

# Laser System Manager (LSM) Training Class Handout

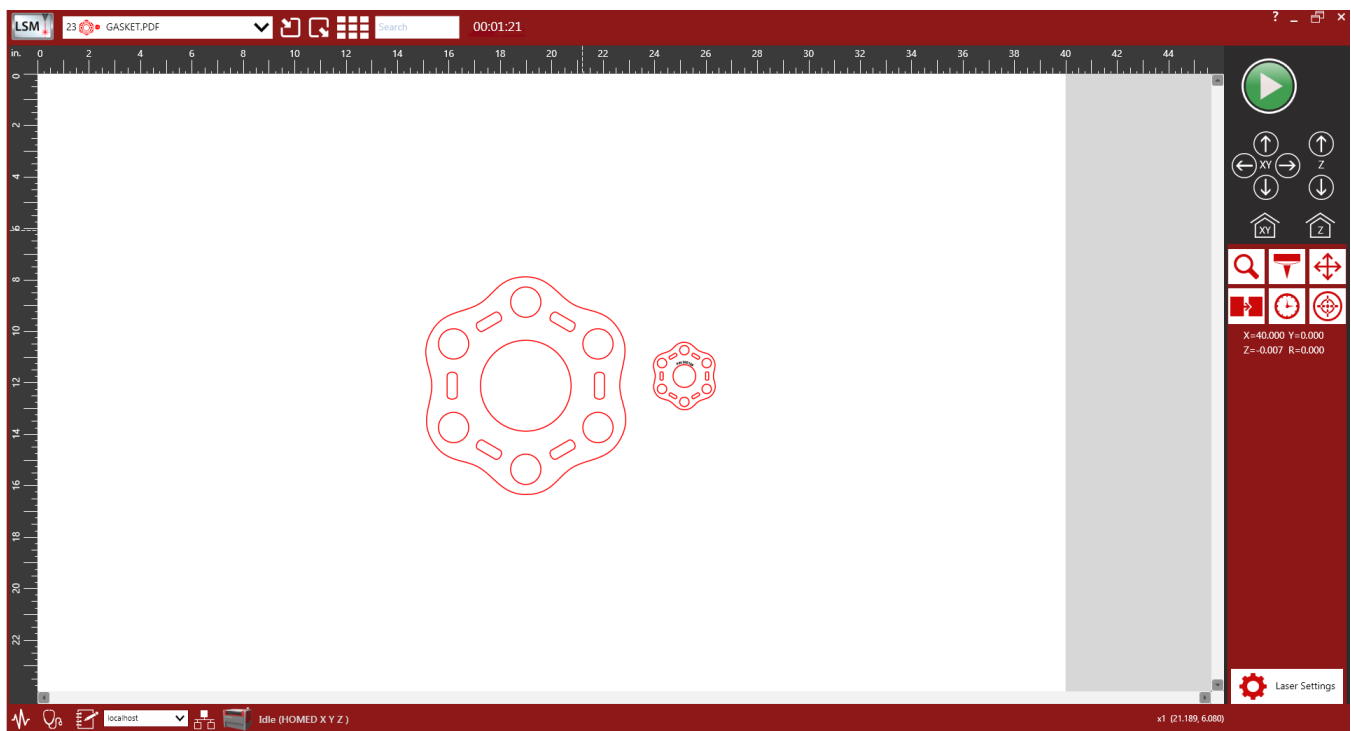
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The **LSM** is required to control and operate the laser system. It runs on a computer with the correct specifications and connects to the XLS10 via a USB port. When you print a graphic in the graphics software, the **Laser Processing Settings** component creates a design file and passes it to the queue in the **LSM**.

After installation of the **LSM**, the **LSM** icon appears on the desktop.

## LSM PREVIEW WINDOW

When you access the **LSM** through the icon on the desktop, the **Preview** window opens. The **Preview** window allows you to navigate through and manage the design files in the **Design File Storage Queue**.



*LSM Preview Window*

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**NOTE:** The **Preview** window is re-sizable. Only the viewing area changes size. If the window size is expanded beyond the field size of the machine, that area is grayed.

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## WORKING WITH FILE MANAGEMENT CONTROLS

The **File Management** controls help you navigate through and manage the design files in the **Design File Storage Queue**. These controls are located above the Preview Area and include the currently-selected design file's name, place in the queue, and the file's processing time. The file's processing time will only be available after the job has been run once.

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**NOTE:** A design file's place in the queue may change as files are added or removed or moved around in the queue.

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As design files are printed, they are added to the **Design File Storage Queue** until the queue reaches the limit set in the **System Configuration** window. Once the queue reaches the maximum number of jobs, the oldest job is deleted each time a new job enters the queue.

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**NOTE:** The **Design File Storage Queue** can be set up to hold a maximum of 2000 design files.

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Other options that allow you to manage the design files in the queue include: importing or exporting design files, working with thumbnail design files and searching for a specific design file.

### **Open Design File**

When the **LSM** is first opened, the most recently used design file in the **Design File Storage Queue** displays in the Preview Area. You can process this design file or open another design file from the queue. Tap the **down arrow** in the **Currently Opened Design File** box to select another design file. To open from the **drop-down** list or navigate through the Thumbnail View window, select a thumbnail to open that design file. For more information on using the Thumbnail View window, see View Thumbnail Files.

### **Import Design Files**

The **Import Files** control allows you to import EMF, PDF, DXF, G-code and STL file types.

1. On the **File Management** controls in the upper left-hand corner of the window, tap the **Import Design File** icon. The **Open** dialog box displays.
2. Select the design file type you want to work with from the **drop-down** list.
3. Navigate to and Select the design file you want to open, and tap **Open**.

The design file name is displayed in the **Currently Opened Design File** box and the file opens in the Preview Area.

### **Importing PDF Files**

If a PDF file is selected when importing a design file you will be prompted with the **PDF Import** dialog box.

