

Calibrating The Vernon MPM Machine

This document covers the basics of making sure that your Vernon MPM machine is properly tuned and can cut parts as desired.

Contents

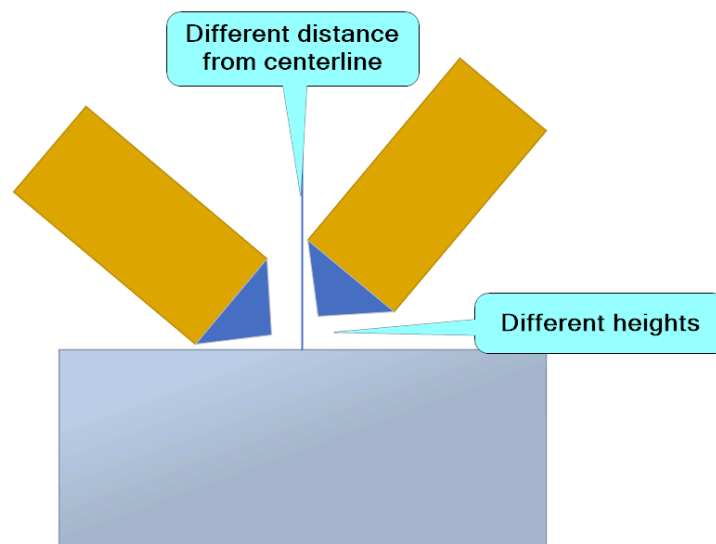
1	Check machine tuning with WinMPM.....	2
2	Set machine settings for PypeServer to control the machine correctly.....	6
2.1	Settings for cutting/ground direction.....	6
2.2	Feedrate control (older vs newer machines).....	7
2.3	Set PypeServer cut parameters for proper machine control.....	8

1 Vernon Machine Calibrator

See also the Vernon Calibration Tool that is in the Machine Settings left sidebar.

