

PypeServer for the Lone Star Revolver with a NUM Controller

This document covers topics specific to PypeServer output for Lone Star Revolvers with chucks, running NUM controllers.

Topics in this document:

- PypeServer settings for creating NC Code (.xpi files) for the machine
- NC file monitoring for PypeServer part cut status
- Various methods for nesting in the pipe dead-zone

This document does not cover operating the machine controller UI that is provided by NUM.

Other recommended documents:

- Getting Started with PypeServer (document) covers setup and use of the system for users and IT.*
- NC File Management and Sync (video)*
- Documentation provided by Lone Star or NUM covering:
 - The .xpi numerical control language
 - NUM machine application (HMI) use
 - Machine operation
 - Using the FX Simulation application which can both simulate running an .xpi file, and can show the machine running live.

*This training content can be found in the PypeServer Training app or in the PypeServer Enterprise applications “Training” tab

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1 Machine Type

This document covers settings for machines with the following characteristics:

- NUM controller
- NUM Flexium HMI and NUM Flexium 3D simulation tool
- A chuck for holding and rotating the pipe
- A single axis (tilting) or two axis (full) beveling head

2 Numerical Control File Output as .xpi files

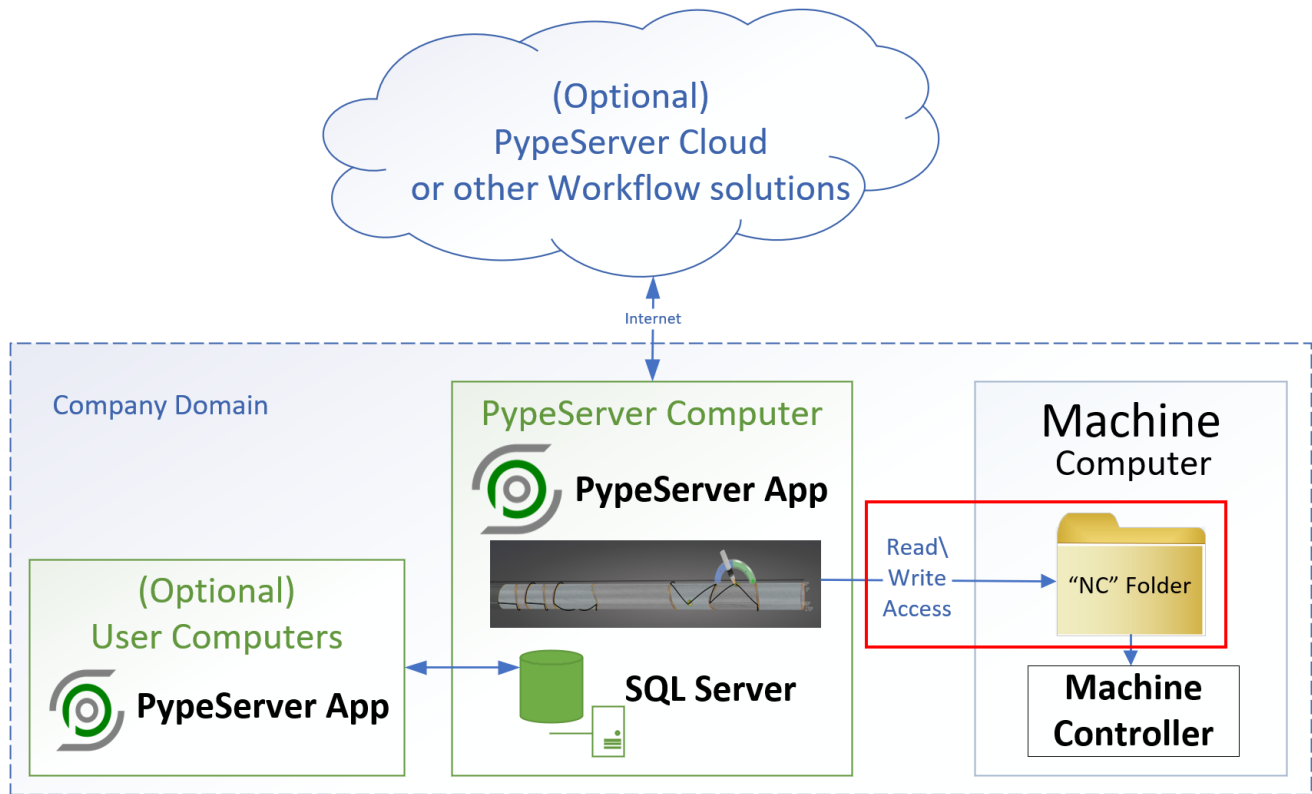
For machines with a NUM controller, PypeServer outputs .xpi files that are g-code to be run by both the machine and the simulator.

