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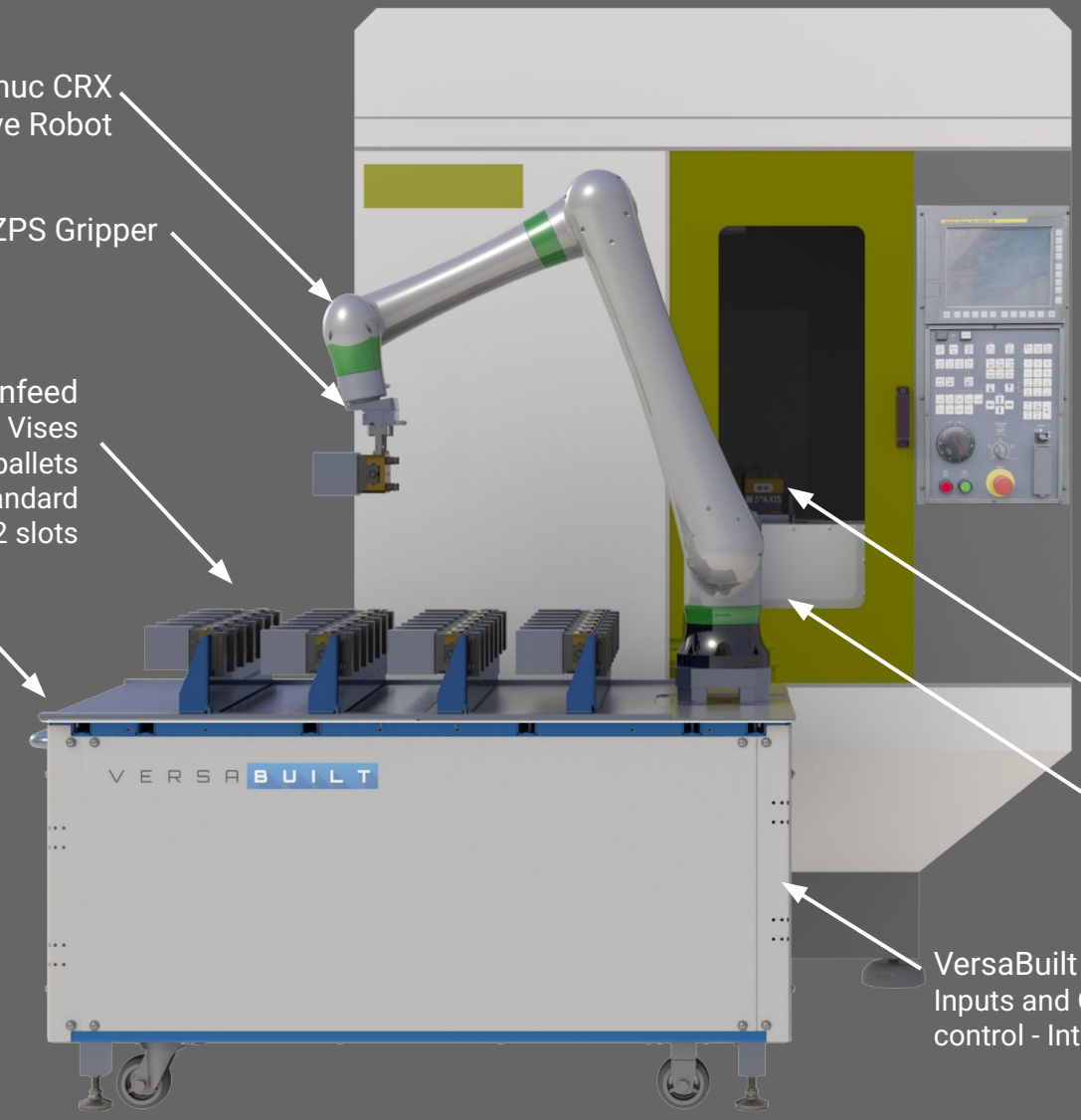
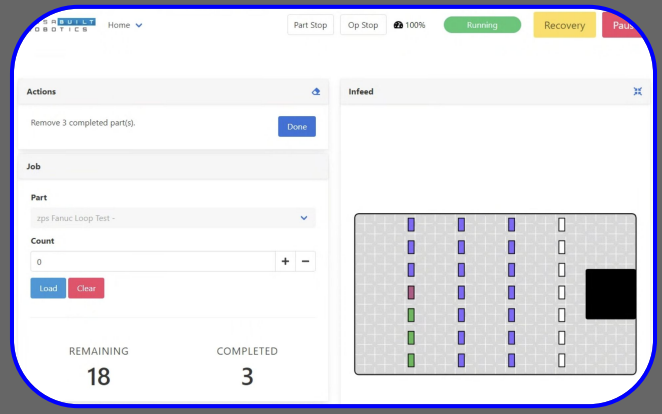
Zero Point System (ZPS) Automation System