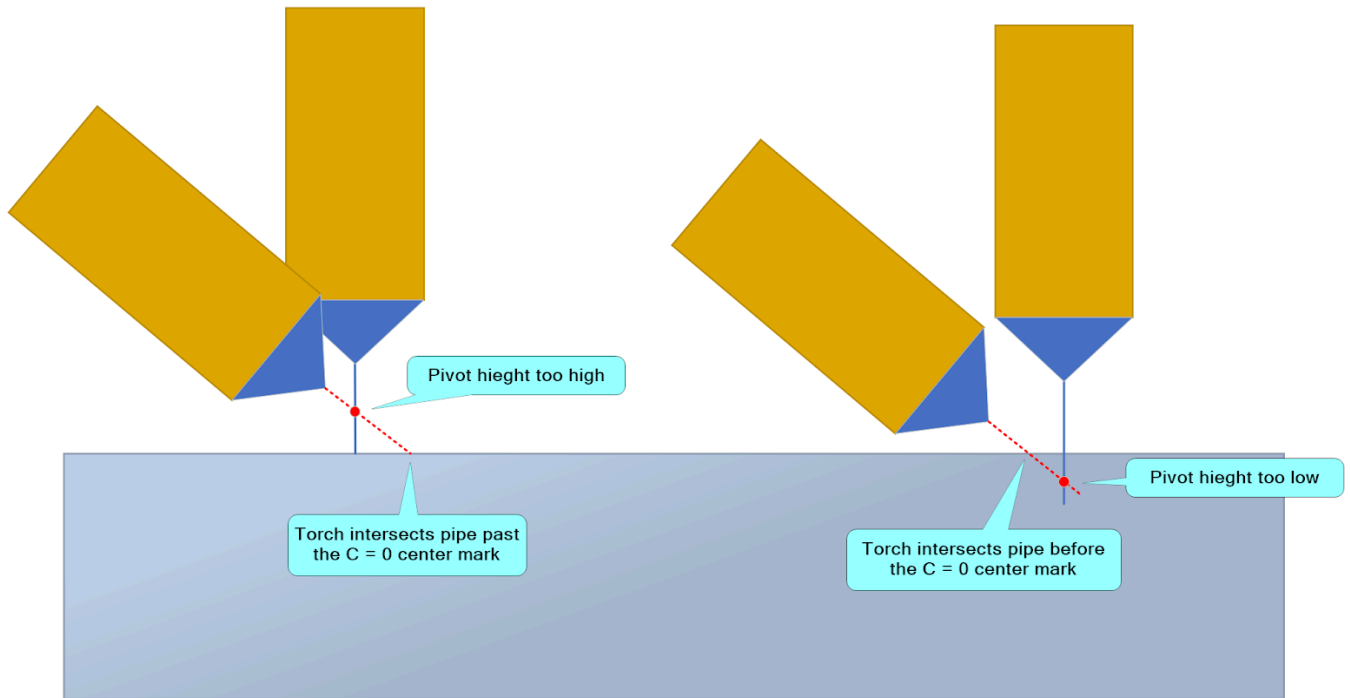
2 Check machine tuning with WinMPM

- Check for C-plate alignment (visually)
 - The Test:
 - With $A = 0$ and $C = 0$, bring the torch tip to sensor torch cut height (typically 3/16") off a pipe. **Mark the centerline position of the torch down the pipe.**
 - With A at zero, tilt the torch C axis over to 42 degrees, or less if the torch begins to touch the pipe. Note:
 - The torch centerline position as it would intersect the pipe,
 - The actual torch angle, and
 - The height of the beveled side of the torch tip off the pipe.
 - Tilt the torch C axis over the other way the same distance as the first tilt direction. Note the same things as the first tilt.
 - Expected:
 - The torch centerline position should be the same distance from the $C = 0$ centerline mark. The position need not be the same (that's pivot height), but the distances for both tilts should be equal.
 - The torch angle should be the same both ways.
 - The torch's beveled side should be at the same height off the pipe tilted either way.



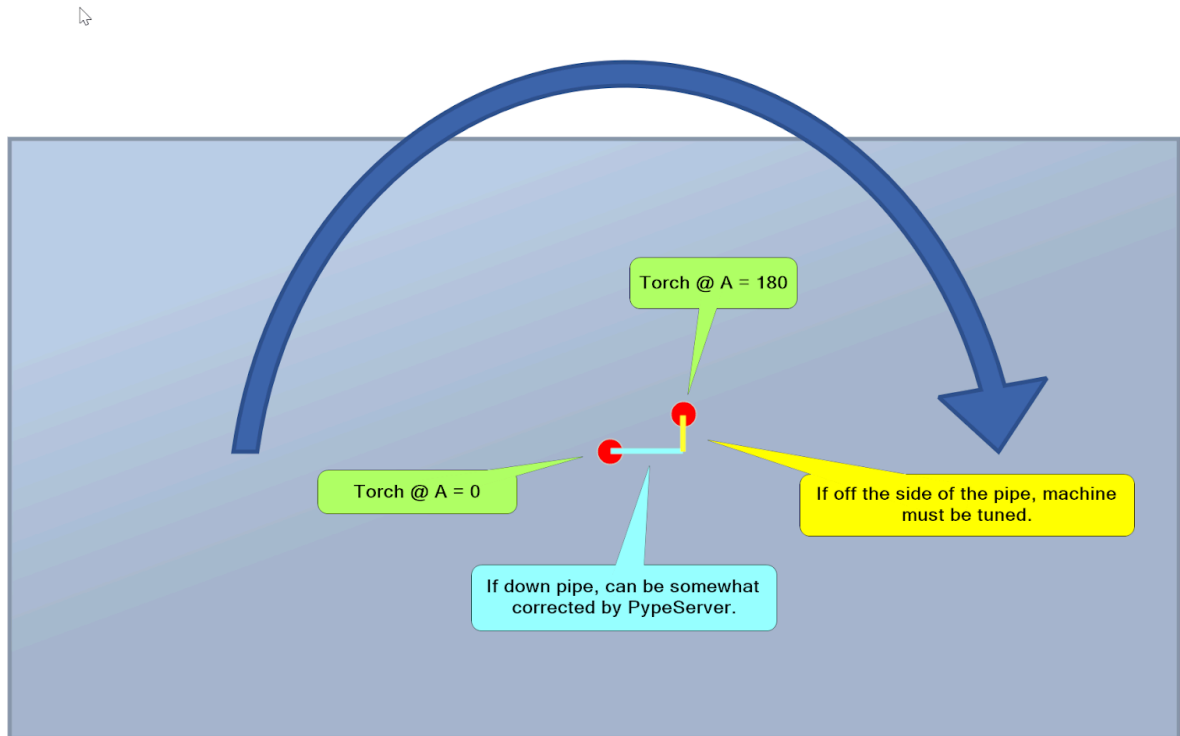
- Troubleshooting: If you do not get the expected results, contact Vernon support to adjust the C-Plate.

- Check for Pivot Height (visually)
 - The Test:
 - Perform the same steps as for testing the C Plate alignment. Be sure that you are at sensor cut height for this test.
 - Expected:
 - The torch centerline position should be hitting the pipe at the same center position as where you marked when C was at Zero.