2.1 Sending a .xpi Cut a Program to the Machine

Per the diagram below, PypeServer writes .xpi files to a folder location that the machine can also access. In PypeServer application this location is set in machine settings. See the [Folder or IP Address](#) section for more information.

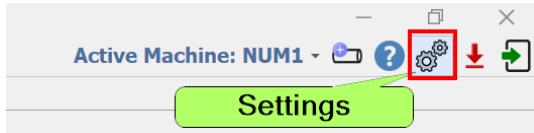
The folder location can be a shared file on the PypeServer computer, the Lone Star machine, or anywhere that both computer and machine can access read/write. This is commonly set up by your IT department or anyone with rights to create a network folder share.

The diagram shows the overall topology of PypeServer products. The area in the red rectangle shows where PypeServer writes .xpi files out to a shared folder. These .xpi files are then loaded by the machine controller app (the NUM HMI). In this example the folder is on the actual Machine computer.



3 PypeServer Machine Settings for Creating .xpi Files

This section covers the settings in PypeServer that affect machine behavior via .xpi program files. The settings NOT highlighted are either set by PypeServer, or adjusted as needed per customer support. This dialog is opened through Settings → Machine Settings tab.



If you have multiple machines on the same server, you'll need to be sure to select the correct machine. If you are at the PypeServer machine kiosk where the server is running, you will have rights to modify some of these settings. For some settings, or when on a remote computer (not at the machine), you will need to enter the Admin password, which by default is "Admin". This password can be changed per request.

System Settings

Machine SettingsSystem PropertiesConfigure ServicesList ManagementCustom ColumnsPrintingDefault Cut ValuesDeveloper

Machine

NUM1 DynamicTilt

Validate Settings

Machine Diagnostics

Calc Machine Zero to End of Pipe

Firmware Revision	1.50
Machine Name	NUM1 DynamicTilt
Cutting Dead Zone	20.000
Machine Zero to End of Pipe	-292
Folder or IP Address	C:\MachineOutput\NUM1_DynamicTilt
Data Transfer Mode	DumpToFile
Data Reporting Mode	SystemWatchesFiles
Local Connection Required	☐
Min Cut Steps	2
Max Cut Steps	500
Leadin Min Distance	0.25
Lead In-Out Arc Radius	0.2
Leadin Steps	10
Machine Positioning	111
Machine Capabilities Filter	11111111111000000
Is Metric	☐
Default Cutter Type	Plasma

Name	Value
Add Date Time To NC File Names	False
Bed Wheel Axle Distance Apart	18
Bed Wheel Diameter	16
Block Skips	False
Computer Watching Files	PYPESERVER
Inverse Time Feedrate Threshold	0.25
Line Numbers	False
Machine Can Home	False
Max Z Drop Over Pipe	-1
NC File Tag	.xpi
Negate Bevel Tilt Down Pipe	False
Negate Gantry Travel	False
Negate Pipe Rotation	False
Negate Torch Across Travel	False
Pause After Pieces Shorter Than	0
Pause Before Returning To Start	False
Pipe Rotation Axis Is V	False
Pipe Rotation Is Degrees	False
Return To Start After Final Cut	False
Stagger Staight Cut Start Rotation Dist	0
Torch Head Type	DynamicTilt
Transverse Travel Centerline	0
Transverse Travel Max	15
Transverse Travel Min	-15

3.1 Cutting Dead Zone

This is the distance that you do not want the machine to cut at the far, final end of the pipe. Considerations for a dead zone how close the chuck can safely get to the chucked end of the pipe. This is determined with the torch tilted toward the chuck to be sure that a cut will not hit the chuck.

It is also possible to use the far end of the pipe as the final endcut of a part, thereby using the entire pipe. When using the far end of the pipe as the end of a part you STILL should have a dead-zone so that no cuts are placed in the dead-zone. Please see the section [Last Cut on End of Pipe](#) for more information.

3.2 “Machine Zero to End of Pipe” for Using Pipe Far End

Please see the section [Last Cut on End of Pipe](#) for more information.

