

V E R S A **B U I L T**



Automation System Troubleshooting Manual

Table of Contents

Section 1

Section 2

General Troubleshooting

Topics and Solutions

Chips

Robot mis-loads / mis-picks

System stalling-out

User Interface Connection

System Problems after running manually

Robot Fault - Joint Error

Robot Protective Stop

MultiGrip Workholding

Sensors

VersaBuilt System (VSC) User Interface Errors & Notifications

All Manuals are available in PDF format at <https://www.versabuilt.com/resources/>

Use the PDF to search for topics or errors

Manuals are updated regularly. Re-download each for each use.

General Troubleshooting

Section 1

Quality and Support

VersaBuilt is committed to providing excellent customer service and support. We aim to fulfill the highest standards in quality control and quality assurance with process control and product/system testing prior to shipment.

We also understand that a perfect and unblemished record will be difficult to achieve. With that, we put an emphasis on an urgent, empathetic, measured approach to solving issues and helping our customers.

To our customers: We are in this together and we will not let you fail. You've made a significant investment in our products and trust in VersaBuilt. We intend to exceed your expectations.

New Systems / New Installations

The keys to getting started with a new system are:

1. **Follow the Installation Checklist** and familiarize yourself with manuals and resources. Manuals, CAD Models, Checklists and Guides can be found at www.versabuilt.com/resources.
2. **Setup and enable remote support**, then verify that the VersaBuilt support team can access your system for software updates and troubleshooting.
3. **In the initial installation, be methodical:**
 - a. Validate your process with hand loading first
 - b. Validate the system components through the Recovery Panel on the Home Page and by activating Outputs and checking Inputs on the I/O Panel Page.
 - c. Aim for a system that will run relentlessly. Start with reliability and then start working on speed/efficiency.
4. **Refer to the Manuals** found at www.versabuilt.com/resources, covering all topics of a system and accessories
5. **Maintenance!** Refer to the VersaBuilt Maintenance Manual and the Robot Maintenance Manual. Keep the robot clean and free from coolant with daily wipe downs. Simple cleaning can be the difference between a reliable system that runs for 10+ years and a system with regular downtime.
6. **Don't struggle** - Contact VersaBuilt (support@versabuilt.com) when something is not working, or behaving as expected. There are no bad or silly questions. Let's get you running with confidence.

General Troubleshooting

- **VersaBuilt is available for help, troubleshooting and support.** We are most effective when remote support is enabled and a customer contact is available for phone or video calls at the system.
- The cause of most issues is something simple.
- Yes, sometimes restarting the system (VSC restart) or a power cycle is needed.
- In general, with automation systems, the robot or system did the thing you observed because it was told to do so. Either VersaBuilt's software has a bug or the input or a change by the user/configurator/operator caused an issue.
- Isolate variables or use the tools available to test one thing at a time.
- Notes or pictures of error codes and/or the system state can be the key to solving or troubleshooting.
- When errors or issues occur, these questions are helpful:
 - Has something changed? Setup, process, part, program, software or environment.
 - Has this happened before?
 - How can I repeat this error or issue?
 - How can I test it with available tools?

General Troubleshooting

Has something changed / What has changed?

It's common when automation stops, to make assumptions about the cause of the stop without considering that it could have been caused by a recent change or adjustment to or with the system. If a machine has been running for a period of time, then stops, it is appropriate to ask the question, "What changed?" Examples:

- Has something changed with the CNC settings?
 - Is the 9000 or Dispatcher program in memory?
 - Have the CNC communication settings changed?
 - Does the G-Code include the correct end of program commands?
- Has something changed with the VSC part configuration?
- Has the Cart moved? or did it get bumped by a forklift?
- Has the CNC moved?

General Troubleshooting

Did something move? The CNC, the Robot Cart. We've seen CNC's move 1-3" from the original mount position over the course of a couple days, depending on how they are used. CNC's moving 0.03" can cause automation issues. Check cart position. It's possible for a cart to easily move during operation on a polished or slick floor. Perform regular maintenance, checking for loose connections on hardware (e.g., robot mount). If cart or CNC is moving, it may require anchoring to the floor.

