

VERSABUILT ROBOTICS



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

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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

Preparing to Automate with MultiGrip

Section 2

Preparing to Automate with MultiGrip

Steps to automate with MultiGrip

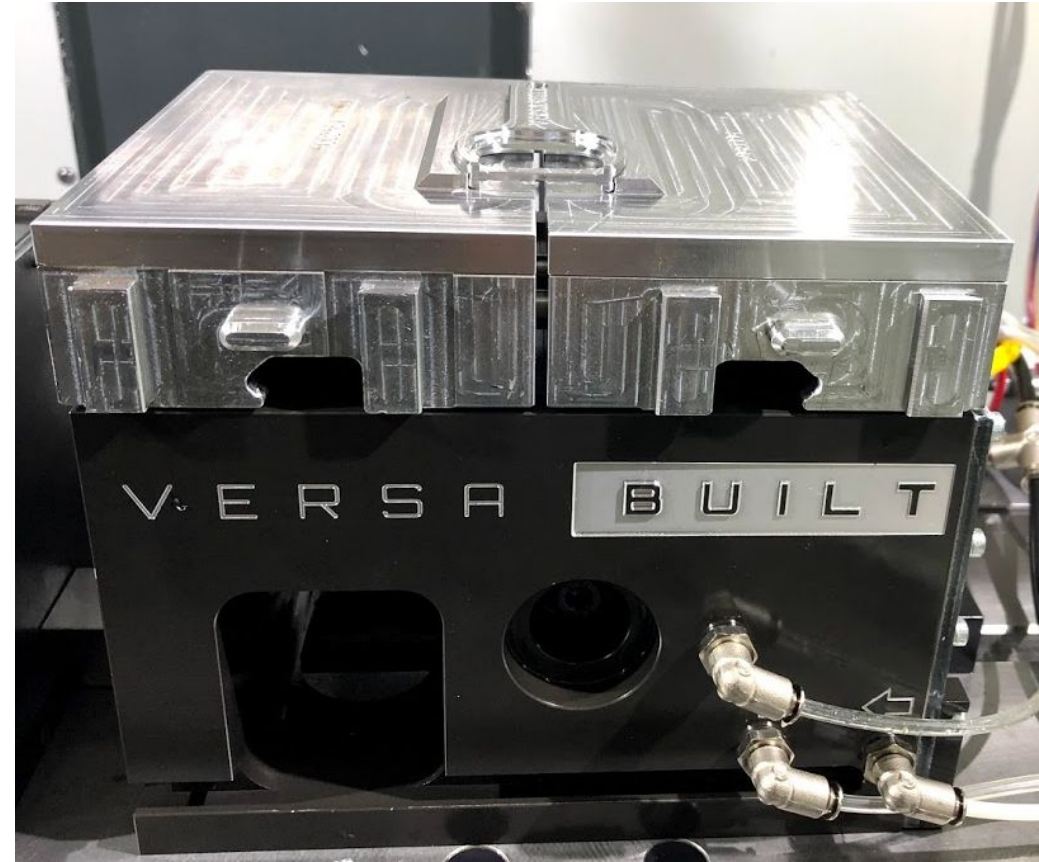
1. Prove out machining of the part by hand loading
2. Determine pick, transfer and place heights
3. Weigh jaws and parts
4. Verify raw material and infeed setup
5. Verify Jaws have proper X/Y pick and place clearance with part layout on the Infeed
6. Configure Jaws and Part on the VSC Part Configuration Page
7. Verify the CNC is setup properly
 - a. Refer to VSC/CNC Programming Manual
 - b. Proper program is in are memory
 - c. Programs end with correct G-Code callout
8. Select Part in VSC Home Page
9. Enter Part Quantity
10. Setup and Run Job
11. Process Measurement, Refinement, Control



Part Prove-out

Part Prove-out

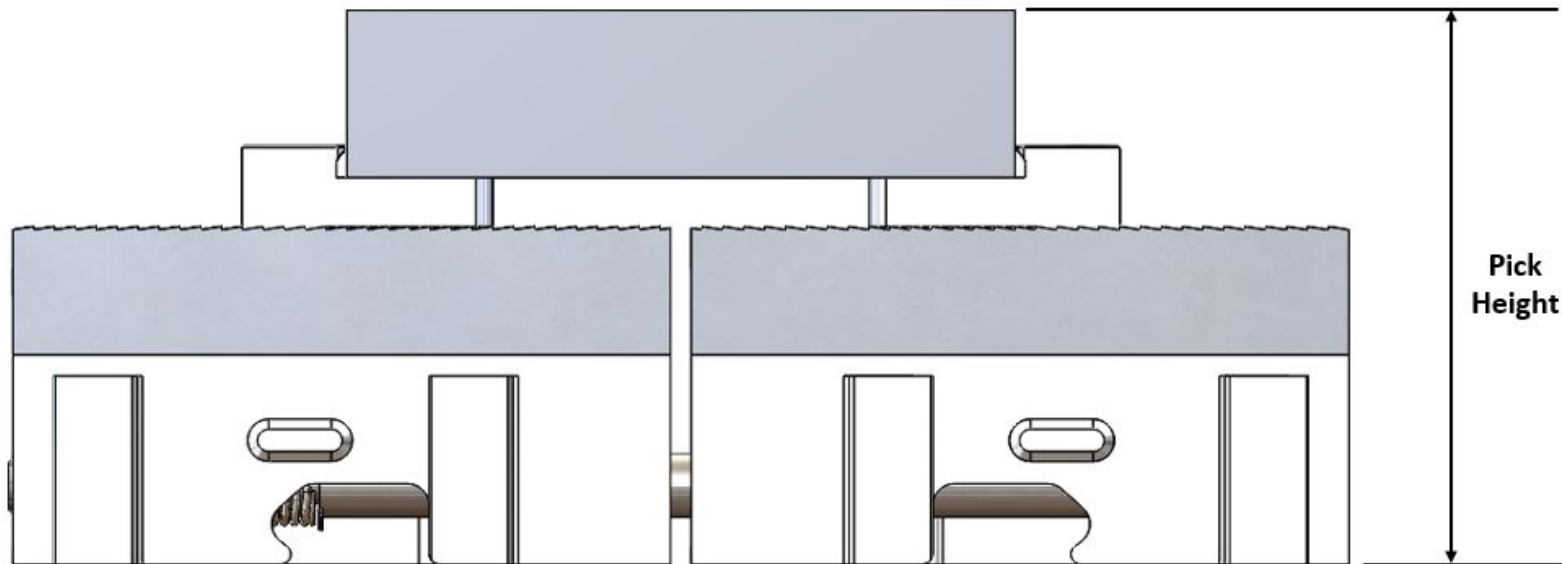
- Validate CNC process is functioning as expected by hand loading parts into jaws.
- Avoid mixing variables by introducing parts to automation without first proving out the parts via hand loading.
- The image to the right shows a MultiGrip Mill Application. For MultiGrip workholding applications, refer to the “MultiGrip Manual” for guidance on Jaw and Process Design.