3.3 Folder or IP Address = <Shared folder> (where the NC files are sent)

This is the location that the .xpi files are written to. This can be any folder that the machine can locate and load .xpi programs from. Note that if you load files from a PypeServer remote seat, you will need to use a share name that resolves to the same folder for any computer that is running PypeServer and outputting .xpi files. For example a network share like [\\LoneStarMachine\PypeServerFiles](#) or [\\PypeServer\MachineOutput](#), or a share on each computer that is mapped to the same drive letter for all PypeServer computers that write output.

Note that if you use network drive mappings (such as z:\), and then change the drive letter, then the cut status synchronization system will not work for previous files in process.

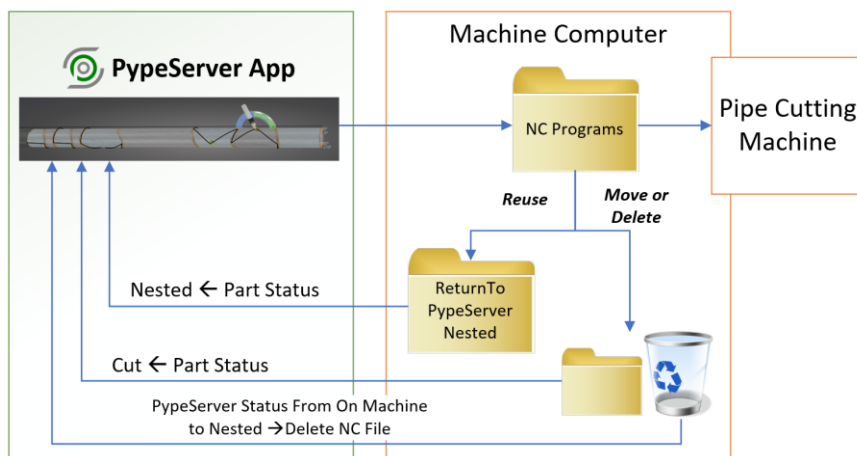
See also [Sending a .xpi Cut a Program to the Machine](#) and [NC \(.xpi\) PypeServer Part Status Synchronization](#).

3.4 NC (.xpi) PypeServer Part Status Synchronization

This section discusses how PypeServer can monitor .xpi files to maintain the status of scheduled parts. Scheduled Part status can be:

- Not Nested
- Nested
- On Machine
- Cut
- Scrapped

This synchronization behavior is summarized in the following diagram:



For more information, please see the PypeServer training video “NC File Management and Sync”.

There are three parameters involved in this process:

- Data Reporting Mode
- Computer Watching Files
- NC File Timer Interval Seconds

Data Reporting Mode = *SystemWatchesFiles* : With this setting, PypeServer will monitor the “[Folder or IP Address](#)” folder, such that

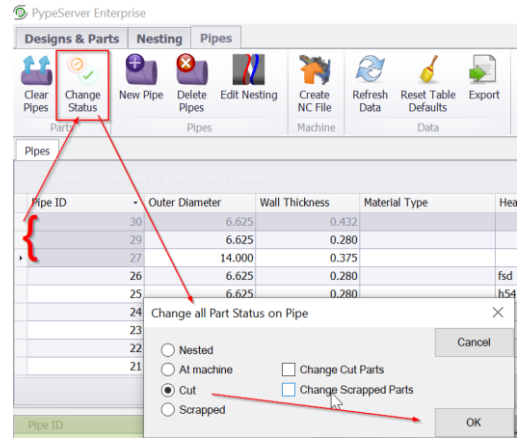
- When files are deleted, the Scheduled Parts’ status are changed from “On Machine” to “Cut”.
- When files are move to the subfolder “Return To PypeServer Nested”, the Scheduled Parts’ status are changed from “On Machine” to “Nested”
- When a user in PypeServer changes a pipe nesting that is currently “On Machine” back to nested, the NC (.xpi) file will be deleted. This is done so that operators do not cut parts that are not ready to be cut.

Data Reporting Mode = *None (Manual)*

With no data reporting (file tracking), users will need to manage the status of pipes after they are cut.

If this mode is selected, then the user can (should) maintain Scheduled Part cut status in PypeServer by selecting one or more pipes and selecting the Change Status button as shown here:

Note that this extra work is performed automatically when Data Reporting Mode = SystemWatchesFiles.



