

VERSABUILT ROBOTICS



Vertical Mill w/ ZPS User Interface / Part Configuration Parametric Programming Manual

Software Version 1.2.5 Copyright VersaBuilt 2025
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Table of Contents

1. [Safety Warnings](#)
2. [Overview of ZPS Mill Automation System](#)
3. [General Installation Instructions](#)
4. [User Interface & Part Configuration](#)

This manual is a section of the standard automation systems manuals. Latest version of standard manuals can be found on the VersaBuilt website, Resources page: <https://www.versabuilt.com/resources/>

CAD Models and other resources can also be found on the resources page.

For support, contact VersaBuilt via email at support@versabuilt.com or phone 208-906-0814

Safety Warnings

Section 1

Safety Warnings

DANGER: VersaBuilt makes industrial machine tool automation components designed to be operated by trained personnel only. Machine tool automation components may move suddenly and without warning. Serious or fatal crushing injuries can occur from contact with the robot, gripper or vises.

Before deploying VersaBuilt industrial machine tool automation components, a safety risk assessment must be completed in accordance with local, state and/or federal requirements.

VersaBuilt industrial machine tool automation components should only be used by trained operators.

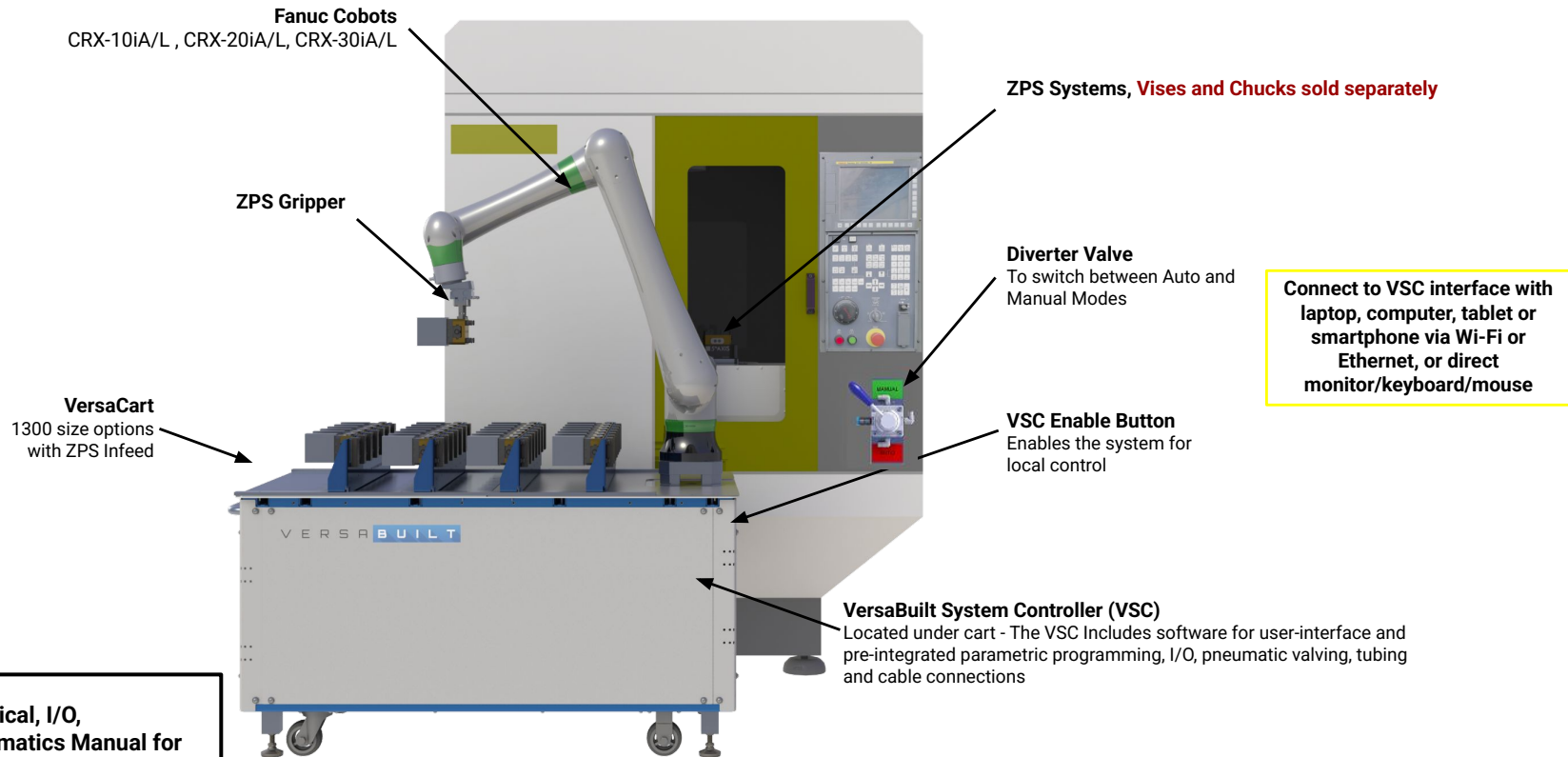
Read and understand the VersaBuilt Automation System Safety Manual before proceeding