Intuitive VSC User Interface



Option: 52mm Pneumatic ZPS Chuck

All required pneumatics and signal cables are included, as well as hand valves for manual tending

VersaBuilt System Controller (VSC)
Inputs and Outputs, CPU, Networking, Pneumatic control - Integrated with VersaCart

No Robot Programming

Install in 1 day

Plug and Play with any CNC

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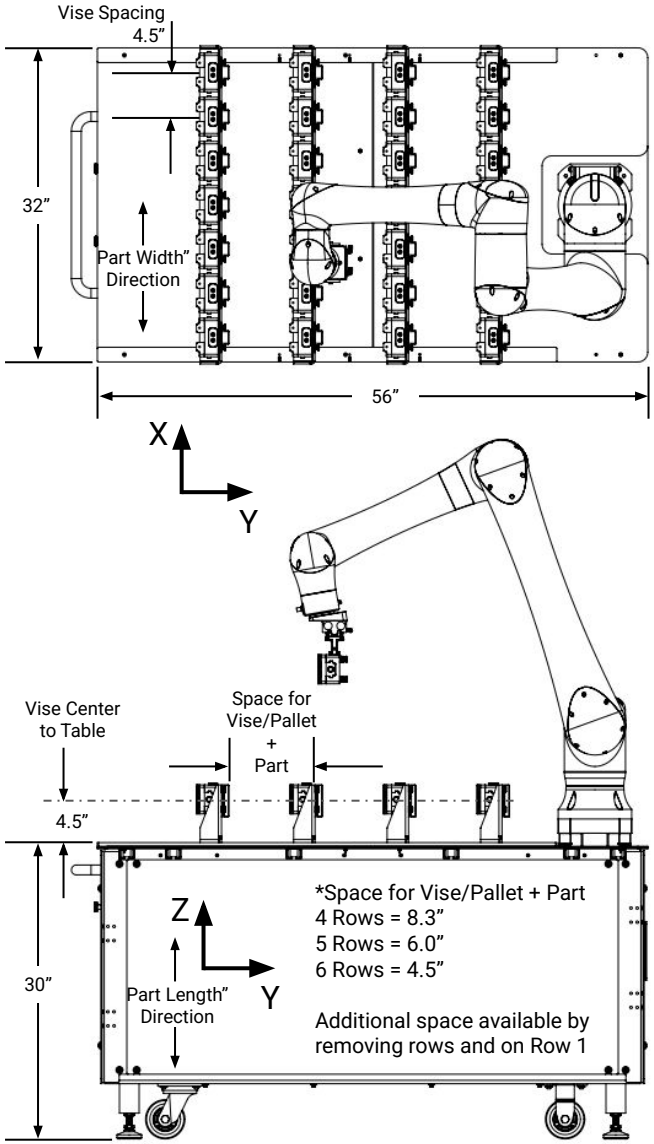
Hardware & Software included *Base System*	VersaCart 1300 with ZPS-Ready Infeed (4-Rows)	VersaBuilt ZPS Gripper	VersaBuilt ZPS Cleats for Vise to Gripper Adapter
	VSC 2.0 Standard** **Advanced VSC available option	VSC User Interface Software	All Required Electrical cables & Pneumatic valves and tubing
	4 Row Infeed (28 Vise Slots)	Robot Tubing Kit	Hand valves for Manual Tending
System Options	Robot Types: Fanuc CRX-10iA/L Fanuc CRX-20iA/L Fanuc CRX-25iA Fanuc CRX-30iA	52mm ZPS Vises 52mm ZPS Dovetail Fixtures 52mm Custom Pallets	Infeed Option: 4, 5, or 6 Rows
	5th Axis ZPS Chuck	5th Axis ZPS Chuck Mount Plate	
Maximum Part Sizes *Height value is space for Vise/Pallet plus Part Height	4 Row Infeed	7 parts/row: 4.5" Wide x 9.0" Long x 8.3" Height* 4 parts/row: 9.0" Wide x 9.0" Long x 8.3" Part Height*	
	5 Rack Infeed	7 parts/row: 4.5" Wide x 9.0" Long x 6.0" Height* 4 parts/row: 9.0" Wide x 9.0" Long x 6.0" Height*	
	6 Rack Infeed	7 parts/row: 4.5" Wide x 9.0" Long x max 4.5" Height* 4 parts/row: 9.0" Wide x 9.0" Long x max 4.5" Height*	
Maximum Payload w/ COG at robot wrist Gripper = 1.1 kg	Fanuc CRX-10iA/L or CRX-20iA/L	1418mm Reach / 10kg or 20kg	
	Fanuc CRX-25iA	1889mm Reach / 25kg	
	Fanuc CRX-30iA	1756mm Reach / 30kg	
Software	VSC Software enables users to setup, calibrate and run system, recover from errors, add/configure new parts, configure settings, test I/O, and enable remote support.		
Programming	No Robot Programming required. VSC software enables new part introduction with configuration forms. Pre-Integrated and Pre-configured for ZPS Vise load and unload to and from VersaCart infeed Racks		
User Interface	User Interface Connection Options **customer provided* • Web based application, connected via Wi-Fi or LAN, Phone, Tablet, Laptop or Computer • Monitor, keyboard, mouse connection to VersaBuilt System Controller		
Support	Remote connectivity available for software updates and remote support *availability of network connection for remote support is customer responsibility		
CNC compatibility	Vertical Machining Centers *Horizontal Milling Centers, depending on layout Robot2CNC dynamic communication for Haas NGC/Legacy and Fanuc Focus 2.0 controls. Handshake communication with all other CNCs		
Air Requirements	90-120 psi, 15-20 scfm *air should be conditioned to meet ISO 8573-1:2010 [7:4:4] standard		
Electrical Requirements	120VAC 1 Phase, 50/60Hz, Full Load 30A (Robot, Controls, VersaWash Pump)		
Optional Accessories	VersaDoor CNC AutoDoor	Area Safety Scanners	VSC 2.0 Standard or VSC 2.0 Advanced Hardware
	Dual CNC Setup	VersaCart Anchor Kit	