General Troubleshooting

Did a new process get introduced? Something as simple as adding a new tool in the CNC can cause a change that interrupts the automation process.

For example, VersaBuilt added a Shell Mill for a new part on a CNC that had been running robotically for months. After a couple of hours running the new part, the system faulted because the door was stuck. Hours were spent trying to find the problem with the door opener. Initially, we focused our attention on the door cylinder and shop air pressure. After further review, we realized it was caused by chips getting thrown by the Shell Mill onto the door rail. The tool path of the Shell Mill was modified to throw chips in a different direction and the problem was resolved. If we started with “what changed?”, we may have targeted the root cause of the problem faster.

General Troubleshooting

Did something get modified?

Examples:

- A new set of MultiGrip Jaws were introduced to an existing part may require a change to the part configuration.
- Parts were run manually and the M codes at the end of the programs were changed, then not changed back before running with the robot.
- Manual valves were left in the closed or open state, rather than the closed/neutral position.
- CNC networking settings were changed.

General Troubleshooting

Did something get damaged? It is common and understandable to make mistakes or have accidents. These adverse events can cause things to move or cause system failures. For example, if the MultiGrip Jaws get dropped on the floor during handling, the cross-pins may get bent, causing a number of issues that may misdirect your troubleshooting. These issues could be:

- Jaws mispicked by the robot
- Jaws misloaded into the MultiGrip Vises
- Machining out of tolerance (z-height changes to the part)

General Troubleshooting

Was there a recent software update?

With software updates, close attention to the system as it is ramped up again is critical. Work closely with VersaBuilt during updates and testing.

Topics and Solutions

Section 2

Chips

Machining Chips can become the number one cause of automation stops. The following are a list of issues, with the resolution of

- 1) Maintenance and Regular cleaning
 - 2) Improved / more thorough jaw and part wash at the VersaWash for MultiGrip Systems
- Build-up of chips on door rail, causing door faults
 - Solution: regular maintenance and review process to determine if chips can be deflected or redirected, with coolant or tool path changes.
 - Chips on the vise surface, causing robot mis-loads or bad parts
 - Solution: review table wash program. Table wash needs to thoroughly wash vises, ideally with coolant. It is better to take more time washing the vises, to ensure chip removal than to optimize the table wash for time.
 - Chips on the bottom of soft jaws, causing robot mis-loads or bad parts
 - Solution: Check the water levels and performance of the VersaWash Nozzles. Via the Calibration Page, select VersaWash Test while the robot is holding a set of jaws.
 - Build-up of chips in the interface between the MultiGrip Jaws and MultiGrip Gripper
 - Solution: regular maintenance - use the provided pick to clean out the interface between job setups.

Chips during Mill Automation with MultiGrip

If there are issues with chips getting under the part or under the jaws during processing, we recommend:

- Using thru spindle coolant to wash jaws and parts before and between operations
- Adding time or slowing down the federate during table wash to make it more thorough
- Select all Jaw Cleaning checkboxes in the part configuration:
 - Wash program includes thorough cleaning of the Op2 Vise before starting the robot process to clean the empty Op2 Jaws
 - After Op1 to clean the empty Op2 Vise.
 - Increase VersaWash cycles, with slower dunk speed (see example below with 0.25 dunk speed, and 5 cycles)
 - You can slow down the VersaWash process with a valve between 0 and 1 in the Dunk Speed
 - It is possible that chips are in the wash tank and getting washed onto the jaws:
 - Make sure you have a clean filter around the VersaWash pump (600-micron version of <https://www.mcmaster.com/2514K28/>)
 - Clean the tank with new water daily
 - Clean the filter weekly, replace as needed or on a monthly schedule