Overview

Mill Automation with DuoGrip

Section 2

Mill Automation System w/ ZPS overview



Mill Automation System w/ ZPS overview

- VersaBuilt provides standard automation products for CNC Mill and CNC Lathe Automation, with pre-programmed, generalized software interface, "VSC" (Versabuilt System Controller).
- New parts are introduced with the creation of "Configurations", entering parameters, rather than creating or revising a robot program, i.e., "Parametric Programming". There is no limit to configurations.
- Systems include pre-programmed robot positions for generalized CNC machine tending, including:
 - Table Home - Robot Positioned over the VersaCart infeed/outfeed, poised to pick or place parts, or pivot to the CNC
 - CNC Home - Robot positioned in front of CNC, poised to move into the CNC, or pivot to the Table Home
 - InCNC Home - Robot positioned inside the CNC, in a neutrally poised position for the Vise or Chuck load/unload moves
**calibrated/optimized at installation on the calibration page*
 - For all part processing, the robot moves to these intermediate positions
- Systems include these variations:
 - Gripper Type (MultiGrip, DuoGrip, ZPS)
 - Infeed Type (Lathe, Mill, ZPS, Robot Size, VersaCart Size, Stacked Infeed)
 - Process scripts (pre-programmed sequences available for MultiGrip, DuoGrip, and ZPS). *Custom scripts are available for quote.*

Automatic Payload Calculation:

- **Fanuc CRX Robot Systems will automatically calculate the payload after each pick of a vise or pallet.**
- **After each pick from the infeed, the robot will move to a neutral position above the cart**

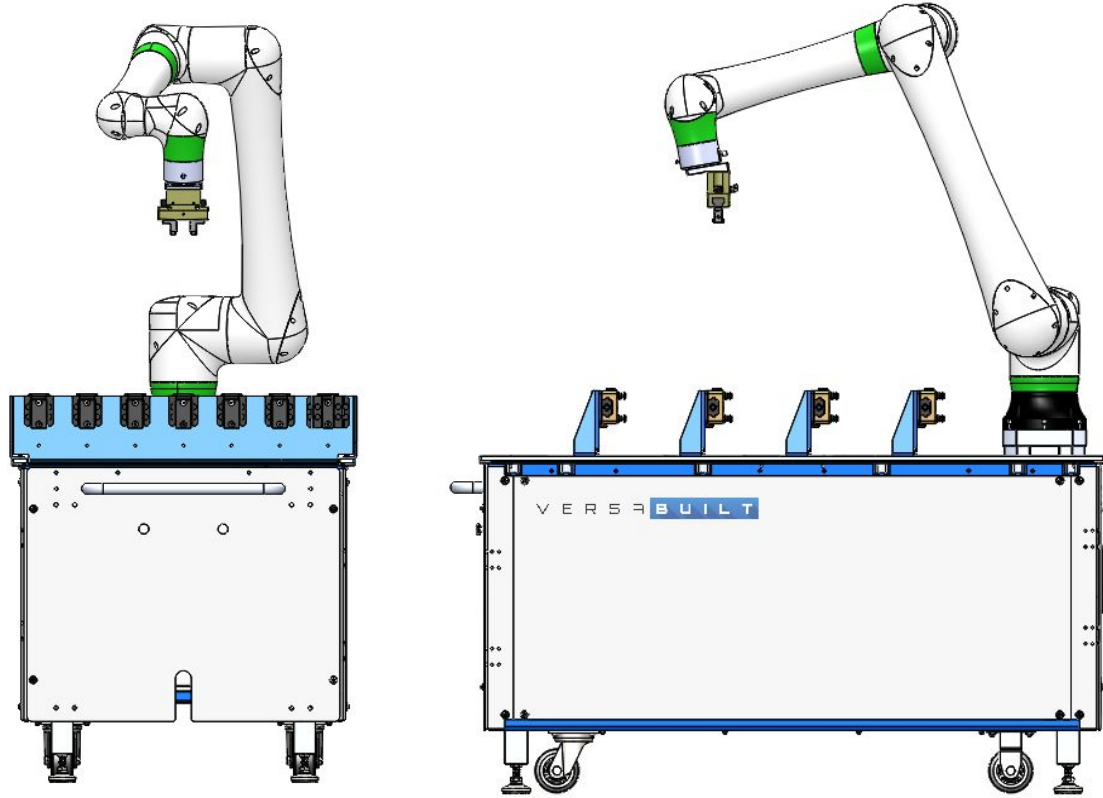
Mill Automation System w/ DuoGrip overview

