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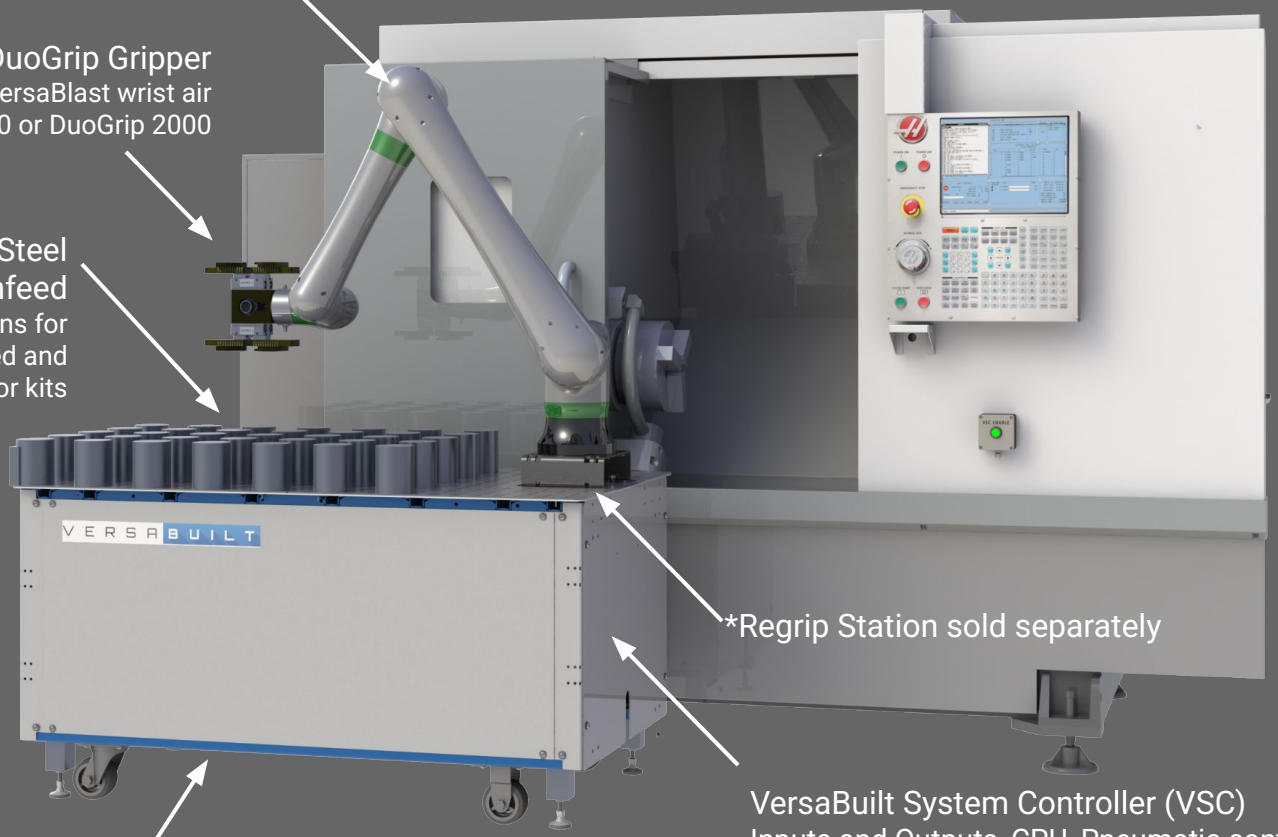
Lathe Automation System with DuoGrip and Fanuc CRX

Fanuc CRX
Collaborative Robot

DuoGrip Gripper
w/ VersaBlast wrist air
DuoGrip 400 or DuoGrip 2000

Stainless Steel
Visual Infeed
*options for
oversized and
part locator kits

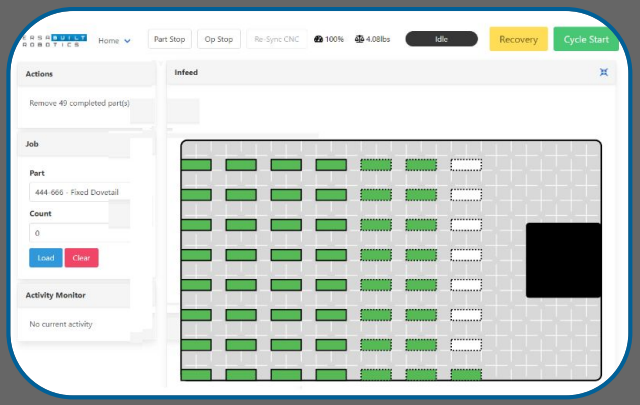


*Regrip Station sold separately

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

VersaCart
1300 or 1700 models

Intuitive VSC User Interface



Applications:

