VERSA BUILT ROBOTICS

Lathe Automation System Operator's Manual

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Safety Warnings

DANGER: VersaBuilt makes industrial machine tool automation components designed to be operated by trained personnel only. Machine tool automation components may move suddenly and without warning. Serious or fatal crushing injuries can occur from contact with the robot, gripper or vises.

Before deploying VersaBuilt industrial machine tool automation components, a safety risk assessment must be completed in accordance with local, state and/or federal requirements.

VersaBuilt industrial machine tool automation components should only be used by trained operators.

Read and understand the VersaBuilt Lathe Automation System Safety Manual before proceeding

Accessing VSC Lathe Home Screen and Navigation

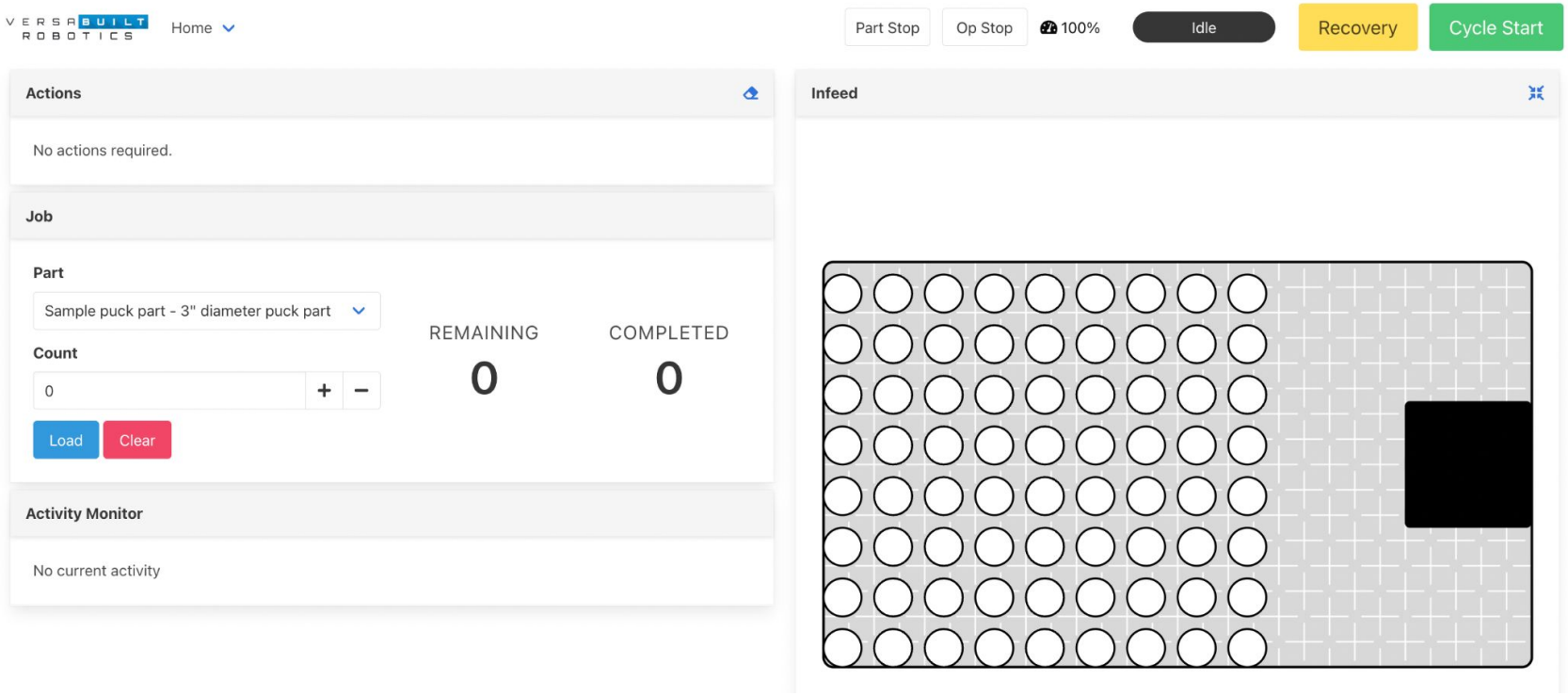
Section 2

Accessing the VSC Lathe

The VSC can be accessed by any computer, tablet or phone with WiFi or Ethernet using a web browser such as Google Chrome.

VersaBuilt recommends dedicating a laptop computer or a full-sized tablet (10” or greater) such as an IPad.

The VSC can be accessed via a smartphone or small tablet, with some changes to how the user interface is displayed.



Accessing the VSC Lathe - Ethernet

Connecting to the VSC via Ethernet

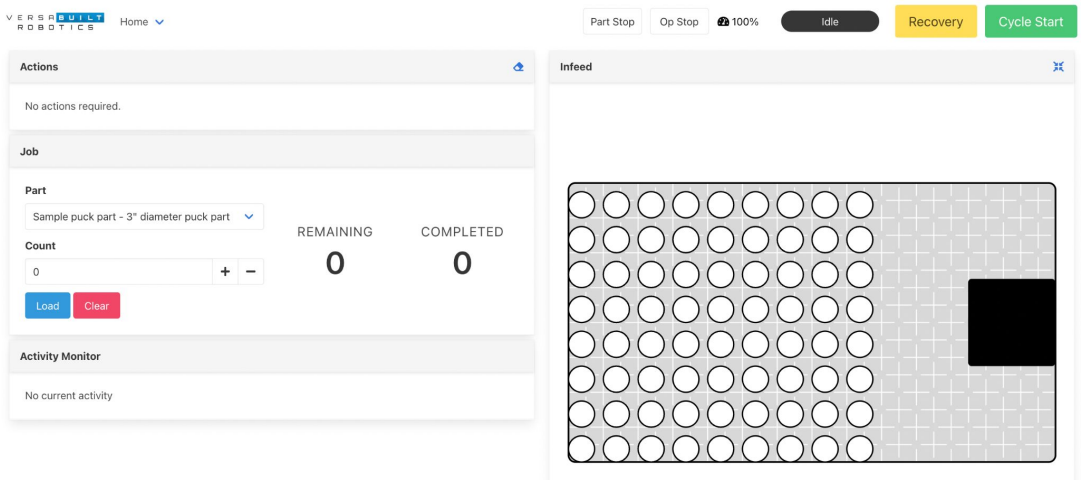
For an Ethernet device such as a laptop, plug the device into an available port on the Ethernet switch the VSC is plugged into. For most computers, the ethernet port will be automatically configured to access the VSC.

Open up a web browser and ether the following into the address bar:

192.168.2.1:9000

The VSC home page should appear. If the VSC home page does not appear, go to the computer's Ethernet settings and configure the Ethernet port for:

DHCP: Obtain an IP Address Automatically



Accessing the VSC Lathe - Wi-Fi

Connecting to VSC via VSC Wifi Access Point

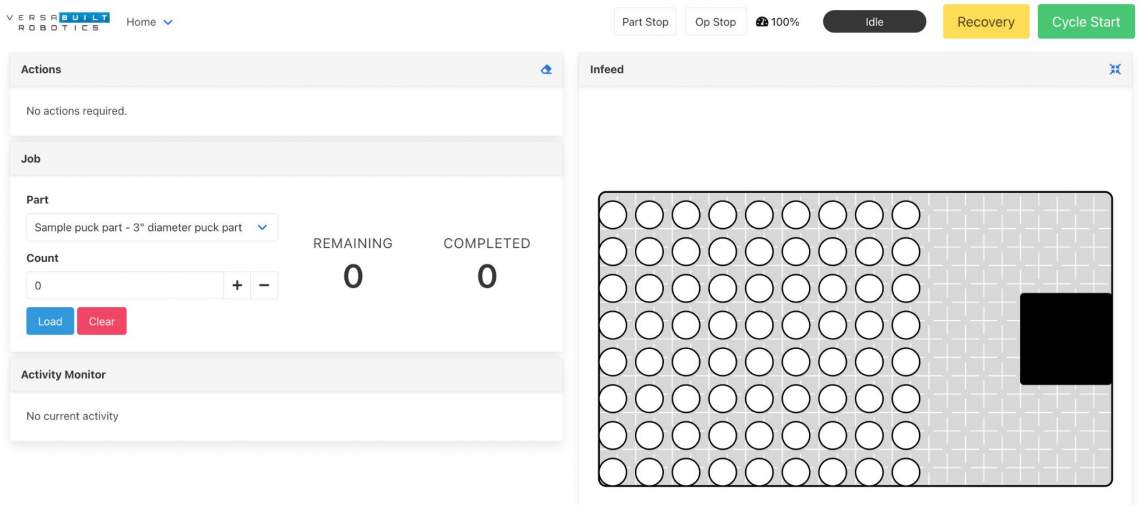
For a Wifi connected device such as an IPad, device network settings will be automatic. Open your device's Wifi settings and search for a network named vscXXXXX where the XXXXX is the serial number of your VSC (e.g., vsc00125).

Connect to the VSC Access Point, using the password:

versabuilt

(all lower case). Once connected to the access point, open a web browser and enter the following address:

192.68.4.1:9000

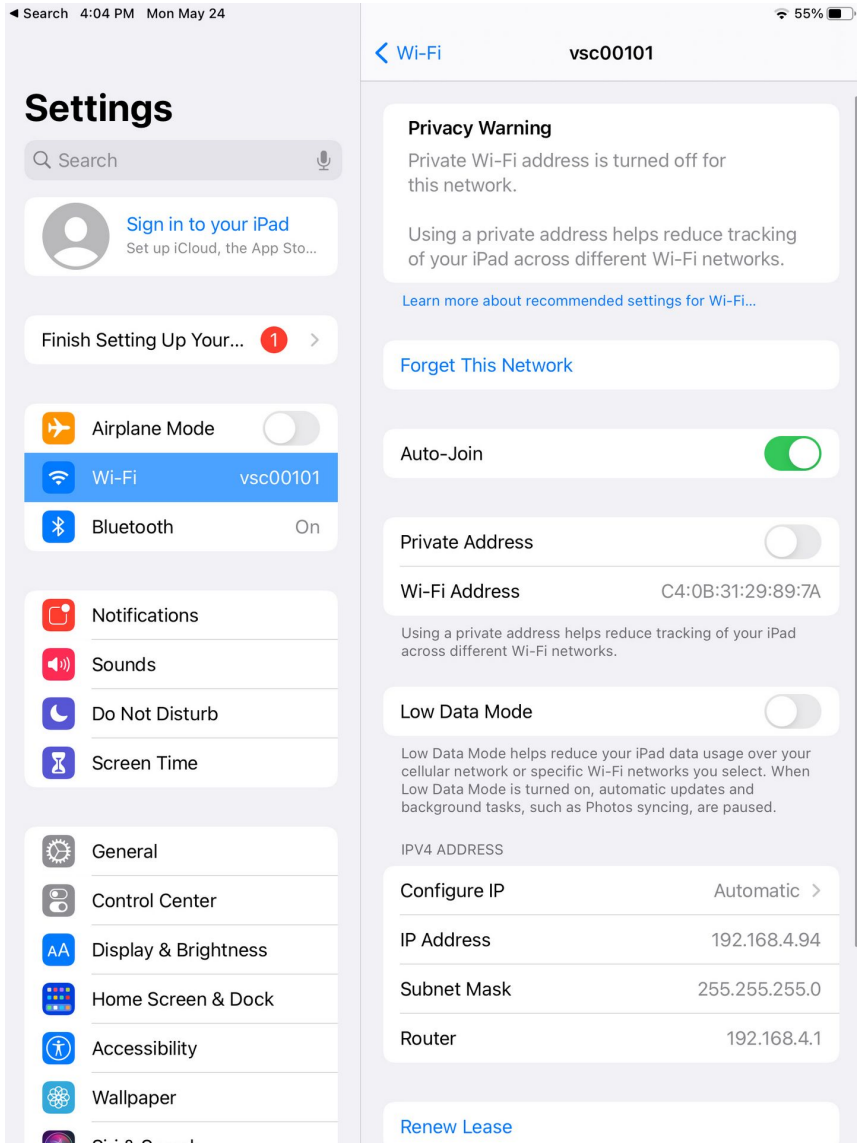


Accessing the VSC Lathe

Configuring WiFi settings for the VSC

Because the VSC does not have an Internet connection, your device may try to automatically connect to another WiFi access point. To prevent this, do two things:

1. Select Auto-Join on the VSC Wifi network
2. If the device has previously connected to any other Wifi network, modify the settings for that Wifi network to “forget” the settings

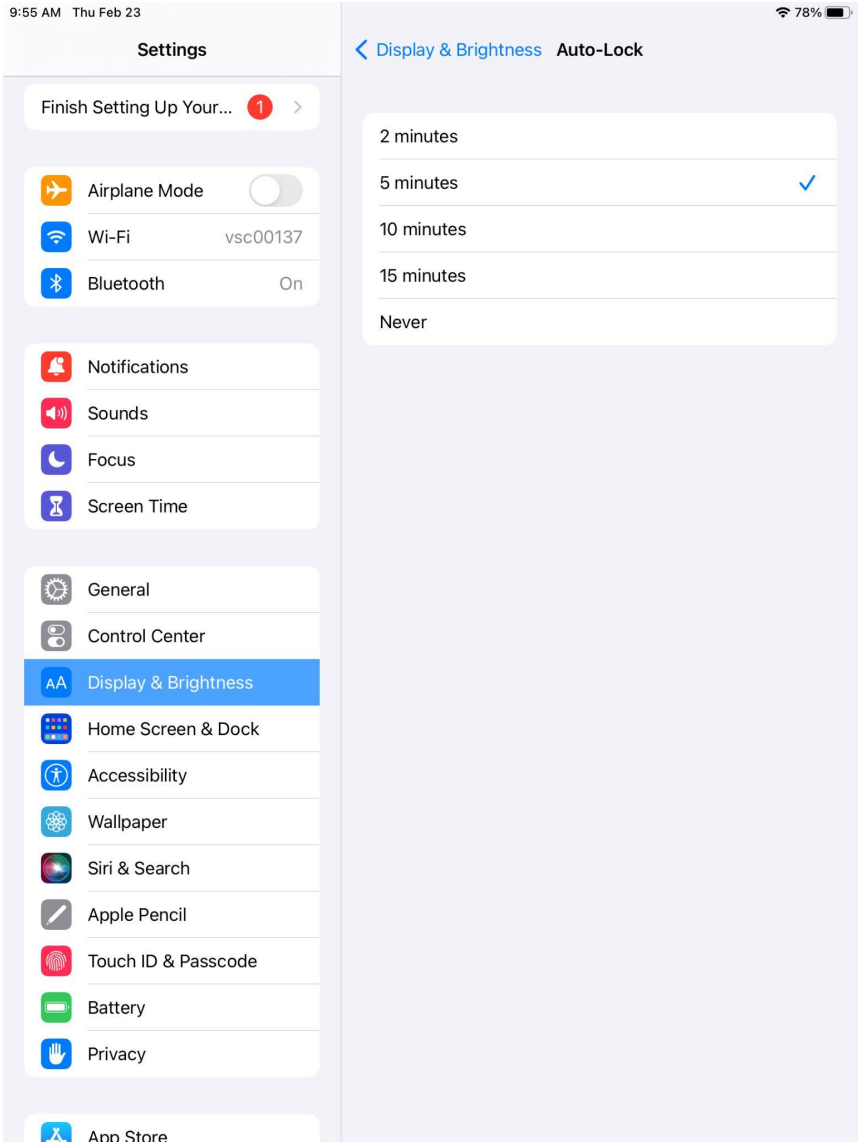


Accessing the VersaBuilt System Controller (VSC)