Robot Overhead

- i. Total time processing parts where the CNC is not running
 - 1. First Part load to CNC Program Start
 - 2. CNC program end to CNC program start for subsequent parts
 - 3. Last part CNC program end to finished unload and stop
- ii. Includes:
 - 1. Time to open/close CNC door
 - 2. Chuck or Vise actuation time
 - 3. Robot motion outside CNC while CNC is waiting
 - 4. Regripping process for 2Op w/ Regrip with 1 Vise or Single-Spindle Lathe
 - 5. CNC processes used for automation
 - a. Y/Z push to locate the part against a datum or to a precise position
 - b. Table Wash & Table Load programs

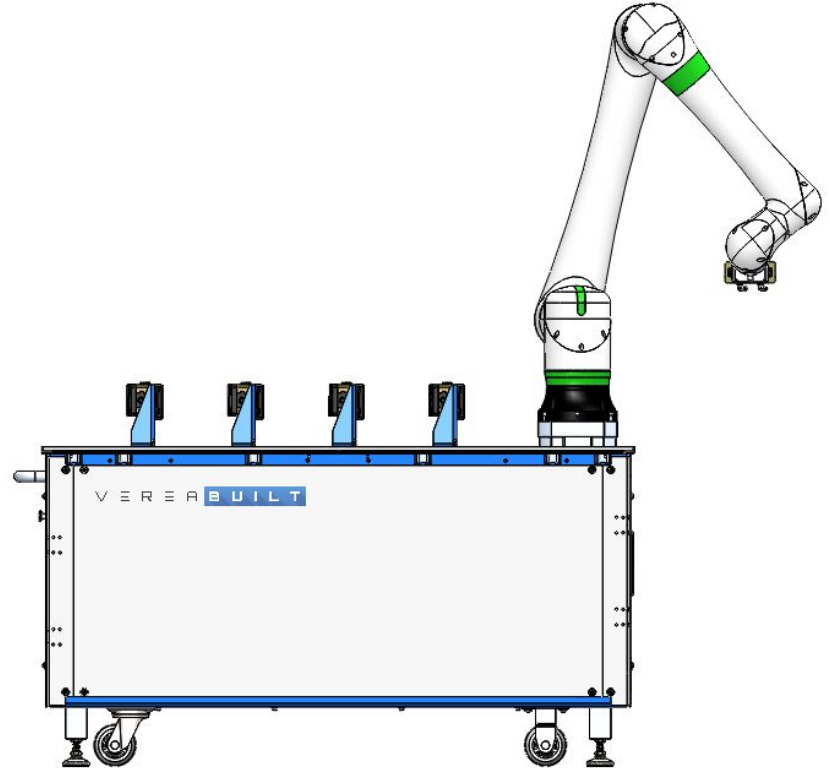
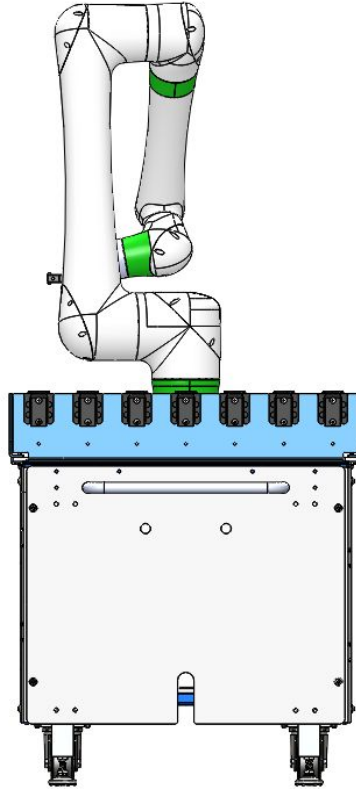
ZPS Table Home