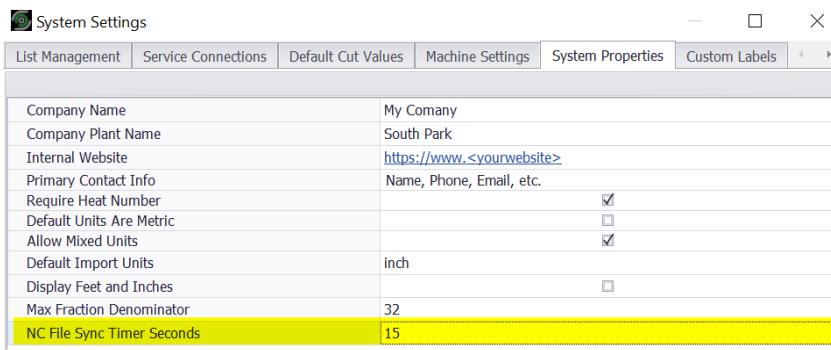
Other Data Reporting Mode settings are not applicable for this machine

Computer Watching Files

This is the name of the computer that is watching files in the NC folder location (Folder or IP Address) for changes to the file's existence. This is typically the name of the computer with the PypeServer SQL server that is typically near the machine. By default this computer name is PYPESERVER.

NC File Timer Interval Seconds = <minutes>

When you use this synchronization feature, you can set how often the system checks the NC file folder for synchronization. This setting is in the System Properties Tab and is a global setting for all machines, shown here:



For more information, please see the training video "NC File Management and Sync".

3.5 Add Date Time to NC File Names

Set to true and the date will be appended to the file name. For example:

Add Date Time To NC File Names:

- False: "Part 138.xpi"
- True: "Part 138 **Apr 18-24 2.35 PM**.xpi"

Notes

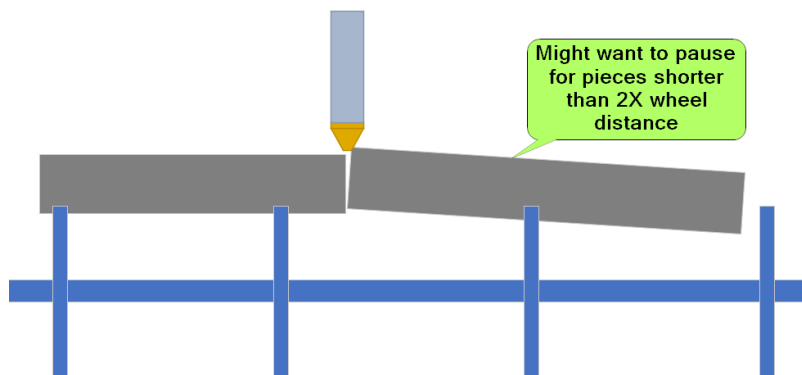
Using this feature can result in duplicates if the operator makes changes to a part or pipe nesting and creates a new .xpi file.

This feature is not recommended when using “System Watches Files” part status synchronization, as multiple files for the same part become monitored.

3.6 Pause After Pieces Shorter Than <machine units>

Small parts, including the thin waste pieces between nested parts can fall into the wheel-bed or get tangled up with the pipe being cut. You can instruct the machine to pause when a piece or waste piece is shorter than a given length (in machine units). The machine will not pause when this setting = Zero.

Why make this longer than, say 4 inches? Parts or the remaining drop piece can also rock/tilt up or down if resting on only one wheel-set. For example if the distance between rollers is 24” and a 40” part was cut with the first cut being 23 inches away from a roller set, then the part would rock on the wheel set and the end just cut would lift up into the torch, probably causing a fault.



If this rocking is a concern, then set the Pause After Pieces Shorter Than to 2 times the distance between wheelsets. The rocking may still occur, but the machine will stop after the cut for you to check that everything is OK.

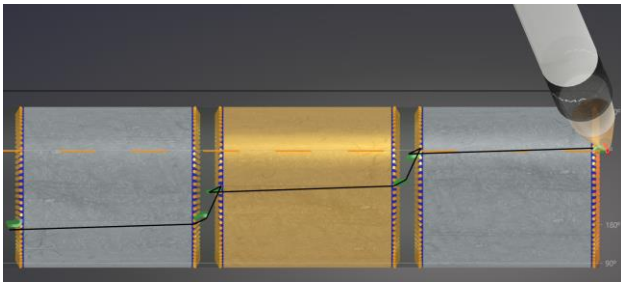
3.7 Return to Start After Final Cut and Pause Before Returning to Start

With “**Return to Start After Final Cut**” = **true**, instructions will be added in the .xpi file to return the machine to its original X location after the program is finished.

Set “**Pause Before Returning to Start**” = **true** if you want the machine to pause before returning to the start after the final cut.

