using extension lines that appear when your pointer is positioned near the target point. For example, when you are drawing a mechanical part, you can use shape extension lines to draw a line that intersects another line at its exact midpoint.

If you are drawing isometric diagrams, you can turn on isometric extension lines to help you draw lines along isometric planes.

To turn on shape extensions

1. Choose Tools > Snap & Glue.
2. On the General tab, under Snap To, check Shape Extensions.
3. On the Advanced tab, under Shape Extension Options, check the ones you want. Click the Help button (?) to see an explanation of the options.
4. Click OK.
5. While using a drawing tool, move the pointer toward or along a shape to see a shape extension.

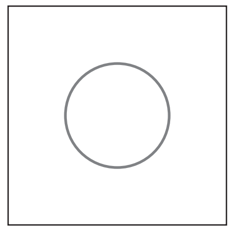
Shape extensions work with the line, arc, freeform, pencil, ellipse, rectangle, and connection point tools.

To turn on isometric extensions

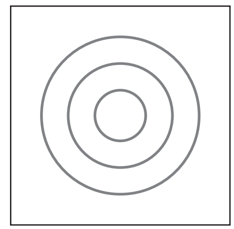
1. Choose Tools > Snap & Glue.
2. On the General tab, under Snap To, check Shape Extensions.
3. On the Advanced tab, under Shape Extension Options, check Isometric Angle Lines.
4. In the Isometric Angles box, type the angles you want. For example, type *30, 90, 150*.
5. Click OK.
6. While using a drawing tool, move the pointer toward or along a shape to see an isometric shape extension line.

Offsetting shapes

You can offset shapes to create a set of parallel shapes on either side of the original shape. For example, you can offset a circle to create concentric circles for a mechanical part drawing.



Original circle



Offsets on the inside and outside of the original circle

You can offset lines, arcs, circles, rectangles, and ***polylines***. If the offset to a curve is not an arc, the curve is approximated by a spline (a curve that passes through specified points).

To offset a shape

1. Select the shape and choose Shape > Operations > Offset.
2. In the Offset dialog box, enter the distance for the offset. Click OK to create the offset shapes.
3. If you do not need both inside and outside offsets, delete the one you don’t want.

Working with large drawings

For details, use this online Help keyword:

- *Zooming*

Many engineering drawings are large and contain many shapes. Visio 2000 provides tools that let you easily locate and magnify details in a drawing.

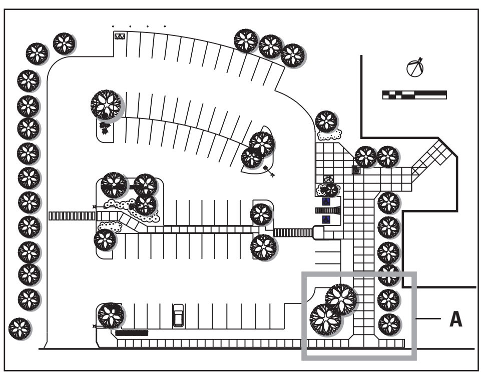
Zooming and panning drawings

Instead of frequently zooming in and zooming out of a drawing, you can use the Pan & Zoom window to quickly locate and magnify an area of a large drawing. Panning moves the visible part of the drawing in the drawing window. Zooming changes the magnification of the drawing.

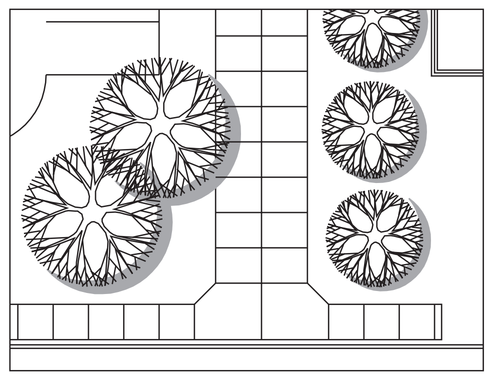
To zoom and pan a drawing

1. Choose View > Windows > Pan & Zoom.
2. In the Pan & Zoom window, drag a box around the area you want to magnify.
3. To pan to a different part of the drawing, drag the box.

Pan & Zoom window



View in Pan & Zoom window



View in drawing page

For CAD users: Drawing in Visio 2000

When you create an engineering drawing in Visio 2000, you use intelligent SmartShapes® symbols that graphically represent real-world objects and functionally behave like those real-world objects. For example, when you draw a floor plan, you can add windows by simply dragging window shapes onto wall shapes. The window shapes automatically align with the wall shapes and assume the correct wall thickness. When you move a wall in your drawing, the windows move with it.

Creating drawings by using intelligent shapes allows you to focus on the design of your building, process plant, electrical circuit, or ventilation system rather than on the tools you use to draw and redraw the symbols you need.

Of course, if you do need to create your own shapes by using lines, circles, and arcs, you can use drawing tools and shape operations, such as Combine and Fragment. You can add intelligent behavior to your shapes so that they are as easy to use as the shapes that are provided in Visio 2000.

Because you work with intelligent shapes in Visio 2000, many of the CAD operations you might have used in CAD programs do not exist. Other CAD operations are slightly different (and easier) in Visio 2000. The following table matches some common CAD operations to their Visio 2000 equivalents.

CAD actions in Visio 2000

To perform this CAD action	Do this in Visio 2000
Set drawing scale	Choose File > Page Setup, click the Drawing Scale tab, and then select a scale. Unlike in CAD drawings, you generally set the scale for a Visio drawing before you begin the drawing.
Move an object	Select the shape and drag it.
Move an object a specific distance	Select the shape and choose Tools > Macros > Visio Extras > Move.
Copy an object	Select the shape and use Ctrl+C and Ctrl+V to copy and paste the shape, or press Ctrl and drag the shape to copy it.
Plot a diagram	Choose File > Print.
Create a block	Use the Visio drawing tools to create a shape, and then drag the shape to a stencil.
Pan and zoom a drawing	Choose View > Windows > Pan & Zoom to open a window in which you can adjust the view of a drawing.
Create objects by using operations such as Union, Fragment, and Join	Choose Shape > Operations and choose an action.
Add a hatch pattern to an object	Select the shape and choose Format > Fill. Choose options from the Color, Pattern, and Pattern Color lists. You can also create your own patterns.
Use entity snaps or object snaps	Choose Tools > Snap & Glue and check Shape Extensions. On the Advanced Tab, check the shape extension options you want (for example, Segment Midpoint).

3

Working with CAD drawings

You can insert existing CAD drawings into your Visio® 2000 Technical Edition drawings to use as background images or as detail images. For example, you might want to insert a floor plan drawn in Autodesk AutoCAD and add HVAC shapes on top of the floor plan. Or you might want to insert an equipment drawing into a Process Engineering document.

After you insert a CAD drawing, you can drag Visio shapes onto it, change its drawing scale, ***crop*** and ***pan*** it, and hide or show its layers or levels.

If you need to modify or delete objects in the CAD drawing, you can convert the CAD objects into Visio shapes. You can also convert Visio drawings into CAD format.

Topics in this chapter

Inserting CAD drawings into Visio drawings

When you insert existing CAD drawings into a Visio drawing, the inserted drawing is a copy of the original CAD drawing. Changes you make to the drawing within Visio 2000 do not alter the original drawing.

You can insert CAD files in the following formats:

- Autodesk AutoCAD DWG and DXF file formats
- Bentley MicroStation DGN file format

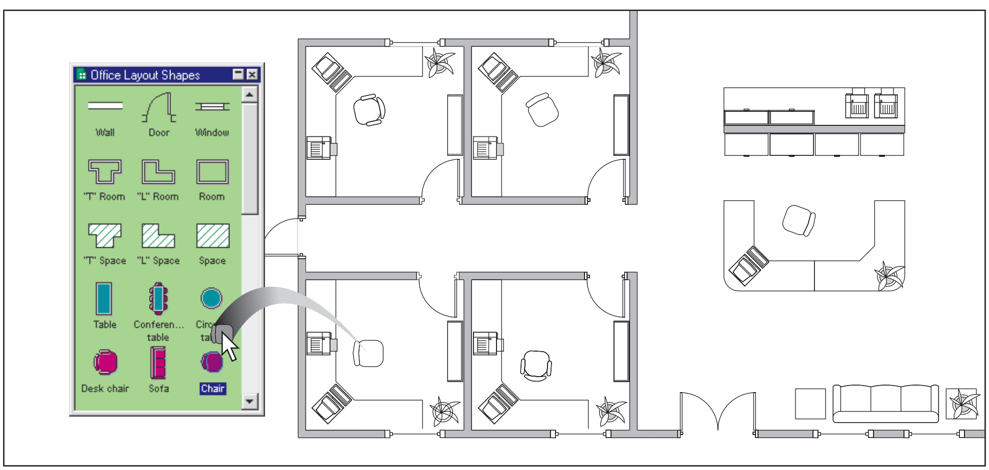
Inserting CAD floor plans as background images

You can insert a floor plan drawn in a CAD package into your Visio drawing to use as a background page or as a reference layer.

After you have inserted the floor plan, you can drag Visio shapes onto it, add comments, or hide layers. Visio shapes will snap to objects in an inserted DWG drawing.

To make it easier to select and move the shapes you drag onto a background image, you should lock the Visio layer that contains the inserted CAD drawing so that you do not accidentally select and move the CAD drawing instead of your Visio shapes.

CAD floor plan



You can drag Visio shapes onto an inserted CAD drawing.

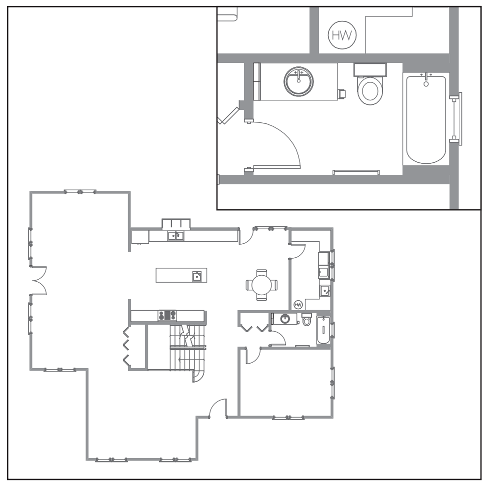
To insert a floor plan as a background image

1. Create a blank Visio drawing that has the page size and drawing scale you want.
2. In the Visio drawing, choose Insert > CAD Drawing.
3. Under Files Of Type, select the CAD drawing file format you want. Locate the CAD file containing the background image and click Open.
4. If you plan to drag shapes such as office furniture onto the CAD drawing, set the CAD drawing and the Visio drawing to the same scale. For details, see “Changing the scale of an inserted drawing” on page 39.
5. On the General tab of the CAD Drawing Properties dialog box, check Lock Position and Lock Cropping so that you don’t accidentally move or resize the drawing while you are working with it. Click OK to begin working with the inserted drawing.
6. To lock the Visio layer that contains the inserted drawing, right-click the inserted drawing and choose View > Layer Properties. Click the Lock column for the CAD Drawing layer, and then click OK.

Inserting CAD drawings as detail images

You can insert a CAD drawing into an existing Visio drawing to show a detail of a floor plan or of a mechanical part.

After you have inserted the detail image, you can add comments to it, crop it, change its scale, or hide layers.



You can insert a CAD drawing to show a detail of a mechanical part, a portion of a floor plan, or an alternate view of an object.

For details, use these online Help keywords:

- *CAD files*

To insert a CAD drawing as a detail image

1. Open the Visio drawing into which you want to insert the CAD drawing.
2. Choose Insert > CAD Drawing.
3. Under Files Of Type, select the CAD drawing file format you want. Locate the CAD file you want and click Open.
4. If you want to reduce or enlarge the image, set the CAD drawing scale on the General tab of the CAD Drawing Properties dialog box.

   If you are not planning to drag Visio shapes onto the inserted image, you can set the CAD drawing to a scale different from that of the Visio drawing. For details, see “Changing the scale of an inserted drawing” on page 39.
5. On the General tab, uncheck Lock Position and Lock Cropping so that you can move and crop the inserted CAD drawing. Click OK to begin working with the inserted drawing.
6. To position the CAD drawing on the Visio page, select the drawing and drag it.
7. If necessary, crop and pan the drawing so that only the portion of the CAD drawing that you want is visible. For details, see “Cropping inserted drawings” on page 40.
8. When the CAD drawing is positioned where you want it, right-click the drawing and choose CAD Drawing Object > Properties. Check Lock Position and Lock Cropping, and then click OK.

Modifying inserted CAD drawings

You can work with an inserted CAD drawing in many ways. You can drag Visio shapes onto it, rescale it, crop and pan it, or hide and show layers or levels.

For details, use these online Help keywords:

- *CAD files*

Changing the scale of an inserted drawing

When you insert a CAD drawing, Visio 2000 chooses a drawing scale that fits the CAD drawing onto the Visio drawing page. You can change the scale of the CAD drawing to make it larger or smaller, and you can match the scale of the CAD drawing to the Visio drawing scale.

To change the scale of a CAD drawing

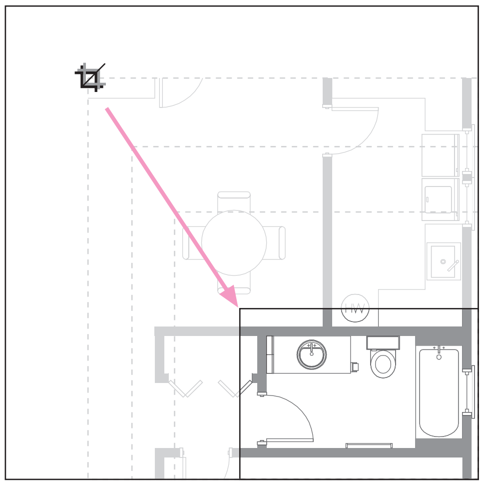
1. Right-click an inserted CAD drawing and choose CAD Drawing Object > Properties.
2. Click the General tab and choose a CAD Drawing Scale option. For details about these options, see the following table.
3. Verify the size of the CAD drawing on the Visio drawing page by looking at the preview. If the CAD drawing does not fit on the Visio drawing page, try the following actions:
   - Choose a smaller CAD drawing scale or Visio drawing scale. For example, 3/32 inch = 1 foot is a smaller scale than 1/4 inch = 1 foot, and will show more of the inserted CAD drawing.
   - Choose a larger page size. For example, the ANSI Architectural page size of 36 inches by 24 inches might be large enough to display an entire floor plan. Click Page Setup. On the Page Size tab, select a page size, and then click OK.
4. Click OK to accept your changes. If you have chosen to set the CAD drawing to a scale different from that of the Visio drawing, click Continue Without Matching Scale in the dialog box, and then click OK.

CAD drawing scale options

If you want to do this...	Choose this CAD scale option...
Drag Visio shapes onto an inserted CAD drawing.	Click Pre-defined Scale, and then select Page Scale. This option matches the CAD drawing scale to the Visio drawing scale so that shapes are sized correctly when you place them on the CAD drawing.
Set the CAD drawing scale to a smaller or larger scale than the Visio drawing scale.	Click Pre-defined Scale, and then select an industry and a specific scale from the list. When you select this option, Visio shapes that represent physical objects (such as desks and chairs) are not sized correctly when you place them on the CAD drawing. You can, however, use annotation shapes or add text blocks to the inserted drawing.
Set your own scale.	Click Custom Scale, and then type in a scale. CAD drawings generally have a custom scale when you first insert them.

Cropping inserted drawings

You can select an inserted CAD drawing and move it around the page like any Visio shape. You can crop the inserted drawing to focus on certain details.



You can crop an inserted CAD drawing to focus on one part of the drawing.

To crop an inserted drawing

- Select the crop tool ( ), and then click the CAD drawing. Drag a selection handle ( ) to crop the drawing.
- To move the CAD drawing inside its drawing border (pan the drawing), click inside the border and drag the drawing.

Hiding layers or levels

You can hide layers or levels to hide objects in an inserted CAD drawing. For example, you might want to turn off all the layers containing office furniture in a CAD floor plan so that you can drag Visio office furniture shapes onto the floor plan.

To hide layers or levels

1. In Visio 2000, right-click the CAD drawing and choose CAD Drawing Object > Properties. Click the Layer tab or the Level tab.
2. To hide a layer or level, uncheck it, and then click OK.

Converting CAD drawings into Visio format

When you insert a CAD drawing, you get an image of the CAD drawing that you cannot alter by deleting, resizing, or modifying the objects in the drawing. If you need to modify the CAD objects in a drawing, you must convert those objects into Visio shapes. For example, if you want to move an interior wall in a floor plan, you must convert the CAD objects that represent the wall into Visio shapes. You select the objects to convert by selecting the CAD layer or level on which they appear.

Converting CAD objects into Visio format

Whenever possible, convert only the CAD layers that contain objects that you want to modify. Working with an unconverted CAD drawing is faster and generally gives you better visual results.

You can do many editing tasks on inserted CAD drawings that are not converted. You can drag Visio shapes onto unconverted layers, hide layers, ***redline*** or mark up layers, and resize or crop the inserted drawing.

To convert CAD objects

1. In Visio 2000, right-click the CAD drawing and choose CAD Drawing Object > Convert.
2. In the Convert Wizard, Ctrl+click to select the layers or levels containing the objects you want to convert. Click Next.
3. Choose whether to delete or hide the original layers or levels.
4. For DWG files, specify how you want to convert dimensions:
   - To get dimension lines that are updated when you resize the associated Visio shapes, click Convert Into Visio’s Dimension Shapes. Converted dimension lines lose their original CAD font and line style.
   - To preserve the CAD formatting of dimensions, including the font and line style, click Convert Into Lines And Text.
5. Click Finish to convert the objects on the selected CAD layers or levels.

For details, use these online Help keywords:

- *CAD files*

Converting Visio drawings into CAD format

You can convert, or export, Visio drawings into CAD format by choosing the Save As command. For example, if you work with engineers or customers who have a CAD drawing program, you can create drawings in Visio 2000 and convert them into CAD format when you send them for review.

You can convert files into the following formats:

- Autodesk AutoCAD DWG and DXF file formats
- Bentley MicroStation DGN file format

Converting drawings works best in one direction: either from CAD format into Visio format, or from Visio format into CAD format. Because each file format supports capabilities that are unique to its program, converting a file only once best maintains data integrity. For example, if you convert CAD dimension lines into Visio format, the dimension lines lose their formatting, such as fonts, line styles, and fills.

Visio 2000 converts the current Visio drawing page into CAD format. If you have a multipage Visio drawing, you must convert each page separately.

To convert a Visio page

1 Go to the Visio drawing page you want to convert, and then choose File > Save As.

2 Under Save As Type, select the CAD drawing file format (for example, AutoCAD Drawing [*.dwg]), and then click Save.

4

Process Engineering: Drawing PFDs and P&IDs

Industries of all kinds rely on process plants to manufacture and deliver products or refined materials. Effectively managing the design of processes and the systems that support them is critical to the success of these plants.

The Process Engineering solution provides the drawing tools you need to create PFDs (process flow diagrams) and P&IDs (piping and instrumentation diagrams) and tools for creating process component specifications.

Using the Process Engineering solution, you can

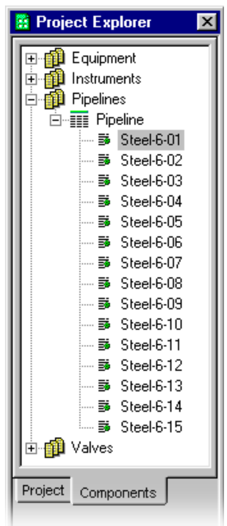
- Quickly and efficiently create and modify PFDs and P&IDs.
- Add data about process components directly to your diagrams and automatically generate lists or bills of materials from the diagrams.
- Automatically number or tag process components.
- Create company-standard formats for documents such as datasheets and lists.
- Share diagrams with other team members.

Topics in this chapter

Working in projects

P&IDs are some of the most important drawings in the design of a process plant. Before you actually build the process plant, the equipment and piping shown on a P&ID must be fully specified, ordered, and assembled. In the past, managing the volume of diagrams and related equipment lists (or bills of materials), datasheets, and assembly drawings required complex and expensive tools.

Project view shows all of the diagrams in a Process Engineering project.



Components view shows the datasheets of all the components in a project.

In the Process Engineering solution, you work in projects where you create and edit the PFDs, P&IDs, datasheets, and lists for your project. The Project Explorer makes it easy to locate and open project-related documents.

Exploring the sample project

Visio® 2000 Technical Edition includes a full sample Process Engineering project, including sample P&IDs, datasheets, and lists. Exploring the sample project is a good way to learn more about the Process Engineering solution.

Try it: Explore the sample project

1 Start Visio 2000. In the Welcome To Visio 2000 dialog box, click Open Existing File, and then double-click Browse Existing Files. In the Open dialog box, navigate to Visio\Samples\Process Engineering\Process Engineering Project. Select Sample Project.vsd and click Open.

2 In the Project Explorer, click the Project tab. Double-click SamplePID1 to open the sample P&ID.

3 Select the Centrifugal Pump shape in the diagram, and then choose Process Engineering > Datasheets > Edit Datasheet to see the specifications for the pump. Choose File > Close to close the datasheet.

4 In the Project Explorer, click the Components tab to see a list of all the datasheets in the sample project. Click the plus sign (+) next to Valves to see the Valve datasheet, and then click the plus sign next to Valve to see the tags of all of the valves in the project that use that datasheet. Right-click any valve and choose Edit Datasheet to open its datasheet.

5 In the Components tab, right-click any valve and choose Go To Shape. The valve is highlighted in the drawing.

6 When you are finished exploring, choose Process Engineering > Close Project.

Starting a new project

To use the Process Engineering intelligent shapes and to access process component data, you must work in a project. Starting a new project is as easy as starting any new drawing in Visio 2000. After you have started and named a project, the Process Engineering menu appears on the Visio 2000 main menu bar. The commands you need to work with drawings and data appear on that menu.

You should create a Process Engineering project for each engineering project you are working on. You can create as many projects as you need, although you can open only one project at a time. You should store all of the Process Engineering files for a single project in the same project folder.

Try it: Start a new project

1 Create a project folder on your computer named Heat Project.

   Each separate Process Engineering project should have its own folder.

2 In Visio 2000, choose File > New > Process Engineering > Process Engineering. Click the Create A New Project option, and then click the Browse button to locate and open the Heat Project folder.

3 Name the project Heat_Proj.vsd, and then click Save. Click OK to open the new project.

For details, use this online Help keyword:

- *Projects*

TIP *To make it easier to distinguish project files from diagrams, you should indicate in the file name whether a VSD file is a project file or a diagram.*

Opening an existing project

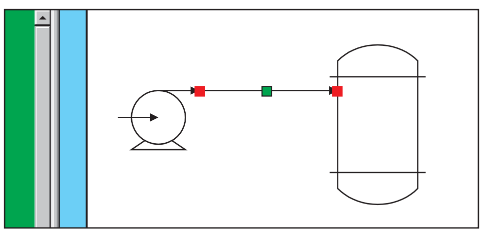
To open an existing project that was saved in this release of Process Engineering, open the project file.