VersaBuilt Recommends Setting iPad/Tablet Screen Timeout to 5 minutes

If the screen goes to sleep during part configuration, anything entered will be lost. To change this setting Follow these steps:

1. Go to settings
2. Select Display & Brightness
3. Select Auto Lock
4. Select 5 minutes

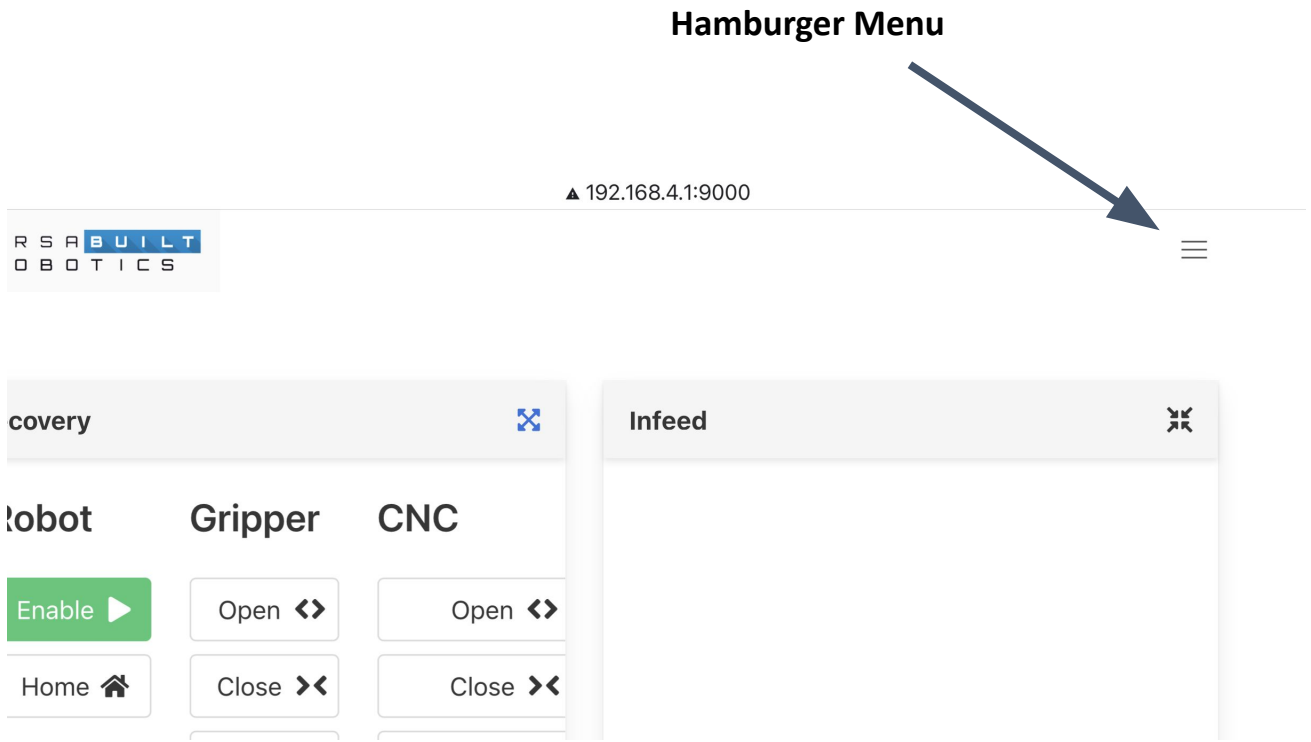


Using the VSC on Smartphones and Small Tablets

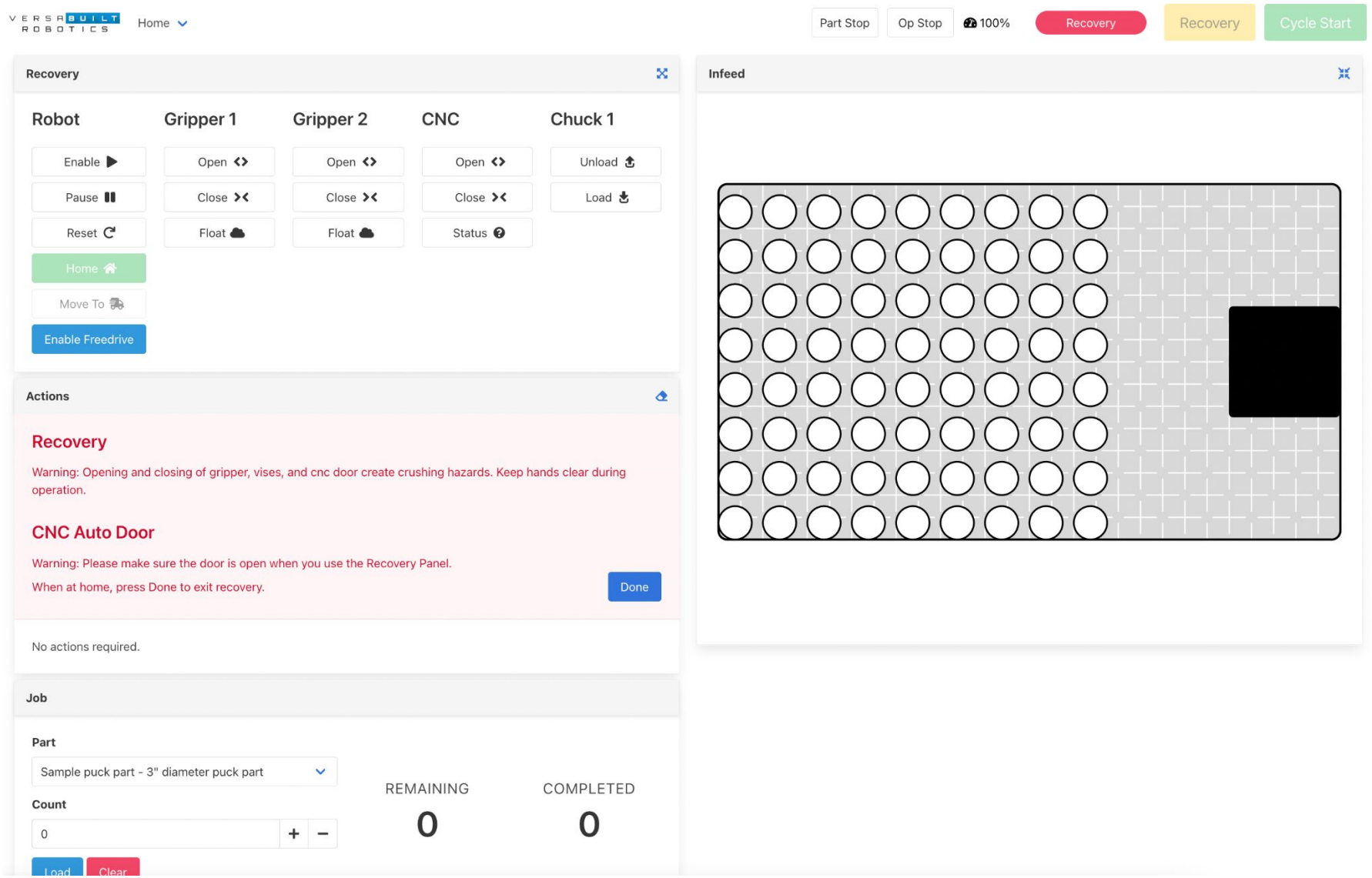
When accessing the VSC on smartphones and smaller tablets, the display changes to accommodate the smaller screen.

Page navigation, VSC Status Bar and Cycle control buttons are accessible via the “hamburger” menu in the upper right of the screen on smaller devices.

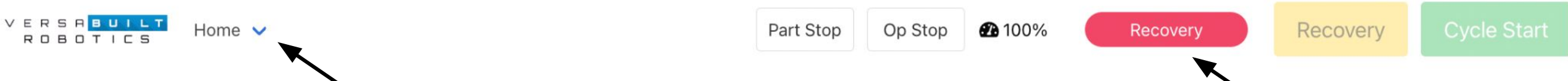
Use your finger to pan the screen to the upper right to access the hamburger menu then use your finger to pan the page to access items in the menu.

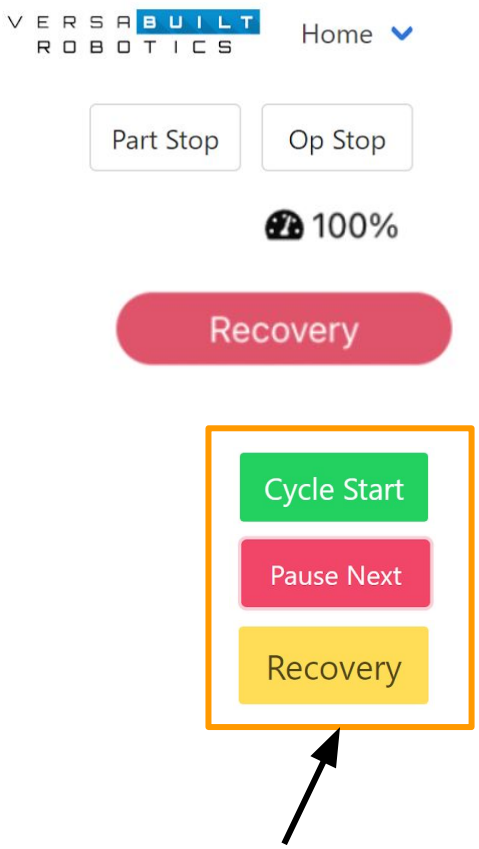


VSC Lathe Home Screen



VSC Status Bar





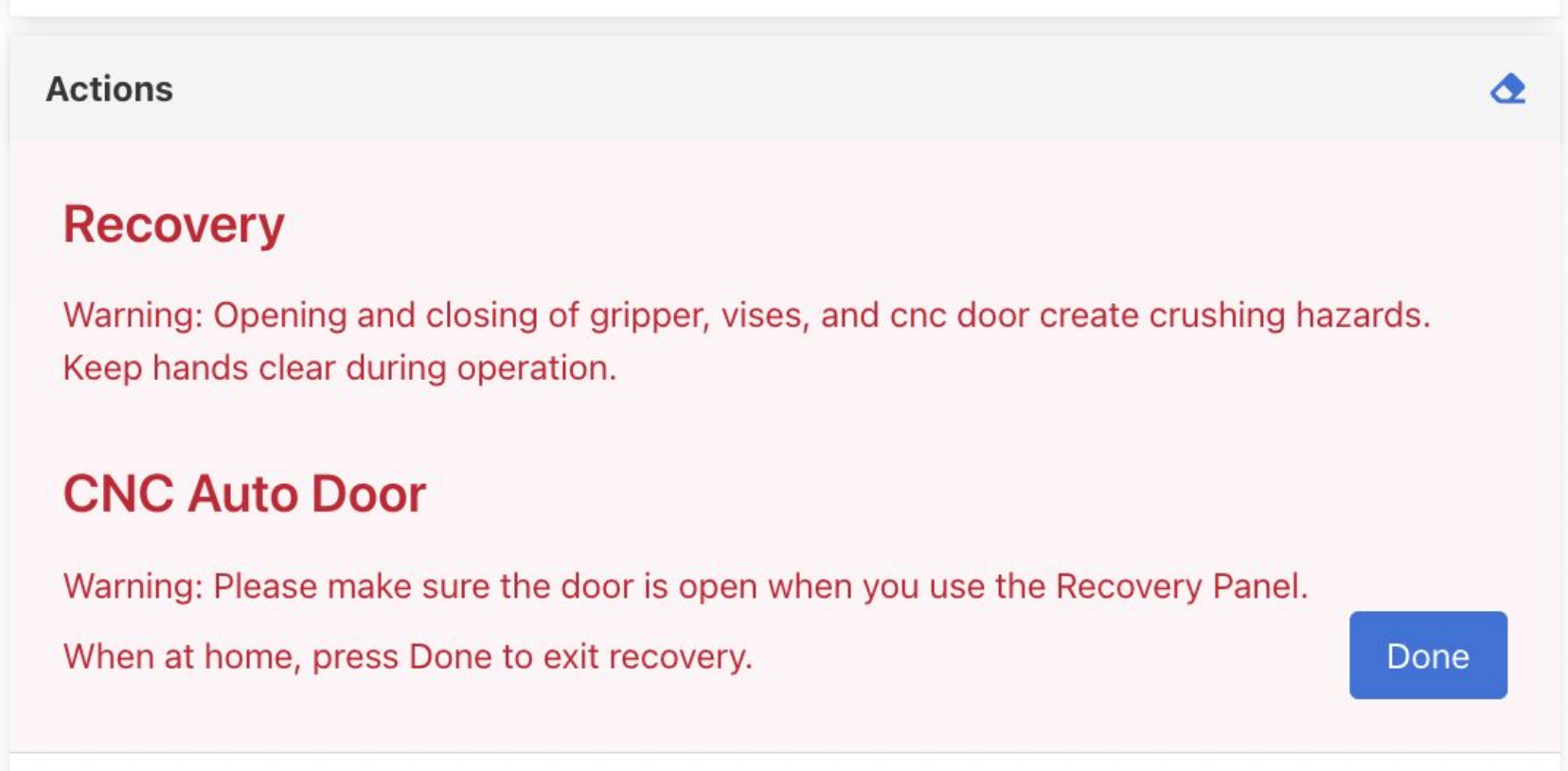
Processing Mode

- Navigation - allows navigation between the available VSC Pages
  - Home
  - Configuration
  - Settings
  - Network Settings
  - I/O Panel
  - About
- Part Stop
  - When selected, the system will pause after current part is complete
- Op Stop
  - When selected, the system will pause after current CNC operation
- Robot Speed: set robot speed to a percentage of maximum
- Processing Mode - the processing mode of the VSC system; one of Running, Paused, Recovery or Idle
- Control Buttons:
  - Cycle Start: when Processing Mode is Idle and job is configured, begins processing
  - Pause Next: when Processing Mode is Running, pauses robot motion after current motion commands are complete
  - Recovery: Enters Recovery Mode

Actions Panel

The Actions Panel displays steps required to exit recovery and/or start a job, such as loading jaws onto vises and moving to a home position.

When finished with the action confirm the action complete by clicking on the Done button associated with the action.