3.8 Stagger Straight Cut Start Rotation Dist = <distance>

When straight cuts are nested together without any rotation between starts and finish, the leadins and leadouts can overlap and cause the torch to burn incorrectly (gap sideways), or fault as the leadin cut hits the previous cut's leadin and leadout gaps. This setting instructs PypeServer nesting to rotate the next part by a distance (around the pipe) so as to avoid this intersection. Shown below is a 4.5" pipe with StaggerStraightCutStartRotationDist = 1 inch.



3.9 Other Machine Settings

3.9.1 LeadIn/Out Settings

These settings are seldom changed. These are only limits. The actual leadin settings are made in the Torch settings, but they must fall within these limits.

For more information, please see the document "Torch End of Cut Leadout and Tuning" in the PypeServer training system.

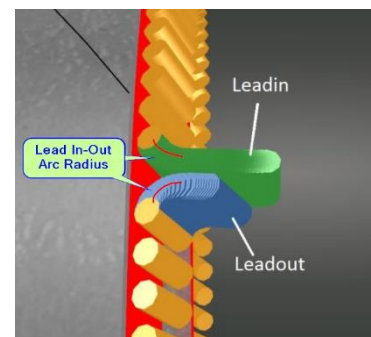
Leadin Min Distance	0.25
Lead In-Out Arc Radius	0.15
Leadin Steps	8

3.9.2 Leadin Min Distance = <distance>

This is the minimum distance allowed for a leadin in PypeServer.

3.9.3 Lead In-Out Arc Radius = <distance>

This is the radius of the turn made by the leadin. Note that this is not the overall length of the leadin. Having this as a small radius decreases the range of gouging, but the tradeoff is that if it's too tight, the machine may fault, have difficulty making turn smoothly, or the pipe may slip in the chuck.



3.9.4 Leadin Steps = <integer number>

This is the number of steps PypeServer creates for the leadin. This adjustment is not typically made by the user.

3.10 Is Metric = <checkbox>

If you set this to Metric, all your machine and torch settings will be interpreted as metric. You can still create and cut parts and nestings designed in standard (Imperial) units. Note that you do not need to set this to Metric just because your machine runs in metric. This is only a convenience to allow users to work in familiar units.

4 Last Cut on End of Pipe “Use Far Pipe End”

PypeServer can cut single parts and also nest parts to use the far end of the pipe as the final (straight) cut of the last part. This allows PypeServer to nest through the Dead-Zone to the end of the pipe in the chuck, but not make any actual cuts in that Dead-Zone. To use this feature:

- One-Time Setup to set the [Machine Cutting Dead Zone](#). Use this tool:

Machine	Firmware Revision	1.50	Name	Value
NUM1 DynamicTilt	Machine Name	NUM1 DynamicTilt	Add Date Time To NC File Names	False
Validate Settings	Cutting Dead Zone	20.000	Bed Wheel Axle Distance Apart	18
Machine Diagnostics	Machine Zero to End of Pipe	-292	Bed Wheel Diameter	16
Calc Machine Zero to End of Pipe	Folder or IP Address	C:\MachineOutput\NUM1_DynamicTilt	Block Skips	False
	Data Transfer Mode	DumpToFile	Computer Watching Files	KD7
	Data Reporting Mode	SystemWatchesFiles	Inverse Time Feedrate Threshold	0.25
	Local Connection Required	☐		
	Min Cut Steps	2		

Machine Zero To End Of Pipe Calculator

Steps:

- 1) Enter an estimated Chuck Stop Dist From Machine Zero value in Machine settings. This is the distance from the pipe end in the chuck to the torch tip when the machine is homed to zero. This could be near the chuck, or on the far end of the machine. If the zero is behind the chuck, use a positive number.
- 2) Make sure you have a proper dead zone distance set for your machine. That is the distance that the machine must stay away from the chuck.
- 3) Using any size of pipe, design a straight by straight no-bevel part that is longer than the dead-zone. You can use any length pipe and design a part that is just short of the length of that pipe so that you only cut an inch or so off the end.
- 4) Load the Part to the machine, MAKING SURE to check the Last Cut In Chuck (or Use Pipe Far End) checkbox. The machine will only make one cut because the last cut is in the chuck.

Current Machine Zero To Part End: -292

Designed Part Length: 30.000

Actual Part Length: 30.

