MACHMOTION

Pipe Coping

Operations Manual

2/4/2013

Everything you need to know to operate your pipe coping machine.

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1 Overview

This manual covers everything from turning on your control to creating and running programs on your fully automatic pipe coping machine.

1.1 Machine

The coping machine has the following four axes: X axis, Y axis, A axis, and B axis. Use the pictures below to identify the different axes.

Figure 1 Machine Axes

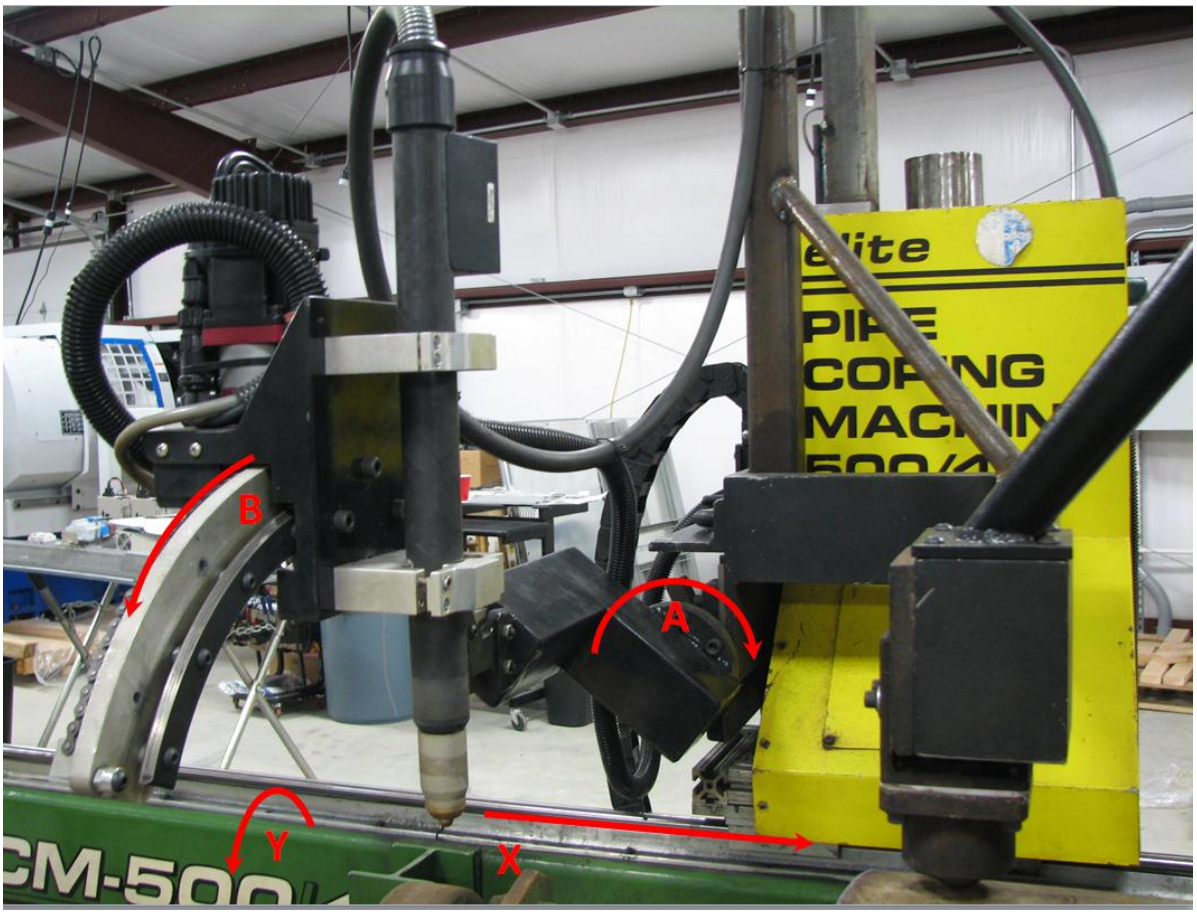

Figure 2 Machine Axes Close Up

1.2 CNC Control

The CNC control is mounted near the chuck on your pipe coping machine. The control is running Windows 7.

Figure 3 CNC Control

1.3 Control Operator Panel

On the right side of your control there is an operator panel with a cycle start, stop, and emergency stop button. See the picture below.

Figure 4 Control Operator Panel

****

Emergency Stop

In case of an emergency, press the large red Emergency Stop button on the operator panel. All motion will stop immediately.

DO NOT PRESS STOP!

****

1.4 Carriage Operator Panel

Mounted on the X axis carriage is another panel with jog buttons, selector knobs, and a few control buttons. See the picture below.

Figure 5 Carriage Operator Panel

2 Turning on the CNC Control

Locate the keys that came with your machine.

Figure 6 Keys

Place one key into the keyhole at the back right hand side of the control as pictured below. Turn on your computer by rotating the key and then quickly releasing it.

Figure 7 PC Start

Windows should start up.

3 Starting the Mach3 Software

After the control is completely up, double click on the Plasma icon on the desktop.

Figure 8 Profiles

A window will come up asking you to agree to its legal notice.

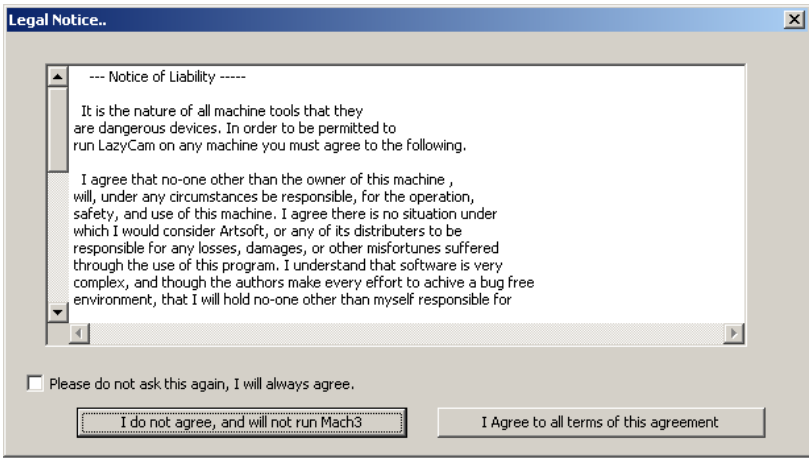

Figure 9 Legal Notice

Read the legal notice and click on the check box "*Please do not ask this again, I will always agree.*" Then press **I agree to all terms of this agreement**.

