Synergy™
User's Manual

Revision

Table of Contents

Synergy Operation

The Synergy system allows users to customize pretreat and cure settings, for each individual garment, with ease. To accommodate the users preferred production method, the system has two different operating modes: **Manual Mode** and **Queue Mode**. More information regarding these operating modes can be found in the sections to follow.

When the machine is first turned on, the Synergy software will start automatically and display the **Spray Screen** in the last mode used during operation. The **Spray Screen** is where the pretreat and cure settings (pretreat amount, spray area, cure temperature, cure time, etc.) are chosen for a garment. These settings are grouped together to form "**Profiles**" (sometimes referred to as "Programs"). In **Manual Mode**, **Profiles** can be created or loaded from a list of premade **Profiles**. In **Queue Mode**, the **Profile** for a garment is sent to a database via API and loaded when a garment barcode is scanned (or garment Piece ID is entered).

After the **Profile** is selected, the operator can load the garment onto the belt. When loading a garment please note the following:

⚠ **Warning**: The belt must be completely stopped before attempting to load the product.

- The word "TOP" is being projected on the belt. The collar of the garment will need to be loaded closest to that side (either collar up or collar right)
- The garment MUST be loaded within the projected red box on the belt. Failing to load within this box will result in garments getting stuck between belts during transfers.
- Shirt sleeves and collars should be folded under the body of the garment
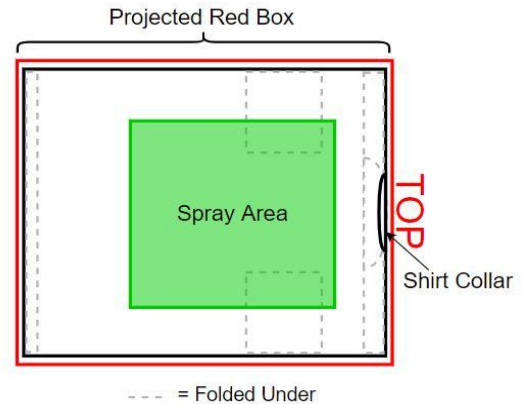
Correctly Loading a Garment

Once the shirt is loaded, the operator can send the garment by either pressing the SEND button on the touchscreen or by pressing the green start button mounted to the Pretreater frame (in front of the scanner).

⚠ **Warning**: Keep hands, loose clothing/accessories, etc. away from the belt after the send button is pressed.

The Pretreater belt will index forward until the garment is positioned under the Pretreater, often referred to as the **Spray Chamber**. The Pretreater carriage will sweep across the **Spray Chamber** while simultaneously spraying the garment. How and where the garment is sprayed are based on the **Profile(s)** that was selected before sending the garment. Only one nozzle is used to spray the garment, and the one that is chosen depends on the spray area width, Plumbing Configuration, and the fluid type.

Once the Pretreater is done spraying, the operator can send another garment and the one that is currently in the Spray Chamber will be automatically transferred to the next belt. This second belt is called the "Transfer" belt. After the Firefly prewarms and the preceding shirt has passed the transitional area, the garment will be transferred to the Firefly belt. Note that the Transfer belt will match the speed of the Firefly belt to allow

for a smooth transition. The garment will be cured according to the previously selected **Profile**.

Note that the intention of the previous paragraph was to describe the pretreatment process for one garment. To increase efficiency, multiple garments can be cured at the same time. As soon as the preceding garment is transferred onto the second belt (Transfer belt), another garment can be sent. There is also an Auto-Start feature that allows operators to continuously load garments without having to press START after each one. For more information about this feature, see "Auto Indexing Timer" (under Belt Operations section).

Spray Screen

As aforementioned, the Spray Screen is where Profiles are selected for a garment and can be displayed in two different operating modes. Use the Mode Toggle button, located in the top, right corner of the screen (see image below), to switch between operating modes. The displayed mode will be highlighted green whereas the other mode will be greyed out.
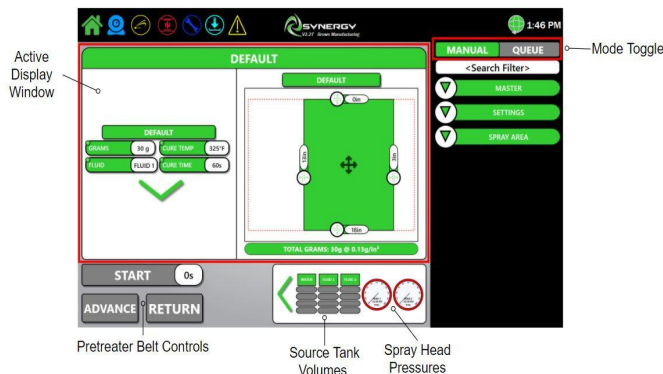
Spray Screen Indicating the Various Displays

The main window that contains the Profile information (image above) is known as the **Active**

Display Window. This is where the settings for a garment can be altered.

Below the Active Display Window the operator will find the Pretreater Belt Controls (image above) and the Quick Fluid Feedback (image above). The Pretreater Belt Controls contain the Start, Return, and Advance buttons. More information about the Pretreater Belt controls can be found under "Belt Operations".

The Quick Fluid Feedback is used to prevent potential spray problems caused by empty source tanks and low spray pressure. The displayed feedback includes the current tank volumes of all available source tanks and pressure gauges for both spray lines. For additional information, see "Quick Fluid Feedback".

Note: if a Synergy receives its source fluid from a Central Source, the tank volumes will not be available.

The bar running across the top of the Spray Screen is called the **Navigation Bar**. The following can be found in the Navigation Bar:

- 🏠 **Home Button**: when pressed, the user will be redirected to the Navigation Screen

- 📷 **Camera Icon**: brings up the camera view when pressed. See "Camera Display Window" for more information

- ✎ **Firefly Feedback Window**: see "Firefly Feedback Window" for more information

- 🔧 **Maintenance Cards**: see "Maintenance Cards" section under "Maintenance" for more information

- ⬇ **Update Icon**: Indicates there is an update available for the software. When the icon is pressed a message will appear showing what will be updated. Press OK to update or press CANCEL to close the screen without updating

- ⚠️ **Error Icon**: when pressed, a message will appear listing the errors that the system is currently experiencing
- Synergy Software Version: located in the center, directly below "SYNERGY"
- 🌐 **Network Status**: see "Network Status" for more information
- **Time**
- Other icons may be displayed if your Synergy Machine is on a Digital Line System. See the Digital Line User's Manual for a description of any additional device icons.

Manual Mode

In Manual Mode, programs can be saved, loaded and deleted. The saved programs are split into three different categories: Master, Settings, and Spray Area.

- **Master**: All settings within the Active Display Window. A Master Profile is a combination of both a Spray Profile and a Spray Area Profile.
- **Settings**: The settings located on the left side of the Active Display Window. The settings include, Spray Density, Fluid, Passes, Cure Temp, Cure Time, etc.
- **Spray Area**: Contains the area where the garment will be sprayed. These settings can be found on the right side of the Active Display Window.

These categories allow for unique combinations of spray and cure settings to accommodate each type/style of garment. For example, a Dark Hoodie with a Left Chest print is going to need a different Profile than a Light T-Shirt with a Center Chest.

All the saved Programs/Profiles can be found on the right side of the screen under their specific category. To view the Profiles within a category, press the green down arrow 🔽 located next to the category header. Similarly, press the green up arrow 🔼 to minimize it.

To load a Profile, select the program name from the corresponding category list. After selecting a Profile, it will be pulled into the Active Display window and the name will be displayed in the Category Header. Category Header locations can be seen in the image below.
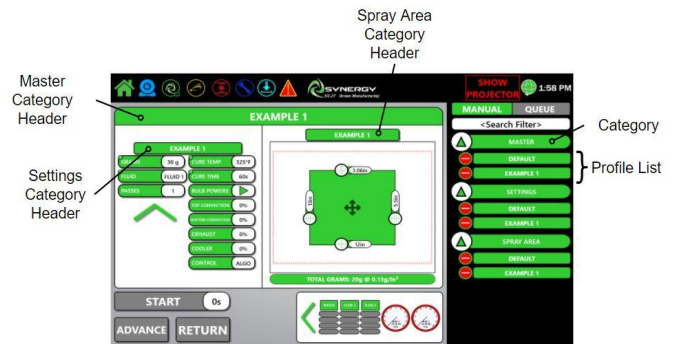
Category Header Locations

To delete a Profile, press the minus ⊖ next to the name in the Profile list. After pressing the delete icon, a message window will appear asking you to confirm the deletion of the selected Profile. Press

OK to continue deleting the Profile or

press CANCEL to return to the Spray Screen without deleting.

Descriptions about specific Profile settings are outlined in the section called "Spray Control Settings".

Creating a Master Profile:

Change the settings within the Active Display Window as needed. When finished, click the title bar at the top of that window. A message will appear asking for a Profile name. Give it an applicable name then press enter. If the window is still displayed after pushing enter, click the X in the corner of the window to close it. Since a Master Profile is made up of both a Settings Profile and Spray Area Profile, the saved name will appear under all three categories.

Note: You cannot save Settings and Spray Area Profiles with the same name as an existing Master Profile. If a Settings/Spray Area Profile were to be saved with a matching name, only the Master Profile would appear. Meaning if that Profile name was selected (from Settings/Spray Area category list), the Master Profile settings would load instead of the one that was recently saved.

Creating a Settings Profile:

To create a Settings Profile, alter the settings on the left side of the Active Display Window as desired. The Category Header will change to SAVE after a value has been altered. When finished, press that header to save the Spray Profile. A message window will appear. Type in an appropriate name then push enter. If the window is still displayed after pushing enter, click the X in the corner of the window to close it. The saved Profile name will then appear under the Settings category.

Note: Specific spray setting descriptions can be found under "Spray Control Settings"

Creating a Spray Area Profile:

To create a Spray Area Profile, alter the spray area size (on the right side of the Active Display Window) as desired. When a setting is changed, the Category Header will change to SAVE. When finished, press that header to save the Spray Area Profile. A message window will appear. Type in an appropriate name then push enter. If the window is still displayed after pushing enter, click the X in the corner of the window to close it. The saved Profile name will then appear under the Spray Area category.

Note: Specific spray area setting descriptions can be found under "Spray Control Settings"

Overwrite a Profile:

To overwrite a program (including Default) save a new program with the same name. Program names are not case sensitive.

If unwanted Profile editing is a concern, it is possible to lock spray settings, spray area settings, Program selection, and Mode selection. If any of these options are locked, the system would require a password before allowing access. For more information see **Security**.