Robot is positioned over the table, in position for pick and place of ZPS Vises to/from the infeed



ZPS CNC Home

Robot is positioned in front of the CNC door, in position for pick and place of ZPS Vises to/from the CNC



General Installation Instructions

Section 3

General Installation Instructions

Refer to up-to-date Manuals and Installation Checklist at <https://www.versabuilt.com/resources/>

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

Systems / Products ▾ Workholding / Licensing ▾ Resources ▾ Contact Us

MANUALS

— Automation System - Installation & U/I Manuals

Installation & U/I Manuals

- [Read Me First](#)
- [Safety Manual](#)
- [Pre-Installation & Install Prep Checklist](#)
- [Installation Checklist & Manual Map](#)
- [Installation Overview](#)
- [VSC User Interface \(U/I\) Connection Manual](#)
- [VSC / CNC Communication Manual](#)
- [Calibration Manual](#)
- [MultiGrip Mill System U/I Manual](#)
- [DuoGrip Mill System U/I Manual](#)
- [DuoGrip Lathe System U/I Manual Puck / Shaft](#)

**See sections below for category-specific manuals*

DATA SHEETS & GUIDES

Datasheets

- [Mill Automation System w/ MultiGrip](#)
- [VBX-160 Upgrade to Mill Automation](#)
- [Mill Automation System w/ DuoGrip](#)
- [Mill Automation System w/ Zero-Point-Systems](#)
- [Lathe Automation System w/DuoGrip](#)
- [MultiGrip Vise](#)
- [MultiGrip Jaws](#)
- [MultiGrip Gripper](#)
- [DuoGrip Gripper](#)
- [VersaCart](#)
- [VersaDoor](#)
- [Robot2CNC Basic Edition](#)
- [Robot2CNC Advanced Edition](#)

Guides & Tools for Mill and Lathe Systems

- [Cycle Time and Infeed Capacity Calculator](#)
- [Site Acceptance Test Form \(Mill System\)](#)
- [Site Acceptance Test Form \(Lathe System\)](#)

Guides & Tools for Build-Your-Own Systems

- [CNC Automation Checklist & Guide](#)

General Installation Instructions

Refer to the Calibration Manual for Calibration of:

- VersaCart ZPS Infeed
- Chuck
- InCNC position



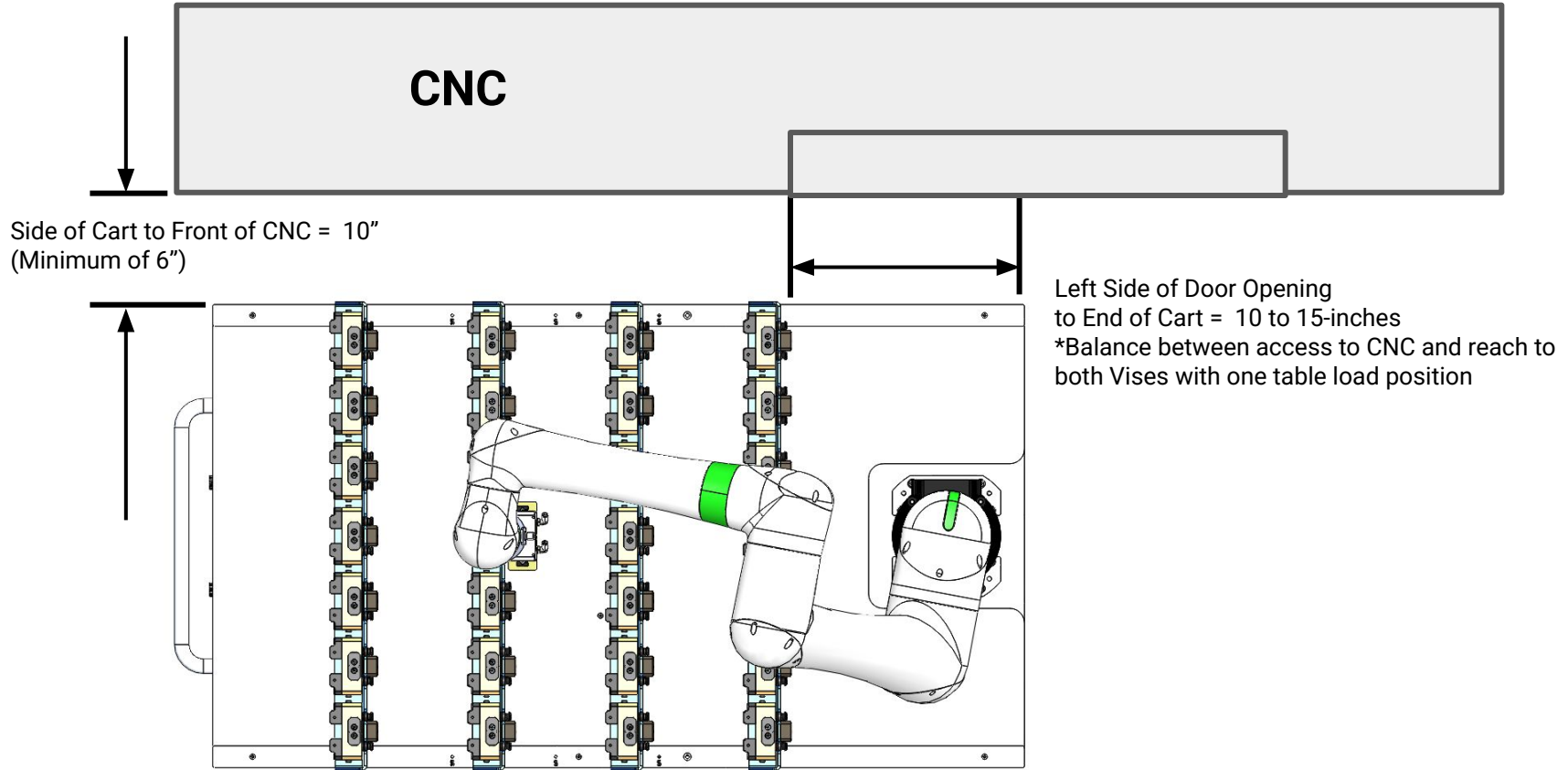
General Installation Instructions

Referencing the Installation Checklist, the following are the steps:

1. Prove out manual process
2. Powerup VSC and Enable Remote Support
3. Configure CNC Connections
 - a. VersaBuilt CNC Software (programs 8000 & 9000)
 - b. Cycle Start Cable
 - c. Ethernet Connections or CNC Cycle End
4. Test Inputs and Outputs (I/O), Configure Settings on VSC
5. Calibration
 - a. Infeed *done at VersaBuilt factory, test before re-calibrating
 - b. Chuck
6. Configure Parts
 - a. Select Process, Enter Parameters
7. Run Parts

***Application specific instructions are shown on the following pages/sections**

General Installation Instructions



User Interface & Part Configuration

Section 4

User Interface (U/I) Screens

The web-based user-interface has the following screens, selected by a pull-down menu at the top of the screen:

1. Home (Run Jobs and Recover from errors)
2. Configuration (Configuration / Parametric Programming of Parts)
3. System Settings (Customer specific setup of system)
4. Network Settings (options for advanced networking)
5. I/O Panel (testing and troubleshooting of devices with Input and Output signalling)
6. Calibration (Tools for Calibrating VersaCart Infeed, Vise/Chuck, Bin Drop, and testing)
7. About Page (Restarting VSC, Enabling Remote Support, information about software and version)ut

**Refer to the “VSC User Interface Connection”
Manual for details of each screen**

Home Screen (Recovery Mode)

Recovery Panel at the top of the Configuration Page, allowing user to stay on one screen during configuration

VERSABUILT Home ▾

Part Stop Op Stop 🔋 100% Recovery

Recovery Cycle Start

Recovery

Robot

Enabled ▶

Reset ▶

Home 🏠

Enable Freedrive

Gripper

Open ↔

Close >>

Float ☁

CNC

Open Door ↔

Close Door >>

Status ?