Next you will see Mach3 loading.

Figure 10 Mach3 Software

When Mach3 is up, you will see the following screen:

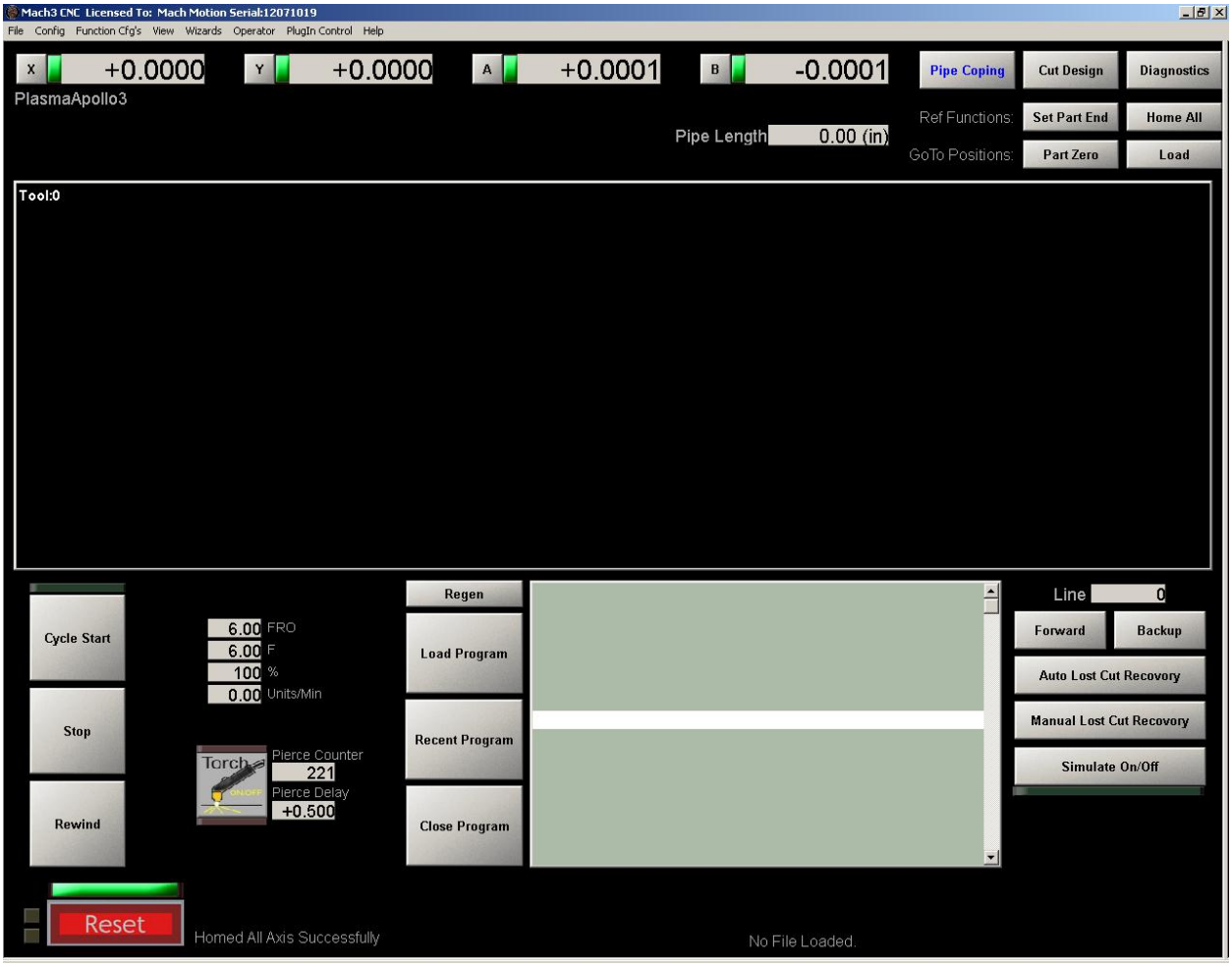

Figure 11 Plasma

Make sure to click **Reset** before continuing.

Figure 12 RESET

After pressing **Reset**, a warning message will appear asking you to home the machine.

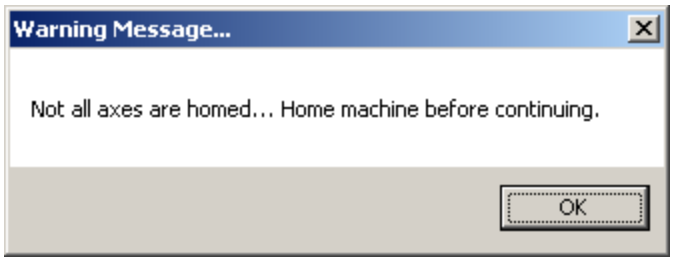

Figure 13 Home Machine Warning

4 Homing

Before doing anything on the machine, you should always start out by pressing the **Home All** button on the top right side. This makes the carriage move up and the A and B axes reference off of their respective home switches. After touching off of the home switches, the axes will move to part zero and the carriage will move back down. The X and Y axes do not need to be referenced by a switch, so their position is set to zero after the homing routine is complete.

Figure 14 Reference All Button

The machine will need to be homed every time Mach3 is restarted. It is possible to know if the machine needs to be homed by simply looking near the axes' DROs. If the LED associated with an axis is red, then the axis is not homed. If it is green, then it is homed.

Figure 15 - Machine Position after Being Homed

5 Jogging

You can use the jog buttons on the carriage operator panel to move your axes manually. Use the Axis Selector to switch between which axis you want to jog. If the Axis Selector is in the off position, the jog buttons are disabled.