To open an existing project that was created in a previous release of Process Engineering, open the project file. Visio 2000 converts all of the project diagrams and documents into the new format for Visio 2000. Your documents will not lose any data; however, your existing files will be saved in a backup folder for safekeeping.

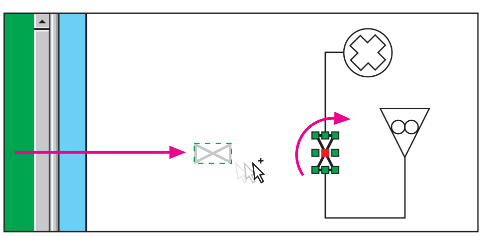
Creating PFDs and P&IDs

You create PFDs and P&IDs by dragging Process Engineering shapes from stencils onto your drawing page. The Process Engineering solution comes with a library of SmartShapes® symbols that are specifically designed for process engineering schematics.

Unlike objects drawn with a computer-aided design (CAD) program, Process Engineering shapes behave in ways that make it easy for you to create and modify your schematics. Shapes that represent related process components are associated in the diagram and move together. Pipelines stretch and contract as you move equipment shapes on the diagram, and valves reorient themselves as the pipeline they are on moves. You do not need to redraw shapes as you change your diagrams.



Pipelines connect equipment shapes on a P&ID. Pipelines are drawn with Visio connectors.



Valves rotate into position and glue themselves to a pipeline as you drag them onto the pipeline.

Drawing PFDs and P&IDs

The most efficient order for drawing a PFD or P&ID is given in the following steps. For an example of a P&ID that is similar to the one you will create in this chapter, see SamplePID1.vsd in the sample project.

Try it: Draw a P&ID

1. Open the Heat_Proj.vsd project file you created in “Starting a new project.” If the default blank drawing page is open, choose File > Close to close it.
2. Choose Process Engineering > New Project Document > Drawing. Name the drawing Steam1.vsd, and choose a sheet format from the Based On list to determine the page size, border, and title block format of the new diagram. Click OK to open a drawing page that has the Process Engineering stencils next to it.
3. Click the Equipment - Pumps stencil to see the pump shapes, and then drag the Centrifugal Pump shape from the stencil onto the drawing page.
4. From the Equipment - Heat Exchangers stencil, drag the Shell And Tube shape to the right of the pump shape, and then choose Shape > Rotate Left. If necessary, press Ctrl+Shift+click to zoom in.
5. Click the connector tool ( ) on the Standard toolbar to draw a pipeline. Click the outlet arrow on the Centrifugal Pump shape, and then drag the connector tool to any connection point on the Shell And Tube shape. The endpoints of the pipeline turn red when the two shapes are connected.

TIP *You can connect a pipeline to any point on the outside of an equipment shape. Visio 2000 creates a new connection point wherever you attach the pipeline.*

6 Click the pointer tool ( ), and then from the Valves And Fittings stencil, drag the Check Valve shape onto the pipeline.

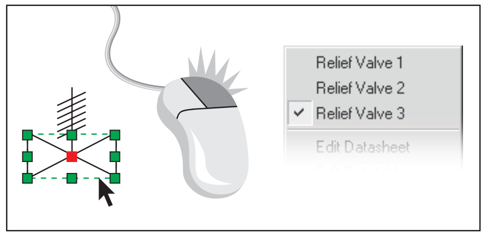
The valve is now associated with this pipeline and moves with it. You'll learn more about association in the next section.

7 From the Instruments stencil, drag the Indicator shape and place it above the pipeline to the right of the Check Valve.

8 Drag the association control handle ( ) from the instrument to the pipeline.

A red dashed line appears, indicating that the instrument is now associated with the pipeline it monitors and will move with the pipeline.

9 Choose File > Save.

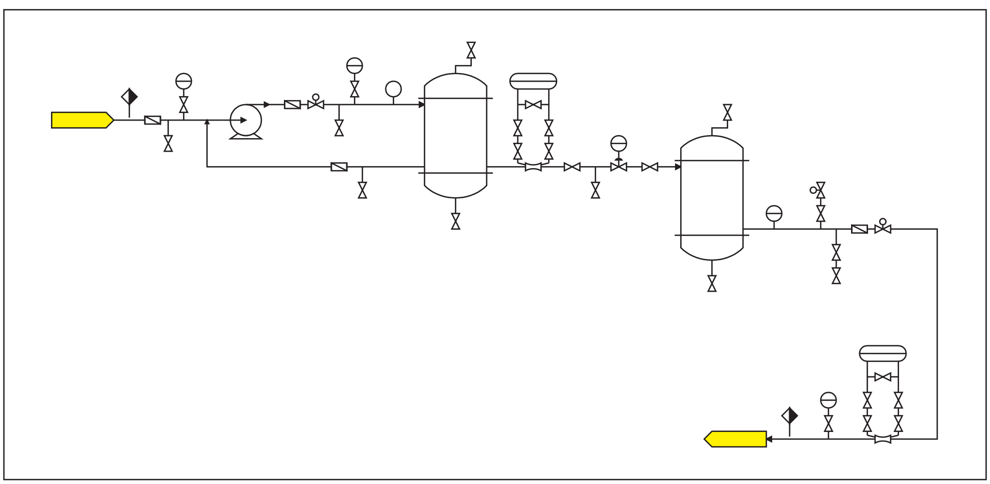


You can quickly change some Process Engineering shapes by right-clicking the shape and choosing a different shape variation from the shortcut menu.

For details, use these online Help keywords:

- *Process Engineering solution*

A P&ID drawing



The Process Engineering solution provides drawing tools with which you can quickly and efficiently create and modify PFDs and P&IDs.

For details, use these online Help keywords:

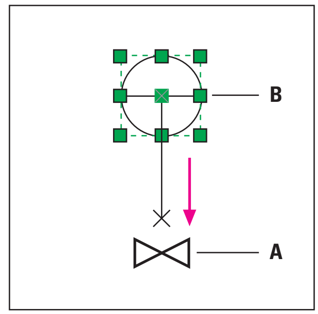
- *Associating shapes with data*

Associating components in diagrams

A P&ID shows how physical components are functionally or mechanically related. In a Visio 2000 P&ID, this relationship is called an ***association***. You can associate shapes when the shapes need to stay together in a drawing. You can also associate shapes when the components they represent are functionally dependent. For example, because a valve is physically mounted on a pipeline, the valve is functionally dependent on the pipeline.

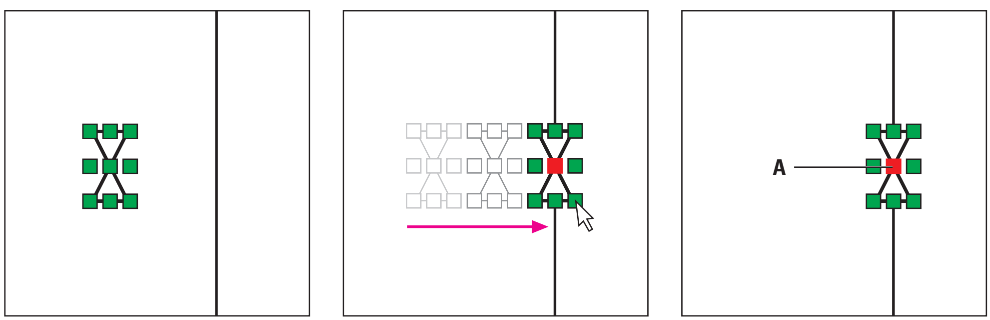
Visio 2000 automatically creates an association between a shape that represents an in-line component, such as a valve, and the pipeline shape to which the component is dragged. Pipelines are automatically associated with equipment and with other pipelines to which they connect.

You can manually create associations between shapes that represent offset components, such as a monitoring instrument that is not mounted directly in a pipeline. You can also manually associate annotation shapes with component shapes so that text you add to the diagram stays with the shape it describes.



Drag the association control handle from an instrument (**B**) to a valve (**A**) to manually associate the two components.

Associating a valve with a pipeline



Some components in a P&ID are automatically associated to show the relationship between them. The association control handle (**A**) turns red to show that this valve is associated with the pipeline.

Grouping components

You can group Process Engineering shapes to make it easy to repeat the same sequence of shapes in a P&ID. For example, you could group the pumps, valves, and instruments used in feedwater lines. While a group is easy to move or copy as a unit, the components are still listed individually when you generate lists or add data to components. To group shapes, select the shapes and choose Shape > Grouping > Group.

Collections of components, or *assemblies*, are sometimes assembled as a unit and then installed in the process plant. You can create an assembly by grouping shapes and then converting the group into a Process Engineering shape. The assembly is treated as a single shape that has one datasheet and one tag. For more information about converting shapes, see "Creating your own process shapes" on page 55.

NOTE *The Group command replaces the Process Engineering > Make Assembly command that was in previous releases of Process Engineering.*

Modifying your diagrams

As you design and refine a process, you need to be able to manipulate components on your diagrams quickly and easily. The intelligent shapes in Visio 2000 make it easy for you to modify diagrams.

To move an equipment shape, simply select it and move it. All of the pipelines connected to the shape move with it. Pipelines stretch or contract as needed; pipelines can even jump over other pipelines. Branched pipelines retain their branches.

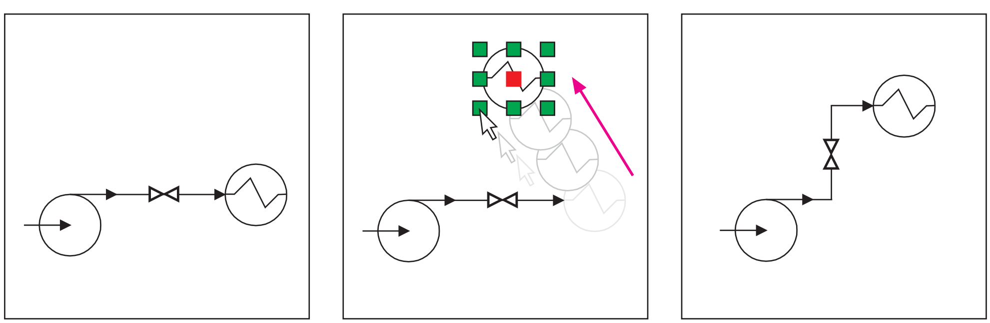
Valve shapes move with the pipeline with which they are associated. To move a valve shape along a pipeline, select it and slide it. If you move the valve around a bend in the line, the valve will reorient itself to match the line.

To change a pipeline's appearance, select the pipeline, and then select a new style from the Line Style list on the Format Shape toolbar. The Process Engineering solution provides styles for many types of pipelines and signal lines, including hydraulic and electrical lines.

For details, use this online Help keyword:

- *Groups*

Moving equipment shapes



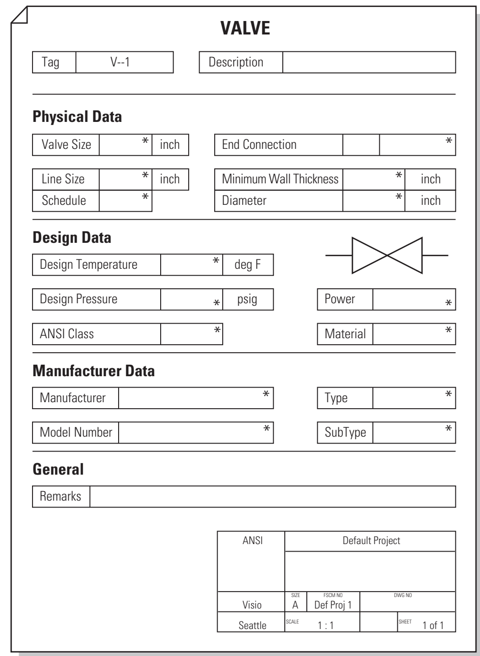
As you move equipment shapes, the connecting pipelines are rerouted and valves are repositioned.

Working with component data

From the piping and fittings you order from standard vendor catalogs to the custom equipment you have manufactured for your plant, you specify and track large amounts of data about the components in your process plant. In the Process Engineering solution, you can add data directly to components in the diagram—without calling up a separate database or spreadsheet program.

Each component in a diagram has a related ***datasheet***, an electronic form that contains fields of data for the component. For example, the datasheet for a pipeline generally specifies the line size, material, and design temperature and pressure.

Storing component data in Process Engineering datasheets makes creating lists of equipment, valves, instruments, and pipelines easy. Instead of typing lists by hand, you can quickly generate lists of components directly from the datasheets, and you can quickly update component data directly from the diagram or from the Components tab of the Project Explorer.



Add data to diagrams by filling out a datasheet for each Process Engineering component in your diagram.

Entering component data

You can enter all the data for one component at a time or finish a portion of a diagram and enter data for several components at once. You can always edit the datasheet for a component later as you refine component selection and add more detailed data.

		V-4-1	T-1
ANSI Class	–		
Design Pressure	psig	1200	800
Design Temperature	deg F	650	320
Diameter	inch	5	
End Connection	–	BW	
Line Size	inch	4	
Manufacturer	–		
Material	–	CS	CS
MinWallThick	inch		
Model Number	–		

Datasheet Window

The Datasheet window stays open so that you can add data to or edit data for several shapes at once.

A component might inherit values from another component. For example, all valves on a pipeline generally inherit the line size. Inherited values are automatically placed in the datasheet for a secondary component.

Try it: Enter data for a single component

1. Open the Steam1.vsd diagram you created in "Drawing PFDs and P&IDs."
2. Select the Centrifugal Pump shape on the diagram, and then choose Process Engineering > Datasheets > Edit Datasheet.
3. Tab through the fields and fill them in with values that are typical for this type of pump. Some fields have a drop-down list that appears when you tab to the field; others have a check box.
4. Choose File > Close to exit the datasheet and save your changes.

Try it: Enter data for several components at once

1. In the Steam1.vsd diagram, choose Process Engineering > Datasheet Window.
2. Select several valves in the diagram and set some values that are typical for these types of valves in the Datasheet window. The datasheet is automatically updated as you type values into the Datasheet window.

For details, use these online Help keywords:

- *Datasheets*
- *Datasheet window*

Displaying component data in the diagram

You can display data from a component's datasheet in special annotation labels on your diagram. For example, a label could show the Line Size field from a pipeline datasheet. When you update the datasheet, the label on the diagram is automatically updated.

Try it: Display a data field in the diagram

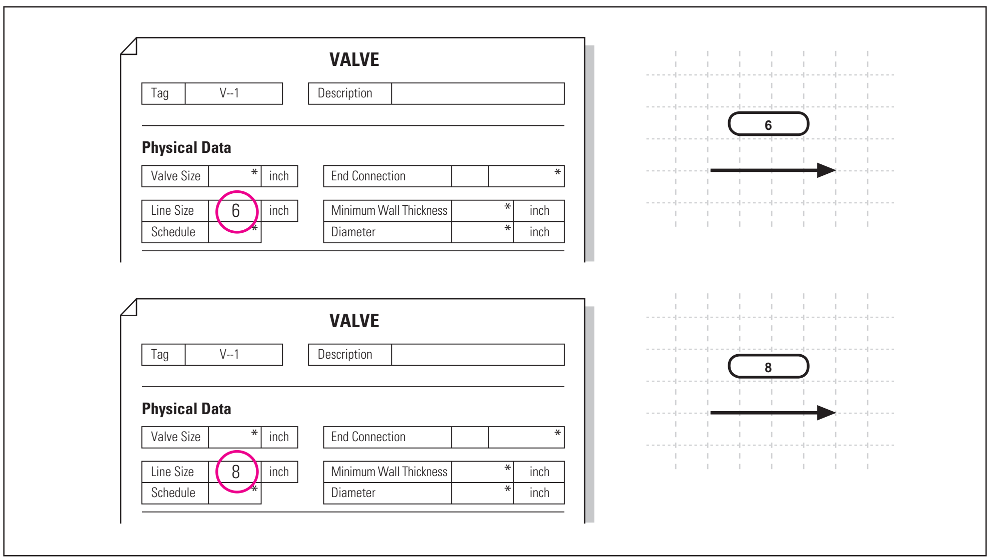
1 From the Process Annotations stencil, drag the Automatic Label 1 shape onto the drawing page near the pipeline.

2 Drag the association control handle from the Automatic Label 1 shape to the pipeline. In the Select Field To Display dialog box, select Line Size, and then click OK.

The Automatic Label 1 shape is now linked to the datasheet so that changes you make to the Line Size field are displayed in the Automatic Label 1 shape.

3 In the Datasheet window, set the line size and update the label shape.

Automatic labels



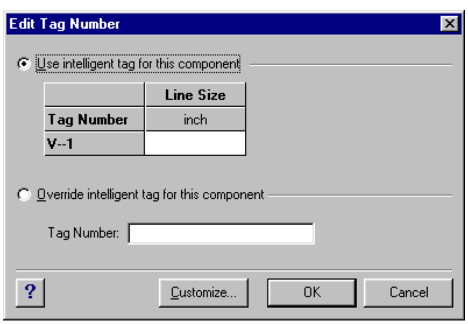
Automatic Label shapes display data from a component's datasheet directly on the diagram.

Numbering or tagging components

Component tags often provide information about components. A pipeline tag might indicate the line size, pressure rating, material, and type of fluid carried.

To make entering tags faster, you can set up datasheets so that component tags are constructed directly from certain fields in a datasheet. These ***intelligent tags*** appear on the diagram when you enter data into the datasheet for the component. The default datasheets for components have intelligent tags.

You tag a component by using the Edit Tag Number command. If a component does not have an intelligent tag, you simply type the new tag number into a dialog box. If a component has an intelligent tag, you type values into the datasheet fields that form the tag number. You can also override an intelligent tag and manually type in a tag number.



You edit an intelligent tag by changing the datasheet fields from which the tag is constructed.

You can create your own tagging scheme by creating intelligent tags for your customized datasheets. For information on creating an intelligent tag, see "Creating intelligent tags" on page 60.

Try it: Tag a pipeline

1 Open the Steam1.vsd diagram you created in "Drawing PFDs and P&IDs."

2 Right-click the major pipeline between the pump and the heat exchanger, and then choose Edit Tag Number.

3 In the Line Size field, type *4*, and then click OK. Notice that the pipeline tag is updated to show the new line size.

4 To move the tag on the diagram, select the tag's green control handle (■) and move it. The tag moves with the control handle.

For details, use these online Help keywords:

- *Intelligent tags*

For details, use these online Help keywords:

- *Lists of components*

Generating equipment, line, and valve lists

You can generate lists of equipment, pipelines, valves, and instruments directly from the data in datasheets. As you modify diagrams, you can quickly generate a new list from the updated datasheets. You can create lists in Microsoft Excel format or plain text format, or you can create a list in a new Visio drawing. You can copy and paste lists generated as Visio drawings into P&IDs or other Visio 2000 drawings.

You can generate a list of all the components in a project, all the components in a diagram, or selected components in a diagram.

Try it: Generate a list of all valves in a diagram

1. Open SamplePID1.vsd in Visio\Samples\Process Engineering\Process Engineering Project.
2. Choose Process Engineering > Lists > Generate List. From the List box, select Valve List.
3. Under Include In List, choose Entire Document.
4. Under Output File, name the file. Click Write To Visio Drawing, and then click OK to generate the list.

   Visio 2000 opens a new drawing page that contains the generated list. You can save the list, print it, or copy it to another Visio 2000 drawing.

Creating your own process shapes

Visio 2000 provides a number of industry-standard shapes on the Process Engineering stencils. If you need additional shapes for your processes, you can draw your own shapes in Visio 2000 or import symbols created in a computer-aided design (CAD) program. You can import symbols created in Autodesk AutoCAD DWG or DXF format.

You must convert the shapes you create or import before you use them in Process Engineering diagrams. Conversion adds intelligence to the shapes so that they can be associated with other shapes, have data in datasheets, and be included in lists. You can save the shapes you create or import on a stencil so that you can easily reuse those shapes. Stencils are saved with a project.

Try it: Convert a CAD symbol library

1. Open the Steam1.vsd diagram you created in "Drawing PFDs and P&IDs."
2. Choose Process Engineering > Shape Conversion Wizard. Click Next to go to the second screen.
3. Select the CAD Symbols From One Or More Files option, and then click Next.
4. Use the Browse button to locate the file HeatExch.dwg in the Visio\Samples\Process Engineering folder. Accept the default setting for Scaling and click Next.
5. In the table that shows the HEATEXCHANGER shape, click the Shape Type field and select Equipment from the drop-down list. Click the Datasheet field and select Heat Exchanger. Click Next.
6. Map the block attributes from the DWG file into datasheet fields. For the MANUFACTURER attribute, click the Assigned Fields column and select Manufacturer from the list. Similarly, set the TEMPERATURE attribute to the Design Temperature field, and set the PRESSURE attribute to the Design Pressure field. Click Next.
7. Name the stencil Imported Heat Exchanger.
8. Click Finish to complete the wizard.

   The Imported Heat Exchanger stencil appears next to your drawing.
9. Choose File > Save to save the diagram.

   The stencil is saved with the diagram.

For details, use these online Help keywords:

- *Converting shapes for Process Engineering solution*

Sharing and reviewing PFDs and P&IDs

For details, use these online Help keywords:

- *Projects*
- *Redlining drawings*

PFDs and P&IDs are frequently shared by engineers in a group or reviewed by project members. You can set up projects so that the project documents are accessible to everyone on a team.

You can send PFDs and P&IDs to engineers in other work groups or companies for reviewing. Reviewers who do not have access to your Process Engineering project can mark up or redline diagrams with comments.

Setting up project folders

To make projects accessible to members of a team, create your projects in a shared network folder. All engineers in the group can work on the same project files in the shared folder (although not simultaneously).

When you start a new project, Visio 2000 places all of the diagrams, datasheets, and lists associated with the project in subfolders of the project folder. To make it easier to maintain projects, do not alter the default folder structure.

All engineers who access a shared project must be using Visio 2000 Technical Edition. A project cannot be shared with engineers who have a previous version of the Process Engineering solution.

Sending diagrams to reviewers

You can send PFDs and P&IDs to any reviewer who has Visio 2000 to mark up or redline with comments. Simply send the Visio drawing file (.vsd) that contains the diagram. To organize reviewer comments, you can set up a redlining layer for each reviewer.

To add, delete, or move process components, however, reviewers must have the Process Engineering solution installed on their computers, and must have access to all of the project documents (diagrams, datasheets, lists, the project file, and the project database). If you are working with an external group that needs to modify component data but does not have access to your network folders, you can send group members the entire project.

Printing datasheets for review

You can print all of the datasheets in a category at once from the Project Explorer. For example, you can print all of the valves in a project for distribution or review.

To print all datasheets in a category

- In the Project Explorer, right-click a datasheet category or a datasheet, and then choose Print Datasheets.

