Automation System Order Expectations and Pre-Installation Checklist

The following document will provide an overview of VersaBuilt Automation Systems, in preparation for system installation. VersaBuilt aims to delight customers by exceeding expectations for each purchase and installation. This document includes sections listed below to communicate lead time, a review of the system specifications, how to prepare for installation and automation ramp-up, and a review of installation steps.

Lead-time

- Average 2-3 weeks after receipt of order
- If an order includes customization, such as oversized infeed, jaw design, custom processes, etc., lead time may be extended
- Freight transit time – Average 1-week, depending on location

Keys to success

- Prepare for the system by following this document
- Use the installation checklist when integrating the equipment
- Prove out parts manually first, then introduce automation
- Enable remote support
- Refer to manuals and guides at www.versabuilt.com/resources/
- Use the VersaBuilt team for help by contacting us at support@versabuilt.com

VersaBuilt Automation System Overview

VersaBuilt Automation Systems are flexible robotic solutions that allow fast and easy setup for single-part and high-part-mix environments. Each Mill Automation and Lathe Automation System is a standard product, with optional accessories and/or configuration (e.g., Jaw type for Mill, number of Vises, Shaft processing for Lathe, VersaDoor, and customer-specific part processing requests). The user interface is an intuitive, user-friendly application using a customer-provided tablet, phone, laptop, or computer connected to the system *typically via Wi-Fi.

The systems utilize “parametric” programming, where the user inputs parameters (such as part height, weight, CNC program number, number of operations, etc.) rather than programming each part with traditional teach pendant programming. Part parameters are saved as individual “part configurations” in the VersaBuilt System Controller (VSC), allowing for all of your part’s “programs” to be saved without the need to re-setup or re-program when switching between parts.

For each part configuration, a “script” is selected for the part process. Standard scripts are included with each system, such as 1, 2, and 3 operation parts, Part Stacking at the VersaCart infeed, and Shaft or Puck processing for Lathes. Non-standard and custom scripts are available for a quote.) Scripts can be edited or added by VersaBuilt, advanced users or with guidance from VersaBuilt technical support.

The robot moves between pre-programmed robot home positions and calibrated positions (calibrated at the time of installation) while communicating with the CNC to initialize cycle start or wait for a cycle end signal from the CNC. Haas and Fanuc Focus 2.0 Controls allow for dynamic CNC program communication from the VSC to the CNC and G-Code communication from the CNC to the VSC. Other controllers utilize a handshake between the CNC and VSC, where the VSC sends a Cycle Start to initial CNC control and the CNC sends a Cycle End signal to hand control of the process back to the robot. Lathe Chuck actuation is controlled by either wiring into the existing foot pedal or to the CNC I/O. Wiring for Cycle Start, Cycle End, and Lathe Chucks, please consult your CNC dealer and maintenance team on proper connections.

VersaBuilt Automation Systems are pre-configured to ship with standardized cables and pneumatic tubing at predefined lengths. Tubing is multicolor to enable ease of installation and troubleshooting. Cable ties and magnet loops are used for cable and tube routing. If your application requires a change to the cable or tubing type and/or requires cable/tubing routing with hardware outside of the description above, please contact VersaBuilt for quoting and specification.

Bringing up New Automation

- Follow the installation checklist, available here: https://www.versabuilt.com/resources/
- Each installation of a Mill or Lathe Automation System has unique applications (CNC Make/Model, Vise/Chuck Arrangement, Unique Part Geometry, and Machining Strategies), requiring process development and refinement
- VersaBuilt Automation Systems installation will validate core functionality. This includes Pick/Place, Calibration, Motion, and communication between the robot and the CNC.
- There is an automation ramp-up process during the initial use of all new installations, which requires system monitoring, and typically adjustments will be needed before highly reliable processing is achieved. Items to monitor and refine include:
    - Chip Management
    - CNC movement
    - VersaCart movement
    - Sensors requiring adjustment
    - New part introduction part pick/place issues
    - New part payload accuracy
    - MultiGrip Jaw design (Mill only)
    - Shaft of Puck Finger position or design (Lathe only)
- Process Monitoring and Daily Maintenance of equipment is critical for optimal performance of equipment
- VersaBuilt will continue to work with you for a successful implementation. A troubleshooting manual can be found here https://www.versabuilt.com/resources/

VERSABUILT

Pre-installation Checklist

Customer Checklist Items to complete before installation	Completion/Notes
1. **POC** - Identify a point of contact for installation and user training a. For training before shipment b. To provide dedicated personnel to be available during the installation c. For training upon completion of the installation	
2. Network information for remote support a. Wi-Fi or Ethernet access b. IT contact if using the company network	
3. What PPE is required on-site for an installer?	
4. The customer has a user interface device (Tablet, laptop, keyboard/mouse) *Systems are typically connected to the system via Wi-Fi & devices are not included with the system) Example tablet selections: ● Apple iPad ● iPad Protective Case ● Tablet Magnetic holder	

5. Space available for VersaCart a. Datasheet and CAD models available here: https://www.versabuilt.com/resources/ b. VersaCart 1300 w/ Standard Top = 32” W x 56” L x 30” H Cart c. VersaCart 1300 w/ Oversized Top = 40” W x 56” L x 30” H Cart d. VersaCart 1700 w/ Standard Top = 46” W x 62” L x 30” H Cart e. VersaCart 1700 w/ Oversized Top = 54” W x 62” L x 30” H Cart f. Mounted in front of the machine with space to access for manual operation g. 6-10” from CNC front face to allow full access to complete cart infeed	
6. VSC mount (VSC 1.0 only) a. Determine storage or mount location of VSC within 15 ft of VersaCart, on CNC, Rack, or mounted on the bottom shelf of the VersaCart *DIN rail mounting included	