Figure 16 Jog Buttons and Axis Selector

To change the jogging speed or the jog increments adjust the Jog Selector. The selections labeled **Step Jog** allow you to jog a predefined step or increment each time a jog key is pressed. You can jog 1 or 0.0001 of an inch or degree at a time by selecting X1 and X.0001 respectively. See Figure 17 below.

Figure 17 Jog Selector

If you want to jog continuously (or as long as you hold the jog buttons down) rather than incrementally, turn the Jog Selector over into the **Continuous Jog** section. You can jog your machine at the full jog rate (100%) or slow it down to 2%.

You can also raise and lower the carriage using the toggle switch on the right side of the carriage operator panel.

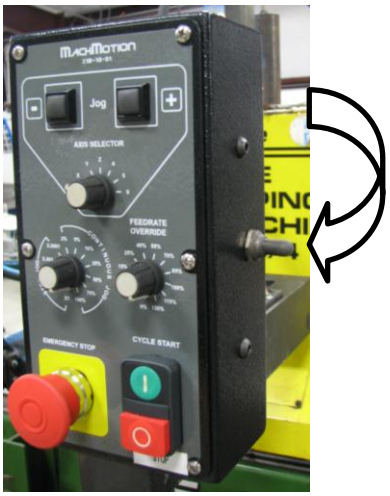

Figure 18 Carriage Operator Panel Toggle Switch

6 Loading & Closing Programs

To load an existing program you can press either **Load Program** or **Recent Program** located near the bottom left of the screen. To close a program, press **Close Program**.

Figure 19 Load and Close Buttons

Load Program opens up a browse window for you to locate your program. After locating your program, press **Open** and your program will load.

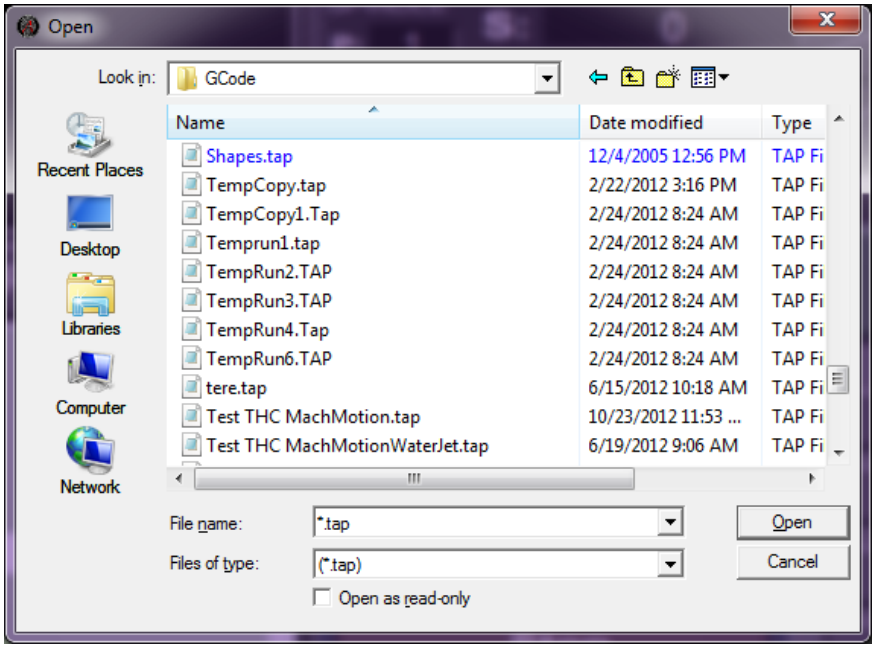

Figure 20 Open Program

Note: If you do not see the program you are looking for, set Files of type to All Files.

Recent Program displays a list of all the recently opened programs. Select the program you want to load and press **OK**.

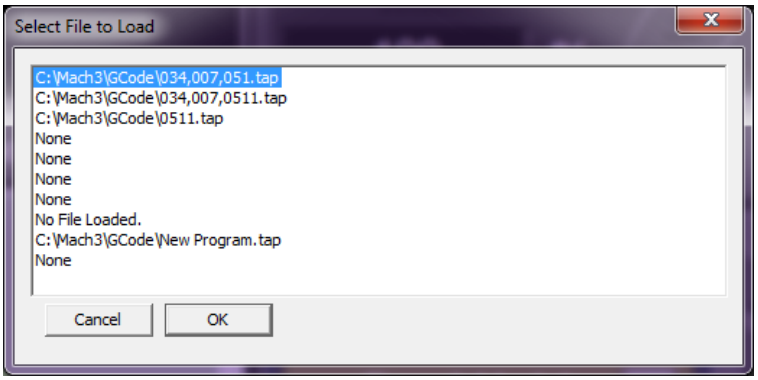

Figure 21 Recent Program

After a program is loaded you can see it in the *Program Display Window* shown below.

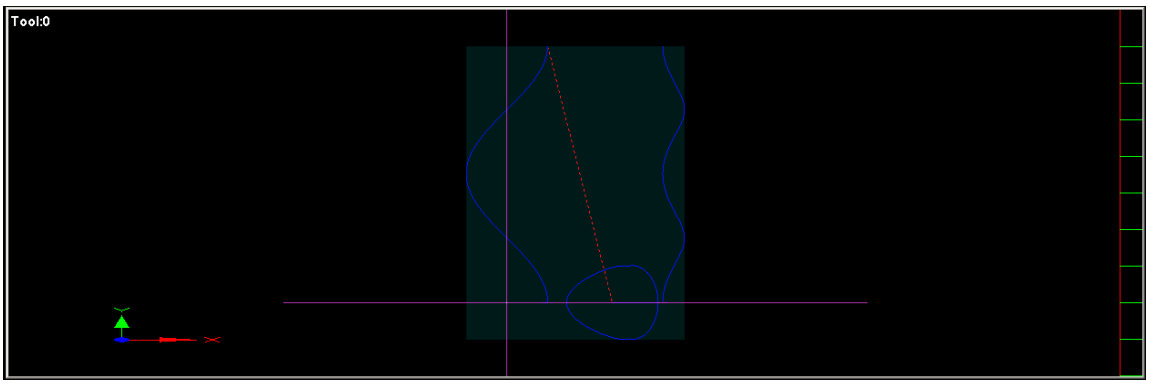

Figure 22 Program Display Window

7 Creating Programs

Programs can be created at any time directly in the pipe coping software. Click on the **Cut Design** button on the top right side to create a new program.