Queue Mode

In Queue Mode, spray settings for each garment are loaded from a Database, either via the systems API or Linx Software Integration. The loaded Profile for a garment is able to be changed, but only while it is in the Active Display Window. Settings cannot be changed after a garment has been sent or if operators are using the Auto-Start feature.

Stored information for a garment is retrieved by scanning the product barcode or by typing in the garment piece ID in the bottom, right corner of the screen. Notice that when a garment is scanned, the garment details populate the "card" in the upper, left corner of the Active Display Window (in addition to the Profile settings). This card is referred to as the **Product Display Card**. See the image below for a closer look at the Product Display Card and the information it will contain.
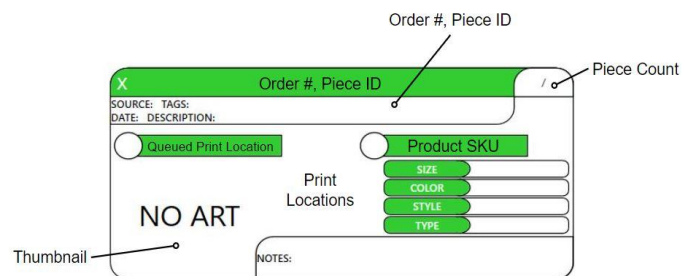
Product Attributes on Product Display Card

Multiple garments can be scanned into the queue and their Product Display Card will appear on the right side of the screen (in the order scanned). There is not a limit to how many items the queue can hold unless the user sets one. To set a limit:

1. Press 🏠

2. Press the SCANNING Icon 🔴

3. Set the MAX QUEUE LENGTH to the desired amount. If the amount is set less than zero, there is no limit.

After a garment is sent, the next item in the queue is pulled into the Active Display Window. This garment is also known as the **Active Garment**. If there is not a garment available to be pulled into the Active Display Window (queue is empty), the DEFAULT Profile from Manual Mode will be loaded instead.

An Active Garment can be removed from the Active Display Window by pressing **X** in the top, left corner of the card. Note that this product will be deleted. If you wish to re-queue this product, simply scan the barcode again. Alternatively, the item can be re-queued if the QUEUE SELECTION MODE is set to SwapActive or DumpActive.

The QUEUE SELECTION MODE is a setting that tells the system how to react when one of the Product Display Cards is selected from the queued item list. There are four modes available:

- **ReplaceActive**: The queued Product Display Card will replace the current Active Garment
- **SwapActive**: The queued Product Display Card will trade places with the current Active Garment
- **DumpActive**: The selected Display card [from the queue] replaces the Active Garment. The Active Garment is pushed back to position two in the queue (two items need to be sent through the machine before it becomes the active garment again).
- **Delete**: Product Display Card is deleted when it is selected from the queue

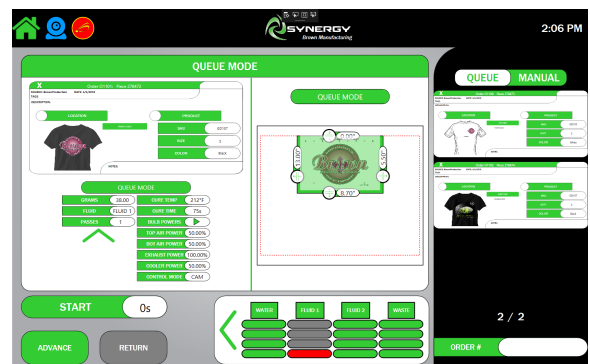To view or change the current QUEUE SELECTION MODE:
1. Press 🏠
2. Press the SCANNING Icon 📟
3. Locate the QUEUE SELECTION MODE setting on this screen.

4. QUEUE SELECTION MODE REPLACEACTIVE to change the current mode, press the white area and select the desired mode from the drop down menu

Tip: Press the setting "name" to pull up a description of that setting.

5. Return to the Spray Screen by pressing 🏠 twice or by pressing 🏠 once then pressing 🔄

The system is programmed to automatically add a "halo" around the incoming art dimensions to act as a spray buffer. For example, look at the Spray Area Profile in the image below. The attached art is the lighter green rectangle. The border of dark green around the art is the "halo".

Spray Screen in Queue Mode

The spray buffer is set to avoid potential printing issues caused by pretreat under-spray. These are set based on user preference. To view or change the current spray buffers:

1. Press 🏠
2. Press SETTINGS ⚙️
3. At the bottom, press BASE SETTINGS **BASE SETTINGS**. The tab will turn grey when selected.
4. On the left, under PRETREAT SETTINGS, locate IMAGE HALO TOP/BOT and IMAGE HALO LEFT/RIGHT
5. Change these values as desired.

Reminder: Press the setting "name" to pull up a description of that setting.

For more details about Queue Mode contact Brown Manufacturing about the Synergy Queue Mode, Linx and Synergy API.

Spray Control Settings

Earlier in this document, Profiles were explained as a group of settings used to pretreat and cure a garment. This section will explore the settings within each Profile category and the purpose of each setting. As a reminder, the Profile categories include Master, Settings, and Spray Area. Since a Master Profile is a combination of both Settings and Spray Area Profiles, the individual settings will be covered under the other two categories, and therefore, will be disregarded in this section.
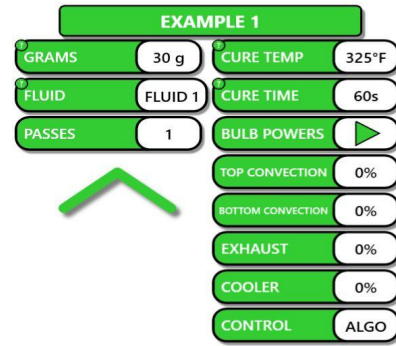
Settings Profile

The Settings Profile consists of the controls that determine how the garment will be sprayed and cured. These are located on the left side of the Active Display Window. The layout will look similar to the image below.
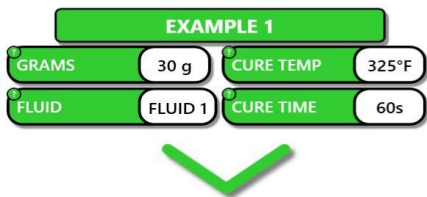
Commonly Changed Spray/Cure Settings

The four settings displayed in the example image are the ones that are most commonly changed. To view all available settings in this Profile, press the green arrow .

All Available Spray/Cure Settings

Notice that there are two columns of settings in this Profile; the left column displays the spray settings and the right displays the cure settings.

Spray Settings:

- **Grams**: The amount of fluid that will be sprayed in grams. The system uses this value to determine how fast the carriage will move during a spray.
- **Fluid**: The fluid that will be sprayed. Since the Synergy Pretreater is a multi-fluid system, this tells the system which fluid to use for a spray.
- **Passes**: The number of times the garment will be sprayed.

Cure Settings:

- **Cure Temp**: The target temperature that the system will try to maintain while a garment is curing.
- **Cure Time**: Amount of time the garment will be exposed to heat while in the dryer
- **Bulb Powers**: The power, represented as a percentage, that each bulb will be set to during garment curing. Press ▶ to show all bulbs. Drag the scroll bar at the bottom to increase/decrease power.
- **Top Air Power**: Power, represented as a percentage, of the top convection fan in the dryer.
- **Bot Air Power ***: Power, represented as a percentage, of the bottom convection fan in the dryer. [see note below]
- **Exhaust Power***: Power, represented as a percentage, for the exhaust fans on the dryer. [see note below]

- **Cooler Power***: Percentage power for the cooler fan at the end of the dryer. [see note below]
- **Control Mode**: The method the dryer will use to maintain the cure temperature.
  - CAM(era): utilizes IR cameras to read the temperature on the garment. This is the default option.
  - ALGO(rithm): uses predictive math to determine the best way to maintain temperature on the garment. Only use if justified by a Brown Representative.

Note: Your system may not have a bottom convection fan, exhaust fan, or cooler. Consult your sales representative if you are unsure.

Spray Area Settings

The Spray Area Profile consists of the settings used to determine where the garment will be sprayed. These settings are located on the right side of the Active Display Window. The layout will look similar to the image below.
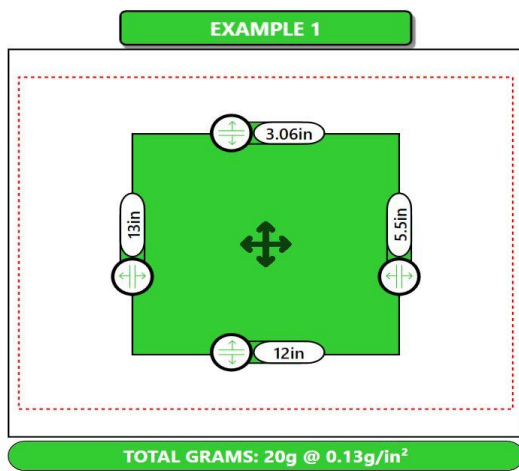
Spray Area Profile

Below the sample image there is a footnote indicating the total grams to be sprayed. This may NOT equal the value that was selected for the "Grams" setting within the Settings Profile. This is because the density is calculated using a fixed spray area. The fixed spray area is defaulted to 234in² (13" x 18"). So when a different spray area is selected (other than 13" x 18"), the calculated density is used to determine the actual amount sprayed (in grams) and how fast the carriage must move to spray that amount.

The sample image is where the spray area and the spray location are chosen. The green box being projected down onto the Pretreater belt mimics the green box in the sample image.

Drag ⊕ and ⊕ on the edges of the box to resize the spray area. Alternatively, manually enter the desired dimensions by pressing the white text boxes next to the resizing icons.

Each side of the spray area box has a text box with a value. Descriptions for these values can be found below (also shown in the image below):
- **Left Side**: the length of the spray area. This value controls how far the carriage will move
- **Bottom Side**: the width of the spray area. The width determines which nozzle to use.
- **Right Side**: displays how close the right edge of the spray area is to reaching the right side Spray Zone Boundary (red dotted-line)
- **Top Side**: displays how close the top edge of the spray area is to reaching the top Spray Zone Boundary (red dotted-line).

The Green box can also be relocated to anywhere within the red boundary. Press ✛ located in the center of the spray box and drag to the desired location. As the box is relocated, the values at the top and right edges of the box will change to reflect the updated distances to the Spray Zone Boundary. The left and bottom values will stay the same since the length and width of the spray area remains unchanged.