1. Select the settings and Platform you would like to use.
2. Tap **Settings** to open the **Laser Processing Settings** window.
3. Select/Enter the desired setting in the **Laser Processing Settings** window. Tap **Apply** and then **Exit**.
4. Tap **Import**.

The design file name is displayed in the **Currently Opened Design File** box and the file opens in the Preview Area.

### **Importing DXF Files**

If a DXF file is selected when importing a design file, you will be prompted with the **DXF Import** dialog box.

1. Select the settings and Platform you would like to use.
2. Tap **Settings** to open the **Laser Processing Settings** window.
3. Select/Enter the desired setting in the **Laser Processing Settings** window. Tap **Apply** and then **Exit**.
4. Tap **Import**.

The design file name is displayed in the **Currently Opened Design File** box and the file opens in the Preview Area.

## Importing G-code Files

If a G-code file is selected when importing a design file, you will be prompted with the **G-code Import** dialog box.

1. Select the settings and Platform you would like to use.
2. Tap **Settings** to open the **Laser Processing Settings** window.
3. Select/Enter the desired setting in the **Laser Processing Settings** window. Tap **Apply** and then **Exit**.
4. Tap **Import**.

The design file name is displayed in the **Currently Opened Design File** box and the file opens in the Preview Area.

## *Export Design Files*

The **Export Design File** control allows you to export design files to other computers using the proprietary ULS Job Files format (file extension .emf).

1. Open the design file you want to export.
2. On the **File Management** controls in the upper left-hand corner of the window, tap **Export Design File**. The **Save As** dialog box displays.

The currently-opened design file's name displays in the File name field.

The Job Files extension .emf is selected as the default file type.

3. **Navigate** to the location where you want to save the design file.
4. Tap **Save**.

## View Thumbnail Files

In Thumbnail view, all of the stored design files are visible as small representations of the files. Thumbnail view makes it easy to navigate through the design files stored on your hard drive to locate the file you want to process.

1. On the **File Management** controls in the upper left-hand corner of the window, tap **Show Thumbnails**. The **Thumbnail View** window displays.

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**NOTE:** *If there are more files than can be displayed on the window, swipe **left** or **right**.*

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2. Do one of the following:
  - **Swipe** to pan through the available design files until you locate the one you want to open; or
  - Search for a thumbnail file, by typing its name in the **Search** box. The design files that match your search criteria display in the **Thumbnail View** window.

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**NOTE:** *As you type, only the files that match the letters entered will display in the **Thumbnail View** window.*

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3. Optionally, change the order of the design files in the queue by selecting a file and dragging it to a new location. The design files renumber to reflect the new queue order.
4. Double-tap a **thumbnail file** to select it.

The design file displays in the Preview Area of the **Preview** window.

5. To return to the **Preview** window without selecting a new file, tap to toggle to **Preview**.

## Use the Thumbnail File View Context Menu

1. Tap **Switch to Thumbnail File View** to open the **Thumbnail File View** Context Menu.
2. Tap and hold a **thumbnail file** to view the **context menu**.

The following options are available on the **Context Menu**:

<b>Open</b>	Opens the currently-selected thumbnail file.
<b>Delete</b>	Deletes the currently-selected thumbnail file, upon confirmation. <b>NOTE:</b> <i>Files that are marked <b>Permanent</b> cannot be deleted until you first un-check the permanent flag.</i>
<b>Rename</b>	Allows you to rename the currently-selected thumbnail file. Enter the <i>new name</i> in the <b>text</b> box.
<b>Settings</b>	Opens <b>Laser Processing Settings</b> for the currently-selected file.
<b>Export</b>	Exports the currently-selected file as an .emf.
<b>Estimate</b>	Provides the ability to estimate processing time in advance. This feature is beneficial in planning productivity.
<b>Permanent</b>	Marks the thumbnail file as permanent so it will not be deleted. A push-pin appears in the upper right-hand corner of the thumbnail. De-select the permanent flag to allow the file to be deleted.
<b>Select All</b>	Selects all thumbnail files.
<b>De-select All</b>	De-selects all thumbnail files.

## USING THE MAIN CONTROL PANEL

The **Main Control Panel** is located on the right side of the **Preview** window. Many of the same controls found on the **LCD Control Panel** are duplicated here in the **LSM**.

### ***Start, Pause and Resume Controls***

Tap the green **Start** button to begin processing the selected job. The **Pause** button appears to the right of the **Start** button.

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**NOTE:** *The Main Control Panel tools are disabled when the laser processing job is running.*



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If needed, tap the **Pause** button to temporarily stop processing. The **Pause** button changes to the **Resume** button.


Tap the **Resume** button to continue the process where it was last paused.

Tap the **Start** button to restart the process from the beginning.




### ***Position X and Y Manually***

	<p>The <b>XY</b> navigation buttons move the Carriage manually in the X or Y direction. Tap and hold for longer moves, or tap and release to move in small increments, .</p> <p>As you move the Carriage, a green target symbol  indicates the location of the Carriage on the laser processing table.</p>
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### ***Position Z Manually***

	<p>Tap the up and down <b>Z</b> buttons to move the Processing Table up or down. Tap and hold for longer moves, or tap and release to move in small increments.</p> <hr/> <p><b>CAUTION:</b> <i>While a properly-calibrated system will prevent this, care should be taken when raising the table toward the Carriage to prevent potential damage.</i></p> <hr/>
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### ***Move to Home Position***

	<p>Tap <b>Home XY</b> to move the Carriage to the home position in the upper right-hand corner of the laser processing table.</p> <hr/> <p><b>NOTE:</b> <i>When the Carriage is in the home position, the green target symbol  does not display in the Preview Area.</i></p> <hr/>
	<p>Tap <b>Home Z</b> to move the Z-axis to the home position at the bottom of the laser system.</p>

## USING THE PROCESSING TOOLS

Six window views are available using the processing tools on the **Main Control Panel**:

- **Zoom View**
- **Focus View**
- **Relocate View**
- **Duplicate View**
- **Estimate View**
- **Registration View**

### ***Zoom View***

Zoom View (default mode) shows a preview of the currently-selected job in the Preview Area.