Jaw Cleaning Options

☒ Op 1 Empty Jaws Cleaning

☒ Op 2 Part Cleaning

☒ Op2 Empty Jaws Cleaning

☒ Table Wash After Op2 Empty Jaws Cleaning

☐ Dump Coolant at In CNC Home

☐ Dump Coolant at CNC Home

VersaWash Settings

Cycles	Dunk Speed	Drip Time(seconds)	Rotational Drip Speed
5	0.25	20	1

Robot mis-loads or mis-picks to/from the CNC

System is not in Auto-Mode

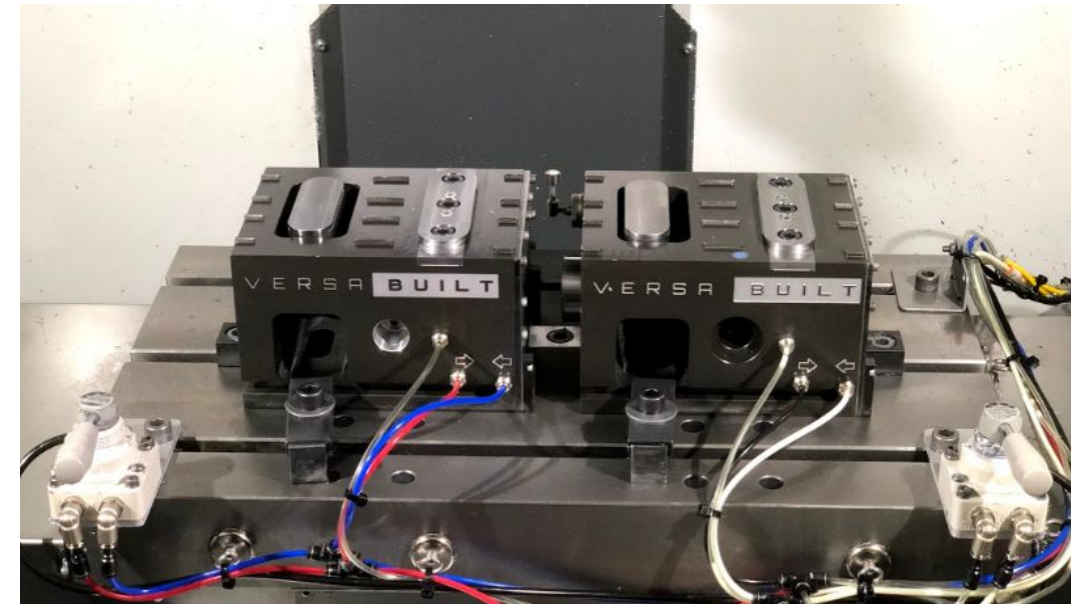
Verify Diverter Valve (Auto/Manual) valve is in the Auto position, allowing air pressure to reach the automatic valves in the VSC

Also verify the Hand Valves in the CNC for the vises are in the “center-closed” position (blocking shop air from passing through the hand valves to the vises during automatic operation)

Vise hand valves not in center position

When running in AUTO mode, verify the Hand Valves in the CNC for the vises are in the “center-closed” position (blocking shop air from passing through the hand valves to the vises during automatic operation)

Image shows valves in center position



Robot mis-loads or mis-picks to/from the CNC

Robot mis-loads or mis-picks to/from the CNC

- Is the CNC or VersaCart moving? Has there been any recent robot collision/crash? Has a person accidentally bumped into the Versacart?
 - Recalibrate the vises and watch for possible position changes of the cart or CNC by drawing a mark around the footpads. If CNC is moving, consider anchoring it to the floor.
- Are there chips between at the Gripper Fingers to Jaw interface?
 - Include regular inspection and cleaning of Gripper Fingers and Jaws
- Check to see if the Vises are opening and closing properly
 - If opening and closing seems to be slow or inconsistent, see following page for vise troubleshooting