If the spray box is greyed out, that means the spray area is deactivated and will NOT spray the garment. This occurs when the user presses anywhere within the green box. Similarly, to reactivate the spray area box, press anywhere within the grey box.

Belt Operations

As mentioned in a previous section, there are three belt controls displayed on the Spray Screen: **START**, **ADVANCE**, and **RETURN**. The controls will look similar to the following image.
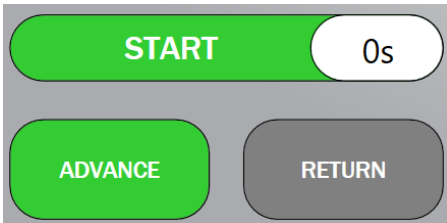
Pretreater Belt Controls on Spray Screen

These settings control how the belt will move and how the system will react to a garment on the belt.

- **Start Button**: Initiates the Pretreatment process for a garment. In Queue Mode, the Active Garment will be removed from the Active Display Window after the Start button is pressed
- **Return Button**: Brings the garment, currently in the Spray Chamber, back to the Load Zone. IMPORTANT: verify that there are not any garments in the Load Zone before pressing this button. Objects loaded on the belt after the button is pressed will be sent backwards towards the operator. This button is most commonly used to check the spray on a garment or to calibrate spray zones.
- **Advance Button**: Indexes the garment without initiating a spray. The advanced garment will use the cure settings that were set at the time the button was pressed. Example uses include:
  - to reposition a garment after the Return button was hit
  - to resend a garment through the Firefly after a failed cure
  - to push the last garment (no garments to follow) through to the Firefly.

Note: if there is not a garment on the belt and the Start/Advance button is pressed, the system will act

as if there was a garment and will still attempt to transfer it accordingly.

These buttons only control the Pretreater belt (belt garments are loaded on). This is because the system will automatically move the other belts in response to the motion of the Pretreater belt. Say there is already a garment occupying the belt position under the Pretreater and another garment is sent/advanced. The system will begin moving the Transfer belt at the same speed so it can accept the incoming garment from the Spray Chamber. Since the Firefly belt moves at a slower pace than the Pretreater belt, the transfer belt acts as a mediator between the different belt speeds.

Now let's say, there is already a garment on the Transfer belt and one in the Spray Chamber awaiting transfer, the Pretreater belt will not advance (after pressing the start/advance button) until the Spray Chamber belt space is available.

Automatic Indexing Timer (Auto Start)

The Auto-Start function automatically indexes the belt after a specified amount of time. The incremented time is chosen by the operator.

There will be a countdown displayed in the projected spray area to notify operators of the remaining time before the next belt index. In some cases, the countdown will be longer than the time selected by the operator. This is because the Transfer belt may not be available to accept an incoming garment. Garment run times vary and are limited by the cure time of the preceding garments. Meaning, even if the Auto-Start timer never changes, the countdown for the next belt index may change if the cure time for a garment [currently] in the dryer is set longer than normal.

To utilize this function, press the number next to the Start button. An onscreen keyboard will appear where the operator can enter the desired time. What happens next is determined by a setting called AUTO START MODE. The options are as follows:

- **STARTFROMLOAD**: the countdown will start the next time the belt stops and the operator is able to load a garment
- **STARTFROMSTART**: the auto-start will not begin until AFTER the operator sends the first shirt
- **STARTFROMENABLED**: the countdown will begin the moment the Start/Advance/Return buttons would normally be enabled (after a spray)
- **STARTFROMQUEUE**: the countdown will start as soon as garment details are pulled into the Active Display Window.

To view or change this setting:

1. Press 🏠
2. Press SETTINGS ⚙
3. At the bottom, press GENERIC

   GENERIC. The tab will turn grey when selected.
4. On the right, locate the AUTO START MODE setting.
5. Select the desired mode from the drop down menu

Reminder: Press the setting "name" to pull up a description of that setting.

The belt will continue to countdown/index until the Auto-Start function is cancelled.

Quick Fluid Feedback
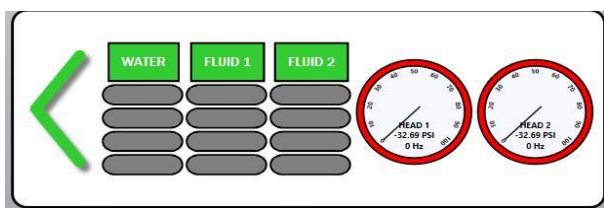
Quick Fluid Feedback Window on the Spray Screen

The tank volumes will only be displayed if your Synergy is connected to a Synergy Lower Cabinet (typically pushed underneath the Pretreater frame). If your Synergy is connected to a Central Source, the tank values will not be available.

Note: if you are unsure which source your Synergy is receiving fluid from, contact your sales representative for more information.

If a tank illustration turns red, that means the tank is running low/empty and needs to be refilled. After the tank is refilled, the system will automatically remind the user to bleed the pump associated with that tank. If the pump is not bled, it will trigger multiple Errors/Alerts and may cause patchy sprays on garments.
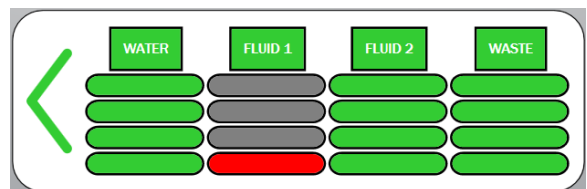
Tank Illustrations Showing Low Tank Level

Next to the tank levels are two pressure gauges. These are the current pressure readings for Spray Heads 1 and 2. The purpose of these is to alert the operator when there is low pressure. Low pressure can cause a lower spray density. In other words, the actual amount sprayed will be less than the expected amount.

Camera Display Window

The Synergy comes with a camera attached to the back of the Pretreater (see image).
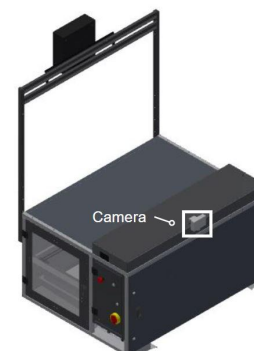
Back Side of Synergy Indicating Camera

This allows the operator to view transfers and garments entering the FireFly. To open the Camera Window, press the Camera Icon 📷 in the

Navigation Bar. Similarly, press the icon again to close the window. To move the window to a different location on the screen, press and drag the green title bar located at the top of the window. The window can be resized by pressing in the bottom, right corner of the window and dragging it to the desired size.

FireFly Feedback Window

To view the current settings that the Firefly is using to cure garments, press the Firefly device icon located in the Navigation Bar at the top of the screen. The window that appears will look similar to the one below.

Firefly Feedback Window

The Firefly Feedback Window is color coded to match the lane settings displayed in the Firefly Software (software on Firefly Kiosk/Pedestal). The following image shows the lane settings in the Firefly Software and the Firefly Feedback Windows in the Synergy Software.
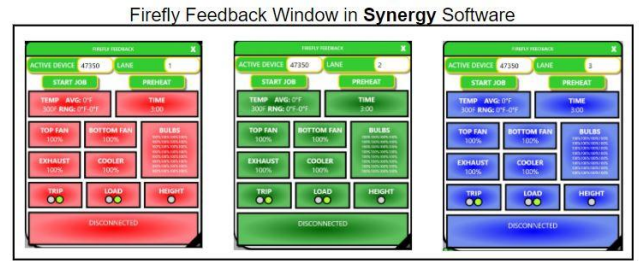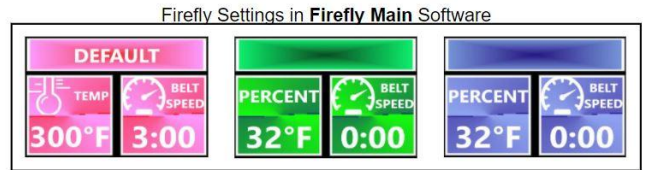
Firefly Software and Synergy Feedback Window Comparison

The initial color of the Firefly Feedback Window (when it is first opened) indicates which lane the Pretreater is connected to. If the operator wants to see the current settings for a different Firefly lane, they can press the white area next to LANE and select the desired lane from the drop down menu. The color of the Feedback window will change accordingly.

The buttons below the LANE selection are as follows:
- **Start job**: sends a command to the Firefly to start moving the belt and attempting to cure incoming pallets.
- **Preheat**: sends the command to the Firefly to start prewarming if necessary.
- **Show Errors**: Shows any errors that are displayed on the Firefly. The button will only appear if there are errors to display.

The remaining details on the Feedback Window are the current settings of the Firefly. These settings include the following:
- **Cure Temperature**: contains the average temperature and the temperature range of the dryer
- **Cure Time**: indicates how fast the belt is currently moving
- **Bulb Percentages**: the power, represented as a percentage, for each individual bulb during the curing process.

- **Trip Sensor Indicators**: when the sensors detect a product, the displayed circle(s) will turn green.

The text at the bottom of the Firefly Feedback window represents the state of the Firefly and could display any of the following:

- **Belt stopped**: Belt has stopped moving
- **Job stopped**: Firefly is not actively attempting to cure or move the belt
- **Objects in Chamber**: Sensors on the Firefly have detected objects entering the dryer that have not yet exited
- **Camera Disconnected**: A camera in the Drone is not connecting
- **Prewarming Xs**: Dryer is currently prewarming with X seconds left
- **Connected**: Firefly is currently connected and communicating
- **Preheat State X**: Displays the current preheat state where X will be one of the following:
  - **Cold**: The dryer has been inactive for a sufficient amount of time to justify a full prewarm cycle
  - **Warming From Cold**: Prewarm State
  - **Warming From Warm**: Prewarm State
  - **Hot**: Is the active state
  - **Warm**: Is a passive state between hot and cooling
  - **Cooling**: Is a passive state between warm and cold

To close the Firefly Feedback Window press the Firefly Icon again. To move the window to somewhere else on the screen press and drag the title bar at the top of the window. The window can be resized by dragging on the bottom right corner of the window.

The Firefly device icon can be used to quickly check the status of the Firefly. The icon will be one of three colors:

The Firefly is operating normally and waiting for garments to enter

Garments are currently being cured

The Firefly is experiencing an error or is disconnected from the Synergy

Network Status

In the top right corner of the screen there is that could be one of three colors: green, yellow, or red.

When the icon is green it means that the machine is connected to the internet.

When it is yellow, it means that the machine is only connected locally, but there is no internet access. When it is red, the machine is disconnected from the network.