Tap **Zoom** to activate the magnifying glass in the Preview Area. The cursor becomes a magnifying glass (Zoom Tool) when passed over the image in the Preview Area.

Tap **Zoom to image** to fit the entire image into the Preview Area.

For touchscreens, **stretch to zoom in** or **pinch to zoom out** of the Preview Area. **Swipe** to pan across the Preview Area.

When using mouse control, **left-clicking** zooms in and **right-clicking** zooms out. You can also use the mouse scroll wheel in any mode to zoom in and out. You can pan by **clicking and holding** the mouse wheel down and dragging.

### ***Focus View***

**Focus View** quickly moves the Carriage to a desired position on the laser processing field.

Tap **Focus** on the **Main Control Panel** to activate **Focus View**.

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**NOTE:** *To have a full range of motion, verify that you are zoomed out in the Preview Area.*

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In **Focus View**, the cursor changes to a blue target symbol.

To move the Carriage, do one of the following:

- **Click** the mouse or **touch** a new location on the screen and the Carriage moves to the selected position.
- Enter the ***X and Y coordinates*** in the **Control Panel fields** and tap **Go**.

The Carriage moves to the specified location.

Move the laser processing table along the Z-axis by entering *a specific Z-height*, and then tapping **Go**.

## ***Relocate View***

**Relocate View** provides the ability to move the image in the selected design file to another area of the laser processing field without having to reprint the design. This does not permanently modify the original image location.

When **Move** is activated on the **Main Control Panel**, nine anchor points surround the image, representing the center and extents of the graphic.

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**NOTE:** *If your page size is larger than the maximum field size of the laser system, the anchor points will display at the edges of the page on the image.*

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Use these anchor points to relocate the image in the one of the following ways:

- **Drag to new location** - Drag an anchor point to move the image around in the field.
- **Enter new location coordinates** - Select an **anchor point** from the image or the Control Panel and then *enter new XY coordinates* for that anchor point in the **XY** fields below the processing tools.
- **Snap to Carriage location** - Using the **XY** navigation buttons, move the Carriage to a location on the processing table using the Red Laser Pointer as a reference. **Select** an anchor point from the image or from the control panel, and tap the **To Pointer** button.

The anchor point moves to the current Carriage location. This feature is useful for aligning an image with the piece of material to be processed.

## ***Duplicate View***

**Duplicate View** provides the ability to duplicate an image in a grid pattern on the laser processing field. The horizontal and vertical spacing of the grid can be independently adjusted.

Tap **Duplicate** on the **Main Control Panel** to activate **Duplicate View**.

- **Enter** the *number of rows and columns* for the grid.
- **Enter** the *spacing between the rows and columns*.
- Tap **Fill Field** to fill the entire Preview Area with a duplicate of the image.

The image displays in a grid pattern.

After you create a grid of duplicate images, you can also remove any one of the copies or the original image from the group by selecting that instance in the Preview Area.

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**NOTE:** *Tap **Reset** to remove all duplicate settings.*

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To restore a copy that has been removed, tap in the general area of that instance and it will return.

## ***Estimate View***

**Estimate View** provides the ability to estimate processing time in advance. This feature is beneficial in planning productivity.

Tap **Time Estimator** on the **Main Control Panel** to activate **Time Estimate View**.

- Select the *laser, or lasers*, from the **drop-down** lists you want to use to estimate processing time.
- Tap the **Estimate** button.
- The estimated time displays on the **Control Panel** (3).

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**NOTE:** *A job can still be estimated when the machine is disconnected or turned off.*

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## ***Registration View***

In addition to providing you with unique camera-related tools, **Registration View** provides the ability to automate the alignment of a design file. The Universal Camera Registration option must be installed to activate **Registration View**.

Tap **Registration View** on the **Main Control Panel** to activate **Registration View**.

- Select the **Registration** Mode you want to use to process your design file.
- Enter the *tolerance value*.
- Tap **Train Auto** or **Run Manual** to begin using **Camera Registration** to process a design file, or
- Tap **Camera View** to utilize the **Camera Interface** Controls without processing a design file.

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**NOTE:** ***Auto** and **Manual** registration modes will only be present if the selected design file contains registration marks. If a design file without registration marks is selected only the **Camera View** button will be displayed.*

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## ***View Laser Processing Settings***

Tap the **Settings** button to open the **Laser Processing Settings** window. This control is found in the lower right-hand corner of the **Preview** window.

If necessary, most of the Laser Processing Settings can be changed after printing. A few of the settings such as Image Density and Print Special Effects are not reconfigurable after printing and are grayed out. Any changes made are permanently saved with the job.

## ***View Current Zoom & Cursor Location***

The current level of magnification and the location of the cursor displays in the lower right-hand corner of the **Preview** window.



## USING THE SYSTEM INFORMATION CONTROLS

The **System Information** controls are located in the lower left-hand corner of the **Preview** window.

### **System Configuration Window**

The **System Configuration** window allows for configuration of certain features of the laser system. If needed, calibration of the laser system is performed from this window.

Access this window by tapping the **System Configuration** button.

The **System Configuration** window displays.