Customizing diagrams, datasheets, and lists

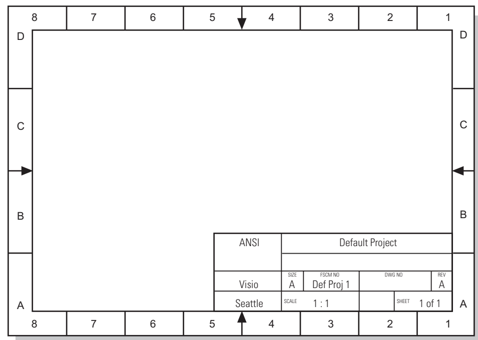
Engineering groups usually have company-standard formats for diagrams, datasheets, and lists or bills of materials. Visio 2000 provides default formats for all diagrams and documents in a project, but you can create your own formats so that a project's documents conform to your company's standards. You can customize datasheets and lists to include the fields needed for a project. You can also specify a unit-conversion system to use throughout a project.

Sheet formats, datasheet forms, and list forms are saved with a project. You can set up a project that has the company-standard formats you want your engineering group to use, and engineers can start new projects based on your standard project.

Creating your own sheet formats

New diagrams are based on sheet formats that determine the page size and orientation of the page, as well as the border and title block of the diagram. You can create a new sheet format by creating a new page that has the size and orientation you want, adding the title block and border to the page, and then assigning the new formats to any new diagram you start in a project.

You can also create sheet formats for lists and datasheets.



Sheet formats determine the page size, page orientation, border style, and title blocks for diagrams, datasheets, and lists in a project.

Try it: Create a new sheet format for diagrams

1. Open the Steam1.vsd diagram you created in "Drawing PFDs and P&IDs."
2. Choose Process Engineering > New Project Document > Sheet Format. In the Name field, type *Project Sheet*.
3. For Based On, select None, and then click OK. A blank drawing page and the Sheet Format stencil appear.

For details, use these online Help keywords:

- *Sheet formats*

4 Select a border shape from the stencil and drag it onto the page. The border shape automatically resizes to fit the page. You can adjust the page size by choosing File > Page Setup and selecting a new size.

5 Drag the Title Block Small shape onto the page. To type text in the title block, click in a title block field and start typing.

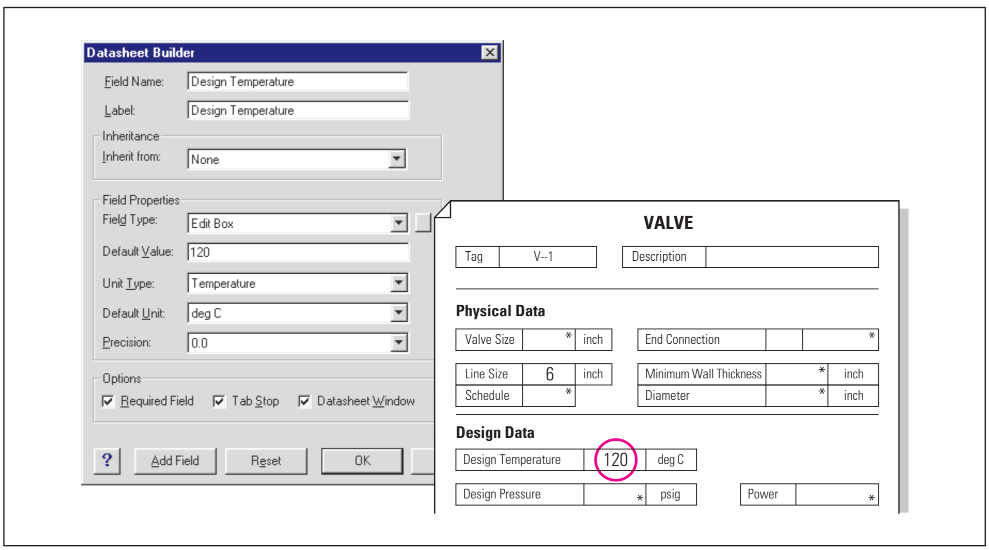
6 Choose File > Save to save your new sheet format, and then close it. To apply the new sheet format to a diagram, start a new drawing and choose the Project Sheet format from the Based On list in the New Drawing dialog box.

Creating your own datasheet

Visio 2000 provides default datasheets for equipment, pipelines, valves, and instruments. You can modify the default datasheets, or you can create your own datasheets that conform to your company's specific requirements.

When you create a datasheet, you control which data is tracked for a component, which data fields are included in lists or bills of materials, and the format for fields on the datasheet. You can create sheet formats for datasheets that provide project information, such as project name, company name, and date.

Custom datasheets



When you create your own datasheet forms, you specify the label, format, and default unit for each field.

When you create datasheet forms, you assign datasheets to categories. A *category* is a collection of similar datasheet formats. For example, you could create different datasheet formats for generators and reaction vessels and group the formats under the general category of equipment. The default categories in Visio 2000 are valves, instruments, equipment, and pipelines, and you can create new categories. For example, you could refine the equipment category by creating a new category for heat exchangers.

Datasheet categories help you manage component views in the Project Explorer. Each Process Engineering component is automatically assigned to a layer that contains components that have the same datasheet category.

Try it: Create a new datasheet

1 Open the Steam1.vsd diagram you created in "Drawing PFDs and P&IDs."

2 Choose Process Engineering > New Project Document > Datasheet. In the New Datasheet dialog box, name the datasheet MyPump, and select Equipment from the Based On list and from the Category list. Click OK.

A fast way to create a new datasheet is to base it on an existing datasheet and add new fields or modify existing fields. In this procedure, you are basing a new datasheet on the default datasheet for equipment.

3 In the Datasheet Builder dialog box, type *Motor* in the Field Name box. The Label box is updated to use the same name.

The field name is a unique identifier for the datasheet field; the label is the name that appears on the datasheet.

4 For Unit Type, select Power. Accept the default settings for the rest of the dialog box and click Add Field.

A field shape is added to the datasheet page, and the dialog box is cleared so that you can create the next datasheet field.

5 Add more fields, if you want to, and then click OK to exit the dialog box. When you are finished, choose File > Save to save the new datasheet, and then close it.

To use the new datasheet, you use the Assign Datasheet Wizard to assign it to some components in your project. For example, you could assign this MyPump datasheet to all of the shapes on the Equipment - Pumps stencil.

For details, use this online Help keyword:

- *Datasheets*

For details, use these online Help keywords:

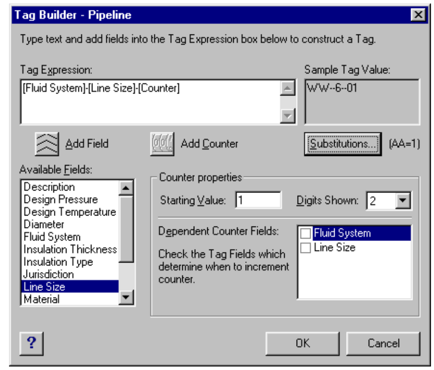
- *Intelligent tags*
- *Datasheets*

Creating intelligent tags

You can create component tags that are automatically constructed from fields in the component's datasheet. These intelligent tags are useful for component tagging schemes that provide information about the component, such as the line size, material, and fluid.

You can set up intelligent tags that substitute codes for values in a datasheet field. For example, if the fluid carried by a pipeline is designated as Waste Water in the datasheet, the tag can substitute the code WW for that value. You can also create tags that are automatically incremented as components are added to a diagram.

You can modify existing intelligent tags, or you can construct new intelligent tags when you create your own datasheets. In a new datasheet, you should create all of the other datasheet fields before creating the intelligent tag because the tag is built from existing fields.



You can create intelligent tags for components that are automatically constructed from fields in the component's datasheet.

Try it: Create an intelligent tag

1. Open the Steam1.vsd diagram you created in "Drawing PFDs and P&IDs."
2. Choose Process Engineering > Tags > Customize Tags.
3. In the Customize Tags dialog box, select the Pipelines category and the Pipeline datasheet. Click OK to open the Tag Builder dialog box.
4. Select everything in the Tag Expression box and delete it. From the Available Fields list, select Fluid System and click the Add Field button (⩯). Notice that the selected field is added to the expression in the Tag Expression box.

5 Type a hyphen after the Fluid System field in the Tag Expression box, and then add the Line Size field to the tag expression.

6 Type a hyphen after the Line Size field, and then click the Add Counter button ( ) to add a counter to the tag expression.

A counter automatically numbers components as they are added to a diagram.

7 Click the Substitutions button, and under Substitution Table Assignments, select System from the Substitution Table field for Fluid System.

A substitution table appears on the right. When you enter a pipeline fluid in the datasheet for a pipeline, Visio 2000 locates the appropriate abbreviation and inserts that into the tag for the pipeline. For example, if you specify waste water as the pipeline fluid, the letters WW are used in the tag expression.

8 Click OK to accept the substitution table, and then click OK again to accept the intelligent tag expression.

Now, when you fill out the datasheet for any pipeline, the tag is automatically updated to show the current values. You can also use the Datasheet window or the Edit Tag Number command to change the datasheet fields and update the tag.

Creating a system of units

The default datasheets are set up with conversion tables for units so that you can enter values using the unit system you want. When you change the displayed unit on a datasheet, the value is automatically converted.

The Process Engineering solution provides conversion tables for common measurements such as length, temperature, and pressure. You can add additional unit types for a project by choosing Process Engineering > Project Information > System Of Units and adding a new unit.

Creating your own list form

You can create your own forms for lists or bills of materials that you generate for equipment, instruments, valves, and pipelines. When you create a new list form, you specify which datasheet fields are to be included. Like diagrams, lists can have a sheet format.

For details, use these online Help keywords:

- *System of units*
- *Lists of components*

Try it: Create a new list form

1 Open the Steam1.vsd diagram you created in “Drawing PFDs and P&IDs.”

2 Choose Process Engineering > New Project Document > List.

3 In the New List dialog box, type *My Equipment List* in the List Name text box, and then select a sheet format.

4 From the Categories & Datasheets list, click Equipment to select the Equipment category.

When you select a category, all of the datasheets in that category are automatically selected.

5 Under Choose Fields, click the fields you want to include in the generated list. To select all of the fields, click the Select All button.

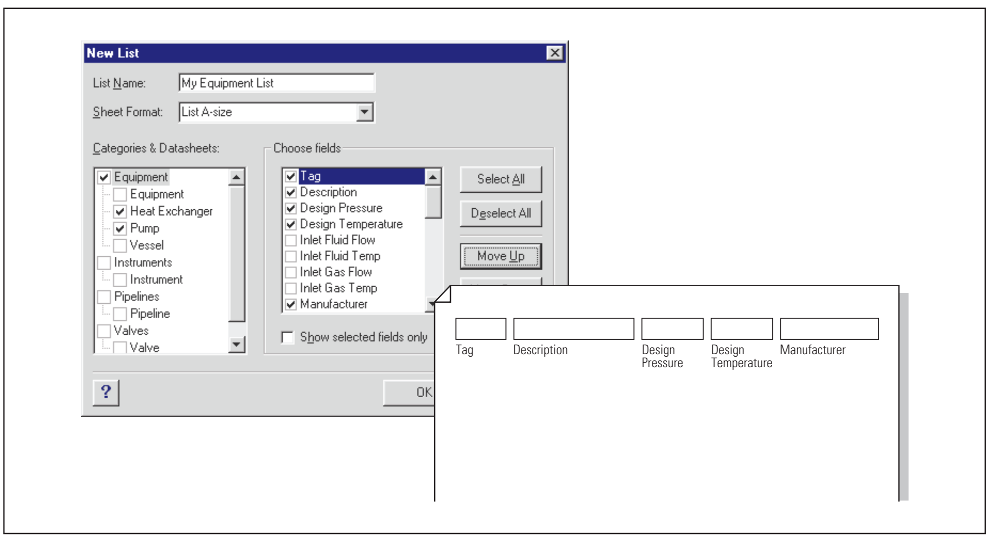
6 To change the order of fields in the generated list, select a field and click the Move Up or Move Down button.

7 Click OK to create your new list form, and then save and close it.

8 To use the new list form, choose Process Engineering > Lists > Generate List. From the List box, select My Equipment List.

9 Click Entire Document to include all shapes in the document. In the Filename box, type a file name for your generated list. Click Write To Visio Drawing, and then click OK to write out the list.

Custom list forms



You can create your own list form by specifying the datasheet fields you want to include in the generated list.

5

Facilities Management: Drawing facilities plans and tracking assets

The Facilities Management solution combines space-planning and asset-tracking capabilities in one easy-to-use software package. This solution offers two different views of your facility information: a spatial view when you use the facilities plan, and an organizational view when you use Visio® CAFM Explorer.

You can

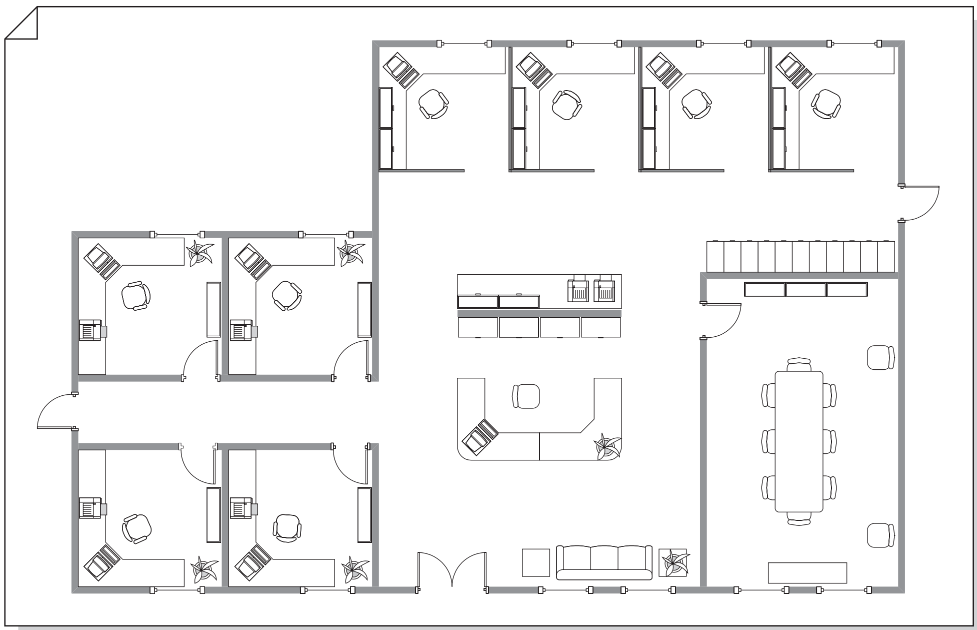
- Create and revise facility plans based on head count, workstation configuration, and other space requirements.
- Locate and list assets, such as furniture, equipment, and fixtures.
- Graphically view room assignments and quickly update them.

Topics in this chapter

Starting your facilities plan and connecting it to a database

When you work with the Facilities Management solution, you draw a facilities plan and use the drawing to track information. Your drawing acts as a "visual database" that you can use to track information about the resources and assets in your facility, specifically the spaces, boundaries, people, fixtures, furniture, and equipment. When you start your facilities plan, you connect your drawing to a facilities database that contains the facilities information you want to track for your organization.

Facilities plan



By using the Facilities Management solution, you can draw facilities plans that have asset-tracking capabilities to assist in managing your facilities. Visio 2000 also offers other drawing types, such as floor plans, site plans, HVAC, security systems, and network diagrams that you can use in conjunction with your facilities plan.

Setting up the facilities database

To get started quickly, you can use the basic database that is created by default when you start a facilities plan. The basic database is a Microsoft Access database stored on your computer; you do not need special permissions or extensive database knowledge to create it. The basic facilities database contains commonly used information about organizations, and you can easily add additional tracking information.

If you want to create a facilities database that is located on a network server, create a custom database. Ask your database administrator to create an empty database in the appropriate format and a data source for that database. You will need the data source name, a user name, and a password (if the database is protected) to begin working with your remote facilities database.

You can also create a custom facilities database in Microsoft SQL Server format instead of Microsoft Access format.

Starting your facilities plan

When you start your facilities plan, you connect to your facilities database. In this procedure, you will connect to the default database.

Try it: Start a facilities plan

1. Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Facilities Management.
3. In the Drawing Type box, double-click Facilities Plan.
4. On the first screen of the Facilities Management Setup Wizard, click Next. On the next screen, select Yes to track information in your drawing. Select Basic: Facilities Data.mdb to track information in the basic database, and then click Next.

   If you have connected to the basic database before, the option for the basic database changes to Recent: Facilities Data.mdb.
5. Enter a company name, location, building, and floor name.
6. Click Finish until you exit the wizard.

Now that you've connected to the facilities database, you can begin creating the building shell of your facilities plan.

NOTE *If you want to create a facilities plan that has no asset-tracking capabilities, or if you want to diagram "what-if" scenarios, start a facilities plan and choose no tracking in the wizard.*

For details, use these online Help keywords:

- *Facilities Management solution*

Creating a building shell

Each page in your Visio drawing represents a floor or a section of a floor in your facility. You can represent an entire floor on one page, or, for example, the northeast, northwest, southeast, and southwest sections of a floor on four different pages. However, you can't represent more than one floor on the same page.

The Facilities Plan template opens one drawing page at a drawing scale of 1/8"= 1'. You already associated this page with the floor you specified during the Facilities Management Setup Wizard. Now, you create a building shell for that floor of your facility. With the Facilities Management solution, you can

- Create a building shell from scratch using the shapes on the Walls, Shell And Structure and the Building Core stencils. You can also insert a building shell you've already created using these shapes.
- Insert a building shell from a CAD (computer-aided design) program such as Autodesk AutoCAD or Bentley MicroStation.
- Convert an existing facilities plan created in a CAD program.

NOTE *If your building shell for a particular floor starts getting too big for the drawing, just change the size or scale of the page by choosing File > Page Setup.*

As you insert building shells for each floor, you need to insert other pages into your drawing that represent other floors in your facility and then create or import the building shell for each floor.

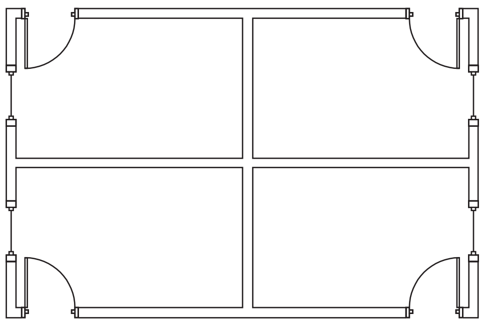
To associate a floor in a facility with a page in a Visio drawing

1. Choose Insert > Page.
2. In the Page Setup dialog box, click OK.
3. In the Site Information dialog box, type the name of the floor, and then click OK.

   This step associates the floor with the page, and changes the name of the page to match the floor name.

Creating a building shell for each floor of your facility

The Facilities Plan template contains shapes for walls, doors, and windows that you can use to create a building shell for a particular floor.



Drag shapes from the Walls, Shell And Structure stencil onto the drawing page to quickly create this building shell with four office spaces.

On the first page of your facilities plan, create the building shell by using the shapes on the Walls, Shell And Structure stencil. For more information about creating a building shell, see "Drawing a floor plan" on page 90.

If you have already created a building shell by using the Walls, Shell And Structure stencil, just copy and paste your building shell into your facilities plan. If you created a building shell that includes space shapes, the space shapes designate spaces for asset tracking. You do not need to drag space shapes from the Resources stencil into offices.

Inserting existing building shells in CAD format

If you have existing building shells created in a CAD program, such as Autodesk AutoCAD or Bentley MicroStation, you can insert these drawings into your facilities plan to use as background images. Each page in your drawing represents one floor in your facility, so import each shell, one floor at a time.

To import a building shell saved in a CAD file format

1 After you open the Facilities Plan solution and complete the Facilities Management Setup Wizard, choose Insert > CAD Drawing to insert a building shell onto the active drawing page.

2 In the Insert CAD Drawing dialog box, navigate to the folder that contains your CAD drawing, select the file you want to import, and then click Open.

3 In the CAD Drawing Properties dialog box, click the General tab, and then select the CAD drawing scale settings you want.

4 Click OK to begin adding spaces to your building shell.

For more information about inserting CAD drawings, see Chapter 3, "Working with CAD drawings."

For details, use these online Help keywords:

- *Pages*
- *CAD files*
- *Floor plans*

For details, use these online Help keywords:

- *CAD files*
- *Converting shapes for Facilities Management solution*

Converting existing building shells and entire facilities plans

If your entire facilities plan is in CAD file format, you can convert the drawing into Visio format. This converts the CAD objects that represent assets into Visio SmartShapes® symbols. You can then convert symbols that represent assets into Facilities Management shapes that have asset-tracking capabilities. For example, you could convert all of the CAD objects that represent chairs into Visio chair shapes and then convert the Visio chair shapes into Facilities Management chair shapes.

If you created a facilities plan by using the Facilities Management solution in Visio Technical 5.0 Plus, you can open the plan in Visio 2000 Technical Edition. Your facilities plan is automatically converted to the new format.

If you created facilities plans by using an earlier version of a Visio product, you can copy and paste these drawings into your facilities plan. If you paste an entire facilities plan, including the shell and facilities shapes, you can convert the shapes into Facilities Management shapes with asset-tracking capabilities by choosing Convert Shapes from the Facilities menu.

NOTE *When you paste existing Visio drawings into your facilities plan, make sure the scale matches. To check or change the scale for your facilities plan, choose File > Page Setup, and then click the Drawing Scale tab.*

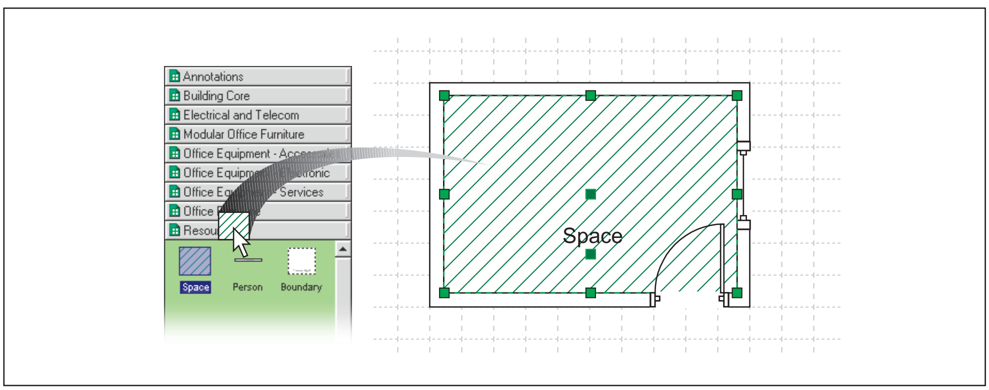
Tracking people, spaces, and areas in your facilities plan

Once you've completed the building shell for at least one floor, you can begin designating and tracking information for spaces, such as offices and conference rooms, and for areas, such as departments. You can also assign people to offices and calculate the square footage allotted to one or to multiple departments. For example, if you're planning an office move, you can calculate how much area a specific department needs and allocate space accordingly.