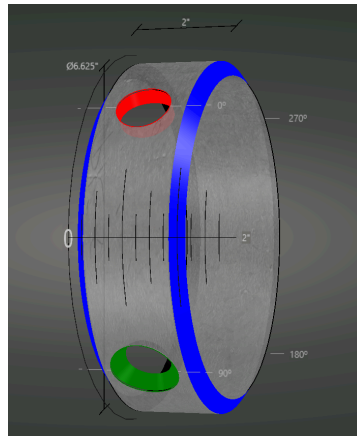
- Troubleshooting:
 - If when tilting the torch centerline moves toward the tilt, then while the sensor is on, adjust/turn the sensor height knob so that the torch returns to the C = 0 centerline mark.
 - Continue tilting back and forth until the torch is pointing at the same mark for any tilt angle.
- Check A spin alignment (visually)
 - The Test:
 - With a round, straight pipe that sits on and rolls on the roller-bed evenly, Set A = 0 and C = 0 and bring the torch down close to the pipe.
 - Mark the centerlines for the torch—both around the pipe and down the pipe. Or mark a point where the torch is pointing to.
 - Rotate A to 180 degrees.

- Expected:
 - At $A = 0$ the torch should be on top of the pipe—not off center.
 - The torch should still be pointing at the point.



- Troubleshooting:
 - If the torch is off-center at $A = 0$ or $A = 180$, contact Lincoln support to get the torch head centered over the pipe roller bed. If the torch is off to the side of the pipe (no longer on the top of the pipe).
 - If the torch is on-center but at $A = 180$ is left or right of the mark made at $A = 0$, you can probably factor that out in PypeServer with the A-pivot adjustment. Note that this cannot be factored out with WinMPM.


- Cut a part using WinMPM
 - The part:
 - 2" part beveled 37 degrees
 - Make sure that you have the actual wall thickness entered for the pipe—not just the ASME thickness.
 - with a 1" OD hole no bevel
 - and a 1" ID bevel hole.
 - Cut with proper feedrates or over-burn will skew your results



- Troubleshooting:
 - If the straight hole is too big, increase the kerf by the amount that the hole is too big.
 - If the straight hole is small, decrease the kerf by the amount that the hole is too small.
 - If your A-Spin is not aligned, these checks will not be useful. You can do the same tests in PypeServer with the A-spin factored out.
 - If the part is short and the beveled hole is too big, your pivot height might be a little low.
 - If the part is long and the beveled hole is too small, your pivot height might be a little high.
 - If the part is short and the beveled hole is short you may have entered a wall thickness that is more than the part.
 - If the part is long and the beveled hole is long you may have entered a wall thickness that is less than the part.

3 Set machine settings for PypeServer to control the machine correctly

Properties for this section are shown here:

 System Settings

Machine Settings	System Properties	Configure Services	List Management	Custom Columns	Label Printing	Default Cut Values	Printers	Beta Options
Machine	Firmware Revision	1.02						
Vernon 5Ax	Machine Name	Vernon 5Ax						
Admin logout...	Cutting Dead Zone	18.000						
Validate Settings	Machine Zero to End of Pipe	0						
Machine Diagnostics	Folder or IP Address	C:\PypeServerVernon\Machine1						
	Data Transfer Mode	DumpToFile						
	Data Reporting Mode	SystemWatchesFiles						
	Local Connection Required	<input type="checkbox"/>						
	Min Cut Steps	2						
	Max Cut Steps	600						
	Leadin Min Distance	0.2						
	Lead In-Out Arc Radius	0.15						
	Leadin Steps	8						
	Machine Positioning	111						
	Machine Capabilities Filter	11111111111000000						
	Is Metric	<input type="checkbox"/>						
	Default Cutter Type	Plasma						
			Name	Value				
			A Max Rotation	355				
			A Min Rotation	-365				
			Add Date Time To NC File Names	False				
			Adjust Speed By Step Count	False				
			A Rotate Feed Rate Increase	1				
			Bed Wheel Axle Distance Apart	13				
			Bed Wheel Diameter	12				
			Carriage Up Time Seconds	2.000				
			Computer Watching Files	KD7				
			C Tilt Feed Rate Increase	1				
			Default Smoothing Distance	1				
			Default Smoothing Passes	2				
			Dist To Blend Dynamic Tilt Crossovers	1				
			Dwell Secs For Torch To Reach Sensor Height	4				
			Exact Stop G61 Supported	True				
			Friendly Name For Machine App Tab	unspecified				
			Locate Far Pipe End At Last Part	False				
			NC File Tag	.nc				
			Negate A Axis Rotation	False				
			Pause After Pieces Shorter Than	0.000				
			Pause Before Any Motion	True				
			Pause Before Returning To Start	True				
			Process Running Machine	unspecified				
			Requires M0 On First Sensors On	True				
			Return To Start After Final Cut	True				
			Show Machine App In Tab	False				
			Stagger Straight Cut Start Rotation Dist	1				
			Supports Pause After Pieces Shorter Than	True				
			Supports Shift Pipe Forward For Each Part	True				
			Swap Ground And Sensor At End	False				
			Torch Head Type	ACRotateTilt				
			Use G01 For Rapid	False				
			X Pipe Rotation Dir	-1				