Figure 23 Cut Design Button

You will see the following screen:

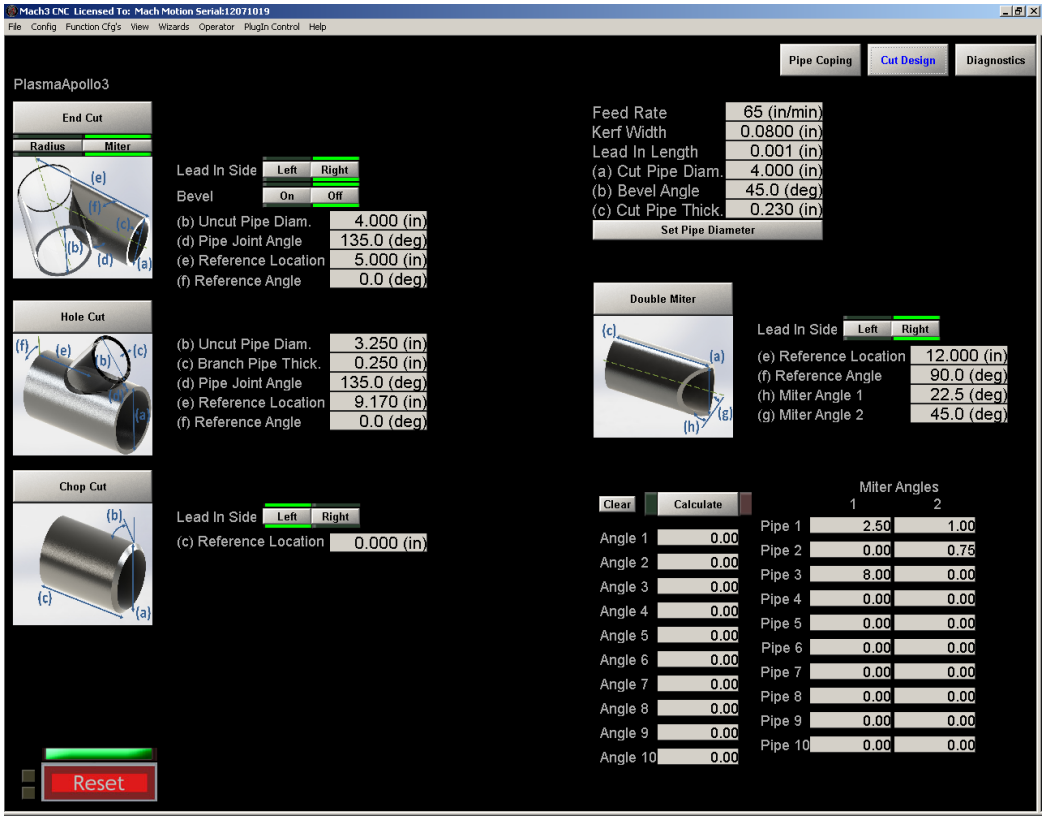

Figure 24 Cut Design Screen

Your pipe coping machine can make the following four types of cuts: end cut, hole cut, chop cut, and double miter. Before adding any cuts to your program, you must set up some general parameters.

7.1 General Parameters

The following general parameters must be set up before creating a program. Use Figure 25 below as a reference.

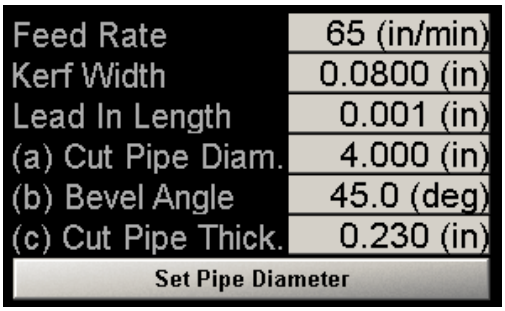

Figure 25 General Parameters

7.1.1 Feed Rate

Feed Rate is the speed that the machine will cut in inches per minute. It can be changed each time you add a new cut to your program. The maximum *Feed Rate* is 200 in/min.

7.1.2 Kerf Width

Kerf Width is the width of the plasma cutter in inches. It depends on your amperage and the material you are cutting. Consult the plasma torch manual for more information.

7.1.3 Lead in Length

Lead in Length is the distance in inches from where the torch will pierce to the start of the programmed cut. If this is set to zero, the torch will pierce directly over the cut. The direction of the lead in can be changed when you actually create the program (See 7.2 Cut Parameters).

7.1.4 Cut Pipe Diam (a)

Cut Pipe Diam refers to the cut pipe diameter in inches. Depending on the cut you are doing, it may need to be larger or smaller than the uncut pipe. On all figures the cut pipe diameter is labeled (a).

7.1.5 Bevel Angle (b)

Bevel Angle is the angle in degrees of the cut on the cut pipe. For a straight cut, the *Bevel Angle* should be set to 0 degrees. An angle larger than 0 degrees will cut a bevel pointing out towards the end of the pipe. For example, a 45 degree angle will cut a 45 degree bevel pointing out towards the end of the pipe and a -45 degree angle will cut a -45 degree bevel pointing inside the pipe. The *Bevel Angle* cannot be greater than +-45 degrees. On all figures the *Bevel Angle* is labeled (b).

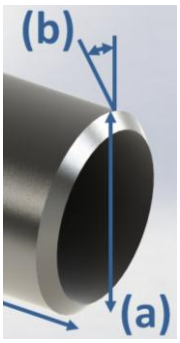

Figure 26 Bevel Angle

7.1.6 Cut Pipe Thick (c)

Cut Pipe Thick refers to the cut pipe thickness in inches. On all figures the *Cut Pipe Thick* is labeled (c).

After entering in all the general parameters, press the **Set Pipe Diameter** to configure the coping software with the correct settings.

7.2 Cut Parameters

Now with the general parameters configured, it is time to choose which of the four types of cuts you want to make. Note that all angles and distances are based off of vector measurements (See 7.4 Vector Measurements).