Job Panel and Activity Monitor

The Job Panel is used to:

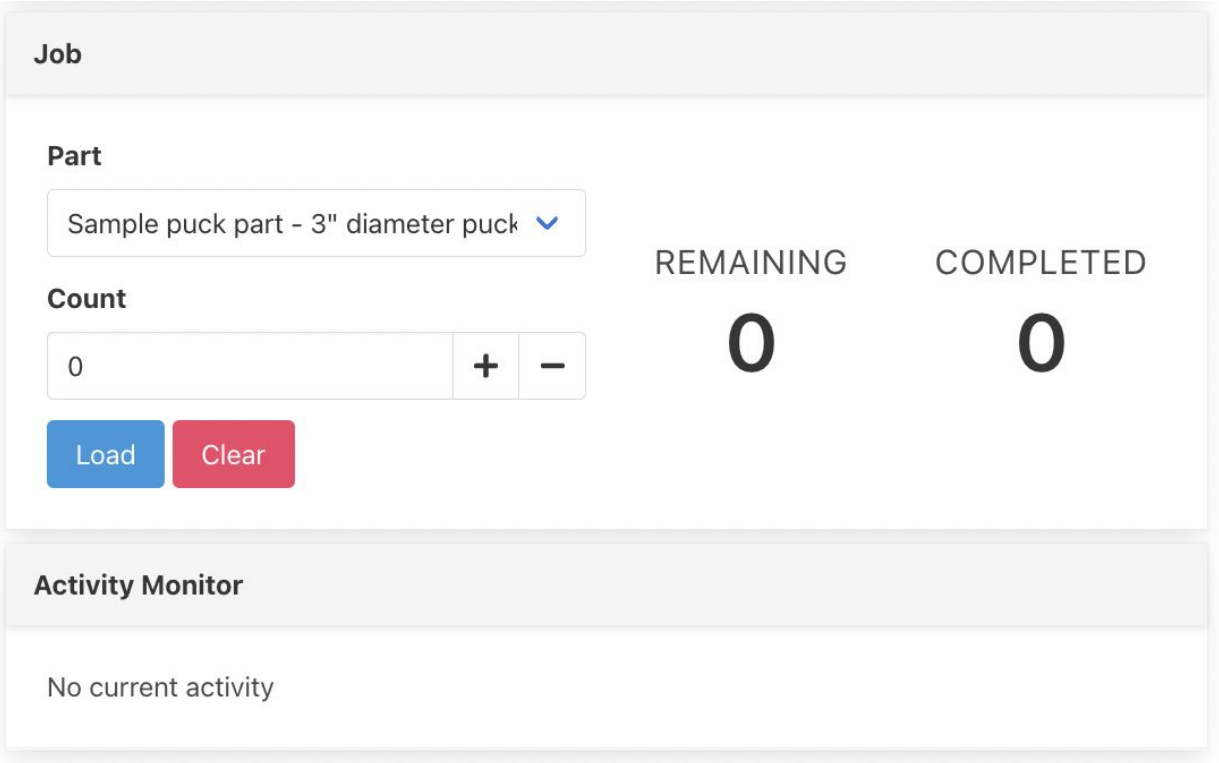
- Select a part (from the Part Configuration list)
- Enter a part count (total number of parts loaded on the VersaCart)
- Load a job for processing (confirms the part count and adds them to VersaCart display on the screen)

Remaining and Completed:

- Remaining displays how many parts remain
- Completed shows how many parts have completed for the current Job

Activity Monitor:

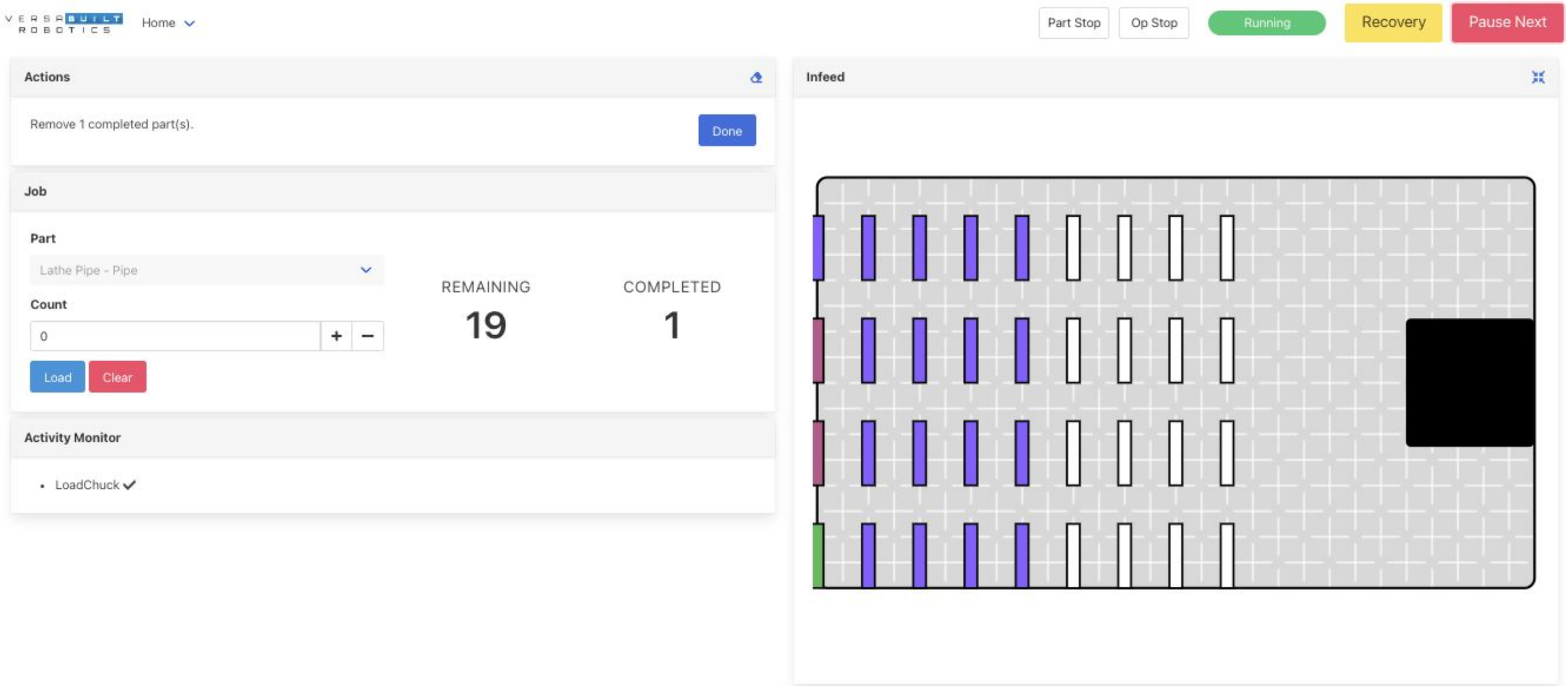
- Shows what the VSC is currently doing or what step the VSC is waiting to complete before additional processing



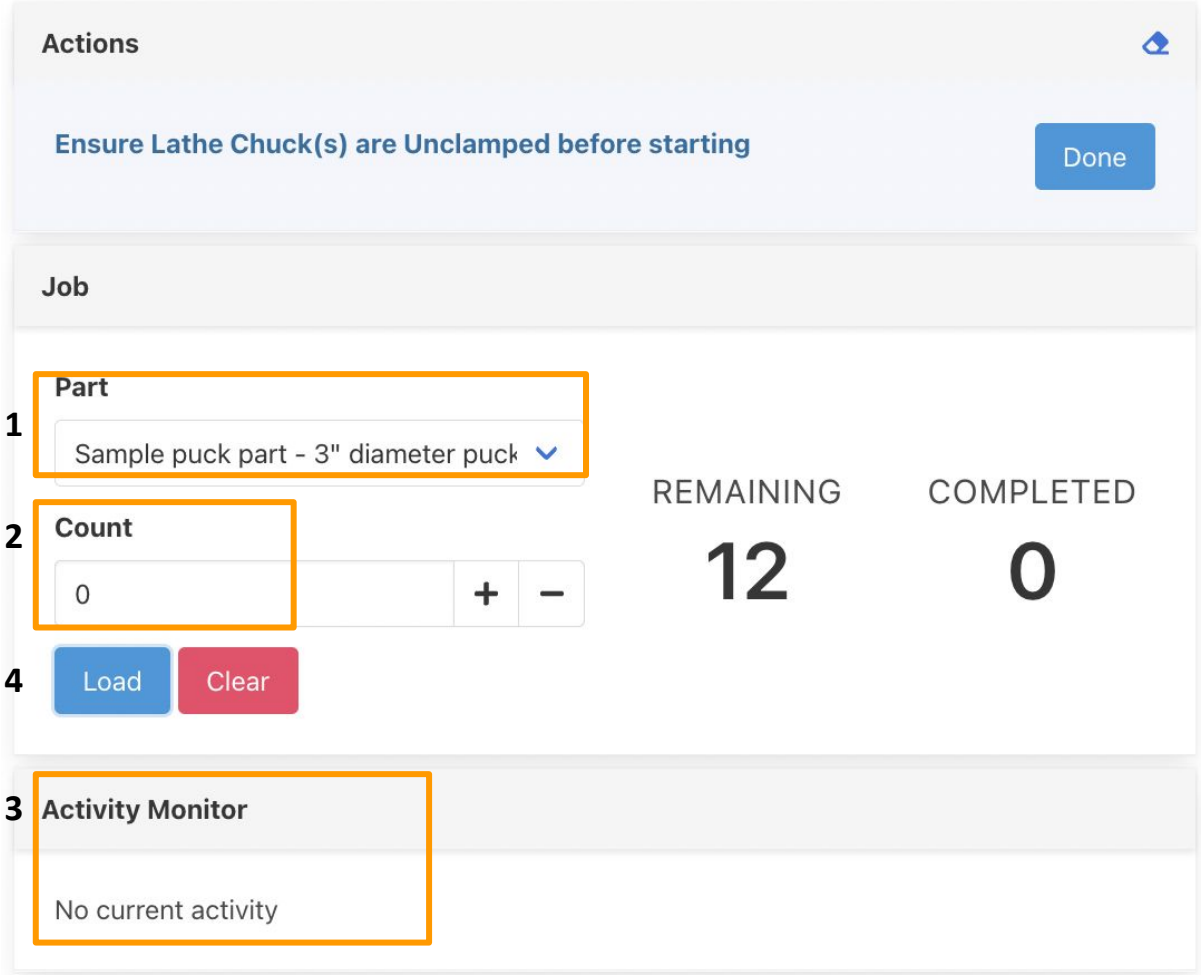
Running Jobs and Aligning Parts in the Visual Infeed System

Section 3

Running a Job on the VSC



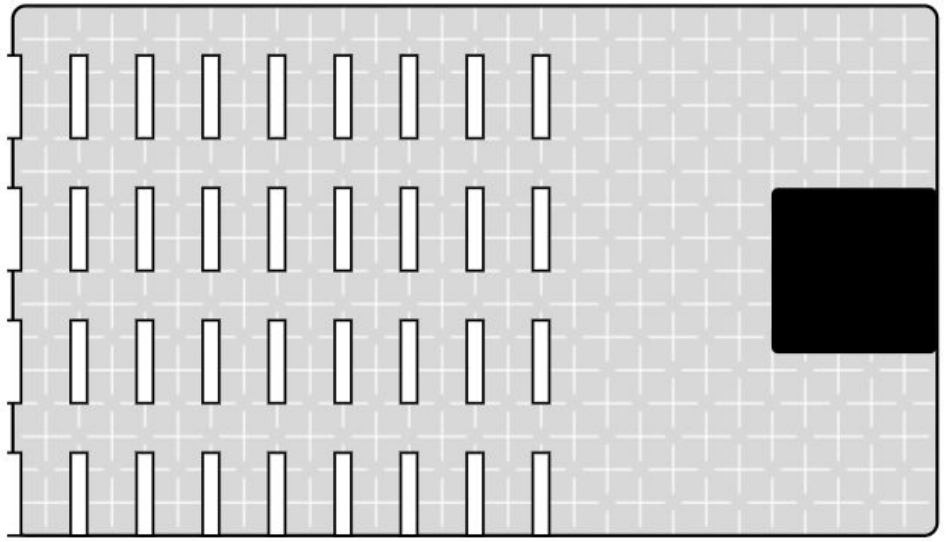
Running a Job on the VSC



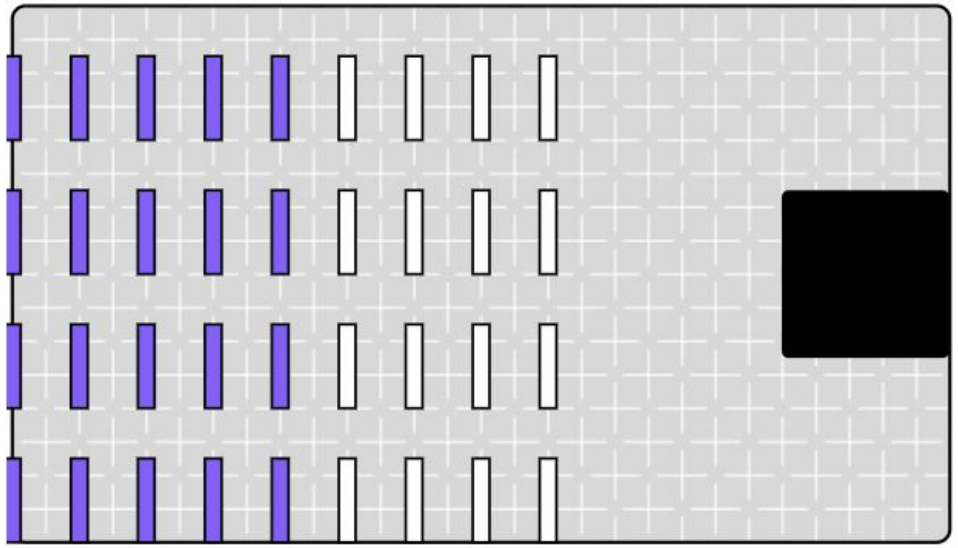
To run a job on the VSC:

1. Select the Part from the drop-down list in the Job Panel.
2. Enter a Count of parts to be processed in the job.
3. The operator will be prompted in the Actions panel to ensure the Lathe chuck(s) are unclamped before starting.
4. Press the **Load** button to initialize the raw material in the infeed display.

Running a Job on the VSC

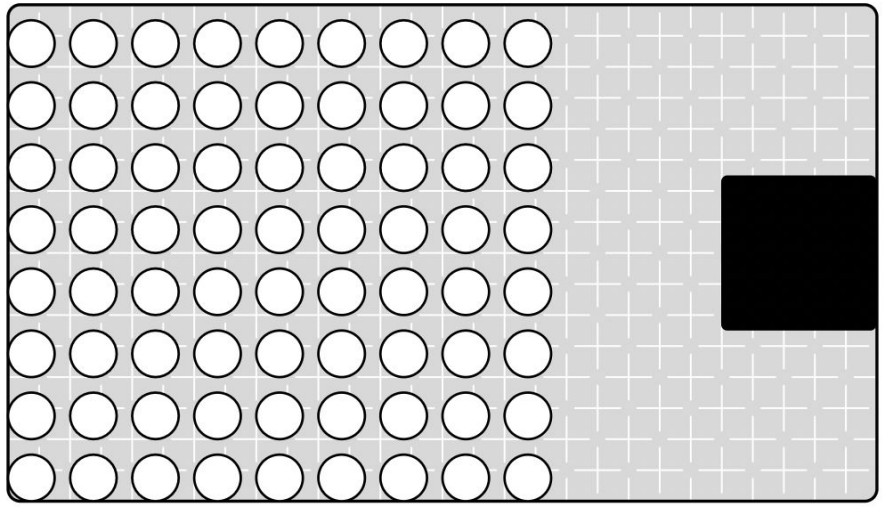


After the Part is selected in the Job panel, the Infeed panel will display an outline of each part in the Visual Infeed showing the alignment of the raw material on the table.