- Single & Dual Spindle
- 1Op, Multi-Op with Regrip

No Robot Programming

Install in 1-2 days

Plug and Play with any CNC

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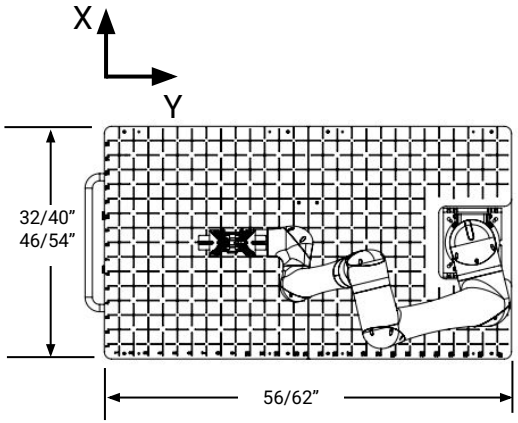
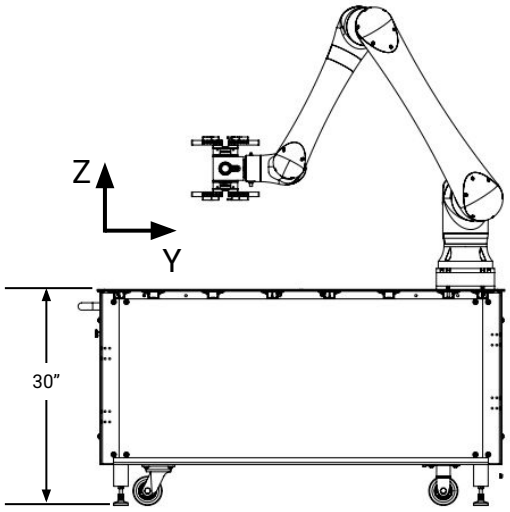
Hardware/Software included **Robots can be sold separately or system can use existing robots*	Fanuc CRX-10iA/L Fanuc CRX-20iA/L Fanuc CRX-25iA Fanuc CRX-30iA	DuoGrip Gripper w/ VersaBlast	Electrical signal and communication cables
	Robot to CNC communication	VersaCart 1300 with Standard SS Visual Infeed	Pneumatic valves and tubing
	VSC 2.0 Standard** **Advanced VSC available option	VSC User Interface Software	Chuck actuation connection
Processes	1 Op Single Load Unload, 2 Op Dual Spindle Load Unload, Unload only, 2 Op Single Spindle w/ Regrip Station		
Maximum Part Sizes	Max Width x Length x Height	Ø4.00" with standard fingers / Ø8.25" with larger fingers With provisions for larger round and rectangular sizes	
Maximum Payload **Gripper weights:** DuoGrip 400 = 3.6 kg DuoGrip 2000 = 6.0 kg	**Robot Model**	**Reach & Max Payload at robot wrist**	
	Fanuc CRX-10iA/L	1418mm Reach / 10kg	
	Fanuc CRX-20iA/L	1418mm Reach / 20kg	
	Fanuc CRX-25iA	1889mm Reach / 25kg	
	Fanuc CRX-30iA	1756mm Reach / 30kg	
Max Gripping Capacity	DuoGrip 400 = 9 lbs per gripper (200 N clamping force at 101 psi) DuoGrip 2000 = 40 lbs per gripper (1000 N clapping force at 94 psi)		
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 MultiGrip Processing (1 Op w/ 1 Vise, 1 Op w/ 2-Vises, 2Op w/ 2-Vises)		
User Interface	User Interface Connection Options **customer provided* • Web based application, connected via Wi-Fi or network, 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	Robot2CNC dynamic communication for Haas NGC/Legacy and Fanuc Focus 2.0 controls Handshake communication with all other CNC Controls (Cycle Start to CNC; Cycle End from CNC)		
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)		
Options and Substitutions	VersaDoor CNC AutoDoor	DuoGrip 400 or DuoGrip 2000	VersaCart Anchor Kit
	VersaCart 1300 or VersaCart 1700	Shaft Gripper Fingers	Area Safety Scanners
	Standard or Oversized SS Visual Infeed Custom Infeed Ready Kit	Shaft Infeed	Regrip Station
	VSC 2.0 Standard or VSC 2.0 Advanced		





DuoGrip

Double Headed Gripper
Flexible Hardware Options
2 sizes available:
DuoGrip 400
DuoGrip 2000

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For more information contact: sales@verxcorp.com
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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
Standard > Single Layer of parts, aligned with the VersaCart Visual Infeed
Stacked > Option allowing for stacked parts with Outfeed placement on VersaCart or Bin Drop. Standard Stacked divides the VersaCart in half, one half for infeed, the other for outfeed. Stacked Infeed, with Bin-Drop selected in the part configuration, doubles infeed w/out requirement of restacking the parts on the cart.
Custom Infeed > Single Layer of parts, defined by the location of the first part position relative to the cart X/Y datums, then row/column spacing and quantities