Machine Zero to Pipe End -292

Set Value Cancel

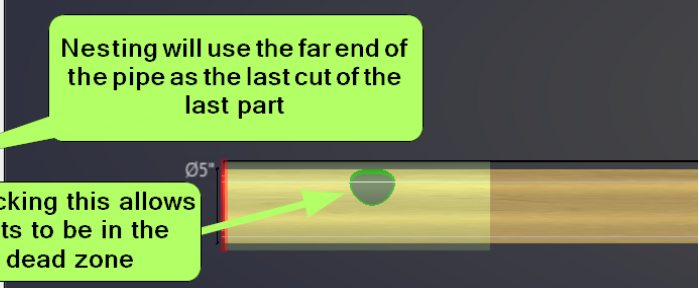
NOTE that most LoneStar Revolvers have the machine zero at the far end of the gantry—away from the chuck. There is no problem with this. The Machine Zero to Pipe End is just a large number.

- To nest in the dead-zone and use the far end of the pipe, for each pipe:
 - Check the “Use Pipe Far End” on the Pipe. Checking this will change the Dead-Zone indicator to green and PypeServer will nest parts into that zone.

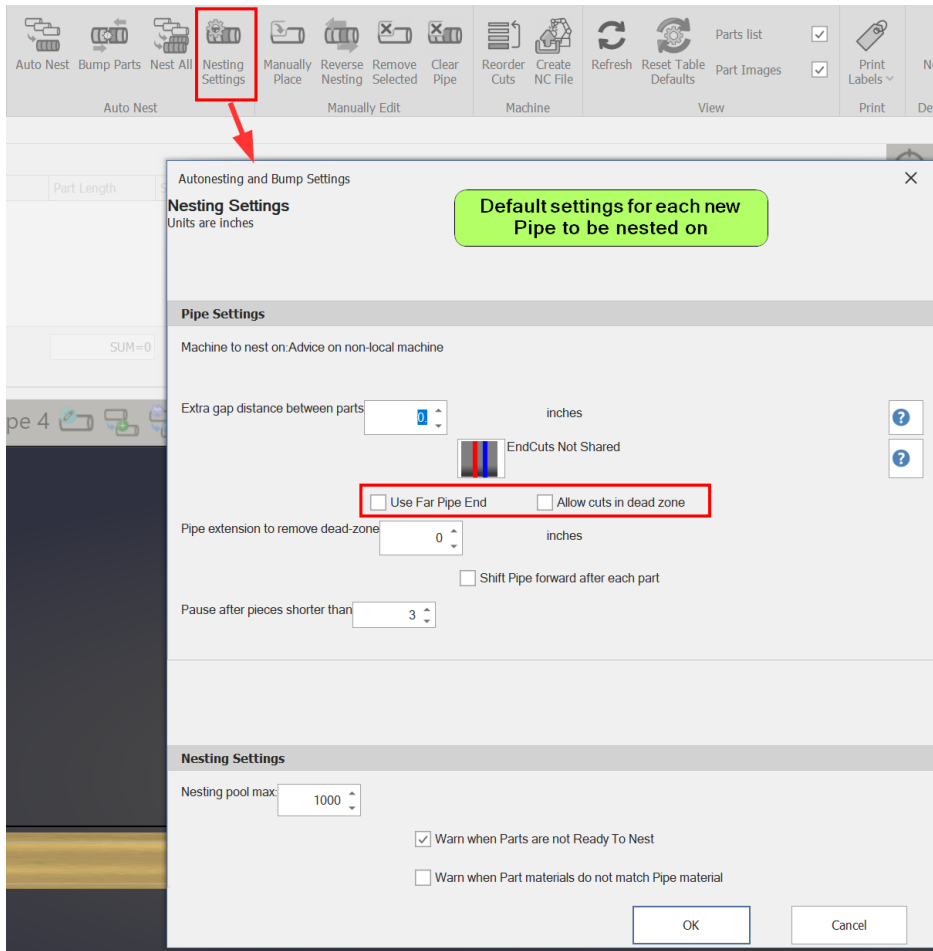
- By default, PypeServer will not nest cuts in the dead-zone, but it's still good practice to make sure no cuts are in that zone. Note that you can allow cuts in the dead-zone by checking "Allow Cuts in Dead Zone". These dead-zone cuts will be added to the program but the machine will pause before making these cuts.