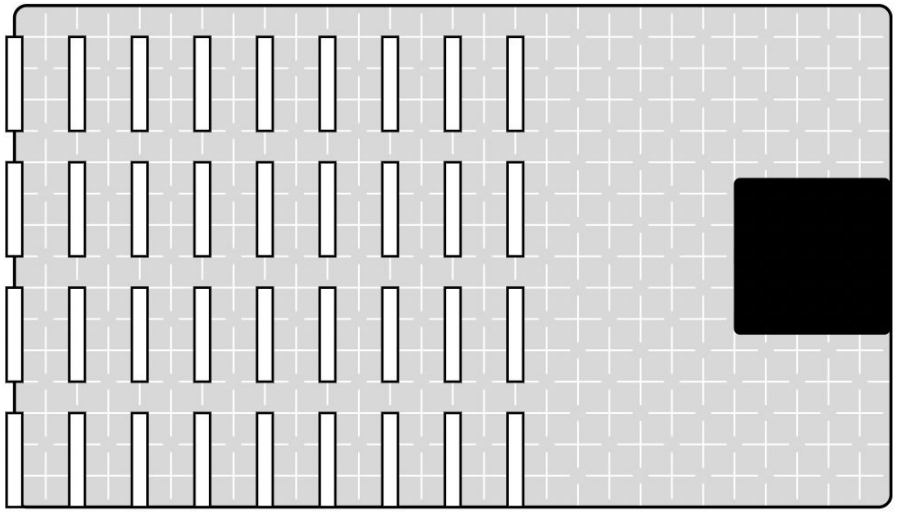


After the Load button is pressed in the Actions panel, the Infeed panel will show the operator where to load the raw material by displaying the allocated parts in purple.

Running a Job on the VSC

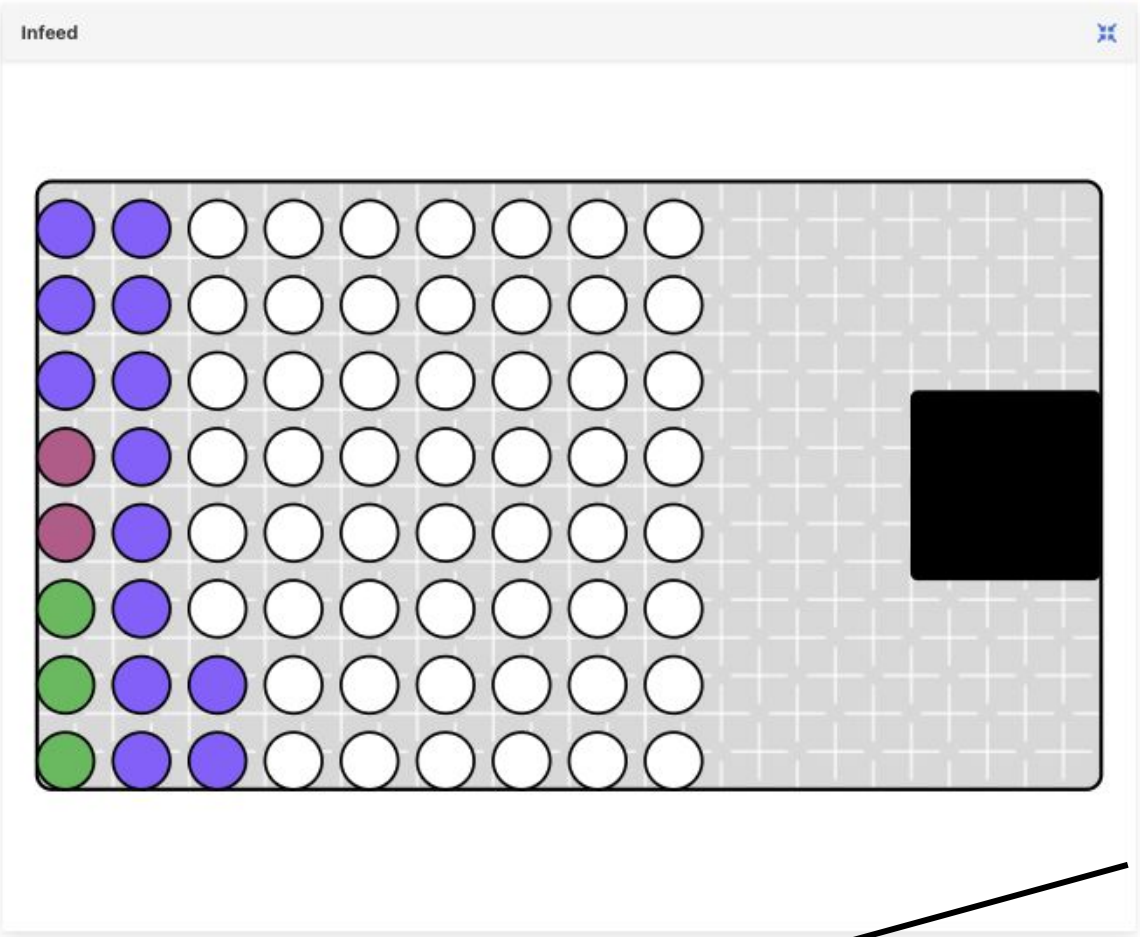


Parts configured in the “Puck” configuration will show up in the infeed a circles.



Parts configured in the “Shaft” configuration will show up in the infeed as rectangles.

Infeed Panel

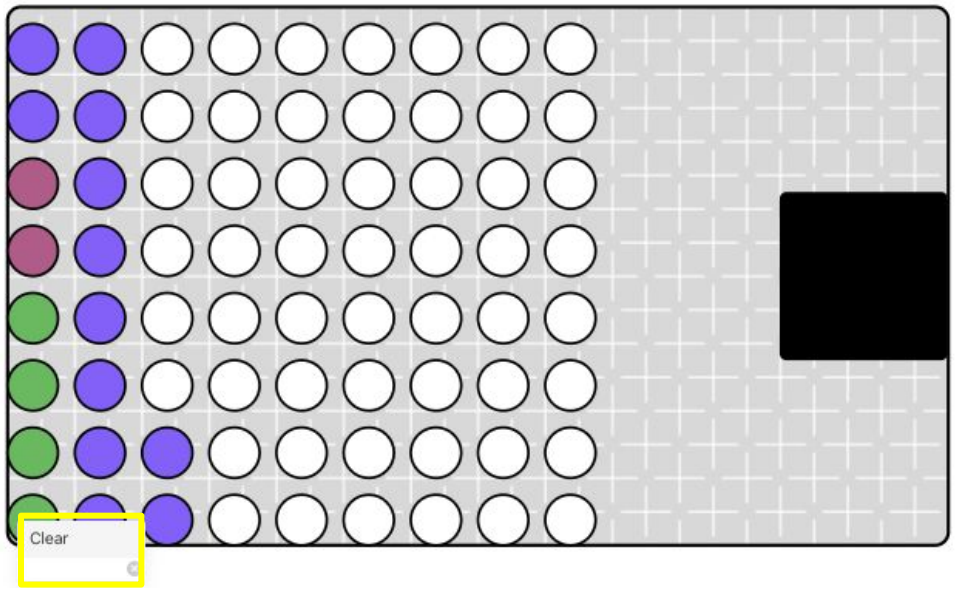


Color codes:

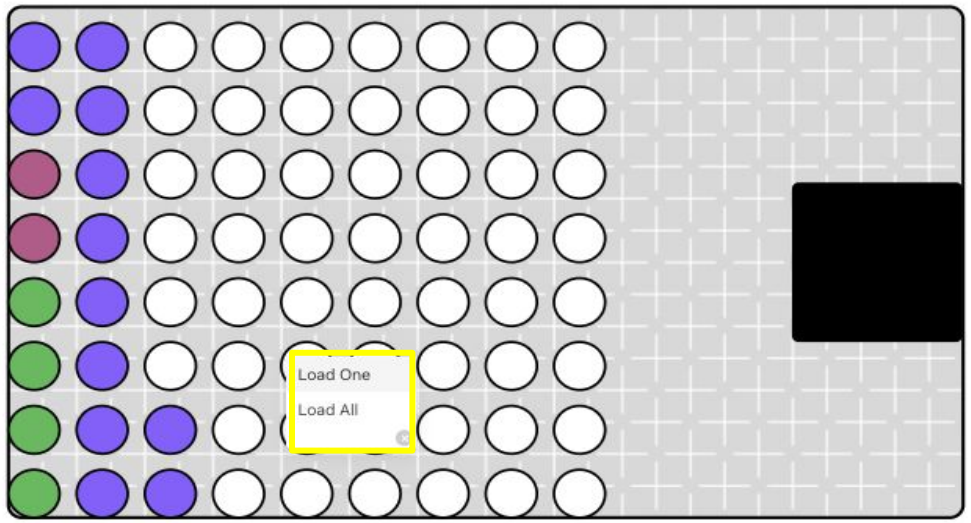
- White - Unloaded slots (unassigned locations)
- Purple - Raw material set as loaded with the VSC (ready to process)
- Maroon - Parts that are currently being processed (picked by the gripper or in the CNC)
- Green - completed parts

The Actions Panel will include an action to remove completed (green) parts. Remove the completed parts then press the Done button in the Actions panel and the green parts will become white signaling to the VSC that those locations are available to load more raw material.

Infeed Panel - Click Menu



When not in Recovery mode, clicking on (selecting) a colored slot will bring up a pop-up menu with an option for Clear. if the Clear menu item is selected, the rectangle will turn white signifying to the VSC that raw material is no longer loaded in that location and the part count will reduce by one.



Clicking on a white rectangle will bring up a pop-up menu with an option for **Load**. Clicking on Load will load a single part (turning the rectangle purple) at that location.

Running a Job on the VSC

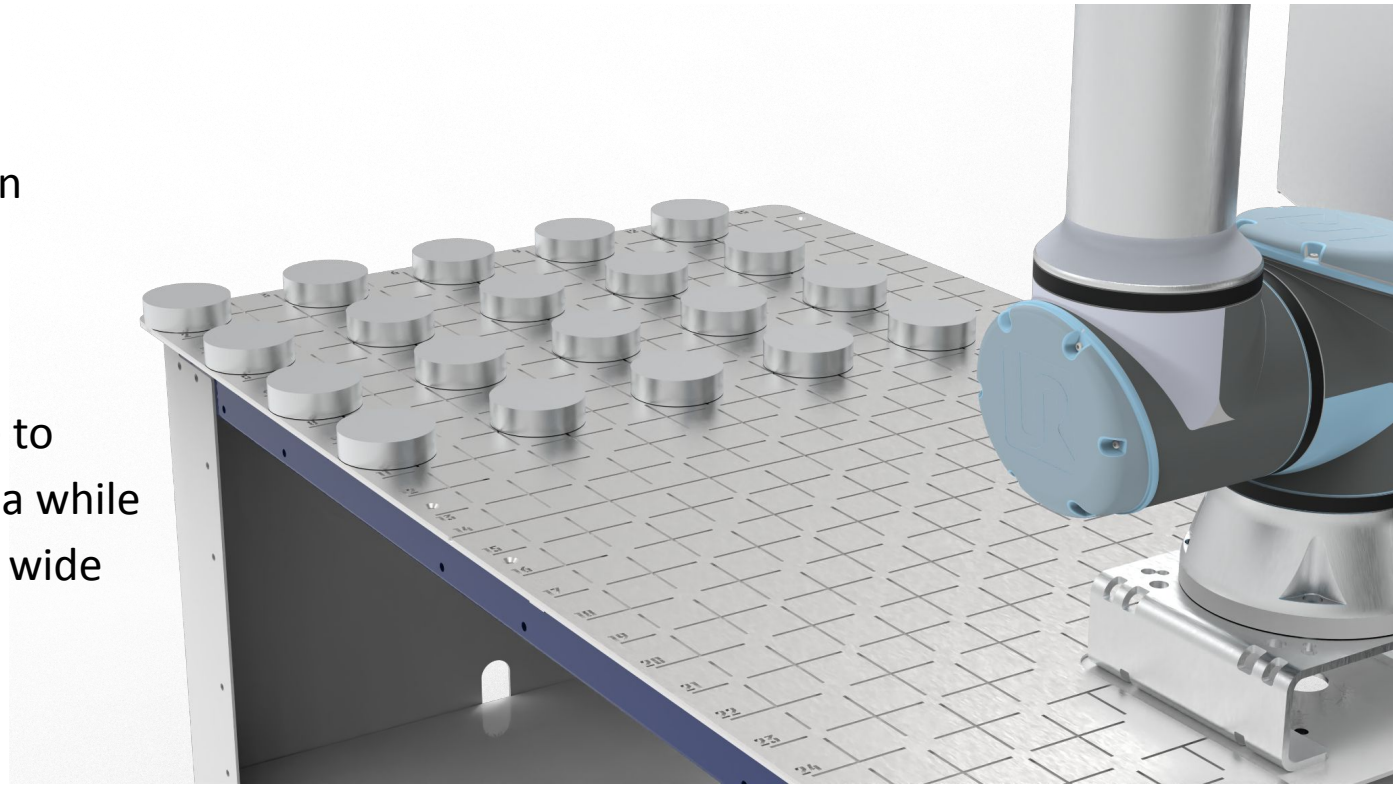
Before pressing the Cycle Start button on the VSC, the following conditions must be met:

1. Lathe chuck(s) open, action panel items acknowledged
2. Raw material loaded and aligned in the Visual Infeed
3. CNC in Memory mode and Idle state
4. Proper CNC program selected:
   a. 9000 program for Haas and Fanuc
   b. Correct program selected for Generic
5. VSC Enable button needs to be pushed before pressing VSC Cycle Start button on screen (VSC Enable valid for 3 minutes)

Aligning Parts Using the Visual Infeed System

The VersaBuilt Visual Infeed System is a grid pattern engraved into the robot's part infeed area.

By following a few simple rules, an operator is able to quickly and accurately place parts in the infeed area while maximizing the total part storage capacity across a wide range of part sizes.



Aligning Parts Using the Visual Infeed System (Pucks)

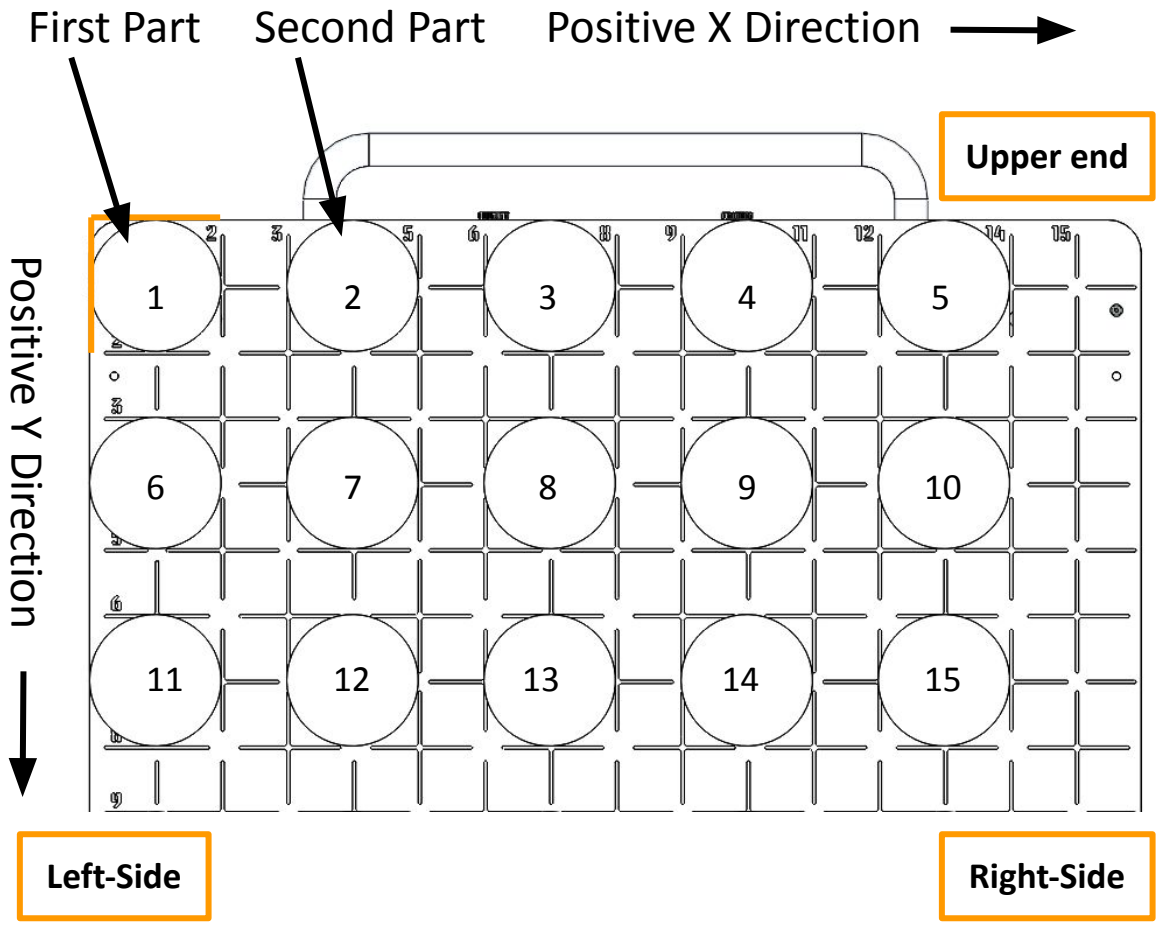
The upper left edge of the grid (*highlighted*) is the initial index point - the first part will always be located in the upper left corner of the visual grid.