7 Vise Slots per Row
4 Rows Standard
Option for 5 or 6 Rows



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Robot2CNC Communication	
1.	**Macro-Driver Communication with CNC**
	Available for Haas Legacy, Haas NGC, and Fanuc Focus 2.0 controls (see list in VSC/CNC Manual)
	With CNC Dispatcher in memory, CNC programs are communicated via macro-variables from the VSC to the CNC to select programs from the CNC program list, then run as sub-routines in the Dispatcher.
	CNC Cycle Start is initiated with a 2-wire relay connection to the CNC Cycle Start Button
	Cycle End is commanded at the end of the program through the dispatcher and M-code command.
	G-Code Commands are available for control of Vise Open, Close, and Pressure Exhaust
2.	**Standard-Driver Communication with CNC**
	Generalized handshake between VSC and CNC, for CNC Controls without Macro-Driver option
	CNC Cycle Start is initiated with a 2-wire relay connection to the CNC Cycle Start Button
	Cycle End is commanded at the end of the program through an M-code command triggering a 24VDC signal to the VSC.
	*Alternative options for Cycle Start/Cycle End are available, such as push-button actuator for cycle start, and stack-light trigger for Cycle End, etc.

Infeed Options available with System
52mm ZPS Slots
7 Slots per Row
4, 5, or 6 Rows

Devices/Hardware:
VersaBuilt ZPS Gripper - Centering Pneumatic Gripper with interface for picking the VersaBuilt ZPS Cleat assembled to ZPS Vises or Pallets.
VersaCart - Steel construction on casters, with adjustable foot pads to lock position, robot pedestal and infeed options optimized for 1300mm reach robots
VSC 2.0 - Computer, Pneumatics, and Electrical Signal devices for System
VSC Enable Button - Physical button, local to system, allowing for user access to VSC software

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VSC M8 Cable Digital Inputs and Outputs:	
1.	**24VDC Outputs**
	Cycle Start
	VersaWash
	Robot Lock (for Dual CNC tending applications)
	Pallet Ready (for CNC's with Pallet Ready button)
	Door Interlock Release (for CNC's with Door Interlock Release button)
	Chuck 1 Toggle (for lathe foot pedal)
	Chuck 2 Toggle (for lathe foot pedal)
2.	**24VDC Inputs**
	Vise 1 and Vise 2 Sensors
	VersaDoor 1 Open/Close Sensor
	VersaDoor 2 Open/Close Sensor
	VSC Enable
	CNC Cycle End (for non-macro-driver CNC controls)
	Robot Lock (for Dual CNC tending applications)
	Pallet Safe (for CNC's with Pallet Ready button)

