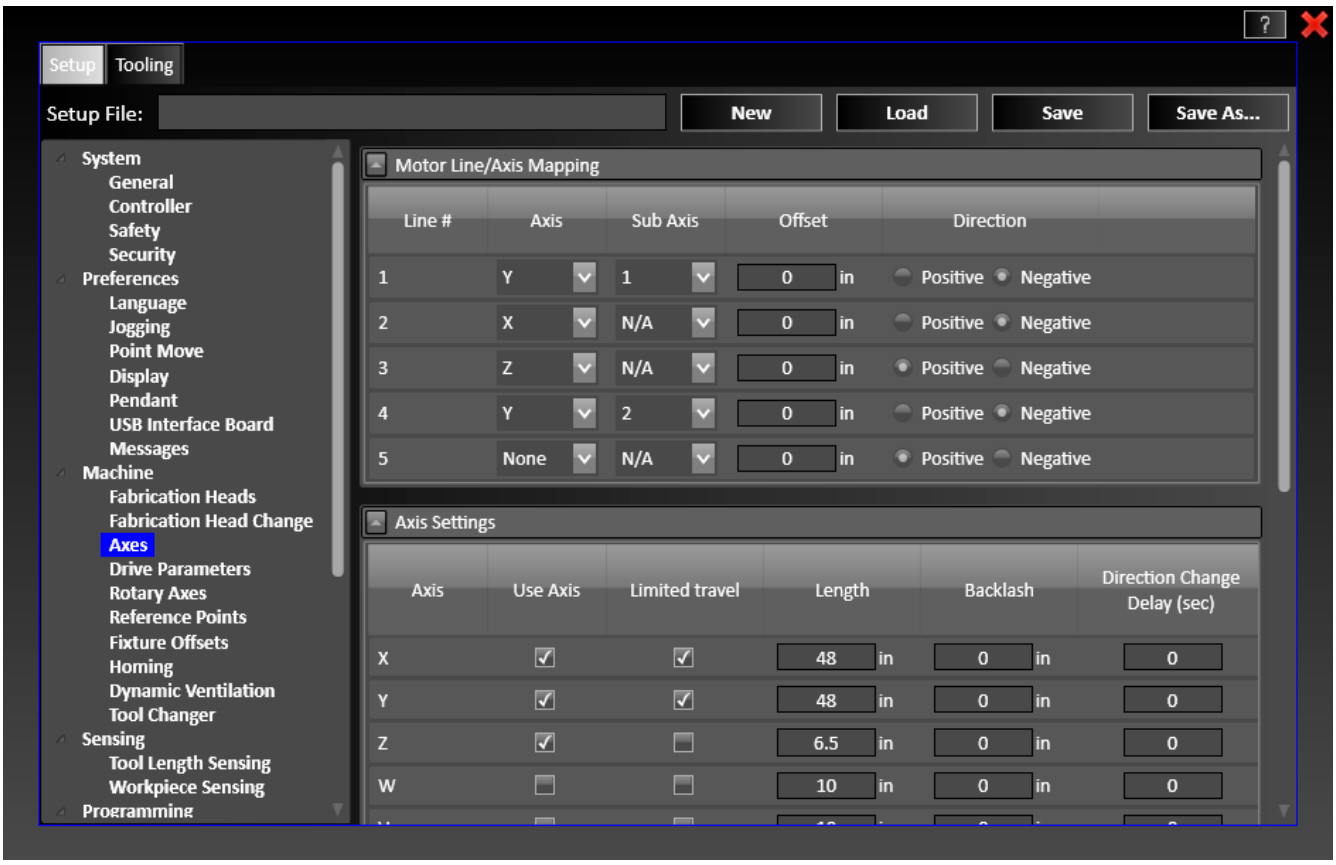
FLASHCUT CNC

CONTROL MADE SIMPLE

Quick Start Guide



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Getting Started

About This Manual

CNC is a unique application involving hardware and software. We recommend that you read all of these instructions before using the product.

Since automated machining is potentially dangerous, please take the time to completely read through this manual and the software User's Guide to understand the operation of the electronics, software and machine before cutting a part.

Turning Off the Controller

Always turn off the CNC Controller when it is not in use.

Safety and Usage Guidelines

When running an automated machine tool, safety is of the utmost importance. For proper and safe use of the CNC program and your CNC machine, the following safety guidelines must be followed:

1. **Never let the machine tool run unattended.**
2. **Require any person in the same room as a running machine tool to wear safety goggles and to stay a safe distance from the machine.**
3. **Allow only trained operators to run the machine tool. Any operator must have:**
   - **Knowledge of machine tool operation.**
   - **Knowledge of personal computer operation.**
   - **Knowledge of Microsoft Windows.**
   - **Good common sense.**
4. **Place safety guards around the machine to prevent injury from flying objects. It is highly recommended that you build a safety shield around the entire tool envelope.**
5. **Never place any part of your body within the tool envelope while the machine is online, since unexpected machine movement can occur at any time.**
6. **Always keep the tool envelope tidy and free of any loose objects.**
7. **Be on alert for computer crashes at all times.**

WPI, Inc. is not responsible for the safe installation and use of this product. You and only you are responsible for the safety of yourself and others during the operation of your CNC machine tool. We supply this product but have no control over how it is installed or used. Always be careful!

WPI, Inc. or its affiliates are not responsible for damage to any equipment or workpiece resulting from use of this product.

If you do not understand and agree with all of the above safety guidelines, do not use this product.

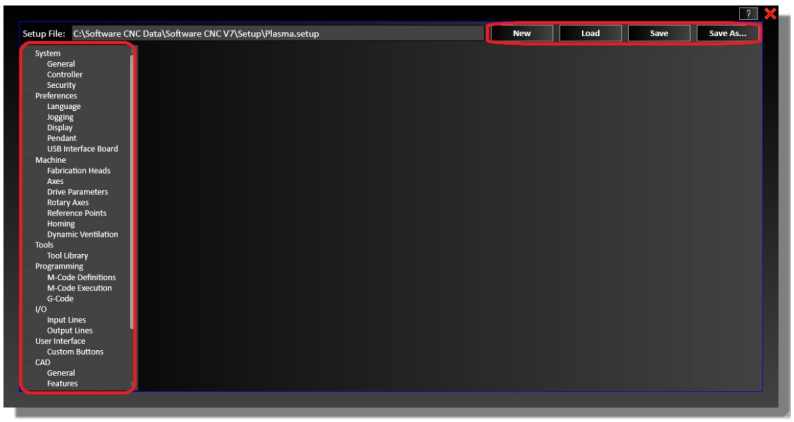
Using the Configuration Screen

To open the configuration panel, click the ‘Double Gear’ icon found in the upper-right of the screen:

The File tools are located at the upper right of the panel:

- New – Starts a brand new configuration from factory defaults
- Load – Browse for a previously-saved setup file
- Save – Overwrites the currently open setup file with any changes
- Save As… – Prompts to save the currently open setup file under a different file name

On the left-hand side, the configuration page browser can be used to move between categories:

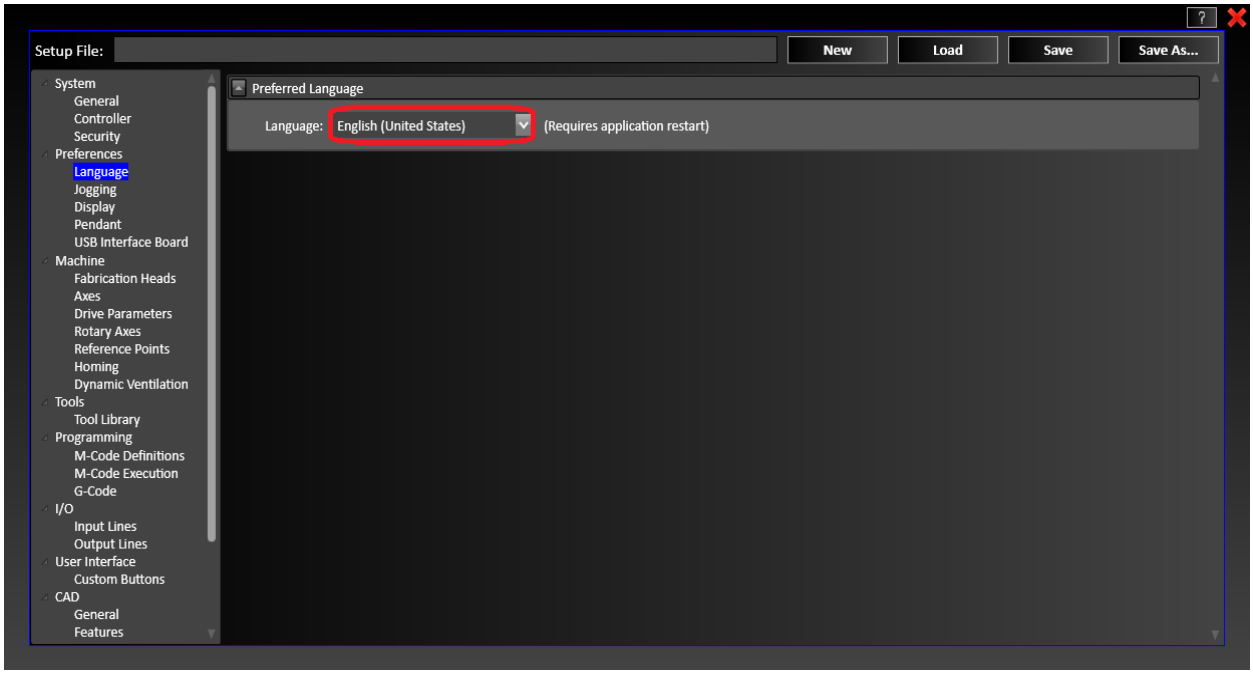


Primary Configuration

Preferences

Preferences…Language

The software comes equipped with multiple languages. Using the dropdown, select which language you prefer:



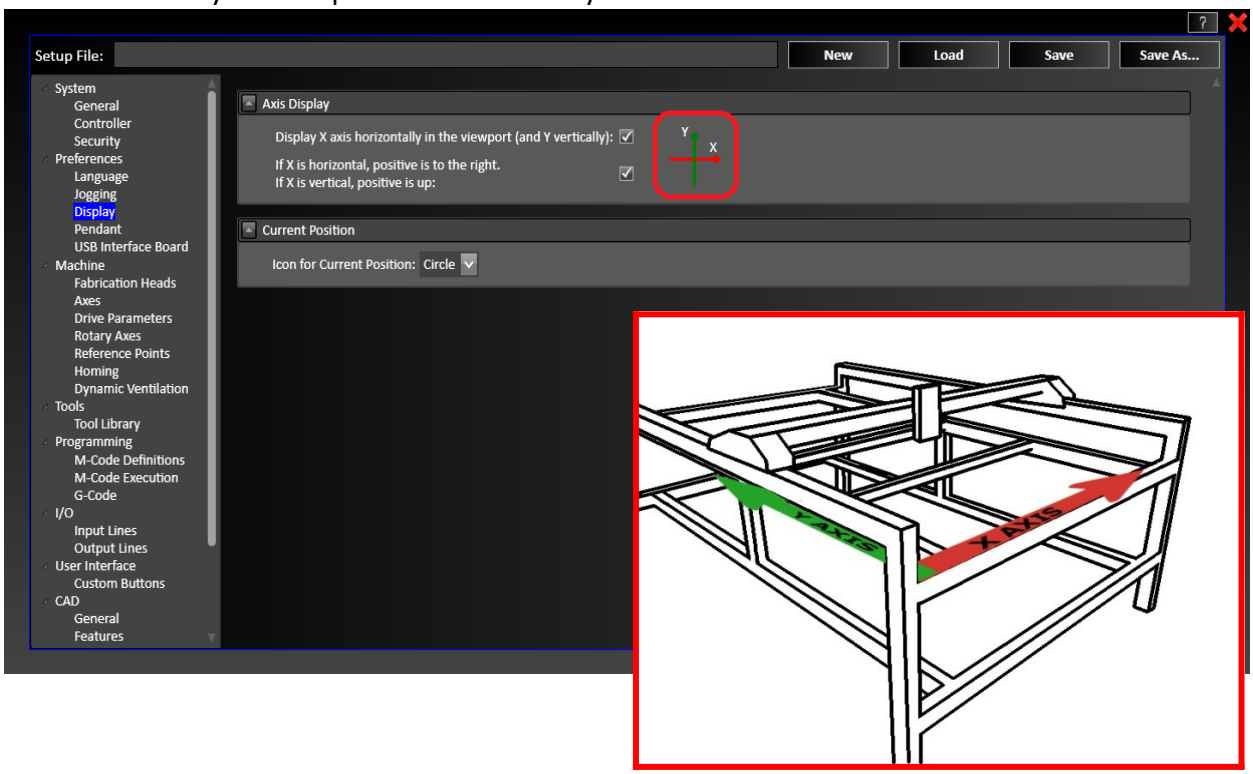
Available languages are:

- English
- Spanish
- Italian
- French
- Dutch
- Portuguese
- Japanese

  Please note: if you decide to change the displayed language, you must save the setup file and restart the software for changes to take effect.

Preferences…Display

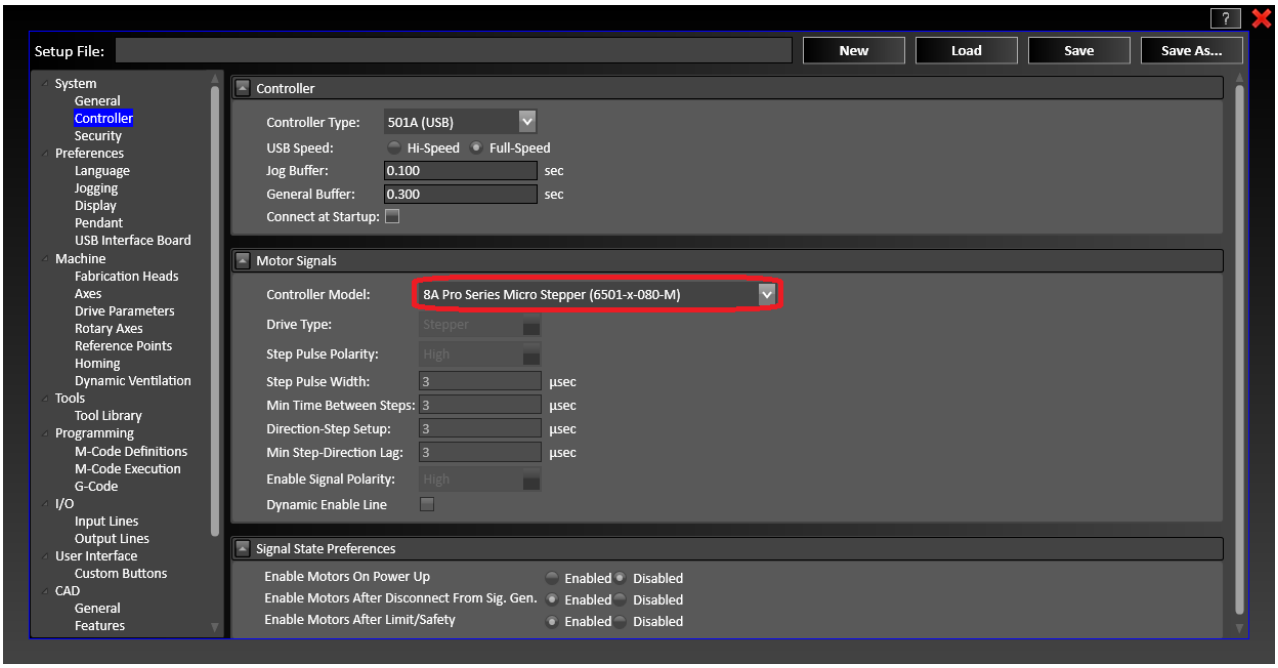
Using the checkboxes on this page, ensure that the axes layout highlighted here matches the orientation of your computer in relation to your machine.

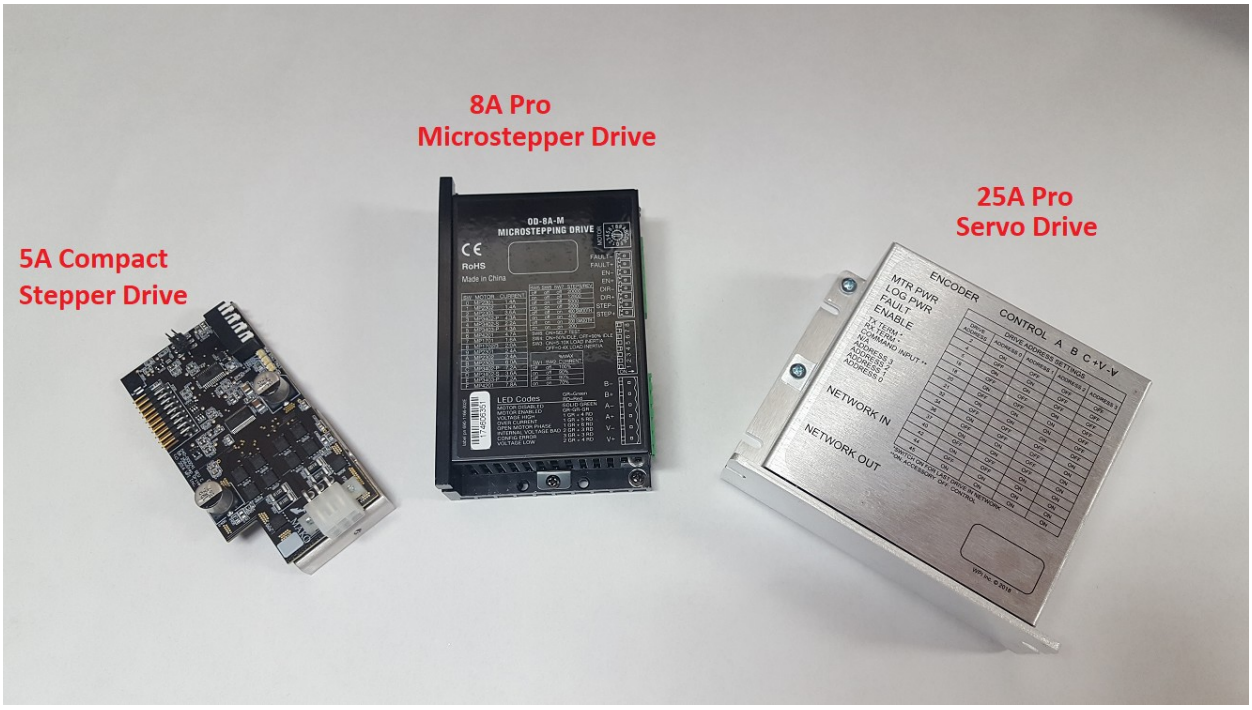


Controller

System…Controller

Using the highlighted dropdown, select the driver model installed on the machine (the model number associated with each driver is shown in parentheses). If you are using third-party drives, select other and manually enter each value.

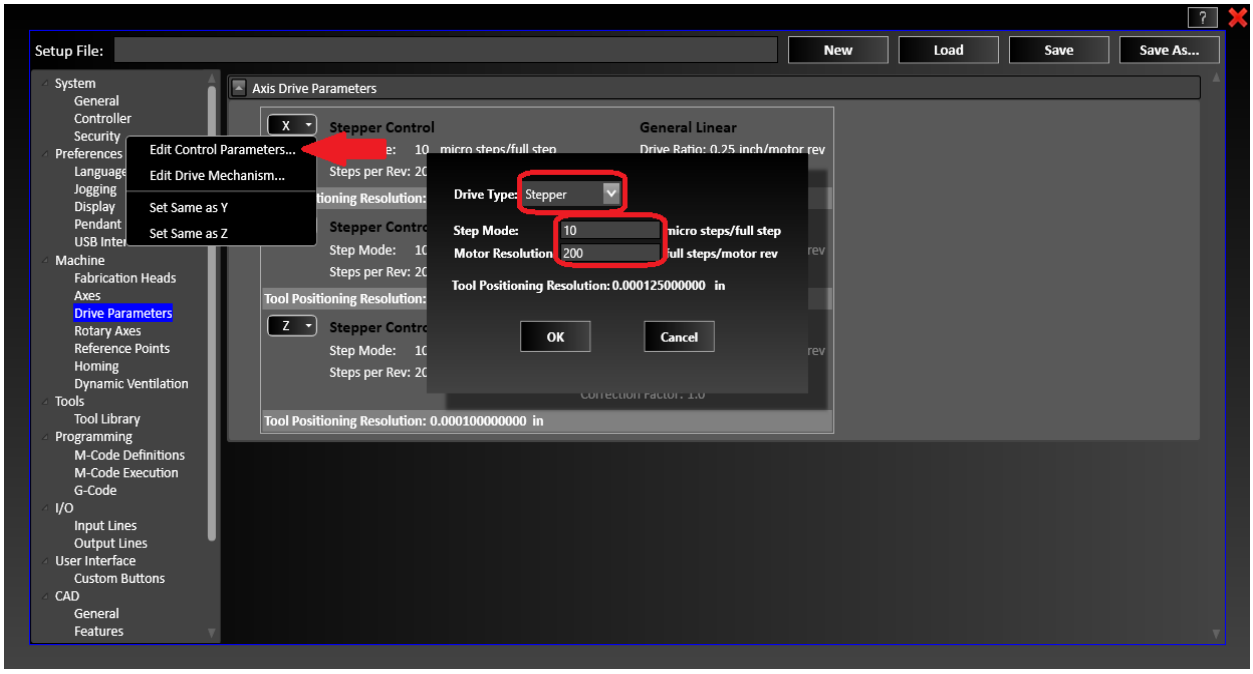




Motion

Machine…Drive Parameters

First, set the control parameters to the default value based on the drive. The control parameters edit screen can be accessed through the relevant axis dropdown:



2.5A/5A Compact Micro Stepper—

- Step Mode: 4 micro steps/full step
- Steps per Rev: 200 full steps/motor rev

8A Pro/Titanium Series Micro Stepper—

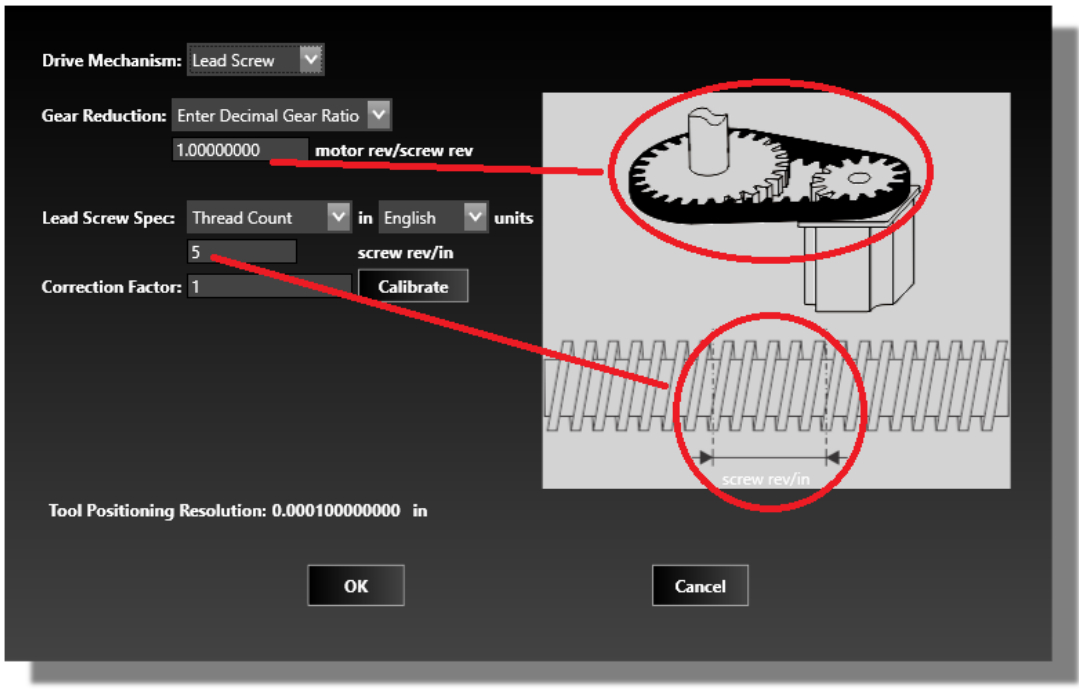
- Step Mode: 10 micro steps/full step
- Steps per Rev: 200 full steps/motor rev

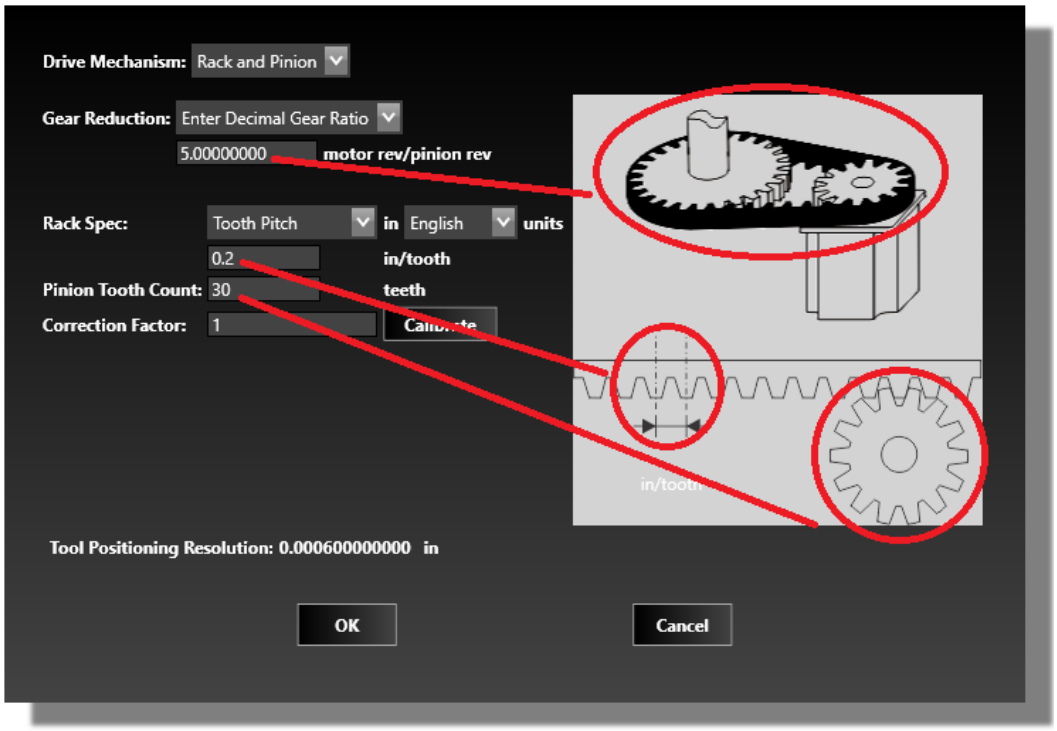
25A Pro/Titanium Series Servo—

- Encoder Divisor: 5 encoder ticks/SG pulse
- Encoder Resolution: 1000 lines/rev

These values may vary significantly if using third-party drives or motors.

Next, select ‘Edit Drive Mechanics…’ from the axis dropdown. This will open the Mechanics Editor window. Here, you will enter the mechanics for the relevant axis. You will need the specifications of each component, either from the manufacturer or by measuring. First, define the type of mechanism on the axis.





Gear Reduction—

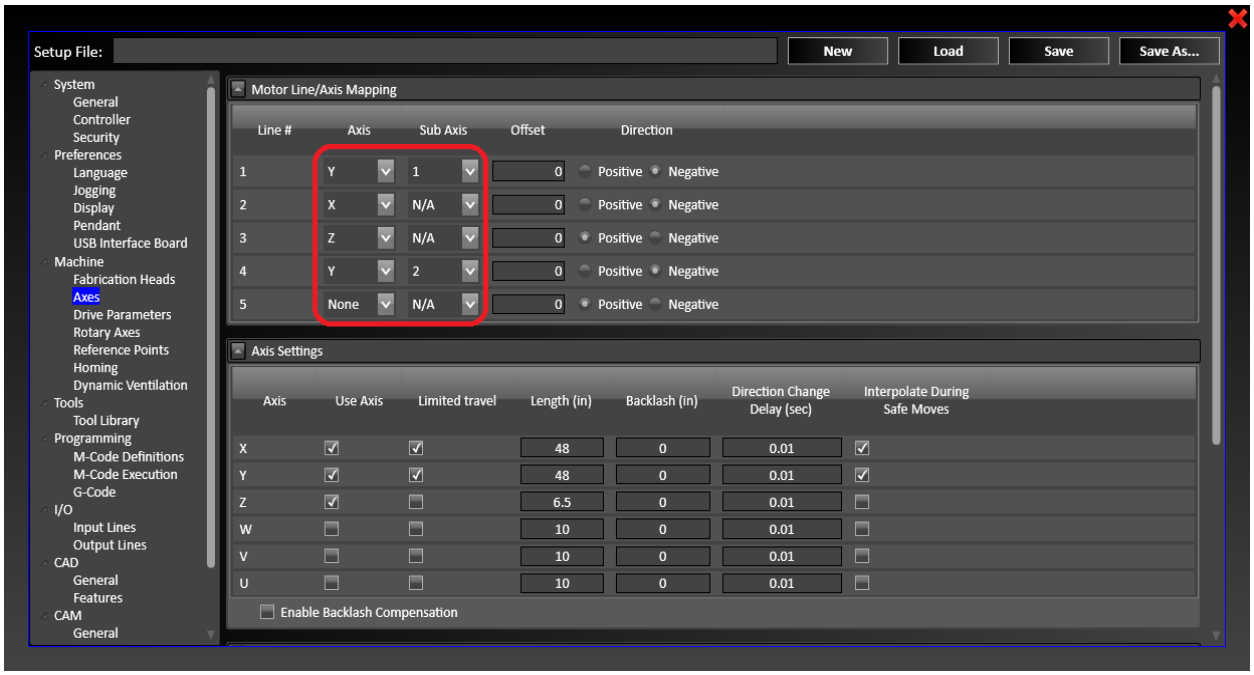
Then, enter in your gearing. If the axis is using belt gearing, you can enter the teeth on each pulley instead of finding the gear ratio. Keep in mind, if the axis has multiple gearing systems (such as both belt gearing as well as a gearbox), you must use the decimal gear ratio of the whole system, found by multiplying each ratio together.

Lead Screw and Rack Specs—

It is easiest to acquire thread or tooth pitch from published specifications, but in the event they are not available, you can measure either the pitch or threads/teeth per inch. If measuring pitch, be sure to measure from the exact same point between threads/teeth. If measuring number per inch, do not count the first one. See the above picture for example.

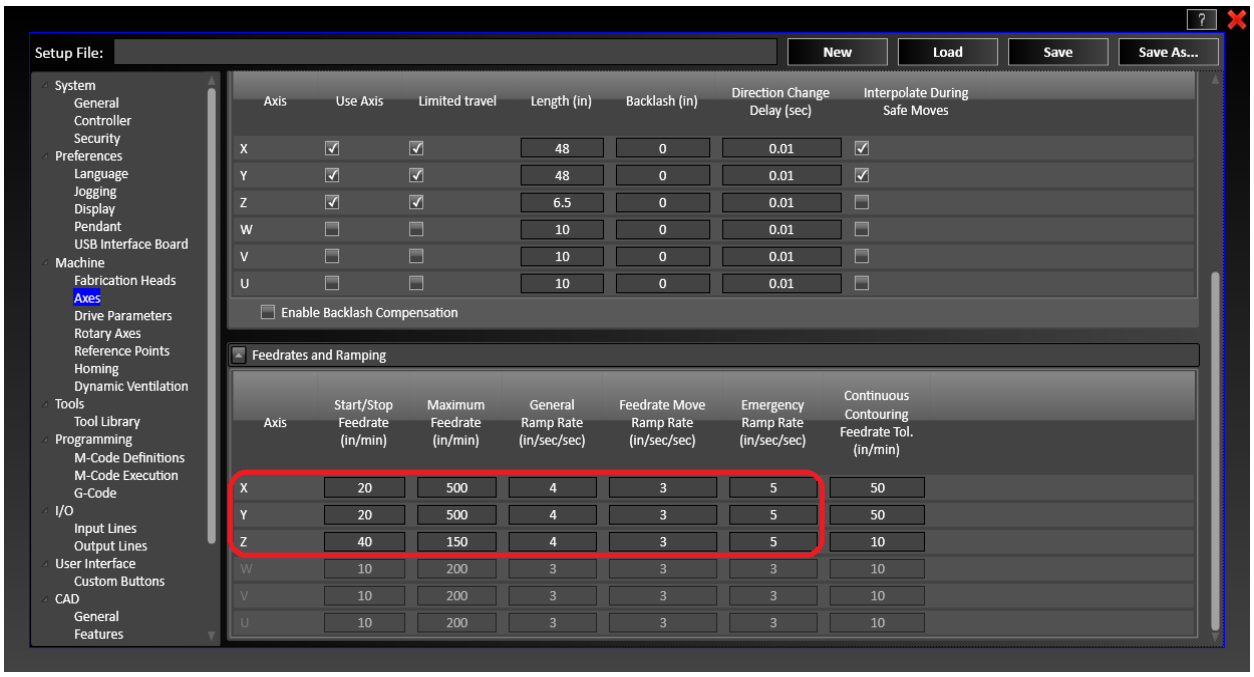
'Machine…Axes'

Now, define which axis numbers—that is, which lines the motors are physically plugged into—correspond with which axis letters. If any axis is a dual-driven gantry (i.e, has two motors operating to move in one direction), you must assign different sub-axis numbers to each line driving the same axis. In the example below, the machine's X-axis motor is plugged into Line 2, the Z-axis into Line 3, one of the dual-driven Y-axis motors into Line 1, and the other into line 4.



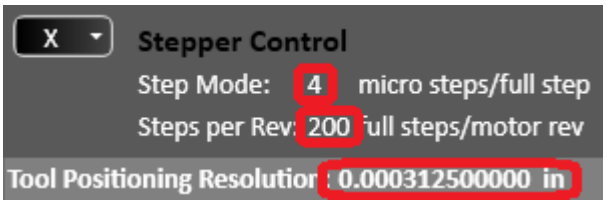
Then, ensure that you have the correct direction for each motor. The simplest way to do this is to save the Setup and try to jog each axis. If it moves as expected, the polarity is correct. If not, reopen the Configuration to the 'Machine…Axes' page and change the incorrect axes to the other polarity. With a dual-driven axis, make sure that the motors don't fight each other. If the shafts of both point the same direction, their polarity must be the same. If their shafts point toward each other (or away from each other), one line's direction will be positive and the other's will be negative. If setting up a servo system with a slaved drive, set that line's axis and sub-axis as N/A.

Next, scroll down to the 'Feedrates/Ramping' section. These values are dependent on the individual machine, but some conservative starting values are outlined below. You will need to refer to the 'Machine…Drive Parameters' section.



Calculating Maximum Feedrate (Stepper):

Use the following formula to determine the initial maximum feedrate on each axis:



[Step Mode] x [Steps per Rev] x [Tool Positioning Resolution] x 500 RPM = Maximum Feedrate

Calculating Maximum Feedrate (Servo):

Use the following formula to determine the initial maximum feedrate on each axis (the 'x4' is due to servo quadrature):

$$\frac{[\text{Encoder Resolution}] \times [\text{Tool Positioning Resolution}]}{[\text{Encoder Divisor}]} \times 1000 \text{ RPM} \times 4 = \text{Maximum Feedrate}$$

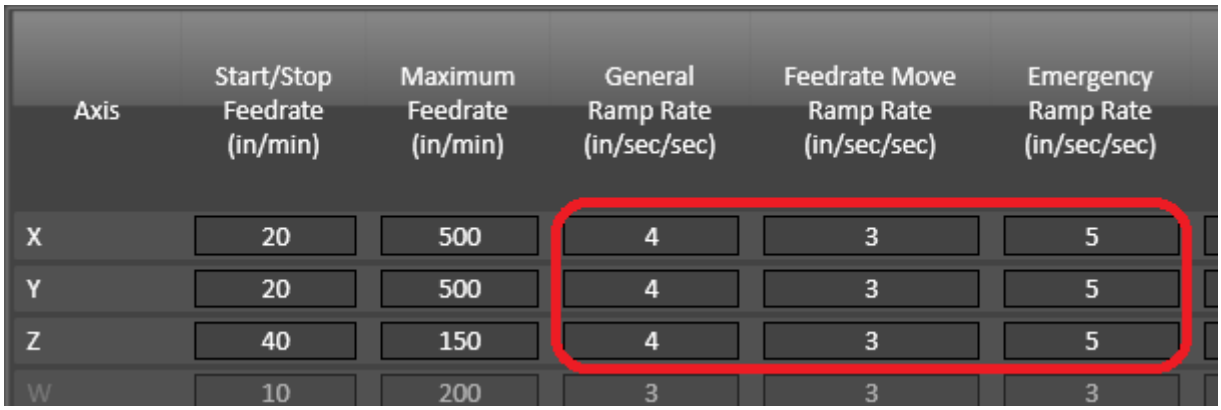
Calculating Start/Stop Feedrate:

To determine the Start/Stop Feedrate on each axis, simply use 5% of the calculated Max Feedrate or:

[Maximum Feedrate] x 0.05 = Start/Stop Feedrate

Ramp Rates:

The ramp (or acceleration) rates will determine the responsiveness of each axis. The higher ramp rate will be more responsive, but will put a greater load on the motor driving each axis. For now, set all General Ramp Rates at 4 in/sec^2, Feedrate Move Ramp Rates at 3 in/sec^2, and Emergency Ramp Rates at 5 in/sec^2.



Axis	Start/Stop Feedrate (in/min)	Maximum Feedrate (in/min)	General Ramp Rate (in/sec/sec)	Feedrate Move Ramp Rate (in/sec/sec)	Emergency Ramp Rate (in/sec/sec)
X	20	500	4	3	5
Y	20	500	4	3	5
Z	40	150	4	3	5
W	10	200	3	3	3

Secondary Configuration

Motion Calibration

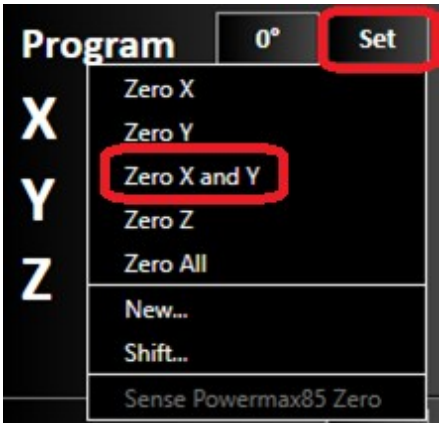
Backlash Compensation

If the machine is using plasma or laser, do not use Backlash Compensation. These type of machines may leave excessive burn marks as the machine dwells during compensation. For other applications, run this procedure on both the X- and Y-axes to determine the amount of backlash on each axis:

1) Jog the axis to the negative of its travel.

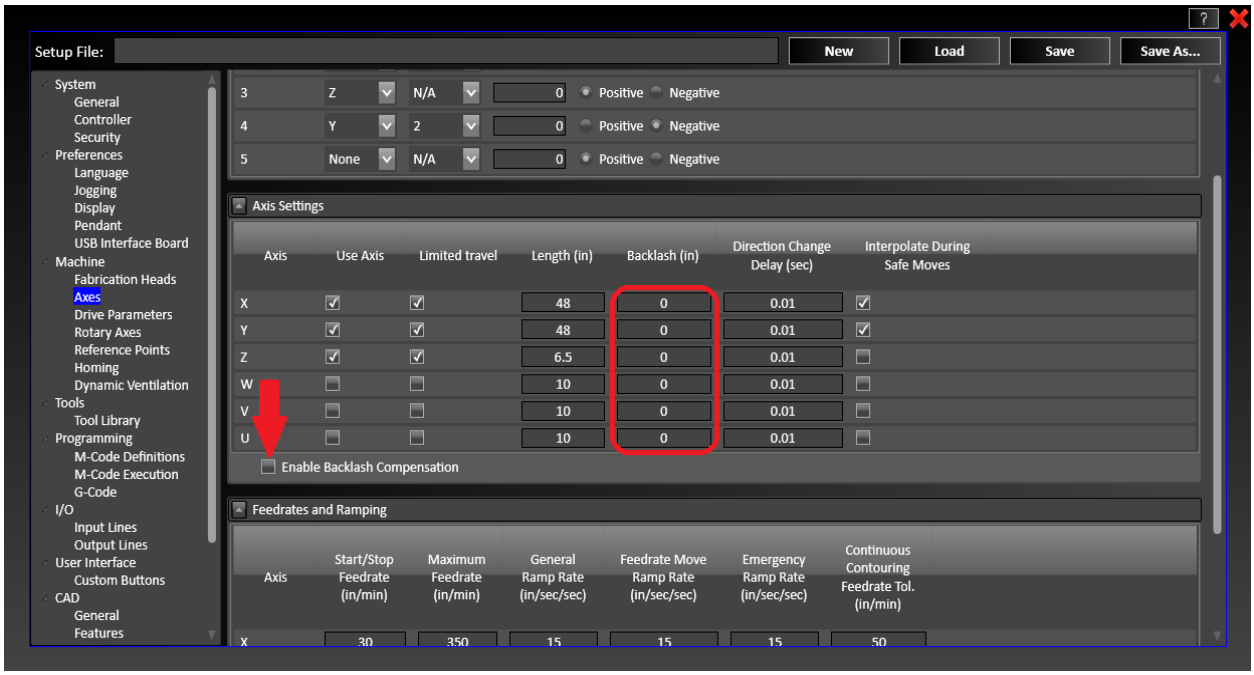
2) Now, use Move to Point mode to travel 1” toward the other end. This can be accessed through the button on the Jog panel.

3) Make a mark under the fabrication head’s position. Set the axes coordinates to zero with the ‘Set’ dropdown in the Program Coordinate panel.



4) Once again, travel 1” in the same direction. Then, return to the axis’s zero. Measure the distance between the original mark and the fabrication head’s current position. This is the backlash distance on this axis.

5) Enter this value for the appropriate axis on the “Machine….Axes” page of the configuration. Be sure to enable Backlash Compensation on this page.



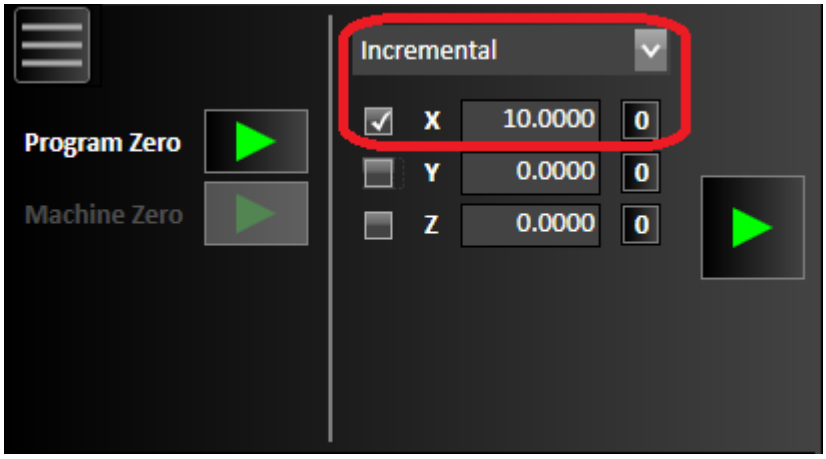
6) Repeat for each axis to be measured.

Calibration Factors

To truly fine-tune motion, follow this procedure to determine and correct any error on each axis:

1) Jog the axis to the negative extent of its travel.

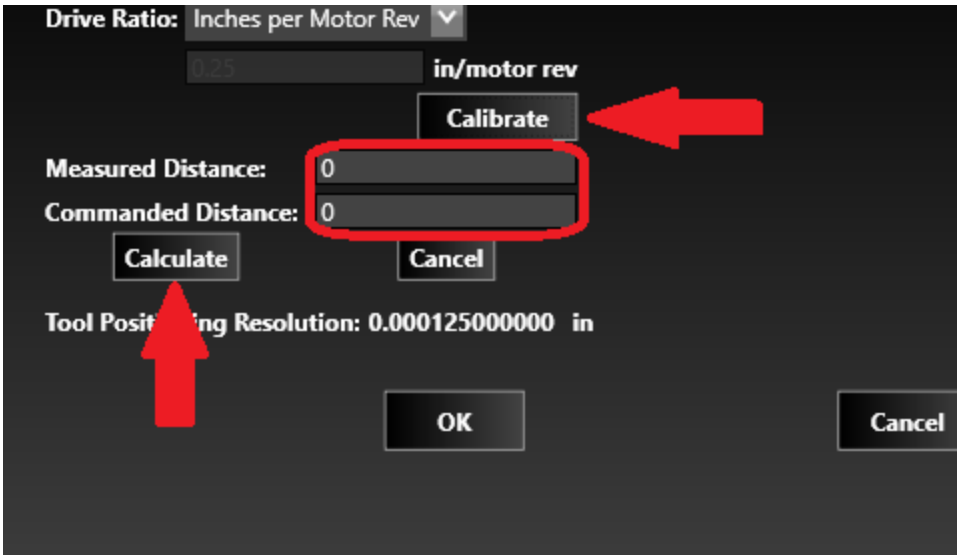
2) Mark the machine's current position. Then, use Move to Point mode to move at least 10" (or just short of max travel, if the axis is shorter) toward the other end of the axis.