Top and left edge of a part are ***always*** aligned with the grid lines.

Parts are allocated left to right in the positive X direction and then positive Y direction.

At the start of a job, the VSC interface will provide part spacing information to the operator.

The minimum spacing between parts in the X and Y directions is 0.25” .



Align part tangent edges to the cart grid lines shown in the Infeed Panel of the VSC

1.5” min gap between parts in X direction

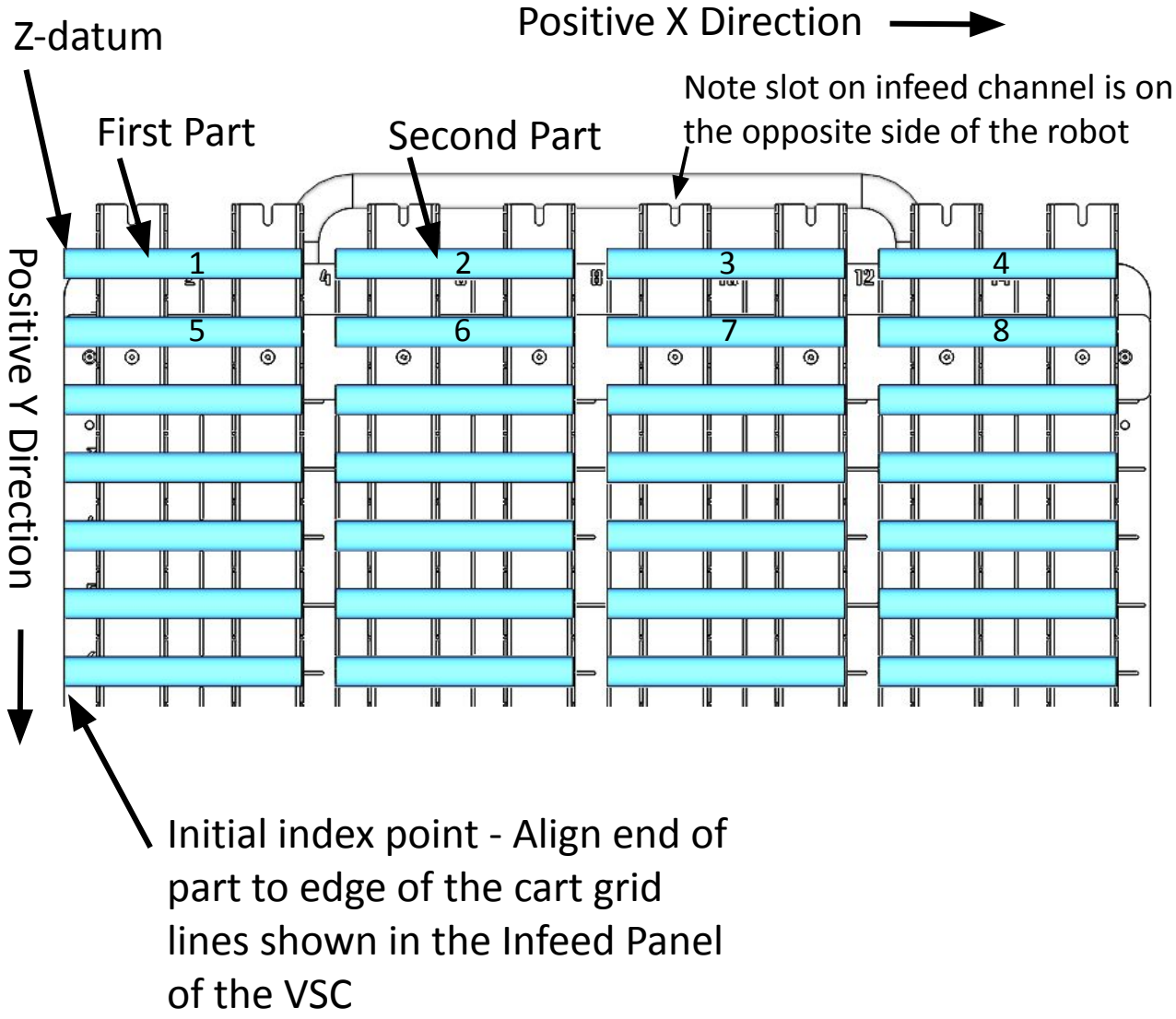
Aligning Parts Using the Shaft Infeed

The upper left edge of the grid is the initial index point - the first part will always be located in the upper left corner of the visual grid.

The VSC will allocate the parts to the nearest left grid line. There is flexibility in how parts are actually aligned in the infeed because the pick and place locations are calibrated. ***The parts must be spaced the same distance apart as shown in the VSC visual display.***

Parts are allocated left to right in the positive X direction and then positive Y direction.

The minimum spacing between parts in the X direction is 0.25”. Spacing between parts in the Y direction is based on the diameter of the part.



Aligning Parts Using the Visual Infeed System

Standard Infeed X Spacing Chart

Part Diameter	0 to 1.75”	>1.75” to 3.75”	>3.75” to 5.75”	>5.75” to 7.75”	>7.75” to 8”
X Spacing Inches	2”	4”	6”	8”	10”
X Spacing Columns	1	2	3	4	5

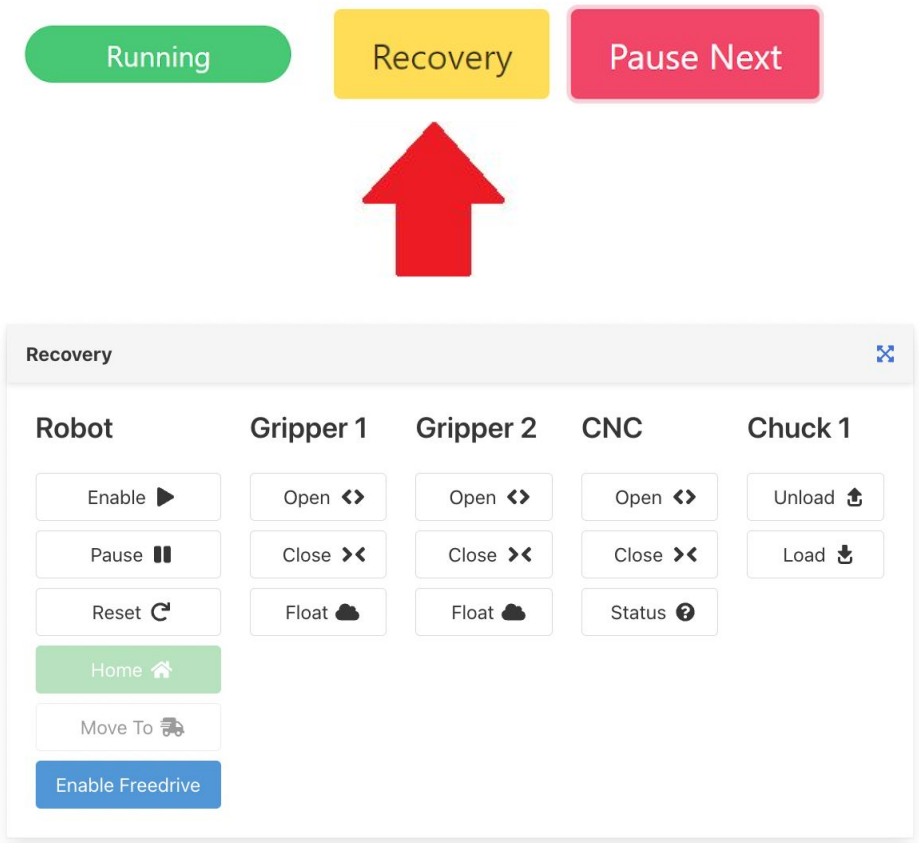
Standard Infeed Y Spacing Chart

Part Diameter	0” to 1.75”	>1.75” to 3.75”	> 3.75” to 5.75”	> 5.75” to 7.75”	> 7.75” to 8”
Y Spacing Inches	2”	4”	6”	8”	10”
Y Spacing Rows	1	2	3	4	5

Recovery Panel

Section 4

Recovery Panel



The Recovery Panel can be accessed at any time by pressing Recovery button in the top right of the screen.

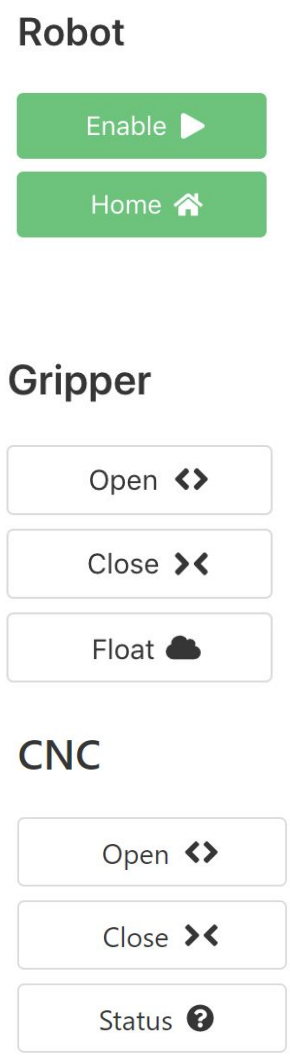
The VSC will enter the Recovery state whenever a processing error is encountered.

When in Recovery with an active job, the Recovery Panel can be used to get the Lathe Automation System and CNC in state where the job can be resumed.

When in Recovery without a job active, the Recovery panel can be used to perform individual robot actions useful for validating new part processes.

Before using the Recovery panel functions, the Operator will be prompted to press the VSC Enable button to acknowledge they are physically present and the system is safe to operate.

Recovery Panel



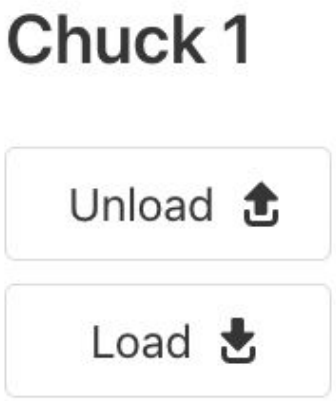
Robot allows the robot to be Enabled for movement, Reset or Moved to the Home Position

The Home button can be used to get the robot to a safe Home position from almost anywhere (The robot must be at the Home position to exit the Recovery Panel)

Gripper allows the Gripper to be opened, closed or floated; the Float button removes open or closing pressure from the gripper

CNC allows the operator to open or close the CNC Door (for VSC Controlled door openers only) and check the connection status with the CNC (VSC Macro CNC Drivers only)

Recovery Panel



Chuck allows the robot to load or unload a chuck according to the selected part configuration.

When the Unload button is pressed, the robot will use gripper 2 to unload the part. The starting payload will be set to an empty gripper. When the robot grips the part, the payload will be set to a completed part in gripper 2 according to the part configuration.

When the Load button is pressed, the robot will use gripper 1 to load the part. The starting payload will be set to raw material in gripper 1 according to the part configuration. When the robot releases the part in the chuck, the payload will be set to empty gripper.

Home Locations

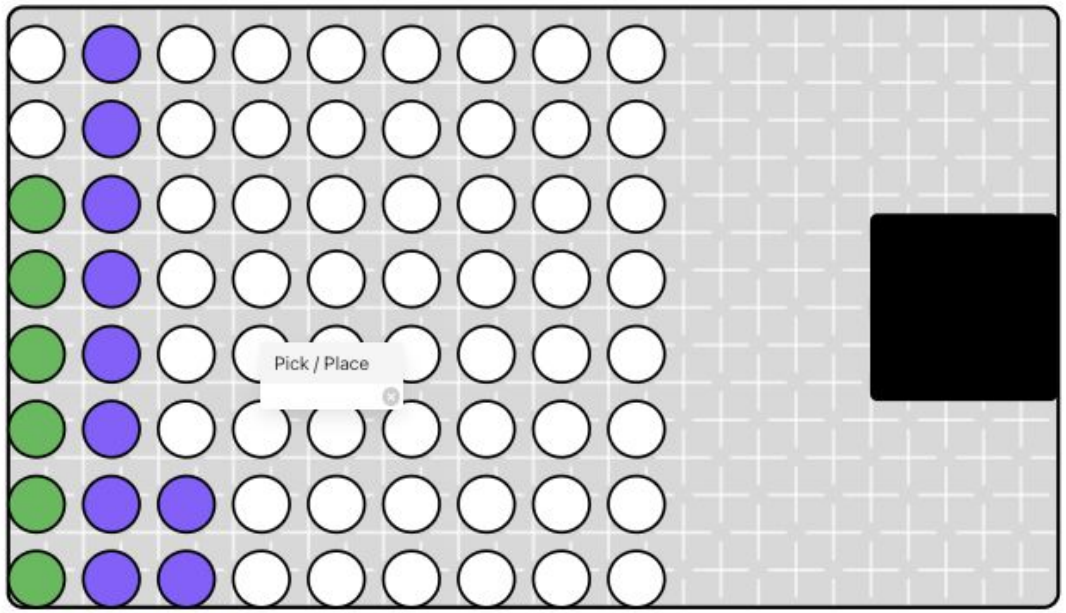
Table Home Gripper 1 Location

The Lathe Automation System has predefined locations that every operation either starts from, ends at or uses during processing. Before processing can begin, the robot must be in a known home location. If the robot is not at a recognized home location at the start of processing, an error will occur and the system will go into Recovery mode.

Press the Home button in the Recovery Panel to move the robot to its default Home location, **Table Home Gripper 1**. If the robot does not recognize its current location as a Home location, the VSC will prompt the operator to select the Home location the robot is currently nearest to. The robot's first move will be to the Home location selected, from there the robot will know how to get to the Table Home location.

NOTE: Failure to understand which Home location the robot is nearest to could result in the robot colliding with the CNC or other things in its path.