Determine Pick Height

Pick Height

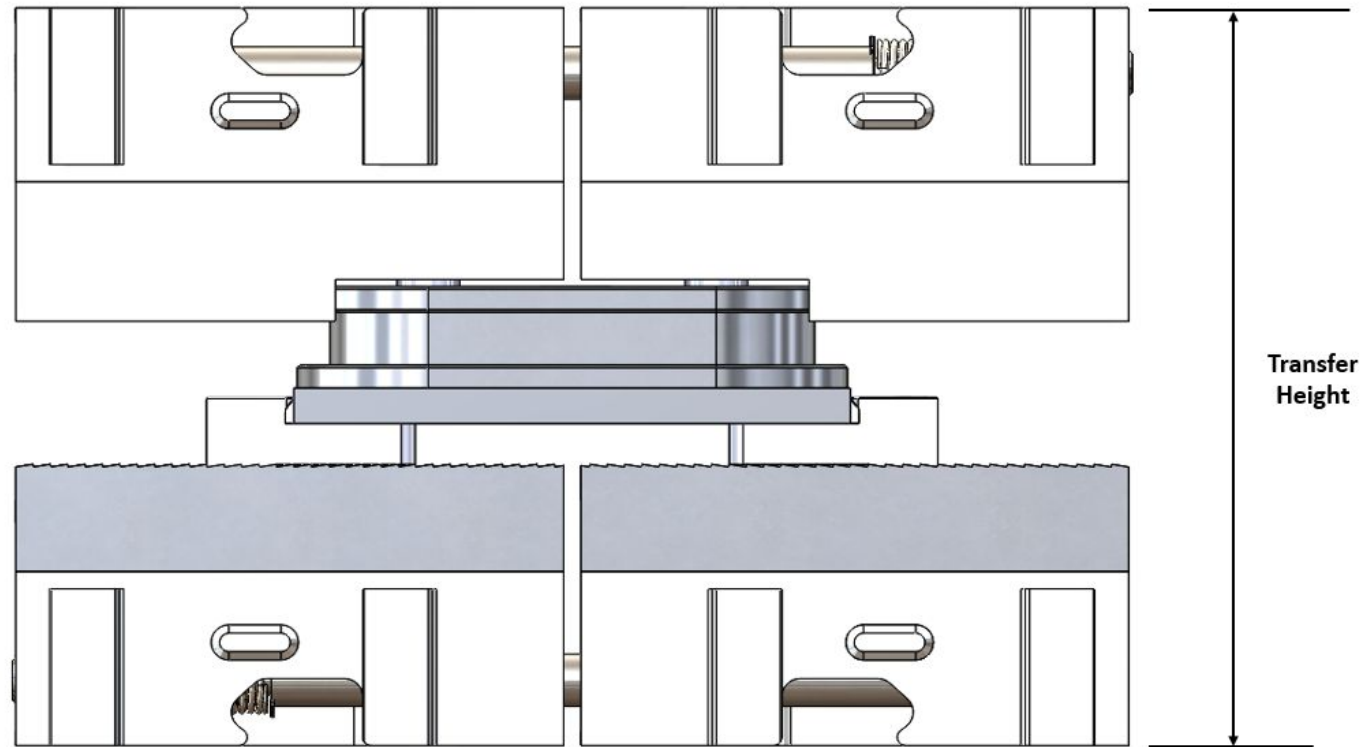
- Determine the Infeed Pick Height from CAD or measurement
- Infeed Pick height is measured from the bottom of the MultiGrip Jaw to the top of the part to be picked from the infeed
- **Tip:** Enable Part Find on Pick is an option in the part configuration that uses the robots force sensors to find the part height more accurately



Determine Transfer Height

Transfer Height

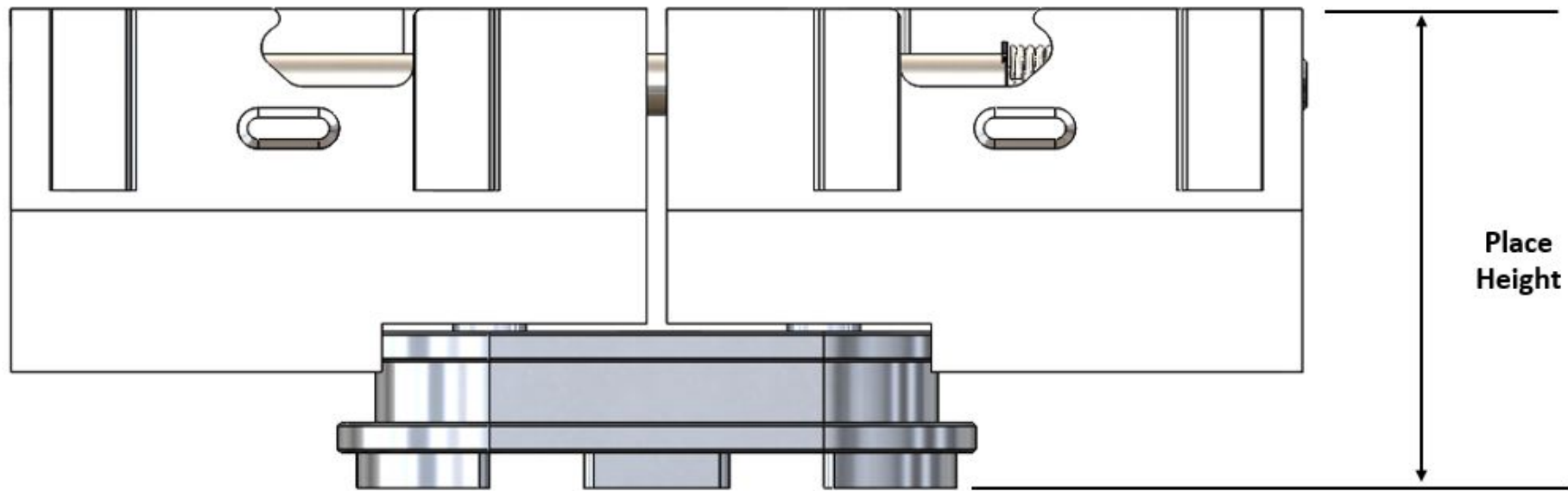
- Determine the Op Transfer Height from CAD or measurement
- Transfer height is measured from the bottom of the first op jaw to the bottom of the second op jaws with the after first op part (½ complete part) coincident with the Z locating surface of the second op jaws



Determine Place Height

Outfeed Place Height

- Determine the Infeed Place Height from CAD or measurement
- Place height is measured from the bottom of the second op jaw to the top of the completed part



Weights

Part and Jaw Weights

- Weigh each MultiGrip Jaw used in the application
- Weigh the part at the various states of the operation. For example, for a 2 Operation part:
 - Weight of raw material before machining
 - Weight of part after first operation machining is complete
 - Weight of completed part