3) Measure the actual distance physically traveled.

4) Open the configuration and navigate to the "Machine…Drive Parameters" section. Open the "Edit Drive Mechanism…" window for the relevant axis.

5) Click the "Calibrate" button and enter in both the measured and commanded distances. Then, click "Calculate" followed by the "OK" button and save the configuration.



6) This test can be repeated to further fine-tune motion. Bear in mind that a longer distance will yield a more accurate calibration.

Optimizing Feedrates and Ramp Rates

The Feedrates and Ramping section is located at the bottom of the “Machine...Axes” configuration page. Due to variations in the drive mechanisms for each axis, make sure you test the set parameters at several positions along each axis, in both directions.

Start/Stop Feedrate

1) Set a value of 50 ipm for the Start/Stop Feedrate in the Axes section of the configuration for the axis being tested.

2) Now, use Move to Point mode to travel 1”. This can be accessed through the button on the Jog panel.

3) If the motor stalls, decrease the Start/Stop Feedrate and repeat the motion. If the motor doesn’t stall, increase the parameter and repeat.

4) Continue this process until you find the greatest Start/Stop Feedrate at which stalling does not occur.

5) Return to the Axes screen and enter 70% of the feedrate:

[Greatest Start/Stop Feedrate] x 0.7 = Recommended Start/Stop Feedrate

6) Repeat for each axis.

Maximum Feedrate

1) Return to the Axes screen and verify that your Maximum Feedrate on each axis is set to the value calculated in the Basic Configuration section.

2) Click the Plus button below the Move to Point panel:

3) Click the Rapid Move checkbox.

4) Use the Move to Point panel to do a longer move of at least a few inches.

5) If the motor stalls, decrease the Maximum Feedrate and repeat the motion. If the motor doesn't stall, increase the parameter and repeat.

6) Continue this process until you find the greatest Maximum Feedrate at which stalling does not occur.

7) Return to the Axes screen and enter 70% of the feedrate:

[Greatest Maximum Feedrate] x 0.7 = Recommended Maximum Feedrate

8) Repeat for each axis.

General and Feedrate Move Ramp Rates

1) Use the Move to Point panel to do a longer move of at least a few inches.

2) If the motor stalls, decrease the General Ramp Rate and repeat the motion. If the motor doesn't stall, increase the parameter and repeat.

3) Continue this process until you find the maximum General Ramp Rate at which stalling does not occur.

4) Return to the Axes screen and enter 70% of the ramp rate:

[Greatest Ramp Rate] x 0.7 = Recommended Ramp Rate

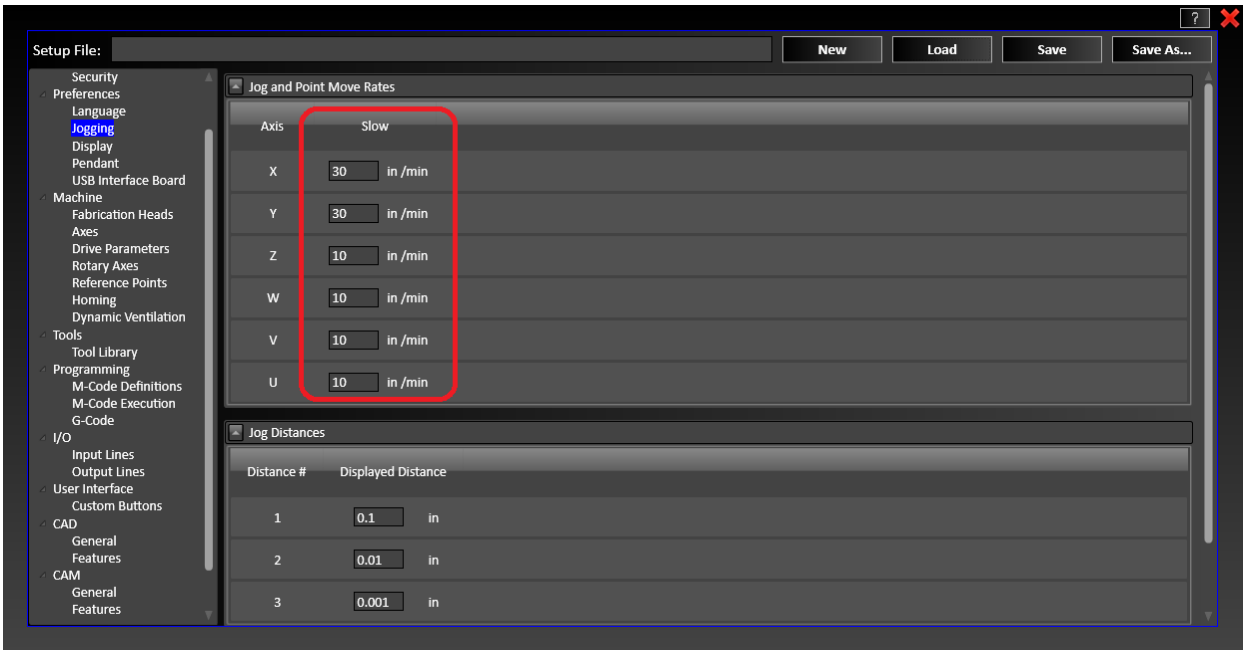
5) Copy this value to the Feedrate Move and Emergency Ramp rates. If you encounter stalls while cutting, reduce only the Feedrate Move Ramp Rate.

6) Repeat for each axis.

Jogging

Minimum Speeds

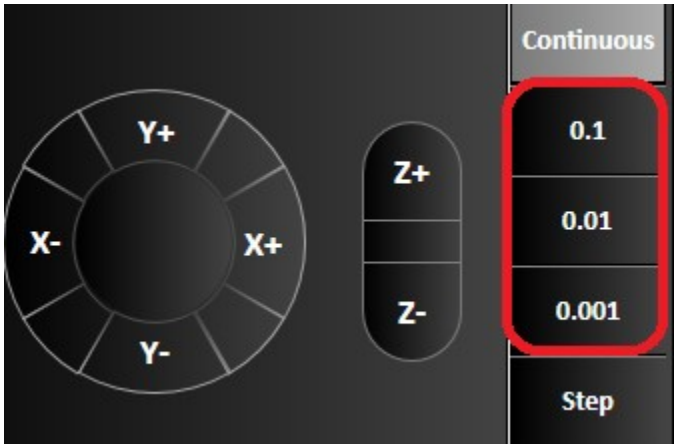
In the “Preferences….Jogging” section of the configuration, you can set the minimum jog and point move speeds for each axis. Choose a speed that is slow enough to position the machine precisely:



These speeds correspond to the left-most position on the speed slider:

Jog Distances

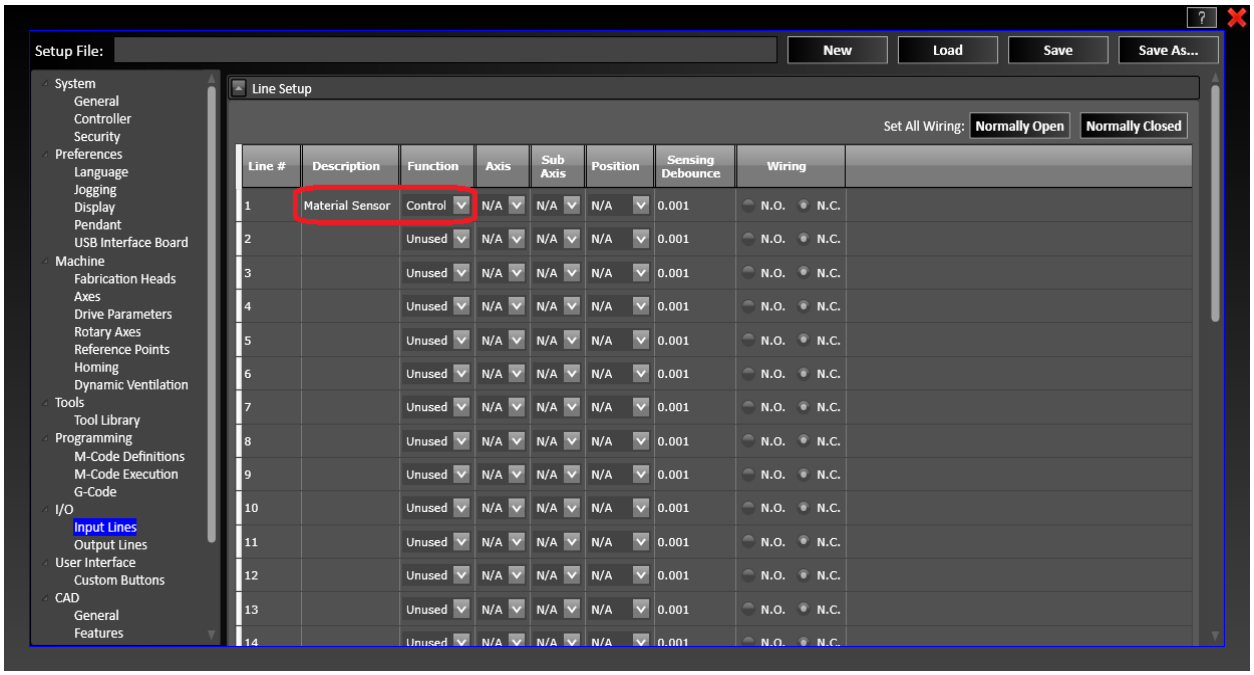
On the same page, you can set discrete jog distances to display on the jog panel:



Inputs

Sensing

Depending on your application, you may be using a material-sensing system, such as an ohmic sensor on a plasma torch. First, open the “I/O….Input Lines” page in the configuration:

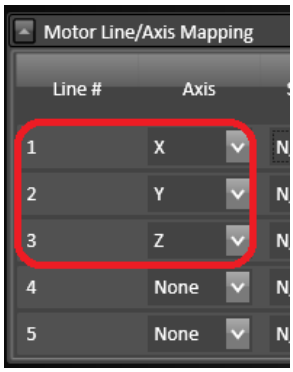


Determine which input the sensing mechanism is wired to. If using ohmic sensing through our integrated THC, this will be line 19. Name the sensor in the ‘Description’ column and set it as a ‘Control’ from the ‘Function’ dropdown. If you have multiple modes of sensing, do this for each.

Drive Faults

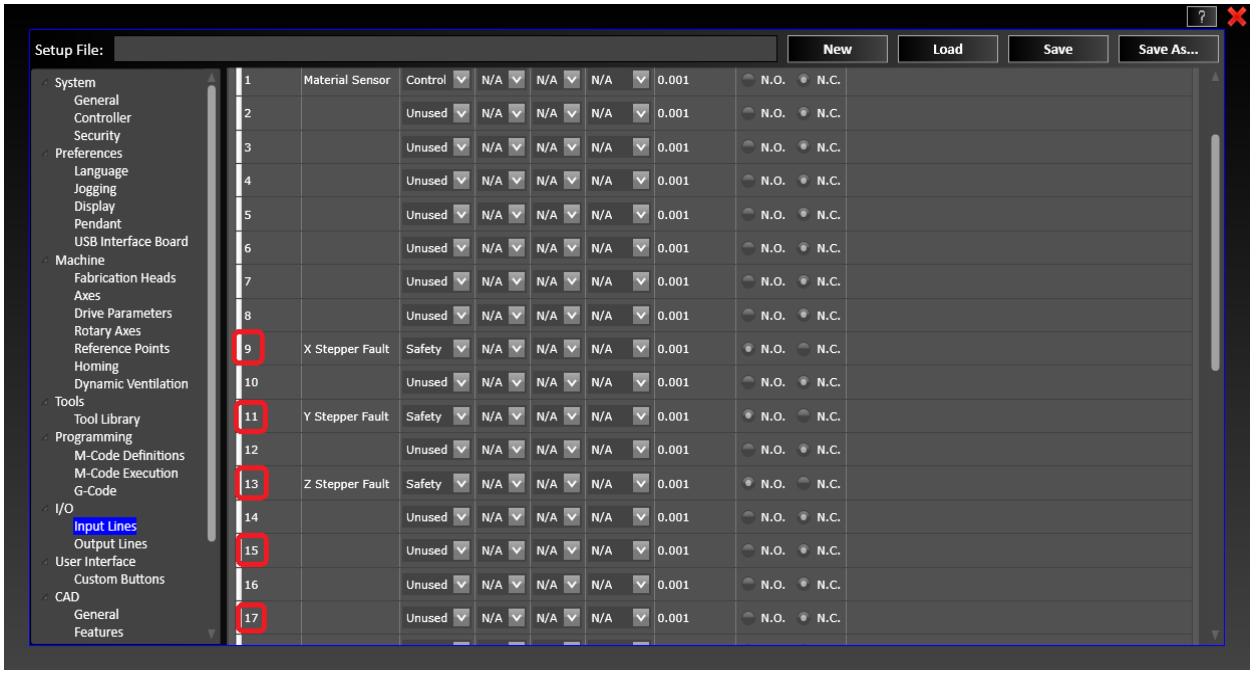
In a Pro or Titanium series controller, setting up input lines as drive faults has two advantages: fault reporting and safety. With fault lines set up, the operator will be notified if a fault occurs and unable to move the machine until the fault is resolved.

Take note of the ‘Motor Line/Axis Mapping’ on the “Machine….Axes” page. Each numbered line corresponds with a different input line for fault reporting.



Motor Line	Input Line
1	9
2	11
3	13
4	15
5	17

Assign each axis present in your system to one of the input lines using the above chart. Assign the ‘Safety’ function to each line and name them appropriately.



The lines in a stepper system should be configured as Normally Open, or N.O. In a servo system, these fault lines should be set as Normally Closed (N.C.).

Air Plasma Fabrication Head Configuration

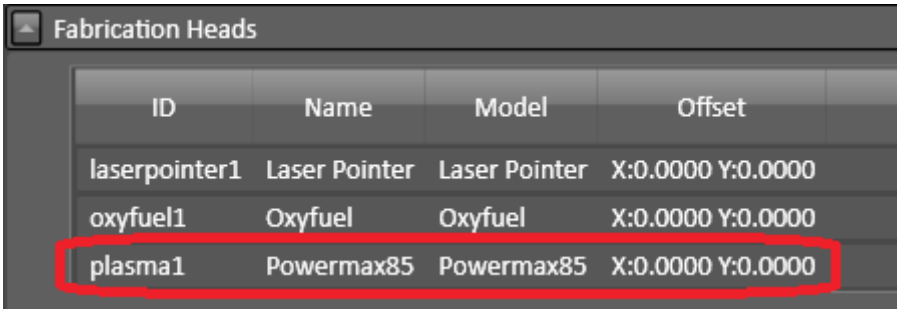
Adding/Editing Air Plasma Fabrication Head

To create or edit an Air Plasma fabrication head (or fab head), click the configuration icon in the upper right corner of the control software.

Navigate to the “Machine...Fabrication Heads” page in the configuration using the navigation tree on the left side of the configuration window.

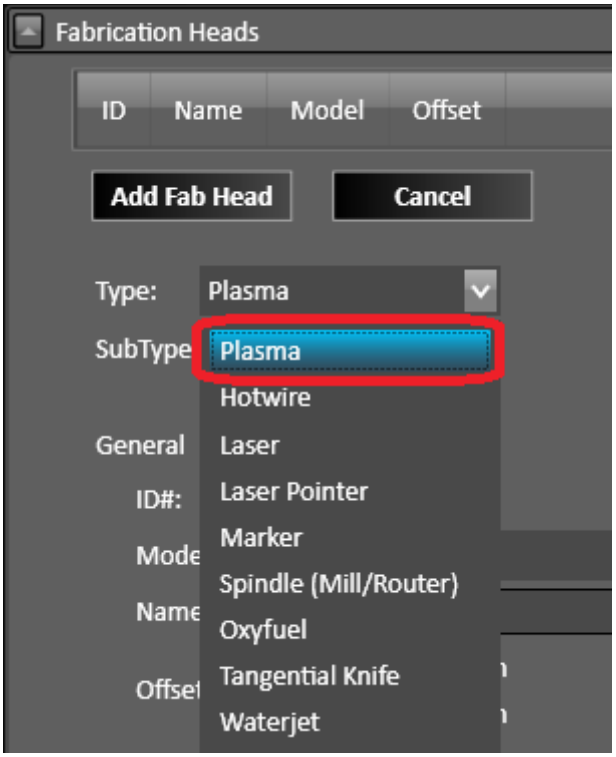
When adding a new Plasma fab head, click the ‘Add Fab Head’ button.

If editing an existing Plasma fab head, select which one to edit from the list by clicking on the name of the Plasma in the chart. This will drop down additional settings.



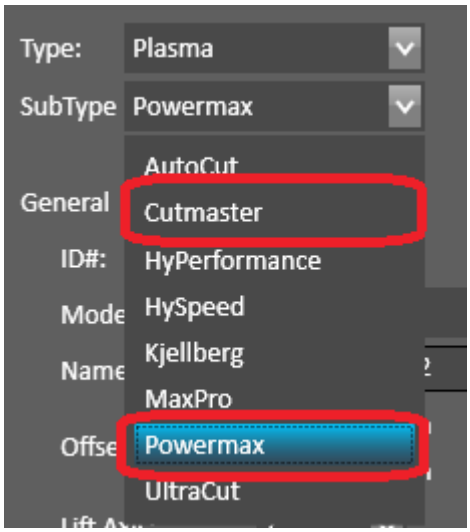
Type Configuration

The fabrication head type selects the fabrication technology. For air plasma cutting, select 'Plasma' from the drop-down menu.

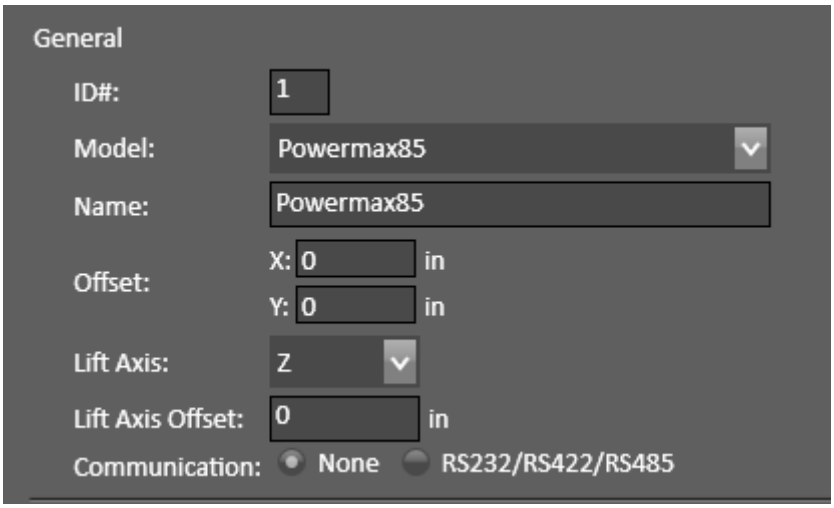


SubType Configuration

The SubType configuration is used to select the series of plasma cutter to be configured. For air plasma, select 'Cutmaster' or 'Powermax'. Check your plasma power supply to identify the correct series of plasma to configure.



General Configuration



ID#

The ID# is automatically generated, incrementing the value for each instance of a particular fabrication head type. For example, if there are currently 3 Plasma fabrication heads configured and another is added, the ID# will be set to 4. This number is used in the program to identify which fabrication head is used for a particular process. The number can be overwritten.

Name

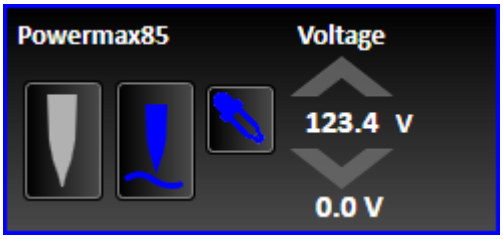
'Name' is automatically generated by the fabrication head type. This value can be overwritten if desired. The name is used on the CAM and CNC screens to identify the fabrication head.

Offset (X/Y)

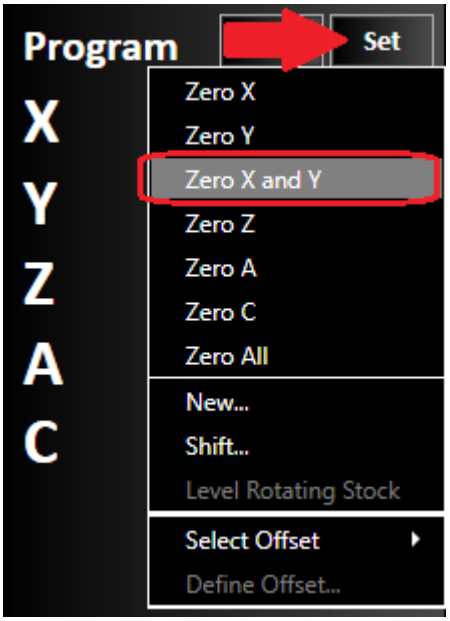
The offset is used for transitioning from one fabrication head to the next. For example, if an plasma fab head and laser pointer fab head are configured, the X and Y offset is used to shift between the plasma fabrication head and the laser pointer fabrication head.

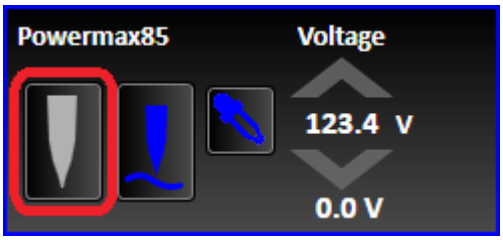
A common way to configure the offset is to have a primary fabrication head with an X,Y offset of 0,0. Other fabrication heads should have an offset from that primary fab head. In the previous example with a laser pointer and plasma fabrication heads, the plasma would be the primary fabrication head with X,Y offset of 0,0 and the laser pointer fabrication head would have an X,Y offset from the plasma fabrication head.

To determine which offset is applied, select the primary fab head on the CNC screen. A blue outline around the fab head's control panel indicates which fabrication head is active.

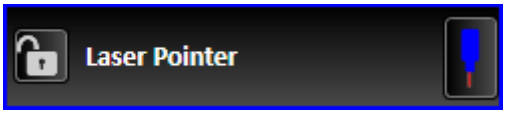


Move the active fab head into firing position above a scrap section of material and zero the X and Y coordinates under the 'Set' drop-down. Then, manually fire the fabrication head to mark the current position. The marking can be a pierce, gouge, mark, etc.

