Showing and Hiding Entities

The check box next to each entity listed on the left side of the Laser Module's **Process Pattern** tab indicates whether the entity appears in the workspace and is processed by the laser module. For registration points (RP entries in the list) this check box identifies vision system triggers.

To show or hide entities and change their processing state, follow these steps:

1. Select an entity either from the entity list or the workspace.
2. Clear or select the check box next to the entity to hide or show it.
   - To hide an entity, clear its check box. When entities are hidden, they do not appear in the workspace and are not processed.
   - To show an entity, select its check box. All entities shown in the workspace are processed.

TIP
If you're processing in **Sensor** mode, you can use registration points or marks as triggers for the laser. Select an **RP** entity's check box to use that registration point as a trigger.

During processing, when the vision system detects the selected registration points, it signals the system to fire the laser using the other **Process** values selected on the **Settings** tab.

Clear the **RP** check boxes if you want to trigger the laser based only on sensor triggers and any **Process** values. Doing so bypasses the vision system and any registration marks in the part.

Selecting Entities

To select an arc, polyline, registration point, or group of entities from the workspace, use one of these methods:

- Click an entry in the entity list to select that entity. To select multiple entities, hold the **Ctrl** key while clicking them.

  If you select a registration point from the list, that point flashes pink in the workspace.

- Click the **Select** button on the workspace toolbar, then click the entity in the workspace to select it. To select multiple entities, hold the **Ctrl** key while clicking them.

  To select a registration point, click the center of the point. When it is selected, the registration point flashes pink.

- Use the mouse to draw a box around the entities you want to select in the workspace. All entities that lie completely inside that box are selected. If an entity touches or crosses the boundary of the box you draw, it is not added to the selection.

Changing Entity Processing Order

When a pattern is imported from a DXF or PDF file, the entities it contains are listed according to an internal sequence number. This order is also the order in which the entities are processed. You can change this processing order, if needed.

When you change entity processing order, you move selected entities up or down in the entity list. The entity's sequence number does not change until you reload or refresh the pattern.

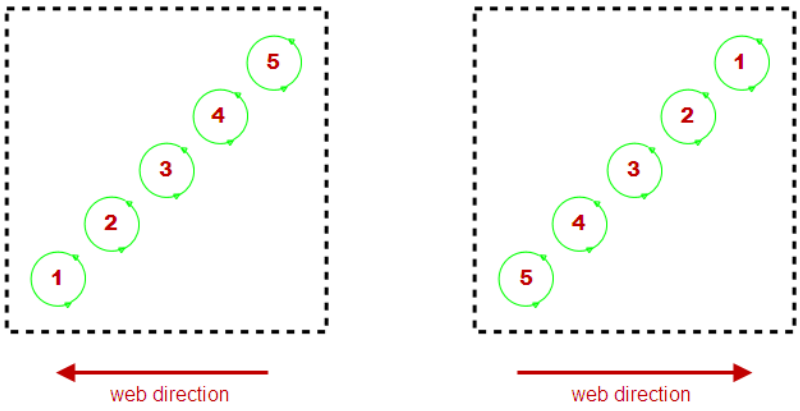
LightGuide uses entity sequence numbers an internal tool to uniquely identify each entity. These numbers have no meaning outside LightGuide, and are not related to any identifiers used in the original pattern source file. LightGuide automatically renumbers entities when you load different a different pattern, reload the original pattern, or restart the software.

To change the processing order of entities, follow these steps:

1 Select the entity that you want to move in the entity list (and processing order). To select multiple entities, hold the **Ctrl** key while clicking entities in the list.

2 On the floating entity toolbar, click the up arrow to move the entity up in the list; click the down arrow to move it down in the list.

For the most efficient processing on web systems, order entities such that the first entity processed corresponds to the direction the web travels. As an illustration, see the example below.



When you order entities in this manner, the first to encounter the laser is the first to be processed. This order gives the system enough time to process subsequent entities as they pass under the laser, and avoids missed part errors.

3 Repeat the above steps for any other entities that you want to move in the entity list and processing order.

LightGuide can also update processing order by sorting entities into the most efficient processing path. For more details, see *Changing Processing Order by Sorting Entities* on page 43.

Editing Entities

LightGuide includes commands that allow you to cut, copy, and paste pattern entities. You can use these commands to make changes directly in LightGuide instead of returning to the pattern source file. You can also cut, copy, and paste entities to the Laser Module screen's workspace for a different laser module on the system.