The **System Configuration** window contains the following settings:

<b>General</b>	
<b>Server</b>	Displays the currently-selected laser system. Enter the name or IP address of another laser system and select <b>Connect</b> to connect to another laser system.
<b>Print Cache</b>	Enter the <i>maximum number of design files</i> that will be stored on the hard drive. If you exceed the number entered, the software automatically begins deleting the oldest design file as newer design files enter the queue, unless it's marked Permanent.
<b>Units</b>	Select <b>Metric</b> or <b>Inches</b> as the units of measure used.
<b>Lens Size</b>	Shows the currently-installed lens that is auto-detected by the laser system. This is important for proper function of the <b>Auto</b> mode and <b>Autofocus</b> , if installed. Lenses are calibrated to the laser system at the factory, but if a lens is replaced, it will need to be re-calibrated.
<b>Z Height</b>	Displays the current Z height position in relation to the lens size installed.
<b>Z-Axis Speed %</b>	Adjusts the speed by which the Z-Axis moves based on the percentage entered. Enter a value between <i>1% and 100%</i> .
<b>Job-State Delay</b>	Delay the start of all laser processes by the <i>entered value</i> .
<b>Enable Auto Z</b>	If activated, automatically moves the Z-axis to the <i>material thickness value</i> entered in the Laser Processing Settings component. If disabled, the Z-axis values in the color table are ignored and the focus will need to be set manually using the Focusing Tool. Make sure the Z-axis is properly-homed when using this function.
<b>NOTE:</b> <i>If a Rotary Fixture is currently installed this feature will be disabled.</i>	
<b>Laser Diode Always On</b>	<b>Tap</b> or <b>click</b> to place a <b>check mark</b> in the box to activate. If activated, the red laser pointer will remain on regardless of door status.

# Laser Processing Settings

**Laser Processing Settings** is the component of the **LSM** that allows you to set the required processing parameters for a laser processing job.

After using a third-party graphics software program to prepare the graphics file, launch the graphics program's **Print** function. Use **Preferences** or **Properties** for the **Print** function to open the **Laser Processing Settings** component.

After selecting and applying the parameters for the graphics file using the **Laser Processing Settings** component, you are ready to create a design file. After printing, the design file is created and appended to the design file storage queue in the **LSM** control service for laser processing.

## To Launch Laser Processing Settings:

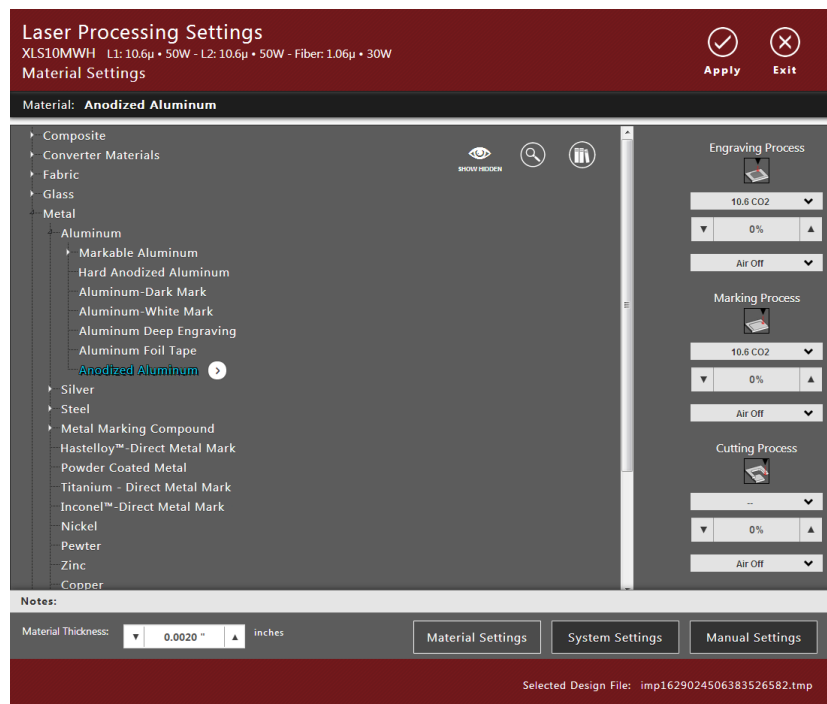
1. When you are ready to process your graphics file, select **Print** in your graphics software's **Print** function.
2. Verify that the laser system appears as the *Printer name*. If the laser systems name does not appear, **click** the **drop-down** list and select your laser system.
3. Select **Preferences** or **Properties** from the graphics software's **Print** function.

The **Laser Processing Settings** component launches with the **Material Settings** page displayed.

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**NOTE:** The name of the design file to which you are applying settings displays in the lower right-hand corner.

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**NOTE:** The **Laser Processing Settings** window is re-sizable.

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4. Complete the **Laser Processing Settings** selections on the following pages, as necessary:
  - **Material Settings Page**
  - **System Settings Page**
  - **Manual Settings Page**
5. Tap to apply and **Save** the settings as they are defined. The **Laser Processing Settings** page remains open so that you can continue working.
6. When finished, tap to apply and **Save** all settings, and then tap to **Exit** and return to the graphics program's Print function.

## ***Laser Processing Settings - Common Controls***

The following controls are common to all **Laser Processing Settings** pages.

	<b>Apply</b>	Applies the changes made to the <b>Laser Processing Settings</b> . Tap <b>Apply</b> on the <b>Material Settings</b> , <b>System Settings</b> , or <b>Manual Settings</b> page to save changes made to the design file.
	<b>Exit</b>	Closes the <b>Laser Processing Settings</b> application window. Tap <b>Exit</b> on the <b>Material Settings</b> , <b>System Settings</b> , or <b>Manual Settings</b> page to close the <b>Laser Processing Settings</b> application window. An <b>Exit</b> without a prior <b>Save</b> displays a confirmation message.
	<b>Selected Design File</b>	Displays the name of the currently-opened design file.

## ***Material Settings Page***

The **Material Settings** page displays when the **Laser Processing Settings** window first opens. This page lets you select the type of material, thickness of the material and units used for the thickness measurement for a new design file. Additional controls on the page allow you to customize the **Materials Database** view, access parameter settings or learn more about a material.

You can adjust laser intensity settings specified in the Materials Database by using the controls in the right pane of the page. **Gas Assist** settings can also be adjusted for each process.

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**NOTE:** *A material must be selected first before you can adjust any other settings. All settings stay with the design file.*

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## **Materials Database**

The Materials Database provides nominal settings for the most common materials used in laser processing. When you select a material from the materials database the system queries the database and uses the entered thickness to automatically calculate the settings that are required for laser processing that material.