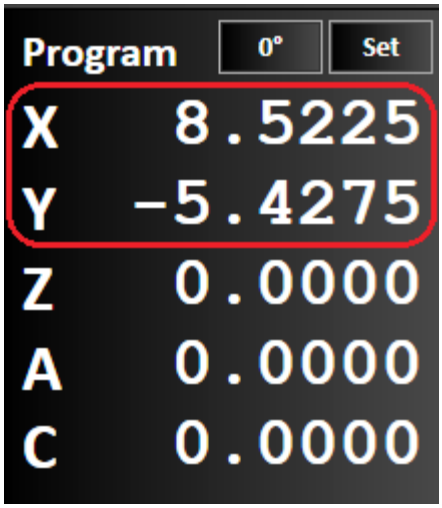


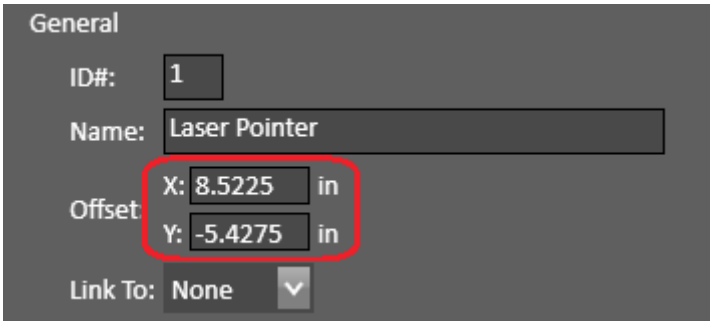


Then, select the fabrication head we are measuring the offset for (in this example, a laser pointer) and position it over the mark using the jog controls.



The currently displayed X and Y program coordinates now represent the X,Y offset for the currently selected fabrication head. Return to the configuration and fill these values in.





Lift Axis

Use the drop down to select the lift axis of the plasma fabrication head.

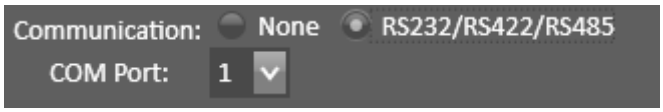
'Lift Axis' is the axis letter that represents the axis that will be associated with the lifter. When this axis letter is moved using the jog controls on the CNC panel, the lifter will be moved. This letter is also used to map the mechanical definition used to ensure proper motion. Most commonly the lift axis will be assigned to Z, U, V or W.

A lift axis of None indicates all positioning of the lifter is done outside the control software. This could include a torch which is positioned by hand, pneumatics, or even a motor driven torch that does not use the control software to position.

The 'Lift Axis Offset' is an offset, similar to the X,Y offset, used to indicate the offset from one fabrication head to another fabrication head. The offset is only critical to define if multiple fabrication heads are using the same axis letter. The typical lift axis offset is 0.

Communication (Powermax Only)

The communication configuration is used to define the communication with the Powermax series plasma cutter.

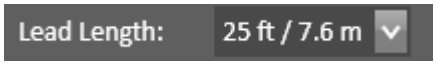


If RS232/RS422/RS485 is selected, the control software will communicate with the Powermax power supply to correctly set the current, pressure, and mode for a given process. The control software will also be able to report any errors on the Powermax power supply on the CNC screen. Select the COM port on the PC that the Powermax communication cable is connected to. If this is not known, it can be found in the Windows Device Manager under *Ports (COM & LPT).*

If 'None' is selected, there is no communication between the Powermax power supply and the control software.

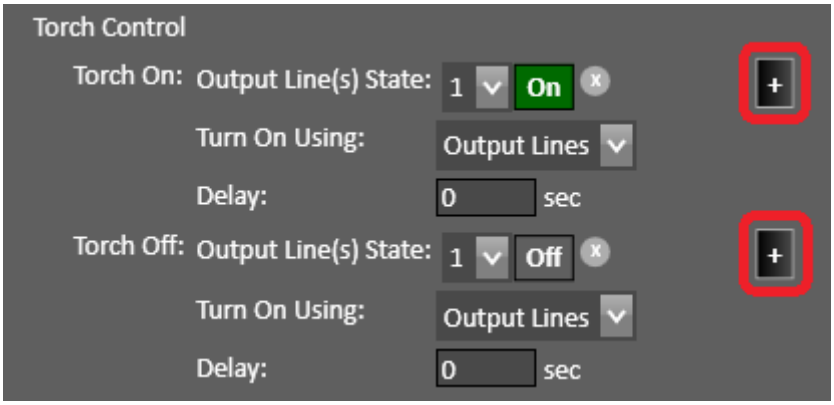
Lead Length

This configuration is used for a proper cut chart lookup for cut parameters. From the drop-down, select the plasma torch lead length used on your plasma system.



Torch Control

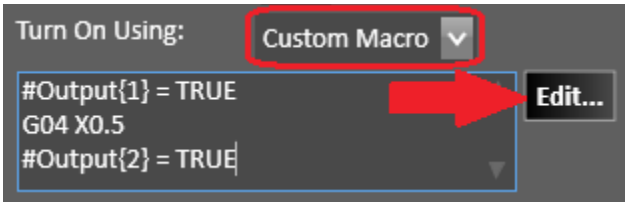
Torch Control configuration is used to configure the behavior for the Torch On and Torch Off states.



The configuration of Torch Control provides a button on the CNC screen to be used to turn on and off the plasma torch.

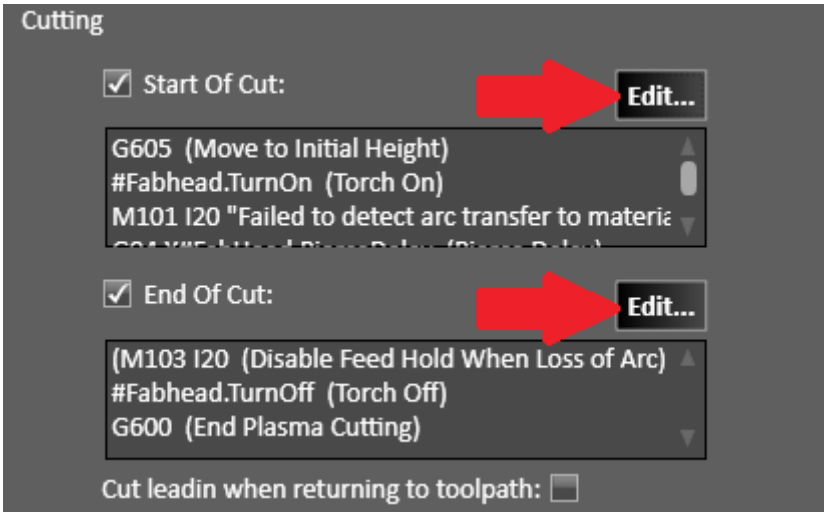
To configure the behavior, we need to describe what needs to happen when the Torch button is turned on and off. In the example above, output line 1 is turned on when the Cut Oxy button is on and output 1 is off when the Torch button is off. If multiple output lines need to be changed, the '+' button will add additional output lines to configure. There is also an optional delay that can be applied after setting the output line state.

If a macro—a sequence of commands—must be performed for either the on or off state, simply change the 'Turn On Using' drop down from 'Output Lines' to 'Custom Macro'. When a custom macro is specified, enter the macro by typing in the macro box or pressing the 'Edit...' button to launch a separate dialog.



Cutting

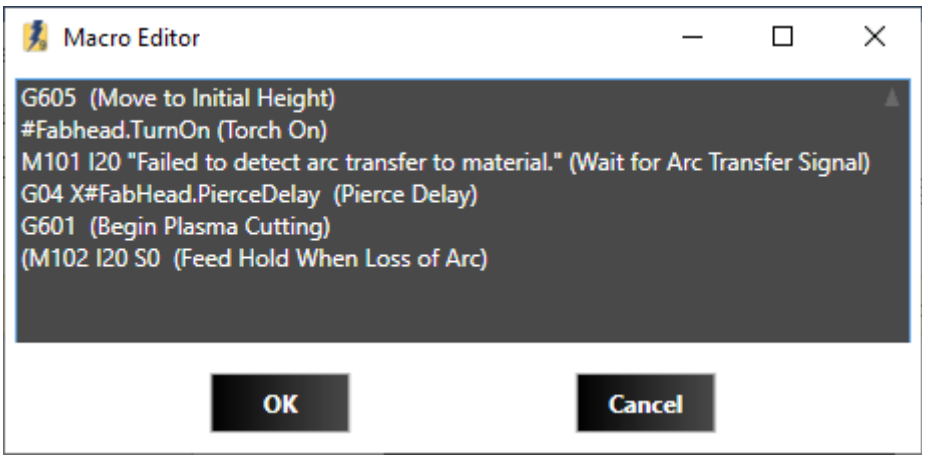
This configuration is used to describe the behavior of the plasma system at the beginning and end of each cut.



Start Of Cut

The 'Start Of Cut' is used to describe the routine to perform at the start of the cut. This macro will fire at the beginning of any feed rate move. If the checkbox is not checked, no macro will be run at the start of a feed rate move. To configure the macro, either enter the routine into the macro editor box or click the edit button to launch a macro editor dialog box.

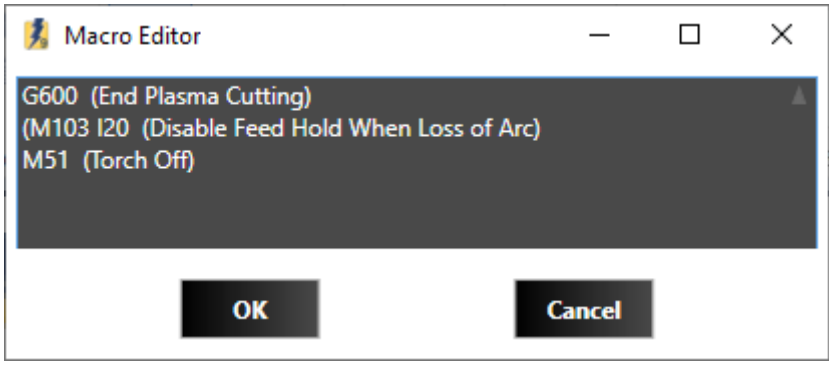
The following is the default start of cut macro for an air plasma fabrication head:



End Of Cut

The 'End Of Cut' checkbox is used to describe the routine to perform at the end of the cut. This macro will fire at the beginning of any rapid move. If the checkbox is not checked, no macro will be run at the start of a rapid move. To configure the macro, either enter the routine into the macro editor box or click the edit button to launch a macro editor dialog box.

The following is the default end of cut macro for an air plasma fabrication head:

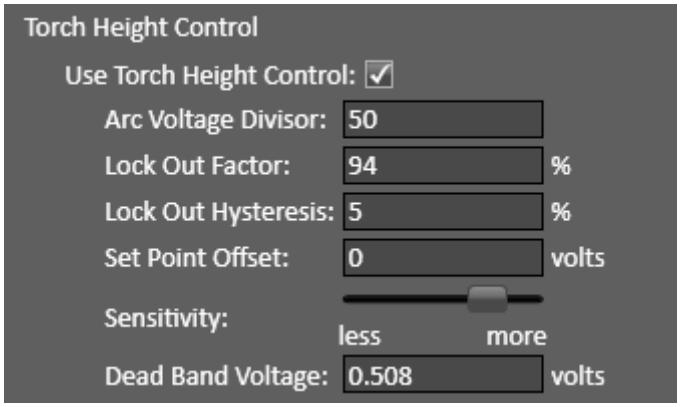


Cut Leadin When Returning To Toolpath

The 'Cut leadin when returning to toolpath' feature is used to automatically cut a lead-in when a program is paused. If this checkbox is checked the program, can be feed held and the torch moved off path. When the program is then resumed, the torch will begin cutting from the current position. If the checkbox is unchecked, the torch will instead rapid move to the point at which the program was paused and then resume cutting. This feature is helpful to prevent gouging the part in the event that cutting has to be interrupted.

Torch Height Control

The Torch Height Control configuration is used to describe the torch height control system response. To enable the use torch height control the 'Use Torch Height Control' checkbox must be checked.



Arc Voltage Divisor

The arc voltage divisor describes the ratio of the cutting voltage divided by the control voltage from the plasma power supply. The ideal arc voltage divisor for the control system is 50:1. Check your plasma manufacturer to determine the voltage divider on your equipment. On some plasma systems, the voltage divisor is configurable—if that is the case, select a divisor at or close to 50:1.

Lock Out Factor

The lock out factor is a velocity lock out factor. This is used to pause changes in torch height when the velocity of the machine slows down to take corners. This is done to prevent the plasma torch from diving into the material as the kerf widens. The factor dictates at what percent of the specified feedrate this occurs. By default, this is 94%.

Lock Out Hysteresis

The lock out hysteresis is a buffer value used to prevent the height control from rapidly pausing and resuming during velocity changes. For example—if the lockout factor is 94% and the lockout hysteresis is 5%—when the velocity slows down to 94% of the program feedrate, the height control will pause lifter adjustments. The height control will only then resume lifter adjustments once velocity has reached 99% (lockout factor plus hysteresis) of the program feedrate.

Set Point Offset

The set point offset is a factor used to shift the idle voltage reading on the CNC screen. Typically, with no set point offset, you will see an idle voltage on the CNC screen. This idle voltage shows the noise floor of the system. This typically displays as 4V-9V but this really represents only 100-200mV. In order to normalize the view, the offset can be used so the idle voltage will fluctuate around 0V.

Sensitivity

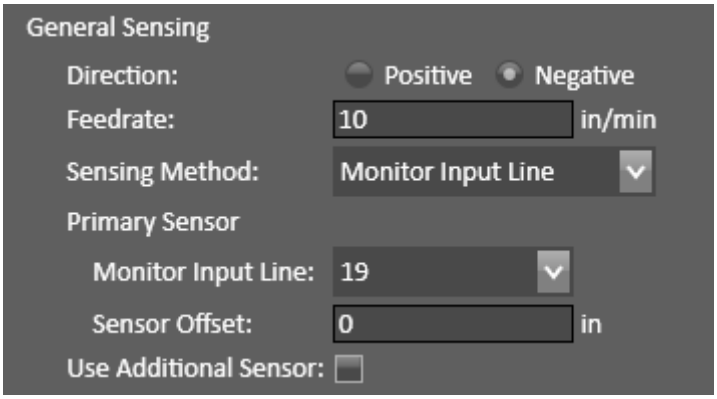
The sensitivity slider is used to increase or decrease the sensitivity or reactiveness of the torch height control. Move the slider to the left and the height control will react to large error, move the slider to right and the height control will react to small error.

Dead Band Voltage

The dead band voltage is based on the sensitivity slider and indicates what the minimum voltage error for the height control to make an adjustment. The less sensitive, the larger the dead band voltage and vice versa. For an example, imagine the dead band voltage is 1V and the set point voltage is 130V. If the measured voltage is 130.9V, the voltage error between the setpoint and measure voltages would be 0.9V—less than the dead band voltage. Therefore, the height control would not make an adjustment. However, if the measured voltage is 132.5, the height control would make an adjustment because the voltage error is now 2.5V.

General Sensing

The ‘General Sensing’ configuration is used to define the sensing parameters for the plasma fabrication head used during program zero sensing and touch off during a program.



Direction

The direction defines which way the fabrication head will sense the workpiece. This is typically negative.

Feedrate

The feedrate is the speed at which the fabrication head will travel while sensing the workpiece. The faster the speed, the less time to complete but the lower accuracy the sense will be. The sensing feedrate cannot exceed the start/stop feedrate of the lift axis.

Sensing Method

The sensing method drop has options to use a traditional switch (mechanical, proximity, etc) or, in the case of a servo system, motor current sensing. When using a traditional switch, there is an option to use a secondary switch as a backup in the event the primary switch fails. When configured for motor current sensing the motor current is the only sensor option.

Sensing Method: Monitor Input Line

Select the input line number to be used as the primary sensor. This input line must also be configured as a control-type input in the input line configuration. If a second switch is being used as a backup, check 'Use Additional Sensor' and select another control-type input line.

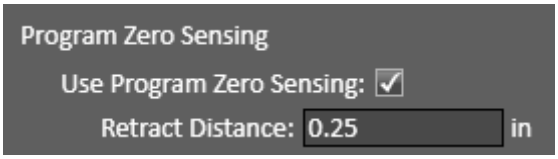
The sensor offset is used to define a distance from when the sensor returns to a normal state after contacting the workpiece and the point when the plasma torch lifts off the material. The value is typically negative. For example, the torch is lifting off the workpiece and the sensor returns to a normal state at point A, the torch continues to lift and stops contacting the workpiece at point B. The sensor offset would be A – B.

Sensing Method: Monitor Motor Current

Choose a current limit that will indicate that the axis has encountered the material. By default, this is 1A. If the system is causing significant deflection in the material, this value needs to decrease. If the system instead is setting the zero before it reaches the material, this value should be increased. The debounce dictates the time that the motor current must exceed the limit. If the sensing is not consistent, this value should be increased. If the sensing is slow to react, decrease this value.

Program Zero Sensing

The program zero sensing checkbox enables the use of program zero sensing with the fabrication head lift axis. The option to sense the lift axis zero can be found in the Program Coordinate 'Set' menu when checked.



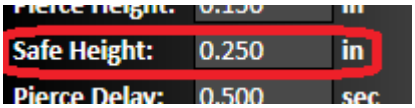
Retract Distance

The retract distance is the position to move to after sensing the workpiece.

Additional Controls

Safe Height

When the 'Safe Height' checkbox is checked, a parameter will be enabled on the CNC screen to indicate the height to move to at the start of the program and between cuts. The system will only move up to the safe height. If the lift axis is already above the safe height and a safe height move is to be performed, no lift axis motion will occur.

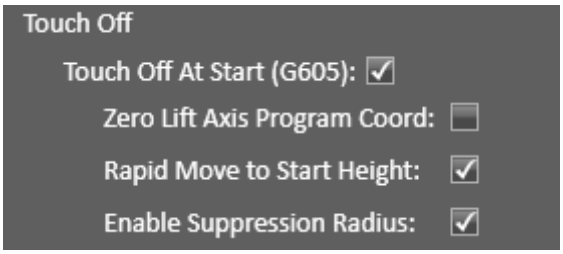


Specify As

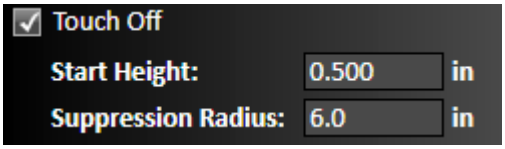
Use the 'Specify As' radio buttons to describe if the safe height parameter is listed as a Program Coordinate or and incremental distance. For example, if the safe height is 0.25" and it is listed as an incremental distance the lift axis will move up 0.25" from its current height when a move to safe height is required. If the safe height value is in Program Coordinates the lift axis will move to the coordinate 0.25".

Touch Off

This checkbox determines if the 'Touch Off' mode checkbox is available on the CNC screen. Ideally, the torch will touch off before a pierce to ensure it is at a proper height.



If 'Touch Off At Start' is checked, a parameter will be enabled on the CNC screen to enable touch off while running the program. In addition, if the "Rapid Move to Start Height" and "Enable Suppression Radius" options are also checked, those additional controls will be available.



Zero Lift Axis Program Coord.

If 'Zero Life Axis Program Coord' is checked, the lift axis's zero will be reset every time a touch is performed during a program. If this is unchecked, the lift axis's zero will not change during a touch off.

Rapid Move to Start Height

If 'Rapid Move to Start Height' is checked, the system will make a rapid move from the Safe Height to the Start Height before performing a touch off. This can decrease sensing time while allowing larger clearance to reduce the risk of contacting a tip up.

Enable Suppression Radius

If 'Enable Suppression Radius' is checked, the system will skip touch offs within a specified distance of the previous touch off. This feature helps with efficiency by reduce the number of touch off sequences.

Oxy Fuel Fabrication Head Configuration

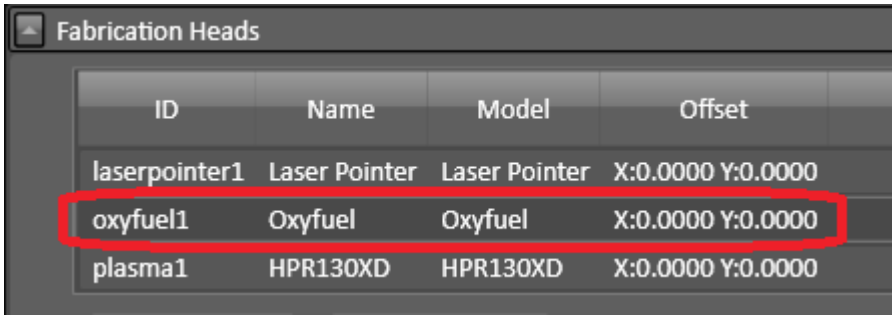
Adding/Editing Oxy Fuel Fabrication Head

To create or edit an Oxy Fuel fabrication head (or fab head), click the configuration icon in the upper right corner of the control software.

Navigate to the “Machine...Fabrication Heads” page in the configuration using the navigation tree on the left side of the configuration window.

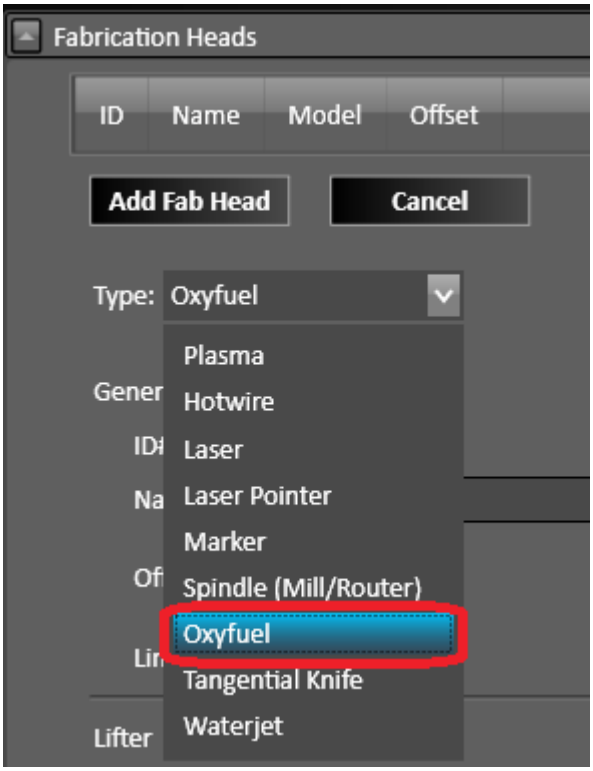
When adding a new Oxy Fuel fab head, click the ‘Add Fab Head’ button.

If editing an existing Oxy Fuel fab head, select which one to edit from the list by clicking on the name of the Oxyfuel in the chart. This will drop down additional settings.