To use the editing tools, follow these steps:

1. Select the polyline, arc, or registration point and then click **Edit**.
2. When the menu opens, select the command that you want to use.
   - To remove the selected entity from the list and workspace, select **Cut**. You can also delete the entity by clicking **Delete** on the entity toolbar.
   - To copy the selected entity, select **Copy**.
   - To paste a copied entity, select **Paste**. This command is available only after you have copied at least one entity.
   - To undo the last change you made, select **Undo**.
   - To repeat your last action, select **Redo**.
3. To add the copied entity to a different laser module, click the appropriate **Laser Module** listed in the Module View, then use the **Edit** button on that Laser Module's **Process Pattern** tab.

Grouping Entities

When you group entities, LightGuide treats them as a single unit. Grouping entities makes it easier to work with related entities by allowing you to make the same changes to all group members at once.

To group and ungroup entities, follow these steps:

1. Select the entities to work with.
   - To group entities, select the entities that you want to group together.
   - To ungroup entities, select the group to explode into individual entities.

2. Click the **Group** button on the workspace toolbar.
3. When the menu opens, select the command you want to use.
   - To group entities together to treat them as a single unit, click **Group**.
   - To explode an entity group into its component entities, click **Ungroup**.

   You can also choose how to view group members when you select a group:
   - Select **Show as Group** to view group members only as part of the group in which they are included. When you view entities as a group, selecting an individual member selects the group as a whole.
   - Select **Show Entities as Individuals** to view group members as separate components. When you view grouped entities as individuals, selecting a group member selects only that entity, not the entire group.

Sorting Entities

In addition to allowing you to change processing order manually, LightGuide can also change processing order by automatically sorting entities into the most efficient processing path.

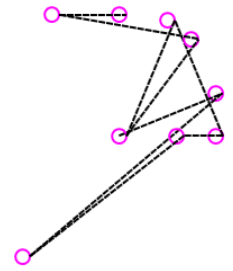
When LightGuide sorts entities, it arranges adjacent entity start and end points together according to the sort option you select to reduce the amount of jumps between entities. (Jumps are non-processing movements of the laser scanhead from the endpoint of one entity to the starting point of another.) Sorting entity start and end points and reducing jumps results in faster and more efficient processing.

Sort Options

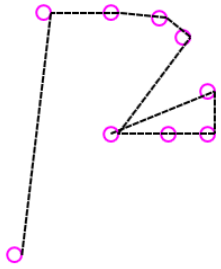
You can use these sort options to rearrange the processing order of the entity list:

- **Start–End Point Proximity Sort**: Sorts the process order based on the distance between the end point of one entity and the start point of another.

  This sort option finds the shortest path between entity start and end points to minimize jump distances. When you select this option, you can also choose to allow LightGuide to change the current processing direction of the selected entities to calculate the most efficient processing path.

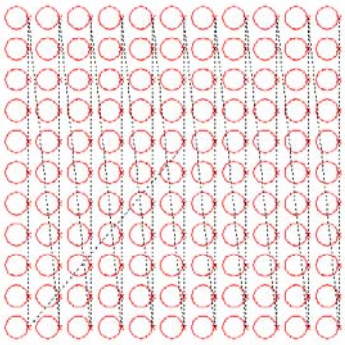


Original processing order

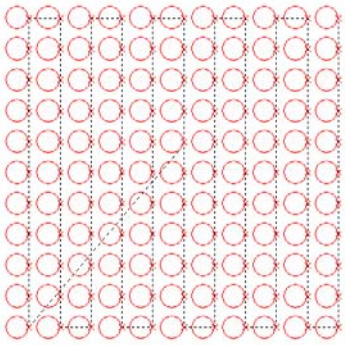


After proximity sort

- **Snake Sort with Selected**: Sorts entities based on part spacing and part geometry according to the directions you select.



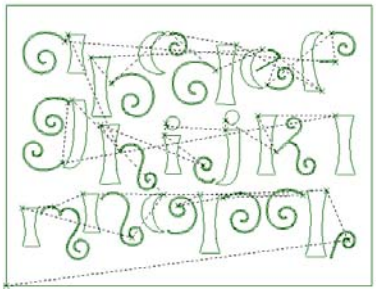
Before snake sort...



...and after.

When you use this sort option, you select the sort geometry LightGuide uses to "snake" through the array of parts to identify the most efficient processing path.