7.2.1 End Cut

End Cut is used to cut a pipe completely off. It has two modes, miter or radius. A miter cut is used for joining a pipe to a flat surface and a radius cut is used for joining a pipe to another pipe. Select which option you want as shown in Figure 27.

Figure 27 Radius or Miter Cut

Now enter in all the parameters for the end cut shown in Figure 28. Use the parameter descriptions below for more information. View Figure 31 on page 20 to see a figure with all of the different parameters.

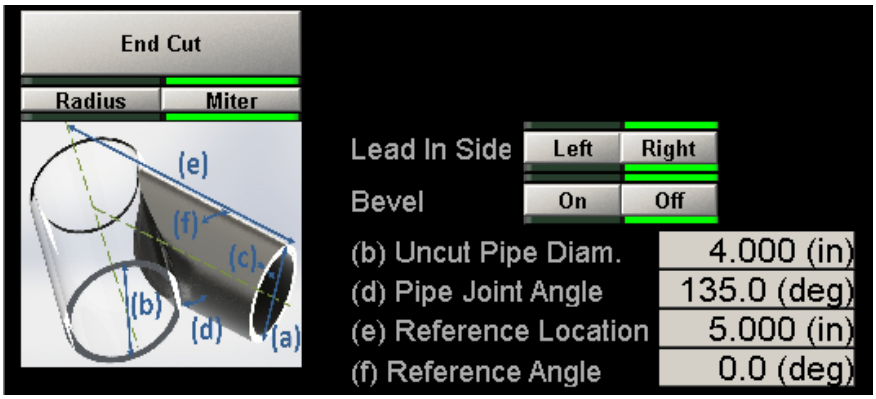

Figure 28 End Cut Parameters

7.2.1.1 Lead in Side

Lead in Side is the direction that the *Lead in Length* will be applied. If you are facing the CNC control, *Left* is towards the end of the pipe and *Right* is towards chuck. Change the *Lead in Side* according to which end of the pipe you want to keep. For example, if you want to cut off the end of a pipe and keep the pipe still in the chuck, select *Right*.

Figure 29 Lead in Side

7.2.1.2 Bevel

You can turn the *Bevel* on or off. The bevel cuts the pipe at an angle to allow space for welding. With *Bevel* off the cut will follow the surface it is mounting to so there is no gap. See the 7.1.5 Bevel Angle (b) on page 17 for more information.

Figure 30 Bevel On/Off

7.2.1.3 Uncut Pipe Diameter (b)

Uncut Pipe Diameter is the diameter in inches of the pipe that the cut pipe will mount on. This is the clear pipe shown in Figure 31 (distance b). If you select a miter cut, this value is ignored.

7.2.1.4 Pipe Join Angle (d)

Pipe Join Angle is the angle between the uncut pipe and the cut pipe, or, if you have selected a miter cut, it is the angle between the cut pipe and a flat surface. At 90 degrees the cut pipe will be perpendicular to the uncut pipe. An angle larger than 90 degrees will point out towards the end of the cut pipe (away from the chuck). For example, a 135 degree *Pipe Join Angle* will create a 45 degree angle pointing towards the end of the cut pipe. A 45 degree *Pipe Join Angle* will create a 45 degree angle pointing towards the chuck.

7.2.1.5 Reference Location (e)

Reference Location is the distance in inches on the X axis from the end of the pipe (or the position set by pressing **Set Part End** before running a program). It is basically the placement of the cut on the X axis. Remember that this value is based off of vector measurements (See 7.4 Vector Measurements).

7.2.1.6 Reference Angle (f)

Reference Angle is the rotation of the cut pipe (the Y axis). Before running a program the angle is zeroed by pressing **Set Part End**. All angles are referenced from this initial zero. For example, a 180 degree *Reference Angle* will place the cut on the opposite side of the pipe from where the program started.