Advanced Options

Advanced Options to consider:

- Refer to MultiGrip Manual, sections:
 - MultiGrip Workholding Design - Verify the Jaw design meets the Guidelines
 - Best Practices - Implement as needed
- Custom Infeed:
 - If the setup does not use the Visual Infeed
 - Refer to Custom Infeed section of this manual for guidance to design and implement a custom infeed
- Find Part:
 - Option for accurate Z height picking, if the first operation jaws have a shallow z-depth
- Y/Z Datum Positions / Part Settle:
 - Refer to the Best Practices section of the MultiGrip Manual for guidance
- Bin Drop:
 - Option for dropping off parts after process completion, rather than placing back on the infeed cart
- VersaWash Settings:
 - Variables are available for optimizing the process for debris and chip removal from MultiGrip Jaws

MultiGrip Processes

Section 3

Standard Processes (Scripts) with VersaBuilt Systems

MultiGrip Gripper Systems (Vertical Mills)

1. **1Op**
 - a. 1x Vise
 - b. One part at a time
2. **1Op Pipeline**
 - a. 2x Vises
 - b. Alternate Op1 on both vises (Op1 Vise 1, Op1 Vise 2, Op1 Vise 1, etc.)
3. **2Op**
 - a. 2x Vises
 - b. One Operation at a time (Op1, Op2, Op1, Op2, etc.)
 - c. Each vise is dedicated to either Op1 or Op2 for each part that is configured

MultiGrip 2Op *1 Operation, 1 Vises, 1 Jaw

Setup

1. Clean/Empty jaws hand loaded on clean vises
2. CNC Dispatcher in memory w/ CNC door open
3. VSC U/I - Robot at Table Home
4. VSC U/I - Part selected and quantity entered
5. Raw Material hand loaded on VersaCart Infeed
6. VSC U/I - Select VSC Cycle Start
7. CNC door closes
8. CNC runs table position program
9. CNC door opens
10. Robot - Unload jaws from vise
11. Robot - Pick part from infeed using jaws
12. Robot - Load jaws into vise
13. CNC door closes
14. Run CNC program

Cycle

1. Wait for CNC
2. CNC door opens
3. Robot - Unload jaws from vise
4. Robot - VersaWash part and jaws
5. Robot - Place part on infeed or at bin drop
6. Robot - VersaWash empty op1 jaws
7. Robot - Pick next part from infeed using jaws
8. Robot - Load jaws into vise
9. CNC door closes
10. Run CNC Program
11. Go to Cycle step 1 or if on last part, go to completion

Completion

1. Wait for CNC
2. CNC door opens
3. Robot - Unload jaws from vise
4. Robot - VersaWash part and jaws
5. Robot - Place part on infeed or at bin drop
6. Robot - VersaWash empty jaws
7. Robot - Load empty jaws into vise
8. Robot - Move back to Table Home

MultiGrip 2Op *1 Operation, 2 Vises, 2 Jaws (Pipeline)

Setup

1. Clean/Empty jaws hand loaded on clean vises
2. CNC Dispatcher in memory w/ CNC door open
3. VSC U/I - Robot at Table Home
4. VSC U/I - Part selected and quantity entered
5. Raw Material hand loaded on VersaCart Infeed
6. VSC U/I - Select VSC Cycle Start
7. CNC door closes
8. CNC runs table position program
9. CNC door opens
10. Robot - Unload jaws from vise
11. Robot - Pick part from infeed using jaws
12. Robot - Load jaws into vise
13. Robot - Unload jaws from other vise
14. CNC door closes
15. Run CNC program
16. Robot - Pick part from infeed using jaws

Cycle

1. Wait for CNC
2. CNC door opens
3. Robot - Load jaws on unused vise
4. Robot - Unload jaws from vise
5. CNC door closes
6. Run CNC program
7. Robot - VersaWash part and jaws
8. Robot - Place part on infeed or at bin drop
9. Robot - VersaWash empty jaws
10. Robot - Pick next part from infeed using jaws
11. Go to Cycle step 1 or if on last part, go to completion

Completion

1. Wait for CNC
2. CNC door opens
3. Robot - Load jaws on empty vise
4. Robot - Unload jaws from other vise
5. Robot - VersaWash part and jaws
6. Robot - Place part on infeed or at bin drop
7. Robot - VersaWash empty jaws
8. Robot - Load jaws into vise
9. Robot - Move back to Table Home

Items in **Blue** are robot overhead actions completed during CNC machining, assuming the machining operations are greater than ~100 sec

CNC Operations are run one at a time (i.e., the system does not machine 2 op1 parts at the same time)

MultiGrip 2Op *2 Operations, 2 Vises, 2 Jaws

Setup		Cycle		Completion	
1.	Clean/Empty jaws hand loaded on clean vises	1.	Wait for CNC	1.	Wait for CNC
2.	CNC Dispatcher in memory w/ CNC door open	2.	CNC door opens	2.	CNC door opens
3.	VSC U/I - Robot at Table Home	3.	Robot - Unload part from op1 vise using op2 jaws, load	3.	Robot - Unload part from op1 vise using op2
4.	VSC U/I - Part selected and quantity entered		op2 jaws into op 2 vise		jaws, load op2 jaws into op 2 vise
5.	Raw Material hand loaded on VersaCart Infeed	4.	Robot - Unload op1 jaws from op1 vise	4.	Robot - Unload op1 jaws from op1 vise
6.	VSC U/I - Select VSC Cycle Start	5.	CNC door closes	5.	CNC door closes
7.	CNC door closes	6.	Run op2 CNC program	6.	Run op2 CNC program
8.	CNC runs table position program	7.	Robot - VersaWash Empty Op1 Jaws	7.	Robot - VersaWash Empty Op1 Jaws
9.	CNC door opens	8.	Robot - Pick next part from infeed using op1 jaws	8.	Wait for CNC
10.	Robot - Unload op1 jaws from op1 vise	9.	Wait for CNC	9.	CNC door opens
11.	Robot - Pick part from infeed using op1 jaws	10.	CNC door opens	10.	Robot - Load empty op1 jaws into op1 vise
12.	Robot - Load op1 jaws into op1 vise	11.	Robot - Load op1 jaws into op1 vise	11.	Robot - Unload op2 jaws from op2 vise
13.	Robot - Unload op2 jaws from op2 vise	12.	Robot - Unload op2 jaws from op2 vise	12.	Robot - VersaWash part and op2 jaws
14.	CNC door closes	13.	CNC door closes	13.	Robot - Place part on infeed or at bin drop
15.	Run op1 CNC program	14.	Run op1 CNC Program	14.	Robot - VersaWash Empty Jaws
		15.	Robot - VersaWash part and op2 jaws	15.	Robot - Load op2 jaws into op2 vise
		16.	Robot - Place part on infeed or at bin drop	16.	Robot - Move back to Table Home
		17.	Robot - VersaWash Empty op2 jaws		
		18.	Go to Cycle step 1 or if on last part, go to completion		

Items in **Blue** are robot overhead actions completed during CNC machining, assuming the machining operations are greater than ~100 sec

CNC Operations are run one at a time (i.e., Op1 and Op2 are not combined programs)

MultiGrip Jaw & Part Configurations

Section 4

VSC Configurations

Jaws +				
Name	Description	Clamp	Weight	Edit
5003737	5003722	OD	6.2	
5007779	Op2_uni_op2jaws	OD	6.8	
Universal OP1 Jaws	OP1 jaws	OD	8.08	
VersaBuilt Rectangle A	VB Test Rectangle	OD	4	
VersaBuilt Rectangle B	VB Test Rectangle	OD	6.2	

Parts +		
Part Number	Description	Actions
One Op Test	One Op Test	
Generic One Op	Generic CNC driver test.	