For example, this job has roughly 6 columns and 3 rows. After selecting the **Sort Up then Right** geometry when using this option, LightGuide rearranges entity processing order to plot the most efficient processing path.



Original job with inefficient jumps in the processing path

After Snake Sort (up and to the right)

- **Sort Entity to Start of Entity List**: Moves the selected entities to the beginning of the entity list so that they are processed first.
- **Sort Entity to End of Entity List**: Moves the selected entities to the end of the entity list so that they are processed last.
- **Sort Entity to Index in Entity List**: Moves the selected entities to the location you select in the entity list.

  When you use this sort option, enter the index number to use when rearranging and sorting the entity list. This index number identifies the position to which to move the selected entities, starting from 0 at the top of the entity list.

NOTE
This index number is not the same as the number in the entity's name in the list (such as PL254, for example). To sort the selected entities to the correct location in the entity list, count down from the top of the list, starting at 0 (zero).

For example, to sort the selected entities to the 5th position in the entity list, enter 4 as the index number.

Changing Processing Order by Sorting Entities

To sort entities for more efficient processing, follow these steps:

1. Select the entities to sort into the best processing path. For more information, see *Selecting Entities* on page 39.
2. Click **Sort**.
3. When the Sort dialog box opens, select the sort option to use.
   - If you select **Start–End Point Proximity Sort**, select the **Allow Vector Change** check box to allow LightGuide to calculate the most efficient path.

     When you select the **Allow Vector Change** check box, LightGuide can reverse the processing direction of entities as needed to better join adjacent start and end points. Clear the check box if you want to retain the current processing direction of the selected entities.

- If you select **Snake Sort with Selected**, select the sort geometry to use.

  LightGuide "snakes" through the pattern according to the sort geometry you select to sort entities into the most efficient processing order.

- If you select **Sort Entity to Index in Entity List**, type the index number at which to place the selected entities in the entity list in the box to the right.

  Index numbers start from 0 at the top of the list. For example, to place an entity in the 6th position in the list, type 5 into the text box.

For more information, see *Sort Options* on page 42.

4 Click **OK**. LightGuide calculates the best processing path and sorts the entities into that processing order.

Working with Entity Properties

You can view the various properties (name, layer, point X and Y values, and LightGuide flag values) that make up each entity. Of these properties, there are specific polyline and registration point values that you should pay special attention to.

To view entity properties, select an entity (or select multiple entities) and then click the **Entity Properties** button on the entity toolbar.

- If you selected only one entity, the Entity Properties dialog box opens and lists the properties for that entity.
- If you selected multiple entities, the Entity Properties displays only the properties that the selected entities have in common. If a property value differs among the selected entities, then that property is blank.

The Entity Properties dialog box is divided into the sections listed below. Properties that can be changed in these sections appear in bold black text.

- If you selected an arc from the entity list, the **Arc Attribute** section identifies the values that define the arc's geometetry.
- The **Entity** section displays the entity's length (if applicable) and the process parameter it uses.
- The **General** section lists the entity's name (RP, ARC, or PL), the layer on which it was located in the original source file, its length (if applicable) and the process parameter it uses. Also listed in this section are other properties that were imported from the original source file. These properties are displayed for your reference only; you cannot change them.

  For more information on process parameters and how to change them, see *Working With Process Parameters* on page 63.

- If you selected a polyline, the **Polyline** section identifies whether the polyline forms a closed shape. The table under **Polyline** contains the positions of the various points in the polyline and their flag values.

  For more information, see *Setting Polyline Flag Values* on page 46.

- If you selected a registration point, the **Reg Point** section lists the registration point's position and the vision system properties used to monitor it. For more information, see *Changing Registration Point Properties* on page 47.

Generally, you don't need to change an entity's name, layer, or position information. Depending on how you want processing to be performed, however, you should monitor and change an entity's **Process Parameter**, **Flag** value, or registration point **Y**, **CamNum**, and **RegNum** properties. For more information about these properties, refer to these topics:

- *Selecting a Polyline's Start Point* on page 45
- *Setting Polyline Flag Values* on page 46
- *Changing Registration Point Properties* on page 47
- *Setting up Automatic Score Position Monitoring* on page 47
- *Identifying Vision System Registration Points* on page 36
- *Working With Process Parameters* on page 63

Selecting a Polyline's Start Point

A polyline's start point is the vertex at which laser processing starts: during processing, the laser starts at this point and proceeds according to the entity's geometry. If needed, you can change a polyline's start point to a different vertex.