Recovery Infeed Panel - Click Menu

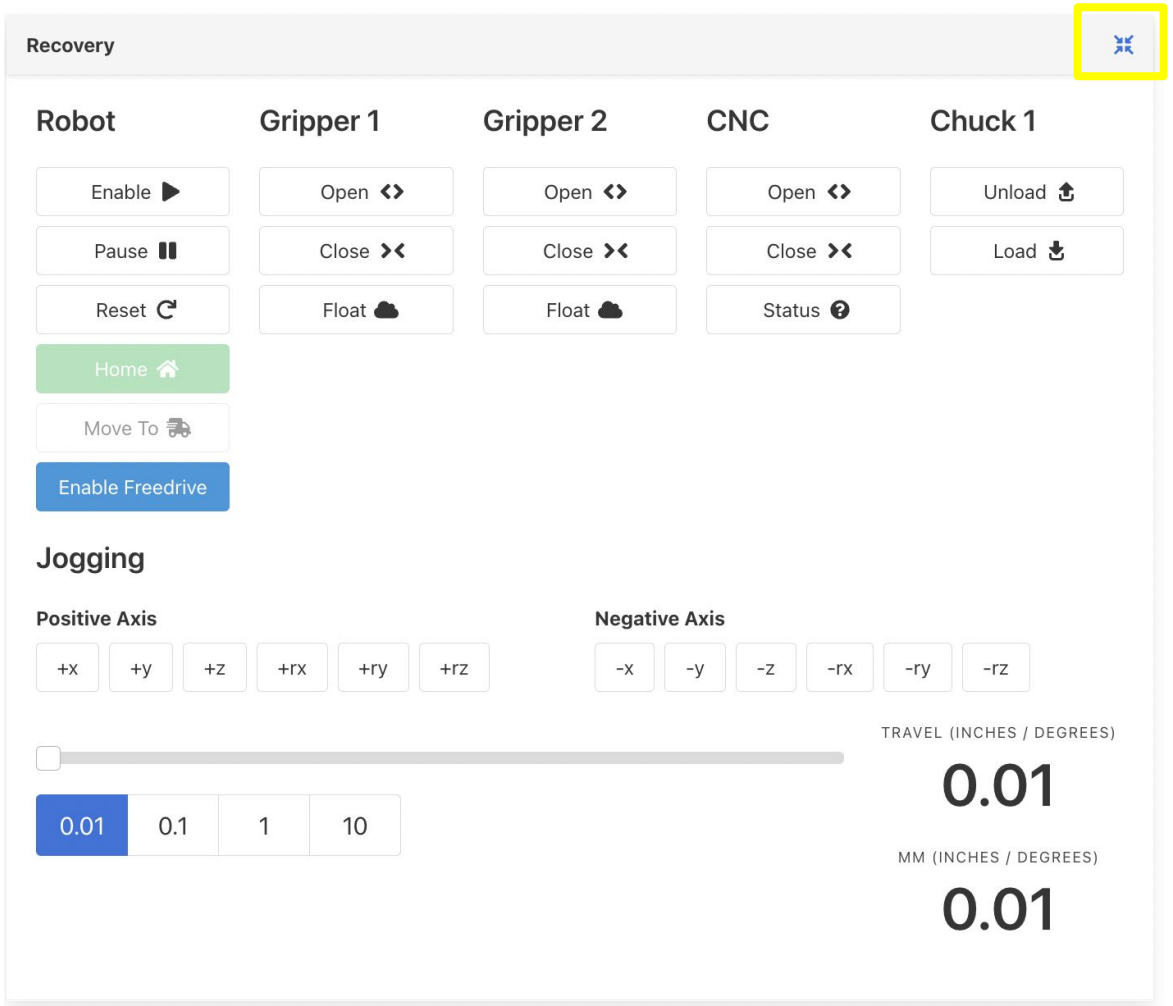


While in Recovery mode, clicking on a white rectangle will bring up a pop-up menu with an option to Pick/Place. Selecting Pick/Place will bring up a pop-up window giving an option to test Pick or Place a part at that location in the Infeed.

To begin, the robot must be at a known Home location.

Note: The robot payload will be set according to the part configuration selected. For Pick, the payload will be set to empty for gripper 1 & 2 until the part is picked, then the payload will be set according to the part configuration. For Place, the payload will initially be set to a finished part in gripper 2 according to the part configuration. After the part is placed, the payload will be set to empty gripper.

Extended Recovery Panel

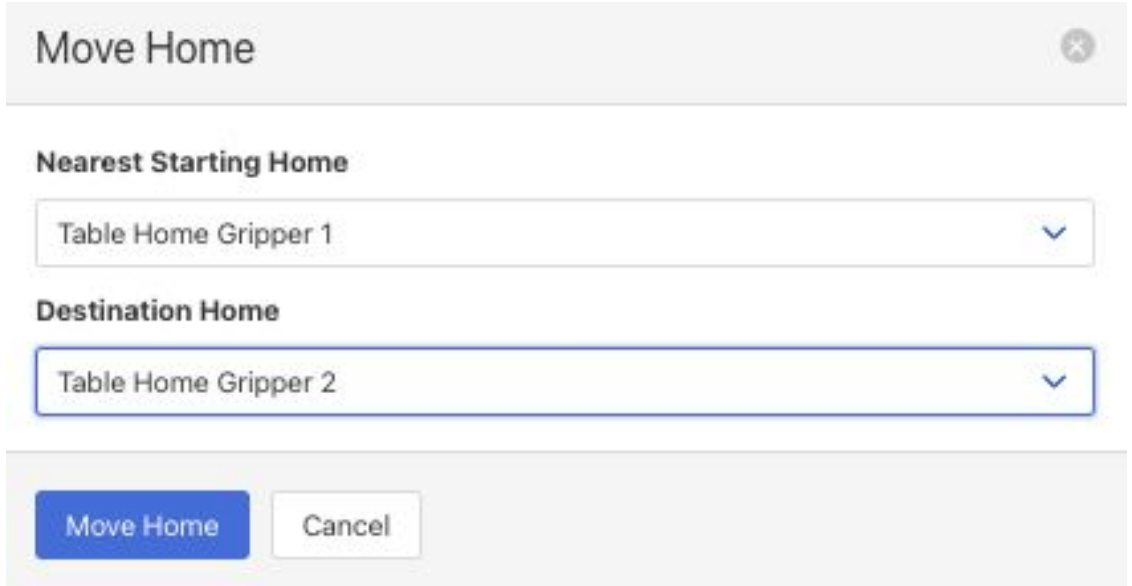


Extended Functions can be accessed in the Recovery Panel by pressing the blue 4 arrows button in the upper right of the Recovery Panel.

The **Move To** button allows user to select a specific robot home position to move to.

The Extended Recovery Panel also adds Robot Motion Jogging commands and the ability to put the robot into Freedrive mode.

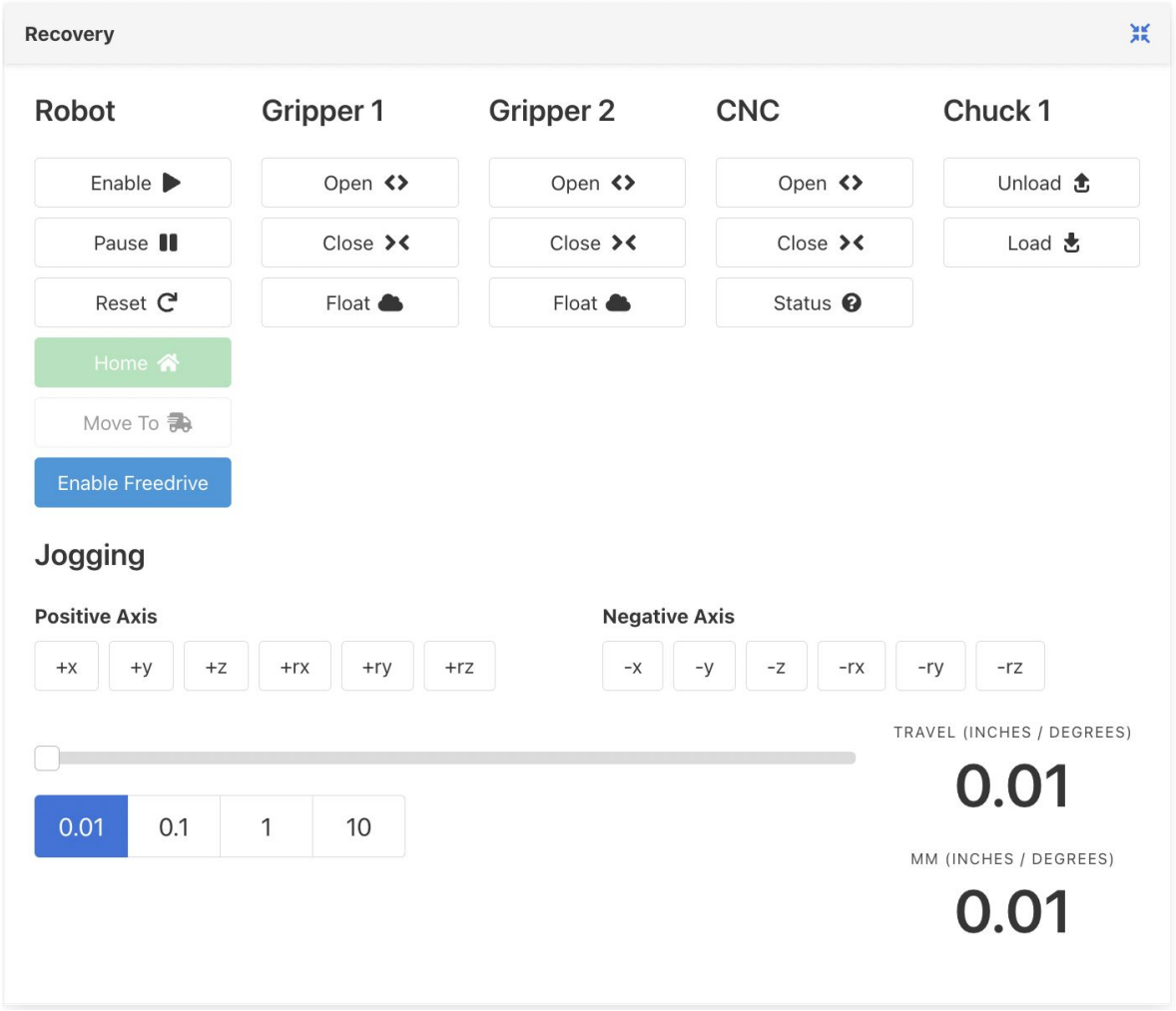
Extended Recovery Panel - Move Home



Clicking on the Move To button allows user to select robot home positions to move to.

The Nearest Starting Home is where the robot will begin its motion to. The Destination Home is where the robot will finish its motion path.

Extended Recovery Panel - Jogging

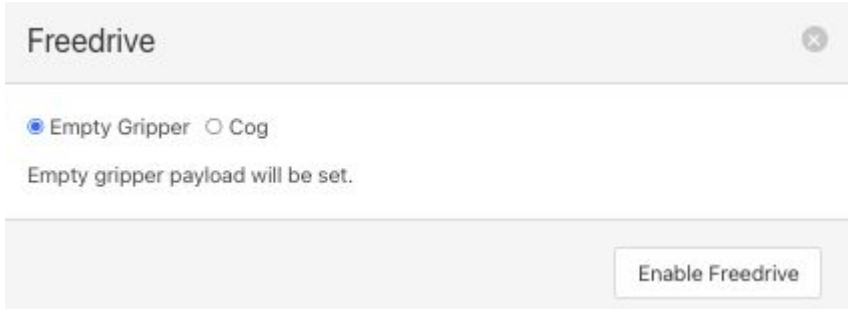


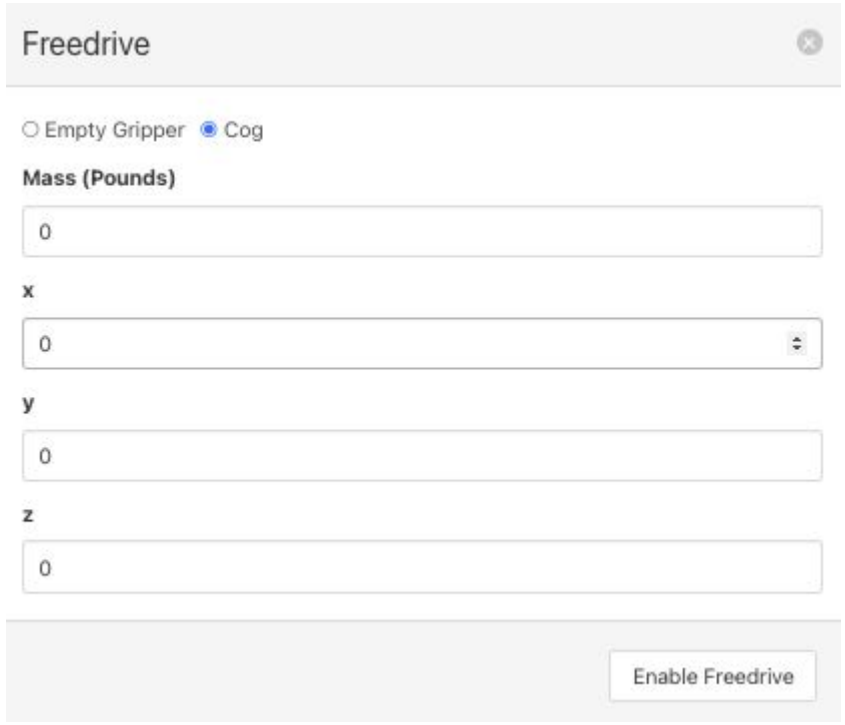
The movement scale adjusts how far the robot moves in inches (or millimeters) or degrees; always start with movements of 1mm (1deg) or less until you are confident in the direction and distance of motion.

+xyz and -xyz create linear motion relative to the gripper from the current position.

+rxryrz and -rxryrz rotate the gripper from the current position.

Extended Recovery Panel - Enable Freedrive



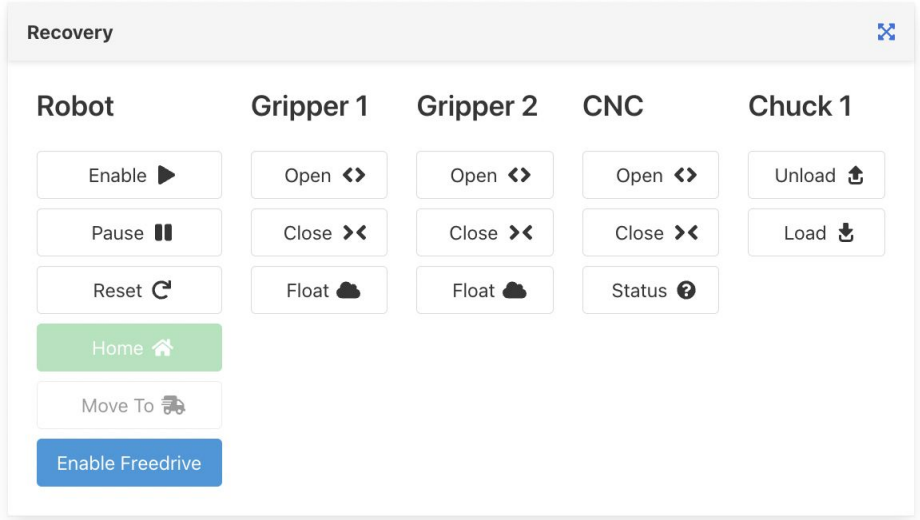


When **Enable Freedrive** is selected, a popup window will appear allowing the user to set the payload. Select what the robot is holding (Jaws, Jaws and Part or Empty Gripper) and set the remaining fields to properly set the robot payload.