Maintenance Screen

The Maintenance Screen is designed to reduce the amount of time lost to preventative maintenance tasks. For more information about the required maintenance activities and instructions on how to perform each one, refer to the **Synergy Maintenance Manual**. Some of the required maintenance activities can be automated through this screen. This includes idle/power down Carriage flushes (with the option of using cleaning solution or water), full line flushes, and pump bleeds.

It is understood that some maintenance activities cannot be automatically performed by the system. With that being said, there are additional features offered in the software's Maintenance Screen that will alleviate the time spent on difficult tasks.

Any maintenance activities (both manual and automated) performed using the Maintenance software will be recorded for future reference.

These logs can be beneficial for:

- Production managers who want to verify that a task has been completed
- Users who are determining when a task is due for maintenance. This would include tasks that need to be performed weekly-monthly
- Users trying to determine which maintenance activities still need to be performed. This would include tasks that can be performed at either startup or shutdown.

The Maintenance Screen and its features can be found by:

1. Pressing 🏠
2. Pressing MAINTENANCE 🔧

After pressing the MAINTENANCE icon, the user will be redirected to a screen that looks similar to the one shown below.
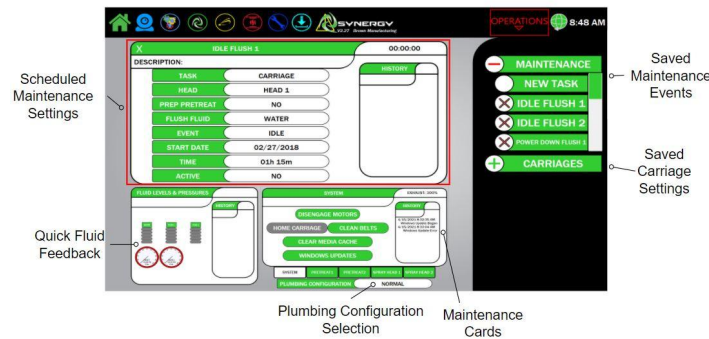
Maintenance Screen

There are three display windows and an option bar shown on the left side of the screen:

- **Task Card**: The top display window that allows the user to customize tasks and save/adjust spray nozzle settings
- **Quick Fluid Feedback**: The bottom, left display window that shows the current source tank volumes and spray head pressures
- **Maintenance Cards**: The window directly right of the Quick Fluid Feedback that displays a variety of controls for the user's convenience
- **Plumbing Configuration**: option bar, displayed below the Maintenance cards,

that allows the user to select how fluid will be directed through the lines.

All of these features are designed to not only help the user save time, but to increase the efficiency and performance of the Synergy system.

Maintenance Cards

Collectively, the Maintenance Cards contain all of the controls the user will need to complete the software assisted Maintenance activities. Because of the Synergy's complexity, the controls are broken down into five categories: System, Pretreat 1, Pretreat 2, Spray Head 1, and Spray Head 2.
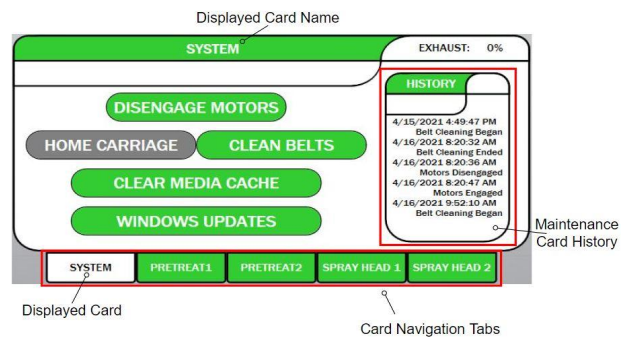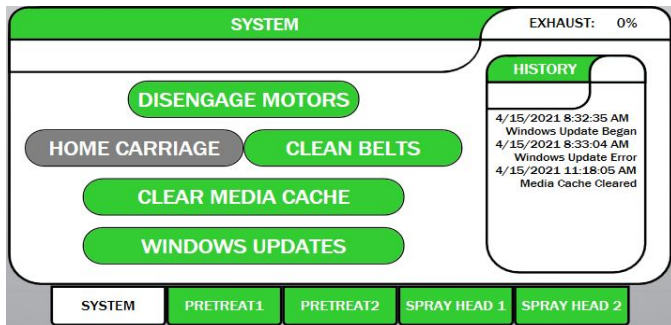

Maintenance Cards

The options available for each card can only be viewed one at a time. Use the tabs located below the displayed card to switch between cards. The white tab indicates which card is currently being displayed. To avoid any confusion, the card name will also be shown in the title bar at the top of each card. Along with the available controls on each card, will be a HISTORY section displaying the date, time, and status of the previous operations. The status of past operations includes when a specified control was initiated, completed, or experienced any errors. See the image above for the locations of the tabs, displayed card name, and card history.

The Maintenance Cards can also be pulled up from any screen using the Maintenance Icon 🔧 located in the Navigation Bar at the top of the screen. A window will appear showing the same display as the one shown on the Maintenance Screen. Press and drag the bottom, right corner of the window to

resize it. Relocate the window by pressing and dragging the title bar.

Tab 1: System Maintenance Card

The System Maintenance Card contains the mechanical and software related controls. When the System Card is being displayed, it will look similar to the one below.

System Maintenance Card

The controls on this card include:
- Exhaust Power
- Disengage Motors
- Home Carriage
- Clean Belts
- Clear Media Cache
- Windows Updates

Exhaust Control

The exhaust option controls the power of the exhaust fan (above the Spray Chamber). This control is located in the top, right corner of the System Card. To alter the current power, simply press where it says EXHAUST on the card and enter the desired value. Since the power is represented as a percentage, setting it to 0% will turn the exhaust OFF and 100% turns the fan on at full power.

Disengage Motors

The Disengage Motors button will release all Pretreater motors from their locked position. To explain this, think about how a car motor functions. Say a car is parked on a hill. It will not roll backwards because the motor is "engaged". Now say a car is on a hill in the neutral position (no

brakes). The car will start rolling backwards because the motor is "disengaged".
When the user presses the Disengage Motors button on the card, the user will be able to manually move the belt.

Note: when the motors are disengaged, all current belt operations will stop.

This is beneficial for machine maintenance and troubleshooting. Examples include:
- Pretreater/Transfer belt cleaning
- Carriage belt/drive shaft cleaning
- Manually relocating the Carriage
  - Returning the Carriage to the home position
  - Testing the homing sensor after a failed homing attempt
  - Calibrating the nozzles
    - Motors are disengaged automatically during calibration, but some users prefer to take extra caution.
- Technician safety
  - Performing all activities listed above
  - Replacing a motor, belt, encoder (Carriage), drive shaft, etc.

Notice that after the button is pressed, it will change from [DISENGAGE MOTORS] to [ENGAGE MOTORS] . To give control of the motors back to the System, press [ENGAGE MOTORS] .

Index/Home Carriage

This button changes depending on the current location of the Carriage. If the Carriage is at the home position, the button will say INDEX CARRIAGE. When pressed, the system will index the Carriage 10" from the home position. Alternatively, if the Carriage is away from home, it will say HOME CARRIAGE. When pressed, the system will initiate a homing sequence.

Clean Belts

When the Clean Belts button is pressed, the system will initiate a belt cleaning sequence. All

belts will start moving at the set speed. This control is fully customizable allowing the user to select the values for the following settings:

- **Cleaning Velocity**: will set the velocity of the belts during the belt cleaning sequence. All belts will move at the same speed (with the exception of the carriage).
  - Default speed = 5 in/s

- **Cleaning Auto-Spray**: when activated (✓), the Carriage will sweep back and forth while simultaneously spraying water onto the belt [when the Clean Belts button is pressed].
- **Cleaning Spray Head**: determines which Spray Head is used during the belt cleaning sequence. This will also act as a Spray Head flush, so it would be beneficial to select BOTH.
- **Cleaning Spray Velocity**: sets the velocity of the Carriage during a belt cleaning sequence
  - Default speed = 15 in/s
- **Cleaning Spray Front**: sets the front boundary of Carriage movement during a belt cleaning. "Front boundary" refers to how close the carriage is allowed to get to the Spray Chamber door.
  - This value is usually set between 5"-25"
- **Cleaning Spray Back**: sets the back boundary of Carriage movement during a belt cleaning. "Back boundary" is how close the carriage can get to the drive shaft side of the Pretreater.
  - This is usually set between 25"-35"
- **Cleaning Timeout**: sets how long the belt sequence will last.
  - If set to 0s, it will continue until the user tells it to stop.

To view or edit these settings:

1. Press 🏠
2. Press SETTINGS ⚙️
3. At the bottom, press BELTS [BELTS]. The tab will turn grey when selected.

4. These settings will be on the left side of the screen, under the header BELT CLEANING

After the user presses [CLEAN BELTS] , that button will then switch to [STOP CLEAN BELTS] , which the user can press to cancel the belt cleaning sequence.

Clear Media Cache

This operation clears the stored images that are collected from the garments scanned into Queue Mode. This would be used if a garment image failed to load after being scanned.

Windows Updates

In order for the Synergy software to function properly, the computer itself must be functioning correctly. Windows is constantly releasing updates to improve their system's functionality, which allows the Synergy software to evolve with it. That being said, to benefit from the Synergy's improvement, the computer has to be capable of running it. The Windows Update button not only acts as a reminder to users, but also makes Windows updates less of a hassle.

Tabs 2-3: Pretreat Maintenance Cards

Before the Synergy can perform a spray, it must first obtain the fluid that will be used to spray a garment. The Pretreat 1 and Pretreat 2 Maintenance Cards respectively control the mixing operations for the two pretreat lines.

Note: if your Pretreater is connected to a Central Source, these cards can be disregarded. The Central Source is controlled using a different software. These cards are intended for machines connected to a Synergy Lower Cabinet, which is the wheeled cabinet that is typically pushed under the Pretreater frame.

Use the tabs on the bottom to display the controls available for the desired Pretreat line. The card displayed will look similar to the one shown below.
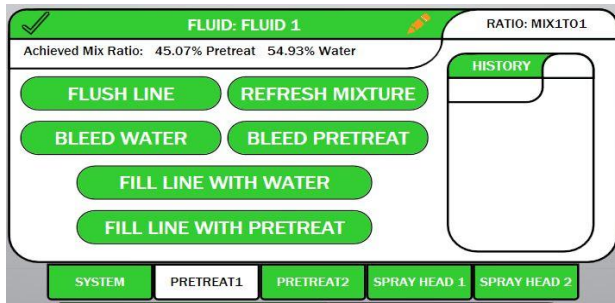
Pretreat 1 Maintenance Card

As implied by the card names, the Synergy is capable of spraying two different types of pretreat. To help users distinguish between which pretreat is carried in which line, the Pretreat Maintenance Cards allow the user to rename each fluid. When the machine is first installed, the names will be defaulted to FLUID 1 and FLUID 2. These are the options that appear when selecting a fluid type on the Spray Screen. To rename a fluid, click on the name displayed in the title bar at the top of the card.

