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## Lathe Automation System with DuoGrip and Fanuc CRX

Fanuc CRX  
Collaborative Robots  
CRX-10iA/L,  
CRX-20iA/L,  
CRX-30iA

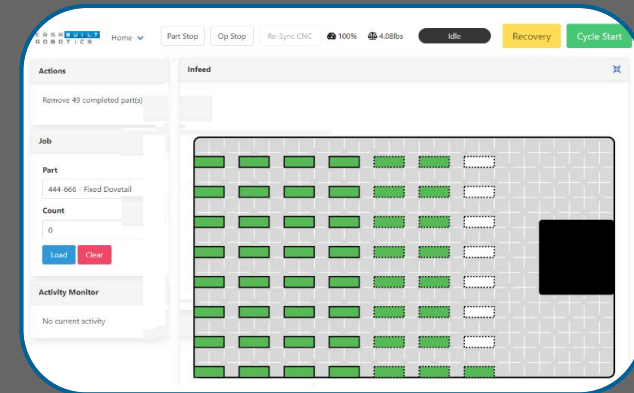
DuoGrip Gripper  
w/ VersaBlast wrist air  
DuoGrip 400 or DuoGrip 2000

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

VersaCart  
1300 or 1700 models

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

### Intuitive VSC User Interface



### Applications:

- Single & Dual Spindle
- 1 Operation parts

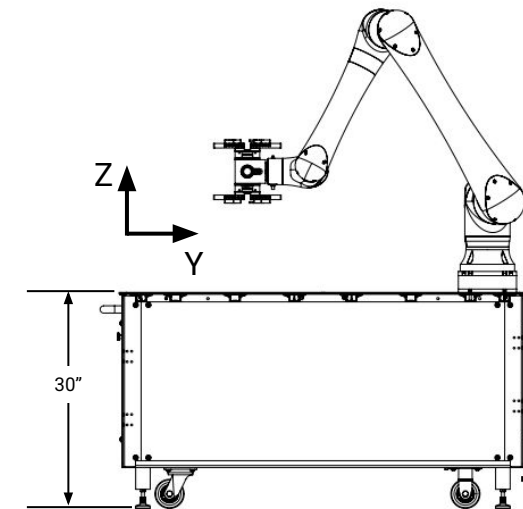
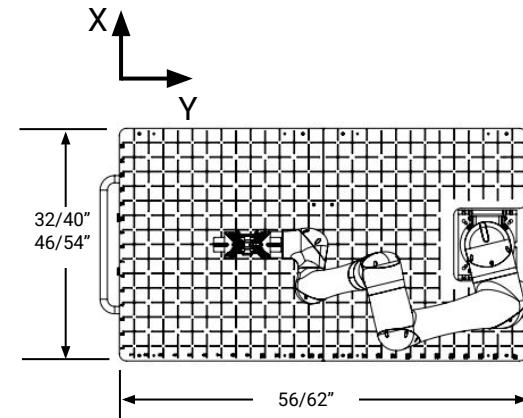
No Robot Programming