How Freedrive is ended is robot specific. Refer to the Robot Installation, Configuration and Operation manual that matches your make and model for more information about using Freedrive.

For UR robots, select the “Continue” or “Stop Program” button to exit Freedrive

Recovering from CNC Processing Errors



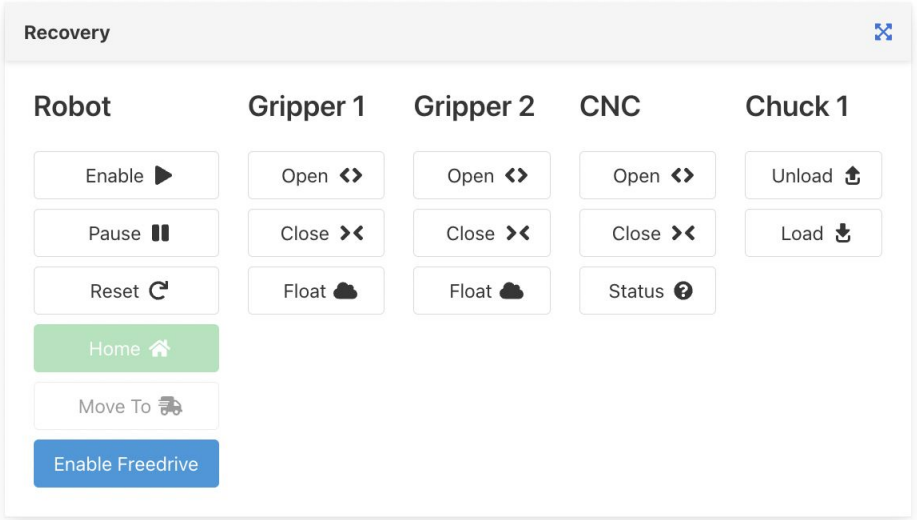
CNC Processing Errors

If an error occurs during the CNC turning cycle the VSC will need to be put into Recovery mode and the robot will need to be reset similar to the start of the job.

Start by pressing the Recovery Button. Move the robot to Home using the Home button in the Recovery panel. Remove the part from the chuck and make sure the chuck is free of chips. If the robot gripper is holding a part, remove the part from the gripper.

When all VSC steps are complete and the CNC is back to it's starting state, end Recovery mode, and press the VSC Cycle Start button to continue.

Recovering from Robot Processing Errors



Robot processing errors most commonly occur if the robot collides with something or the robot actual payload differs significantly from the programmed payload. This can occur if the robot fails to pick a part or drops a relatively heavy part. When a robot processing error occurs, the VSC will go into Recovery mode automatically.

The first step is to reset the robot so it is ready to accept commands again from the VSC. Resetting the robot is robot model specific. Refer to the Robot Installation and Operation Manual that matches the robot used in your Lathe Automation System.

When the robot is reset, move the robot to Home using the Home button in the Recovery panel. Clean off the chuck(s) with compressed air and remove any parts held in the chucks. If the robot is holding a part, remove the part from the robot gripper.

When all steps are complete, end Recovery mode, and press the VSC Cycle Start button to continue.

IO Panel, Calibration and About Page

Section 5

IO Panel

The VSC IO Panel Page is a dashboard displaying all inputs and outputs configured in the VersaBuilt System Controller.

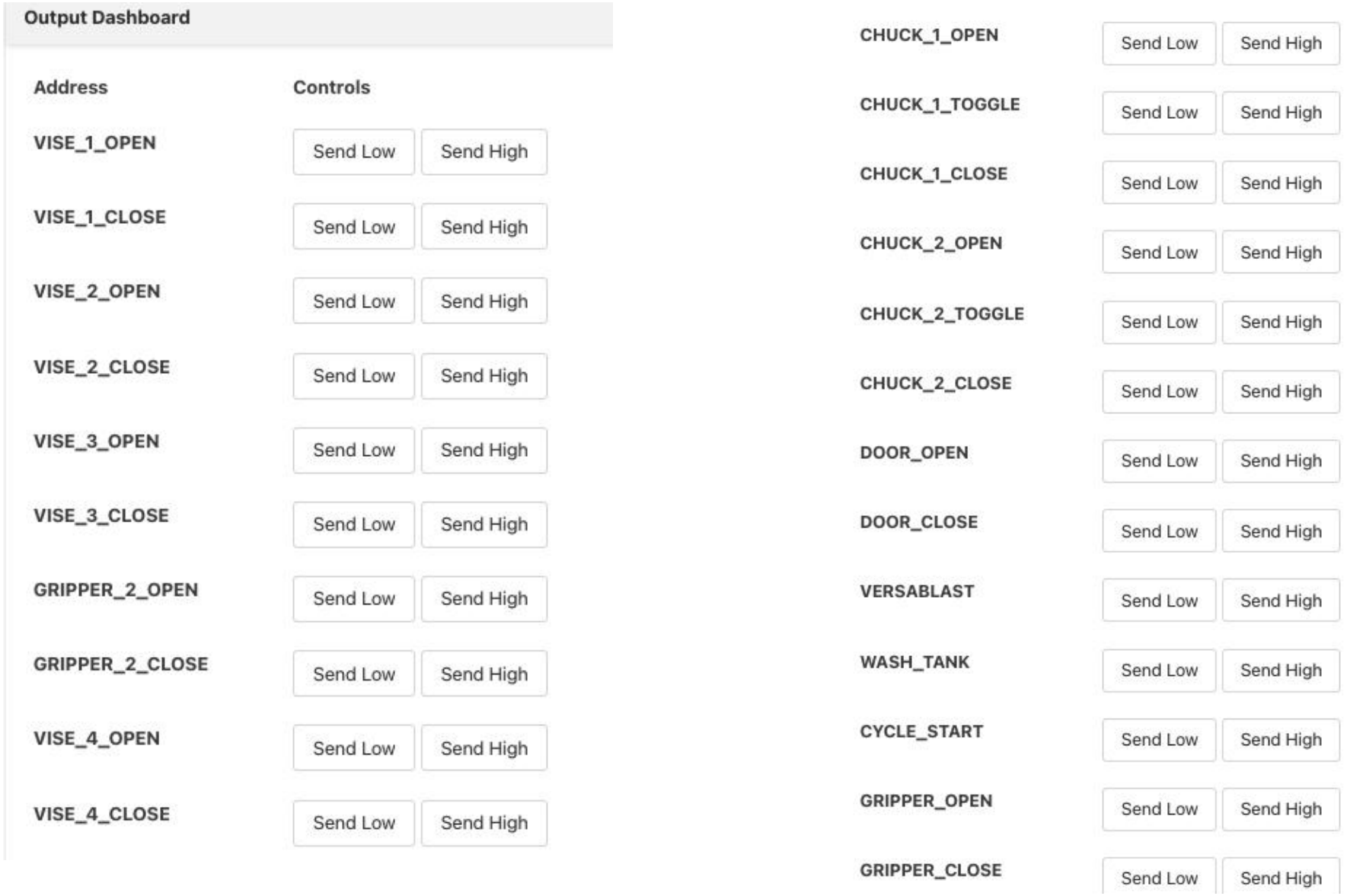
The dashboard displays high and low settings with buttons to toggle high and low for testing and troubleshooting purposes.

The IO Panel is used to verify the installation and to troubleshoot problems.

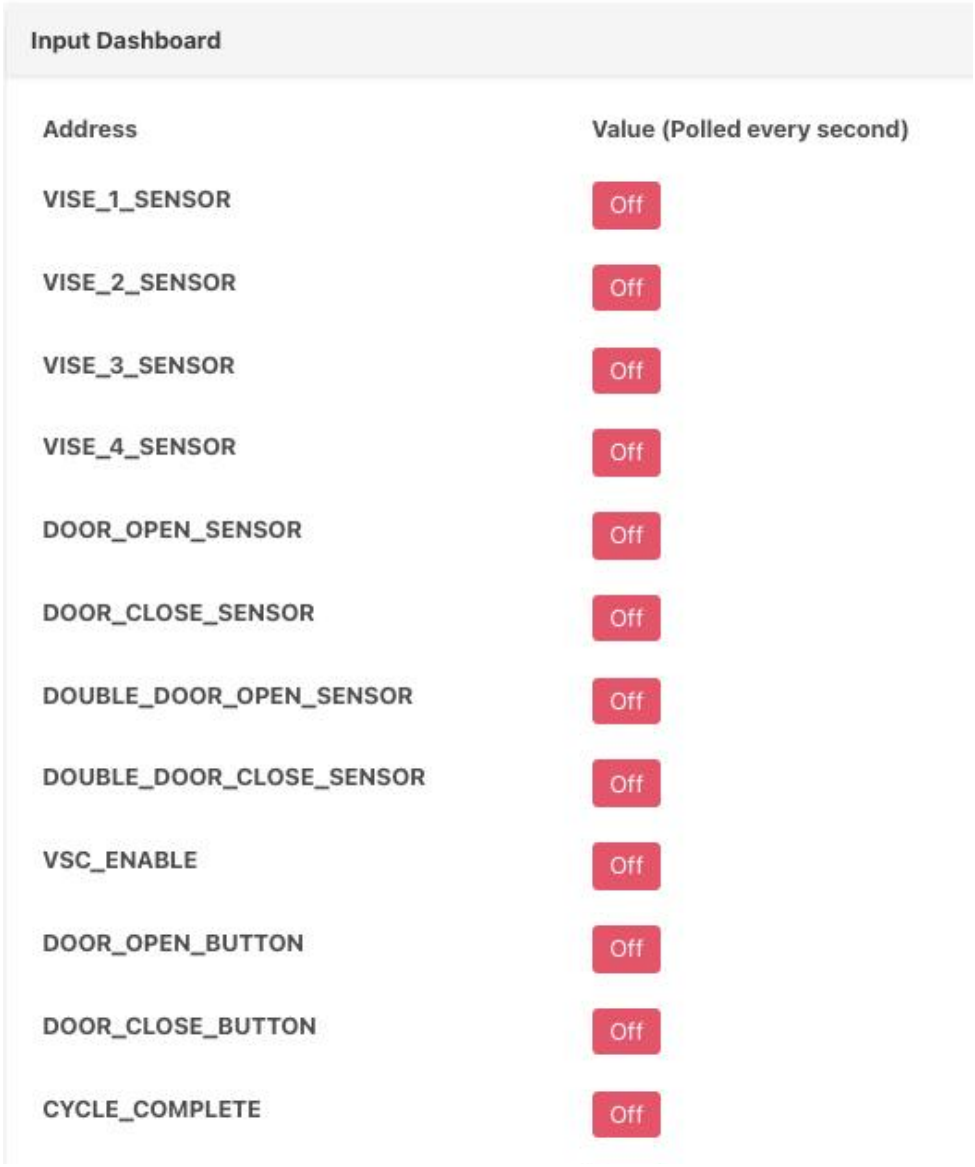
- Outputs send signals to devices (Open Chuck, Close Door, etc)
  - Send High - Turns on the signal
  - Send Low - Turns off the signal

- Inputs receive signals from devices (sensors, cycle end from CNC, VSC Enable button, etc.)
  - Off - no signal is received from device
  - On - signal has been received from device

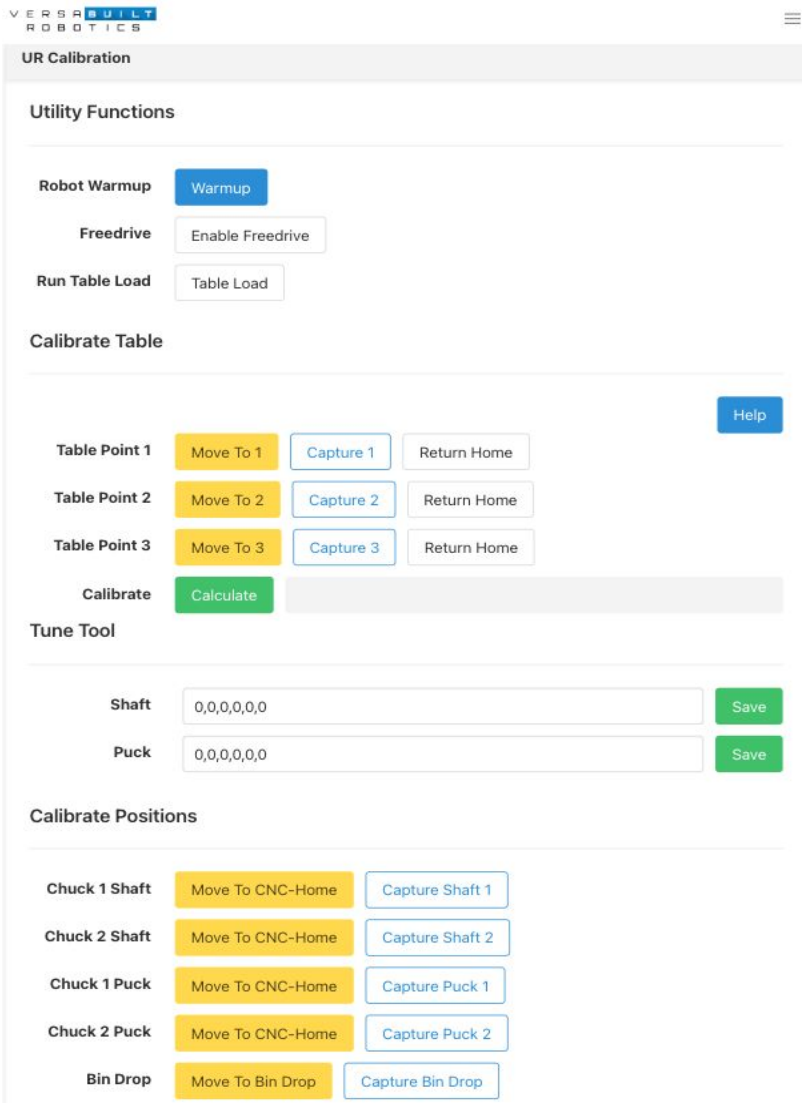
IO Panel - Output Signals



IO Panel - Input Signals



VSC Calibration Page

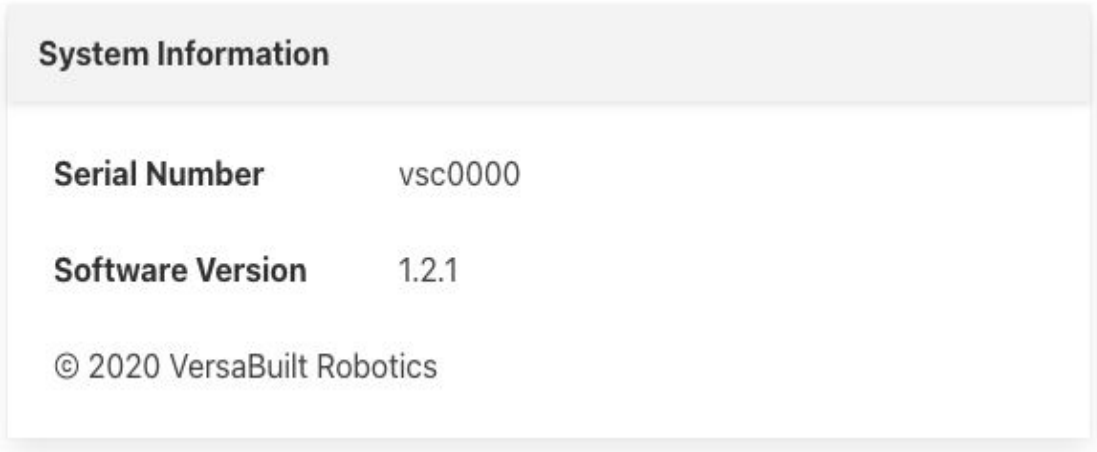


The VSC Calibration Page is used to calibrate the Robot Infeed, in-CNC position, VersaBlast position, and Vises.