Navigate to the “Configuration” Page

- The VSC Configurations page allows MultiGrip Jaws and Part configurations to be stored in the VSC
- Jaws are configured separately from Parts because MultiGrip Jaws can be used by more than one part configuration
- Once a Part configuration is complete, it can quickly be recalled at any time by the operator from the Home screen
- New part configurations can be created from scratch or by copying an existing part configuration

VSC Jaw Configurations

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Configurations ▾

Part Stop Op Stop Resync CNC

Jaws +				
Name	Description	Clamp	Weight	Edit
5008982 - Op2 Jaws for MultiGrip FJ Piston	Op2 Jaws for 5007867	OD	5	

Jaws

Name

Description

Clamp

☒ OD ☐ ID

Weight (Pounds)

0

Save Cancel Delete

A new Jaw configuration is created by clicking on the + in the upper right corner of the Jaws panel

Name: Identifier used to select the jaw in the part configuration

Description: Additional text to display to the user

Clamp: Identify if the jaws use OD (Outer Diameter) or ID (Inner Diameter) clamping

Weight: Weight of the jaws

VSC Part Configurations

Parts +		
Part Number	Description	Actions
5005547 - 1.5" Top Jaw - Fixed Side	MultiGrip Top Jaw Fixed Side - 1.5" x 4" x 6.15" blank	 
5007867 - MultiGrip FJ Piston	MultiGrip FJ Piston -	 

A new Part configuration is created by clicking on the **+** in the upper right corner of the Jaws panel

Parts

Part Number

Part Description

Process

Save

Cancel

Part Number: an identifier used by the operator to select the part to run in the Jobs Panel

Part Description: a description of the part

Process: the script used to process the part; included process script parameters are described on the following pages

VSC Process Scripts - MultiGrip Systems

VSC Process Script Overview

VSC Process Scripts drive how the Automation System moves parts through the automation process. VSC Process scripts include parameters entered in the part configuration and how the VSC uses those parameters to coordinate robot motion, IO and CNC processing.

The Automation Systems include standard scripts. If you're automation application has special requirements, contact VersaBuilt for a quote on a custom Process Script.

Standard Scripts are:

- **1Op with 1 Vise**
- **1Op Pipeline (1 Op with 2 Vises)**
- **2 Op with 2 Vises**
- **3 Op with 3 Vises**

VSC Process Scripts - MultiGrip Systems

- **1Op with 1 Vise** (Macro Version and Standard Driver (generic handshake) Version)
 - Used for 1 milling operation parts on a single vise.
- **1 Op Pipeline** (Macro Version and Standard Driver (generic handshake) Version)
 - Used for 1 milling operation parts alternating between two vises for higher efficiency.
- **2 Op with 2 Vises** (Macro Version and Standard Driver (generic handshake) Version)
 - Used for 2 milling operation parts; with Op1 performed on one side of the part on one vise and another milling operation performed on the opposite side of the part on the second vise. The Part configuration allows for selection of “Vise 1” or “Vise 2” for either operation, but not the same vise for both operations, as each vise needs to be dedicated for one individual operation.
- **3 Op with 3 Vises**
 - Used for 3 milling operation parts. The Part configuration allows for selection of “Vise 1” or “Vise 2” or “Vise 3” for each operation, but each vise needs to be dedicated for one individual operation.
- **Show Advanced Options**
 - By default, Process Scripts show the basic information required to implement the process, advanced options are set to default values. To show advanced options, click on the Show Advanced Options button.

One Op Process - Pick Options

Pick Options

☐ Show Advanced Pick Options

Raw Material Width (Inches)

0

Raw Material Length (Inches)

0

Raw Material Height (Inches)

0

Pick Height (Inches)

0

Raw Material Weight (Pounds)

0

Show Advanced Pick Options: selecting this box will display advanced options (see next page)

Raw Material Width: the width of the raw material

Raw Material Length: the length of the raw material

Raw Material Height: the height of the raw material

Pick Height: pick height measured from the bottom of the MultiGrip Jaws to the top of the part (raw material)

Raw Material Weight: weight of raw material before processing

One Op Process - Advanced Pick Options

Pick Options

☒ Show Advanced Pick Options

Raw Material Width (Inches)

0

Raw Material Length (Inches)

0

Raw Material Height (Inches)

0

Pick Height (Inches)

0

Raw Material Weight (Pounds)

0

☒ Enable Part Find on Pick

☒ Clap Gripper on Pick

☒ Op 1 Robot Settle

☒ Custom Infeed Spacing

Tune Pick Tilt Angle

0

Infeed X Offset (Inches)

0

Infeed Y Offset (Inches)

0

Robot Settle Angle

0

Starting X Position (Inches)

0

Starting Y Position (Inches)

0

Part Spacing in X (Inches)

0

Part Spacing in Y (Inches)

0

Number of Columns

0

Number of Rows

0

Enable Part Find on Pick: the robot will use it's force sensor to find the top of the part

Clap Gripper on Pick: the robot will open and close the gripper twice before lifting the part

Op 1 Robot Settle: after picking the part, the robot will open and close the gripper to settle the part against the Z surface of the jaws

Custom Infeed Spacing: override the default Visual Infeed alignment spacing

Infeed X/Y Offset: during *part pick*, an X and Y offset to apply to each part pick location

Tune Pick Angle: positive number will tilt the jaws up by the degrees entered during *part pick*; negative number will tilt the jaws down

Robot Settle Angle: positive number will tilt the jaws up by the degrees entered during *robot settle*; negative number will tilt the jaws down

One Op Process - Advanced Pick Options (cont'd)

Pick Options

☒ Show Advanced Pick Options

Raw Material Width (Inches)

0

Raw Material Length (Inches)

0

Raw Material Height (Inches)

0

Pick Height (Inches)

0

Raw Material Weight (Pounds)

0

☒ Enable Part Find on Pick

☒ Clap Gripper on Pick

☒ Op 1 Robot Settle

☒ Custom Infeed Spacing

Tune Pick Tilt Angle

0

Infeed X Offset (Inches)

0

Infeed Y Offset (Inches)

0

Robot Settle Angle

0

Starting X Position (Inches)