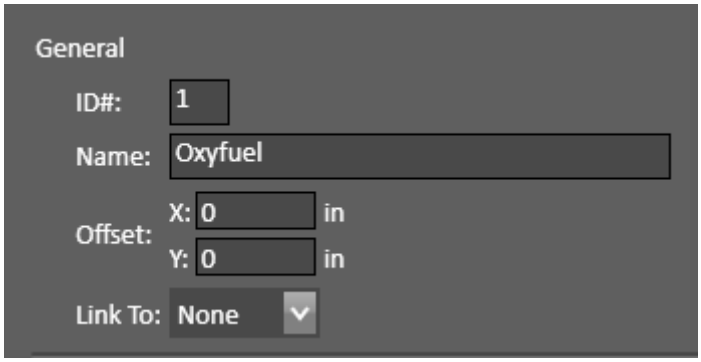


Type Configuration

The fabrication head type selects the fabrication technology. For oxy fuel cutting, select ‘Oxyfuel’ from the drop-down menu.



General Configuration



ID#

The ID# is automatically generated, incrementing the value for each instance of a particular fabrication head type. For example, if there are currently 3 Oxyfuel fabrication heads configured and another is added, the ID# will be set to 4. This number is used in the program to identify which fabrication head is used for a particular process. The number can be overwritten.

Name

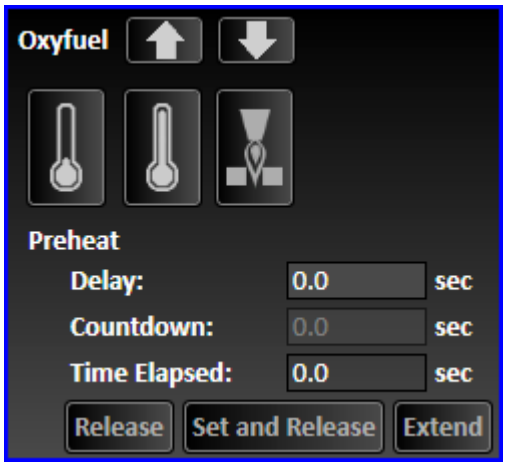
'Name' is automatically generated by the fabrication head type. This value can be overwritten if desired. The name is used on the CAM and CNC screens to identify the fabrication head.

Offset (X/Y)

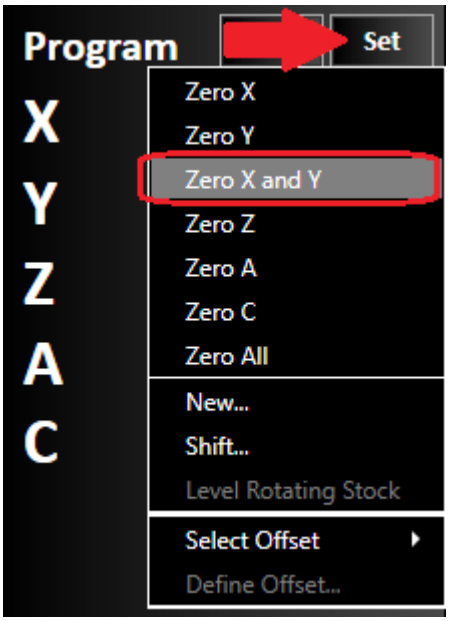
The offset is used for transitioning from one fabrication head to the next. For example, if an oxyfuel fab head and laser pointer fab head are configured, the X and Y offset is used to shift between the oxyfuel fabrication head and the laser pointer fabrication head.

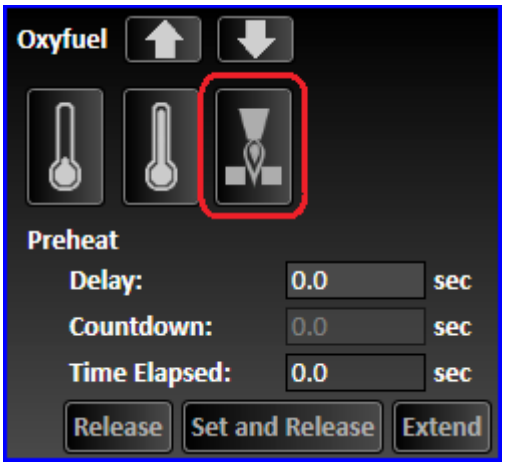
A common way to configure the offset is to have a primary fabrication head with an X,Y offset of 0,0. Other fabrication heads should have an offset from that primary fab head. In the previous example with a laser pointer and oxyfuel fabrication heads, the oxyfuel would be the primary fabrication head with X,Y offset of 0,0 and the laser pointer fabrication head would have an X,Y offset from the oxy fuel fabrication head.

To determine which offset is applied, select the primary fab head on the CNC screen. A blue outline around the fab head's control panel indicates which fabrication head is active.

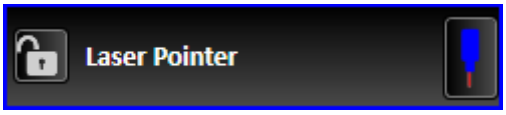


Move the active fab head into firing position above a scrap section of material and zero the X and Y coordinates under the 'Set' drop-down. Then, manually fire the fabrication head to mark the current position. The marking can be a pierce, gouge, mark, etc.



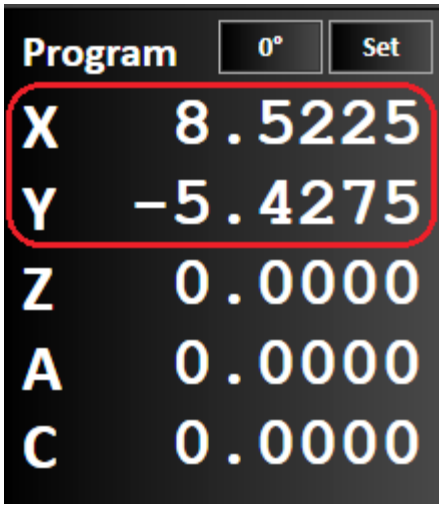


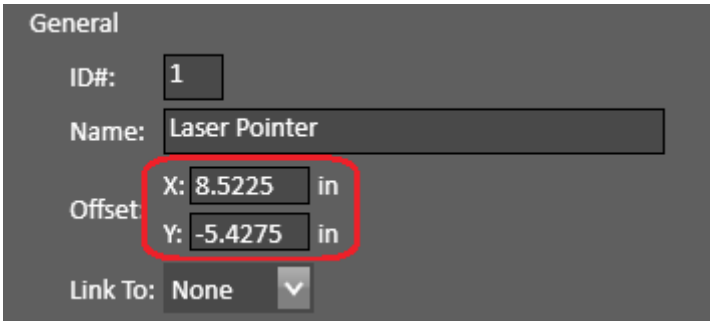
Then, select the fabrication head we are measuring the offset for (in this example, a laser pointer) and position it over the mark using the jog controls.



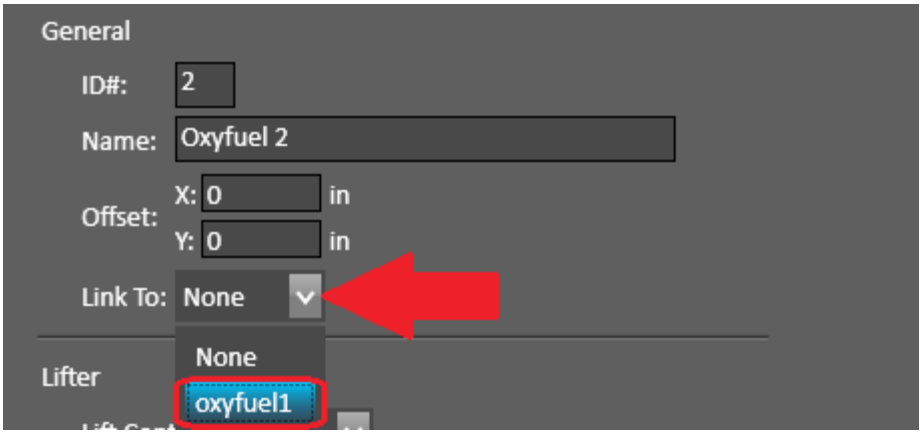
The currently displayed X and Y program coordinates now represent the X,Y offset for the currently selected fabrication head. Return to the configuration and fill these values in.

Link To

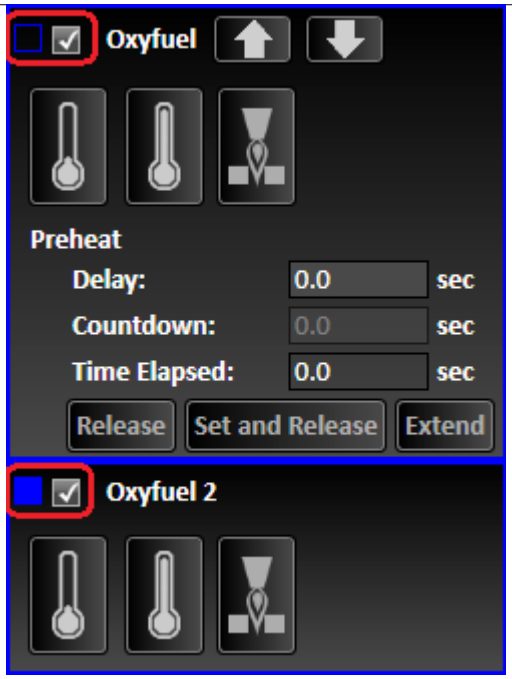




The Link To configuration is used to link identical fabrication heads when multiple heads are used to cut duplicate parts at the same time. For example, if there are three oxyfuel fabrication heads linked all three can run a single program with three times the output.



When multiple, identical fabrication heads are configured, they can be enabled or disabled for use on the main screen by checking a box.



The blue box in the example above indicates which fabrication head is used for positioning. That fabrication head's offset is used for zeroing. The checkbox next to the blue box is used to indicate which of the link fabrication heads will be used during the program.

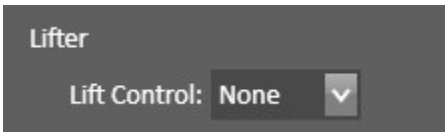
Lifter

Lift Control

The lift control will configure the type of lift control is used for the oxyfuel.

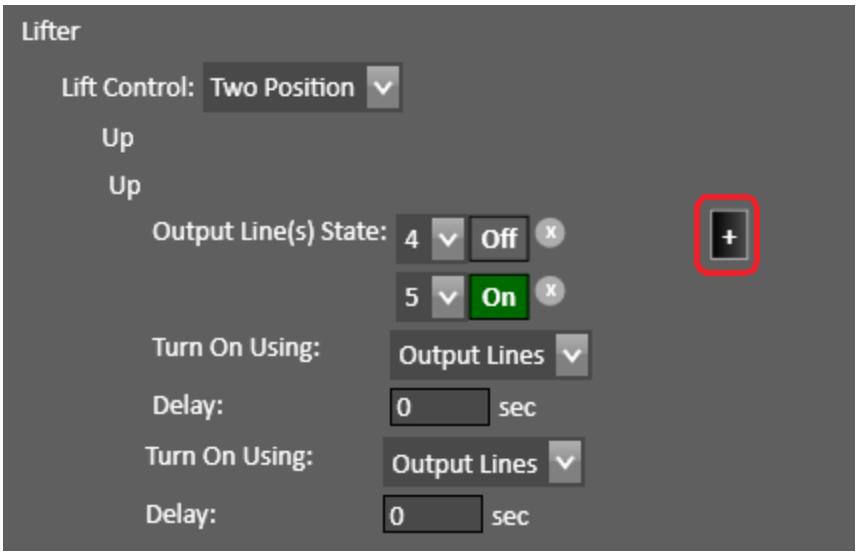
Lift Control: None

A lift control of None indicates all positioning of the lifter is done outside the control software. This could include a torch which is positioned by hand, or even a motor-driven torch that does not use the control software to position.



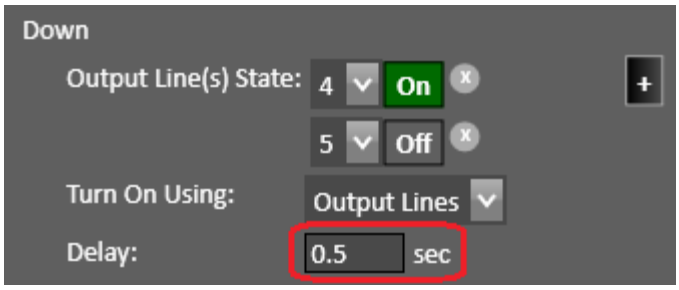
Lift Control: Two Position

A lift control of 'Two Position' describes a torch lifter that is either all the way up or all the way down. A common example of this type of lift control is a pneumatic lifter that used compressed air push the torch all the way up or all the way down using some sort of roller system to maintain a proper cut height.

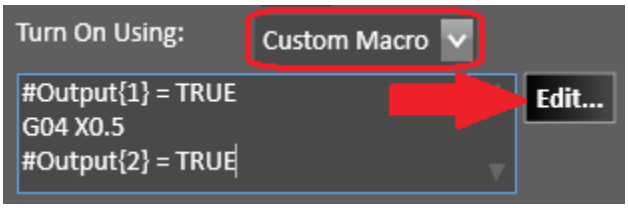


To configure the behavior, we need to describe what needs to happen to put the lifter in the Up position and what needs to happen to put the lifter in the Down position. In the example above, output line 4 is used to control the device which raises and lowers the lifter. If multiple output lines need to be changed the '+' button will add additional output lines to configure.

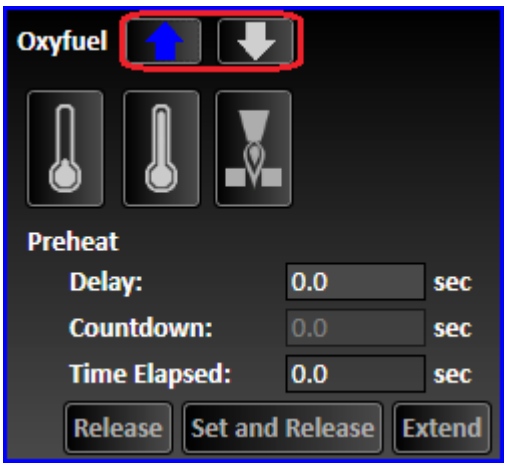
There is also an optional delay that can be applied after setting the output line state. This delay can be used to allow enough time for the lifter to reach the desired position.



If a macro—a sequence of commands—must be performed for either the up or down state, simply change the 'Turn On Using' drop down from 'Output Lines' to 'Custom Macro'. When a custom macro is specified, enter the macro by typing in the macro box or pressing the 'Edit...' button to launch a separate dialog.

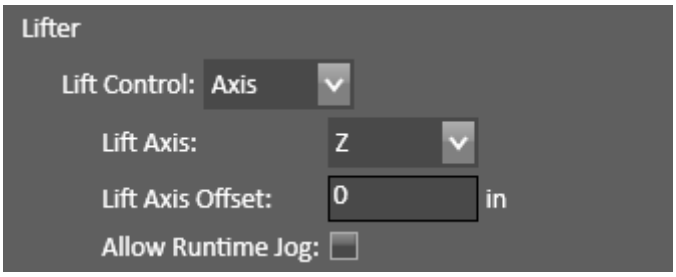


A Two Position lifter will have two buttons on the fab head's control panel on the CNC screen to manually control the position of the lifter. The lit-up arrow shows the current state.



Lift Control: Axis

A lift control of Axis describes a lifter that is precisely controlled using the control software in conjunction with the motion control. Lifters of this type utilize a stepper or servo motor and the positioning of the lifter is commanded through the control software the same as any X, Y positioning.



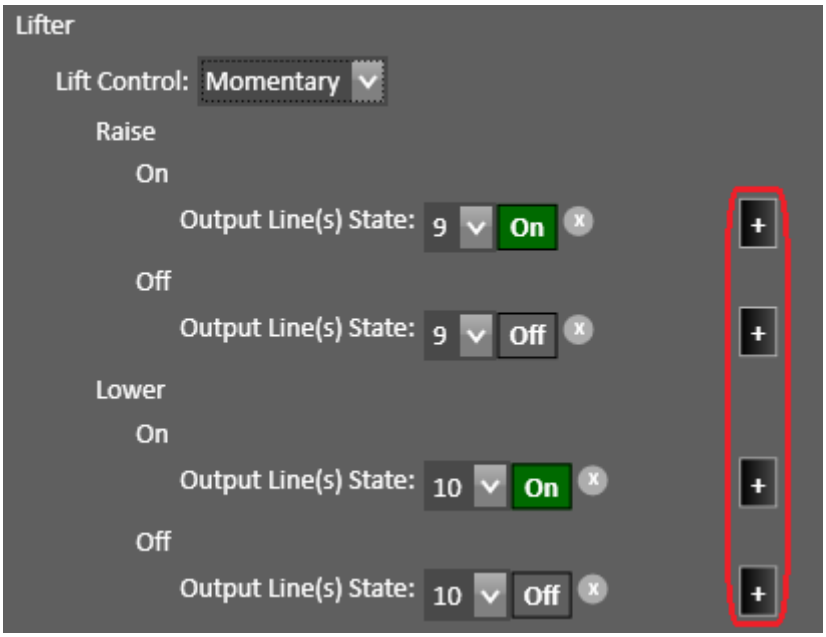
The 'Lift Axis' is the axis letter that represents the axis that will be associated with the lifter. This when this axis letter is moved using the jog controls on the CNC panel, the lifter will be moved. This letter is also used to map the mechanical definition used to ensure proper motion. Most commonly the lift axis will be assigned to Z, U, V or W.

The 'Lift Axis Offset' is an offset, similar to the X,Y offset, used to indicate the offset from one fabrication head to another fabrication head. The offset is only critical to define if multiple fabrication heads are using the same axis letter. The typical lift axis offset is 0.

The checkbox to allow runtime jog will allow the lift axis to be moved using the jog control while running a program. In order to allow runtime jog for a lift axis, there cannot be any motion commands for that axis in the program.

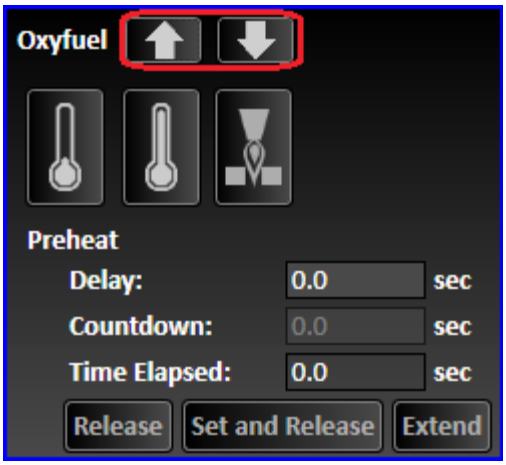
Lift Control: Momentary

A lift control of Momentary describes a lifter that is controlled (typically) by a motor. The motor is spun in one direction to go up and spun in the other direction to go down.



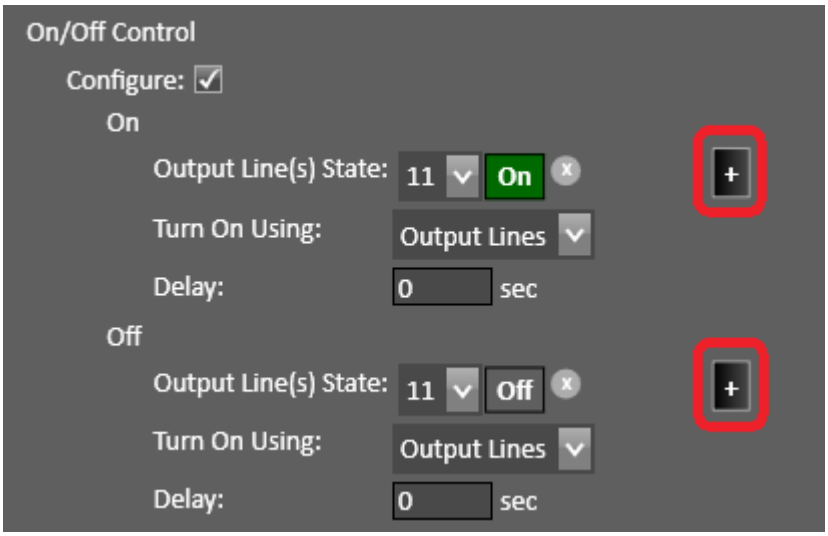
To configure the behavior, we need to describe what needs to happen when the Up button is pressed and released in addition to what needs to happen when the Down button is pressed and released. In the example above, output line 9 is turned on when the Up button is pressed and output 9 is turned off when the Up button is released. For the Down button, output 10 is turned on when the button is pressed and turned off when released. If multiple output lines need to be commanded, the '+' button will add additional output lines to configure.

A Momentary lifter will have two buttons on the CNC screen to manually control the position of the lifter.



On/Off Controls

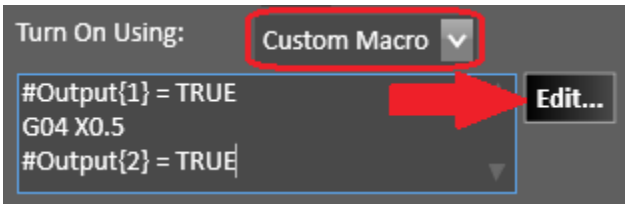
On/Off Control configuration is used to configure the behavior of cut oxygen valve. To control the cut oxygen valve through the control software, the 'Configure' checkbox should be checked. If the checkbox is unchecked, control of the cut oxygen valve is handled manually outside of the control software.



The configuration of On/Off Control provides a button on the CNC screen to be used to turn on and off the cut oxygen valve.

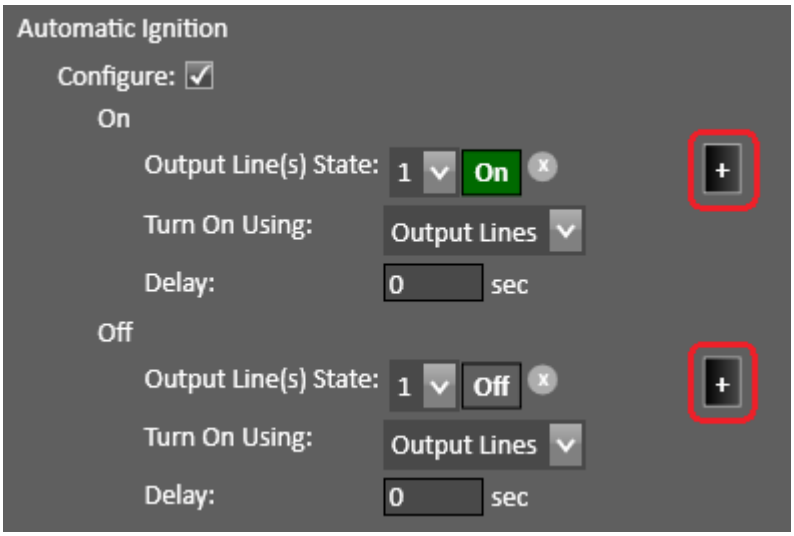
To configure the behavior, we need to describe what needs to happen when the Cut Oxy On button is turned on and off. In the example above, output line 11 is turned on when the Cut Oxy button is on and output 11 is off when the Cut Oxy button is off. If multiple output lines need to be changed, the '+' button will add additional output lines to configure. There is also an optional delay that can be applied after setting the output line state.