Robot mis-loads or mis-picks to/from the CNC

Vises are not actuating or are actuating too slowly

- If not actuating:
 - Verify the hand valves are in the correct position, then try with the I/O Panel or Recovery Panel:
 - If you can, do a test load and observe if the vises are not opening or closing at all or are actuating slowly
 - If they are not actuating during programs, but can in the I/O Panel or Recovery Panel, there may be a VSC issue (contact VersaBuilt) or the Load/Unload position is jamming the vise, requiring calibration.
 - Check to see if the vises open and close with Hand Valves. If you can, but not through the I/O panel, there could be something to investigate with VersaBuilt with software or electrical issues in the VSC. If you can with both I/O and Hand Valves, try the program again. If unsuccessful, contact VersaBuilt.
 - If not actuating at all, contact VersaBuilt for vise repair.
- If actuating slowly:
 - Investigate tube routing for leaks and/or kinks
 - Grease the vise **if your vise is of a vintage without a Grease Zerk on the front side, contact VersaBuilt for a Replacement or Refurbishment.*
 - If the speed does not improve with verified tube routing and greasing, contact VersaBuilt to add quick exhaust fittings and/or delays to account for vise open and close speed

Robot mis-loads or mis-picks to/from the CNC

- **Check Maintenance schedule**

- Clean chips out of CNC daily (recommended daily)
- Clean CNC door and door rails (recommended daily)
- Clean out chips or any chip build-up on the Gripper to MultiGrip Jaw interface (recommended daily)
- Clean robot and robot cover (if used) -(recommended daily)
- Clean the VersaCart table top (recommended monthly)
- Clean robot controller
- Look for leaks in air tubing (monthly)
- Look for kinks in air tubing (monthly)
- *Review Maintenance manual for recommended maintenance on VersaBuilt components

Robot mis-loads or mis-picks to/from the CNC

Bent Cross-Pins in MultiGrip Jaws

MultiGrip Jaws have 2 cross-pins, with springs, connecting the left and right jaws. These cross-pins hold the jaws together and hold the springs, allowing OD jaws to spring-open, and ID jaws to spring-closed.

If MultiGrip Jaws are dropped or mis-loaded in a vise, then clamped, it is possible that the cross-pins could get damaged or bent.

- Bent cross-pins may cause the jaws to not open/close properly
- Bent cross-pins may cause robot mis-loads
- In order for the MultiGrip Gripper with MultiGrip Jaws to work properly, the OD Jaws must spring-open and ID jaws must spring-closed.
- Jaws may get loaded in the vise, but not fully seat in Z, which can lead to parts getting machined out of spec, or jaws getting machined.

If you are noticing

- Dropped jaws
- Robot Misloads
- Parts out of spec

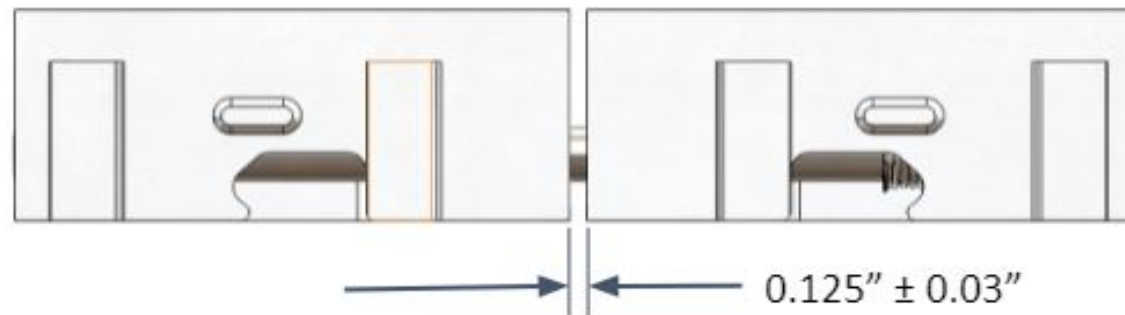
Remove the cross-pins from the jaws, roll them on granite to check flatness/runout. If they are not straight, discard and replace.