Chuck 1

Unclamp ↔

Clamp >>

Unload ⬆

Load ⬇

Expand button to access more options

*Exhaust for Manual Mode puts the solenoid valves in a neutral position for Chuck clamp and release with the hand valve

Home Screen (Running a Job)

The screenshot displays the 'Home' screen of a CNC control system. The interface includes a top navigation bar with a 'Home' dropdown menu. The main area is divided into several sections: a 'Job' configuration section on the left, a 'CNC State' section at the top right, a 'Robot Speed Control' section in the middle right, and an 'Infeed Representation' at the bottom right. The 'Job' section shows 'Part' selection (Demo #1 - ZPS Demo 1) and 'Count' (0). The 'CNC State' section shows 'Idle' and 'Cycle Start' buttons. The 'Robot Speed Control' section shows 'Part Stop', 'Op Stop', and 'Recovery' buttons. The 'Infeed Representation' shows a grid of parts in various states (loaded, in process, or complete) and a legend for 'Infeed Axes Directions' (+X, +Y).

Annotations:

- Part Selection:** Points to the 'Part' dropdown menu.
- Job QTY:** Points to the 'Count' input field.
- Part Stop:** Points to the 'Part Stop' button.
- Op Stop:** Points to the 'Op Stop' button.
- Robot Speed Control:** Points to the 'Recovery' button.
- CNC State:** Points to the 'Idle' button.
- Cycle Start to begin robot processing:** Points to the 'Cycle Start' button.
- Recovery button to stop processing and access recovery buttons:** Points to the 'Recovery' button.
- Infeed Representation showing parts states of loaded on infeed, in process, or complete:** Points to the grid of parts.
- Infeed Axes Directions:** Points to the legend showing +X and +Y directions.

Configuration Screen

The following section includes details for all options available for part configurations. Most common settings are selected by default when adding a new part configuration.

Not all fields are required - use the checkboxes and options best suited for your application. For assistance, please contact support@versabuilt.com

Macro-Enabled CNC Controls (e.g., Haas, Fanuc Focus 2.0) allow CNC programs to be selected from the parameters entered in the part configuration. Each job can run with the “Dispatcher Program” in CNC Memory. Communication for Macro-Enabled controls is via Ethernet or RS232 for legacy CNC’s with Macros-Enabled.

Non-Macro-Enabled CNC Controls utilize a handshake signal between Cycle Start from the Automation System to the CNC and a Cycle End Signal from the CNC to the Automation System (typically an M-Code Relay Output). The CNC program needs to be setup on a per job basis.

Refer to the “VSC / CNC Communication” Manual for details.

Part Configuration - Adding or Editing

VERSABUILT

Configurations ▾

Recovery

Cycle Start

Workholding

Search jaws...



Add New Workholding Type

Name	Description	Weight	TCP X	TCP Y	TCP Z	Edit
52mm Infeed Calibration Tool	52mm ZPS Infeed Calibration Tool	1.1	0	-1.02	1.67	
52mm ZPS Chuck Calibration Tool	52mm ZPS Chuck Calibration Tool	1.1	0	-1.02	1.67	
5th Axis R52-D22	54mm ZPS Dovetail Top Tooling	2.55	0	-1.02	1.67	
5th Axis V75100X	52mm ZPS Compact Self-Centering Vise	5.35	0	-1.02	1.67	

Edit existing Workholding definition

Parts

Search parts...



Add New Part Configuration

Part Number	Description	Actions	
Demo #1	ZPS Demo 1		
Demo #2	ZPS Demo 2		

Edit Existing Part Configuration

Duplicate Existing Part Configuration

Part Configuration - ZPS Parameters

VERSABUILT Configurations

Part Stop Op Stop 100% Idle

Recovery Cycle Start

ZPS Demo 1

Process
ZPS

ZPS Vise Processing Options

ZPS Workholding Type
5th Axis V75100X - 52mm ZPS Compact Self-Centering Vise

Load Workholding into Chuck
1

CNC Machining Program
111

CNC Table Load Program
8010

CNC Wash Program
8001

Part Cleaning Options

☒ Dump Coolant in CNC

Dump Coolant Drip Time (seconds)
2

Save Cancel Delete

CNC Program selected by the System when using Macro-Enabled CNC Control (e.g., Haas, Fanuc Focus 2.0)

Verify selection of correct Workholding Type

Number of Chucks in CNC that the system will load

Dump Coolant rotates the robot wrist inside the CNC after picking the Vise/Pallet to dump coolant that may have pooled up

Part Processing

ZPS Process - Machining 1Op part to completion, one part at a time.