These cards also allow the operator to disable a line, which prevents further mixing and spraying with that fluid. Typically, a line would be disabled:
- if a critical component used to mix/spray a fluid has failed.
- to prevent automated fluid operations when maintenance is being performed on a plumbing line.
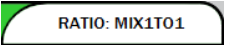
To disable the fluid line, press ✓ in the top, left corner of the card to change it to ✗. Similarly, to re-enable a line, press ✗ to change it to ✓. When a line is disabled, the text on the control buttons will turn to grey indicating that they are unavailable to the user.

The controls available on these two cards include:
- Mix Ratio (if applicable)
- Flush Line
- Refresh Mixture (if applicable)
- Bleed Water
- Bleed Pretreat
- Fill Line with Water
- Fill Line with Pretreat

Mix Ratio

This operation allows the user to select the Desired Mix Ratio for a Pretreat line. To change the Desired Mix Ratio, press on the current ratio in the top right corner of the maintenance card . A drop down menu will appear displaying the available options in a ratio format. Press on the desired option to select it. For users who are purchasing Pretreat pre-mixed, select MIX1TO0.

Note: a ratio can be described as the relationship between two numbers showing how much bigger one is than the other. In this case it is the amount of pretreat compared to the amount of water in a solution. So a 1 TO 1 ratio means for every 1 part of pretreat there is 1 part water.

Also displayed on the card will be the Achieved Mix Ratio in the form of percentages. This can be found below the title bar and is the actual ratio that was achieved during the previous mix. The user can reference this if there is a system error that reports the Mix Ratio is off.

Note: The Achieved Mix Ratio is represented as a percentage. In the example used in the previous note, there are 2 parts total (1 part pretreat and 1 part water) so that means there is 50% pretreat (1 part pretreat/2 parts total) and 50% water.

Flush Line

A flush is when a specified component is drained and then rinsed with water in an attempt to remove/prevent clogs. In this case, the entire line will be flushed. The system will have to perform multiple cycles to accomplish this. The first part involves draining the pretreat out of the mixing tank. Then it will begin rinsing out the line by pushing water through the lines and out of the nozzles. When the system finishes, it will perform another mix to fill the lines with freshly mixed pretreat. This should be done on a weekly basis and can be set up as an automated task performed by the system. Scheduling and editing Maintenance Tasks will be explained later in the document.

Refresh Mixture

When this button is pressed, the system will empty the contents in the mixing tank by pushing it out of the spray nozzles. When empty, the system will refill the mixing tank according to the Desired Mix Ratio. Typically used:
- after selecting a different Desired Mix Ratio
- after the system alerts the user that the Achieved Mix Ratio is off

Bleed Water

This control will initiate a bleed cycle on the water line. The purpose of this operation is to remove any air from the line. The pump will be turned on at full power, the water source valve will open, and the water bleed valve will open. During this time, water will be pulled up from the source tank, run through the pump, then be pushed back into the source tank. The system will continue this cycle for two minutes and then the pump will stop. If the bleed cycle stops before the two minutes, it could be an indication of a valve failure (typically one that is not closing).

The four Maintenance Cards consisting of fluid controls (Pretreat 1, Pretreat 2, Spray Head 1, Spray Head 2) will all have at least one pump that will need to be bled. This operation is REQUIRED if there is any air in the lines. This includes after replacing/refilling a tank and emptying a plumbing line for maintenance purposes. Failure to bleed a pump will result in problems that could potentially shutdown production of one or both of the Synergy plumbing lines. **This action will NOT waste pretreat.**

Bleed Pretreat

When this button is pressed, the system will run fluid through the Pretreat Mixing Pump (for this line) for two minutes in attempts to rid the line of air. During this time, liquid will be pulled from the source tank, run through the pump, and then be pushed back into the source tank.

As a reminder this should be done whenever there is air in the line including after replacing a tank or

emptying a line for maintenance. **This does not waste any fluid**. If this sequence stops early, it could be an indication that a valve is not closing when it is supposed to.

Fill Line with Water

When pressed, the system will fill the Pretreat Fluid Line with water. This includes the Pretreat Mixing Pump, Mixing Tank, and the current Spray Head assigned to spray this fluid. It is advised that this is performed before leaving a machine unused for more than a day.

Remembering to refill the lines with pretreat after an idle period can be a difficult task. That is why the system was programmed to keep track of the water-filled lines and will not allow the operator to spray until the lines have been refilled with pretreat.
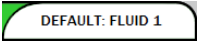
Fill Line with Pretreat

When this button is pressed, the system will fill the Pretreat Fluid Line with mixed pretreat. During this operation, the pumps for this line will automatically be primed and bled. After the system has finished prepping the fluid line with pretreat, the operator can return to the Spray Screen and begin sending garments.

Tabs 4-5: Spray Head Maintenance Cards

Notice that there are two tubes that plug into the Carriage (inside the Spray Chamber). Each line has a separate nozzle set, which consists of a 6", 12", and an 18" nozzle. Spray Head 1 is the line that runs to Nozzles 1, 2, and 3. Spray Head 2 is the line that runs to Nozzles 4, 5, and 6. The control for a specific Spray Head can be displayed by pressing the corresponding maintenance tab. When one is selected, the displayed Maintenance Card will look similar to the one shown below.
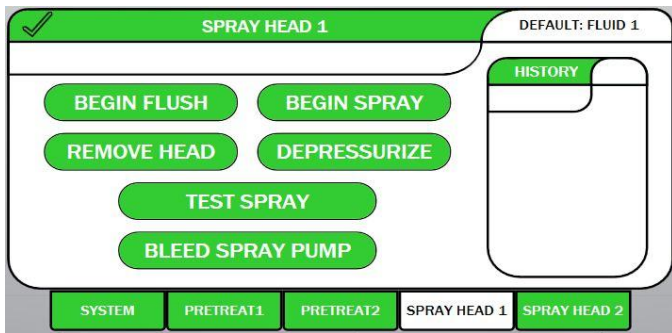
Spray Head 1 Maintenance Card

The fluid that is sprayed out of each Spray Head depends on which fluid is selected as the DEFAULT fluid (top, right corner of the card). This can be changed by pressing [DEFAULT: FLUID 1] and selecting the desired fluid from the drop down list.

Similar to the Pretreat Maintenance Cards, the icon in the top, left corner of the card indicates if the Spray Head is active (✓) or disabled (✗). A line can be disabled/enabled by pressing on the currently displayed icon. A Spray Head would be disabled if one of the valves inside the Carriage fails or if maintenance is being performed on the Spray Head plumbing.

The available controls on the Spray Head Maintenance Cards includes:
- Begin Flush
- Begin Spray
- Remove Head
- Depressurize
- Test Spray
- Bleed Spray Pump

Begin Flush

When a Spray Head flush is initiated, the system will begin spraying water/cleaning solution out of the associated Spray Head nozzles. As a reminder, there are three nozzles per Spray Head; meaning, only three will spray during this operation. Once the Begin Flush button is pressed, a message will appear asking the user to select the fluid that the system will use to flush. The options are:
- Water
- Cleaning Solution

- Cancel: will return the user to the maintenance screen without initiating a flush

Ater a fluid is selected, the flush sequence will be initiated and the [BEGIN FLUSH] will switch to [STOP FLUSH]. The user can press [STOP FLUSH] to close the nozzles and the system will revert to back to the previous spray configuration. Note that water will still remain in the head, but can be removed using the Begin Spray control.

Begin/Stop Spray

Configures the system to push the default fluid through the nozzles associated with this Spray Head, and begins spraying. After [BEGIN SPRAY] is pressed, it will immediately switch to [STOP SPRAY]. Use the Stop Spray button to close the nozzles. This function can be used after the Begin Flush to push the remaining water out of the Spray Head.

Remove Head

When this is pressed, the system will begin prepping the Carriage for removal. During this time, both Heads in the Carriage fill with Water and the Carriage is depressurized. This operation is the same regardless of which **Spray Head Maintenance Card** is it initiated on.

Depressurize

This operation depressurizes the Carriage by closing all valves in the Valve Cabinet and opening all nozzles. The manual valves inside the Valve Cabinet (may also be located just outside the Valve Cabinet) will need to be closed before the system can be depressurized.

Lines have to be depressurized if maintenance needs to be performed on the plumbing inside the Valve Cabinet. Failure to do so will result in fluid being pushed out of the disconnected tube and the pump will continue pushing liquid out until it is turned off. Pressing this button allows the user to operate on a line while minimizing the amount of pretreat lost. Keep in mind that some liquid will still come out of the tube when it is disconnected, so it

is recommended that towels/rags be placed under the connection to catch excess liquid. Also, the user should wear gloves when operating on plumbing lines.

Note: Do not disconnect the tubes that run from the Synergy Lower Cabinet/Central Source to the manual valves. Only one side of the manual valves will be depressurized and that is the side leading to the nozzles.

After [DEPRESSURIZE] is pressed, the button will change to [PRESSURIZE] . When finished operating on the lines, press the PRESSURIZE button to close the nozzles and allow fluid to refill the lines. Both Spray Heads will be depressurized/repressurized regardless of which **Spray Head Maintenance Card** is it initiated on.

Test Spray

This button allows the user to perform a test spray on the desired Spray Head. Unlike the Begin Spray button, this button will check the valves and pumps in the spray system to identify any failed components.

Bleed Spray Pump

When this button is pressed, the system will initiate a bleed cycle on the corresponding spray pump.

Note: This button can be disregarded if your Pretreater is connected to a Central Source. This button is only intended for machines connected to Synergy Lower Cabinets.

The spray pump for Spray Head 1 is typically pump 3 and for Spray Head 2 it is pump 5 (in the Synergy Lower Cabinet). These are the pumps that pull liquid from their respective mixing tank and push it up to the nozzles. This is done by closing the valves used to spray then opening up a return valve. During this time, liquid will be pulled from the mixing tank, run through the pump, then pushed back into the mixing tank (via return valve). This operation should last two minutes.