Robot mis-loads or mis-picks to/from the CNC

MultiGrip Jaws set up - gap between left and right jaws out of spec

OD Jaws should be machined or setup with a 0.125" gap when clamping on a part during milling **using provide 1/8" spacer when machining pocket in jaws*

- Gaps above 0.19" may cause robot load/unload errors due to minimal vise to jaw feature interference and may cause vise sensor errors (false negative - detecting part missing, when part is actually clamped).
- Gaps under 0.09" may cause vise sensor errors (false negative - detecting part missing, when part is actually clamped). There will not be robot picking errors, but note the material tolerance to guard against clamping the left and right jaw closed, before engaging the part



System Stalling Out

The robot seems to stall out or run inconsistently, without an error on the screen.

- 1) Check that the Dispatcher program is in Memory on the CNC
- 2) Check for errors on the Teach Pendant (if there are errors, recover *unless it is a fault that requires a robot manufacturer case to be created)
- 3) Check that Ethernet connections are made and lights on the ethernet switch are illuminated
- 4) Check that there is electrical power and air pressure to the VSC
- 5) If electrical power is supplied by the CNC, change to a separate source. CNC power can fluctuate during machining operations, causing power drops to the automation system.
- 6) If all states look normal, contact VersaBuilt, support@versabuilt.com, with Remote Support Enabled for troubleshooting and testing. Troubleshooting may include:
 - a) Testing the Cycle Start Connection
 - b) Testing the Ethernet Connections
 - c) By passing Ethernet connections with direct connections between the Ethernet switch and devices
 - d) Replacing the Ethernet switch
 - e) Replacing Ethernet Cables
 - f) Update to the program to include software updates for communication issues from the VSC to the Robot.
 - g) Back up system and replace SD Card in VSC computer

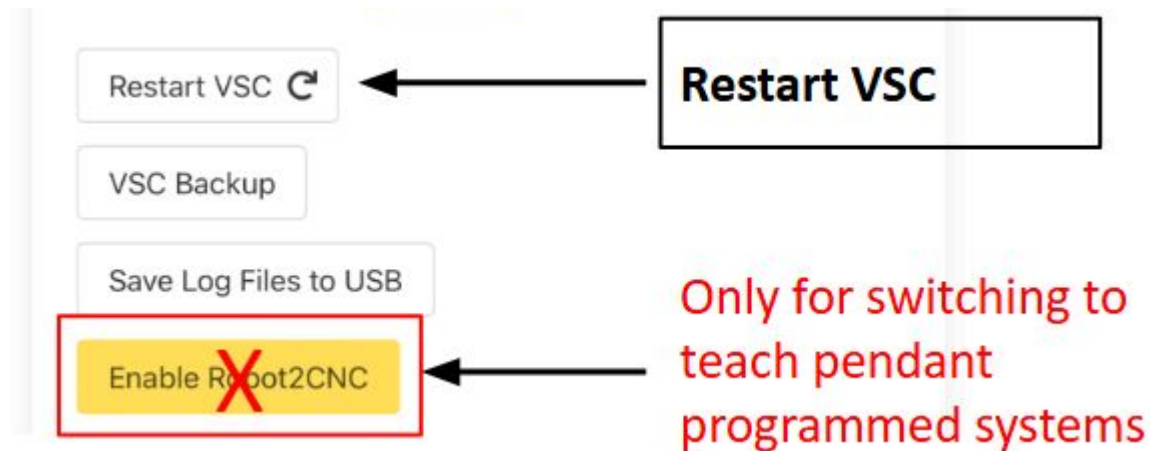
System Stalling Out - Power Fluctuations

- **Do not use power from the CNC, as this can cause system interruptions**
 - Connect automation system components to separate, isolated supply
- **If the system has random stops, consider adding a back-up power supply, such as:**
 - APC BX1500M Back-UPS Pro, 1500VA, Tower, 120V, 10 NEMA 5-15R outlets, AVR, LCD - Tower - 16 Hour Recharge - 3 Minute Stand-by -120 V Input- 120VAC Output -5 x NEMA 5-15R, 5x NEMA 5-15R Surge Receptacle

User Interface - Not Connecting

All of a sudden I can't access user interface after selecting "Restart VSC"

It is likely that the system was switched to Robot2CNC mode, by selecting "Enable Robot2CNC". To switch back to VSC mode, the Robot2CNC interface needs to be accessed. The web page for Robot2CNC is will end with 9001 rather than 9000 (same address, just different ending). After connecting to the Robot2CNC interface, go to the about page and select "Enable VSC". The system will restart and can be accessed with a web browser address ending in 9000.