If a macro—a sequence of commands—must be performed for either the on or off state, simply change the 'Turn On Using' drop down from 'Output Lines' to 'Custom Macro'. When a custom macro is specified, enter the macro by typing in the macro box or pressing the 'Edit...' button to launch a separate dialog.



Automatic Ignition

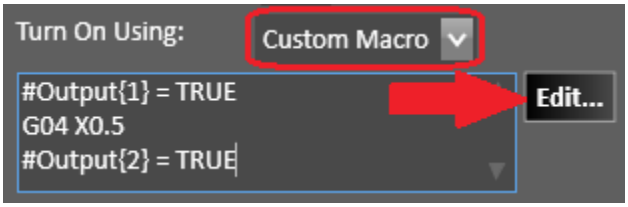
Automatic Ignition is used to configure the behavior of an automatic striker for lighting the flame on an oxyfuel torch. If the machine does not have a software-controlled striker, leave the 'Configure' box unchecked.



The configuration of Automatic Ignition provides a button on the CNC screen to be used to turn on and off the ignition striker.

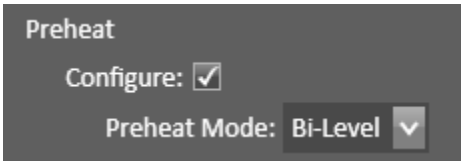
To configure the behavior, we need to describe what needs to happen when the Ignition button is turned on and off. In the example above, output line 1 is turned on when the Ignition button is on and output 1 is off when the Ignition button is off. If multiple output lines need to be changed, the '+' button will add additional output lines to configure. There is also an optional delay that can be applied after setting the output line state.

If a macro—a sequence of commands—must be performed for either the on or off state, simply change the 'Turn On Using' drop down from 'Output Lines' to 'Custom Macro'. When a custom macro is specified, enter the macro by typing in the macro box or pressing the 'Edit...' button to launch a separate dialog.



Preheat

The Preheat configuration is used to configure the behavior of the preheat controls for the oxyfuel system.



Configure

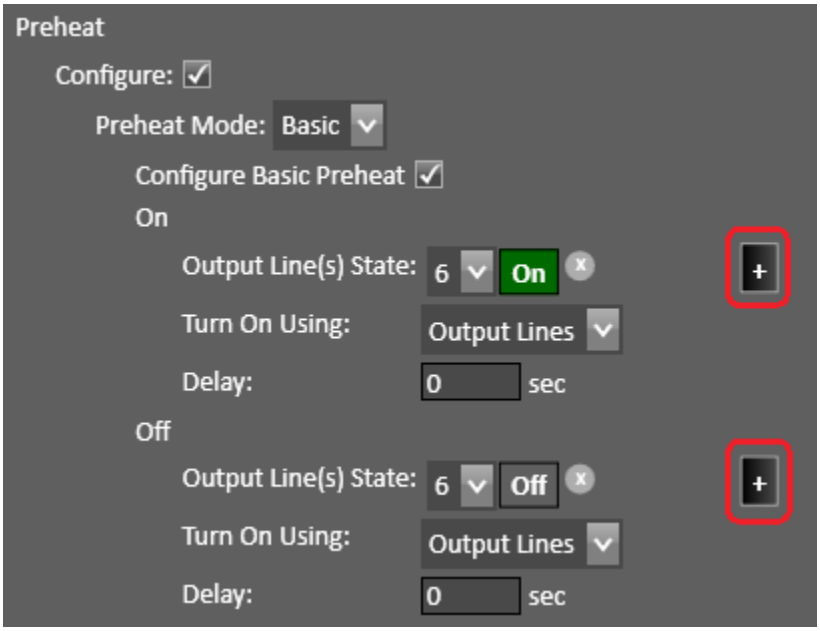
The configure checkbox is used to indicate if the preheat controls will be handled by the control software. If it is not checked, no preheat process will be managed through the control software.

Preheat Mode

The preheat mode is used to describe the type of preheat system or how many preheat valves will be managed through the control system.

Preheat Mode: Basic

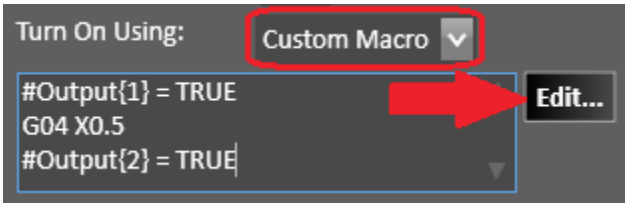
Basic preheat describes a preheat system that only utilizes only one preheat valve. The valve can be manually opened or automatically managed through the control software.



The 'Configure Basic Preheat' checkbox is used to configure the preheat valve to be managed through the control software. If it is unchecked, the preheat valve is managed manually. This configuration still allows for preheat parameters to be utilized on the CNC screen. If checked, it will provide a button on the CNC screen to be used to turn on and off the preheat valve.

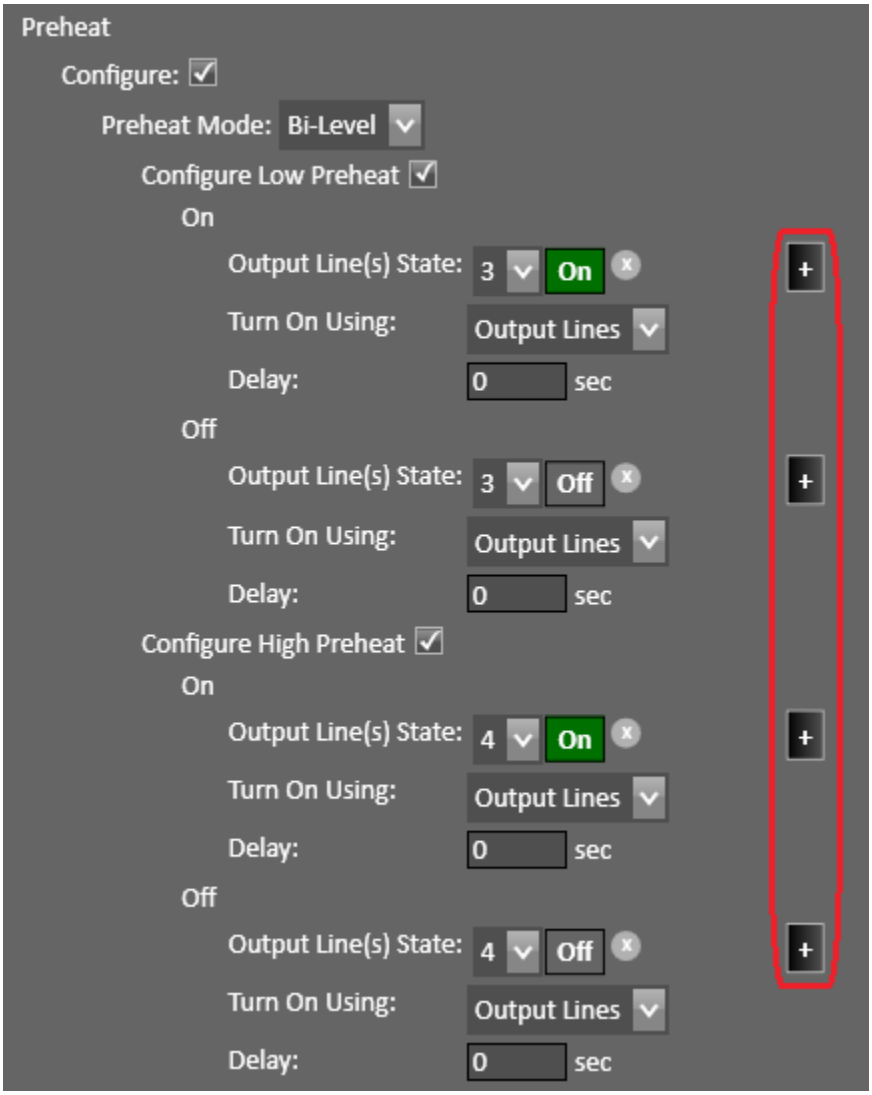
To configure the behavior, we need to describe what needs to happen when the Preheat button is turned on and off. In the example above, output line 6 is turned on when the Preheat button is on and output 6 is off when the Preheat button is off. If multiple output lines need to be commanded, the '+' button will add additional output lines to configure. There is also an optional delay that can be applied after setting the output line state.

If a macro—a sequence of commands—must be performed for either the on or off state, simply change the 'Turn On Using' drop down from 'Output Lines' to 'Custom Macro'. When a custom macro is specified, enter the macro by typing in the macro box or pressing the 'Edit...' button to launch a separate dialog.



Preheat Mode: Bi-Level

Bi-Level preheat describes a preheat system that utilizes two preheat valves: a low preheat and a high preheat. The valves can be manually opened or automatically managed through the control software.

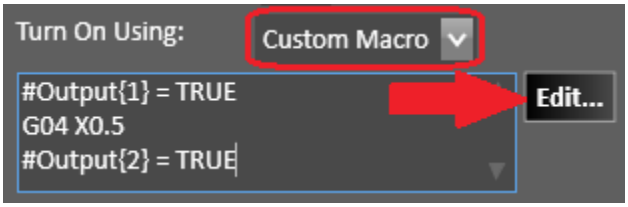


The ‘Configure Low Preheat’ checkbox is used to configure the low preheat valve to be managed through the control software. If the ‘Configure Low Preheat’ checkbox is unchecked, the preheat valve is managed manually. If checked, it will provide a button on the CNC screen to be used to turn on and off the low preheat valve.

The ‘Configure High Preheat’ checkbox is used to configure the high preheat valve to be managed through the control software. If the ‘Configure High Preheat’ checkbox is unchecked, the preheat valve is managed manually. If checked, it will provide a button on the CNC screen to be used to turn on and off the high preheat valve.

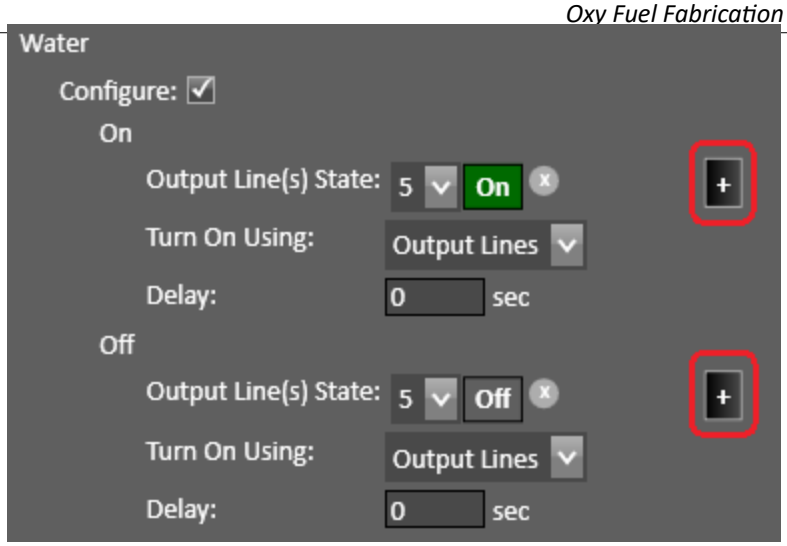
To configure the behavior, we need to describe what needs to happen when the Low and High Preheat buttons are turned on and off. In the example above, output line 3 is turned on when the Low Preheat button is on and output 3 is off when the Low Preheat button is off. Additionally, output line 4 is turned on when the High Preheat button is on and output 4 is off when the Low Preheat button is off. If multiple output lines need to be commanded, the ‘+’ button will add additional output lines to configure. There is also an optional delay that can be applied after setting the output line state.

If a macro—a sequence of commands—must be performed for either the on or off state, simply change the ‘Turn On Using’ drop down from ‘Output Lines’ to ‘Custom Macro’. When a custom macro is specified, enter the macro by typing in the macro box or pressing the ‘Edit...’ button to launch a separate dialog.



Water

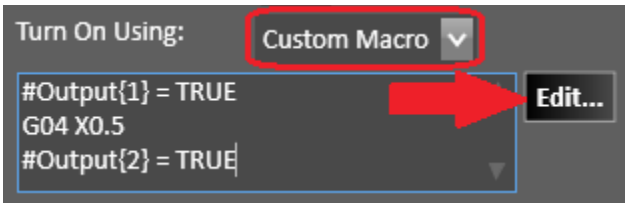
Water configuration is used to configure the behavior of water utilization during cutting do minimize plate warpage. If the machine does not have a software-controlled water spray, leave the ‘Configure’ box unchecked.



The configuration of Water Spray provides a button on the CNC screen to be used to turn on and off the ignition striker.

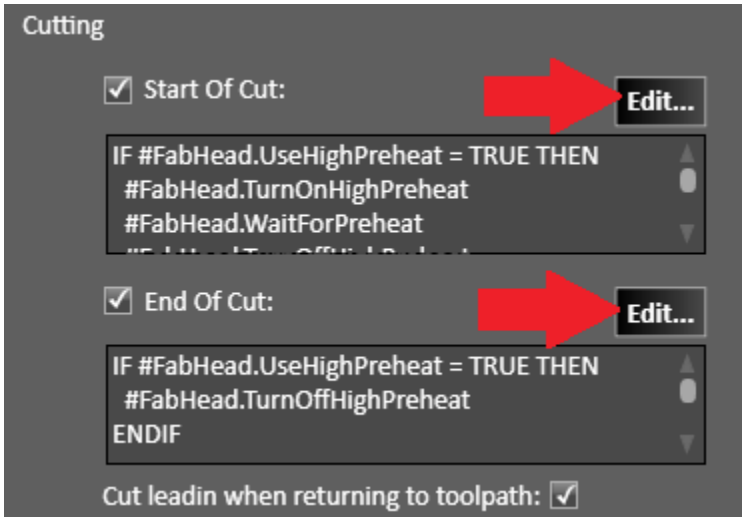
To configure the behavior, we need to describe what needs to happen when the Water button is turned on and off. In the example above, output line 5 is turned on when the Water button is on and output 5 is off when the Water button is off. If multiple output lines need to be commanded, the '+' button will add additional output lines to configure. There is also an optional delay that can be applied after setting the output line state.

If a macro—a sequence of commands—must be performed for either the on or off state, simply change the 'Turn On Using' drop down from 'Output Lines' to 'Custom Macro'. When a custom macro is specified, enter the macro by typing in the macro box or pressing the 'Edit...' button to launch a separate dialog.



Cutting

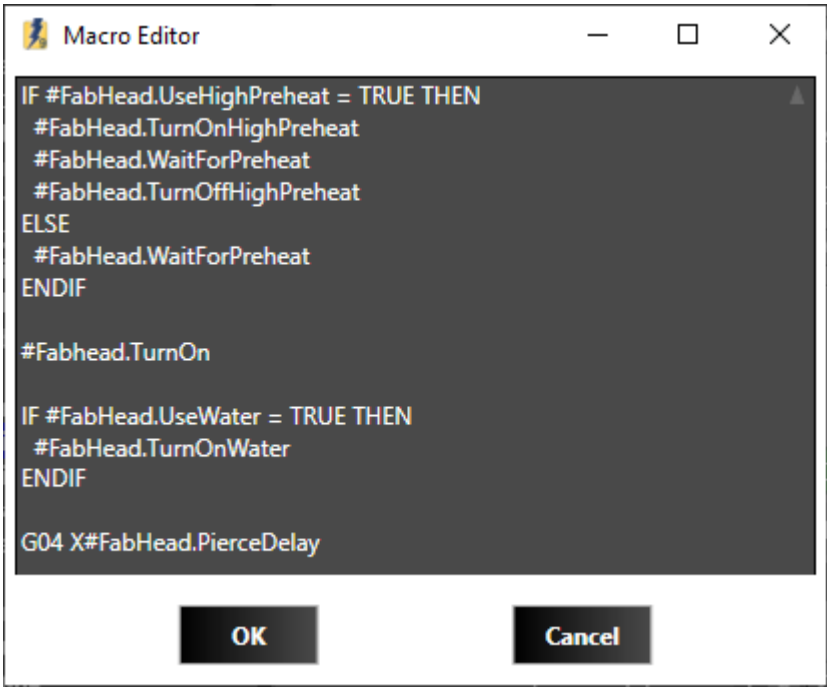
The Cutting configuration is used to describe the behavior of the oxyfuel system at the beginning and end of the cut.



Start Of Cut

The 'Start Of Cut' is used to describe the routine to perform at the start of the cut. This macro will fire at the beginning of any feed rate move. If the checkbox is not checked, no macro will be run at the start of a feed rate move. To configure the macro, either enter the routine into the macro editor box or click the edit button to launch a macro editor dialog box.

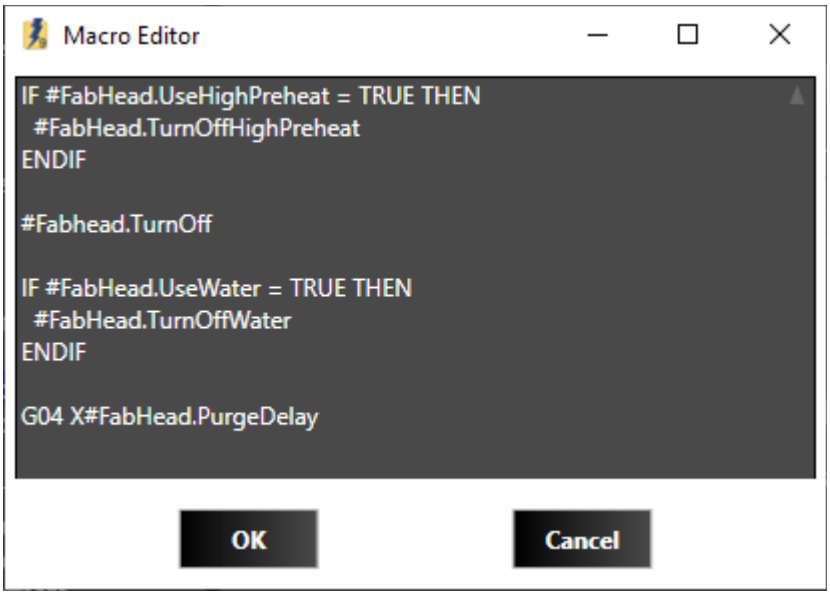
The following is the default start of cut macro for an oxyfuel fabrication head:



End Of Cut

The 'End Of Cut' checkbox is used to describe the routine to perform at the end of the cut. This macro will fire at the beginning of any rapid move. If the checkbox is not checked, no macro will be run at the start of a rapid move. To configure the macro, either enter the routine into the macro editor box or click the edit button to launch a macro editor dialog box.

The following is the default end of cut macro for an oxyfuel fabrication head:



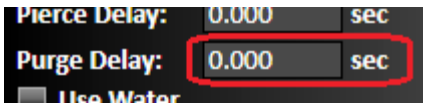
Cut Leadin When Returning To Toolpath

The 'Cut leadin when returning to toolpath' feature is used to automatically cut a lead-in when a program is paused. If this checkbox is checked the program, can be feed held and the torch moved off path. When the program is then resumed, the torch will begin cutting from the current position. If the checkbox is unchecked, the torch will instead rapid move to the point at which the program was paused and then resume cutting. This feature is helpful to prevent gouging the part in the event that cutting has to be interrupted.

Additional Controls

Support Purge Delay

The 'Support Purge Delay' checkbox creates a parameter on the CNC screen the specify the amount of time to delay after the cut oxygen is turned off to allow the gas to purge and prevent gouging the part before moving to the next cut. If the checkbox is unchecked, the torch will not delay at the end of a cut before moving on to the next cut.



Spindle (Mill/Router) Fabrication Head Configuration

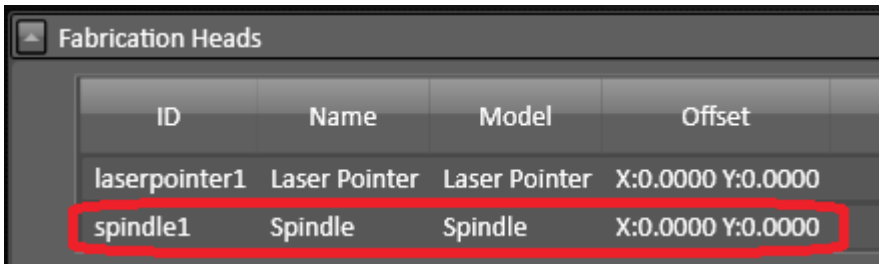
Adding/Editing Spindle Fabrication Head

To create or edit a Spindle fabrication head (or fab head), click the configuration icon in the upper right corner of the control software.

Navigate to the “Machine...Fabrication Heads” page in the configuration using the navigation tree on the left side of the configuration window.

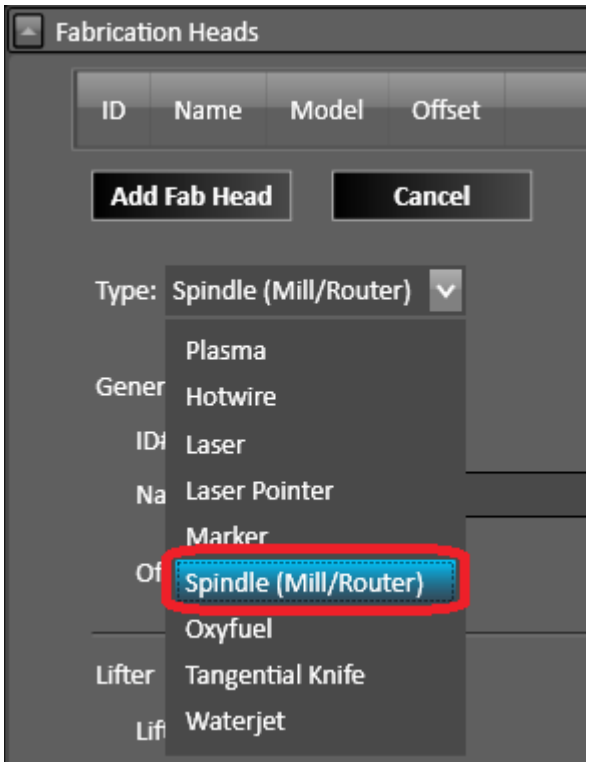
When adding a new Spindle fab head, click the ‘Add Fab Head’ button.

If editing an existing Spindle fab head, select which one to edit from the list by clicking on the name of the Spindle in the chart. This will drop down additional settings.