0

Starting Y Position (Inches)

0

Part Spacing in X (Inches)

0

Part Spacing in Y (Inches)

0

Number of Columns

0

Number of Rows

0

Custom Infeed Settings

Starting X Position: offset in X from the edge of the table to the center of the first pick

Starting Y Position: offset in Y from the edge of the table to the center of the first pick

Part Spacing in X: the center-to-center distance in X between part picks

Part Spacing in Y: the center-to-center distance in Y between part picks

Number of Columns: the number of columns in the custom infeed

Number of rows: the number of rows in the custom infeed

One Op Process - Op1 Options

Op 1 Options

☐ Show Advanced Op 1 Options

Jaws

Op 1 CNC Program

Show Advanced Op1 Options: selecting this box will display advanced options (see next page)

Jaws: the Jaws to be used for the first operation

Op 1 CNC Program: the program number on the CNC to execute the first operation

One Op Process - Advanced Op1 Options

Op 1 Options

☒ Show Advanced Op 1 Options

Jaws

▼

☒ Y Push

☒ Override Y Push Distance

Y Push Height Offset (Inches)

-0.15

Y Push X Offset (Inches)

0

Override Y Push Distance (Inches)

0

☒ Vise Settle

CNC Table Load Program

8000

CNC Vise Wash Program

8001

Op 1 CNC Program

0

Vise

1

Y Push: option to have the robot push the part to center in the vise; typically used with a -0.25" Y infeed offset (see Machinists Manual)

Override Y Push Distance: instead of letting the VSC, calculate the distance to push the part to center, specify the distance

Y Push Distance: used with Override option, the distance from the front of vise to push to

Y Push Height Offset: offset from the top of the part the gripper will move down to push the part to center

Y Push X Offset: before performing the Y push, specify a distance to move left or right of center when pushing the part

Vise Settle: option to unclamp then clamp the part after loading in the vise to settle the part in Z (see Machinists Manual)

CNC Table Load Program: CNC program number used to position the table for loading by the robot. Defaults to 8000

CNC Vise Wash Program: CNC program number used wash the vises of chips and position the table for loading by the robot. Defaults to 8001

One Op Process - Place Options

Place Options

☐ Show Advanced Place Options

Place Height (Inches)	Finished Part Height (Inches)	Post Op Part Weight (Pounds)
0	0	0

Show Advanced Place Options: selecting this box will display advanced options (see next page)

Place Height: the the height off of the table the robot will move to before releasing the part

Finished Part Height: the the height off of the part when it is put back on the table

Post Op Weight: the weight of the part after op1 is complete

One Op Process - Advanced Place Options

Place Options

☒ Show Advanced Place Options

Place Height (Inches)

0

Finished Part Height (Inches)

0

Post Op Part Weight (Pounds)

0

☐ Bin Drop

☒ Clap Gripper on Place

☐ Enable Part Find on Place

Outfeed X Offset (Inches)

0

Outfeed Y Offset (Inches)

0

Bin Drop: will move the finished part to the calibrated Bin Drop location and release the part

Clap Gripper on Place: opens and closes the gripper several times to help release light parts

Enable Part Find on Place: the robot will use it's force sensor to find the top of the part during place

Outfeed X/Y Offset: during *part pick*, an X and Y offset to apply to each part place location

One Op Process - Jaw Cleaning Options

Jaw Cleaning Options

☒ Finished Part Cleaning

☒ Empty Jaws Cleaning

☐ Dump Coolant at CNC Home

VersaWash Settings

Cycles

Dunk Speed

Drip Time(seconds)

Rotational Drip Speed

3

0.2

30

0.2

Finished Part Cleaning: wash the part in the VersaWash tank before placing in outfeed

Empty Jaws Cleaning: wash the empty jaws in the VersaWash tank before continuing processing

Dump Coolant at CNC Home: after unloading the completed part, the robot inverts the jaws and parts to release coolant held in the top of the part

VersaWash Settings:

Cycles: the number of rinse cycles to move the part and jaws up and down through the wash stream

Dunk Speed: speed scaling value (from 0.1 to 1) relative to max speed, the robot will move through the rinse cycles

Drip Time: how long the robot should spend waiting for the jaws and part to drip dry

Rotational Drip Speed: speed scaling value (from 0.1 to 1) relative to max speed, the robot will move through the drip angle motion

Two Op Process - Pick Options

Pick Options

☐ Show Advanced Pick Options

Raw Material Width (Inches)

0

Raw Material Length (Inches)

0

Raw Material Height (Inches)

0

Pick Height (Inches)

0

Raw Material Weight (Pounds)

0

Show Advanced Pick Options: selecting this box will display advanced options (see next page)

Raw Material Width: the width of the raw material

Raw Material Length: the length of the raw material

Raw Material Height: the height of the raw material

Pick Height: pick height measured from the bottom of the MultiGrip Jaws to the top of the part (raw material)

Raw Material Weight: weight of raw material before processing

Two Op Process - Advanced Pick Options

Pick Options

☒ Show Advanced Pick Options

Raw Material Width (Inches)

0

Raw Material Length (Inches)

0

Raw Material Height (Inches)

0

Pick Height (Inches)

0

Raw Material Weight (Pounds)

0

☒ Enable Part Find on Pick

☒ Clap Gripper on Pick

☒ Op 1 Robot Settle

☒ Custom Infeed Spacing

Tune Pick Tilt Angle

0

Infeed X Offset (Inches)

0

Infeed Y Offset (Inches)

0

Robot Settle Angle

0

Starting X Position (Inches)

0

Starting Y Position (Inches)

0

Part Spacing in X (Inches)

0

Part Spacing in Y (Inches)

0

Number of Columns

0

Number of Rows

0

Enable Part Find on Pick: the robot will use it's force sensor to find the top of the part

Clap Gripper on Pick: the robot will open and close the gripper twice before lifting the part

Op 1 Robot Settle: after picking the part, the robot will open and close the gripper to settle the part against the Z surface of the jaws

Custom Infeed Spacing: override the default Visual Infeed alignment spacing

Infeed X/Y Offset: during *part pick*, an X and Y offset to apply to each part pick location

Tune Pick Angle: positive number will tilt the jaws up by the degrees entered during *part pick*; negative number will tilt the jaws down

Robot Settle Angle: positive number will tilt the jaws up by the degrees entered during *robot settle*; negative number will tilt the jaws down

Two Op Process - Advanced Pick Options (cont'd)

Pick Options

☒ Show Advanced Pick Options

Raw Material Width (Inches)

0

Raw Material Length (Inches)

0

Raw Material Height (Inches)

0

Pick Height (Inches)

0

Raw Material Weight (Pounds)

0

☒ Enable Part Find on Pick

☒ Clap Gripper on Pick

☒ Op 1 Robot Settle

☒ Custom Infeed Spacing

Tune Pick Tilt Angle

0

Infeed X Offset (Inches)

0

Infeed Y Offset (Inches)

0

Robot Settle Angle

0

Starting X Position (Inches)