Install in 1-2 days

Plug and Play with any CNC

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|                                                                                                                  |                                                                                                                                                                                                                                                                                  |                                                                                                                     |                                            |
|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| <b>Hardware/Software included</b><br><br><i>*Robots can be sold separately or system can use existing robots</i> | 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**<br>**Advanced VSC available option                                                                                                                                                                                                                            | VSC User Interface Software                                                                                         | Chuck actuation connection                 |
| <b>Processes</b>                                                                                                 | 1 Op Single Load Unload, 2 Op Dual Spindle Load Unload, Unload only, 2 Op Single Spindle w/ Regrip Station                                                                                                                                                                       |                                                                                                                     |                                            |
| <b>Maximum Part Sizes</b>                                                                                        | Max Width x Length x Height                                                                                                                                                                                                                                                      | Ø4.00" with standard fingers / Ø8.25" with larger fingers<br>With provisions for larger round and rectangular sizes |                                            |
| <b>Maximum Payload</b><br><br><b>Gripper weights:</b><br>DuoGrip 400 = 3.6 kg<br>DuoGrip 2000 = 6.0 kg           | <b>Robot Model</b>                                                                                                                                                                                                                                                               | <b>Reach &amp; Max Payload at robot wrist</b>                                                                       |                                            |
|                                                                                                                  | 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                                                                                                 |                                            |
| <b>Max Gripping Capacity</b>                                                                                     | DuoGrip 400 = 9 lbs per gripper (200 N clamping force at 101 psi)<br>DuoGrip 2000 = 40 lbs per gripper (1000 N clapping force at 94 psi)                                                                                                                                         |                                                                                                                     |                                            |
| <b>Software</b>                                                                                                  | 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.                                                                                                            |                                                                                                                     |                                            |
| <b>Programming</b>                                                                                               | 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)                                                                 |                                                                                                                     |                                            |
| <b>User Interface</b>                                                                                            | User Interface Connection Options <i>*customer provided</i> <ul style="list-style-type: none"><li>Web based application, connected via Wi-Fi or network, Phone, Tablet, Laptop or Computer</li><li>Monitor, keyboard, mouse connection to VersaBuilt System Controller</li></ul> |                                                                                                                     |                                            |
| <b>Support</b>                                                                                                   | Remote connectivity available for software updates and remote support<br>*availability of network connection for remote support is customer responsibility                                                                                                                       |                                                                                                                     |                                            |
| <b>CNC compatibility</b>                                                                                         | Robot2CNC dynamic communication for Haas NGC/Legacy and Fanuc Focus 2.0 controls<br>Handshake communication with all other CNC Controls (Cycle Start to CNC; Cycle End from CNC)                                                                                                 |                                                                                                                     |                                            |
| <b>Air Requirements</b>                                                                                          | 90-120 psi, 15-20 scfm *air should be conditioned to meet ISO 8573-1:2010 [7:4:4] standard                                                                                                                                                                                       |                                                                                                                     |                                            |
| <b>Electrical Requirements</b>                                                                                   | 120VAC 1 Phase, 50/60Hz, Full Load 30A (Robot, Controls, VersaWash Pump)                                                                                                                                                                                                         |                                                                                                                     |                                            |
| <b>Options and Substitutions</b>                                                                                 | 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<br>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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| Robot2CNC Communication                                                                                                                                                                            | Infeed Options available with System                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Macro-Driver Communication with CNC</b>                                                                                                                                                      | Standard > Single Layer of parts, aligned with the VersaCart Visual Infeed                                                                                                                                                   |
| Available for Haas Legacy, Haas NGC, and Fanuc Focus 2.0 controls (see list in VSC/CNC Manual)                                                                                                     | Stacked > Option allowing for stacked parts with Outfeed placement on VersaCart or Bin Drop.                                                                                                                                 |
| 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. | Standard Stacked divides the VersaCart in half, one half for infeed, the other for outfeed.                                                                                                                                  |
| CNC Cycle Start is initiated with a 2-wire relay connection to the CNC Cycle Start Button                                                                                                          | Stacked Infeed, with Bin-Drop selected in the part configuration, doubles infeed w/out requirement of restacking the parts on the cart.                                                                                      |
| Cycle End is commanded at the end of the program through the dispatcher and M-code command.                                                                                                        | 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                                                            |
| G-Code Commands are available for control of Vise Open, Close, and Pressure Exhaust                                                                                                                | <b>Devices:</b>                                                                                                                                                                                                              |
| <b>2. Standard-Driver Communication with CNC</b>                                                                                                                                                   | <b>DuoGrip Gripper</b> - 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                        |
| Generalized handshake between VSC and CNC, for CNC Controls without Macro-Driver option                                                                                                            | <b>VersaCart 1300</b> - Steel construction on casters, with adjustable foot pads to lock position, robot pedestal and infeed options optimized for 1300mm reach robot                                                        |
| CNC Cycle Start is initiated with a 2-wire relay connection to the CNC Cycle Start Button                                                                                                          | <b>Shaft Infeed</b> - Indeed accessory for positioning round shafts for processing with the DuoGrip Gripper with Shaft Fingers.                                                                                              |
| Cycle End is commanded at the end of the program through an M-code command triggering a 24VDC signal to the VSC.                                                                                   | <b>VSC 2.0</b> - Computer, Pneumatics, and Electrical Signal devices for System                                                                                                                                              |
| *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.                                            | <b>VSC Enable Button</b> - Physical button, local to system, allowing for user access to VSC software                                                                                                                        |
|                                                                                                                                                                                                    | <b>VersaBlast</b> - 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:                              | VSC 2.0 Pneumatics:                                                            | VSC Accessories:                                                                            |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| <b>1. 24VDC Outputs</b>                                               | <b>1. Standard VSC 2.0 Connections</b>                                         | <b>1. Pneumatics</b>                                                                        |
| Cycle Start                                                           | Gripper 1 Open & Close                                                         | Supply, Shut-off and Lockout Valve                                                          |
| VersaWash                                                             | Gripper 2 Open & Close                                                         | Supply Air Pressure Gauge                                                                   |
| Robot Lock (for Dual CNC tending applications)                        | VersaDoor Open & Close                                                         | Vise Air Pressure Gauge                                                                     |
| Pallet Ready (for CNC's with Pallet Ready button)                     | VersaBlast (air pilot signal)                                                  | Exhaust through bottom ports with push-to-connect fittings for customer routing, if desired |
| Door Interlock Release (for CNC's with Door Interlock Release button) | <b>2. VSC 2.0 Advanced adds the following for Lathe and Mill capabilities:</b> | <b>2. Electrical/User Interface:</b>                                                        |
| Chuck 1 Toggle (for lathe foot pedal)                                 | Vise 1 Open & Close                                                            | 110 VAC to 24VDC Power Supply with connector                                                |
| Chuck 2 Toggle (for lathe foot pedal)                                 | Vise 2 Open & Close                                                            | HDMI for monitor connection to user-interface computer                                      |
| <b>2. 24VDC Inputs</b>                                                | Vise 3 Open & Close                                                            | 2x USB for software backup and connection to user-interface computer                        |
| Vise 1 and Vise 2 Sensors                                             | Vise 4 Open & Close                                                            | <b>3. Networking:</b>                                                                       |
| VersaDoor 1 Open/Close Sensor                                         | Vise Pressure Control                                                          | 5-Port Ethernet Switch                                                                      |
| VersaDoor 2 Open/Close Sensor                                         | <b>3. Hand Valves</b>                                                          | Ethernet Cables for CNC, Robot Controller, Router, and VSC                                  |
| VSC Enable                                                            | Diverter Valve to switch between "Auto" / VSC valves or "Manual" Vise valves   | WiFi or Networking Options available for U/I and Remote Support                             |
| CNC Cycle End (for non-macro-driver CNC controls)                     | 2x Vise Hand Valves                                                            |                                                                                             |
| Robot Lock (for Dual CNC tending applications)                        |                                                                                |                                                                                             |
| Pallet Safe (for CNC's with Pallet Ready button)                      |                                                                                |                                                                                             |

## Processes included with Lathe Automation System w/ DuoGrip

1Op Puck\*  
1Op Shaft\*  
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:

- 2Op with Regrip
- 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
- Pick Heights
- Pick from infeed
  - Place height
- CNC Programs\*
- Op1

## 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
- Apply 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
- 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 operator 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](http://www.versabuilt.com)