Here's one example of nesting with the Use Far Pipe End checked:

Units	
Machine Name	Vernon 5Ax
Seam Angle	0.00
Nesting Settings	
End Cut Sharing	☐
Extra Nesting Gap	0.000
Use Far Pipe End	☒
Allow Cuts in Dead Zone	☒
Dead Zone Extension	0.000
Shift Pipe Forward	☐
Pause After Pieces Shorter Than	3.000



Note: You can also set these as default settings for new pipes in the **Nesting Settings** dialog:

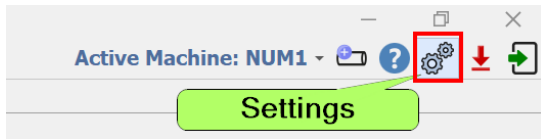


Note: when not using the far pipe end (“Use Far Pipe End” unchecked), then this dead-zone will show up in PypeServer as a yellow area on the end of the pipe and PypeServer will not nest into it. It will look like this:



5 Plasma Torch Settings

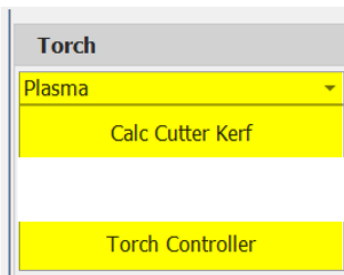
This section covers plasma torch settings that operators typically need to understand and adjust. The settings NOT highlighted are either common to other training content (such as Kerf and Leadin), are set by PypeServer, or are adjusted as needed per customer support. This dialog is opened through Settings → Machine Settings tab.



Some machine (torches) can also be set to etch mode. There is a separate “Torch” for etching.

Torch	Torch Name	Plasma	Name	Value
Plasma	Cutter Beam Divergence Ang	0	Cut Height	.21
Calc Cutter Kerf	Kerf	0.120	Dynamic Torch Height Control	True
	Pierce Angle	0.00	Height Sensing Averaging Delay	1000
	Leadin	0.250	Height Sensing Delay Before Averaging	1000
	Leadout	☒	Height Sensing For Endcuts	False
Torch Controller	Leadout Start Distance	0.200	Height Sensing For Holes	False
	Early Off Dist	0.100	Lock Pipe Rotation On Holes	False
	Torch off lag time (msec)	0	Max Angle For Torch Start	10
	Tab Length	0.125	Max Feed Rate	3000
	Max Bevel Angle U	42.00	Powermax Properties	{
	Max Bevel Angle V	42.00	Tip Edge Min Interference Dist	0.07
	Admin Configs		Tool Number	1
	For Machine		Torch Control Type	Powermax
	Torch ID	10621		
	Torch Type	Plasma	Torch Start Dwell Secs	.75
	Cut Step Increment	0.050	Torch Tip Base Diameter	.48
	Torch Swirl CW	☒	Transfer Height	2
	Use Cut Direction Controls	☒	Use Torch Control	True
	Right Endcut CW	☒	Z Pierce Height	.38
	Hole Cut Direction CW	☒	Z Retract Height	1
	Left Endcut CW	☒		
	XOffset From Pivot	0		
	YOffset From Pivot	0		
	Axis U is Manual	☐		
	Axis V is Manual	☐		
	Pause For Torch Change	☐		
	Torch Cut Order	1		

5.1 Tools



5.1.1 Calculate Cutter Kerf

This tool will help you calculate the plasma kerf (cutter width) by cutting a sample part. It will also help you calculate torch beam divergence (see Beam Divergence in the Training docs). For straight cuts and thin-walled pipe, you do not need to change beam divergence. Beam Divergence should be set correctly if you are cutting steep bevels on thicker pipe.

Kerf Calculator

On any sized pipe, cut a short part (typically one inch/25mm), straight by straight with no bevels.

Recommendations for cutting the part:

- Ensure that your feedrates, amperage and air pressures are correct, as all of these will affect kerf.
- Don't use thin-walled pipe since the bevel is more affected by torch burn
- Be sure the consumables are good. A blown-out tip will significantly affect both Kerf and Beam Divergence

Beam Divergence only applies to machines that can bevel both down and across the pipe.

Current Kerf: 0.120

Design Part Length: 1.000

Cut Part Outer Edge Length: 1.000

New Calculated Kerf: 0.120

Current Beam Divergence: 0

Design Part Wall Thickness: 0.000

Cut Part Inner Edge Length: 1.000

New Calculated Beam Divergence: 0.00

Set Kerf

Set Beam Divergence

Done

5.1.2 Torch Controller

If you are using a torch controller, you can access the Torch Controller settings here. Torch Controller settings are covered in a separate document TBD.

5.2 Max Bevel Angle U and Max Bevel Angle V

These define the maximum bevel that the torch should make for a cut. This is not a machine limitation, but is the limitation imposed by the torch tip's ability to tilt and still cut well, without having to lift back too far away from the part. Numbers typically range from 40-50 degrees of tilt over from straight up and down.