Materials settings in the database are arranged in a multi-leveled tree structure. **Expand** or **collapse** the tree as needed to locate the material to be processed:

- Tap the expand symbol next to a material category to **expand** the category, and then tap to select a *material type*. The selected material displays at the top of the page.
- Tap the collapse symbol next to material category to **collapse** the category.

## ***Entering Material Thickness***

The **Material Thickness** *value* is used by the Materials Database to calculate the Vector cutting job settings to ensure that the laser cuts all the way through the material. This value is also used by the laser system to move the Z-axis to the proper focus height when using **Auto Z** mode.

Using a caliper or similar measuring device, measure the thickness of the material and enter it into the **Material Thickness** box.

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**NOTE:** *If using a fixture, do not add the fixture height to the Material Thickness. Doing so may adversely affect laser speed and power settings for Vector cut lines.*

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## ***Adjusting Process Settings***

Based on the material selected from the Materials Database and the maximum output power of the installed laser, the system automatically calculates the appropriate settings for a nominal effect.

You can adjust the nominal material settings as well as the laser source for engraving, marking, and cutting:

Change the laser source by selecting a different source from the **drop-down** list.

Use the **up/down arrows** to increase or decrease intensity. Increasing intensity causes deeper engraving, marking, and cutting results and decreasing intensity causes shallower engraving, marking, and cutting results.

You can also adjust the Air or Gas Flow Rate by selecting a *percentage* from the **drop-down** list.

# SYSTEM SETTINGS PAGE

The **System Settings** page provides additional options for controlling a process. Options to specify the methods to interpret the design file, select options, and customize processing behavior are offered on this page.

## ***Design File Handling***

**Design File Handling** allows you to set how the system will process the design file.

Place a **check mark** in each option as needed.

### **Merge Pages**

Determines how a multi-page design file is handled:

- When unchecked, a single-page design file is assumed.
- When checked, a **drop-down** box displays.

Choose **Auto-Start** or **Manual Start**:

- **Auto-Start** - The system processes pages in a multi-page job consecutively with no pause between the pages.
- **Manual Start** - The system pauses processing after each page in a multi-page job. The user initiates the start of the next page.

### **Center Design**

Determines if the processing of the drawing/text element in the design file will be centered on the field:

- When **unchecked**, the drawing/text element in the design file is located where placed on the field.
- When **checked**, the drawing/text element in the design file is centered on the field.

## ***Fixture Selection***

Select the fixtures that are installed on the system.

### **Fixtures**

Select the type of fixture in use from the **drop-down** list, and then enter *parameter settings* for the selected fixture.

- **None** - Select **None** if no option is being used.
- **Rotary** - Enter the *Diameter*.
- **Pin Table** - No additional input required.

## ***Raster Motion Controls***

These controls allow you to select Options that control **Raster Motion** behavior.

### **Processing Direction**

Tap **Processing Direction** to toggle between the two Raster motion processing directions:

- Back-to-front (top to bottom)
- Front-to-back (bottom to top)

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**NOTE:** *On some materials it is advantageous to process Raster from front-to-back (bottom-to-top) to prevent smoke from marring the previously marked or engraved surfaces.*

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### **SuperSpeed™**

Tap to **Enable** or **Disable** the SuperSpeed laser processing option. When enabled, SuperSpeed will be utilized while processing Raster data.

### **Image Density**

**Image Density** determines the number of lines of pixels or dots per (vertical) inch (DPI) used to render a Raster image on the material. It is also referred to as the vertical resolution or DPI. **Higher Image Density** settings produce better quality Raster images with finer detail, but reduce productivity by increasing Raster engraving time. **Lower Image Density** settings produce lower quality Raster images, but increase productivity by decreasing Raster engraving time.

**Image Density** settings will also have an effect on Vector quality and processing speeds when Vector objects contain many curves and small segments. Higher image densities will produce finer Vector detail, but may reduce productivity and vice versa for lower image densities. By running samples on scrap materials and trying different density settings, you can find an acceptable compromise between throughput and image quality.

Set **Image Density** from *1 to 9* by using the **up/down arrows** or by *typing in a value*. Select 1 for maximum throughput. Select 9 for maximum quality. An example of the approximate linear quality displays above the selected setting.

## Dithering

Use **Dithering** settings when printing design files that contain grayscale or color bitmaps, such as photographs, for all printing modes except **3D** mode. A dither pattern is a special screen filter that is used to convert a grayscale or color image to monochrome (black and white). The screen filter reduces the image to black and white while preserving the illusion of shades of gray by varying the spacing of pixels (dots) in the image. Darker areas have more dots spaced closer together, and lighter areas have fewer dots spaced farther apart. Since the laser system is not capable of directly reproducing color or shades of gray, use this method to mimic shades of gray when engraving or marking onto your selected material.

Select one of the **Dithering** radio buttons for the dithering algorithm you want to use:

- **Black and White**
- **Halftone**
- **Error Diffusion**

### ***Black and White***

The **Black and White** mode is a thresholding dither pattern. This pattern thresholds at 50% black. Each pixel in a grayscale image that is greater than 50% black is converted into black and each pixel that is less than 50% black is converted into white. This dither pattern does not produce good results when reproducing photographs, but it is very useful when printing design files that should be black and white, yet may have some unintended grayscale pixels in them.

For example, you can use the **Black and White** mode for an image of a text document that was scanned into a computer using a grayscale scanner setting. Ideally the scanned image of text should be black text on a white background, but if a grayscale scanner setting was used, there may be very light gray pixels at the edges of the characters of text. This dither pattern will remove those gray pixels.

### ***Error Diffusion***

The **Error Diffusion** dither pattern uses a random scatter filter to place pixels in order to represent shades of gray, introducing a level of noise into the process. The pattern created will vary with the density chosen. Higher density settings, such as 5, will produce a more densely-packed, finer pattern and lower resolution settings, such as 2, will produce a loosely-packed, coarser pattern.