User Interface - Part Configuration Updates

The update I made in the Part Configuration is not happening

When changes are made to a Part that is actively loaded in the Home Page Job Screen, the updates are not loaded into the active job memory. To update the job memory, go to the Part Configuration selection in the Home Screen, select a different Part, then reselect the changed Part.

System problems after Manual Intervention

I just changed jaws or intervened in some way and now the robot won't load, or looked like it crashed.

- Check the state of the Hand Valves. Are they in the middle or closed position?
- Is the Diverter Valve in the "Auto" position?
- Is the "9000" Dispatcher program in memory on the CNC?
- Has the Table Load Position changed?
- Has the supply air pressure dropped or changed?

Robot Fault - Joint Error

There's a critical fault error on the robot teach pendant

- Contact VersaBuilt immediately, support@versabuilt.com, with Remote Support Enabled for troubleshooting and testing
- VersaBuilt and/or the Reseller of the Robot will contact the robot manufacturer to create a case for part replacement or quote.

Robot Protective Stop

Robot protective stop

To recover

- Go to robot teach pendant
 - Select enable robot
- Go to VSC user interface (VersaBuilt interface on Tablet or Laptop)
 - Enable
 - Move Home
 - Select nearest Home position
 - Select “Move Home”
 - Robot will automatically move to the home position

If robot is stuck, select “free-drive” to move the robot by hand

MultiGrip Workholding

How can I seat my part without opening the jaws or vise?

With G-Code Vise control (refer to the VSC/CNC Communication, G-Code and Programming Manual), the Vise Pressure can be exhausted, then a CNC tool can push the part into place.

MultiGrip Workholding

The vise and jaws are not behaving the same as my Kurt Vise or Manual Vise

Refer to the Safety Manual, the MultiGrip Manuals and the Manual Vise (Kurt) manual for details on clamping forces. Adjustments in machining techniques may be required when transitioning from manual workholding to automatic/actuating workholding.

Also, MultiGrip Jaws are engaged with clamping force at the bottom surface, at the dovetail interface. This is 1 to 4 inches below the clamping interface between the part and the jaws. This distance causes a moment-load on jaws and can cause deflection (frowning of OD clamping jaws). Refer to the **Workholding Design and Best Practices Manual** for guidance.

Contact support@versabuilt.com for further assistance with our internal team of machinists, with 10+ years of experience integrating 100's of parts with MultiGrip.

MultiGrip Workholding - Replacing Cross-Pins

Replacing MultiGrip Jaw Cross-pins

- Cross-pins are held in place with external retaining rings (McMaster-Carr #97431A300). Remove the rings with a small flathead screwdriver.
- Replace one cross-pin at a time. First, secure the cross-pin on the fixed jaw, pushing 2x external retaining rings into place (per cross-pin on the fixed side). Use a Removal Tool for Push-in Rivets (McMaster-Carr #97576A500) to compress the spring when adding the retaining ring on the spring side. *use a flathead screwdriver to save your fingers, when pushing in the rings.



MultiGrip Processing

Logic to continue operating a Mill Automation System with MultiGrip, but stop machining a part if there is an Op2 probe failure

- If inside the tolerance, continue with the machining program
- If outside the tolerance:
 - Go to the end of cycle routine, calling the wash program

...