To change a polyline's start point, follow these steps:

1. From the entity list, select the appropriate polyline and then click the **Entity Properties** button on the entity toolbar.

2. When the Entity Properties dialog box opens, select the point that you want to set as the polyline's processing start point from the table under **Polyline Attribute**.

   In addition to clicking the point directly, you can use the arrow buttons under the table to scroll through the list of points in a polyline. When a point is selected, LightGuide highlights that point on the work space with a black box.

3. Click the **Make Selected Vertex as Start Point** button.

   LightGuide changes the processing start point to the point you selected. The polyline's vector (that is, the direction in which the polyline is processed) is not changed.

   If you want to change the polyline's vector as well as its start point, use the Entity Transform tools. For more information, see *Reversing an Entity's Vector* on page 52.

Setting Polyline Flag Values

You can use the **Flags** entity property to designate a point in a polyline as an in-position point or as a moving vector.

- In-position points provide you with a means to control the sharpness of part geometry. You can also fine-tune the depth of laser cuts in pattern angles and before and after processing jumps.

  After you set a point in a polyline as an in-position point, you can then modify the polyline's **InPos Band** and **Min Power** process parameters. Changing these parameters helps you avoid rounding off corners or cuts that are too deep (or too shallow) at pattern corners or end points during processing.

  For more information, see *Working With Process Parameters* on page 63.

- Moving vectors help you control the distance of the laser's cut or score from registration points printed on the processing material.

  When you set a polyline point as a moving vector, LightGuide automatically monitors the score distance from registration points and adjusts the beam as needed to keep this distance constant.

  In order to use this closed-loop position control, your system must include a vision system and cameras to monitor the score distance from registration points. You must also update the registration point's Y value to specify the score distance to use.

To set a point in a polyline as an in-position point or moving vector, follow these steps:

1. From the entity list, select the appropriate polyline and then click the **Entity Properties** button on the entity toolbar.

2. When the Entity Properties dialog box opens, select the point that you want to set as an in-position point or moving vector from the table under **Polyline Attribute**.

   In addition to clicking the point directly, you can use the arrow buttons under the table to scroll through the list of points in a polyline. When a point is selected, LightGuide highlights that point on the work space with a black box.

3. At the bottom of the dialog box, change the **Flag** value for that point:
   - To designate a point as an in-position point (IP), type **1** in the **Flag** box in the right column of the table.
   - To designate a point as a moving vector (MV), type **4** in the **Flag** box.

     Next, set the distance in the registration point's Y value to enable automatic laser score position monitoring. For more information, see *Changing Registration Point Properties* on page 47 and *Setting up Automatic Score Position Monitoring* on page 47.
   - A **2** in the **Flag** box indicates that the point is a jump in-position point. You typically do not need to set or change this value.
   - A value of **8** indicates that the point is a trigger for the Foresight controller. This value is reserved for future use.

Changing Registration Point Properties

The registration point properties that you may need to change include the **CamNum**, **RegNum**, and **Y** properties. You use these properties to specify the camera to use to detect registration points and to set up automatic score position monitoring.

- If your system uses vision cameras to detect registration points and trigger the laser, you need to specify the **CamNum** and **RegNum** values to use for registration points after importing patterns into LightGuide.

  For details, see *Identifying Vision System Registration Points* on page 36.

- If you want to use the vision system to monitor the laser score distance from a registration point, enter the distance to use in the **Y** property.

  When used with the polyline point MV flag value (4), LightGuide monitors the distance between the registration point and laser score to keep it at the **Y** property value. This value has units of millimeters (mm) and must be positive.

  For more information, see *Setting Polyline Flag Values* on page 46 and *Setting up Automatic Score Position Monitoring* on page 47.

Setting up Automatic Score Position Monitoring

If your system includes vision cameras, LightGuide can use a polyline point along with a registration point to monitor the laser's score and keep it in a constant position. To set up this monitoring, you set the polyline entity's **Flags** property and the registration point's **Y** property.

To set up automatic laser score position monitoring, follow these steps:

1. Select a registration point (RP) entity from the entity list or workspace. The point flashes pink after you select it.

2. Click the **Entity Properties** button on the entity toolbar.
3. When the Entity Properties dialog box opens, type the value in the **Y** box to use as the distance between the registration point and the laser's score.