3.1 Settings for cutting/ground direction

If you are cutting left to right, where the ground is on the right and you are using the right-side sensor:

- Machine Property: X Pipe Rotation Dir= 1
- Machine Property: Negate A Axis Rotation = True

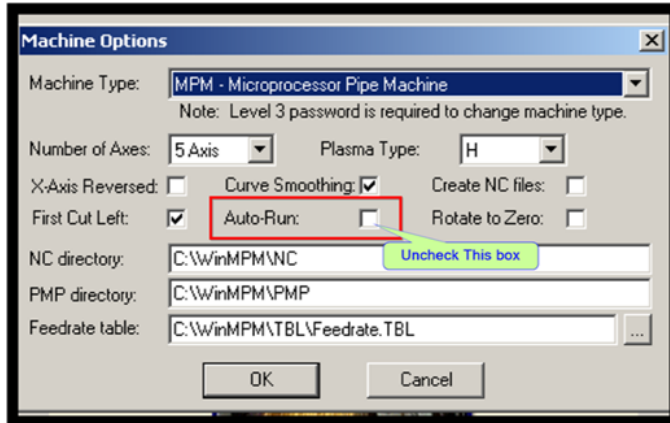
If you are cutting right to left, where the ground is on the left and you are using the left-side sensor:

- X Pipe Rotation Dir -1
- Negate A Axis Rotation = False

3.2 Feedrate control (older vs newer machines)

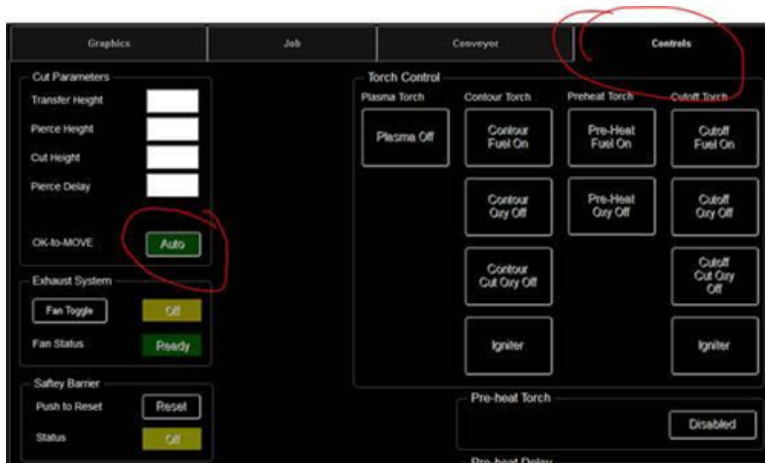
If your machine's UI looks like the image below, then set

- Machine Property: Adjust Speed By Step Count = True



If your machine's UI looks like the image below, then set

- Machine Property: Adjust Speed By Step Count = False



3.3 Set PyeServer cut parameters for proper machine control

- Make sure you set your machine-enable M0 machine stop, as shown above in section 2.2. Also see “NC Code for Vernon Machines”, section 2.1.
- Move your torch to sensor height and Z == 0. Measure the torch height off the pipe and enter it here:

The screenshot displays the PyeServer software interface for configuring a torch. On the left, a sidebar shows 'Torch' and 'Plasma Vern 5ax' selected. The main area is divided into three panels:

- Torch Name: Plasma Vern 5ax**

Parameter	Value
Cutter Beam Divergence Ang	0
Kerf	0.100
Pierce Angle	0.00
Leadin	0.250
Leadout	<input checked="" type="checkbox"/>
Leadout Start Distance	0.200
Early Off Dist	0.100
Torch off lag time (msec)	0
Tab Length	0.125
Max Bevel Angle U	42.00
Max Bevel Angle V	42.00
Admin Configs	
For Machine	
Torch ID	6
Torch Type	Plasma
Cut Step Increment	0.070
Torch Swirl CW	<input checked="" type="checkbox"/>
Use Cut Direction Controls	<input type="checkbox"/>
Right Endcut CW	<input type="checkbox"/>
- Name: Value**