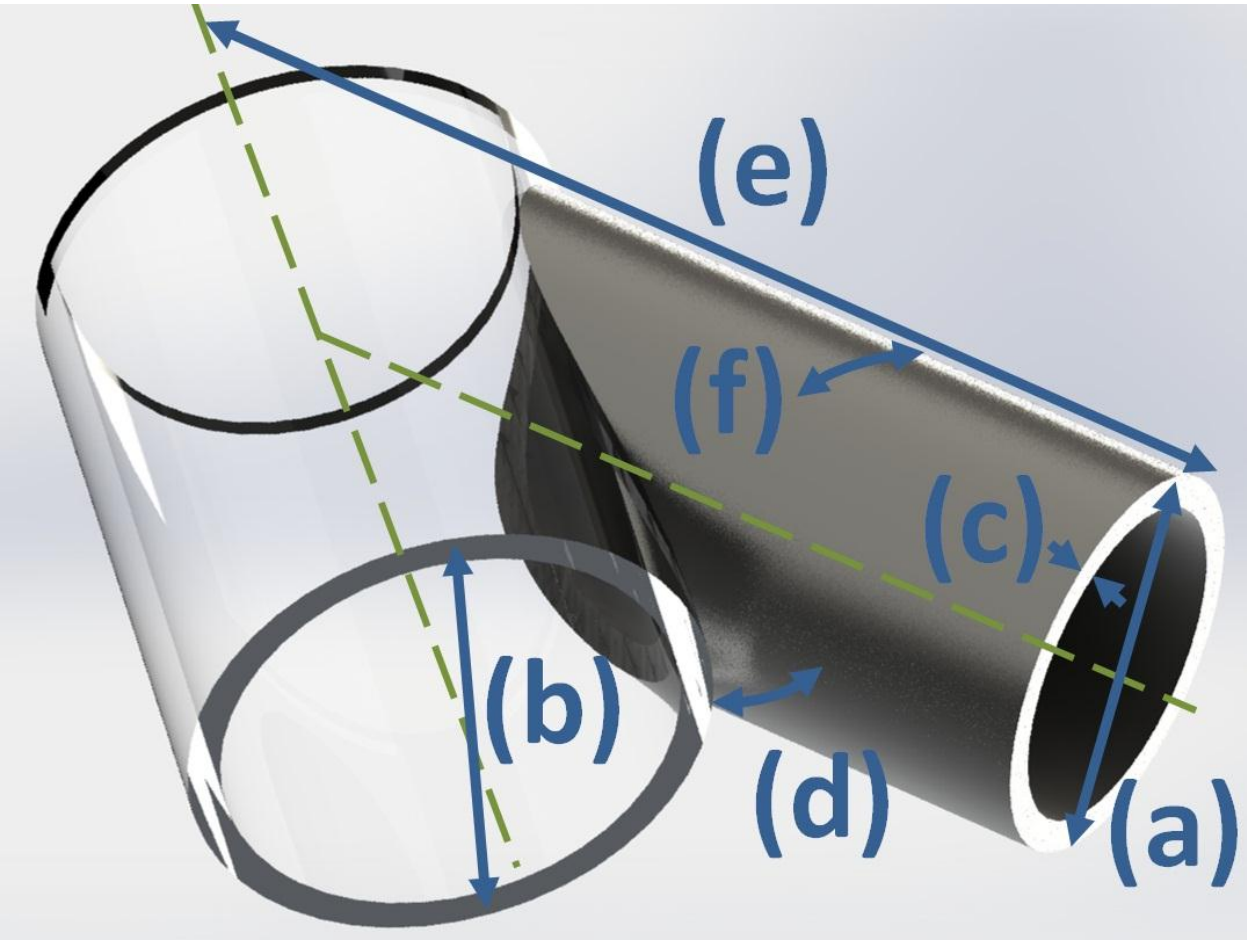

Figure 31 End Cut (Radius)

7.2.2 Hole Cut

Hole Cut is used to cut a hole in a pipe. It is used for joining two pipes together at any angle. Enter in all the parameters for the *Hole Cut* shown in Figure 32. Use the parameter descriptions below for more information. View Figure 33 on page 22 to see a figure with all of the different parameters.

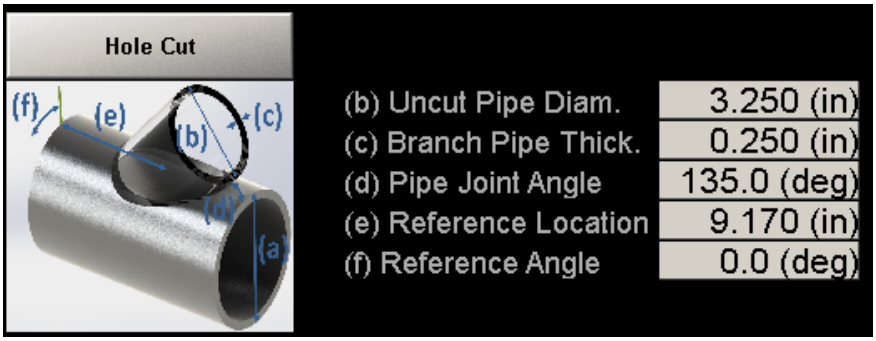

Figure 32 Hole Cut Parameters

7.2.2.1 Uncut Pipe Diameter (b)

Uncut Pipe Diameter is the diameter in inches of the pipe that will go through the hole of the cut pipe. This is the clear pipe shown in Figure 33.

7.2.2.2 Branch Pipe Thickness (c)

The *Branch Pipe Thickness* is the thickness of the uncut pipe.

7.2.2.3 Pipe Join Angle (d)

Pipe Join Angle is the angle between the uncut pipe and the cut pipe. At 90 degrees the cut pipe will be perpendicular to the uncut pipe. Any angle larger than 90 degrees will point out towards the end of the cut pipe (away from the chuck). For example, a 135 degree *Pipe Join Angle* will create a 45 degree angle pointing towards the end of the cut pipe. A 45 degree *Pipe Join Angle* will create a 45 degree angle pointing towards the chuck.

7.2.2.4 Reference Location (e)

Reference Location is the distance in inches on the X axis from the end of the pipe (or the position set by pressing **Set Part End** before running a program). It is basically the placement of the cut on the X axis. Remember that this value is based off of vector measurements (See 7.4 Vector Measurements).

7.2.2.5 Reference Angle (f)

Reference Angle is the rotation of the cut pipe (the Y axis). Before running a program the angle is zeroed by pressing **Set Part End**. All angles are referenced from this initial zero. For example, a 180 degree *Reference Angle* will place the cut on the opposite side of the pipe from where the program started.