If it stops early, this could be an indication that the mixing tank may be reaching the maximum tank level when liquid is pushed back into the tank. There is a setting that can be enabled that will tell the system to briefly spray before a bleed to prevent the mixing tanks from overflowing. This setting can be viewed/changed by:

1. Pressing 🏠
2. Pressing SETTINGS ⚙
3. Click the tab at the bottom that says [PLUMBING] . The tab will be greyed out when it is selected.
4. On the right side, check the box next to SPRAY BEFORE BLEED to activate. Or mark it with an X to disable.

An example of when the spray pump would need to be bled is if mixing tanks ran low (due to empty source tanks).

Plumbing Configuration

At the bottom of the Maintenance Screen, beneath the Maintenance Cards, is the **Plumbing Configuration Selector**. This will automatically apply and display a configuration based on which lines are enabled and what the default fluid is for each Spray Head. If the white box for the Plumbing Configuration is empty, that means the system is not in a known configuration.

The Plumbing Configuration can also be manually selected by pressing in the white area next to the setting and choosing from a list of available options. The configuration options include:
- **Normal**: Both Pretreat fluid lines enabled, Spray Head 1 sprays Fluid 1, Spray Head 2 sprays Fluid 2.
- **Line X Disabled**: [where X is the line that is disabled] This appears when a Pretreat 1 or Pretreat 2 line is disabled (X in top, left corner of the card). Only the specified fluid line is disabled. Everything else remains in "Normal" configuration.

- **All Lines Disabled**: Both Pretreat 1 and Pretreat 2 lines are disabled (X in the top, left corner of the card).
  - Spray Head configurations remain unchanged (Spray Head 1 sprays Fluid 1 and Spray Head 2 sprays Fluid 2)
- **Line X to Nozzle Set Y**: [where X is Pretreat 1 or 2 and Y is Spray Head 1 or 2] Pretreat line X is the only line ENABLED (the other one is disabled). Spray Head Y will spray the specified Pretreat (X) and the other Spray Head will be set to spray water.
- **Flushing Heads**: the DEFAULT fluid will be changed to water for BOTH Spray Heads
  - Pretreat 1 and 2 remain unchanged
- **Flushing Head X**: [where X is either Spray Head 1 or 2] the DEFAULT fluid for Spray Head X will be changed to water.
  - Only the DEFAULT fluid for Spray Head X is changed. The other stays set to spray the "Normal" fluid.
  - Pretreat 1 and 2 remain enabled
- **Flushing Head X (Line Y disabled)**: [where X is Spray Head 1 or 2 and Y is Pretreat 1 or 2] the DEFAULT fluid for Spray Head X will change to water and line Y will be disabled.
  - The other Spray Head and other Pretreat line will remain unchanged

Just as the system automatically updates the configuration when lines are disabled via the Maintenance Cards, the system will automatically disable/enable lines if a configuration is selected using the Plumbing Configuration Selector. For example, if the configuration is set to LINE 1 TO NOZZLE SET 2:

- Pretreat 2 (✖) will be disabled
- DEFAULT fluid for Spray Head 1 will switch to Water
- DEFAULT fluid for Spray Head 2 will change to Fluid 1

Scheduling/Editing Maintenance Events

The Synergy Pretreater can be configured to perform some of the previously described maintenance operations automatically. To do this, the user can use the Task Card to create customized tasks and view/adjust the settings for a saved task.

Each Synergy system will come with pre-scheduled tasks. Typically these tasks include:
- IDLE FLUSH 1
- IDLE FLUSH 2
- POWER DOWN FLUSH 1
- POWER DOWN FLUSH 2.
- WEEKLY FLUSH 1
- WEEKLY FLUSH 2

The reason there are pre-saved events is because the nozzles and carriage valves are often neglected, and the cost to replace a carriage/nozzle outweighs the cost of the time lost to a carriage flush. It is in your best interest to keep these events activated (✔) and to allow them to run without prompting the user (to avoid skipped events). To tell the system whether to prompt the user or trigger a task automatically:
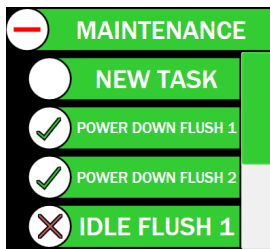
1. Press 🏠
2. Press SETTINGS ⚙
3. Click the tab at the bottom that says GENERIC . The tab will be greyed out when it is selected.
4. On the left, there are three maintenance settings that can be activated by marking the white box next to the desired setting with a ✔
   a. **POWER DOWN PROMPT**: when enabled, allows the system to run power down tasks automatically.
   b. **POWER ON PROMPT**: when enabled, allows the system to run power on tasks automatically

22

c. **SCHEDULED MAINTENANCE ON EXIT**: when enabled, power down tasks will be triggered anytime the user exits/restarts the software

These tasks can be edited; however, Brown Manufacturing strongly advises against increasing the idle countdown (TIME setting for an idle flush event) or reducing the FREQUENCY of any pre-saved events.

Loading a Saved Task

1. Locate the MAINTENANCE category header on the right side of the Maintenance Screen
2. Expand that category by pressing
3. A list of all the saved maintenance events will appear similar to the one shown below. Locate the name of the task you would like to view. Use the scroll bar to the right of the list to scroll down to other options.


Maintenance Category List

4. Press on the event name
5. The saved details of that event will populate the Task Card (top, left display window)

Additional symbols that the user may see when viewing a category list (saved tasks on the right side of the screen) include:

- **+** : [Expand] Press this to expand a category
- **▬** : [Minimize] Press this to minimize the list under a category header
- : [Inactive] will appear next to a saved task name and indicates that the task is inactive. Press the X to activate the task (bubble will change to show a checkmark)

- : [Active] will appear next to a saved task name and indicates that the task is active. Press the checkmark to change the status to inactive (bubble will change to show X)

When a task is loaded, past activity (if any) will appear in the box within the Task Card titled HISTORY. Activity will be displayed with the date, time, and status of the task. The status reports when the task was initiated, completed, or experienced an error (see example below)
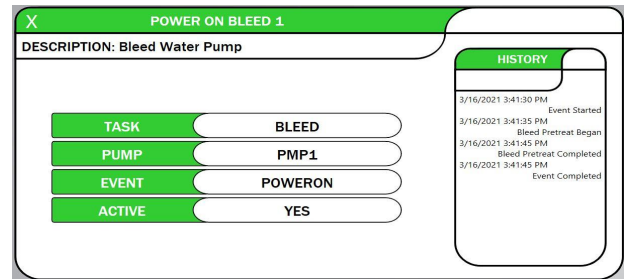
Task Card Showing Past History

If there is a specific time that the loaded task will run, a countdown timer will be displayed in the top, right corner of the Task Card. This timer will be displayed in the format Hours:Minutes:Seconds and indicates the time left until the task is initiated.

Creating a Task
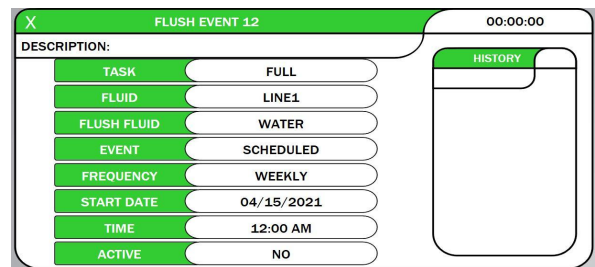
Example Task Card

1. Expand the Maintenance Category Header and press the option from the list that says **NEW TASK**
2. A new task will be created with a system generated name and automatically be added to the bottom of the Maintenance Task List.

    a. The generated name will be generic like "FLUSH EVENT" with an incremented number

3. Change the available settings as desired.
    a. Note that the settings displayed may change after selecting a different TASK or EVENT

4. [Optional] Rename the task by pressing on the green title bar at the top of the Task Card.

5. [Optional] Enter a short description for the task by pressing anywhere in the bar that says DESCRIPTION

Note: descriptions for each task setting can be found in a later section called " Maintenance Task Settings".

Editing a Saved Task

1. Load the desired saved task from the Category List
2. Verify the correct task is loaded by checking the name in the title bar of the Task Card
3. Change the settings as necessary

Settings that determine WHAT will happen when the event starts may save automatically because these are not items that are commonly changed. This includes settings such as:

- Task Name
- TASK
- FLUID
- FLUSH FLUID
- PREP PRETREAT

Changes to settings that determine WHEN a task will happen (or if they happen) will trigger a prompt asking the user to save or cancel (revert). This includes settings such as:

- EVENT
- FREQUENCY
- START DATE
- TIME
- ACTIVE

When a task is switched to Active (from either the Task Card or by checking the bubble next to the task name in the Category List), a message will appear telling the user when the next task will be initiated and prompting the user to continue or to cancel.

Deleting a Saved Task

1. Load the desired saved task from the Category List
2. Verify the correct task is loaded by checking the name in the title bar of the Task Card.
3. Press located in the top, left corner of the Task Card
4. A confirmation message will appear asking the user to CONTINUE or CANCEL. This is to prevent accidental deletion.

Maintenance Task Settings

- **Task**: The maintenance operation to be performed by this task. These tasks allow the user to automate some of the operations described in the **Maintenance Cards** section.
    - **Full**: This allows the user to automate the FLUSH LINE operation, which was previously described in "Tabs 2-3: Pretreat Maintenance Cards"
    - **Fill With Water**: Automatically performs a FILL LINE WITH WATER operation on the indicated fluid line. Described in "Tabs 2-3: Pretreat Maintenance Cards"
    - **Fill With Pretreat**: The system will automatically perform a FILL LINE WITH PRETREAT operation on the indicated fluid line. Described in "Tabs 2-3: Pretreat Maintenance Cards"
    - **Carriage**: Automates the BEGIN FLUSH operation that was described in "Tabs 4-5: Spray Head Maintenance Cards". The amount of time that the carriage will flush for is determined by the CARRIAGE FLUSH TIME settings (Located in SETTINGS → PLUMBING tab)

- **Fluid/Head**: The Fluid Line/Spray Head to perform the task on
- **Event**: The event that triggers the indicated Task. Available options include:
  - **Scheduled**: a task that is pre-planned to occur based on a set date, time, and frequency of recurrence (ie Every Friday at noon, or every Thursday before Black Friday at 6PM).
  - **Power Down**: Performs the task before the machine powers down. The system may or may not prompt the user depending on the enabled setting (explained earlier in the section)
  - **Power On**: Performs the task after the machine powers on. The system may or may not prompt the user depending on the enabled setting (explained earlier in the section)
  - **Garment Count**: Performs the task every specified number of sprays (ie. every 500 garments). The counter for these events are maintained separately for each task and is preserved between power downs.
  - **Idle**: Performs the task if the machine has not sprayed a garment for a fixed amount of time (ie. after 1 hour of inactivity).
- **Frequency**: Associated with Scheduled Events. Determines the amount of time that will pass before a task reoccurs.
  - **Every**: Runs the task every fixed amount of time (ie every 2 hours).
  - **Daily**: Runs the task at a specific time every day (ie every day at 3PM).
  - **Weekly**: Runs the task on a specific day of the week at the specified time (ie every Friday at noon). The day of the week is indicated by the **Start Date**.
  - **Monthly**: Runs the task on a specific day of the month at a specified time (ie on the 3rd of every month at

10AM). The day of the month is determined by the Start Date.
  - **Yearly**: Runs the task on a specific day of the year at a specified time. The day of the year is selected based on the chosen Start Date.
- **Start Date**: Associated with Scheduled Tasks and Idle Tasks. Tells the system when to initiate a task for the first time. This also determines when the task will be repeated.
- **Time**: Associated with Scheduled Tasks and Idle Tasks. For scheduled tasks, it is the time a task will start. For idle tasks, it is the timer for how long the machine must sit idle before a task is triggered.
- **Garments**: The number of garments that should be processed before this task runs.
- **Active**: determines whether the system will initiate a task or not. If the task is active, the system will automatically perform the task based on its event settings. If not, the task will not occur.