Designating spaces

You need to designate spaces in your facilities plan so you can associate people and assets with a particular space. Just drag the Space shape from the Resources stencil onto a space in your drawing, such as an office in your building shell.

If you are using a building shell that you created by using Visio wall, door, and window shapes, the Space shape will automatically resize itself to fit the office. Otherwise, you must manually resize the Space shape.



Dragging the Space shape into an office

To designate an office space, just drag the Space shape from the Resources stencil into an office on the drawing page. The Space shape will automatically resize itself to fit an office drawn with Visio wall, door, and window shapes.

For details, use these online Help keywords:

- *Space shapes*

If you are using a floor plan that you previously created by using the Building Architecture solution or the Office Layout solution and that already contains space shapes, you do not need to add space shapes to your floor plan. You can begin assigning assets to spaces.

In this procedure, designate the four spaces in your building shell as offices.

Try it: Designate office spaces in your facilities plan

1 From the Resources stencil, drag the Space shape into the top-left office in your facilities plan. The Space shape automatically resizes to fit the office.

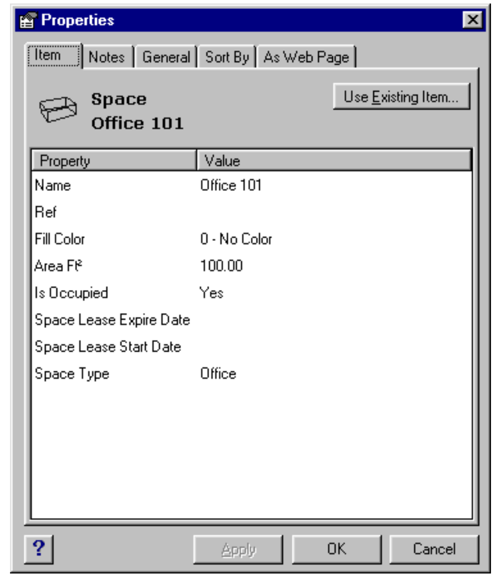
2 To specify information (properties) for the space, double-click the Space shape. In the Properties dialog box, select the area beside the property in the Value column, and then

- Type *Office 101* for the Name property.
- Type *Yes* for the Is Occupied property.
- Type *Office* for the Space Type property.

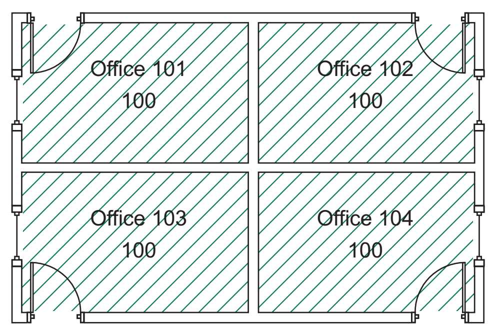
3 Click OK.

The shape's text automatically reflects the name you entered for the Name property.

4 Copy and paste the Space shape into the other similarly shaped spaces, and then enter properties for each office, numbering the spaces as shown.



Double-click a shape to view its category and properties. Values in the Properties dialog box are saved as soon as you change them, as is the case when you change the fields in a database.



Once you size a shape to fit a particular space, you can duplicate the shape to fit other spaces that are the same size.

Resizing spaces

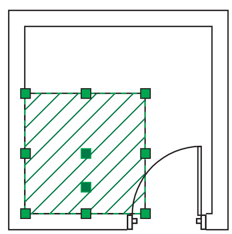
The Space shape is automatically resized when you drag the shape into an office created with Visio wall, door, and window shapes. If you move a wall, you can fit the Space shape to the new office by using the Auto Size command.

You can also use the Auto Size command when you drag the Space shape into an office created with shapes converted from a CAD drawing or any other Visio shapes, such as lines or wall shapes from previous versions of a Visio product.

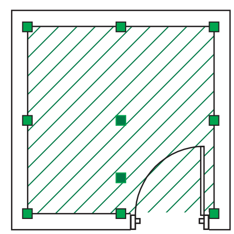
If you are working with an inserted CAD building shell (one that you have not converted into Visio format) or with rooms that are not completely enclosed by Visio wall, door, and window shapes, you must resize the Space shape manually. For irregularly shaped rooms, use the Edit command to modify the Space shape.

To resize a Space shape by using the Auto Size command

- If the Space shape is completely bounded by Visio wall and door shapes, right-click the Space shape and choose Auto Size. The Space shape is automatically resized to fit the new room.
- If the Space shape is bounded by shapes converted from a CAD drawing or by any other Visio shapes, such as lines, right-click the Space shape and choose Auto Size. Ctrl+click to select each bounding wall of the room. Be sure to select any shapes or lines that represent interior structural features, such as interior columns. Click OK to resize the Space shape.



To resize a Space shape completely bounded by Visio wall shapes, right-click the Space shape and choose Auto Size.



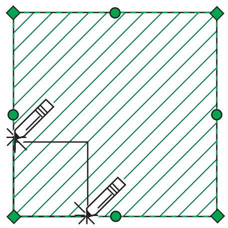
The Space shape expands to fill the room.

For details, use these online Help keywords:

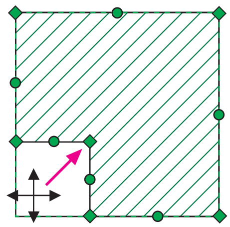
- *Editing shapes*

To resize a space by using the Edit command

1. Right-click the Space shape, and then choose Edit. The pointer changes to the pencil tool ( ).
2. Using the pencil tool, add or move vertices ( ) or points ( ) on the shape.



To size a Space shape to fit an office with an interior corner column, right-click the Space shape and choose Edit. Press Ctrl and click the Space shape at the two points where the column intersects the wall.



Drag the outer corner vertex to accommodate the column.

Designating areas

In addition to designating spaces, you can designate areas, such as departments or teams, by using the Boundary shape on the Resources stencil. This shape marks a boundary around an area. You use it for computational purposes only; you can't associate people or assets with a boundary. For example, you can use this shape to outline an area for which you want to calculate the square footage. You can calculate the square footage for multiple areas the same way you calculate it for multiple spaces.

Try it: Designate a department boundary in your facilities plan

1. From the Resources stencil, drag the Boundary shape onto the drawing page near the four offices.
2. Size the shape so that it encompasses the four offices.
3. Double-click the Boundary shape. In the Properties dialog box, select the area next to the Name property in the Value column, and then type *Finance Department*. Then click OK.

For irregularly shaped areas, you can modify a Boundary shape the same way you modify a Space shape.

Assigning people to spaces

You assign people to spaces to associate them with that location. In many organizations, a manager might occupy an office in several buildings or locations, and two people might share an office. With the Facilities Management solution, you can assign a person to more than one space, and you can assign more than one person to a single space.

To assign a person to a space, just drag the Person shape from the Resources stencil onto a Space shape. When you want to move a person to a new office or location, just drag the Person shape onto the Space shape in the new location.

Try it: Assign a person to each office space in your facilities plan

1. From the Resources stencil, drag the Person shape onto the Space shape for Office 101.

   When you drag a resource or asset onto a Space shape, you are associating it with the space. You must associate resources and assets with Space shapes if you want to use the Find command on the Facilities menu to locate them by their space later.

2. To specify information (properties) about the person, double-click the Person shape. In the Properties dialog box, select the area beside the property in the Value column, and then
   - Type *Eileen Adams* for the Name property.
   - To add Eileen's manager, type *Jullian Elliot* for the Manager property.
   - Type *Accountant* for the Title property.
3. Drag Person shapes onto the Space shapes for the rest of the offices in your facilities plan, and enter properties for each person.

NOTE *You can use Visio CAFM Explorer to organize people within departments. For more information about organizing people by department, see "Tracking organizational data by using Visio CAFM Explorer" on page 83.*

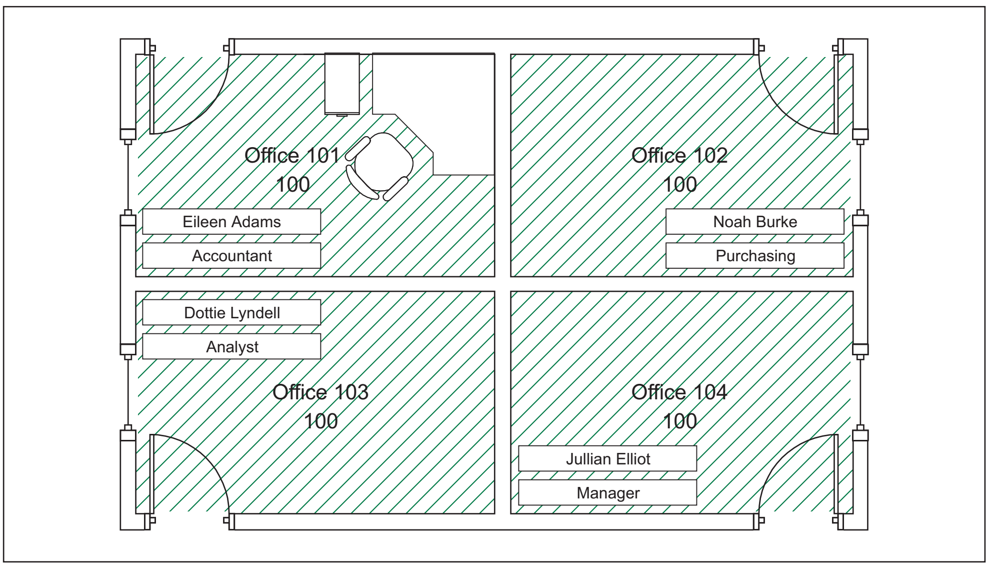
Tracking assets in your facilities plan

Just as you associate people with spaces, you also associate assets with spaces. You can use the asset data you track to locate assets in your facilities plan or to create lists of assets.

To track assets such as fixtures, furniture, and equipment, you must assign asset shapes to a category. Many of the shapes provided with the Facilities Management solution are already assigned to categories; however, you can change the category of shapes or create your own shapes and assign a category to them.

NOTE *You might have assets that are associated with a floor instead of a space. For example, all the people on a floor might use the same fax machine. In this case, the fax machine doesn't belong to a particular person or department, so you wouldn't associate it with a space. When you don't associate an asset with a space, the asset is associated with the floor, or page.*

Assets associated with a space



To associate an asset with a space, just drag the asset onto the space. To associate an asset with a floor, just drag it onto the drawing page, in an open area.

Tracking data by using asset shapes

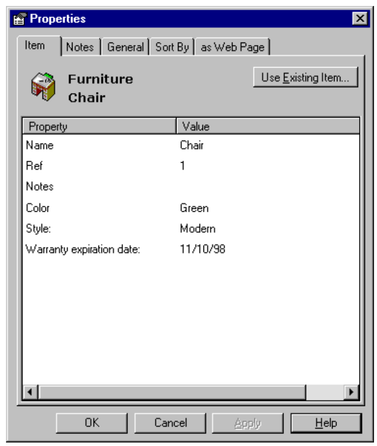
To track your assets, just drag an asset shape from the appropriate stencil onto a Space shape to associate it with that space, and then double-click the asset shape to specify properties. In this procedure, you will add some office furniture to your offices by associating the furniture with specific Space shapes, and then you will enter property values for your assets.

NOTE *When diagramming "what-if" scenarios, make a backup copy of your facilities plan and database first so that you can revert to them later if necessary. For detailed information about making backup copies of your drawing and database, view Readme.wri located in the Visio folder on your Visio 2000 Technical Edition CD.*

Try it: Add assets to your facilities plan and track data for each asset

1 From the Office Furniture stencil, drag a Corner 2, Chair, and File shape onto the Space shape for Office 101 in your facilities plan. Size them to fit your office. To rotate the chair, drag the control handle ( ) on the shape.

2 Double-click each furniture shape, and then specify properties.



Shapes such as desks, chairs, and filing cabinets belong to the Furniture category and have furniture properties, such as color and style. To find out which category a shape belongs to, double-click the shape to view the Properties dialog box.

3 Repeat steps 1 and 2 for Offices 102 and 103 in your facilities plan.

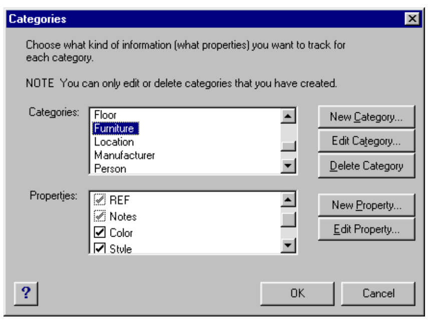
4 Choose File > Save. Save your drawing frequently so that your drawing and the facilities database are synchronized.

For details, use these online Help keywords:

- *Asset information in facilities plans*

Designating new tracking information

The facilities information that you decide to track is organized into *categories*—the groups to which shapes belong—and *properties*—the information you can track for a given category. Many shapes included with the Facilities Management solution are already assigned to a category. For example, furniture shapes belong to the Furniture category, and office equipment shapes belong to the Equipment category.



Every category has Name, Ref (user-defined reference word or number), and Notes properties and other properties specific to that category. For example, the default properties for the Furniture category are Name, Ref, Notes, Color, Style, and Warranty Expiration Date.

You can customize the default categories to track information specific to your organization by adding your own properties to the default categories or by adding your own *subcategories* and properties. A subcategory is a category based on one of the default categories provided with the Facilities Management solution. When you add a subcategory, it inherits the properties of the category on which you base it. For example, you could add a new Printer subcategory based on the Equipment category. The Printer subcategory inherits the Equipment category's properties, and you can add your own properties, such as Department, Printer Type, RAM, Duplex, and Color.

After you add a subcategory, you must assign it to the appropriate shapes. For example, you must assign your Printer subcategory to your printer shapes so that the shapes belong to the Printer subcategory and use its properties. For more information on assigning subcategories to shapes, see "Assigning a category to a shape" on page 77.

Try it: Add new categories and properties

1 Choose Facilities > Customize > Categories.

2 In the Categories dialog box, add the following subcategories and properties in this order:

- Computer subcategory (base this subcategory on the Equipment category) and these properties: Manufacturer, Part Number, Processor, RAM, and Hard Drive Size
- Cost Center Number property for the Person category
- Contractor and Employee subcategories (base these subcategories on the Person category)

Notice that for the Person category, you added the new property first, and then you added the new Contractor and Employee subcategories, which inherited the new property you added for the Person category.

Assigning a category to a shape

The Facilities Management solution offers the flexibility to track any information you want for your facility. To track facilities information with a shape, you must assign the shape to a category that has properties for the information you want to track.

You can create your own shapes and assign a category to them as well as change or assign a category to any shape on a Visio stencil. You can assign a category to one or more shapes on the drawing page or stencil. If you change the category of a shape on the drawing page, only that particular shape will belong to the new category. If you change the category of a shape on a stencil, the shape will belong to the new category any time you drag it onto the drawing page.

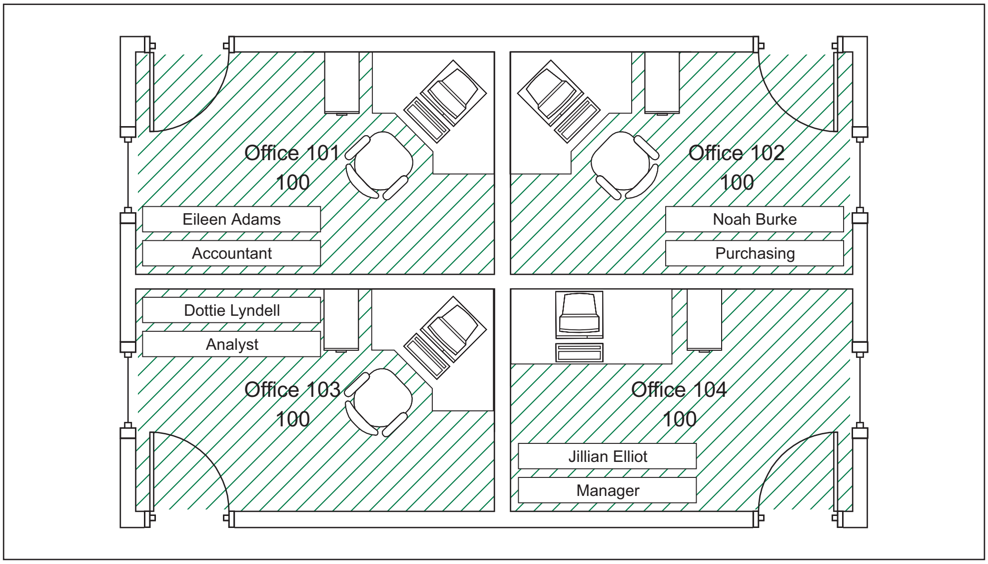
In a previous procedure, you added the Computer subcategory and properties for it. Now, you need to assign the Computer subcategory to the PC and Tower PC master shapes on the Office Equipment - Electronic stencil so that you can use these shapes to track computer information.

For details, use these online Help keywords:

- *Categories in facilities plans*

Try it: Assign a category to shapes on a stencil

1. Make sure nothing is selected on the drawing page, and then choose Facilities > Convert Shapes. Click Next.
2. In the second screen of the wizard, choose the Office Equipment - Electronic stencil from the list, click Next, and then click Yes to open the original stencil.
3. In the next screen, uncheck Show Only Unassigned Shapes so that you can see all of the shapes.
4. From the Categories list, select Computers.
5. Under Shapes, select PC, and then Ctrl+click to select Tower PC. Click Add.
6. Click Finish to reassign the shapes. Click No to indicate that you are finished assigning categories.
7. From the Office Equipment - Electronic stencil, drag a PC shape onto the desk in Office 101 of your facilities plan.
8. Double-click the PC shape to enter information for the Manufacturer, Part Number, Processor, RAM, and Hard Drive Size properties.
9. Repeat steps 7 and 8 to add PC shapes to the rest of the offices in your facilities plan.
10. For the purpose of this exercise, don't save the changes you made to the stencil. However, if you were creating a real facilities plan, you would click the stencil title bar of the stencil you changed and then choose File > Save.
11. With the drawing window active, choose File > Save to save your facilities plan.



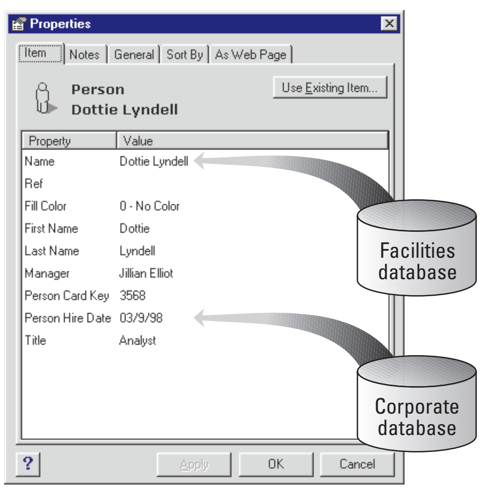
Sample facilities plan

If you followed the procedures in this chapter, your facilities plan should look similar to this one. After you create a facilities plan, you can use it as a tool to list, locate, and print your facilities information.

Using data from existing databases

Much of the information you would track in a facilities plan already exists in databases within your organization. For example, a Human Resources database might contain employee information such as a Social Security number or manager's name. An Information Services database might contain equipment information, such as the make and model of all the printers in your organization.

You can link properties in your facilities plan to fields in existing databases so that you do not need to reenter the existing data into your facilities plan. Whenever the external database is updated, your facilities plan is also updated so that you always have the latest information.



You can link properties to fields in existing databases to reuse your organization's data.

To access an external database, you must know its data source name. If the database is protected, you also need a user name and password. Contact the database administrator for that information.

To link your facilities properties to database fields, you need to know enough about the database tables to select the data you want.

To connect to an existing database and choose data

1. Choose Facilities > Customize > Get External Data.
2. Click Create to create a new connection, or link, to the existing database.
3. Type a connection name for this connection to the database.

   You create a unique connection name for each Facilities Management category you link to a table or view in the external database. For example, if you were accessing a Human Resources database, you could name the connection Employees.
4. Select the data source that points to the existing database, and then click Next.
5. Under Object Types, click the type of database objects you want to view, and then under Database Objects, select the particular table or view you want. Click Next.

   Use the preview of the selected object to verify that you have located the correct data.

6 Choose one or more columns (database fields) to use as the primary key to identify each record in the table, and then click Next.

A primary key is one field or a set of fields that uniquely identify the records stored in a table. For example, in an employee table, an Employee ID field could be the primary key. You can use up to five columns as the primary key for a table.

7 Select the Facilities Management category that will use data from the existing database.

For example, if you were connecting to an existing Human Resources database, you would choose Person from the categories list.

8 Select a Facilities Management property and a database field to link together, and then click Add.

For example, you could link the Hire Date property with a Hire Date field from an employee table in a database.

9 When you have finished linking Facilities Management properties to database fields, click Finish.

To use linked data in your facilities plan

1 Double-click the asset or the Person shape in your facilities plan.

2 In the Properties dialog box, click Use Existing Item.

3 In the Search For box, type text to locate the correct record in the external database.

For example, to locate the record associated with an employee, type the person's first name or last name.

4 Select the record you want, and then click OK.

Any property that is linked to a database field is automatically filled in. Linked properties are unavailable for editing in the Properties dialog box.

5 Click OK to save your changes and close the Properties dialog box.

For details, use these online Help keywords:

- *Databases (Facilities Management)*
- *Properties in facilities plans*

Working with your facilities plan and information

After you create your facilities plan and add information to it, you can easily maintain and revise it by dragging a shape to relocate an asset, or by double-clicking a shape to change facilities information. Your facilities plan becomes a useful tool for quickly listing and locating assets and sorting and printing facilities information.

You can

- Use Visio menu commands or Visio CAFM Explorer to list and locate people or assets.
- Use Visio CAFM Explorer to work with your facilities information within the structure of your company—organizationally rather than spatially.
- Print or electronically distribute a copy of your facilities plan.

Listing and locating assets in your facilities plan

One of the most important uses of your facilities plan is to list assets and track their location in your facilities plan. For example, you can locate a person in your facilities plan or list all of the copiers on a particular floor.

In this procedure, you will use Visio menu commands to list and locate all the chairs in your facilities plan.

NOTE *To locate the assets for a space, you must place them on Space shapes in your facilities plan. Any asset on a drawing page that is not associated with a Space shape is associated with the floor, or page.*

Try it: List and locate the chairs in your facilities plan

1. Choose Facilities > Find.

   To find Steelcase furniture that has particular specifications, choose Facilities > Furniture > Find.

2. In the Find Facilities Data dialog box, on the Name & Location tab, type *chair* in the Search For box and select the Furniture category.