0

Starting Y Position (Inches)

0

Part Spacing in X (Inches)

0

Part Spacing in Y (Inches)

0

Number of Columns

0

Number of Rows

0

Custom Infeed Settings

Starting X Position: offset in X from the edge of the table to the center of the first pick

Starting Y Position: offset in Y from the edge of the table to the center of the first pick

Part Spacing in X: the center-to-center distance in X between part picks

Part Spacing in Y: the center-to-center distance in Y between part picks

Number of Columns: the number of columns in the custom infeed

Number of rows: the number of rows in the custom infeed

Two Op Process - Op1 Options

Op 1 Options

☐ Show Advanced Op 1 Options

Jaws

Op 1 CNC Program

Show Advanced Op1 Options: selecting this box will display advanced options (see next page)

Jaws: the Jaws to be used for the first operation

Op 1 CNC Program: the program number on the CNC to execute the first operation

Two Op Process - Advanced Op1 Options

Op 1 Options

☒ Show Advanced Op 1 Options

Jaws

▼

☒ Y Push

☒ Override Y Push Distance

Y Push Height Offset (Inches)

Y Push X Offset (Inches)

Override Y Push Distance (Inches)

☒ Vise Settle

Op 1 CNC Program

Vise

CNC Table Load Program

CNC Vise Wash Program

0

1

8000

8001

-0.15

0

0

Y Push: option to have the robot push the part to center in the vise; typically used with a -0.25" Y infeed offset (see Machinists Manual)

Override Y Push Distance: instead of letting the VSC, calculate the distance to push the part to center, specify the distance

Y Push Distance: used with Override option, the distance from the front of vise to push to

Y Push Height Offset: offset from the top of the part the gripper will move down to push the part to center

Y Push X Offset: before performing the Y push, specify a distance to move left or right of center when pushing the part

Vise Settle: option to unclamp then clamp the part after loading in the vise to settle the part in Z (see Machinists Manual)

CNC Table Load Program: CNC program number used to position the table for loading by the robot. Defaults to 8000

CNC Vise Wash Program: CNC program number used wash the vises of chips and position the table for loading by the robot. Defaults to 8001

Two Op Process - Part Transfer Options

Part Transfer Options

☐ Show Advanced Transfer Options

Op 1 to 2 Transfer Height (Inches)	After Op 1 Part Height (Inches)	Op 1 to 2 Clearance Height (Inches)	Post Op 1 Part Weight (Pounds)
0	0	2	0

Show Advanced Transfer Options: selecting this box will display advanced options (see next page)

Op 1 to 2 Transfer Height: the Jaws to be used for the first operation

After Op 1 Part Height: the height of the part after Op 1 machining is complete

Op 1 to 2 Clearance Height: the height above the pick position during approach to avoid a collision with the part

Post Op 1 Part Weight: the weight of the part after Op machining is complete

Two Op Process - Advanced Part Transfer Options

Part Transfer Options

☒ Show Advanced Transfer Options

Op 1 to 2 Transfer
Height (Inches)

0

After Op 1 Part
Height (Inches)

0

Op 1 to 2 Clearance
Height (Inches)

2

Post Op 1 Part
Weight (Pounds)

0

☐ Enable Part Find on Transfer

Part Find Starting Height (Inches)

0.25

☒ Calibrate Transfer Position

☐ CNC Vise Wash after Op Transfer

CNC Vise Wash Program after Op Transfer

8001

Above Transfer Position

0,0,0,0,0,0 Get

☐ Run Table Load
after Op Transfer

CNC Table Load
Program After Op
Transfer

8000

Calibrated Transfer Position

0,0,0,0,0,0 Get

X Vise Transfer
Offset (Inches)

0

Y Vise Transfer
Offset (Inches)

0

Enable Part Find on Transfer: use the robot's force sensor to detect the top of the part during the part transfer process

Part Find Starting Height: height above part to start motion using the robot's force sensor to find the top of the part

Calibrate Transfer Position: when this option is selected, the approach position and the transfer position are calibrated

Above Transfer Position: move the robot to a position above the part before the transfer takes place and press the Get button to capture the position; **Note:** the robot will move from the In CNC Home Position to this location

Calibrated Transfer Position: move the robot the part, clamp the jaws on the part and then press the Get button to capture the position

Run Table Load after Op Transfer: if selected, will run the **CNC Table Load Program After Op Transfer** after the part has been picked from the first op vise; **Note:** this is useful when the robot cannot reach the Op 2 vise from the Op 1 vise table position

X/Y Vise Transfer Offset: an X/Y offset to apply to the transfer position

Two Op Process - Op 2 Options

Op 2 Options

☐ Show Advanced Op 2 Options

Op 2 Jaws

Op 2 CNC Program

Post Op 2 Part
Weight (Pounds)

Show Advanced Transfer Options: selecting this box will display advanced options (see next page)

Op 1 to 2 Transfer Height: the Jaws to be used for the first operation

After Op 1 Part Height: the height of the part after Op 1 machining is complete

Op 1 to 2 Clearance Height: the height above the pick position during approach to avoid a collision with the part

Post Op 1 Part Weight: the weight of the part after Op machining is complete

Two Op Process - Advanced Op 2 Options

Op 2 Options

☒ Show Advanced Op 2 Options

Op 2 Jaws

Op 2 CNC Program

Post Op 2 Part
Weight (Pounds)

☒ OP 2 Robot Settle

☒ Op 2 Vise Settle

Op 2 Robot Settle Angle

Show Advanced Transfer Options: selecting this box will display advanced options (see next page)

Op 1 to 2 Transfer Height: the Jaws to be used for the first operation

After Op 1 Part Height: the height of the part after Op 1 machining is complete

Op 1 to 2 Clearance Height: the height above the pick position during approach to avoid a collision with the part

Post Op 1 Part Weight: the weight of the part after Op machining is complete

Two Op Process - Place Options

Place Options

☐ Show Advanced Place Options

Place Height (Inches)	Finished Part Height (Inches)
0	0

Show Advanced Place Options: selecting this box will display advanced options (see next page)

Place Height: the the height off of the table the robot will move to before releasing the part

Finished Part Height: the the height off of the part when it is put back on the table

Two Op Process - Advanced Place Options

Place Options

☒ Show Advanced Place Options

Place Height (Inches)

0

Finished Part Height (Inches)

0

☐ Bin Drop

☒ Clap Gripper on Place

☐ Enable Part Find on Place

Outfeed X Offset (Inches)

0

Outfeed Y Offset (Inches)

0

Bin Drop: will move the finished part to the calibrated Bin Drop location and release the part

Clap Gripper on Place: opens and closes the gripper several times to help release light parts

Enable Part Find on Place: the robot will use it's force sensor to find the top of the part during place

Outfeed X/Y Offset: during *part pick*, an X and Y offset to apply to each part place location

Section 4: MultiGrip Jaw and Part Configurations

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Two Op Process - Jaw Cleaning Options