7. Electrical Prep Complete

a. Power Source: 120 VAC Single Phase / 20A total *<u>*do not branch off CNC*</u>

b. Connections/Receptacles for:

i. Robot

ii. VSC

iii. Ethernet Switch

iv. Ethernet Router

v. VersaWash XT **if included with system*

Robot	120VAC 1 Phase	50/60Hz	Full Load 10A
VSC	120VAC 1 Phase	50/60Hz	Full Load 5A
Ethernet	120VAC 1 Phase	50/60Hz	Full Load 1A
VersaWash Pump	120VAC 1 Phase	50/60Hz	Full Load 2A

*consider adding a backup power supply to prevent power loss or surges to the Automation System. For example: **APC BX1500M Back-UPS Pro i**

8. Does the customer have a scale to weigh parts?*

a. A scale is needed to weigh parts and jaws (e.g., raw material, finished parts, Op1 Jaws, Op2 Jaws)

b. Accuracy within ±0.25 lbs.

*this is not required for ZPS Systems with CRX robots

9. Compressed Air Ready: a. Shop air conditioned to meet ISO 8573-1:2010 [7:4:4] standard (air filters and moisture separators) **if needed VersaBuilt can quote filter system* b. Pressure: 90-120 psi c. Air Consumption: 15-20 scfm d. ¼" Quick Disconnect	
10. For systems with VersaBuilt CNC AutoDoor (VersaDoor) a. CNC will need to be modified (holes drilled for mounting) b. The actuator body and rod-end are mounted with ball joints to prevent loading on the cylinder rod. Modifications to the cylinder or mounting outside recommendations in the VersaDoor installation manual can cause failure and/or performance/reliability issues.	

11. CNC setup ready:

a. What is CNC Make/Model?
b. What is the CNC controller?
    i. Haas & Fanuc Focus 2.0 controllers use VSC Macro communication
    ii. All others use VSC standard communication
c. CNC Door Interlock must be installed
    i. Does the interlock require an operator to push a button
d. Cycle Start connection review
e. Cycle End connection review
f. Chuck actuation (foot pedal or I/O) review *Lathe only
g. Recommended CNC tools:
    i. Tool Probe (Mill)
    ii. Spindle Probe (Mill)
h. Macros-Enabled (Haas Machines)
i. For non-Haas or non-Fanuc Focus 2.0 controls (Generic Driver):
    i. User-definable M-codes
    ii. Cycle Start & Cycle End connection

12. Parts and processes intended for initial use of System

a. Part Dimensions/Drawings/Models
   i. MAS with MultiGrip
      1. Parts less than 17 lbs.
      2. Part envelope of less than 10 x 10 x 10”
   ii. MAS or LAS with DuoGrip 400
      1. Parts less than 10 lbs.
      2. Part size less than 8” Dia (up to 4” diam can be handled with standard parts, 4 to 8” with optional large puck fingers)
   iii. MAS or LAS with DuoGrip 2000
      1. Parts less than 25 lbs. (for DuoGrip Gripper 2000 optimized motion)
      2. Parts less than 40 lbs. (for single gripper flow)
      3. Part size less than 8” Dia (up to 4” diam can be handled with standard parts, 4 to 8” with optional large puck fingers)

b. Cycle Times **refer to Cycle time calculator or review approximate cycle time of system with robot overhead for expectations at installation*

13. Workholding a. Will workholding change from existing setup to automated setup? For example changing from manual Kurt Vises to VersaBuilt MultiGrip Vises with MultiGrip Jaws. If yes: i. What are the differences in clamp forces? ii. What adjustments to the machining approach might be required (feedrate, tooling, etc.)? Typically with automation, slowing down the machining process can increase reliability and uptime, resulting in more production over time (this is the automation tortoise vs. hare concept).	
14. **Cable Routing:** Determine preferred cable & tube route in/out/around CNC	
15. For Lathe System a. Review workholding clearances for part loading. The robot is accurate to +/- 0.015 inches along the Chuck load path. For best results, start with consistent material and Chuck opening as wide as possible with max available lead-in chamfer. Longer parts will require more chuck opening and chamfer to account for error amplification. b. CNC Z-Push Tool is required for parts with tolerances less than ~0.030". This can be mounted in Turret or Tail Stock. c. For accurate calibration of Pucks loaded into the Chuck, a jaw setup for a 3-inch diameter or greater is preferred.	

16. Hand load & make good parts with workholding before installation on CNC in which installation will be complete. a. Install vises and hand valves *Mill System b. Install Automation System files from USB *or https://www.versabuilt.com/resources/ c. 9000 programs for Robot2CNC communication d. 8000 is the table load position program, edited and verified during vise calibration *Mill Systems e. 8001 is the table wash program. The example program provided needs to be validated by a machinist. f. Prove out machining via hand-loading **Note**: *G-Code Program Numbers above can be changed if needed*	

System Installation Steps

1. An installation checklist and complete manuals are available at https://www.versabuilt.com/resources/
2. **Support**
   a. VersaBuilt continues to provide ongoing support for your automation system (support@versabuilt.com)
   b. Each system includes a 1-year warranty
   c. For best results, enable remote support and email support@versabuilt.com with questions, concerns, or details when stops occur (pictures of the VSC screen, and Robot Teach Pendant screen are helpful for troubleshooting)