Important Layout concepts

Following are some important concepts to understand about the Layout software before you begin working with it.

Tool path

The purpose of the Layout software is to ultimately create a continuous tool path. Gaps in the tool path can cause problems. For example, if lines don't quite meet at a corner, this will interrupt the tool path. Gaps can be produced in other CAD software whose object is simply to make a picture. The OMAX Layout software works to help you avoid such problems.

Entities

A Layout drawing is made up of "entities." An entity consists of a starting point, an ending point, and a line or arc between these two points. The drawing tools always create entities made up of lines and arcs. For example, the rectangle command creates four line entities connected at the corners, while the circle command creates two arcs.

An entity is always marked at each end with a point. You can see the points at each end of all entities in the drawing by selecting the **Dots** button.

Drawing tools

The drawing tools include lines, circles, and rectangles. Drawing tools add new entities to the drawing. Once added, the entity can be manipulated, assigned a Quality, or erased.

Snaps

When you use a drawing tool to add a new entity to the drawing, you will see a row of "Snap" buttons appear. Snaps are used to precisely place new entities on the drawing. You can add a new line, for example, that goes from the exact center of a circle to the end of a previous line.

Because every entity must be connected to another entity, snaps are important to learn how to use. Snaps will help you make sure that entities join to each other. Snaps also help you get maximum precision by positioning new entities relative to existing entities.

Manipulating tools

The manipulating tools include moving, copying, rotating, dividing, and other tools to manipulate entities that already exist.

Quality

The Quality of an entity refers to how quickly it is cut. The better the Quality, the more slowly an entity is cut. Green lines are where the abrasive jet nozzle moves with the jet off, to position it. Other colors represent different machining qualities.

Each new entity you add in Layout starts out as a non-cutting (green) line. Once the entity is added, you can change the Quality of the entity. You can also wait until the part is completely drawn to assign Qualities.

Each part is one continuous line

Each tool path that you create with Layout must be one continuous line. It's okay for the path to include steps that turn off and reposition the abrasive jet nozzle; however, in the end, all points on the path must connect in order to make a successful cut.

If an entity doesn't join up with another entity, you will get an incomplete path, and the motion of the abrasive jet nozzle will stop.
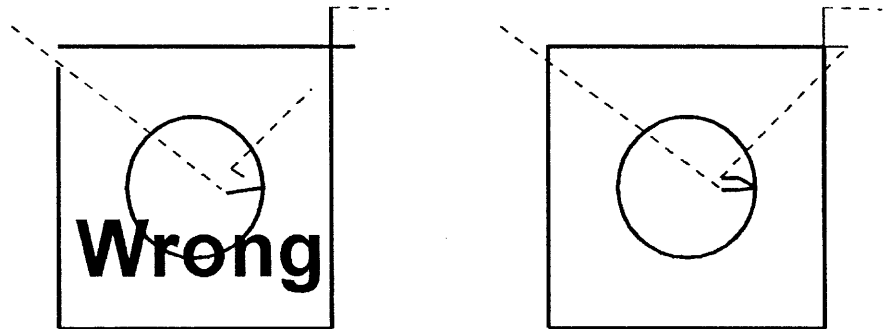
An incomplete path (left) and a complete path (right)

The best way to make sure that your entities always join is to use a *Snap* button for either the beginning or the end of the entity (or both). This will ensure that all your entities are joined.

Drawing your first part: a square with a hole
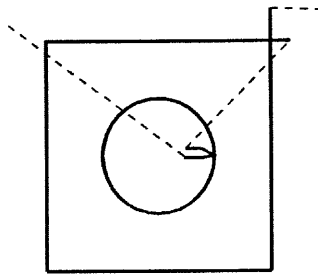
The next few pages take you through the process of drawing a simple part: a square plate with a hole. The square will be precisely 4 inches and the hole will be 2 inches in diameter in the center of the square.

The finished part

Getting started

This section shows you how to start a new part, turn on the grid, and zoom to an appropriate view.
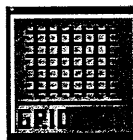
File button

1. Click on the **File** button.

   A callout button bar appears.

2. Select the **New** button.

   The screen is cleared and ready for a new drawing.

Grid Button

3. Click on the **Grid** button to turn on the grid.

   When the **Grid** button is selected, a grid will appear on the screen. Each square in the grid is 1" on a side.

4. Move the cursor to the main screen and hold down the left mouse button.

   When the cursor is on the main part of the Layout screen, it appears as a magnifying glass. Holding down the left mouse button will *zoom in* (magnify).

Zoom Speed Button

5. Now try holding down the right mouse button.

   When you hold down the right mouse button, you will *zoom out* (decrease in size).

   You can change how quickly you zoom in and out by using the **Zoom Speed** button on the **ZOOM** menu. Or by holding down either the "]" or "[" keys.

6. Use the left and right mouse buttons to get an area about 5 to 7 inches square on the screen.

   Remember that each square on the grid is one inch across.

Draw the square

This section shows you how to add a square to your drawing, and how to specify the exact size of the square.

1. Click on the **Box** button.

   > A button bar containing Snap selections will appear. The cursor also changes to a cross with the word "From" underneath the cross.

2. Move the cursor near the lower left corner of the screen and click the left mouse button.

   > This specifies where the lower left corner of the square will be. The exact placement of the square is not important, as you can always move it later.