### ***Halftone***

The **Halftone** dither pattern is a line-type filter which applies a 45° line screen to a color or grayscale image to convert it to black and white. The line spacing of the line screen varies with the density chosen, so at lower densities, the line screen is coarser.

Image Density	Lines Per Inch
9	355
8	180
7	120
6	90

Image Density	Lines Per Inch
5	70
4	60
3	45
2	35

## Raster Stroke

When you select **Normal** as a Special Effect, the **Raster Stroke** option is available for selection:

- If **Tight** is selected, the Raster strokes will vary with the image. For example, if you are engraving a triangular shape, the tip of the triangle will be engraved with short Raster strokes and the strokes get longer as the wider parts of the triangle are engraved.
- If **Frame** is checked, the longest Raster stroke is determined and all other Raster strokes are equal in length to the longest Raster stroke. This increases processing time, but edge quality can improve when engraving or marking at higher processing speeds. Use this mode only if necessary.
- Use the **up/down arrows** to add additional length to the calculated stroke. Adding length will increase total processing time but may improve engraving or marking at higher processing speeds. Use this setting only if necessary.



# MANUAL SETTINGS PAGE

The **Manual Settings** page allows direct control over the laser material processing settings and the ability to specify additional processes.

Add colors to or remove colors from a process, depending on the design file being processed. You can also override the database and directly adjust the **Process Mode, Speed, PPI, Z-axis Height, Gas Assist, and Laser Power** for each process in the design file. In addition to this, if you are working with an XLS10MWH™ you will have the ability to adjust **Fiber Waveform** and **Fiber Frequency**.

## Laser Processing Settings

XLS10MWH L1: 10.6µ • 50W - L2: 10.6µ • 50W - Fiber: 1.06µ • 30W

Manual Settings

Material: **Anodized Aluminum**

Process Color	Process Mode	DB Laser Type	Speed	PPI	Z-Height	Air-Assist	Laser 1 10.6µ Power	Laser 2 10.6µ Power	Fiber 1.06µ Power	Fiber Waveform	Fiber Frequency
● Black	DB Vector Mark	10.6	62.5%	500	0.002 "	Air Off	100%	Off	Off	0	30000 Hz
● Red	DB Raster	10.6	100%	500	0.002 "	Air Off	Off	49.7%	Off	0	30000 Hz
● Green	Custom Raster	--	100%	500	0.002 "	Air Off	Off	Off	100%	0	30000 Hz

Notes:

Material Thickness:  inches

[Material Settings](#) [System Settings](#) [Manual Settings](#)

Selected Design File: imp1629024506383526582.tmp

## Using the Color Table

The **Color Table** contains the settings for individual processes. There are sixteen colors available to which settings can be assigned. Any color in the design file that does not map directly into a color in the Color Table is matched to the nearest color. Any multi-color objects, such as grayscale or color bitmaps, will have a black and white dither pattern applied and will be mapped to the black color settings. Order of execution proceeds down the Color Table from top to bottom, with all Raster objects being completed first, then Vector objects. All materials in the database initially default to a specific arrangement of colors assigned to processes: black for all raster data, blue for all vector mark data, and red for all vector cut data. Each color/process will default to database settings but can be overridden if desired. This process order can be changed and the database will remember the laser used, arrangement of colors, and processes for each material in the database.

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**NOTE:** You can define up to 16 processes: 8 Raster settings and 8 Vector settings.

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### Define a Process

1. Tap a **Color** in the **Color Table** to open the **Process Settings** dialog box.
2. Complete the following settings:
  - **Skip** - Toggle **on/off** by tapping on the **Power** button. Ignores all elements in the design file mapped to the selected color and does not print the elements.
  - **Process Mode** - Select a mode from the **drop-down** list that will interpret the elements mapped to the selected color. The choices include:
    - **DB Raster** - Utilizes the recommended settings from the Materials Database to process Raster objects for the selected color.
    - **DB Vector Mark** - Utilizes the recommended settings from the Materials Database to process Vector marks for the selected color.
    - **DB Vector Cut** - Utilizes the recommended settings from the Materials Database to process Vector cuts for the selected color.
    - **Custom Raster** - Interprets all elements in the design file mapped to the selected color as Raster, including thin line widths.
    - **Custom Vector** - Interprets elements with a line width of .001" (.0245 mm) in the design file mapped to the selected color as Vector. Raster objects of the same color will be ignored.
    - **Registration** - Interprets elements with a line width of .001" (.0245 mm) in the design file mapped to the selected color as a registration mark utilized by the Universal Camera Registration laser processing option.
    - **Drill** - Interprets individual Vector points with a thickness of .001 (.0245 mm) in a design file mapped to the selected color as Drill points. Vector and Raster objects of the same color will be ignored.
    - **DB Laser Type** - Utilizes the recommended settings from the Materials Database for the selected laser type.
    - **# of Pulses** - Available only when the **Drill** process mode is selected. Select the number of times the laser will fire by tapping on the **up/down arrows** or by typing in a *value*.
    - **Duty Cycle** - Select the % of power for the enabled laser(s) when applying each pulse while using the **Drill Process** mode.
    - **Repeat** - Enter the number of times the selected process will be run. Selecting **0** will complete the process once and not repeat.
    - **Kerf Comp** - Available only when a **Vector Cut** process is selected. Select **ON** or **OFF** from

the **drop-down** list. This option will only impact enclosed Vector paths. For individual lines, the laser system will follow the Vector path with no compensation.

- **Kerf Width** - Available when **Kerf Comp** is enabled. This option compensates for the *entered value* by adjusting the Vector path, followed by the laser, while completing the selected process.
- **Good Side** - Select the side on which to apply the kerf compensation. Select **Keep Outside** or **Keep Inside** from the **drop-down** list.
- **Pierce Mode** - Available only when a **Vector Cut** process is selected. Force the laser system to dwell at the start point of a Vector path prior to continuing. Select **ON** or **OFF** from the **drop-down** list.
- **Air Assist** - Select the **Flow Rate** for the **Air or Gas input** from the **drop-down** list.
- **Speed** - Select a processing speed from *0 to 100%* by using the **up/down arrows** or by *typing in a value*. This setting determines the motion system's maximum rate of travel.