   This value has units of millimeters (mm) and must be a positive value.
4. Select the polyline entity that represents the laser's score.

   You do not need to close the Entity Properties dialog box to save your changes to the registration point's properties; LightGuide saves them automatically. You can move the dialog box if it is obscuring the workspace.
5. When the Entity Properties dialog box displays the polyline's properties, type **4** in the **Flags** column under **Polyline** for all points to monitor and adjust.

   This value sets those points as moving vectors. When a point is specified as a moving vector, LightGuide automatically monitors its position and adjusts processing to keep it at the constant distance entered in the point's Y value.

   You must enter **4** in the **Flags** column for all points in the polyline in order to maintain a constant distance between the score and registration point; missing a point may cause the score to skew.
6. Close the Entity Properties dialog box.

Transforming Entity Position and Orientation

Use the **Transform Tools** to change the location, position, or orientation of an entity or of an entire pattern.

Similar to the **Edit** button on the Laser Module's **Process Pattern** tab, the **Transform Tools** button opens a menu when you click it. This menu has two options:

- Select **Entity Transform** to change the orientation of only the selected entities. As you make changes, LightGuide immediately updates the selected entities in the workspace. However, these changes are not reflected in processing until you save the pattern and job recipe files.

  For more information, see *Entity Transform* on page 48.

- Select **Runtime Transform** to slightly change the position of the entire pattern during processing. This helps you to fine-tune patterns as the system runs, allowing you to immediately see the effects of changes as patterns are processed.

  For more information, see *Runtime Transform* on page 53.

Entity Transform

Use the **Entity Transform** command on the **Transform Tools** menu to transform the selected entity (or group of entities). When you transform an entity, you can move it, scale it to enlarge or shrink it, rotate it, flip it to create a mirror image, or reverse its vector direction.

When you use the **Entity Transform** command, LightGuide immediately updates the selected entities when you apply your changes. However, your changes are not reflected in continuous processing until you save the pattern and job recipe files.

If needed, you can test the results of your changes by using the **Single Process** button. When you click this button, LightGuide processes the pattern exactly as shown in the workspace once and then stops. To view the effects of entity transformations during continuous processing, use the **Runtime Transform** command.

When you select **Entity Transform** from the **Transform Tools** menu, the Tools dialog box opens. Use the tabs on the Tools dialog box to move, scale, rotate, mirror, or reverse the selected entity. For more information, refer to these topics:

- *Moving an Entity* on page 49
- *Scaling an Entity* on page 50
- *Rotating an Entity* on page 51
- *Mirroring an Entity* on page 52
- *Reversing an Entity's Vector* on page 52

Moving an Entity

If needed, you can move an entity or tile to a new location. When you move an entity, you can choose to move it to a new position or offset it slightly from its current position.

To move an entity, follow these steps:

1. Select the entity (or entities) from the workspace or entity list. If you want to move a tile as well, select that tile from the entity list.

   Hold the **Ctrl** key while clicking entity and tile names to select multiple items.

2. Click **Transform Tools** and then select **Entity Transform** from the menu that appears.

3. On the **Move** tab of the Tools dialog box, select the type of move to perform from the **Move Type** list.

   - To move the entity to the X, Y position you enter, select **Position**.

     This move type relocates the entity's center (or the common center point of the selected entities) to the X and Y coordinates you enter. For example, if you select Position and then enter 5 for both the X and Y values, the center is moved to 5, 5.

   - To reposition the entity slightly from its current position, select **Offset**.

     This move type offsets the center point from its current position by the X and Y values you enter. For example, if the current center is at 20, 20 and you enter 5 for both the X and Y values, the center is offset to 25, 25.

4. In the **X** and **Y** boxes, type the location or distance (in mm) to which to move the entity.

   For offset move types, X values move the entity horizontally, Y values move the entity vertically. Positive values move the object right or up, negative values move it left or down.

   To quickly zero out the X and Y values, click the **Zero** button.

5. To move any selected tiles, use the check boxes in the **Tiles** area.

   - To move the selected tile along with the selected entity, select the **Move if Selected** check box.

     When you select this check box, LightGuide moves the selected tile and the selected entity according to the X and Y values you entered above. If you clear the check box, LightGuide does not move the tile, regardless of whether it is selected.

     The selected tile does not need to contain the selected entities in order to be moved.