Saving/Editing Carriage Settings
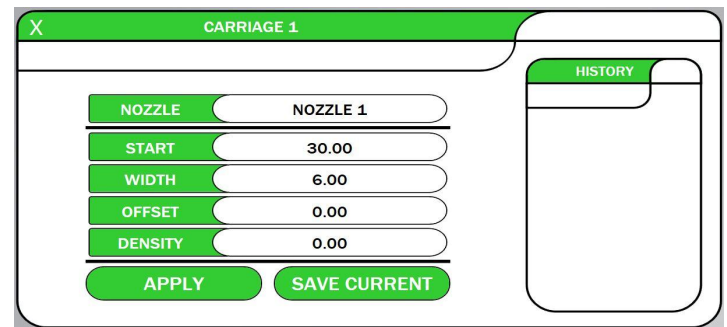
Task Card Showing Carriage Settings

Each nozzle has its own group of settings that is used to tell the system where the pretreat needs to be sprayed and how fast the carriage needs to move to reach the desired amount. There are primarily four settings used to determine this and they are:
- **Start**: helps the system position the garment under the correct spray nozzle. This is achieved by telling the Pretreater belt the distance it needs to travel. This

value is calculated based on the responses during Spray Zone Calibration

- **Width**: determines which spray nozzle to use. As mentioned before, there are three different nozzles: 6", 12", and 18". These values represent the spray area width and these settings should never change. The width for each nozzle are as follows:
  - Nozzle 1: 6"
  - Nozzle 2: 12"
  - Nozzle 3: 18"
  - Nozzle 4: 6"
  - Nozzle 5: 12"
  - Nozzle 6: 18"
- **Offset**: the distance the carriage has to move to cover the entire length of the garment's spray area. This value was calculated from the responses during the Spray Zone Calibration
- **Density**: helps the system determine how fast to move the carriage to achieve the desired spray amount. This value was calculated based on the responses during the Nozzle Calibration.

The Carriage maintenance feature allows users to save or edit the current spray settings for each nozzle. The purpose of this feature is to keep track of any changes to the spray area, overwrite inaccurate spray settings, or allow users to manually calibrate the spray area.

To save current Carriage settings:
1. Locate the CARRIAGE category header [⊕ CARRIAGES] on the right side of the Maintenance Screen
2. Expand that category by pressing ✚
3. Press on the option below the header that says NEW CARRIAGE
4. The Maintenance Task Window will switch to show the Carriage settings and a new Carriage will be added to the bottom of the Carriage Category List.
   a. The new Carriage will be given a generic name like Carriage and then an incremented number

5. Press [SAVE CURRENT] and the current nozzle settings will populate the display window.
6. The settings will be saved automatically
7. Press the title bar to rename the Carriage settings

To view saved Carriage Settings:
1. Locate the CARRIAGE category header [⊕ CARRIAGES] on the right side of the Maintenance Screen
2. Expand that category by pressing ✚
3. Press on the name of the saved Carriage settings to view them
4. The saved settings will populate the Maintenance Task Window.
   a. To confirm the correct settings were loaded, check the name displayed in the title bar
5. To view the settings for a different nozzle, press the white space next to NOZZLE and select the desired nozzle from the drop down.

Edit saved Carriage settings by:
1. Pressing on the name of the saved Carriage settings from the Carriage Category List
2. Select the desired nozzle from the drop down menu
3. Change the settings as necessary
   a. Do not change the WIDTH of any of the nozzles
   b. Increasing Start moves the spray area towards the operator
   c. Decreasing Start moves the spray area away from the operator
   d. Increasing Offset moves the spray area away from the Spray Chamber door
   e. Decreasing Offset moves the spray area towards the Spray Chamber door
4. The values will automatically save when changed
5. To apply these settings to the current settings, press [APPLY]

a. The user will be prompted to confirm overwriting the current settings. Press OK to confirm or CANCEL to return to the Maintenance Screen without saving

Calibrations

The Synergy will experience normal wear and tear over time. Preventative maintenance prolongs the life of the Synergy components, but component failure is inevitable. This screen allows the user to painlessly replace components and can even help diagnose issues. The calibrations are split into three categories: Factory Calibrations, Field Calibrations, and Diagnostic.

First the user must navigate to the Calibration Screen by using the following instructions:

1. Press 🏠
2. Press CALIBRATIONS ☑

The Calibration Screen will look similar to the one shown below.

Calibration Screen

The user will rarely interact with the options listed under Factory Calibrations after machine installation. These are used when a machine is first built, if a primary component needs to be replaced, or if a software configuration file gets corrupted.

The calibration options that the user may interact with include:

- **Calibrate ZMAIN131**: often referred to as the Spray Board and is located in the control panel that sits above the Valve Cabinet. This circuit board controls the pressure transducers, valves in the Valve Cabinet, overtravel sensors, Carriage motor encoder, Pretreater status LED.
  - May need to be performed if the board is replaced, pressure transducer is replaced, or if the software settings got corrupted.
- **Calibrate Source Tanks**: This only applies to machines hooked up to a Synergy Lower Cabinet (ignore if connected to Central Source). This is how the system identifies how much liquid is in the tank. This may need to be performed if one of the circuit boards in the Lower Cabinet is replaced or if the software settings get corrupted.
- **Calibrate Projector**: It is essential that the garment is positioned correctly for smooth belt transfers and accurate spray application. Anytime the projector is physically moved (or replaced), it will need to be recalibrated. This is also how users can move the projected box.
- **Calibrate Belts**: tells the software Pretreater/Transfer/Firefly belt lengths, the Firefly lane the Synergy is connected to, amount of bulbs in the Synergy Drone, etc.. This will rarely, if ever, need to be calibrated.
- **Calibrate Carriage**: this is where the overtravel sensors, homing sensors, and encoder are evaluated.
  - May need to be performed if any of the following are replaced: motor, overtravel/homing sensor, drive shaft, encoder, ZMAIN131, Teknic Hub, Carriage belt. This may also need to be calibrated after a software file corruption.

The Field Calibrations are what the user will interact with the most. This is where the nozzles and the spray area are calibrated. Both will need to

be performed after a carriage replacement. Additionally, nozzle calibration will need to be performed after nozzles are replaced.

The nozzle calibration allows the system to determine the "spray density" for each nozzle. As mentioned earlier, this value determines how fast the carriage will move during a spray.

The spray area calibration helps the system determine the distance the carriage has to move and the distance the Pretreater belt has to move. This calibration requires the user to measure the distances specified in the calibration instructions and type those measurements into the corresponding locations. The software will calculate how far to shift the spray area. Note that this is different from the procedure used to manually shift the spray area via SETTINGS or MAINTENANCE.

The last available calibration is under the Diagnostic category and it is called Valve Mappings. This can be used if the user is trying to troubleshoot a valve related issue, but does not have another person available to open/close the valves from the Diagnostics Screen. Simply select the desired valve from the drop down menu and the system will continuously open and close that valve until it is told to stop.
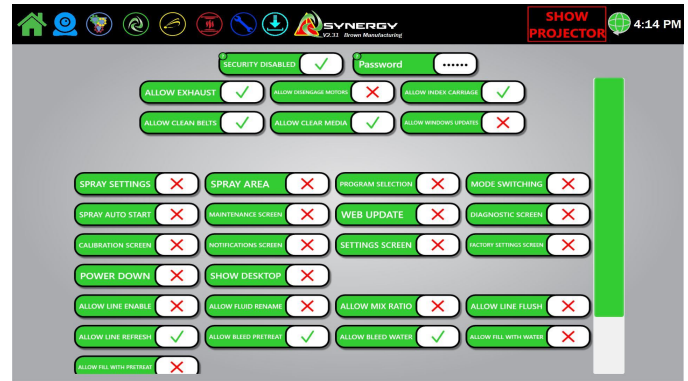
Security

The Synergy provides an optional security feature that will lock specific screens or settings. To activate this feature:

1. Press
2. Press SECURITY

When the SECURITY icon is pressed, a screen will appear that will look similar to the one below.

Security Screen

The user can type in a desired password by pressing in the white space next to PASSWORD. Located below the password selector, are all the features that the user can lock. Use the scroll bar on the right to view additional options. To lock screens, Profile Settings, or the Mode Toggle button, mark the corresponding white box with . Alternatively, mark the box with to leave it unlocked.

To lock Maintenance Card controls, mark the white box for the desired option with .

Note: this is different from locking screens/Profile Settings/Mode Toggle.

After a password is entered, the Security Screen and all the options (not including the Maintenance Card controls) marked with a will automatically lock. When the user exits the Security Screen, will appear on all the selected features. If the user were to press on any of the locked options, a message will appear prompting the user to enter the password. If the wrong password is entered, the user will return to the original screen without being allowed to access the locked feature.

If the password is entered incorrectly or forgotten, the user will need to contact Brown Manufacturing to get the password reset.