VSC 2.0 Pneumatics:	
1.	**Standard VSC 2.0 Connections**
	Gripper 1 Open & Close
	ZPS Chuck Open & Close
	ZPS Chuck Blow-off
	VersaDoor Open & Close
2.	**VSC 2.0 Advanced adds the following:**
	Gripper 2 Open & Close
	Vise 2 Open & Close
	Vise 3 Open & Close
	Vise 4 Open & Close
	Vise Pressure Control
3.	**Hand Valves**
	Diverter Valve to switch between "Auto" / VSC valves or "Manual" Vise valves
	1x Vise Hand Valves

VSC Accessories:	
1.	**Pneumatics**
	Supply, Shut-off and Lockout Valve
	Supply Air Pressure Gauge
	Vise Air Pressure Gauge
	Exhaust through bottom ports with push-to-connect fittings for customer routing, if desired
2.	**Electrical/User Interface:**
	110 VAC to 24VDC Power Supply with connector
	HDMI for monitor connection to user-interface computer
	2x USB for software backup and connection to user-interface computer
3.	**Networking:**
	5-Port Ethernet Switch
	Ethernet Cables for CNC, Robot Controller, Router, and VSC
	WiFi or Networking Options available for U/I and Remote Support

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Processes included with Mill Automation System w/ DuoGrip
1Op w/ 1 Vise
Infeed Options: 4 Row 5 Row 6 Row
*custom processes available for quotation

General Part Configuration Data Entry
Part Number
Part Description
Process (1Op ZPS)
CNC Programs* • Op1 • Wash Program

CNC Programs for System Operation
Dispatcher Files (9000's) *if 9000 programs are in use, file numbers can be changed
Example Table Load Program (8000) *position the CNC table at the vise calibration location for robot load/unload operations *For Mill Automation Systems
Example Table Wash Program (8001) *chip mitigation between operations

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Standard Systems:
VersaBuilt Automation Systems are Pre-programmed, Standardized CNC Machine Tending solutions with the robot moving between "Home" locations above the Table (Table Home), in front of the CNC (CNC Home), inside the CNC (InCNC Home), and performing options with the Gripper, Chucks, and VersaDoor, based on the selected Part Configuration Selections/Options and setup on the VSC User-Interface Settings page. These Standard Systems are pre-programmed in a generalized manner for an easy-to-use interface, incorporating known CNC process requirements.

General DuoGrip Lathe Process Overview:
- CNC Dispatcher or Non-Macro Driver program is in memory
- User selects Part, Enters Quantity on VSC User Interface (multiple parts can be added at once)
- Operator loads vises/pallets on VersaCart, matching display on User Interface
- User selects Cycle Start on VSC user interface
- Robot Picks Vise/Pallet from first slot
- Robot Loads Vise/Pallet into Chuck
- CNC Cycle Start / Op1
- While the CNC is running, the Robot waits at CNC Home
- After CNC Operation is complete, Robot Unloads the Vise/Pallet
- The Chuck can be washed with a CNC wash.
- CNC Programs are run sequentially one-operation at a time.
- Parts can be added to the system while it is running a job, either by adding parts to empty slots shown on the User Interface, or Operator unloading of finished parts and adding on the User Interface.

Definitions:
- **FreeDrive** - Robot state where an operate can freely move the robot by gently pushing on the robot joints
- **Bin Drop** - Option for placing or dropping a part at a calibrated location (in location behind robot base, near the VersaWash tank), rather than placing the finished part back on the VersaCart Infeed.
- **Dump coolant** - after unload from the CNC, flipping the Gripper to drip coolant in the CNC

General System Notes:
- The user interfacing device is provided by the customer (not included in the quoted price). The user interface options are:
  - Wi-Fi connected device with Web-Browser (e.g., laptop, tablet) connected to the VSC interface via a Wi-Fi signal from the VSC router
  - Ethernet connectivity from device with Web-Browser connected to the VSC interface via VSC Ethernet Switch
  - Monitor/Keyboard/Mouse connected directly to the VSC via HDMI and USB ports
- The system operates on software local to the system (i.e., an internet connection is not required for the system to run).
- Pneumatic Tubing is color coded for applications. In general, Red or Black = Close, Blue or White/Clear = Open.
- Compressed air supply shall be 80 to 115 psi and conditioned to meet ISO 8573-1:2010 [7:4:4] standard. Maximum system air consumption is 15-20 SCFM.
- Remote Support is critical for success for installation, troubleshooting and software updates.
- Terms and conditions of sale can be found on the VersaBuilt website: www.versabuilt.com