Name	Value
A Down Pipe Off Center	0
C Bevel Feed Rate Decre...	.6
Consumable Type	Copper
Current	140
Cut Height	0.2
Default Material	Stainless ...
Dwell Secs After Torch On	1
Fineline Process Filters	{
Fineline Properties	{
Marking Gasses	Ar:Air
Minimum Torch Clearance	0.15
Show Machine Correctio...	False
Torch Control Type	Fineline
Torch Model	Fineline 1...
Torch Tip Base Diameter	0.5
Torch Tip Height Off Pip...	0.2
Torch Tip Z Optimal Hei...	0.1875
Use Torch Control	True
- Tip Geometry**

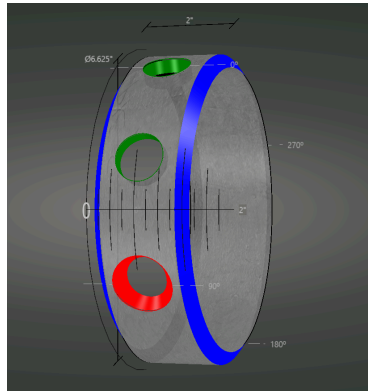
Parameter	Value
Cut Height	0.200
Torch Height Off Pipe at Z Zero	0.187
Torch Tip Base Diameter	0.400
Minimum Torch Clearance	0.100

Below the settings is a diagram of a torch cutting a pipe. The diagram illustrates the relationship between the torch tip, the pipe, and the cut height. Labels include:

- Torch Tip Base Diameter**: Indicated by a red double-headed arrow across the base of the torch tip.
- Torch Height off Pipe At Z Zero**: Indicated by a green double-headed arrow from the pipe surface to the torch tip at Z=0. A note below states: "--at sensor height (Zero if torch touches pipe at Z = 0)".
- Cut Height**: Indicated by a green double-headed arrow from the pipe surface to the cut line. A note states: "--Used when not using Fineline".
- Minimum Torch Clearance**: Indicated by a blue double-headed arrow from the pipe surface to the torch body. A note states: "--Used when beveling".

- Set your torch kerf the same as you have in WinMPM

- Cut this part:
 - 2" 37 degree bevel part
 - 1" OD zero degree fixed-bevel hole.
 - 1" OD zero degree non-fixed bevel hole.
 - 1.25" OD 37 degree bevel hole.
 - Cut with proper feedrates or over-burn will skew your results



- Part Troubleshooting
 - If the fixed bevel hole OD is not to size, adjust kerf as you did in WinMPM. Repeat cut until this is correct before continuing.
 - If 1" OD zero-degree non-fixed bevel hole is too big or too small, adjust the torch property "A Down Pipe Center" property by the distance that the part is too big. Test again. If the hole gets worse in size, negate the "A Down Pipe Center" value and retest. Adjust value until the hole is the right size. (You may need a special password to get to this parameter. Contact PypeServer support for that.) Get this hole sized right before continuing.

Torch	
Plasma Vern Sax	
Torch Controller Settings	
Torch Name	Plasma Vern Sax
Cutter Beam Divergence Ang	0
Kerf	0.100
Pierce Angle	0.00
Leadin	0.250
Leadout	<input checked="" type="checkbox"/>
Leadout Start Distance	0.200
Early Off Dist	0.100
Torch off lag time (msec)	0
Tab Length	0.125
Max Bevel Angle U	42.00
Max Bevel Angle V	42.00
Admin Configs	
For Machine	
Torch ID	6
Torch Type	Plasma
Cut Step Increment	0.070
Torch Swirl CW	<input checked="" type="checkbox"/>
Use Cut Direction Controls	<input type="checkbox"/>
Right Endcut CW	<input type="checkbox"/>

Name	Value
A Down Pipe Off Center	0
C Bevel Feed Rate Decre...	.6
Consumable Type	Copper
Current	140
Cut Height	0.2
Default Material	Stainless ...
Dwell Secs After Torch On	1
Fineline Process Filters	{
Fineline Properties	{
Marking Gasses	Ar:Air
Minimum Torch Clearance	0.15
Show Machine Correctio...	False
Torch Control Type	Fineline
Torch Model	Fineline 1...
Torch Tip Base Diameter	0.5
Torch Tip Height Off Pip...	0.2
Torch Tip Z Optimal Hei...	0.1875
Use Torch Control	True

General Tip Geometry

Cut Height

Torch Height Off Pipe at Z Zero

Torch Tip Base Diameter

Minimum Torch Clearance

- Repeat the same tests for part length and hole size as you did in WinMPM, adjusting pivot height, or double-checking pipe wall thickness as needed.