Actual engraving time (throughput) is not only dependent on the **Speed** setting, but on the size, intricacy and placement of the graphic in the laser processing field. The motion system will accelerate/decelerate at a fixed rate up to the chosen speed. If the motion system cannot achieve the chosen speed based on the size and intricacy of the graphic or graphical placement in the field, it automatically adjusts its speed to the maximum speed it can achieve. This is evidenced when the motion system automatically slows down while cutting curves or circles. Automatic Proportional Pulsing (see PPI below) of the laser beam ensures that there is no difference in the depth of cut from straight lines to curves.

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**NOTE:** *100% Raster speed is different than 100% Vector speed. Rastering is done with the X-axis Carriage which is lightweight and has a high acceleration and top speed. Due to the inertia of the X-axis arm, movements in the Y-direction have a slower acceleration and top speed making Vector speeds range from one-third to one-half the maximum Raster speed.*

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- **Z-axis** - Select the position of the Z-axis Table by using the **up/down arrows** or by *typing in a value*. When the Z-axis height is set and **Enable Auto Z** is selected in **System Settings**, the Table moves to the indicated position before processing elements in the design file. The Z-axis position is equivalent to material thickness unless using a fixture.
- **PPI** - Select the pulsing frequency of the laser pulse stream when Vector cutting. Select from *1 to 1000* pulses per inch (PPI) from the **drop-down** list.

The PPI setting indicates how many laser pulses per linear inch the laser source will emit. The pulsing of the laser beam is electronically linked to the motion. These pulses will always fire, equally spaced, from one to the next, regardless of changes in speed.

Higher PPI settings may cause melting, burning, or charring on the edges when cutting. Lower PPI settings may reduce this effect, but may result in a serrated-looking edge. Using less than 150 PPI may result in the pulses being spread so far apart that they may or may not touch one another, creating a perforated effect. A PPI setting from 300 to 500 PPI is a good nominal value for most applications, but some experimentation may be necessary.

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**NOTE:** *In Raster mode, PPI is controlled by the image density selected for Rasters (image densities 5 and below fix pulses at 500 PPI and image densities 6 and 7 fix pulses at 1000 PPI).*

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- **Laser 1** - Toggle **on/off** by tapping the **Power** button. Select the laser power level for Laser 1 from *0 to 100%* by using the **up/down arrows** or by *typing in a value*.
- **Laser 2** - Toggle **on/off** by tapping the **Power** button. Select the laser power level for Laser 2 from *0 to 100%* by using the **up/down arrows** or by *typing in a value*.

- **Fiber Laser (XLS10MWH™ Only)** - Toggle **on/off** by tapping on the **Power** button. Select the laser power level for the fiber laser from *0 to 100%* by using the **up/down arrows** or by *typing in a value*.

The **Power** settings are directly related to how deep the cutting or engraving will be. The higher the setting, the deeper the cutting or engraving, and vice-versa. Power essentially determines the duty cycle/pulse width of each laser pulse in the job. Laser pulse frequency is controlled by the PPI setting for Vector and by the Image Density setting for Raster (Image Density settings 5 and below fix pulses at 500 PPI and Image Density settings 6 and 7 fix pulses at 1000 PPI).

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**NOTE:** The **Power** and **Speed** settings work together in determining how deep the engraving or cutting will be. Higher power and slower speeds produce deeper results. Lower power and higher speeds produce shallower results.

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- **Waveform (XLS10MWH™ only)** - Set from *0 - 5* by using the **up/down arrows** or by *typing in a value*.
  - **Frequency (XLS10MWH™ only)** - Select the frequency by using the **up/down arrows** or by *typing in a value*. Frequency can range from *1kHz to 500kHz*.
3. Do one of the following:
- Tap **Apply** to save changes and return to the **Manual Settings** page. The **Process Settings** dialog box remains open to allow you to edit another process.
  - Tap **Exit** to close the dialog box. If changes were not previously saved, the dialog will close without saving changes.

## Select Active Processes

1. Tap the **Plus** Symbol above the **Color Table** to select active processes. The **Active Processes** dialog box displays. A check mark next to a process indicates it is active.
2. Select processes by doing one of the following:
  - Touch a **box** to **check it** or **deselect it**.
  - Tap to toggle between **Select All** and **Deselect All**.
    - **Select All** - checks all boxes in the list.
    - **Deselect All** - un-checks all boxes in the list.

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**NOTE:** At least one color must be selected on the **Active Processes** dialog box.

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3. Tap **Apply** to save changes to the design file. Tap **Exit** to close the dialog box. If changes were not previously saved, the dialog box closes without saving any changes.

## Assign Process Order of Execution

The order of execution can only be changed before the first printing of a job. After printing the job, the color order becomes fixed for that job.

1. Change the order of execution for the processes by **dragging a color dot** into the position you want it to process. Processes are executed in the order they appear in the list from top to bottom. This changes the order of execution for all objects using those colors.
2. Tap **Apply** to save changes, or tap **Exit** to close the **Manual Laser Processing Settings** application without saving any changes.