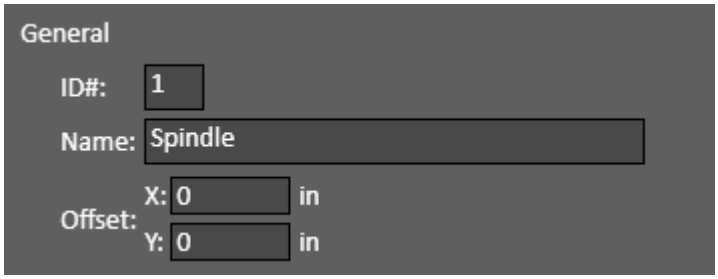


Type Configuration

The fabrication head type selects the fabrication technology. For mill or router cutting, select ‘Spindle (Mill/Router)’ from the drop-down menu



General Configuration



ID#

The ID# is automatically generated, incrementing the value for each instance of a particular fabrication head type. For example, if there are currently 3 Spindle fabrication heads configured and another is added, the ID# will be set to 4. This number is used in the program to identify which fabrication head is used for a particular process. The number can be overwritten.

Name

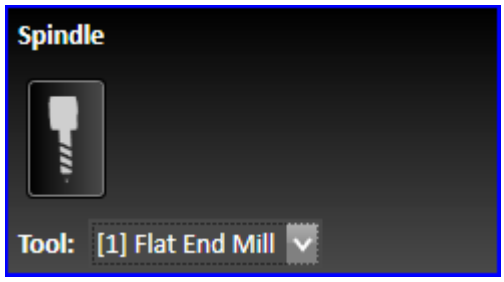
'Name' is automatically generated by the fabrication head type. This value can be overwritten if desired. The name is used on the CAM and CNC screens to identify the fabrication head.

Offset (X/Y)

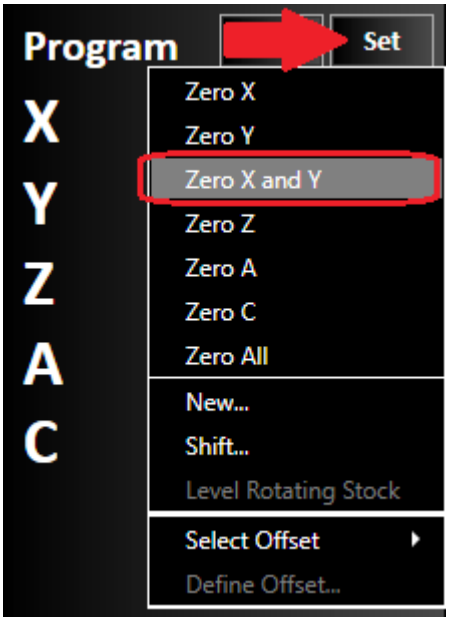
The offset is used for transitioning from one fabrication head to the next. For example, if a spindle fab head and laser pointer fab head are configured, the X and Y offset is used to shift between the spindle fabrication head and the laser pointer fabrication head.

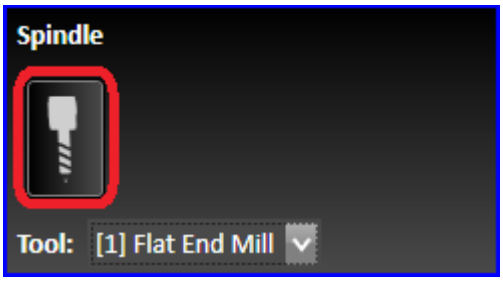
A common way to configure the offset is to have a primary fabrication head with an X,Y offset of 0,0. Other fabrication heads should have an offset from that primary fab head. In the previous example with a laser pointer and spindle fabrication heads, the spindle would be the primary fabrication head with X,Y offset of 0,0 and the laser pointer fabrication head would have an X,Y offset from the spindle fabrication head.

To determine which offset is applied, select the primary fab head on the CNC screen. A blue outline around the fab head's control panel indicates which fabrication head is active.

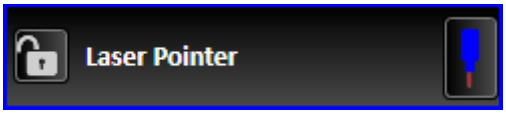


Move the active fab head into position above a scrap section of material and zero the X and Y coordinates under the 'Set' drop-down. Then, manually turn on the fabrication head and slowly lower it to mark the current position. Raise the tool and make sure that the mark is identifiable.

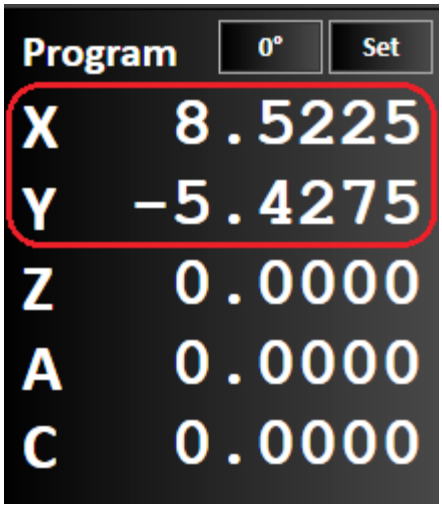


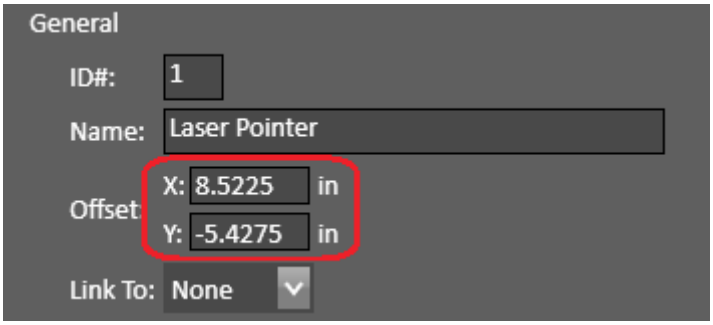


Then, select the fabrication head we are measuring the offset for (in this example, a laser pointer) and position it over the mark using the jog controls.



The currently displayed X and Y program coordinates now represent the X,Y offset for the currently selected fabrication head. Return to the configuration and fill these values in.





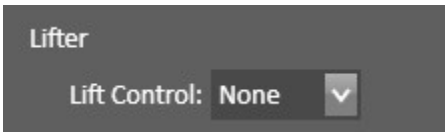
Lifter

Lift Control

The lift control will configure the type of lift control is used for the spindle.

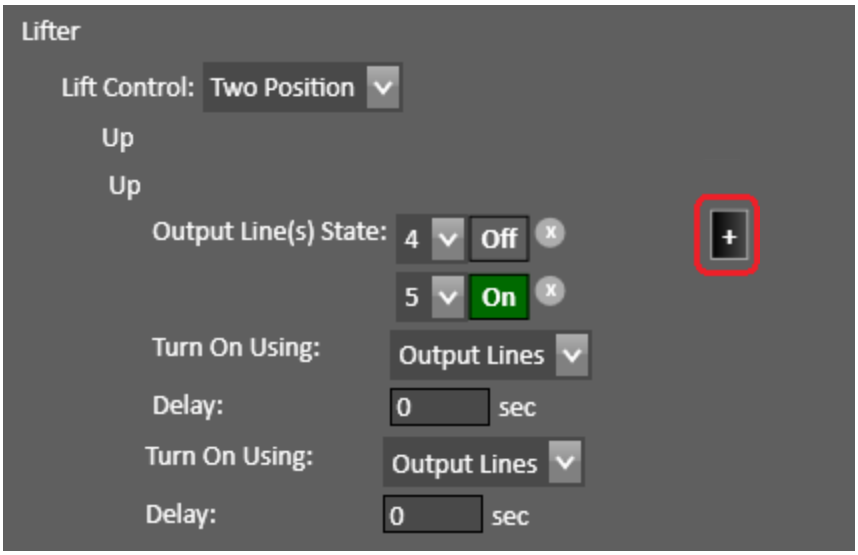
Lift Control: None

A lift control of None indicates all positioning of the lifter is done outside the control software. This could include a tool which is positioned by hand, or even a motor-driven tool that does not use the control software to position.



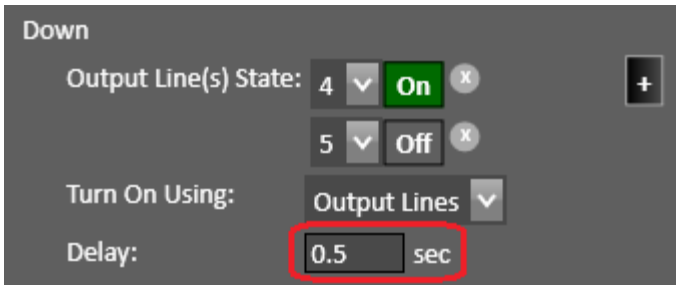
Lift Control: Two Position

A lift control of 'Two Position' describes a tool lifter that is either all the way up or all the way down. A common example of this type of lift control is a pneumatic lifter that used compressed air push the spindle all the way up or all the way down using some sort of roller system to maintain a proper cut height.

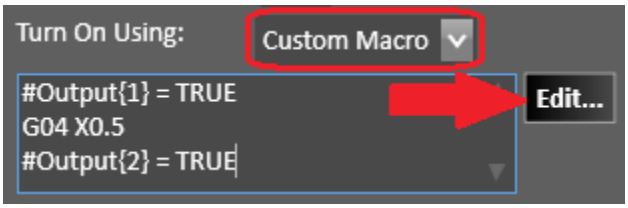


To configure the behavior, we need to describe what needs to happen to put the lifter in the Up position and what needs to happen to put the lifter in the Down position. In the example above, output line 4 is used to control the device which raises and lowers the lifter. If multiple output lines need to be changed the '+' button will add additional output lines to configure.

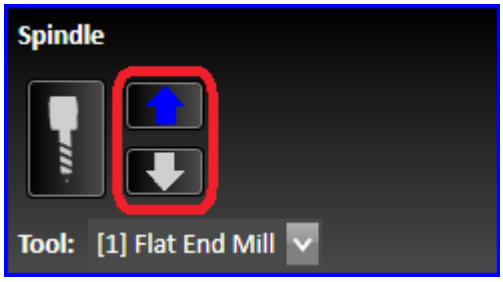
There is also an optional delay that can be applied after setting the output line state. This delay can be used to allow enough time for the lifter to reach the desired position.



If a macro—a sequence of commands—must be performed for either the up or down state, simply change the 'Turn On Using' drop down from 'Output Lines' to 'Custom Macro'. When a custom macro is specified, enter the macro by typing in the macro box or pressing the 'Edit...' button to launch a separate dialog.

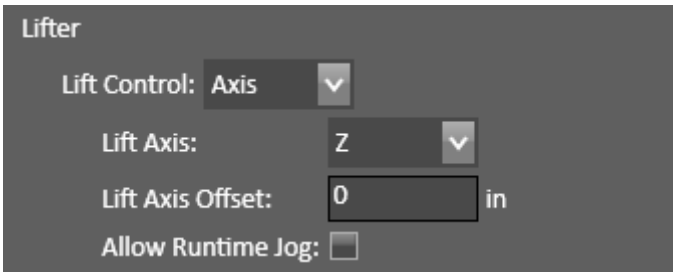


A Two Position lifter will have two buttons on the fab head's control panel on the CNC screen to manually control the position of the lifter. The lit-up arrow shows the current state.



Lift Control: Axis

A lift control of Axis describes a lifter that is precisely controlled using the control software in conjunction with the motion control. Lifters of this type utilize a stepper or servo motor and the positioning of the lifter is commanded through the control software the same as any X,Y positioning.



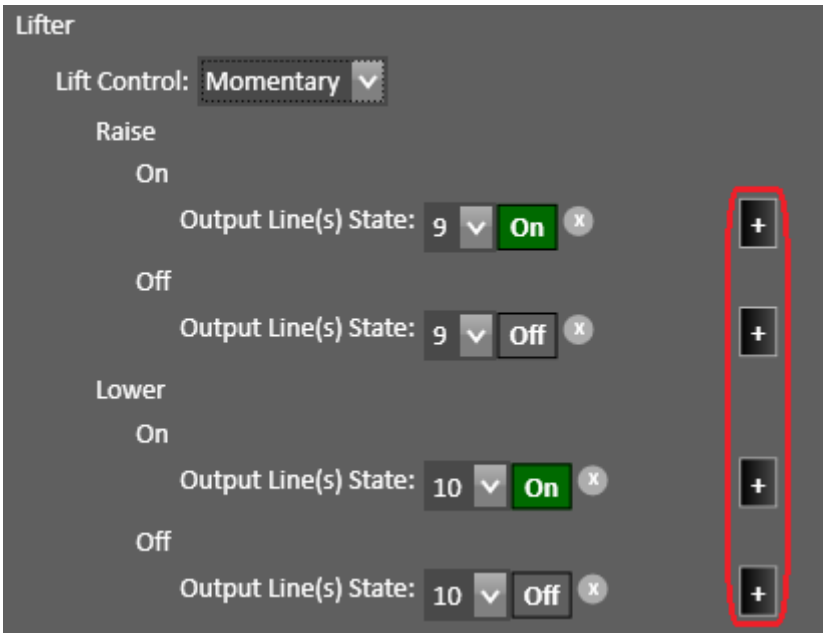
The 'Lift Axis' is the axis letter that represents the axis that will be associated with the lifter. This when this axis letter is moved using the jog controls on the CNC panel, the lifter will be moved. This letter is also used to map the mechanical definition used to ensure proper motion. Most commonly the lift axis will be assigned to Z, U, V or W.

The 'Lift Axis Offset' is an offset, similar to the X,Y offset, used to indicate the offset from one fabrication head to another fabrication head. The offset is only critical to define if multiple fabrication heads are using the same axis letter. The typical lift axis offset is 0.

The checkbox to allow runtime jog will allow the lift axis to be moved using the jog control while running a program. In order to allow runtime jog for a lift axis, there cannot be any motion commands for that axis in the program.

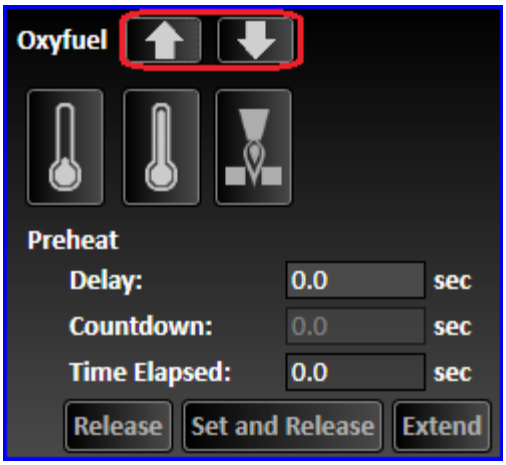
Lift Control: Momentary

A lift control of Momentary describes a lifter that is controlled (typically) by a motor. The motor is spun in one direction to go up and spun in the other direction to go down.



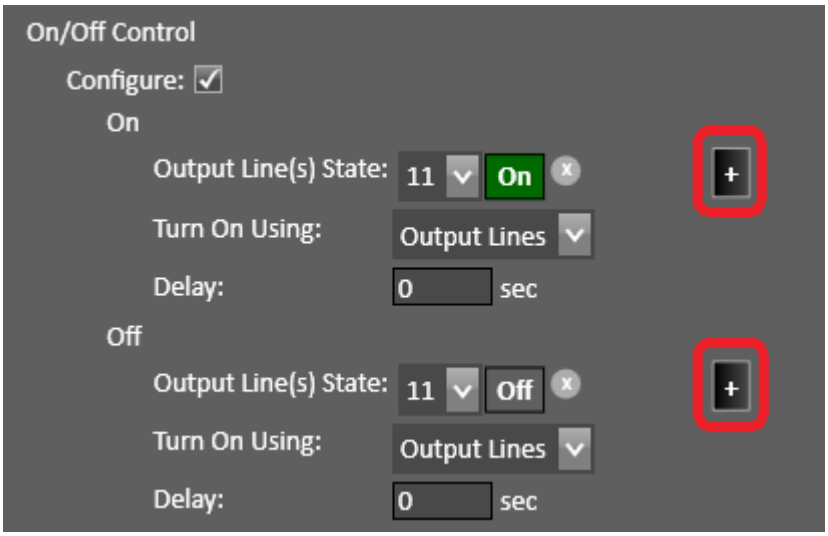
To configure the behavior, we need to describe what needs to happen when the Up button is pressed and released in addition to what needs to happen when the Down button is pressed and released. In the example above, output line 9 is turned on when the Up button is pressed and output 9 is turned off when the Up button is released. For the Down button, output 10 is turned on when the button is pressed and turned off when released. If multiple output lines need to be commanded, the '+' button will add additional output lines to configure.

A Momentary lifter will have two buttons on the CNC screen to manually control the position of the lifter.



On/Off Controls

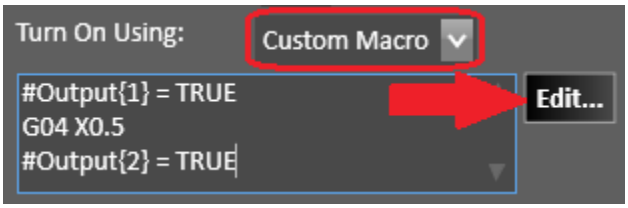
On/Off Control configuration is used to configure the behavior of cut oxygen valve. To control the cut oxygen valve through the control software, the 'Configure' checkbox should be checked. If the checkbox is unchecked, control of the cut oxygen valve is handled manually outside of the control software.



The configuration of On/Off Control provides a button on the CNC screen to be used to turn on and off the cut oxygen valve.

To configure the behavior, we need to describe what needs to happen when the Cut Oxy On button is turned on and off. In the example above, output line 11 is turned on when the Cut Oxy button is on and output 11 is off when the Cut Oxy button is off. If multiple output lines need to be changed, the '+' button will add additional output lines to configure. There is also an optional delay that can be applied after setting the output line state.

If a macro—a sequence of commands—must be performed for either the on or off state, simply change the 'Turn On Using' drop down from 'Output Lines' to 'Custom Macro'. When a custom macro is specified, enter the macro by typing in the macro box or pressing the 'Edit...' button to launch a separate dialog.



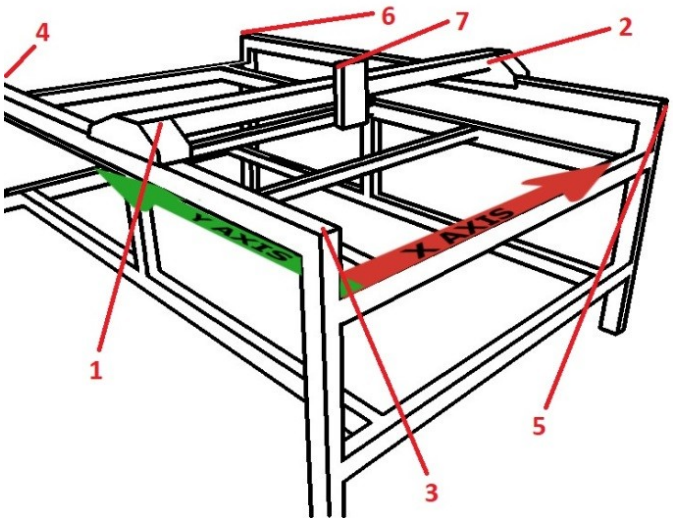
Accessory Configuration

Limits and Homing

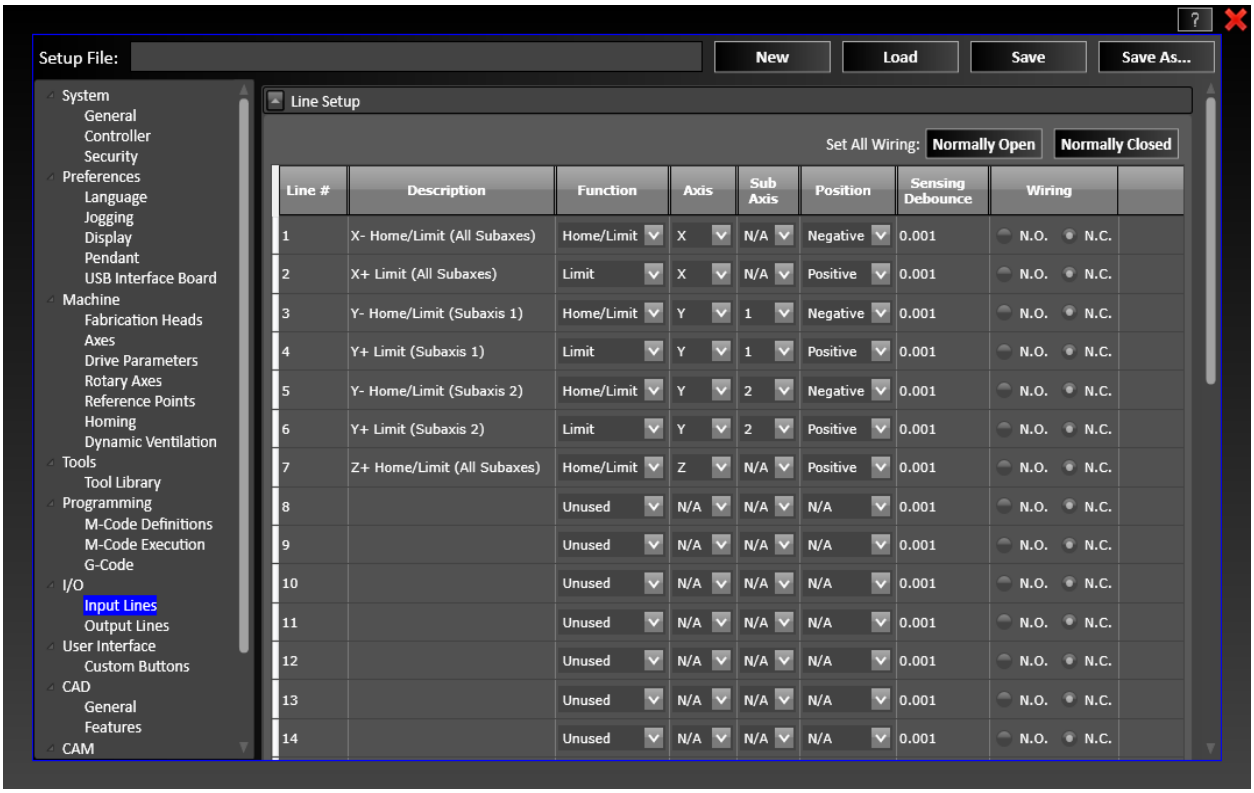
First, determine the axis and position of each switch as well as which input line it is wired to.

Configure Inputs

On the “I/O….Inputs” page, assign the axis, position, and (if applicable) sub-axis to each input in relation to each switch’s physical location and wiring. On every axis you intend to home, decide which position you will home to. Set the function of these inputs as ‘Home/Limit’. The rest should be set as ‘Limit’. See the following page for an example.