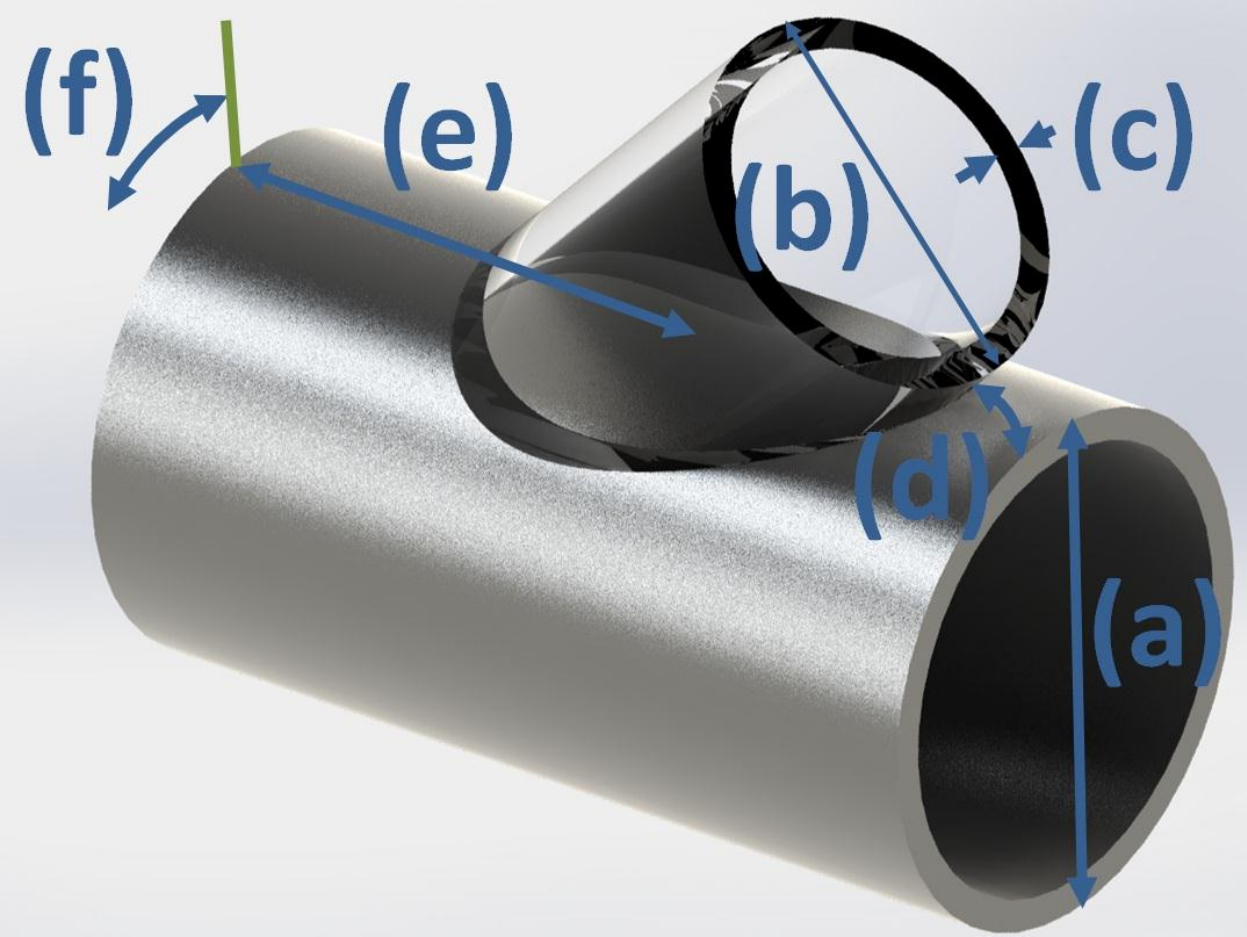

Figure 33 Hole Cut

7.2.3 Chop Cut

Chop Cut is used only for cutting a pipe directly off. Enter in the parameters for the *Chop Cut* shown in Figure 34. Use the parameter descriptions below for more information.

Figure 34 Chop Cut Parameters

7.2.3.1 Lead in Side

Lead in Side is the direction that the *Lead in Length* will be applied. If you are facing the CNC control, *Left* is towards the end of the pipe and *Right* is towards chuck. Change the *Lead in Side* according to which

end of the pipe you want to keep. For example, if you want to cut off the end of a pipe and keep the pipe still in the chuck, select *Right*.

Figure 35 Lead in Side

7.2.3.2 Reference Location

Reference Location is the distance in inches on the X axis from the end of the pipe (or the position set by pressing **Set Part End** before running a program). It is basically the placement of the cut on the X axis. Remember that this value is based off of vector measurements (See 7.4 Vector Measurements).