3 Click Find Now.

All shapes that match the criteria appear in the list at the bottom of the dialog box. To sort and print your list, select all the items you want to print, right-click any item, and then choose Properties. In the Properties dialog box, click the Sort By tab, click the property by which you want to sort the list, click the As Web Page tab, and then click Print.

4 From the list of shapes, select the chairs you want to locate in your facilities plan, right-click any one of the selected chairs, and then choose Add-Ons > Locate.

Visio 2000 selects the chair in your facilities plan.

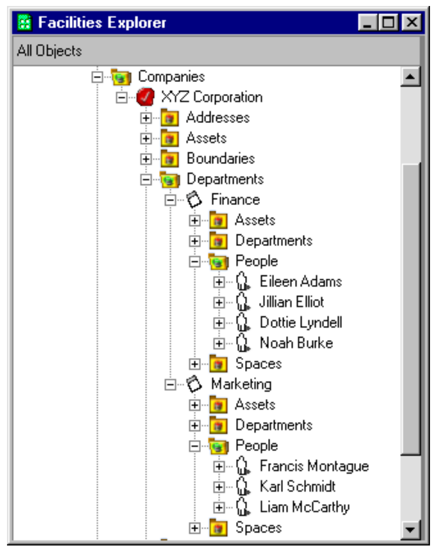
5 Click Close.

You can also use Visio CAFM Explorer to list assets and locate them in your facilities plan. Choose Facilities > Explorer > View to start Visio CAFM Explorer, and then click View Full Screen on the Facilities Explorer toolbar. Choose Edit > Find. From this point, follow steps 1–5 of the previous procedure, "List and locate the chairs in your facilities plan."

TIP *When you use Visio CAFM Explorer to list assets that have a price property, the total cost is displayed on the status bar.*

Tracking organizational data by using Visio CAFM Explorer

Visio CAFM Explorer offers a hierarchical (organizational) view of your facilities data. You can set up departments and organize people within departments so that you can quickly view the structure of your company. Or, you can enter information for a department that you wouldn't track in your facilities plan, such as the total budget for a department.



Visio CAFM Explorer complements your facilities plan by offering a hierarchical view of your organization and facilities information, rather than a spatial view of your facility.

For details, use these online Help keywords:

- *Searching for facilities plans shapes*
- *CAFM Explorer*

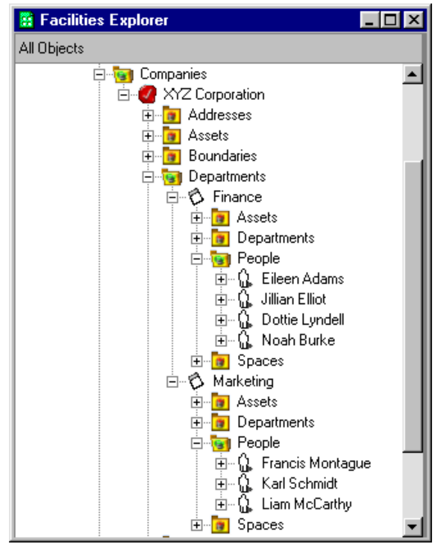
You can also use Visio CAFM Explorer as a holding place for information about resources or assets that you haven't placed in your facilities plan yet. For example, suppose the Human Resources department just hired an employee, but the manager doesn't know where the employee will sit yet. Or, suppose an Accounting manager just bought a new printer, but she doesn't know where she's going to put it yet. Visio CAFM Explorer is the ideal place to store this information until you determine location information and can add the resource or asset to the facilities plan.

In this procedure, you will relate Eileen Adams, one of the people in your facilities plan, to the Finance department.

Try it: Relate a person to a department in your organization

1. Choose Facilities > Explorer > View to start Visio CAFM Explorer.
2. Navigate to the Companies folder and then to the Departments folder.
3. Right-click the Departments folder, choose New > Department, type *Finance,* and then press Enter.
4. Click the Finance item to view the People folder.
5. Navigate to Eileen Adams, the employee you want to associate with the department.
6. Right-click Eileen Adams, choose Relate To, and then click the People folder under the Finance item.

   When you choose Relate To, your pointer changes to an icon appropriate for the item.



To set up a relationship, just drag an item onto a folder within the boundaries of the hierarchy. For example, you can drag a person onto the People folder in a department to relate the person to the department. However, you can't drag a department onto a person.

In this procedure, you will add a new employee, who is not yet represented in your facilities plan, to a department.

Try it: Add new employee information to Visio CAFM Explorer

1. In Visio CAFM Explorer, navigate to the department to which the new employee belongs.
2. Right-click the People folder, choose New > Person, type the new employee's name, and then press Enter.
3. Right-click the new employee name, and then choose Properties to enter information you know about the new employee.

When you determine where the new employee sits, you can add a Person shape to your facilities plan. You can find the new employee's name and any other information you added using Visio CAFM Explorer by double-clicking the Person shape. This opens the Properties dialog box. On the Item tab, click Use Existing Item, and then type the employee's name. Click Find Now and select the correct employee from the list. Click OK to update the Person shape.

Distributing your facilities plan

You can print or electronically distribute your facilities plan to space planners, electricians, telecommunications specialists, and contractors—anyone who needs your plan.

For more information on distributing your facilities plan, see Chapter 8, "Sharing your drawings with others."

6

Building Architecture: Drawing floor plans and site plans

Whether you are an architect designing a commercial building or a facilities manager planning interior spaces, Visio® 2000 Technical Edition provides the drawing tools you need to quickly and easily draw floor plans and site plans.

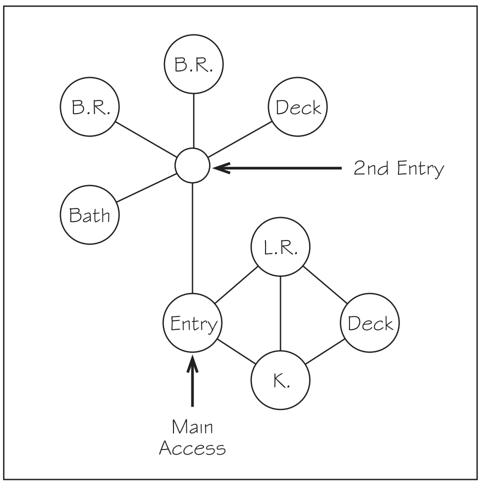
With Visio 2000, you can

- Draw space plans that show the approximate size and location of rooms and areas. You can then transform space plans into floor plans.
- Draw floor plans that show the location of walls, doors, and windows, as well as building core features (such as stairways and elevators) and electrical and telecommunications systems (such as lights, outlets, and switches).
- Draw architectural or landscape site plans complete with roads, parking lots, and plants.
- Lay out a manufacturing plant with shapes for shop floor equipment.
- Draw a home plan for your own remodeling, interior design, or landscaping projects.

Topics in this chapter

Drawing a space plan

Architects sometimes start a floor plan from a bubble diagram. ***Bubble diagrams*** are conceptual design sketches that show the required spaces in a building and the relationships between spaces. As the architect refines the placement and size of the spaces, the sketches begin to accurately reflect the size and location of the final rooms, corridors, and common areas.



Bubble diagrams show the relationships between spaces and help you plan the layout of rooms and common areas.

In Visio 2000, you can create a space plan that, like a bubble diagram, shows the rough location of spaces in your building. When you have finalized the layout of your building, you can convert the spaces into rooms outlined by fully dimensioned wall shapes. You can then continue to create a full floor plan with as much detail as necessary.

Visio 2000 provides shapes and tools you can use to create a space plan in two ways:

- By dragging space shapes onto your drawing page and then converting them into wall shapes
- By drawing lines or rectangles to represent rooms or to trace the outline of your floor plan, and then converting the lines or rectangles to wall shapes

To start your space plan

1. Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Building Architecture.
3. In the Drawing Type box, double-click Floor Plans.
4. To change the page size or drawing scale, choose File > Page Setup.
5. Click the Page Size tab and choose a page size, and then click the Drawing Scale tab to choose a drawing scale.
6. Click OK to accept the new settings and begin working on your space plan.

To create rooms by using space shapes

1. From the Walls, Shell And Structure stencil, drag a space shape onto the drawing page.
2. To resize the space shape, drag any corner of the shape.

   The shape is updated to show its new area.

3 To create a room that is not rectangular, position several space shapes to represent the room. Select all of the shapes, right-click them, and then choose Union, Subtract, or Intersection to combine them.

4 Position shapes to represent all of the rooms and common areas in your space plan.

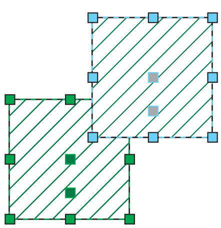
5 To convert a space shape into a room, right-click the shape and choose Convert To Walls.

6 In the Convert To Walls dialog box, check Add Dimensions and Add Guides so that you can reposition the walls easily after they are created.

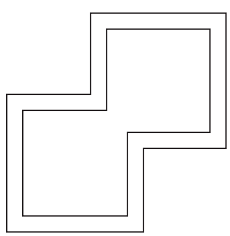
7 Under Original Geometry, click Retain to keep the original space shape.

TIP *Keep the space shape if your floor plan will be used with the Facilities Management solution. For details, see Chapter 5, "Facilities Management: Drawing facilities plans and tracking assets."*

8 Click OK to create the room.



Join two space shapes together by right-clicking the shapes and choosing Union.



Choose Architecture > Convert To Walls to convert the space shape into wall shapes.

To create rooms by drawing lines

1 Use the line tool ( ) or the rectangle tool ( ) from the Standard toolbar to draw an outline of a room.

2 Draw the outlines of all of the rooms and common areas in your space plan.

3 To convert lines into walls, select the lines that represent the rooms, and then choose Architecture > Convert To Walls.

4 In the Convert To Walls dialog box, check Add Dimensions and Add Guides so that you can easily reposition the walls after they are created.

5 Under Original Geometry, click Convert To Space Shape to delete the original lines and insert a space shape into the converted room.

6 Click OK to create the room.

To resize rooms

1 To change the size of a room, drag the guides to which the walls are attached.

2 If the room contains a space shape, update the space shape by right-clicking it and choosing Auto Size.

For details, use these online Help keywords:

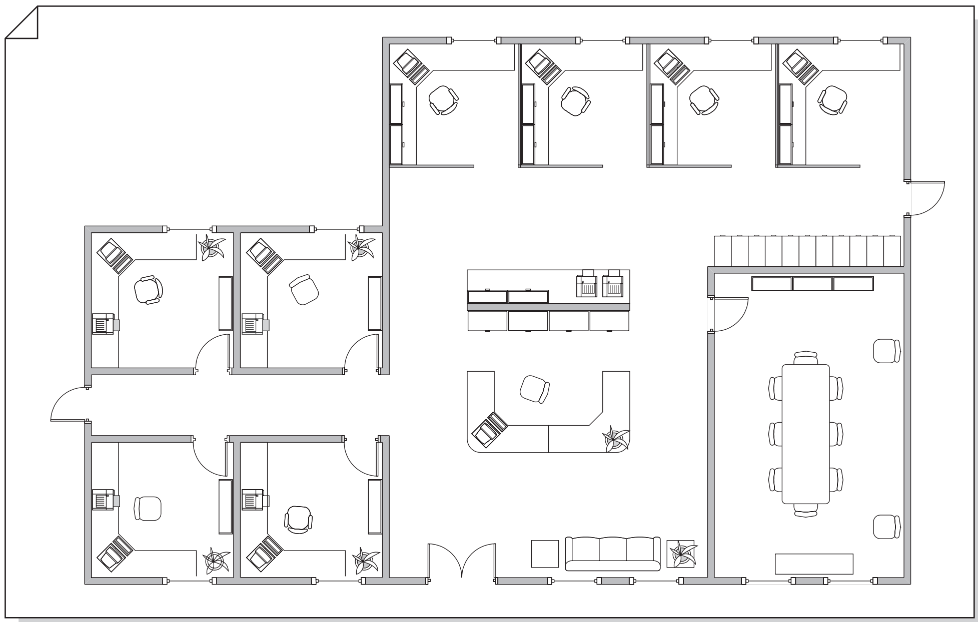
- *Building Architecture solution*
- *Creating shapes*

Drawing a floor plan

Floor plans are the core drawings in a set of construction documents and are frequently used as background images in a wide range of drawings, from office furniture layouts to electrical wiring diagrams.

Visio 2000 gives you the shapes you need to draw walls quickly and easily, add doors and windows, and dimension your floor plan.

Floor plan



The Architecture solution simplifies the complex task of drawing scaled floor plans.

Starting a floor plan

You can use wall shapes from the Floor Plans stencils to draw a detailed floor plan. You can also create a floor plan by creating a space plan and then converting the spaces into walls. For details about creating a space plan, see “Drawing a space plan” on page 88.

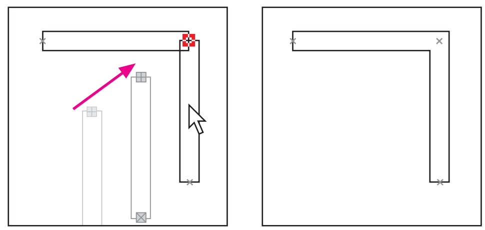
If you are constructing a simple office layout for only a few rooms, you can also use the Office Layout template.

To start a floor plan

1. Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Building Architecture.
3. In the Drawing Type box, double-click Floor Plans.
4. To change the page size or drawing scale, choose File > Page Setup.
5. Click the Page Size tab and choose a page size, and then click the Drawing Scale tab to choose a drawing scale. For details, see “Setting the drawing scale” on page 26.
6. Click OK to accept the new settings and begin working on your floor plan.

Drawing the building shell

The building shell includes exterior and interior walls and columns, and major structural features, such as stairways and elevators. Visio 2000 provides wall shapes that you can glue together to form exterior or interior walls. When wall shapes that form a T-joint or corner joint are glued together, the joint is automatically redrawn so that it is displayed correctly.



Wall joints are displayed correctly when you glue the endpoints of walls together.

For details, use these online Help keywords:

- *Office layout drawings*
- *Floor plans*

For details, use these online Help keywords:

- *Doors*
- *Walls*
- *Windows in space plans*

To draw the building shell

1 Drag guides from the horizontal and vertical rulers and position the guides on the page so that they indicate the perimeter of the building.

2 For each exterior wall, drag a wall shape onto the page. Drag the endpoints of the wall shape to the intersections of the horizontal and vertical guides to glue them to the guides.

3 To reposition exterior walls, drag the guides to which they are attached.

4 Add columns or other structural shapes from the Walls, Shell And Structure stencil or the Building Core stencil.

5 Position interior and cubicle walls by dragging the wall shapes onto the page. Drag the endpoint of one wall to another wall to join them.

6 Add guides to interior walls by right-clicking a wall and choosing Add A Guide.

7 To reposition interior walls, drag the guides to which they are glued.

8 To change wall properties, such as thickness, right-click a wall and choose Set Wall Properties.

Adding doors, windows, and openings

It's easy to add the shapes for doors, windows, and other openings to your floor plan. When you drag a door or window shape onto a wall, the door or window automatically rotates to align with the wall and glues itself to the wall. Door and window shapes also acquire the wall's thickness.

To add doors, windows, and openings to walls

1 Drag a door, window, or opening shape from the Walls, Shell And Structure stencil onto a wall.

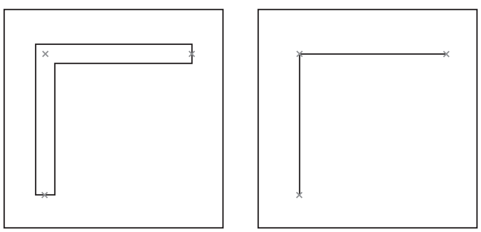
2 To reposition a door or window, drag it along the wall.

3 To change door or window properties, such as width or offset within a wall, right-click a door or window and choose Set Door Properties or Set Window Properties.

Changing the appearance of walls, doors, and windows

For detailed construction drawings, you can change how walls, doors, and windows are displayed. For example, you can hide door header or frame components or display walls as single lines instead of double lines.

You can set the default appearance for all walls, doors, and windows on a drawing page. You can always override the settings for any individual wall, door, or window.



You can quickly change walls from double-line to single-line walls.

To change the appearance of walls, doors, and windows

1. To change the appearance of all walls, doors, or windows on a page, right-click the page and choose Set Architecture Page Properties.
2. Click the Doors, Walls, or Windows tab and choose the settings you want. For more information about the settings on a tab, click the Help button ( ).
3. To override the default appearance of a wall, door, or window, right-click the shape and choose Set Wall Properties, Set Door Properties, or Set Window Properties.
4. Click the Overrides tab and change the settings for the individual wall, door, or window.

Measuring and dimensioning

In Visio 2000, you can add dimension lines to walls at any time. As you refine your plan, the dimensions are automatically updated. You can also find out the area and perimeter of rooms in your floor plan.

To add dimension lines to a wall

1. Select the walls to which you want to add dimensions.
2. Right-click the walls, and then choose Add A Dimension.

To measure the area and perimeter of rooms

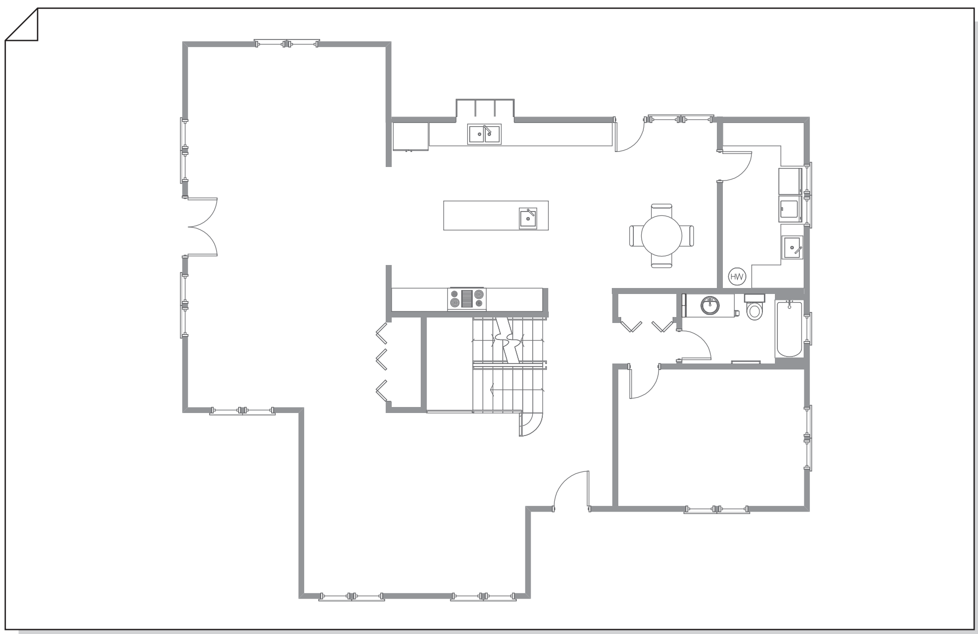
1. Select the shapes.
2. Choose Tools > Macros > Visio Extras > Shape Area And Perimeter.

Drawing a home plan

Visio 2000 provides the shapes and tools you need to draw home plans. Home plans are easy to draw—you do not need to be an architect to create your own initial drafts of remodeling plans, experiment with new kitchen or furniture arrangements, or draw up plans to add a new room to your home. For building projects, you can then give your plans to your architect to create construction plans.

Home plan shapes are complete enough for the professional architect. You draw a home plan using the same wall, door, and window shapes you would use to create a commercial building, and you can use architectural dimensioning and annotation shapes to create a complete construction document.

Home plan



Use home plans for remodeling your house or for a complete residential floor plan.

Creating your home plan

Before you begin drawing a home plan for a remodeling project, measure the existing rooms and note the size and location of windows and doors. Measure the length and width of existing appliances, cabinets, or furniture that you want to use in your home plan.

To start a home plan

1. Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Building Architecture.
3. In the Drawing Type box, double-click Home Plans.
4. To change the page size or drawing scale, choose File > Page Setup.
5. Click the Page Size tab and choose a page size, and then click the Drawing Scale tab to choose a drawing scale. For details, see “Setting the drawing scale” on page 26.
6. Click OK to accept the new settings and begin working on your home plan.

To complete your home plan

1. Use the shapes on the Walls, Shell And Structure stencil to draw the exterior and interior walls. For details, see “Drawing the building shell” on page 91.
2. Alternatively, you can draw a floor plan by starting with a space plan and converting spaces into rooms. For details, see “Drawing a space plan” on page 88.
3. After you have assembled the walls, drag door, window, or opening shapes from the Walls, Shell And Structure stencil onto walls.
4. Add shapes for electrical symbols, fixtures, and appliances.
5. Add furniture shapes.
6. For landscaping projects, add shapes from the Garden Accessories stencil.

For details, use these online Help keywords:

- *Building Architecture solution*
- *Page setup*

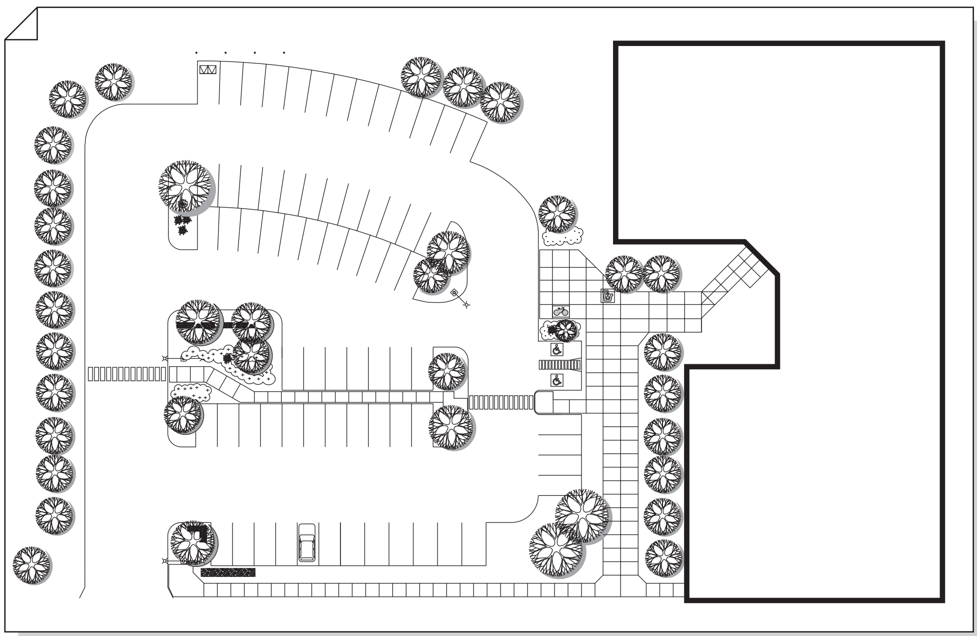
Drawing a site plan

Visio 2000 provides the shapes and tools you need to draw landscape or architectural site plans.