1. User Setup:
 - a. Load Vises/Pallets w/ Material on Infeed
 - b. Preps CNC w/ tools and correct program and run state, with CNC Door Open
 - c. VSC entry: Clear any errors, Send Robot to a Home Position, Select Job, Enter QTY, and VSC Cycle Start
2. Robot Sequence:
 - a. Robot moves from Table Home to picks Vise/Pallet from first/next available slot from Origin (origin is the far left corner of the infeed table, from robots perspective).
 - While picking the part, the CNC moves the table to the calibrated home position (at minimum on the first part)
 - b. Robot moves to neutral position for Center of Gravity / Payload calculation, and moves to CNC Home
 - c. Robot moves to InCNC Home, then loads Vise/Pallet into the ZPS Receiving Chuck; Chuck Blow-off is enabled when loading and unloading
 - d. Robot moves to CNC Home and triggers Door Close* or Cycle Start**
 - e. Robot waits at CNC Home for Machining Cycle to Complete
 - f. After machining is complete, the CNC table returns to a Table Load position and a Cycle End signal is provided to the robot system
 - g. The door opens by the system* or CNC**, and the Robot moves to InCNC Home then unloads the Vise/Pallet, moving from the Chuck back to InCNC Home, then CNC Home, then Table Home, and places the Vise/Pallet back in the original Infeed location.
 - While placing the part in the original infeed position, the CNC Door is closed to start any configured wash program to clear away chips from the Chuck.
 - h. Robot moves to Table Home
 - i. Sequence restarts until all parts in the job are processed.

*VersaBuilt AutoDoors require a signal to actuate the pneumatic cylinders, then wait for a sensor signal or time defined in settings before triggering Cycle Start

**CNC Factory AutoDoors can be configured to close upon Cycle Start and open upon CNC Cycle End

System Settings

Navigate to the Settings Page

Your system is pre-configured by VersaBuilt prior to shipment.

Connect to the VSC and click on the Navigation down arrow in the upper-left corner of the screen and select Settings.

Press the Edit System Settings button at the bottom of the page. Edit the System Settings to confirm the configuration of your system.

Part Stop

Op Stop

100%

VERSABUILT vsc00233 System Settings

Main System Settings

Setting	Value
Units	Imperial
Automation System Type	Zero Point System
VersaCart Size	VersaCart 1300
Gripper	5th Axis ZPS 52mm
ZPS Rack Count	4
ZPS Slots Per Row	7
Robot Type	Fanuc
Robot Model	CRX10iAL
Robot IP	192.168.2.2
Chucks Count	1
CNC	Sim
CNC IP	192.168.2.3
CNC Door Controller	VSC Controlled Autodoor
Door Wait Time	10000
Remote Support Token	Not yet configured

Edit System Settings

Processes

Name	Description
ZPS	

Advanced Admin Data File Editor

File

Save

Cancel

System Settings

Name: Enter a name for the the system, this name is displayed at the top of of the VSC home page to easily identify which automation system is being controlled

Units: Choose imperial or metric units to be used in the VSC

Infeed Template: Select based on the infeed type installed in the system

Automation System Type: Zero Point System

ZPS Rack Count: 4, 5, or 6

ZPS Slots per Row: 7 standard (4 to accommodate every other part)

CNC Dispatcher Program: CNC Dispatcher program number, 9000 by default (Haas and Fanuc CNCs only)

Default CNC Wash Program: The default CNC wash program number, 8001 by default

Vises/Chucks: number of CNC vises or chucks installed

Robot: Select the type of robot installed in the system

Robot IP: IP address of the robot, 192.168.2.2 by default

CNC: Select the type of CNC control the VSC is connected to

CNC IP: IP Address of the CNC (not applicable for Haas Legacy or Generic), 192.168.2.3 by default

IO: IO driver for the VSC; typically I2C, Sim can be used for testing purposes

CNC Door Controller: Select one of VSC Controlled Autodoor or CNC Controlled Autodoor **VSC controlled autodoors receives an air or I/O signal from the VSC to open and close. **CNC Controlled Autodoors must be configured to automatically close on CNC Cycle Start and Open on CNC Cycle End*

CNC Door Wait Time: If Ignore Door Sensors is selected, the amount of time the VSC waits after commanding door movement before it assumes the door motion has completed

Ignore Vise Sensors: If selected, system will not check vise sensors for part load verification

Ignore Door Sensors: If selected, system will not check door sensors

Remote Support Token: Key token used by the VersaBuilt VPN, only edit this if directed by VersaBuilt support