5.3 Pause for Torch Change

Most torches cannot automatically change from Cut to Mark (Etch). Users can still create parts with both Plasma cuts and Etch marks, but will need the machine to pause when the torch needs to switch between cutting and etching. For both Plasma and Etch torches, check the **Pause For Torch Change** setting.

Note: For cutting parts with etching you can order all your etches first so that the machine only pauses once to change from etch back to cut mode. For cutting pipe nestings, you can also reorder cuts for the entire nesting so that etches all occur first. However if something goes wrong when cutting a part, you may have etches in the wrong places after recovering or restarting.

Both Plasma and Etch torches must be configured to **Pause for Torch Change**.

Note: The machine will not pause for torch change on the first cut. If your first "cut" is an etch, you will need to have your torch set up for etching.

5.4 Cut Height and supporting Settings

Settings:

- Cut Height
- Tip Edge Min Interference Distance
- Torch Tip Base Diameter

Cut Height is the height the torch should maintain off the pipe. This is measured from the center of the hole of the torch to the pipe. This height is maintained when beveling unless height limits are reached.

When beveling, the edge/side of the torch tip will move closer to the pipe than the center of the torch tip. The **“Tip Edge Min Interference Dist”** setting defines the minimum height allowed for the edge of the tip.

To calculate the location of the tip edge, the system relies on the **“Torch Tip Base Diameter”** setting. When the bevel becomes steep enough that the torch tip will be less than the *Tip Edge Min Interference Dist*, the torch will shift up along the torch axis to maintain the required minimum height.

Things to consider when setting this minimum height includes the height of pipe seams, and if you are using voltage Height Sensing. Voltage Height Sensing can be unreliable when beveling. Increasing this minimum height may allow cuts without using voltage Height Sensing.

5.5 Dynamic Torch Height Control

When this is true, PypeServer will dynamically calculate torch heights when the torch is beveling—raising the torch height up the torch axis as the torch bevels steeply. This is effective for hole cutting to prevent the tip from dragging on the pipe. This is often used in place of arc voltage “Height Sensing”.

5.6 Height Sensing Settings

Voltage Height Sensing can be used for both end cuts and holes. They are separate because it is often less effective for holes. It is needed for endcuts when cutting larger pipe that is not perfectly round. With Height Sensing, the torch can stay a proper distance away from the pipe as it cuts higher and lower sections.

5.6.1 Height Sensing For Endcuts and Height Sensing for Holes

Set either or both to true to use Voltage Height Sensing. For holes, Dynamic Torch Height Control often works better.

5.6.2 Height Sensing Delay Before Averaging (milliseconds)

This is the amount of time from the start of the cut until the machine begins gathering height sensing voltages. This is typically after pierce and near the end of leadin. This time is required for voltages to settle to consistent values.

5.6.3 Height Sensing Averaging Delay (milliseconds)

This is the time of cutting for the machine to average the voltage before actually using height sensing to set torch height. This timer starts after the *Height Sensing Delay Before Averaging* time expires.

5.7 Lock Pipe Rotation On Holes

Set **Lock Pipe Rotation On Holes** to true to prevent pipe rotation when cutting smaller holes. Cutting without rotating the pipe typically results in better cuts. The size of the hole that be cut this way is limited to how far the

torch can travel down Z around the pipe. This height is set by the Machine Property “**Max Z Drop Over The Pipe**”. Warning, this value is set to negative 1 inch and represents how far the torch beveling head can drop down (when steeply beveling) before it hits the pipe. Setting this to a larger negative number may cause the head to crash into the pipe.

5.8 Torch Start Dwell Secs (seconds)

Some torches detect when pierce has occurred. For those that don’t, such as the PowerMax 125 or MaxPro 200 you will need to set this dwell time for the torch to achieve pierce after turning on. This field is typically overridden when using torch controls (if the torch control data provides this value).

5.9 Transfer Height

The height of the torch when moving before and after running the program.

5.10 Z pierce Height

The height of the torch when piercing. This is commonly greater than cut height.

5.11 Z Retract Height

The height for the torch to retract off the part between cuts.

5.12 Use Torch Control

Set “**Use Torch Control**” to true to use the torch control data. When using torch control, part designers and machine operators can select cut processes for Parts and Pipe Nestings. These process selections will be looked up when creating .xpi files to replace various cut and torch settings such as feedrate, kerf, cut height, pierce height, and torch start dwell. Using torch controls is covered in other documentation (TBD).