Jaw Cleaning Options

☒ Op 1 Empty Jaws Cleaning ☒ Op 2 Part Cleaning ☒ Op2 Empty Jaws Cleaning ☐ Table Wash After Op2 Empty Jaws Cleaning ☐ Dump Coolant at CNC Home

VersaWash Settings

Cycles	Dunk Speed	Drip Time(seconds)	Rotational Drip Speed
3	0.2	30	0.2

Finished Part Cleaning: wash the part in the VersaWash tank before placing in outfeed

Empty Jaws Cleaning: wash the empty jaws in the VersaWash tank before continuing processing

Dump Coolant at CNC Home: after unloading the completed part, the robot inverts the jaws and parts to release coolant held in the top of the part

VersaWash Settings:

Cycles: the number of rinse cycles to move the part and jaws up and down through the wash stream

Dunk Speed: speed scaling value (from 0.1 to 1) relative to max speed, the robot will move through the rinse cycles

Drip Time: how long the robot should spend waiting for the jaws and part to drip dry

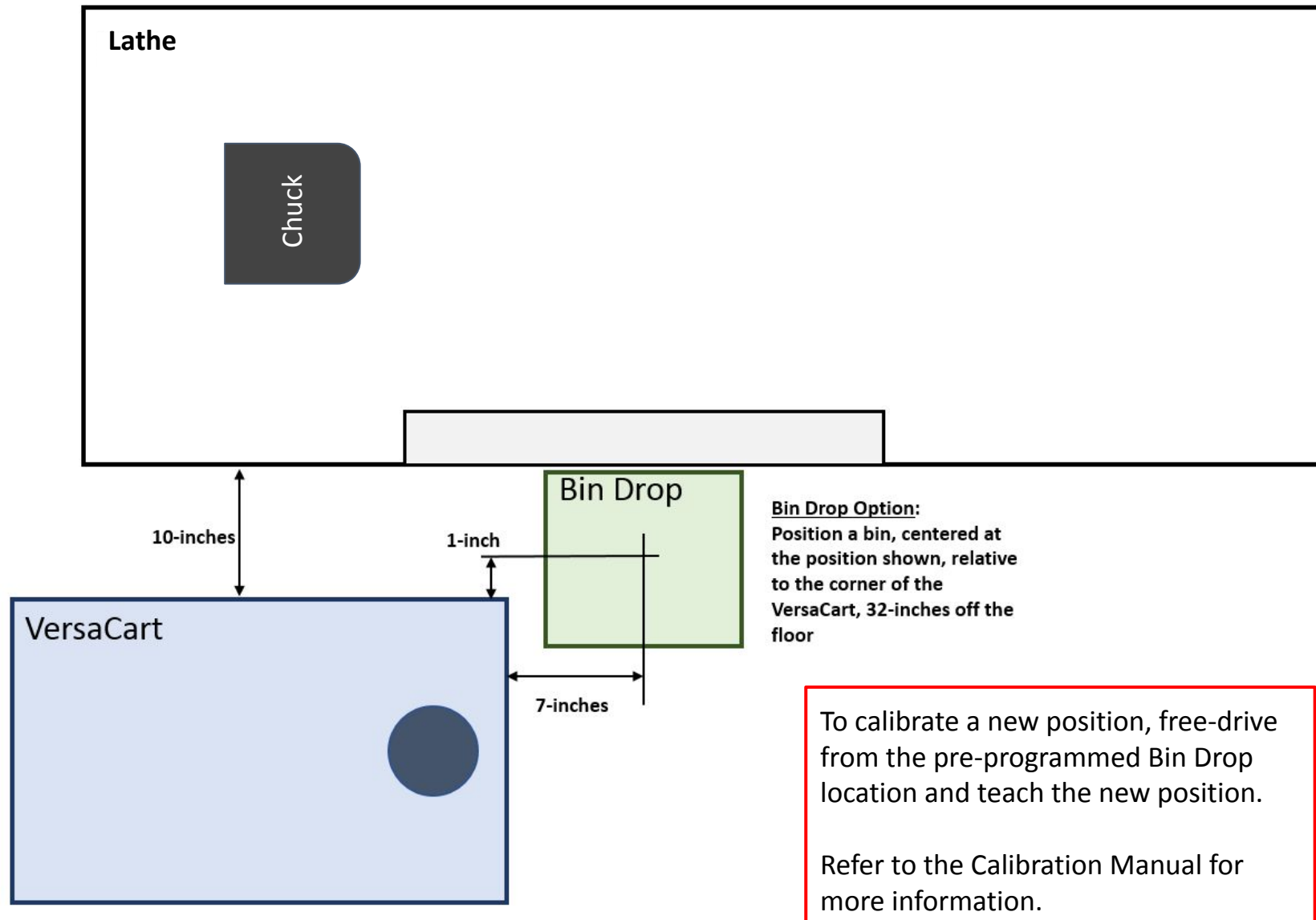
Rotational Drip Speed: speed scaling value (from 0.1 to 1) relative to max speed, the robot will move through the drip angle motion