Devices:
DuoGrip Gripper - Double-Headed Pneumatic w/ Puck Picking and VersaBlast, and option for Shaft Picking. Gripper 1 Picks Parts and Loads Chucks; Gripper 2 Unloads from Chucks and Places Parts
VersaCart 1300 - Steel construction on casters, with adjustable foot pads to lock position, robot pedestal and infeed options optimized for 1300mm reach robot
Shaft Infeed - Indeed accessory for positioning round shafts for processing with the DuoGrip Gripper with Shaft Fingers.
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
VersaBlast - Air amplifier for chip mitigation, blowing high-flow compressed air on Chuck. Controlled by air pilot valve in VSC to High-Flow valve external to the VSC, mounted on a plate with magnets for mounting.

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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
	Gripper 2 Open & Close
	VersaDoor Open & Close
	VersaBlast (air pilot signal)
2.	**VSC 2.0 Advanced adds the following for Lathe and Mill capabilities:**
	Vise 1 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
	2x 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 Lathe Automation System w/ DuoGrip

1Op Puck*
1Op Shaft*
2Op Puck w/ Regrip
Unload only
Single Gripper Puck(for heavy parts)
Single Gripper Shaft (for heavy parts)

*Note: 1Op processes include single spindle 1Op parts and Dual Spindle 2Op parts, where the part is loaded into the CNC and a finished part is unloaded.

*custom processes available for quotation, such as:

- 3Op with custom regrip between each operation

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

General Part Configuration Data Entry

Part Number

Part Description

Process (1Op Puck, 1Op Shaft, etc)

Part Diameter, Height, Weight at part states:

- Raw
- Op1 Complete
- Op2 Complete (2 Op process only)

Pick Heights

- Pick from infeed
- Place height

CNC Programs*

- Op1
- Op2 (2 Op process only)

Part Configuration Selections and Options:

Process:

- Bin Drop (calibrated position at or near VersaWash)
- Custom Infeed Spacing
- Turning Program

Raw Material / Part Picking Options:

- OD Clamp or ID Pick
- Enable Part Find on Pick
- Robot Settle (clamp or float)

Chuck Load/Unload Options:

- Chuck Number (1 or 2 for 2-Vise setup)
- Distance from Face of Chuck to Face of Jaws
- Distance from Face of Chuck to End of Raw Material
- Load Tuning Adjustment
- OD Clamp or ID Clamp on Load Chuck
- Appy Force during Chuck Clamp
- Validate Load Position During Apply Force

Place Options

- Enable Part Find on Place
- OD Clamp or ID Clamp on Finished Part

Jaw Cleaning & VersaWash Options:

- Timing of Jaw Cleaning
- Dump Coolant
- VersaWash # of Cycles/Speed, and Drip Time/Speed

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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, VersaBlast, Lathe 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
- Operator loads parts on VersaCart, matching display on User Interface
- Operator configures DuoGrip Gripper for selected Part
- User selects Cycle Start on VSC user interface
- Robot Picks part with Gripper 1
- Robot Loads Part into Lathe Chuck (main or sub-spindle)
- CNC Cycle Start / Op1
- For 2Op Parts w/ Regrip - Robot Unloads Part with Gripper 2, places the Part on the Regrip Station, Picks the Part from the underside of the Regrip Station with Gripper 1, Loads the Part into the Chuck, then CNC Cycle Start / Op2.
- While the CNC is running, the Robot Picks the Next Part with Gripper 1.
- After CNC Operation is complete, Gripper 2 Unloads the Part, and Gripper 1 Loads the Next Part.
- The Chuck can be washed with a CNC wash and the Part Configuration includes options for using VersaBlast to clean the chuck, before and after Part Unload.
- 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:

- **Settle** - Gripper Open/Close or Gripper Float to seat the part in Z
- **Float** - 24VDC Signals to Valves are turned off, allowing Grippers and VersaDoors to move freely
- **Clap** - Open and close the gripper multiple times during part pick and part place
- **Part Find** - Use of robot force-feedback to detect part or surface
- **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.
- **Pipeline** - Optimized sequence of part processing where a 1Op part is processed in 2 different vises, i.e., first part in Vise 1 with Jaw 1, second part in Vise 2 with Jaw 2, third part in Vise 1 with Jaw 1. Pipelining is the most efficient process for 1 Op parts with MultiGrip.
- **Dump coolant** - after unload from the CNC, flipping the Gripper to drip coolant in the CNC or on the VersaWash bucket

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