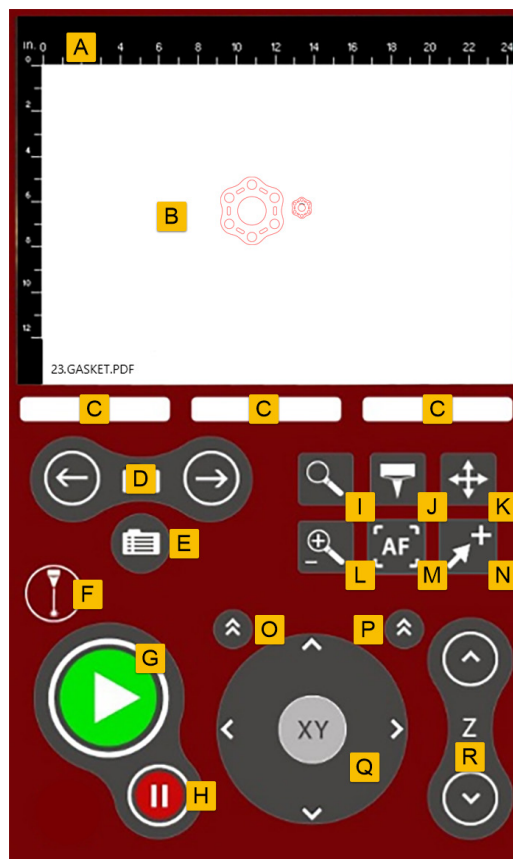
# LCD Control Panel

The **LCD Control Panel** on the XLS10 laser system provides the functions necessary to operate the laser system. The **Control Panel** is a touchscreen that is attached to the right frame of the XLS10.







The Control Panel's **Main Screen** contains two panes:

- The upper pane is the Preview Area for displaying the current design file.
- The lower pane contains the controls.

## USING THE CONTROLS ON THE LCD MAIN SCREEN



A. <i>Rulers</i>	Tap the <b>Rulers</b> to toggle between inches and centimeters. The rulers expand and contract when using the <b>Zoom</b> feature.
B. <i>Preview Area</i>	Displays a preview of the current design file.
C. <i>X, Y, Z Position</i>	Shows the current X, Y, and Z positions of the Carriage.
D. <i>Previous/Next</i>	Tap <b>Previous/Next</b> to display the previous/next file in the queue in the Preview Area.
E. <i>Design File Storage Queue Screen</i>	Displays the <b>Design File Storage Queue</b> screen. This screen is useful when your file queue is large and you need to navigate through it.

F.	<i>Interlock State</i>	Indicates if all the doors to the system are closed so that it is safe for the laser to fire.
G.	<i>Start</i>	Initiates processing of the laser job currently selected and visible in the Preview Area.
H.	<i>Pause/Resume</i>	Stops the execution of the job in process and moves the Carriage to its home position in the upper right-hand corner of the processing area. If the <b>Pause</b> button is tapped again, the job will <b>Resume</b> at the point where the motion system was paused. Tapping <b>Start</b> while the machine is in a paused state restarts processing from the beginning of the job.
I.	<i>Pan/Zoom</i>	<p>Tap  to enter <b>Pan/Zoom</b> mode:</p> <ul style="list-style-type: none"> <li>• Swipe to <b>Pan</b></li> <li>• Tap to <b>Zoom</b></li> </ul> <p>Use <b>Pan</b> to view an area of the image that is outside the displayed ruler area. The <b>Zoom</b> level does not change when panning. If you are <b>Zoomed</b> all the way out so that the rulers show the entire field, you will not be able to <b>Pan</b>.</p>
J.	<i>Focus</i>	Tap  to enter <b>Focus</b> mode. A crosshair identifies the location of the Carriage. Tap a <i>new location</i> on the screen to relocate the Carriage.
K.	<i>Relocate Image</i>	Tap  to change the location of the image on the field. Select one of the anchor points surrounding the image, then tap <b>Relocate Image to Carriage</b> . The selected image anchor point will snap to the Carriage location.
L.	<i>Zoom In/Out</i>	Tap  to toggle between <b>Zoom In</b> and <b>Zoom Out</b> .
M.	<i>Autofocus</i>	While in <b>Focus</b> mode, tap  to enter <b>Autofocus</b> mode.
N.	<i>Relocate Image to Carriage</i>	Select an anchor point and tap  to move that image's anchor point on the field to the same location as the Carriage.
O.	<i>XY Motion Sensitivity</i>	Controls the tap sensitivity of <i>XY Motion Control</i> . <b>Toggle</b> between <i>0.01</i> and <i>0.100</i> inch per tap.
P.	<i>Z Motion Sensitivity</i>	Controls the tap sensitivity of <i>Z Motion Control</i> . <b>Toggle</b> between <i>0.005</i> , <i>0.025</i> and <i>0.100</i> inch per tap.
Q.	<i>XY Motion Control</i>	Drag the Virtual Joystick Control away from center in the desired travel direction. Manual motion speed increases as the joystick control is moved farther from center. Incremental moves in X or Y can only be made by tapping directly on the <b>arrow keys</b> surrounding the <b>joystick</b> control.
R.	<i>Z Motion Control</i>	<p>Moves the Table up and down in the Z direction. Press and hold the <b>Motion Control</b> button for lengthy moves and tap it for short moves.</p> <p><i>Z Motion Control</i> displays the following:</p> <ul style="list-style-type: none"> <li>• Single chevron: <i>0.005</i> inch per tap</li> <li>• Double chevron: <i>0.025</i> inch per tap</li> <li>• Triple chevron: <i>0.100</i> inch per tap</li> </ul>

## USING THE DESIGN FILE STORAGE QUEUE SCREEN

The **Design File Storage Queue Screen** helps you navigate through your design file queue. This is useful when your design file queue is large and you need to locate a specific file.

### To use the Design File Storage Queue Screen:

1. On the LCD Control Panel, tap the **Job File Storage Queue Screen icon**.

The **Design File Storage Queue Screen** button displays the **Design File Queue** list in the bottom pane. The currently-selected design file displays in the **Preview** Area on top.

2. Navigate through the **Design File Storage Queue** using the following buttons:



Moves up approximately 100 lines from the current location in the list.



Moves up 1 page from the current page in the list.



Moves up 1 line from the current location in the list.



Moves down 1 line from the current location in the list.



Moves down 1 page from the current location in the list.



Moves down approximately 100 lines from the current location in the list.

3. When you have located the file to be processed, tap to return to the **LCD Main Screen**.