Appendices

Bin Drop, Custom Infeed

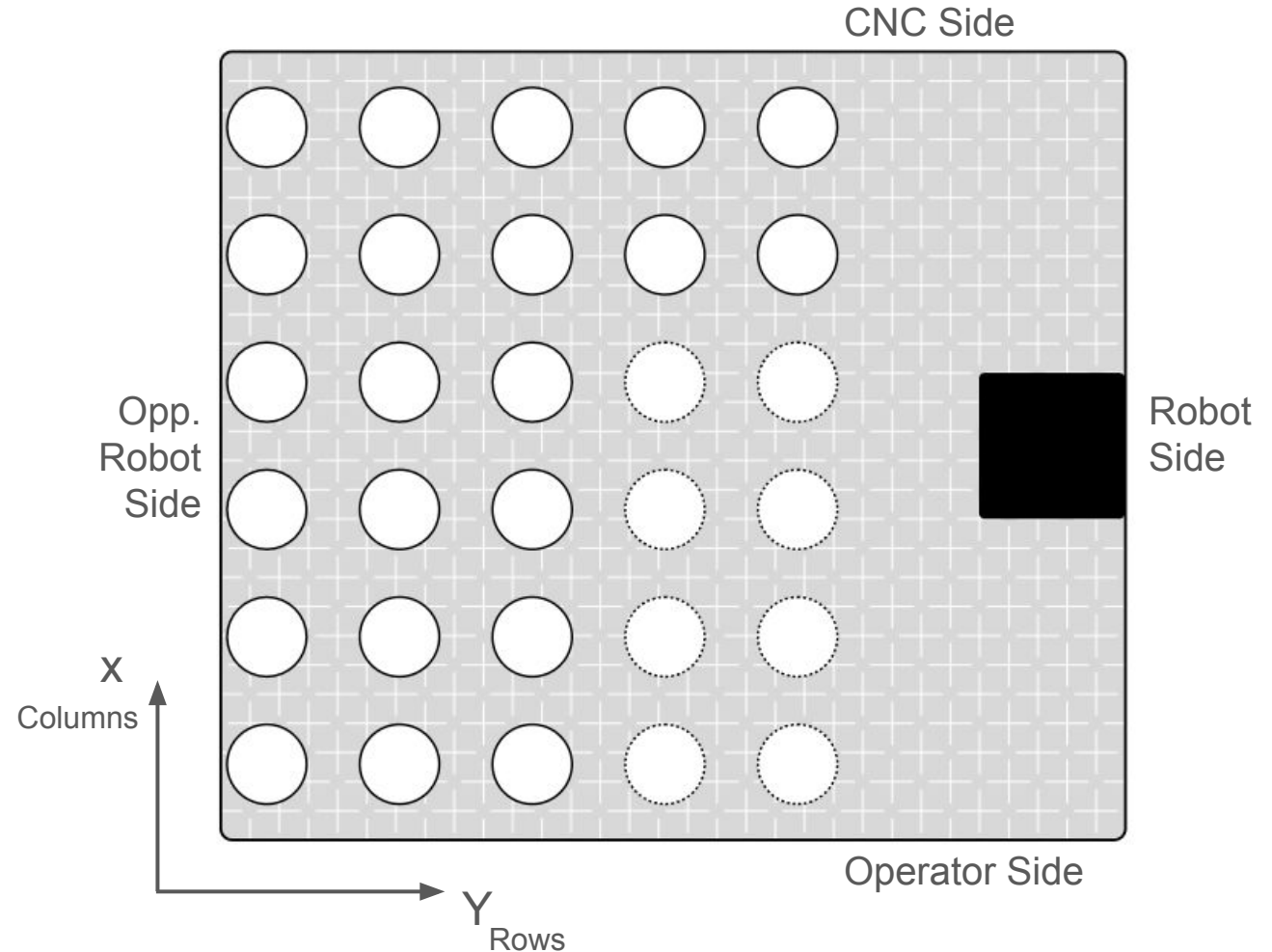
Bin Drop Option

- Place bucket or bin at location shown
- Protect parts with foam, water or other means

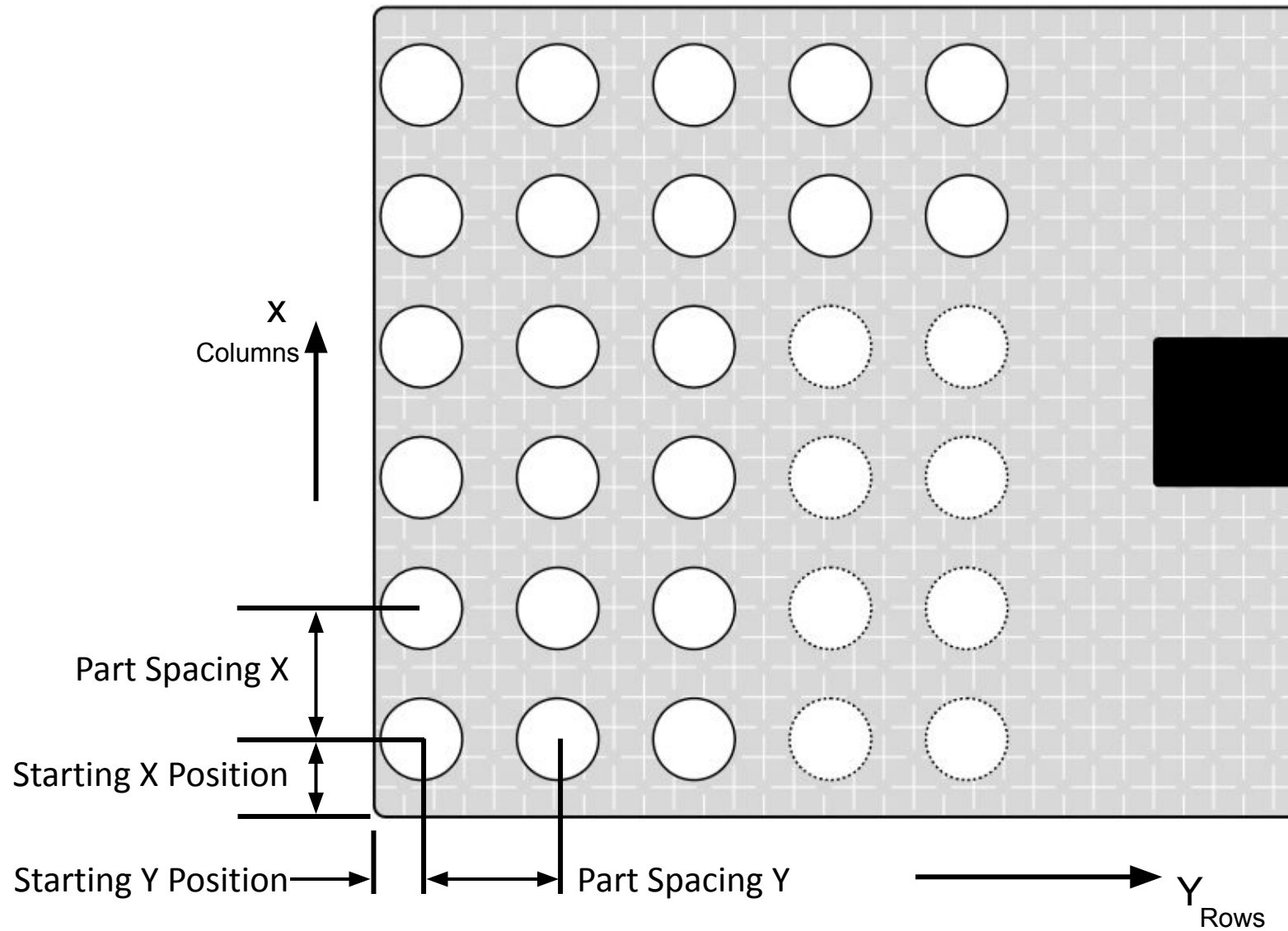


Custom Infeed Option

- The Infeed layout can be customized, typically for infeed optimization.
- The custom locations are set in the Part Configuration, with offsets relative to the calibrated Stainless Steel Visual Infeed (refer to calibration manual).
- In the part configuration, the following information is entered:
 - **Starting X Position** = Distance from Edge of Calibrated Infeed (Operator Side) to Center of Part Picking Location
 - **Starting Y Position** = Distance from Edge of Calibrated Infeed (Opposite Robot) to Center of Part Picking Location
 - **Part Spacing in X** = Center to Center distance in X Direction
 - **Part Spacing in Y** = Center to Center distance in Y Direction
 - **Number of Columns** = X-Direction Part Count
 - **Number of Rows** = Y-Direction Part Count
- For custom infeed design, contact VersaBuilt or use 3D models, available at <https://www.versabuilt.com/resources/>.



Custom Infeed Option



VERSABUILT ROBOTICS