Starting your site plan

Before you begin your site plan, measure the perimeter of the property and the size and placement of existing buildings, or obtain a legal description of the property. For landscape plans, measure the size and placement of existing plants or garden structures that you want to keep in your new plan.

Site plan



Use site plans to show how a building is situated on a piece of property or to show how a site will be landscaped.

To start your site plan

1. Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Building Architecture.
3. In the Drawing Type box, double-click Site Plans.
4. To change the page size or drawing scale, choose File > Page Setup.
5. Click the Page Size tab and choose a page size, and then click the Drawing Scale tab to choose a drawing scale. For details, see “Setting the drawing scale” on page 26.
6. Click OK to accept the new settings and begin working on your site plan.

Incorporating buildings into your site plan

To incorporate buildings and other structures into your site plan, you can

- Draw a building outline by using the line tool ( ) on the Standard toolbar.
- Use wall shapes from the Walls, Shell And Structure stencil to draw the structures. To open the stencil, choose File > Stencils > Building Architecture > Floor Plans > Walls, Shell And Structure.
- Insert a floor plan created in a CAD (computer-aided design) drawing program, such as Autodesk AutoCAD or Bentley MicroStation.
- Open an existing floor plan you created in any Visio product and create the site plan in that drawing.

For details, use these online Help keywords:

- *CAD files*
- *Property Line tool*
- *Building Architecture solution*

For details, use these online Help keywords:

- *Dimensions of shapes*
- *Guides and guide points*

Adding roads, parking lots, and pathways

Visio 2000 provides shapes for architectural site plans, which show the location of roads, driveways, parking lots, and walkways at the site. Site plans might also show the location of utility lines, lighting, and other architectural features.

To lay out roads, parking lots, and pathways

1. Drag guides from the horizontal and vertical rulers and position the guides on the page to mark the locations of the site perimeter, stalls, and roads in the drawing.
2. Drag curbs and driveways from the Parking And Roads stencil into position. Use lines to connect curbs and driveways.
3. Drag parking strips, stalls, and parking islands into position.
4. Drag pathways from the Garden Accessories stencil into position.
5. Position vehicles, parking accessories (such as lights), and plant shapes around the parking strips.

Adding plants and landscape features

Visio 2000 provides shapes for landscape site plans, which show the location of plants, irrigation equipment, fences and walkways, and recreational equipment, such as pools and swing sets.

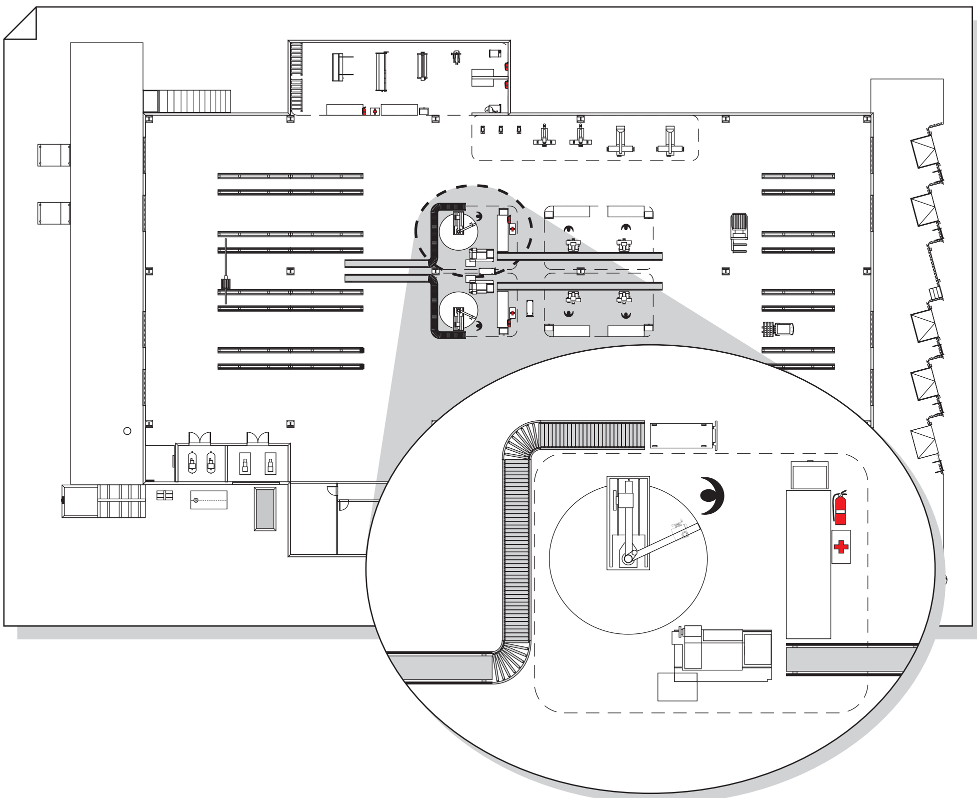
To add plants and landscape features

1. Add shapes for fences and paths from the Garden Accessories stencil.
2. Add recreational equipment from the Sport Fields And Recreation stencil.
3. Add plants from the Planting stencil and irrigation systems from the Irrigation stencil.
4. Use the Plant Callout shape from the Planting stencil to label plants.

Drawing a manufacturing plant layout

You can use Visio 2000 to design shop floors for manufacturing plants. Plant layouts show the building, machinery, storage facilities, and shipping and receiving facilities of a manufacturing plant.

Plant layout



Use plant layouts for manufacturing plant designs that show equipment, storage and distribution, and shipping and receiving areas.

For details, use these online Help keywords:

- *Building Architecture solution*

Creating your plant layout

If you are modifying an existing plant, determine the dimensions of the warehouse or factory structure and of the external loading area. Determine the size of the loading bays and doors, and note the directions for door swings. Obtain the dimensions of existing or proposed equipment, such as machines, cranes, racks, and shelving.

To start a plant layout

1. Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Building Architecture.
3. In the Drawing Type box, double-click Plant Layout.
4. To change the page size or drawing scale, choose File > Page Setup.
5. Click the Page Size tab and choose a page size, and then click the Drawing Scale tab to choose a drawing scale. For details, see "Setting the drawing scale" on page 26.
6. Click OK to accept the new settings and begin working on your plant layout.

To complete the plant layout

1. Use the shapes on the Walls, Shell And Structure stencil to draw the building shell of the plant. For details, see "Drawing the building shell" on page 91.
2. Add shapes for shop floor machines and equipment.
3. Add shapes for transferring materials and for loading and unloading equipment from the Shop Floor - Storage And Distribution stencil.
4. Add shapes for shipping and receiving.
5. Add shapes for transporting materials and manufactured goods from the Vehicles stencil.

7

Additional industry drawings

Using Visio® 2000 Technical Edition, you can create industry-specific drawings such as

- Building services diagrams of HVAC control systems, basic duct layouts, fire and security plans, and lighting and electrical designs.
- Electrical and electronic schematic diagrams for control systems; general electrical diagrams, such as wiring diagrams; printed circuit board diagrams; and circuit and logic diagrams.
- Part and assembly drawings for the mechanical engineering design of manufactured products.
- Hydraulic and pneumatic circuit diagrams for fluid power systems.

Topics in this chapter

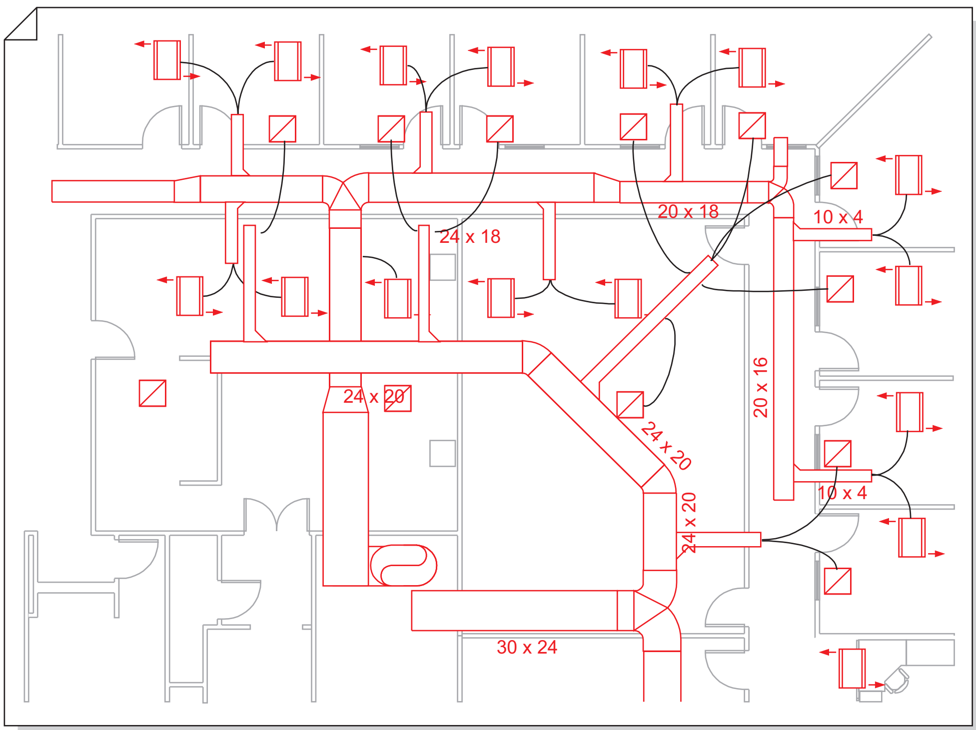
Building Services: HVAC, electrical, and plumbing diagrams

Visio 2000 provides shapes that let you create building services diagrams of HVAC control systems, basic duct layouts, fire and security plans, and lighting and electrical designs.

Creating an HVAC control logic diagram

Visio 2000 provides shapes for creating HVAC control logic diagrams that show a schematic view of the equipment, wiring, and sensors used to control an HVAC system.

HVAC plan



Using the Building Services solution, you can draw HVAC plans to show ductwork for heating, ventilation, and air conditioning systems.

To create an HVAC control logic diagram

1 Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.

2 In the Choose Drawing Type dialog box, click Cancel to start with no open drawing.

3 Determine where you want to create your HVAC control logic plan. You can lay out your plan on a blank drawing page or on top of an existing floor plan:

- To draw your plan on a blank page, choose File > New > Building Services > HVAC Control Logic Diagram.
- To draw your plan on a floor plan drawn in a CAD (computer-aided design) program, choose File > New > Building Services > HVAC Control Logic Diagram, and then insert the floor plan. For details, see “Using an existing floor plan” on page 107.
- To draw your plan on a floor plan created in a Visio product, open the floor plan, and then open the stencils you need. For details, see “Using an existing floor plan” on page 107.

4 Drag HVAC shapes onto the drawing page.

You can configure many shapes by right-clicking them and choosing Set Properties from the shortcut menu. For example, you can change ducts from double line to single line.

5 To label a shape, select it and type the label text. You can reposition a label by dragging the label’s control handle (■).

6 Save your drawing.

Creating an HVAC plan

Visio 2000 provides ductwork, pipe, and valve shapes for creating single-line and double-line HVAC plans that show the location and configuration of ductwork and piping.

To create an HVAC plan

1 Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.

2 In the Choose Drawing Type dialog box, click Cancel to start with no open drawing.

3 Determine where you want to create your HVAC plan. You can lay out your plan on a blank drawing page or on top of an existing floor plan:

- To draw your plan on a blank page, choose File > New > Building Services > HVAC Plans.
- To draw your plan on a floor plan drawn in a CAD program, choose File > New > Building Services > HVAC Plans, and then insert the floor plan. For details, see “Using an existing floor plan” on page 107.
- To draw your plan on a floor plan created in a Visio product, open the floor plan, and then open the stencils you need. For details, see “Using an existing floor plan” on page 107.

For details, use these online Help keywords:

- *Building Services solution*

4 Drag ductwork shapes onto the drawing page. Ductwork shapes rotate into position and glue to other ductwork shapes.

You can configure many shapes by right-clicking them and choosing the appropriate command from the shortcut menu. For example, you can change the angle and radius of a Variable Bend shape.

5 To label a shape, select it and type the label text. You can reposition a label by dragging the label's control handle ( ).

6 Save your drawing.

Creating plumbing drawings

Visio 2000 provides shapes to create plumbing and piping drawings that show the layout of pipes, valves, and fittings in a building.

To create a plumbing drawing

1 Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.

2 In the Choose Drawing Type dialog box, click Cancel to start with no open drawing.

3 Determine where you want to create your plumbing and piping plan. You can lay out your plan on a blank drawing page or on top of an existing floor plan:

- To draw your plan on a blank page, choose File > New > Building Services > Plumbing And Piping Plans.
- To draw your plan on a floor plan drawn in a CAD program, choose File > New > Building Services > Plumbing And Piping Plans, and then insert the floor plan. For details, see "Using an existing floor plan" on page 107.
- To draw your plan on a floor plan created in a Visio product, open the floor plan, and then open the stencils you need. For details, see "Using an existing floor plan" on page 107.

4 Drag plumbing fixtures, pipes, and valves from the stencils onto the drawing page to lay out your plumbing components.

You can configure many shapes by right-clicking them and choosing the appropriate command from the shortcut menu.

5 To connect shapes, drag pipes onto the drawing page. Glue each end of the pipe shapes to connection points on the other shapes. To resize a pipe, drag an endpoint (or).

6 To label a shape, select it and type the label text. You can reposition a label by dragging the label's control handle ( ).

7 Save your drawing.

Creating fire and security system plans

Visio 2000 provides shapes you can use to create fire and security system plans.

To create a fire or security system plan

1. Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Cancel to start with no open drawing.
3. Determine where you want to create your fire and security plan. You can lay out your plan on a blank drawing page or on top of an existing floor plan:
   - To draw your plan on a blank page, choose File > New > Building Services > Fire And Security Systems.
   - To draw your plan on a floor plan drawn in a CAD program, choose File > New > Building Services > Fire And Security Systems, and then insert the floor plan. For details, see “Using an existing floor plan” on page 107.
   - To draw your plan on a floor plan created in a Visio product, open the floor plan, and then open the stencils you need. For details, see “Using an existing floor plan” on page 107.
4. Drag security shapes for alarm access and control, initiation and annunciation, and video surveillance onto the drawing page. If you are prompted for information about a shape, fill in the appropriate data and click OK.

   You can change custom properties data for a shape at any time by right-clicking the shape, choosing Properties from the shortcut menu, and selecting a new property from the list. For example, the Card Access shape has a Mount Type property that indicates where the reader is mounted.
5. Save your drawing.

Creating electric and telecom plans

Visio 2000 provides shapes that you can use to create electric and telecom plans that show the location of lighting, electrical wiring and service panels, and telecommunications outlets.

To create an electrical and telecom plan

1. Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Cancel to start with no open drawing.
3. Determine where you want to create your electrical and telecom plan. You can lay out your plan on a blank drawing page or on top of an existing floor plan:
   - To draw your plan on a blank page, choose File > New > Building Services > Electric And Telecom Plans.
   - To draw your plan on a floor plan drawn in a CAD program, choose File > New > Building Services > Electric And Telecom Plans, and then insert the floor plan. For details, see “Using an existing floor plan” on page 107.

For details, use these online Help keywords:

- *Connecting shapes*
- *Building Services solution*

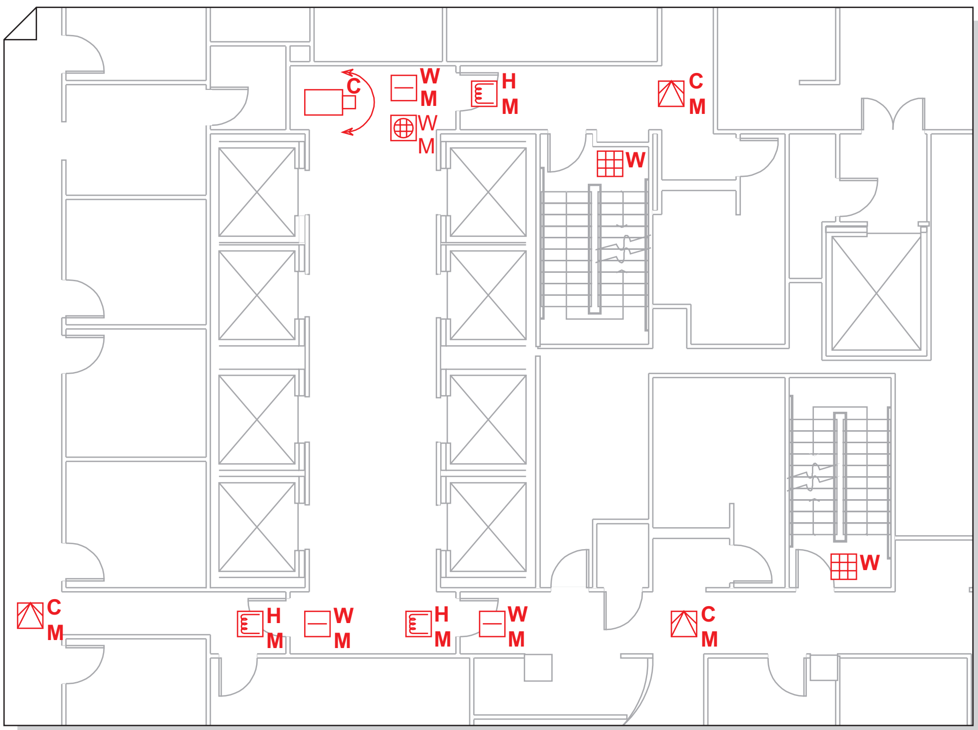
- To draw your plan on a floor plan created in a Visio product, open the floor plan, and then open the stencils you need. For details, see “Using an existing floor plan” on page 107.

4 Drag shapes for lighting, outlets, and switches onto the drawing page.

5 To label a shape, select it and type the label text. You can reposition a label by dragging the label’s control handle (■).

6 Save your drawing.

Fire and security system plans



You can create fire and security system plans by using Visio 2000.

Using an existing floor plan

Many HVAC, electrical, and plumbing drawings are created on a floor plan or building shell to show the location of the components in the building. You can insert an existing floor plan in DWG, DXF, or DGN format, or you can insert a floor plan drawn in Visio 2000.

To use a floor plan saved in a CAD file format

1. Create a blank Building Services drawing, and then choose Insert > CAD Drawing.
2. In the Insert CAD Drawing dialog box, navigate to the folder that contains your CAD drawing, select the file you want to import, and then click Open.
3. In the CAD Drawing Properties dialog box, click the General tab and select the page and scale settings you want. Click OK.
4. Choose View > Layer Properties. Select the CAD Drawing layer and check Lock.

> **TIP** *Lock the layers of a floor plan to make it easier to select the shapes you drag onto the floor plan instead of accidentally selecting the floor plan itself.*

5. Click OK to begin working on your drawing. For details, see Chapter 3, "Working with CAD drawings."

To use a floor plan saved in a Visio product format

1. Choose File > Open. In the Open dialog box, navigate to the folder that contains your Visio drawing, select the Visio drawing file you want to use, and then click Open.
2. Choose View > Layer Properties. Select each floor plan layer and check Lock.
3. Choose File > Stencils > Open Stencil. In the Open Stencil dialog box, navigate to the folder that contains the stencils you want. Ctrl+click each stencil you want to use, and then click Open.

   For example, to open the stencil for electrical and telecom plans, navigate to Visio\Solutions\Building Services and open the file Electrical And Telecom.vss.
4. Begin working with your drawing.

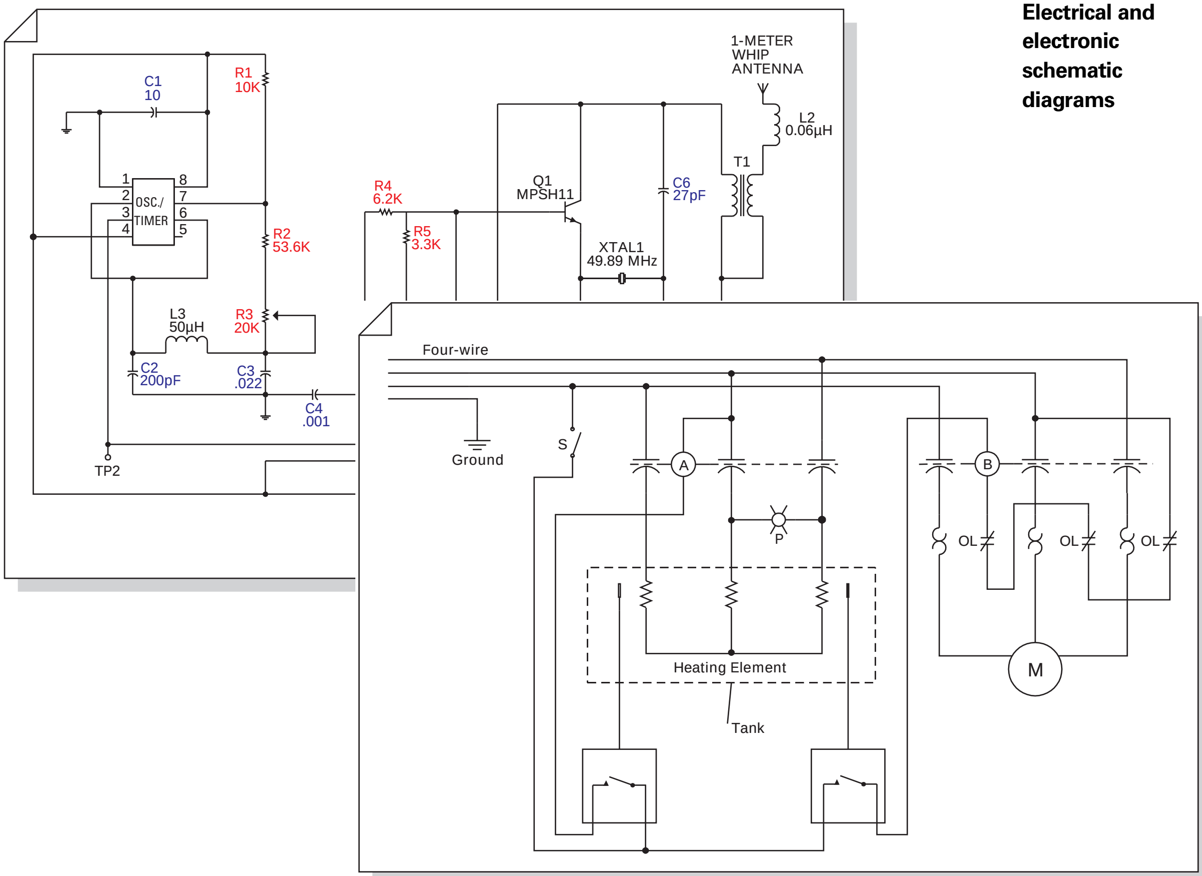
For details, use these online Help keywords:

- *CAD files*
- *Layering shapes*

Electrical Engineering: electrical and electronic diagrams

Using Visio 2000, you can create electrical and electronic schematic diagrams and wiring diagrams. You can also generate a netlist from your diagram that you can use to input information into a circuit analysis program.