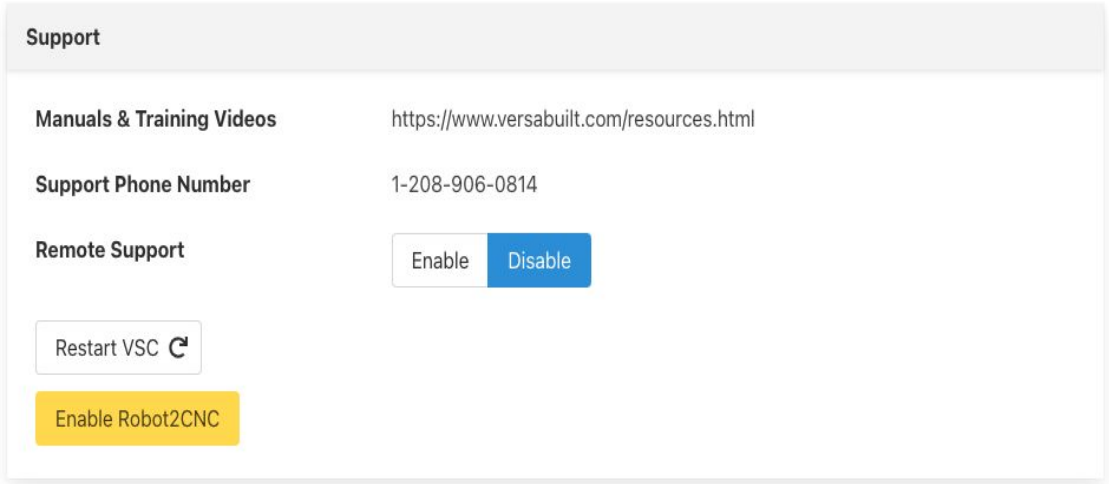
Pressing the **Warmup** button will cause the Robot to move over the VersaCart table to warmup the robot joints. If the robot hasn't been used for more than an hour or the robot is below 60F, VersaBuilt recommends running the warmup cycle several times to ensure that the robot will be accurate.

The VSC Calibration page use is documented in the Lathe Automation System Installation Manual.

VSC About Page



The System Information Panel includes the serial number of the Lathe Automation System and the software version



The Support Panel includes information about manuals and training videos, VersaBuilt's support telephone number an option to Enable or Disable remote support over the Internet for a VersaBuilt technical support representative and a button to Restart the VSC.

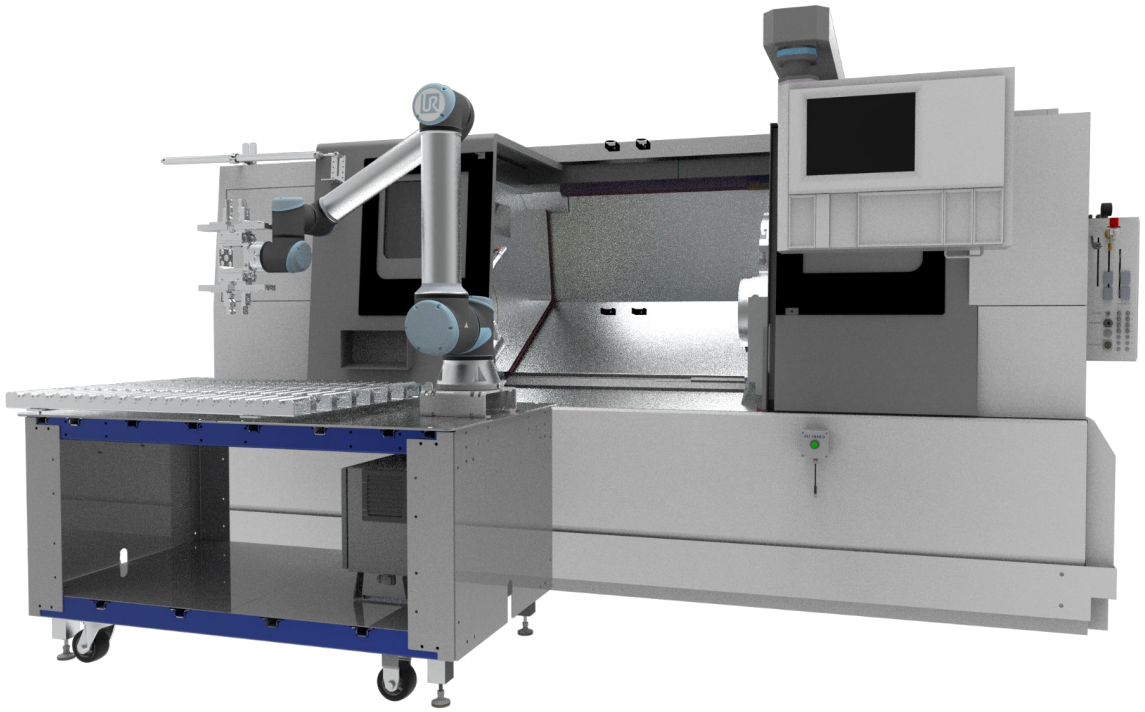
Cleaning and Maintenance

Section 6

Cleaning and Maintenance

Daily Maintenance:

- Lightly dampen a cloth with warm, soapy water
- Wipe down the robot, gripper and the VersaCart
- Use a clean dry cloth to remove any remaining soapy water

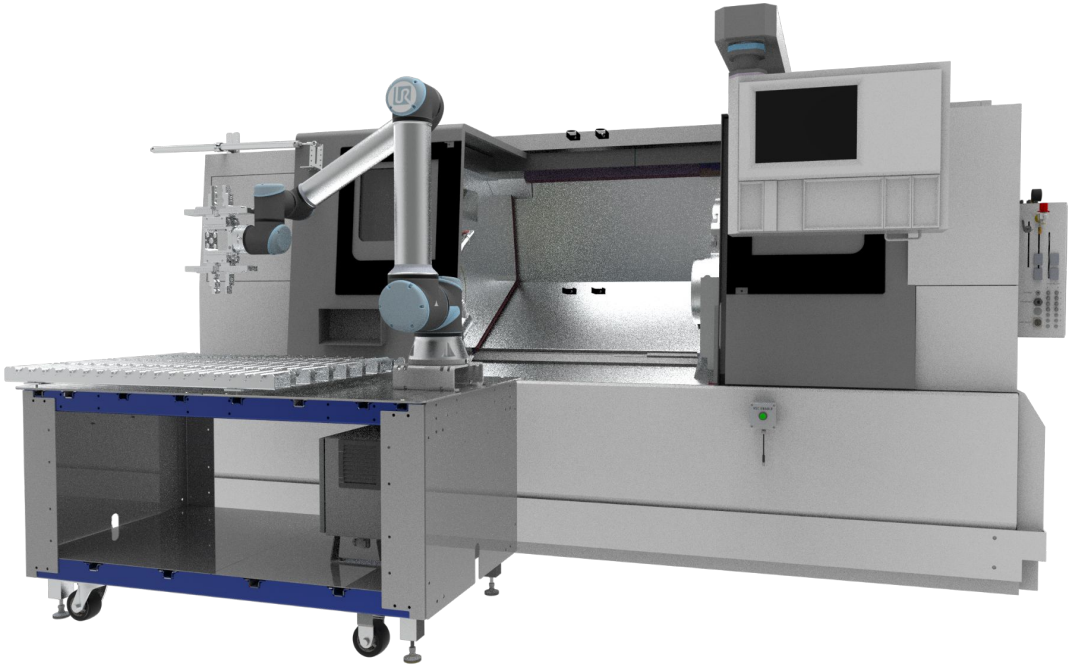


Cleaning and Maintenance

Weekly Maintenance:

- Remove the Visual Infeed top by removing the M6 flat head screws that hold it in place
- Lightly dampen a cloth with warm, soapy water
- Wipe down the VersaCart table top
- Use a clean dry cloth to remove any remaining soapy water
- Wash the Visual Infeed using running water or a pressure washer
- Once dry, re-install Visual Infeed top onto VersaCart

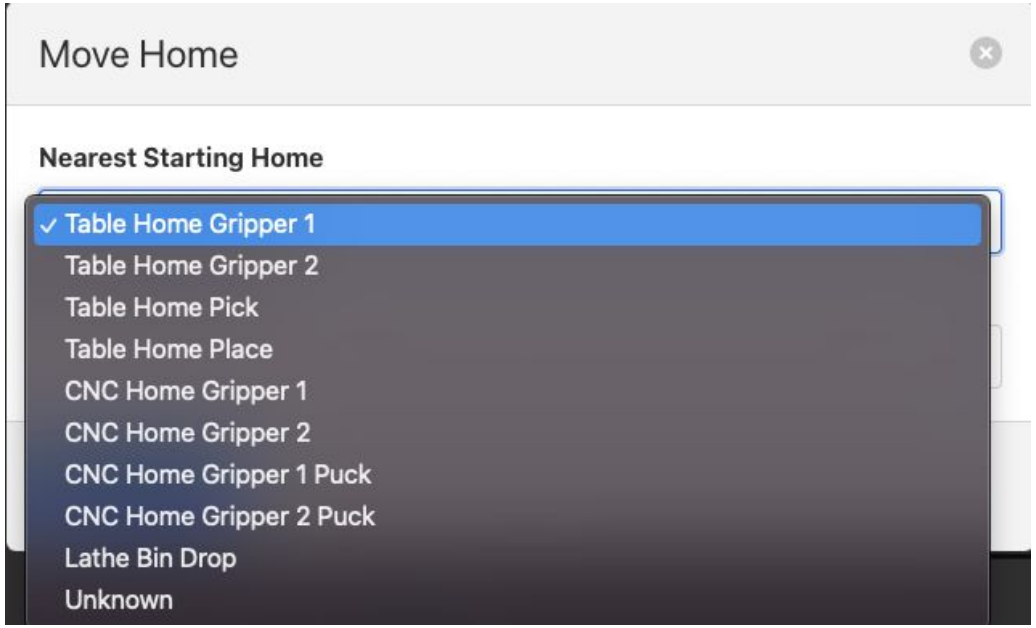
Cleaning and Maintenance - Robot



Refer to the included robot-specific Installation, Configuration and Operation manual for tips on maintenance specific to your robot type.

Appendices

Home Positions



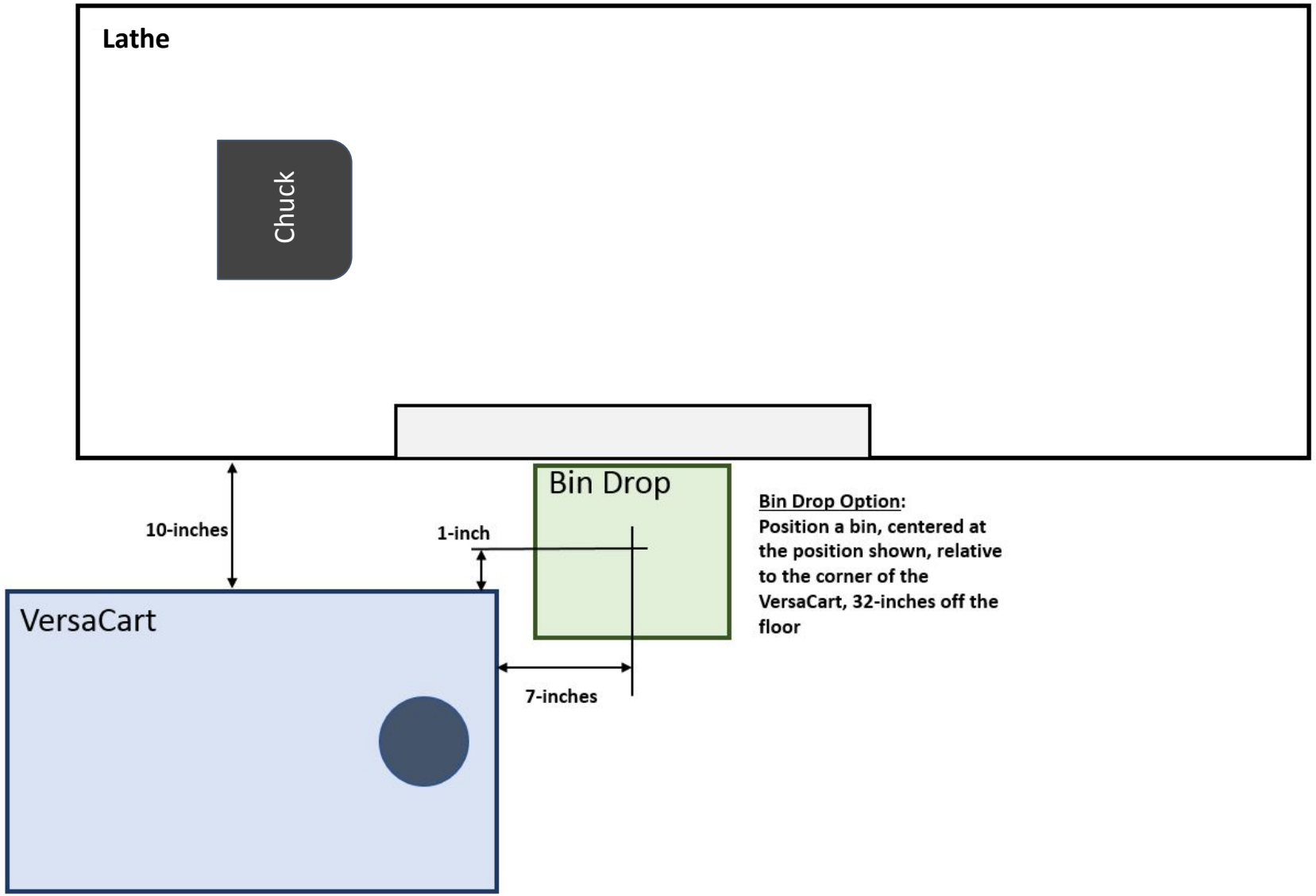
In Recovery, when selecting the Move Home button, the system needs to know approximately where the robot is currently located and optionally where the robot is going.

There are 5 primary home positions:

- **Table Home Gripper 1** - Gripper 1 above center of Table
- **Table Home Gripper 2** - Gripper 2 above center of Table
- **CNC Home Gripper 1** - Robot in front of the CNC, gripper 1 ready to load
- **CNC Home Gripper 2** - Robot in front of the CNC, gripper 1 ready to load
- **CNC Home Gripper 1 Puck** - Robot in front of the CNC, gripper 1 ready to load Puck
- **CNC Home Gripper 2 Puck** - Robot in front of the CNC, gripper 2 ready to unload Puck
- **Bin Drop** - Part drop location

Bin Drop Option

- Place bucket or bin at location shown
- Protect parts with foam, water or other means



VERSA BUILT
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