A table with switches wired to the locations shown would be configured like the following:



Set Up Homing

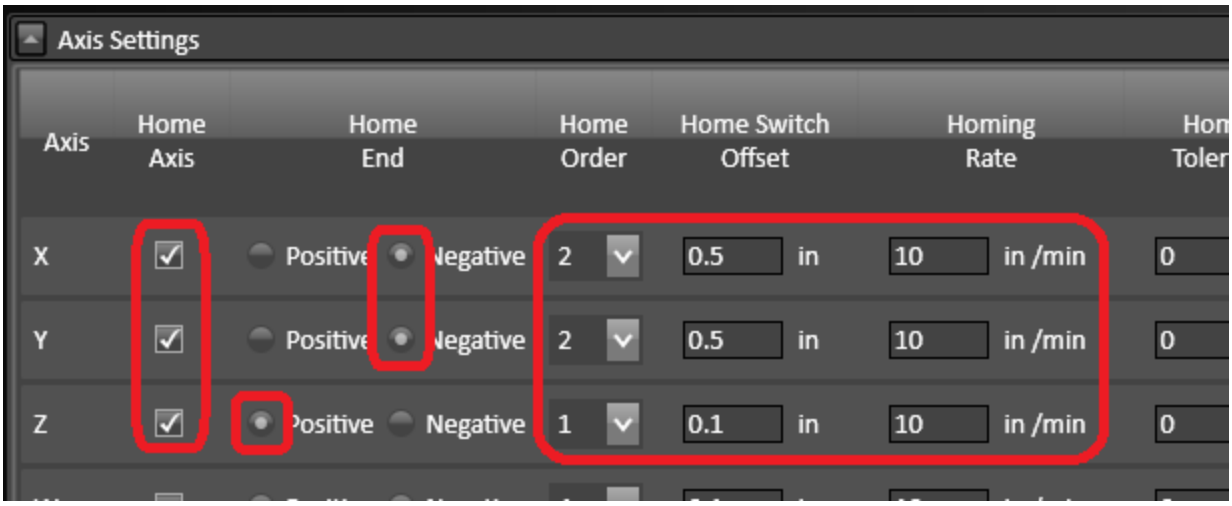
Navigate to the “Machine….Homing” page. Enable homing for each axis you’ve configured a ‘Home/Limit’ switch for. Also, ensure that the ‘Home End’ matches the position of the homing switch.

Home Order

Under this column, select the order in which you wish the axes to seek home. We recommend that this is set up in a way that prevents the machine from moving the tool through the material. Typically, this means homing the Z axis first, followed by X and Y.

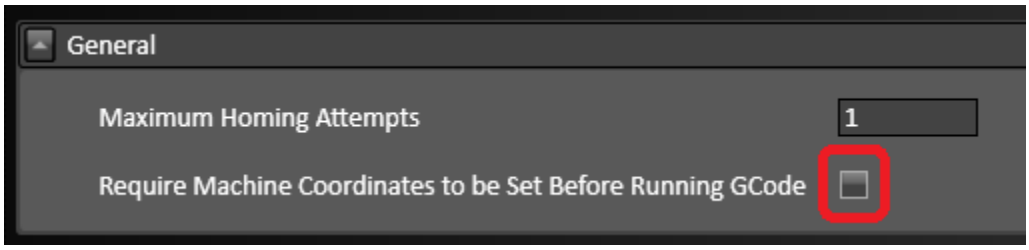
Homing Offset and Rate

The ‘Home Switch Offset’ is the distance the axis will retract after triggering the switch. This is used to create a buffer space between the machine’s maximum travel and the switch. The homing rate is the speed at which the axis will seek the switch. Although this is dependent on the characteristics of the machine, 10 ipm is usually a safe starting point. We do not recommend exceeding 25 ipm.



Require Homing

A commonly used option is ‘Require Machine Coordinates to be Set Before Running GCode”. This will force an operator to home the machine before running any program. It can be enabled at the bottom of the “Machine….Homing” page.



Safety Features

As an Input

For all systems, an emergency stop (E-Stop) can be wired as an input. This includes collision-detection systems. On the "I/O….Input Lines" page, simply set the 'Function' of the device's input as 'Safety'.

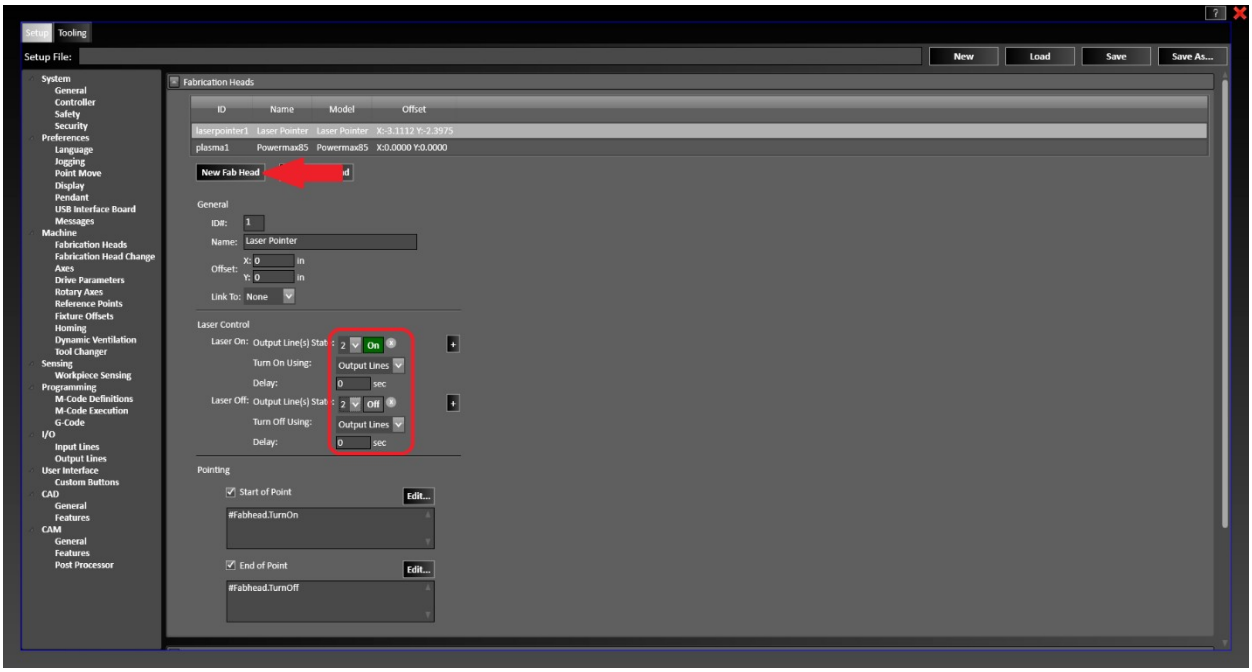
As an Accessory

For Pro Series controllers equipped with a 10-pin Accessory port, an E-Stop can be installed without the use of an input. This should be a normally closed circuit across pins 1 and 2 on that connector. If the system contains a servo power board, make sure switch 6 on the board is in the 'On' position. If it instead uses the stepper power board, jumper JP102 should be removed. Additionally, systems containing a servo power board can be set to wait for a reset signal after being E-Stopped. This reset switch should be a normally open, momentary switch wired to pins 9 and 10. Switch 1 on the power board must be in the 'On' position to enable this function.

Laser Pointer

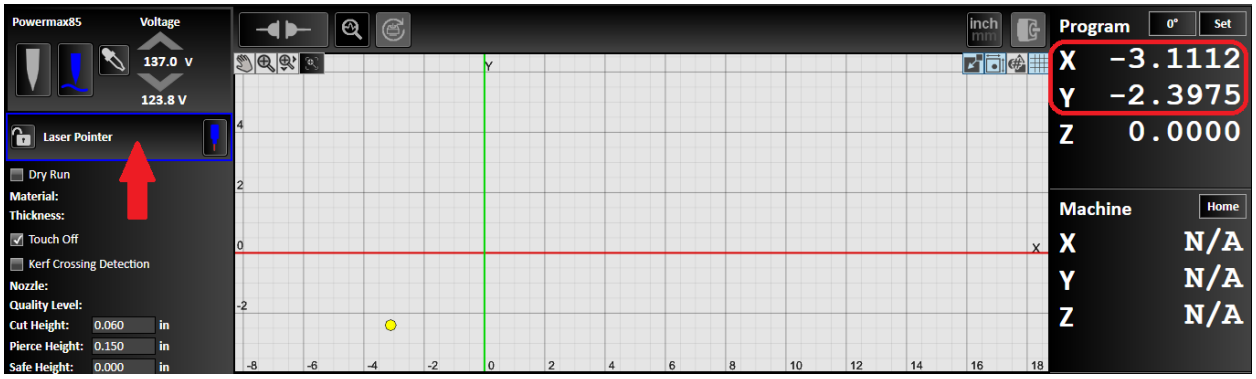
Creating a Fabrication Head

On the “Machine….Fabrication Heads” page in the configuration, click ‘New Fab Head’. Then, select Laser Pointer as the type. Next, enter the On/Off control (output 2 by default). Once complete, click ‘Add Fab Head’ to finalize.

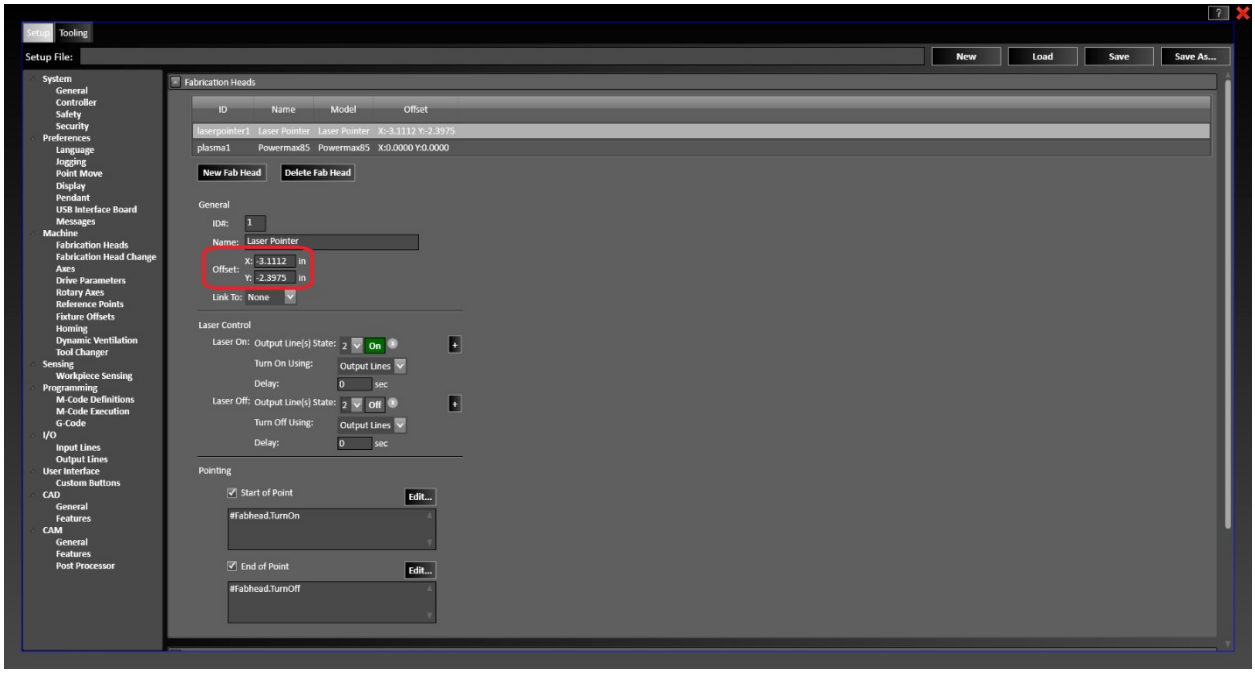


Determine the Offset

Next, find the distance between the primary tool and the laser pointer. The easiest way to make this measurement is to use the software's coordinate readout. First, load the smallest tool available into the machine. Put a piece of scrap material in the work area and jog the primary tool into position above it. Zero the X and Y coordinates and then make a mark or cut in the scrap at this position. Now, turn on the laser pointer and move it to the cut.



Return to the "Machine….Fabrication Heads" page in the configuration and click on the Laser Pointer tool to edit its parameters. Enter the current position in 'Offset' and save the configuration. You then should see the DRO return to X and Y zero.



Dual-Channel Relay

On/Off M-Codes

First, navigate to the "Programming….M-Code Definitions" page in the configuration. Create an Output Line M-Code by clicking the 'Add M-Code' button. Assign an M-Code number to the function and give it an appropriate description. Then, click the Plus button at the end of the line to add an output line control. Use the created dropdown to select the output that the device is controlled by and set whether the M-Code should enable or disable the selected output.

For one, two, or three relay boxes, the output lines are wired by default as:

Box # and Channel	Output
1-A	2
1-B	3
2-A	4
2-B	5
3-A	6
3-B	7

When four relays are connected, the default wiring becomes:

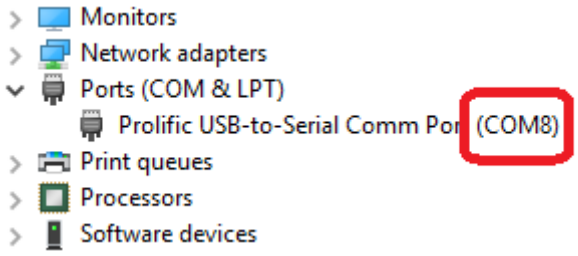
Box # and Channel	Output
1-A	1
1-B	2
2-A	3
2-B	4
3-A	5
3-B	6
4-A	7
4-B	8

Servo Communications

To interface with the drives in a Pro series servo controller, you will need to use the ServoWare software and a USB to serial adapter connected to the DB-9 COM port on the rear of the controller. In a Titanium series, this software and the adapter are preinstalled.

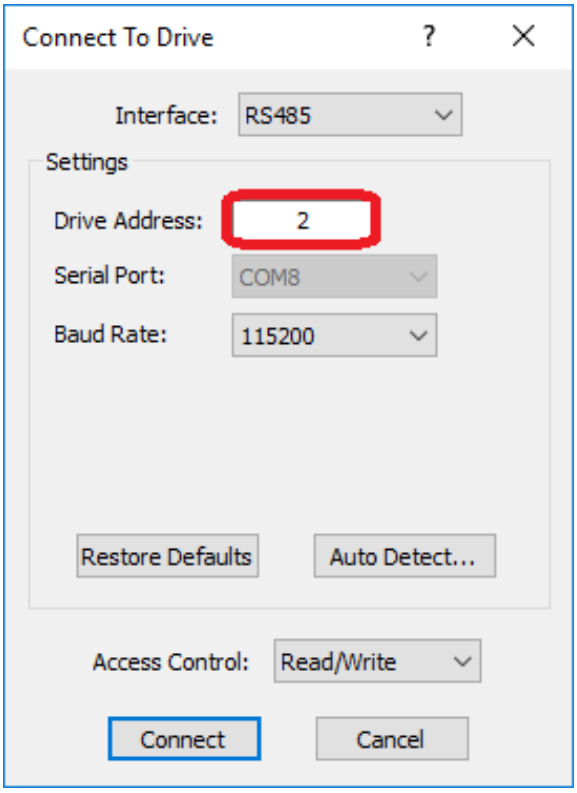
COM Port

To identify the correct port to use, open the Windows Device Manager and expand the 'Ports (COM & LPT)' category. Identify the device and make a note of its COM port.



Connecting to Drives

To interact with a drive, open the ServoWare software and click the 'Connect' button. This will display the 'Connect To Drive' screen. Here, select the COM port you found earlier from the 'Serial Port' dropdown. Then, enter the 'Drive Address'. Addresses correspond to the axis:



Axis #	Address
1	2
2	4
3	5
4	16
5	18

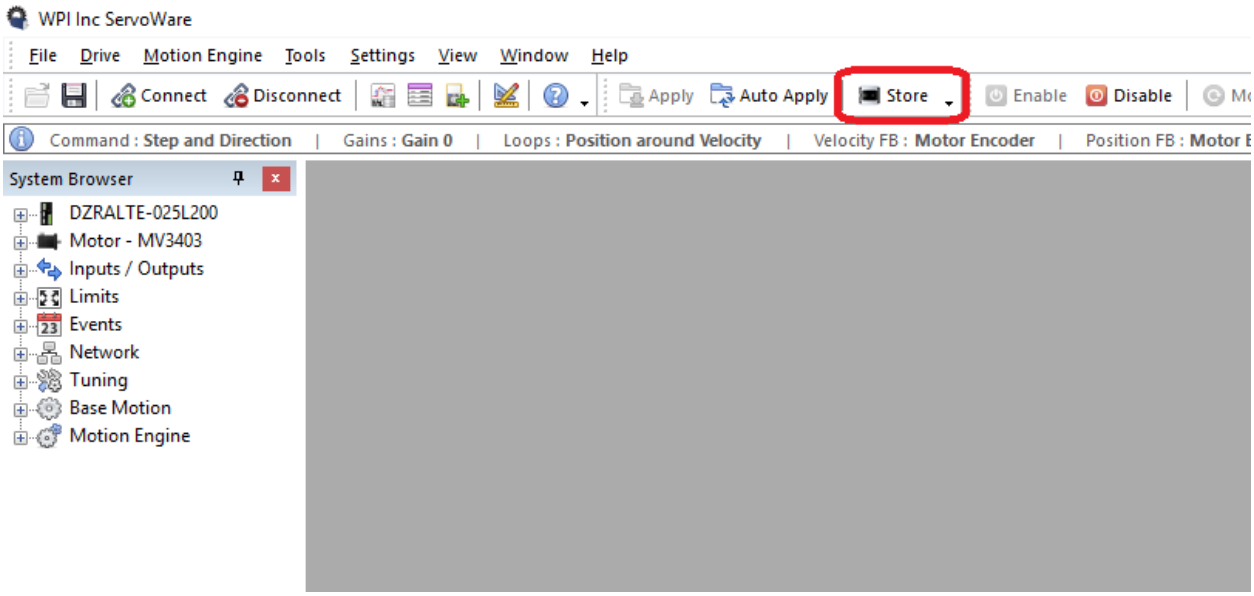
Default Tuning

Preset tuning files for each motor can be found (by default) in:

C:\Users\Public\Documents\ServoWare 7.4\My Projects\Sample Projects

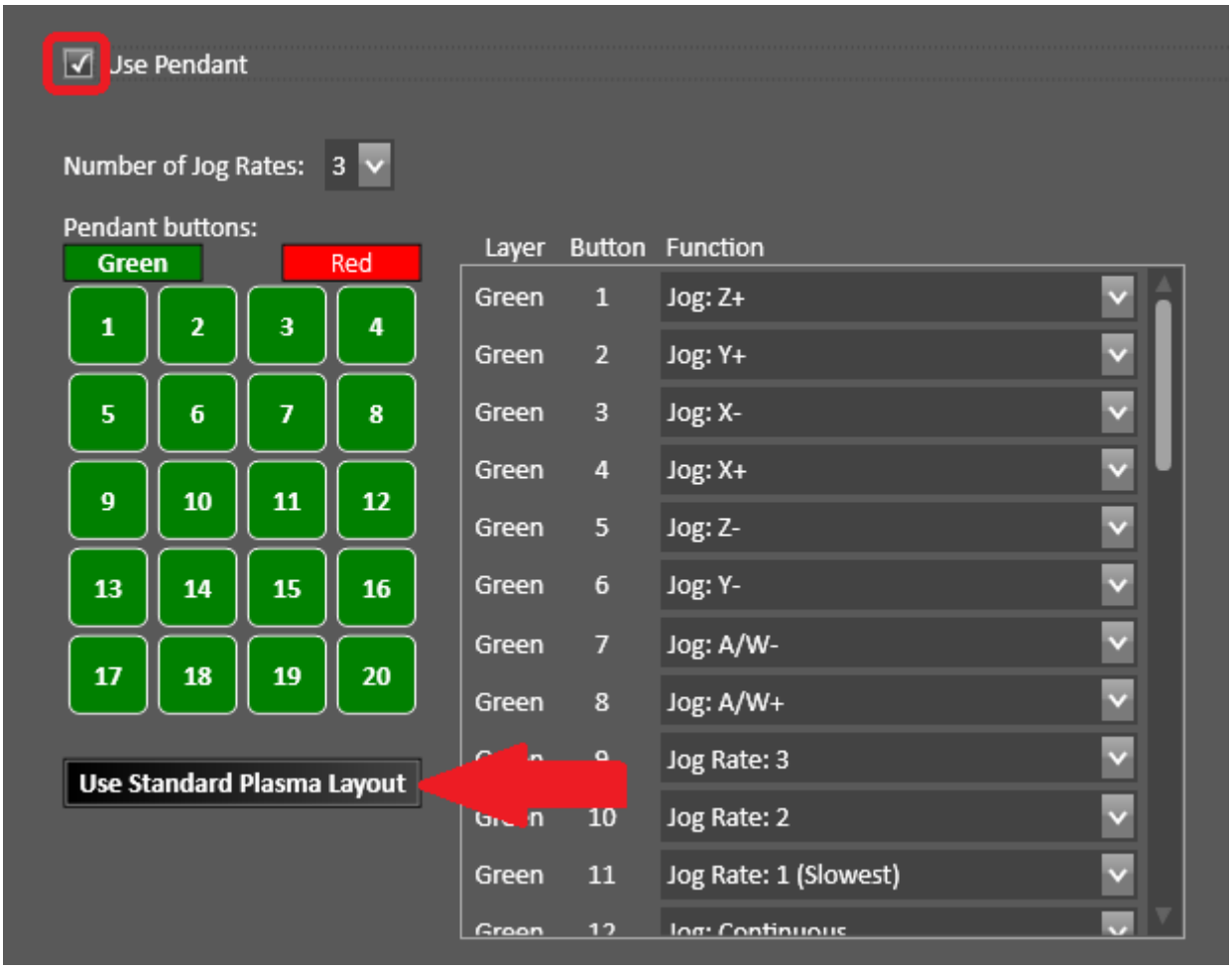
Saving Changes

To save changes to the drive's memory, click the 'Store' button.



Control Pendant

To set up the pendant, open the configuration to “Preferences….Pendant”. Here, you can enable use of the pendant and assign functions to each of the keys. Click the ‘Use Standard Plasma Layout’ button to load the default function set. These can be changed using the dropdowns at the right.



Plasma Communications

COM Port

To identify the correct port to use, open the Windows Device Manager and expand the 'Ports (COM & LPT)' category. Identify the device and make a note of its COM port.

Port Assignment

Open the "Machine…Fabrication Heads" page and click on the fabrication head to edit settings. Change the 'Communications' from 'None' to 'RS-232/RS-485'. Then, using the dropdown, select the COM port identified previously.