Electrical and electronic schematic diagrams



Using the Electrical Engineering solution, you can draw electrical and electronic schematic diagrams for control systems; general electrical diagrams, such as wiring diagrams; printed circuit board diagrams; and circuit and logic diagrams.

To draw an electrical or electronic diagram

1 Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.

2 In the Choose Drawing Type dialog box, click Electrical Engineering, and then double-click the type of electrical or electronic drawing you want to create:
   - To create schematics for integrated circuits and logic circuits, select EE - Circuits And Logic.
   - To create general electrical diagrams, such as schematic, one-line, and wiring diagrams, select EE - General.
   - To create schematics for control systems, select EE - Industrial Control Systems.
   - To create schematics for printed circuit boards, select EE - Systems.

3 Add electrical component shapes. For example, to draw a simple lamp circuit, add a battery, resistor, switch, and lamp.

   You can configure many shapes by right-clicking them and choosing the appropriate command from the shortcut menu. For example, you can change a resistor from variable to fixed.

4 Click the connector tool ( ) on the Standard toolbar, and drag from a connection point ( ) on one component shape to a connection point on another to connect them.

5 To label a shape, select it and type the label text. You can reposition a label by dragging the label's control handle ( ).

6 Save your drawing.

Generating a netlist

You can generate a netlist file from your electrical or electronic diagram to use as an input file for a circuit analysis program, such as SPICE.

To generate an accurate netlist, you must draw your diagram in a certain way:

- Use the connector tool ( ), rather than the line tool, to connect components on the diagram.
- Label components sequentially with a name that begins with a component designator (such as R for resistor or C for capacitor) and ends with the component's value. For example, you might label a resistor R6 10k.
- Use 2-D (two-dimensional) component shapes. The Visio electrical and electronic shapes are all 2-D; if you create your own shapes or use other Visio shapes, be sure they are 2-D.

To generate a netlist

1 In your drawing, select the components that make up the circuit you want to analyze.

2 Choose Tools > Macros > Electrical Engineering > Netlist Generator.

3 In the Netlist Generator dialog box, specify a prefix for unnamed nodes and a location for the netlist file.

4 Click OK to generate the netlist.

For details, use these online Help keywords:

- *Electrical Engineering solution*
- *Netlist Generator*

Mechanical Engineering: part and assembly drawings

For details, use these online Help keywords:

- *Mechanical Engineering solution*
- *Pages*
- *Dimensions of shapes*

Visio 2000 supplies shapes that let you create part drawings and assembly drawings that provide information for manufacturing a product. Part drawings (or detail drawings) show each part contained in a product. Assembly drawings show how all the parts fit together.

To create part and assembly drawings

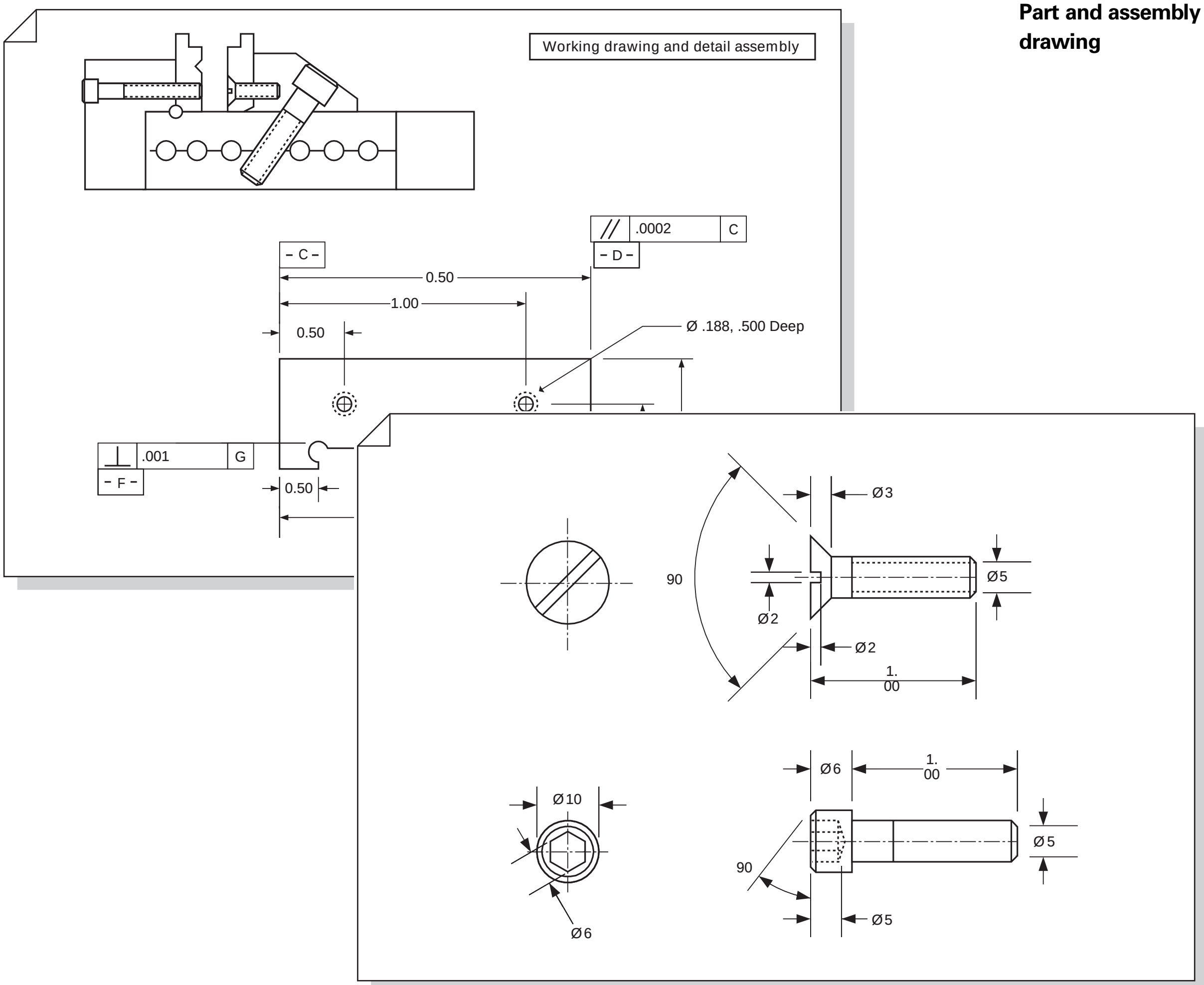
1. Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Mechanical Engineering.
3. In the Drawing Type box, double-click Part And Assembly Drawing.
4. To create a title block, drag shapes from the Title Blocks stencil.

TIP *If you are creating a drawing that has more than one page, create a background page and add your title block to the background page so that you don't need to repeat it on every page of the drawing.*

5. To draw outlines of objects, drag shapes from the Drawing Tool Shapes stencil onto the drawing page. You can configure many shapes by right-clicking them and choosing the appropriate command from the shortcut menu.
6. Drag shapes from the Fasteners 1, Fasteners 2, and Springs And Bearings stencils onto the drawing page. If you are prompted for information about a shape, fill in the appropriate data and click OK.

   You can change custom properties data for a shape at any time by right-clicking the shape and choosing the appropriate command from the shortcut menu. For example, bolts have thread diameter, shaft length, and thread length properties.
7. Add dimensions to your drawing.
8. Add datum feature symbols and feature control frames by dragging shapes from the Geometric Dimensioning And Tolerancing stencil onto the drawing page.
9. Add welding symbols by dragging shapes from the Welding Symbols stencil onto the drawing page.
10. Add callouts and other reference notes by dragging shapes from the Annotations stencil onto the drawing page.

Part and assembly drawing



Using the Mechanical Engineering solution, you can draw part drawings and assembly drawings for manufactured products.

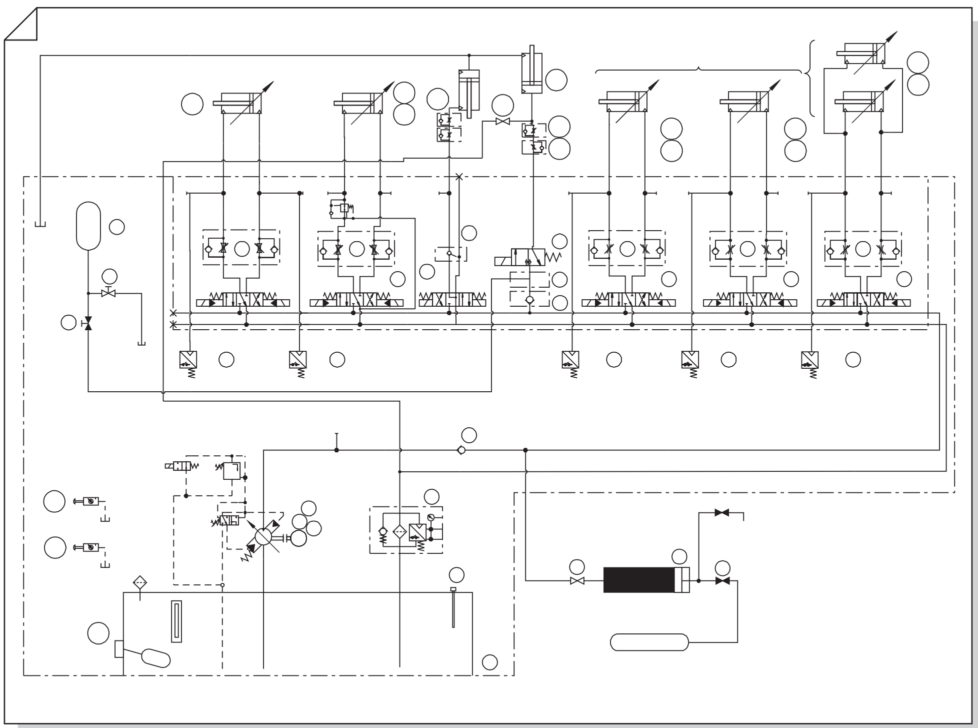
Fluid power diagrams

Visio 2000 provides shapes and tools for creating schematic diagrams of pneumatic or hydraulic circuits. You can use the valve shapes provided with Visio 2000, or you can create your own valve shapes by using the Valve Builder.

Creating fluid power diagrams

You can create fluid power diagrams to document hydraulic or pneumatic circuits, such as those used in factory automation systems, heavy machinery, or automobile suspension systems.

Fluid power diagram



You can use the fluid power shapes and tools to create fluid power control system drawings and circuit schematics.

To create a fluid power diagram

1 Start Visio 2000. In the Welcome To Visio 2000 dialog box, click OK.

2 In the Choose Drawing Type dialog box, click Fluid Power.

3 In the Drawing Type box, double-click Fluid Power.

4 Drag valve and equipment shapes onto the drawing page.

   You can configure many fluid power shapes by right-clicking them and choosing the appropriate command from the shortcut menu. For example, you can quickly change the Pump/Motor (Simple) shape from hydraulic to pneumatic.

5 Use the connector tool ( ) to connect components.

   You can also choose File > Stencils > Annotation > General - Connectors to open a stencil with connector shapes. Drag connector shapes onto the page and glue their endpoints ( ) to connection points ( ) on the equipment or valve shapes.

6 To label a shape, select it and type the label text. You can reposition a label by dragging the label's control handle ( ).

7 Add text, labels, callouts, and other reference notes by dragging shapes from the Annotations stencil onto the drawing page.

8 Save the drawing.

Creating your own valves

Visio 2000 provides shapes for commonly used valves, such as a two-way, two-position directional control valve (a 2/2 valve). You can use the Valve Builder to efficiently create a wide range of additional valve shapes.

To create your own valve

1 Drag the Valve Builder shape from the Fluid Power - Valves stencil onto the drawing page. Position it where you want the new valve to appear.

2 In the Valve Builder dialog box, specify the number of positions and ports you want the valve to have.

3 From the list under Positions and Ports, select a flow path.

4 Under Arrowheads, specify the number and direction of arrowheads for the valve.

5 Under Fluid Type, select Hydraulic or Pneumatic.

6 Under Control Location, specify the location for the control.

7 Under Control Type, select the type of control you want from the list.

8 Click Build to create the valve.

   Visio 2000 places the valve on the page.

For details, use these online Help keywords:

- *Fluid Power solution*
- *Valve Builder*

8

Sharing your drawings with others

After you create a drawing, you can print it for coworkers or business clients, or publish it to a company's intranet or Web site.

You can also

- Automatically update your drawings with any new information by adding hyperlinks to shapes.
- Route your drawings to other departments for comments and evaluation.

Topics in this chapter

Printing your drawings

Most Visio® 2000 Technical Edition drawing types are set up so that the drawing page and printed page sizes are the same, so you don't have to change page settings to get the printed drawing you expect. You can view your drawings or diagrams before you print them to make sure they print the way you want.

If you want to change the size, orientation, or scale of the drawing page as you create your drawing, keep the following terms in mind as your set up your drawing for printing:

- The drawing page is the white page you see on the screen.
- The printer page is the paper in the printer on which you print your Visio diagram.
- The printed drawing is your end result: the image on your drawing page printed onto one or more printer pages.

Using print preview to view your drawing

You can preview your drawing before you print to make sure you get the results you expect.

If you preview your drawing and notice that the drawing page and printer page orientations do not match, you should adjust either your printer page or drawing page settings so the two match.

To preview a drawing before printing

- Click the Print Preview button () on the Standard toolbar.

To match the printer page orientation to the drawing page orientation

1. Choose File > Page Setup.
2. In the Page Setup dialog box, specify the drawing page orientation as Portrait (taller than it is wide) or Landscape (wider than it is tall).

Print setup for large and multiple-page drawings

When you work with large drawings or diagrams, it's possible to have a drawing page that is larger than the printer page. If the size of a drawing is larger than the paper in your printer, Visio 2000 ***tiles*** the drawing, which means that the drawing appears across several sheets of paper.

For example, if you create a large organization chart and, in order to accommodate the drawing on your printer page, you increase the size of the drawing page without changing the paper size in your printer, Visio 2000 prints the drawing across as many pages as necessary.

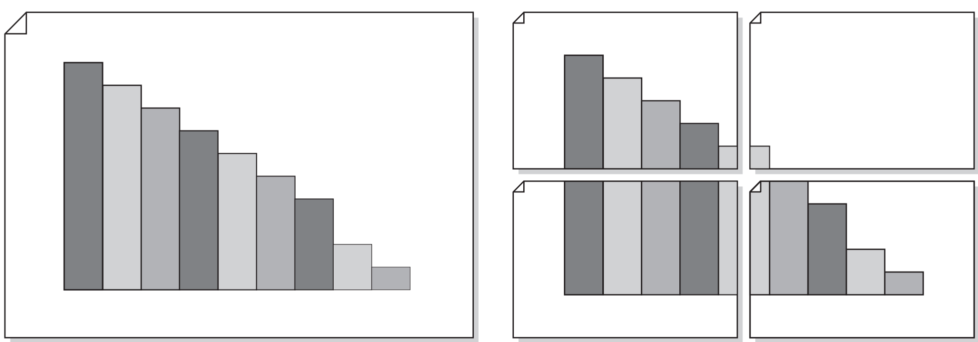
You can preview a large drawing to see if it will require more than one printer page. When you know your drawing will appear across multiple printer pages, you can choose how much a tiled drawing overlaps on adjacent pages. This gives you some room to overlap the parts of the drawings so that they fit together as a whole. You can also specify the number of pages you want your drawing to be tiled over.

To determine whether a large drawing will print on several pages

- Choose View > Page Breaks.

  Gray bands appear on the drawing page, indicating the printer page size and margins selected in the Print Setup dialog box.

Printing large drawings



You can print a drawing on large printer paper or across several smaller sheets of paper.

For details, use these online Help keywords:

- *Drawing scales*
- *Printing*

To reduce or enlarge the size of a printed drawing

1 Choose File > Page Setup.

2 On the Print Setup tab, under Print Zoom (All Pages), choose one of the following options:

   - To reduce the size of the drawing, select Adjust To, and then type a number less than 100.
   - To enlarge the size of the drawing, select Adjust To, and then type a number greater than 100.
   - To set the drawing to print across multiple sheets of paper, select Fit To, and then type the number of pages across and down on which you want the drawing to print.

3 Look at the preview to see if your drawing page and printer page are the way you want, and then click OK.

To increase the area where tiled drawings overlap

1 Choose File > Page Setup, and then on the Print Setup tab click the Setup button.

2 Type larger amounts for the margin settings, and then click OK.

   The larger the margins, the greater the overlap.

3 Click OK in the Page Setup dialog box.

To specify the number of pages for a tiled drawing

1 Choose File > Page Setup, and then on the Print Setup tab click the Setup button.

2 Under Print Zoom, select Fit To, and then specify the number of sheets across and down. Choose the number of pages that represents an area proportionate to the drawing page.

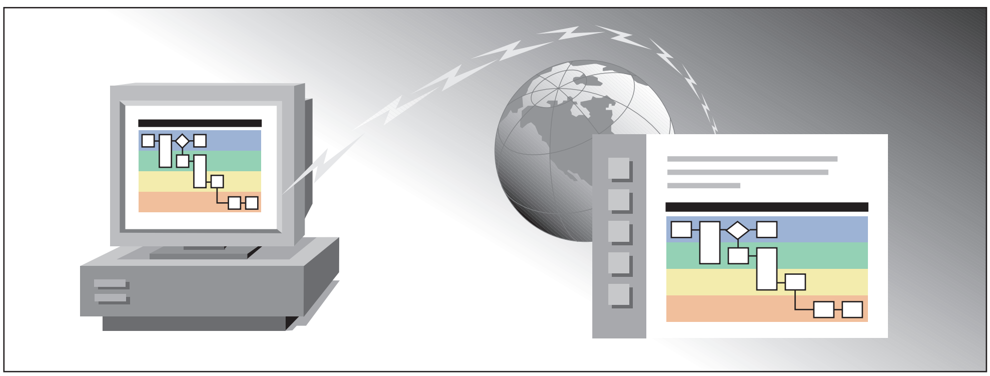
3 Click OK in both the Print Setup and Page Setup dialog boxes.

Publishing drawings to the Web

With Visio 2000, publishing your drawings or diagrams to the Internet or an intranet site is as easy as saving a file. Visio 2000 automatically adds the HTML codes necessary to display the drawing in a Web browser, so all you have to do is make sure your drawing looks the way you want.

You can make your drawing a launching point for users who want more detail and related information by adding hyperlinks to shapes. When users click a “hot” shape, they jump to the linked location.

Converting Visio drawings to Web pages



You can easily convert Visio drawings to Web pages by saving them in HTML format.

For details, use these online Help keywords:

- *Hyperlinks*
- *HTML and Internet tools*

Adding hyperlinks to drawings

You can add one or more hyperlinks, or jumps, to Visio shapes and drawing pages. A link can jump to another page in the same Visio drawing or diagram, another Visio drawing, or a non-Visio document.

When you add hyperlinks to other pages in the same drawing, you can use them to move among pages in the Visio drawing. For example, you can link a Process shape in a flowchart to Total Quality Management (TQM) documentation in a Microsoft Word document for that process.

When you link a shape or page to a file, you can decide whether the path to the link should be a relative path or an absolute path.

- **Relative path** A relative path describes the location of the linked file in relation to the Visio drawing or another path (set on the Summary tab in File > Properties). You can move the Visio drawing and the linked file together (that is, move the entire path structure) without breaking the link, but if you move the drawing or file separately, you break the link.
- **Absolute path** An absolute path spells out the exact location of the linked file in terms of drive, folder, and file name. You can move the Visio drawing file without affecting the link, but if you move the linked file, you must reset the path.

To link a shape or page to another Visio drawing page, a Web page, or a non-Visio file

1. Create or open a Visio drawing. To add a link to a page, display the page with nothing selected. To add a link to a shape, select the shape.

   NOTE *If you are linking to a Visio 2000 drawing, make sure to save the drawing so that you can open the source to which you are linking.*

2. Choose Insert > Hyperlink.
3. Do one of the following:

   To link to a Web site For Address, type the Web site's URL.

   If you don't know the URL, click Browse, and then choose Internet Address to open your default Web browser.

   To link to a file For Address, click Browse, and then click Local File. Navigate to the file you want, and then click Open. (If necessary, change the type of file in Files Of Type.)

4. If you are linking to a file and you want to display a particular page, click Browse next to Sub-Address, select the page you want, and then click OK.
5. Under description, type a name for the link that identifies the location to which you're linking.

6 Do one of the following:

To specify an absolute path Uncheck Use Relative Path For Hyperlink.

To specify a relative path Check Use Relative Path For Hyperlink. To set a path that is not based on the location of the Visio drawing, choose File > Properties. For Hyperlink Base, type the base path that you want.

7 If you want to add another hyperlink for the selected shape or page, click New, and then repeat steps 3 through 6.

8 If you want to link to another page within the document, or to a shape in the document, click the Browse button to the right of Sub-Address, specify the page, shape, and zoom level you want, and then click OK.

Converting drawings to HTML

After you create Visio 2000 drawings, you can convert them into Web pages with links to other Web pages by saving them as HTML files.

To convert a drawing to an HTML file

1 Open the drawing you want to save as an HTML file, and then choose File > Save As.

2 Type a name for the HTML file, using the .htm extension, such as Drawing.htm.

3 For Save As Type, choose HTML Files (*.htm, *.html), and then click Save.

4 In the Save As HTML dialog box, accept the default settings, and then click OK.

You are prompted to view the HTML pages.

5 Click Yes to view the new Web pages in your default browser.

Routing your drawings for comments

You can use e-mail to send a Visio drawing or diagram to another user. For example, if you need information from coworkers to complete your drawing, you can route the drawing to them electronically and ask for their comments.

The Visio program also lets you take advantage of Microsoft Office routing features, including sending drawings to Microsoft Exchange folders, adding routing slips to drawings you send by means of e-mail, and adding journal entries to Microsoft Outlook.

NOTE *Visio products are compatible with electronic mail programs that support the Messaging Application Program Interface (MAPI) protocol.*

To send a drawing with a routing slip

1 Display the drawing you want to send, and then choose File > Send To > Routing Recipient.

2 In the Routing Slip dialog box, click Address to open your address list, select the individuals or groups to whom you want to route your diagram, and then click OK.

3 If you want to route the drawing to people in a specific order, select a person's name, and then click the up or down arrow in the Move section to change that person's position in the list.

4 Under Route To Recipients, specify whether to route the drawing to one person at a time or to everyone at once.

   If you choose to route the drawing to one person at a time, the first person on the list views or updates the drawing, routes the drawing to the next person, and so on.

   If you route the drawing to a designated group (called a group alias), all group members will receive the drawing at the same time.

5 Check Track Status to receive an update as each person on the list passes the drawing to the next person, or check Return When Done if you'd rather not see the drawing again until everyone has seen it.