3. Choose **SPECIFY** from the Snap button bar.

   > A panel appears asking you for the width of the box.

The Snap button bar

> When you clicked on the screen in Step 2, the Snap button bar changed to add some new options. The **SPECIFY** option lets you specify the exact dimensions of the square.

4. Enter **4** for the width, to specify a width of four inches. Press **Enter**.

   > Another panel appears asking you for the height of the box.

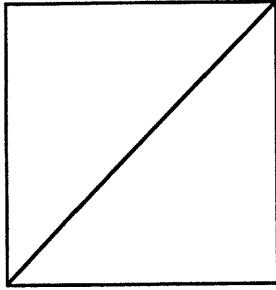5. Enter **4** for the height, to specify a height of four inches. Press **Enter**.

   > A green square exactly four inches on a side appears on the screen.

TIP

Press the Home key to zoom so that your square exactly fills the screen (this is the same as choosing Extents from the Zoom menu).

Add the construction line

Now, add a
construction line

In this section, you will add a construction line to the square using Snaps. This will let you find the exact center of the square for adding the hole in the next step.

1. Click on the **Line** button.

    A button bar containing Snap selections will appear. The cursor also changes to a cross with the word "From" underneath the cross.

2. Click on the **End** button on the Snap button bar.

    The Snap button bar disappears and the cursor shows a cross with the word "Of" underneath it.

    The **End** Snap button instructs Layout to choose the end of the next item you select as the beginning point of the new line.

3. Click on the lower left corner of the square. You do not have to click exactly on the corner.

    The button bar containing Snap selections appears again. The cursor is now a cross with the word "To" underneath it.

    Layout now knows that you want the beginning point of the line at the "end" of one of the two line segments making up the corner of the square.

4. Click on the **End** Snap button again, and this time select the upper right corner of the square.

    The line is drawn diagonally across the square.

    Selecting **End** once again instructs Layout that the second point of the line will be at the "end" of the next selected object. By selecting the corner of the square, you select one of the two line segments at that corner, allowing Layout to draw the line to the exact corner of the square.

Add the hole

In this section, you will use the construction line from the previous section to place a 2" hole in the exact center of the square.
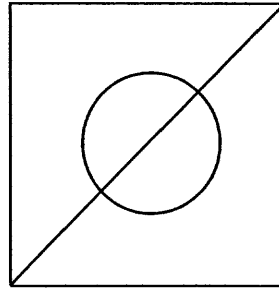
Draw a circle at the middle of the line

NOTE

Circles are always drawn by first specifying the center of the circle, and then either specifying a point on the radius of the circle or entering the diameter of the circle.

Circle button

1. Click on the **CIRCLE** icon.

   A button bar containing Snap selections will appear. The cursor also changes to a cross with the word "From" underneath it.

2. Select the **Middle** button on the *Snap* button bar.

   The **Middle** button tells Layout to place the center of the circle at the *middle* of the next entity you select. Whenever you use the **Middle** button, the entity you select is also divided into two equal entities at the middle.

3. Click anywhere on (or near) the line running diagonally across the circle.

   Layout now knows that you want the center of the circle to be at the middle of the line (which is also the center of the square).

Diameter Snap

4. Click on the **Diameter** button on the Snap button bar. Enter **2** for the diameter of the circle.

   The circle is drawn centered on the middle of the line.

   The **Diameter** button lets you directly specify the diameter of the circle.

You might think that the construction line is not necessary. "Why not just select **Middle** and draw the center of the circle at the middle of the square?" This won't work because Layout views the square as four distinct entities, rather than as a single object.

Erase the construction line
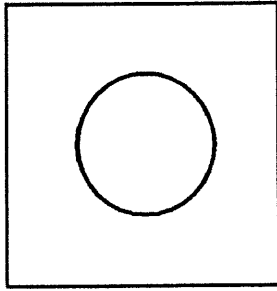
Erase the construction line

Erase button

In this section, you will erase the construction line you used to place the hole in the exact center of the square.

The construction line is now two line segments, rather than one continuous line. When you used the *Middle* Snap button in the previous section, the construction line was divided into two equal entities.

If you click on the *Dots* button, you can see the end points for each entity in the drawing. You will be able to see that the construction line is now two entities.

1. Click on the *Erase* button.

   A callout menu appears with the four different ways you can erase objects.

2. Click on the *Cursor* button.

   Shortcut: If you click on the **Erase** button with the *right* mouse button, you automatically select the *Cursor* button.

3. Click anywhere on the diagonal construction line.

   One of the entities forming the construction line disappears. Because you used the *Middle* Snap button to place the circle, the construction line was divided into two entities.
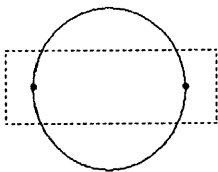
   The cursor erases any entity you click on.

4. Click anywhere on the other half of the construction line to erase it.

There are four ways to erase entities in Layout:

Window

The *Window* button prompts you to draw a box (or window) on the screen. Every entity with both endpoints within the box is erased. In the figure to the left, *both* arcs are erased because the endpoints are within the window.

Selected

The *Selected* button erases all selected entities. You must select the entities *before* you choose *Erase*.

Last

The **Last** button erases the last entity you added to the drawing.

Cursor

The *Cursor* button erases each entity you click on.