Note:

Sim = Simulation when a device is not available or for testing without signals to/from the device

Network Settings

VERSABUILT

vsc00233

Network Settings

Part Stop

Op Stop

100%

80psi

Recovery

Ethernet

eth0

☐ DHCP

IPV4 Address

192.168.2.4

Gateway

192.168.2.1

DNS Servers

8.8.8.8

☒ Disable IPv6

Save

Reboot

Interface: eth0

MAC: e4:5f:01:5f:af:2f

IPV4: 192.168.2.4

Subnet 255.255.255.0

Mask: 192.168.2.255

Broadcast:

IPV6: fe80::e65f:1ff:fe5f:af2f

Up: true

Broadcast: true

Running: true

Multicast: true

Interface: tailscale0

MAC: unknown

IPV4: 100.119.234.30

Subnet 255.255.255.255

Mask:

IPV6: fe80::e27f:b166:2bb7:99c4

Up: true

Broadcast: false

Running: true

Multicast: true

Section 4: Part Configuration

26

I/O Panel Screen

Inputs:

Off = No Signal Received
On = Signal Received

VERSABUILT vsc00233 IO Panel

Input Dashboard	
Address	Value (5s Poll)
WISE_1_SENSOR	Off
WISE_2_SENSOR	Off
WISE_3_SENSOR	Off
DOOR_OPEN_SENSOR	Off
DOOR_CLOSE_SENSOR	Off
DOUBLE_DOOR_OPEN_SENSOR	Off
DOUBLE_DOOR_CLOSE_SENSOR	Off
VSC_ENABLE	Off

Output Dashboard		
Address	Controls	Value
CONTACT_STOP_DISABLE	Low High	Off
FREEDRIVE	Low High	Off
PAYLOAD_CONFIRM	Low High	Off
ZPS_AT_TABLEHOME	Low High	Off
ZPS_AT_CNCHOME	Low High	On
FREEDRIVE_CONTROL	Low High	On
HOLD	Low High	Off

Outputs:

Set Low - Turns off signal
Set High - Turns on signal

Pneumatic Devices:

Set Low - Turns off signal to solenoid valve
Set High - Turns on signal to solenoid valve

For Chuck blow-off:

Turn On: Set Chuck Blow-off High & confirm
Chuck Blow-off Exhaust is set to Low

Turn Off: Set Chuck Blow-off Low & Set Chuck
Blow-off Exhaust High

Calibration Screen (Top, Recovery Panel)

VERSABUILT Calibration ▾

Part Stop Op Stop 100% Recovery

Recovery Cycle Start

Recovery

Robot	Gripper	CNC	Chuck 1
Enabled ▶	Open ↔	Open Door ↔	Unclamp ↔
Reset ▶	Close >>	Close Door >>	Clamp >>
Home 🏠	Float ☁	Status ?	Unload ⬆
Enable Freedrive			Load ⬇

Calibration Screen (ZPS Calibration Section)

VERSABUILT vsc00233 Calibration ▾

ZPS Calibration

Enable Calibration Freedrive ?

Calibrate Rack 1

Capture Point 1

Capture Point 2

Calculate Rack 1

Calibrate Rack 2

Capture Point 1

Capture Point 2

Calculate Rack 2

Calibrate Rack 3

Capture Point 1

Capture Point 2

Calculate Rack 3

Calibrate Rack 4

Capture Point 1

Capture Point 2

Calculate Rack 4

Calibrate ZPS Chucks

Run CNC Table Load
Position Program

Table Load

InCNC Position

Capture InCNC Home Position

Chuck 1 Calibration

Capture Chuck 1

[Refer to the Calibration Manual for detailed instructions for Calibration processes](#)

About Screen

VERSABUILT

vsc00233

About ▾

Part Stop

Op Stop

100%

80psi

Recover

Recovery

Cycle St

System Information

Serial Number	vsc00233
Software Version	1.2.5
System IPv4	192.168.4.1
Robot Type	Fanuc CRX10iAL
Robot IP	192.168.2.2
CNC Type	Sim
CNC IP	192.168.2.3

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Support

Manuals & Training Videos

<https://www.versabuilt.com/resources.html>

Support Phone Number

1-208-906-0814

Remote Support

Please configure Remote Support Token

Restart VSC ↺

VSC Backup

Save Log Files to USB

Theme Settings

Appearance

Dark

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