6 Under Message Text, type the text you want in the e-mail message, and then click Add Slip.

7 Choose File > Send To > Next Routing Recipient to send the drawing to the first person on the routing list.

TIP *If you receive a routed drawing and want to route it to the next person, choose File > Next Routing Recipient.*

9

Go further: Creating shapes, styles, and templates

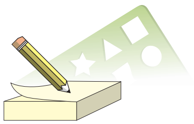
As well as providing you with ready-to-use solutions, Visio® 2000 Technical Edition gives you the flexibility to build your own. You can create your own shapes and styles that you and others can reuse.

You can, for example,

- Use drawing tools or menu commands to create or customize shapes, and add these shapes to stencils for use in future drawings or diagrams.
- Create new styles, such as color fills and text styles, that you can reuse to give shapes a consistent look and make them easier to revise.
- Create new templates that include stencils and drawing page settings you know you'll use again.

Topics in this chapter

Creating your own shapes



When you use the pencil, line, rectangle, or ellipse tool, try holding down the Shift key while you draw, to see how that constrains the drawing behavior.

There are several ways to create your own shapes in Visio 2000 Technical Edition. You can

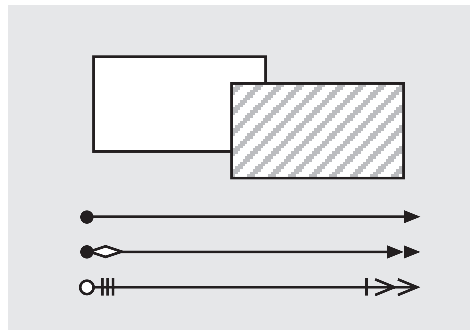
- Draw a shape from scratch using Visio drawing tools, such as the line, rectangle, ellipse, and freeform tools. For example, if you want to add a freeform arrow to a block diagram, you can draw the arrow with the freeform tool ( ).
- Merge a shape with other shapes to create a new, unique shape. For example, if you want to create a round sign with an arrow in its center, you can place an arrow shape on top of a circle and then use the Combine command to create the shape you want.
- Revise an existing Visio shape to create a new, unique shape. For example, if your company uses a special process shape in flowcharts, you can modify the Visio Process shape, save it on the Basic Flowchart Shapes stencil, and then use it in future flowchart drawings.

Using Visio drawing tools to create shapes

When you use the Visio drawing tools to create shapes, keep in mind that a shape can be either open or closed.

Open shapes are lines, arcs, or zigzag shapes. You can format their ends, but you can't fill them with colors or patterns because they contain no enclosed space.

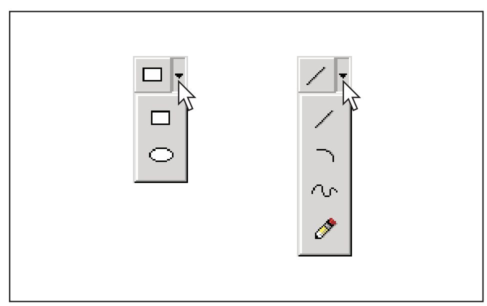
Closed shapes, such as rectangles or circles, are surrounded by a continuous line. You can fill them with colors and patterns.



You can apply a pattern to a closed shape, such as a rectangle. You can add ends to open shapes, such as lines.

To draw a shape from scratch using the Visio drawing tools

1. Choose a drawing tool from the Standard toolbar.
2. Click and drag on the drawing page to create the shape you want.



Click the arrow next to the rectangle tool and the line tool to see more Visio drawing tools.

Merging existing shapes to create new shapes

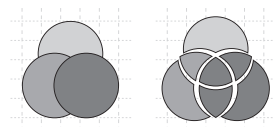
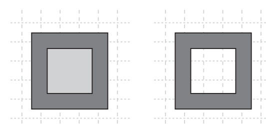
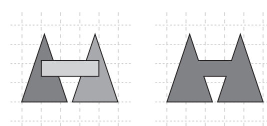
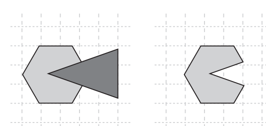
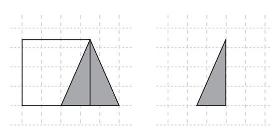
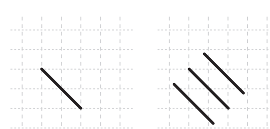
An easy way to create a complex shape is to select simple shapes and then use the shape operation commands, such as Fragment, Combine, and Union, to create the new shape.

NOTE *The new shape you create using any shape operation command inherits the formatting of the first shape you select.*

For details, use these online Help keywords:

- *Drawing tools*
- *Multiple shapes*

Using shape operations commands

Command	Result	Example
Fragment	Breaks a shape into smaller parts or creates new shapes from intersecting lines or from 2-D (two-dimensional) shapes that overlap.	
Combine	Creates a new shape from selected shapes. If the selected shapes overlap, the area where they overlap is cut out (discarded), creating a cookie-cutter effect.	
Union	Creates a new shape from the perimeter of two or more overlapping shapes.	
Subtract	Creates a new shape by subtracting the area where selections overlap from the primary selection.	
Intersect	Creates a new shape from the area where the selected shapes overlap, eliminating non-overlapping areas.	
Offset	Creates a set of parallel lines or curves to the right and left of the original shape.	

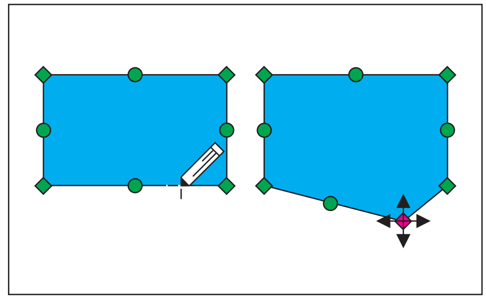
Revising existing shapes

You can revise any Visio shape or shape you draw from scratch as long as the shape isn't locked to prevent specific changes. When a shape is locked, you see padlocks in place of corner handles when you select the shape.

When you select shapes for revision using the pencil tool ( ), the line tool ( ), the arc tool ( ), or the freeform tool ( ), the selection handles turn into ***vertices*** ( ), which are green diamond-shaped handles that you can drag to change the appearance of a shape.

To revise an existing shape

- Select the shape with the pencil tool ( ), and then drag, add, or delete vertices ( ).
- To change curves, drag a control point ( ).



You can reshape shapes using the pencil tool. Select the shape, and then drag, add, or delete vertices.

Reusing shapes you create and save

For details, use these online Help keywords:

- *Masters*
- *Stencils*

If you've created or modified a shape and want to keep it for future drawings or diagrams, you can make the shape a ***master*** by saving it on a stencil. All masters are stored on stencils. When you drag a shape from a stencil onto the drawing page, you are creating an ***instance***, or copy, of the master.

You can also import graphics in other formats to save as masters. For example, if your company logo is in WMF format and you use it on all of your reports, you can import it into a Visio drawing, and then save it as a new master on a stencil.

Adding your own shapes to a stencil

If you want to reuse your own shapes the next time you open a particular drawing type, you can save your own shapes to existing stencils in your drawing, and then save the file as a template (.vst).

You can also create a new stencil, and then add your own shapes as well as any existing Visio shapes you want to it. Then, you can save the stencil in a template file, so that you and others can reuse it in other drawings.

To add your own shape to an existing stencil

1 Open the template containing the stencil you want to add your own shape to.

2 Click the icon on the stencil title bar ( ), and then choose Edit from the menu.

A red asterisk appears on the stencil icon ( ) to indicate that the stencil is editable.

3 Hold down the Ctrl key, and then drag your own shape from the drawing page onto the stencil.

A new icon representing your own shape appears on the stencil with a generic name, such as Master .01.

4 Click the new master on the stencil, click it again, and then type the name you want for the new shape.

5 Click the stencil icon ( ), and then choose File > Save As to open the Save As dialog box. Navigate to the ***Solutions*** folder in which you want to save the stencil, and then type a name for the stencil in the File Name box. For Save As Type, choose Stencil (*.vss), and then click Save to save your stencil.

When you open the stencil again, you can use the new shape as you do any other Visio 2000 master.

To add your own shape to a new stencil

1 Choose File > Stencil > New Stencil. You can also choose View > Toolbars > Stencil, and then click the New Stencil toolbar button ( ) from the Stencil toolbar.

The new stencil appears docked to the left side of the drawing window. The stencil icon has a red asterisk ( ) to indicate that it is editable.

2 Hold down the Ctrl key, and then drag your own shapes, one at a time, from the drawing page onto the new stencil.

3 Click the Save icon on the right side of the stencil title bar ( ).

The Save As dialog box appears.

4 In the Save As dialog box, navigate to the folder where you want to save the stencil, and then type a name for the stencil in the File Name box. Check to make sure Save As Type is Stencil (*.vss), and then click Save.

For details about saving files as templates, see "Creating and saving your own template" on page 129.

Defining and editing styles

A style in Visio 2000 Technical Edition is a named collection of formatting ***attributes*** that you can apply to your shapes. You can create styles that format the elements of a shape: fill, line, and text. For example, you might create a style that gives shapes a black outline, a green fill, and black bold italic text.

When you define or edit styles in a drawing file, the changes you make are available only in the current drawing or diagram. To make a style available for future drawings, you can define or edit it in an existing template. The style is included in every new drawing you create.

For details about designing your own template, see "Designing your own templates" on page 129.

To define a new style

1. Choose Format > Define Styles.
2. Type a name for the new style in the Style list.
3. If you want to base the new style on an existing style, select that style from the Based On list.
4. Under Includes, check the attributes that your style includes. A style can include formatting from any combination of the three attributes.
5. Under Change, click Text, Line, or Fill to change the settings for each attribute you included in Step 4.
6. When the style contains the settings you want, click Apply to add the new style and apply it to selected shapes.

To change a style

1. Choose Format > Define Styles.
2. In the Style list, select the style you want to change.
3. To rename the style, click the Rename button, type a new name in the Rename Style dialog box, and then click OK.
4. To change style settings, click the Change button. When you finish changing the attributes, do one of the following:
   - Click Apply.
   - Click Change to add the changes and continue working in the dialog box.

For details about formatting shapes, see Chapter 1, "Visio basics."

Designing your own templates

Designing your own template enables you to set up the Visio drawing environment, such as your page settings, tools, and stencils, exactly as you prefer. Then you can save the file as a template file and reuse it as often as you want. You can also share your customized template with coworkers.

You might want to create your own templates when your drawings

- Require customized settings such as page size or scale, window size and position, or shape or text styles.
- Often use a particular background or set of layers. For example, if you place your company logo in every drawing, you can create a template with that background or set of layers in place.

Creating and saving your own template

The easiest way to create a template is to set up a drawing file the way you want, open the stencils you want, and then save the settings as a template (.vst) file.

If you simply want to change some of the settings of an existing Visio template, you can base a drawing on that template, save the drawing with a new name, and then make your changes.

To create and save your own template

1. Open your drawing or start a new drawing based on the template you want to modify.
2. Open any additional stencils you want to save with the template by choosing File > Stencils > Open Stencil and then choosing the stencil(s) you want.
3. Change drawing page settings and styles to those you want to use in future drawings that are based on this template.
4. Choose File > Save As, and then do the following:
   - For Save As Type, select Template (*.vst).
   - For File Name, type a name for your template.
   - For Save, make sure Workspace is checked.
   - For Save In, select the folder in which you want to save the template.
5. Click Save.

Using background pages to display common page elements

You can set up background pages that appear each time your customized template opens. For example, if you want your company logo to appear on all of your future drawings, you can create a background page that contains the logo graphic and then assign it to the ***foreground*** page. When you save the drawing file as a template, the logo appears on the drawing page each time you open the template.

For details, use these online Help keywords:

- *Background pages*

To create a background for a drawing

1. Right-click a page tab in the lower-left corner of the drawing window, and then choose Insert > Page from the shortcut menu.
2. On the Page Properties tab, for Type, click Background.
3. If necessary, click the Drawing Scale tab to change the scale or the Page Size tab to change the page size for the new page, and then click OK.
4. Place the design element you want to use as a background onto the drawing page.

To assign a background to a drawing

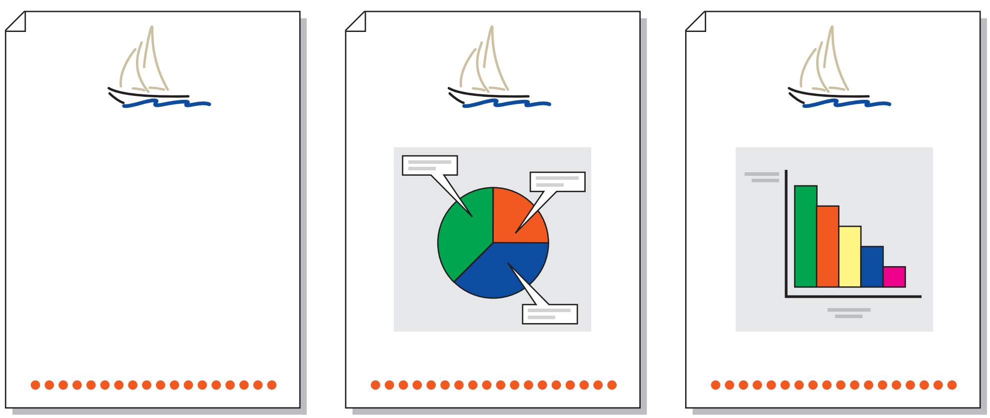
1. Display the page to which you want to assign the background.
2. Choose File > Page Setup, and then click the Page Properties tab.
3. In the Background list, select the name of the background that you want to assign, and then click OK.

   The background appears behind the shapes on the foreground page.

To display a background so you can edit it

- Display the page to which the background is assigned, and then choose Edit > Go To > Background.

Background pages



Use a background to repeat a common element on several drawings. For example, the sailboat appears on each of these three pages.

Glossary

Attribute An individual formatting element such as line color, fill color, and line weight that you can apply to shapes. A style can have more than one attribute. *See also* Style, Format.

Association In the Process Engineering solution, a hierarchical relationship between two shapes that shows how the shapes are functionally or mechanically related. For example, valves automatically form an association with the pipeline on which they are dropped.

Background A page that you can assign to another page to create multiple layers in a drawing. You can see shapes displayed on a background when the page it is assigned to is displayed. You can't select or edit the background without displaying the background page. *See also* Foreground, Layer.

Bubble diagram A conceptual design sketch that shows the required spaces in a building and the relationships between spaces.

Closed shape A shape that is surrounded by a continuous outline, such as a rectangle or circle. You can fill a closed shape with color or a pattern. *See also* Open shape.

Color scheme A set of colors you can assign to some drawing types. You can choose from preset color schemes, or you can create a new color scheme.

Connection point A point on a shape where a connector can be glued. You can create connection points inside, outside, or on the perimeter of a shape, using the connection point tool ( ). *See also* Glue.

Connector Any one-dimensional (1-D) shape that can be glued between two shapes in a drawing to connect the shapes. You can also use lines and other shapes you draw as connectors. *See also* Glue, One-dimensional shape.

Control handle A handle ( ) that specifies unique behavior for certain shapes. For example, in some shapes you can use a control handle to reposition text on the drawing page. You can pause the pointer over a control handle to see what it does.

Crop To reduce or expand an object from another application used in a Visio® drawing. Although cropping appears to clip off parts of the object, the Visio application retains the clipped portions of the object in memory. You crop an object by selecting it with the crop tool ( ) and dragging one of its handles.

Custom property Information about shapes in your drawings. Some Visio shapes come with custom properties already defined. You can edit or delete existing custom properties or create new ones.

Datasheet In the Process Engineering solution, an electronic form you use to add and edit data for components in a project.

Drawing file A Visio file with a .vsd extension that contains a drawing. You can create a new drawing from scratch or base it on a template, and then save the file. *See also* Template.

Drawing scale The ratio of page scale to a specified number of drawing units, such as one centimeter is equal to one meter. *See also* Scale.

Drawing type A Visio file (template) with a .vst extension that opens with the stencils, styles, and settings you need to create a particular type of drawing. *See also* Stencil, Template.

Dynamic grid Lines that show the most desirable location for the next shape you drag onto the drawing page.

Embed To insert a Visio drawing in another application's document (a container application) to establish a dynamic connection between the drawing and the other document. In the container application, you can open the embedded Visio drawing to edit it. *See also* Link.

Endpoint Either of the square handles at the end of a selected line, arc, or other one-dimensional (1-D) shape. The endpoint at the beginning of the shape is an X. The endpoint at the end of the shape is a plus sign (+).

Fill The color and pattern inside a closed shape. The default fill for Visio shapes is solid white.

Foreground The top page of a drawing. Shapes on the foreground page appear in front of shapes on the background page and are not visible when you edit the background of the drawing. *See also* Background.

Format The visual appearance of a shape (such as the thickness and color of its lines, the color and pattern inside the shape, and its font). You can change the format of a shape by applying a style or by changing its individual attributes. *See also* Attribute, Style.

Glue A property of shapes that causes them to stay together even when one of the shapes is moved. When you attach a connector to a shape, you glue the connector. *See also* Connector.

Grid Nonprinting vertical and horizontal lines that appear at regular intervals on the drawing page.

Group A shape composed of two or more shapes. You can move or size groups as a unit, but group members retain their original appearance and properties.

Guide, guide point Reference lines you can drag onto the drawing page to position shapes precisely. A horizontal guide is dragged from the horizontal ruler, a vertical guide is dragged from the vertical ruler, and the guide point is deagged from the upper-left corner of the drawing window where the horizontal and vertical rulers meet.

Instance A copy of a master shape that you drag from the stencil onto the drawing page. *See also* Master.

Intelligent tag In the Process Engineering solution, a tag that contains information about a component, such as the line size of a pipeline.

Isometric drawing A two-dimensional drawing that represents three-dimensional objects.

Layer A named category of shapes. You can organize shapes in your drawing by assigning them to layers. You can selectively view, edit, print, or lock shapes on layers. *See also* Background, Foreground.

Link To establish a dynamic connection between an object in a Visio drawing and another application's file. When changes occur in the original file, you can update the linked file so that the most current version of the object appears in the linked file. *See also* Embed.

Master A shape on a stencil that you use over and over to create drawings. When you drag a shape from a stencil onto the drawing page, the shape becomes an instance of that master. *See also* Instance, Stencil.

Nudge To move a shape a small amount using the arrow keys. Select the shape, and then click the up, down, right, or left arrow key. (Make sure the Scroll Lock key is turned off.)

One-dimensional (1-D) shape Either a straight line you draw using Visio drawing tools or a shape that has a beginning point and ending point and can be glued between two shapes to connect them. *See also* Two-dimensional (2-D) shape.

Open shape A shape such as a line, arc, or zigzag. You can format an open shape with line patterns and ends, such as by changing a solid line to a dashed line and adding an arrow to one end. *See also* Closed shape.

Page The printable area in a drawing window that contains a drawing. A page can be either a foreground or background page. Each page has a size, which usually corresponds to a standard paper size, and a scale, which the Visio program preconfigures for particular drawing types. *See also* Background, Foreground, Scale.

Pan To move an OLE object, such as an inserted CAD drawing, with the crop tool by holding down the left mouse button and shifting the object within the object's border.

Point-to-point A method of connecting shapes. The actual point of connection stays the same no matter how you move the connected shapes. You connect shapes point-to-point by dragging a connector from a connection point on one shape to a connection point on another shape. *See also* Connection point, Connector, Shape-to-shape.

Polyline A shape made up of one or more connected line or arc segments.

Redline To review and mark up or add comments to a drawing.

Scale A measure of the relationship between actual distances and distances represented in a Visio drawing. For example, a floor plan might have a scale of one meter of actual distance to one centimeter in the drawing. *See also* Drawing scale.

ScreenTips Tips that appear when you pause the pointer over certain elements in the Visio program, including masters on stencils, toolbar buttons, and the ruler.

Selection Shapes in a drawing that you have selected and can perform actions upon. Selected shapes have selection handles ( ). Selection also refers to text selected in a text block. Selected text is highlighted when it is editable.

Selection handle A square handle ( ) that appears on a shape selected with the pointer tool ( ). Selection handles indicate that you can move or size the shape.

Shape 1. An open or closed object created using Visio drawing tools or commands. 2. A grouped collection of shapes. 3. An instance of a master that is dragged from a stencil onto the drawing page. *See also* Instance, Master.

Shape Explorer™ A Visio tool you can use to locate shapes when you're not sure what stencils they're on. For example, if you know a 3-D Box shape exists, but don't know where to find it, use the Shape Explorer to determine which stencil contains the shape, and then open the stencil or use the Shape Explorer to add the shape to your drawing. *See also* Shape.

Shape-to-shape A method of connecting shapes. The actual point of connection might change when you move the connected shapes. You make shape-to-shape connections by dragging a connector from the center of one shape to the center of another shape. As you place the mouse over the center of each shape, a red box appears to indicate that you're creating a shape-to-shape connection. *See also* Connection point, Connector, Point-to-point.

Snap The ability of shapes, guides, and grid lines to pull shapes and other elements into position when they are moved and sized.

Solution The file folder that contains templates for particular drawing types. For example, the Project Schedule solution folder contains the Calendar, Gantt Chart, PERT Chart, and Timeline templates that you use to create those particular drawing types. *See also* Template.

Stacking order The order in which shapes overlap other shapes on the page and the order in which shapes are selected. You can change the stacking order of shapes by using commands on the Shape menu.

Stencil A collection of masters associated with a particular Visio drawing type, or template. Stencils that open with a template are docked on the left side of the drawing window, by default. You can open stencil files (.vss) independently of a template. *See also* Master, Template.

Style A collection of attributes that has a name and is saved with a template or drawing file. *See also* Attribute, Format.

Template A Visio file (drawing type) with a .vst extension that opens with the stencils, styles, and settings you need to create a particular type of drawing. *See also* Drawing file, Drawing type, Stencil.

Text block The text area associated with a shape, which appears when you click the shape with the text tool (A) or select it with the pointer tool ().

Tile 1. A printing technique used when oversized drawing pages are printed on multiple sheets of paper. 2. A command on the Visio Window menu that opens multiple drawings side by side in the main window.

Toolbar The rows of boxes, buttons, and bars that appear below the menu bar. To choose which toolbars you want to display and to create custom toolbars, choose View > Toolbars.

Two-dimensional (2-D) shape A shape that has four selection handles you can use to resize the shape proportionally. *See also* One-dimensional shape.

Vanishing point In the Blocks With Perspective template, a point that represents where the perspective recedes in your drawing. You can move the vanishing point to any location on the drawing page.

Vertex, vertices One of the diamond-shaped handles that appears between two segments on a multiple-segment shape, or at the end of a segment. You can reshape a shape or connector by dragging its vertices. *See also* Endpoint.

Workspace A Visio file (.vsw) that contains information about the size and position of stencils and drawings.

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