M98 P8000

M30

%

- Wash routing ends, signaling cycle end to the robot

%

O8000(DEFAULT TABLE LOAD POSITION)

#3000=1(LOAD POSITION NOT SET)

G0G53Z0(MAKE SURE Z AXIS IS HOME)

G0G53Xx.xYx.x(SET TABLE LOAD POSITION)

M98 P9004

M30

%

- Verify Part configuration settings include all Jaw Cleaning Options selected
- Add counter in the probe routine to stop the machine after n number of probe failures in a row, and/or m number of probe failures total during a batch

Sensors

System stops can be caused by false sensor flags, with VersaDoors, Vises with sensors, Safety Scanners, etc.

- Routine maintenance - include sensor checks, with adjustments and re-securing sensors (as needed)
- Do you need sensors?
 - Spindle probes before, during and after machining are more effective than vise sensors
 - Sensors typically cause system stops, same as a robot motion error (cobots are sensitive sensors themselves)

VSC User Interface - Home Notifications

Basic Home Page Notifications

"No part selected to run."

- Definition: The operator pressed Cycle Start without selecting a valid part program for the automation to run.
- Solution: Verify that a part is selected from the dropdown menu on the home page and that the quantity is set correctly before starting

"Failed to start robot, please try again."

- Definition: The robot failed to initiate the start sequence, causing the system status to become "Paused".
- Solution: Verify that the system is enabled, the robot's Teach Pendant is in Remote Control mode, the safety runchain is clear, the E-stop is not engaged, and the active part parameters are valid. If the robot alarm icon is active on the interface, use the Recovery panel to perform a robot reset.

VSC User Interface Errors

Structured Processing Errors

If an error occurs during a job, it will halt the process and present an operator-visible error code

Error 50: Part Fumbled

- Definition: A robot pick failure occurred beyond the allowable retries. This indicates the part is missing or mispositioned.
- Solution: Reload the part manually, and verify your pickHeight parameter and your infeed calibration

Error 52: Part Not Loaded

- Definition: The automation attempted to run, but the infeed slot is not marked as loaded for the selected part.
- Solution: Ensure you have visually loaded the part into the infeed map on the VSC UI. You should also verify that the selected part, infeed template, and stack count/layer configurations are correct.

Error 66: Unload Part Fumbled

- Definition: The robot did not successfully pick the machined part from the vise. This could mean the part is missing from the vise, there is a bad transfer height, or the gripper sensor failed to read.
- Solution: Check the workholding and gripper sensors. Verify your configuration parameters for partHeight, gripperJawHeight, and clamp directions. You will need to recover the system manually.

VSC User Interface Errors

Error 107: CNC already running

- Definition: The VSC attempted to send a generic run command to the CNC while the machine was already busy, resulting in a double-run or stuck busy state.
- Solution: Reset the CNC driver from the VSC and inspect the current program state directly on the CNC control to clear the busy state.

Error 123: Failed To Set Payload

- Definition: The robot refused a command to set its payload.
- Solution: Verify that your payload values are configured correctly, reset the robot, and ensure the robot's Teach Pendant is strictly in Remote Control mode.

Error 125 / 126: Unknown Starting Home

- Definition: The process or recovery routine requested an impossible or unknown home location that is not covered by the system's home mapping.
- Solution: Manually move the robot home using the Recovery panel. Inspect your process parameters and calibration settings to ensure the specified home names exist.

Error 139: Vise jaws out of tolerance before clamp

- Definition: The OD vise load engagement check failed, meaning the jaws are outside of the allowable position tolerance before clamping. This is caused by bad vise calibration or an incorrect jaw position.
- Solution: Recalibrate the vise frame, check the load offsets, and test the load/unload sequence.

VSC User Interface Errors

General Troubleshooting Tip: If you ever receive a generic "6 Internal Error", this means an unstructured or unexpected fault occurred (like an invalid process logic).

You should enter Recovery mode and inspect the system logs for the original stack message to determine the root cause. Furthermore, if the system stalls without a specific VSC error, always check the robot's Teach Pendant for a Protective Stop or joint collision error, which requires manual recovery before the VSC can resume control

V E R S A **B U I L T**