Other features found on this screen include:

- **Temporary Disable**: Disables the security system for 1 Hour after being enabled. During this time, all screens and settings will be available to the user without having to provide a password. After the hour has passed, the security system will re-enable automatically.
- **System Maintenance Controls**: Enables security for options available on the System Maintenance Card (using in the Navigation Bar). If any of the options are marked with , that means the system will ALLOW the user to press those buttons. If the option is marked with , the user will NOT be able to press this button. The options available to be locked include:
    - Exhaust
    - Disengage Motors
    - Index Carriage
    - Clean Belts
    - Clear Media
    - Windows Updates
- **Spray Settings**: when locked, the operator will be unable to edit any options within the Settings Profile on the Spray Screen. These spray settings can be unlocked by pressing on the and entering the password. The icon will then change to and the user will be able to edit the values as desired. This includes the settings within a different Settings Profile. To Re-Lock the settings tap on the Unlocked Icon and it will change back to the Lock Icon (without entering a password).
- **Spray Area**: enables security for the Spray Area Profile settings on the Spray Screen. The operator will not be able to change the Spray Area without first pressing on the Lock Icon next to the Spray Area name and entering the password. The locked icon will then change to indicating the settings can be edited. To Re-Lock the Spray Area, tap on the Unlocked Icon.
- **Program Selection**: when enabled, the saved Profiles/Programs in Manual Mode

will be password protected. If the operator attempts to expand a category header, they will be prompted to enter a password. Minimizing categories does NOT require a password.
- **Web Updates**: Enables Security for updating the Synergy Software. When enabled, the user will be prompted to provide a password if the update icon is pressed (icon is located in the Navigation Bar).
- **Mode Switching**: Enables Security for Mode Switching in the Spray Screen. When the operator tries to switch between Queue Mode and Manual Mode, they will be prompted to enter the password
- **Spray Auto Start**: Enables Security for the Auto-Start feature in the **Spray Screen**. A password will be required to change the Auto-Start timer. The operator will still be able to press Start and Pause without needing a password.
- **Navigation Button Locks**: These enable security for the buttons shown on the Navigation Screen. When one of these is locked, the operator will be prompted for a password every time they press on the locked option. The options available to be locked include:
    - Maintenance Screen
    - Calibration Screen
    - Diagnostics Screen
    - Notifications Screen
    - Settings Screen
    - Factory Settings Screen
    - Power Down
    - Show Desktop
- **Pretreat 1 & 2 Maintenance Card Controls**: Enables security for options available on the Pretreat 1 & 2 Maintenance Cards (using in the Navigation Bar). If any of the options are marked with , that means the system will ALLOW the user to

press those buttons. If the option is marked with ✕, the user will NOT be able to press this button. The options available to be locked include:

- ○ Line Enable/Disable (the user will not be able to switch ✓ or ✕ in the top, left corner of the card)
- ○ Fluid Rename
- ○ Mix Ratio selection (top, right corner of the card)
- ○ Line Flush
- ○ Line Refresh
- ○ Bleed Pretreat
- ○ Bleed Water
- ○ Fill Line with Water
- ○ Fill Line with Pretreat

- **Spray Head Maintenance Card Controls**: Enables security for options available on Spray Head 1 & 2 Maintenance Cards (using 🔧 in the Navigation Bar). If any of the options are marked with ✓, that means the system will ALLOW the user to press those buttons. If the option is marked with ✕, the user will NOT be able to press that button. The options available to be locked include:
  - ○ Head Default Fluid (top, right corner of the card)
  - ○ Head Flush
  - ○ Head Spray
  - ○ Remove Head
  - ○ Depressurize/Pressurize Nozzles
  - ○ Test Spray
  - ○ Bleed Spray Pump

Settings

[settings gear icon]

The Settings screen is split into seven tabs: Generic, Base Settings, Plumbing, Plumbing Mapping, Belts, Belt Placement, and Carriage. The settings within this screen are meant to provide some customization. Commonly changed settings are described in more detail below.

- **Load Returned Garment**: [Generic Tab] If checked, then when the operator presses Return on the Spray Screen, the returned garment's settings will replace what is currently displayed in the Active Display Window. In Queue Mode, this means the garment will be added to the top of the queue.
- **Spray Settings Format**: [Base Settings Tab] Determines what control will be used for setting the Carriage speed during a spray.
  - ○ **Fixed Area Grams**: [Most Common] Grams setting will be displayed (in grams), and it will provide a density of the number entered divided by the grams set for the Fixed Area. The system will then use density calculations based on the Spray Area and nozzle spray densities to determine the Carriage speed
  - ○ **Actual Grams**: Grams setting will be displayed (in grams), and it will provide a density of the number entered divided by the active Spray Area. The system will then use density calculations based on the Spray Area and nozzle spray densities to determine the Carriage speed
  - ○ **Density**: Density setting will be displayed (in grams/in^2). The system will then use density calculations based on the Spray Area and nozzle spray densities to determine the Carriage speed
  - ○ **Speed**: Speed setting will be displayed (in in/s) and will directly control how fast the Carriage moves during a spray.
- **Fixed Area For Grams**: [Base Settings Tab] Determines the fixed area to be used in Fixed Area Grams density calculations. The default value is set for a 13" x 18" area (234 in^2). This was the "fixed area" that was

explained in the "Spray Area Settings" section.

- **Display Countdown**: [Generic Tab] If checked, then the countdown will be displayed in the start button. Otherwise, the start button value will remain static and the countdown will only be visible on the load zone.
- **Image Halo Top/Bottom**: [Base Settings Tab] This was mentioned in the "Queue Mode" section. When a garment is scanned into the system, the value set will be added to the top and bottom of the Spray Zone indicated by the scan (ie, if the scanned image has a height of 8" and the value is 0.5", the Spray Area will be 9" tall).
- **Image Halo Left/Right**: [Base Settings Tab] This was mentioned in the "Queue Mode" section. When a garment is scanned into the system, the value set will be added to the left and right of the Spray Zone indicated by the scan (ie, if the scanned image has a width of 8" and the value is 0.5", the Spray Area will be 9" wide).
- **Temperature Unit**: [Generic Tab] The temperature unit that is displayed for the Cure Temperature. Options include Fahrenheit and Celsius.
- **Spray Before Bleed**: [Plumbing Tab] This was briefly mentioned in "Tabs 4-5: Spray Head Maintenance Cards". If checked then the system will decompress the spray pump lines before attempting a bleed. This can be useful if bleeds are stopping early due to mixing tanks approaching overflow. Only a small amount of fluid will be discarded.
- **Carriage Flush Time**: [Plumbing Tab] The amount of time that an Automated Maintenance Task will spend flushing the Carriage. Typically, this time is set between 5 and 20 seconds.
- **Flush Line Iterations**: [Plumbing Tab] Determines the amount of cycles performed to fill the line with water and then the amount to refill the lines with pretreat during a Flush Line operation (control located on the Pretreat Maintenance Cards)

- **Fill Tank Iterations**: [Plumbing Tab] Determines how many cycles will be performed to fill the line with pretreat during a Fill Line with Pretreat operation (control located on the Pretreat Maintenance Cards)
- **Empty Tank Iterations**: [Plumbing Tab] Determines how many cycles the system will perform filling the lines with water during a Fill Line with Water operation (control located on Pretreat Maintenance Cards)
- **Mix Ratio Alarm**: [Plumbing Tab] Determines how far off the Mix Ratio has to be before it will alert the operator.
- **Load Orientation**: [Belt Placement Tab] Determines where "TOP" is being projected on the Pretreater belt and determines the spray orientation.
  - **Collar Right**: "TOP" is displayed to the right of the operator, and garments are meant to be loaded with the collar towards the right. The max spray area in this orientation is 24" tall and 18" wide
  - **Collar Up**: Top is displayed nearest the Spray Chamber, and garments are meant to be loaded with the collar towards the Spray Chamber. This orientation allows a max spray area of 18" Tall and 24" Wide.
- **Collar Width**: [Belt Placement Tab] Defines how far apart the Collar Alignment Bars are. Locate where "TOP" is being projected on the belt. There are two lines on either side of where it says "TOP". These are the Collar Alignment Bars
- **Collar Height**: [Belt Placement Tab] Determines the height of the Collar Alignment Bars (how long the lines are)

There are a lot more available settings listed on the different tabs. The user can access a description of the setting by pressing anywhere in the green space of the desired setting. A message will appear with a short description of the selected setting.

Factory Settings

The Factory Settings screen contains all the settings for the Synergy Software. Meaning it includes all the settings in the Settings Screen. This screen is automatically locked to prevent users from changing settings that could be detrimental to the software. Even if security is not enabled, this screen will automatically be locked. The user can enter this screen if necessary, but should be familiar with the setting they are changing. To enter this screen when security is not enabled, the user can use the Temporary Disable option that was mentioned in the "Security" section. If there are any doubts about changing a setting, contact Brown Manufacturing for guidance.

Diagnostics

This screen contains useful information/controls when trying to troubleshoot an issue. When this button is pressed (from the Navigation screen), there will be nine tabs along the bottom of the screen. These tabs include:

- **Plumbing Control**: lists all pumps and valves available in the Synergy system. These can be used to manually control a line.
- **Plumbing Feedback**: this is a more detailed view of the Quick Fluid Feedback that is shown on the Spray and Maintenance Screens.
- **Mixing Feedback**: a detailed view of the Achieved Mix Ratio, Target Ratio, Previous Ratio, and Last Mix Rate.

- **Carriage Control**: shows Carriage motor feedback (such as if it is moving and the current position). It also allows the user to control the individual nozzles.
- **Motor Control**: allows the user to control each motor (Carriage, Pretreater, Transfer, and Firefly belts).
- **Belt Feedback**: shows an illustration of the belts and where garments are located on each belt. Also allows the user to move/stop the belts.
- **Software**: this is where the controls over the software are located. The user can do the following from this page:
    - Exit the Software
    - Restart the Software
    - Show Teamviewer: pulls up Teamviewer. Brown Manufacturing uses Teamviewer to remote access the Synergy's software to help diagnose problems
- **Modbus Feedback**: shows the feedback received from the Synergy Lower Cabinet control boards (circuit boards).
- **ZMAIN131 Feedback**: shows the feedback received from the Spray Board located in the control panel above the Valve Cabinet.

The majority of users will only need to interact with the software tab and it will most likely be used to exit/restart the software or to initiate Teamviewer. The Diagnostics screen is primarily used by experienced users and Brown Manufacturing Representatives for troubleshooting.

Central Source

A Synergy machine will be connected to either a Synergy Lower Cabinet or to a Central Source machine. Any features directed towards mixing and source lines, described in this document, will only be used if the Synergy is connected to a Synergy Lower Cabinet. If the machine is connected to a Central Source, refer to the the **Central Source User's Manual** for operating instructions.