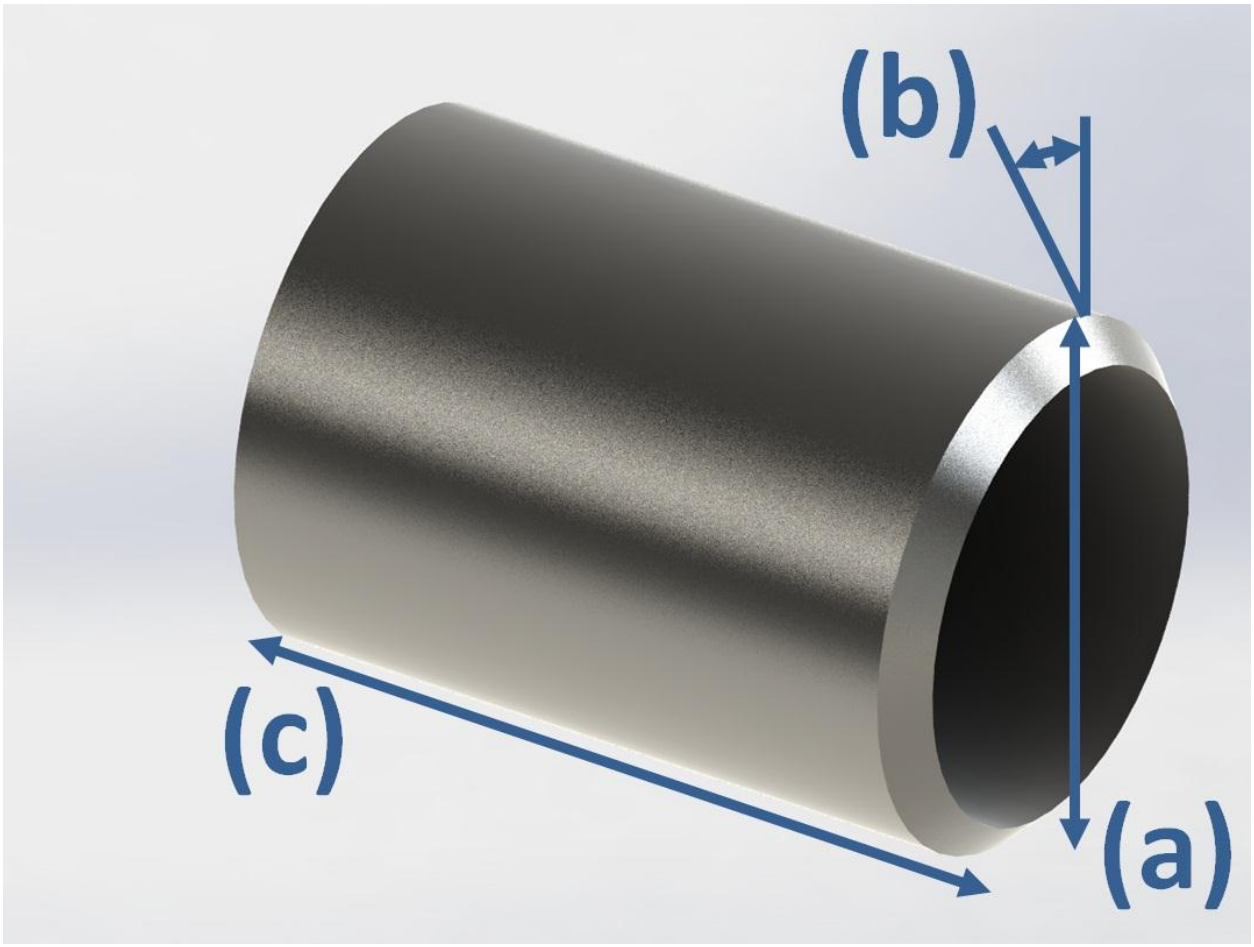

Figure 36 Chop Cut

7.2.4 Double Miter

Double Miter is used to join multiple pipes together. It makes two straight cuts through a pipe. Each cut is referenced to the center and is dependent on the miter angle. Enter in all the parameters for the *Double Miter* shown in Figure 37. Use the parameter descriptions below for more information. View Figure 40 on page 26 to see a figure with all of the different parameters.

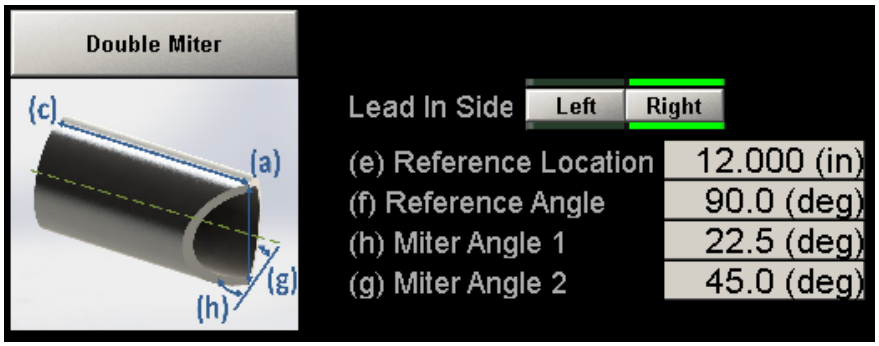

Figure 37 Double Miter

7.2.4.1 Lead in Side

Lead in Side is the direction that the *Lead in Length* will be applied. If you are facing the CNC control, *Left* is towards the end of the pipe and *Right* is towards chuck. Change the *Lead in Side* according to which end of the pipe you want to keep. For example, if you want to cut off the end of a pipe and keep the pipe still in the chuck, select *Right*.

Figure 38 Lead in Side

7.2.4.2 Reference Location (e)

Reference Location is the distance in inches on the X axis from the end of the pipe (or the position set by pressing **Set Part End** before running a program). It is basically the placement of the cut on the X axis. Remember that this value is based off of vector measurements (See 7.4 Vector Measurements).

7.2.4.3 Reference Angle (f)

Reference Angle is the rotation of the cut pipe (the Y axis). Before running a program the angle is zeroed by pressing **Set Part End**. All angles are referenced from this initial zero. For example, a 180 degree *Reference Angle* will place the cut on the opposite side of the pipe from where the program started.

7.2.4.4 Miter Angle 1 (h)

Miter Angle 1 is the angle of the miter facing the back of the machine. It is referenced from the center of the cut pipe. For example, 0 degrees would be a straight cut and 45 degrees would be a cut as shown in (h) in Figure 40.

7.2.4.5 Miter Angle 2 (g)

Miter Angle 2 is the angle of the miter facing the control. It is referenced from the center of the cut pipe. For example, 0 degrees would be a straight cut and 35 degrees would be a cut as shown in (g) in Figure 40.

7.2.4.6 Double Miter Calculator

The coping software also provides a calculator to determine the angles for the miter cut. You must be joining at least three pipes together to use the calculator. The column on the left with *Angle 1, Angle 2, Angle 3*, etc. is for the angles between the pipes you are joining together. If you have four pipes to join together, as shown in Figure 39, you will need to enter in four angles. The angles must add up to 360 degrees.

Press **Clear** to begin. Enter in the angles between the different pipes. Then press **Calculate**. If no errors appear and the green LED turns on next to the **Calculate** button, then the calculator was successful. Cut the pipes using the calculated miter angles.

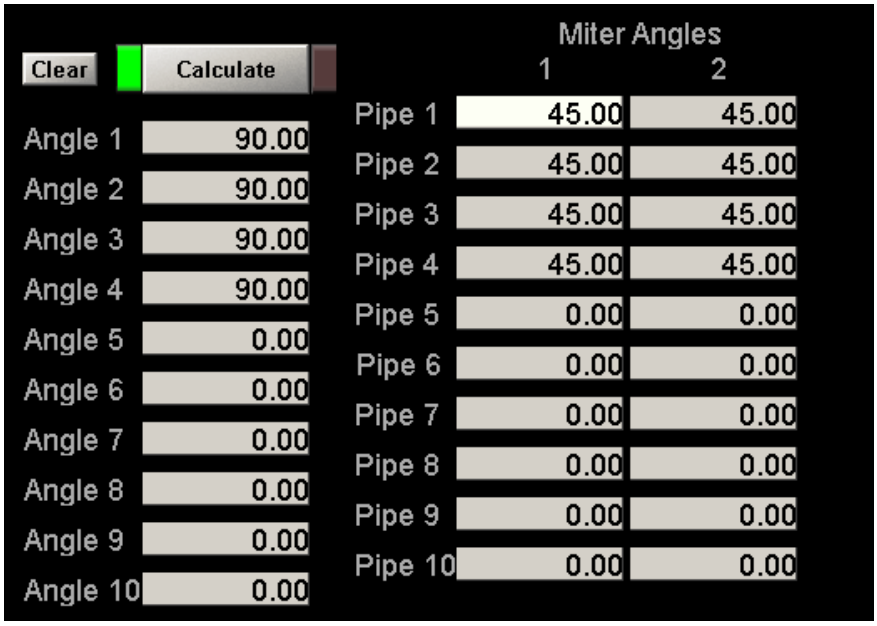

Figure 39 Double Miter Calculator

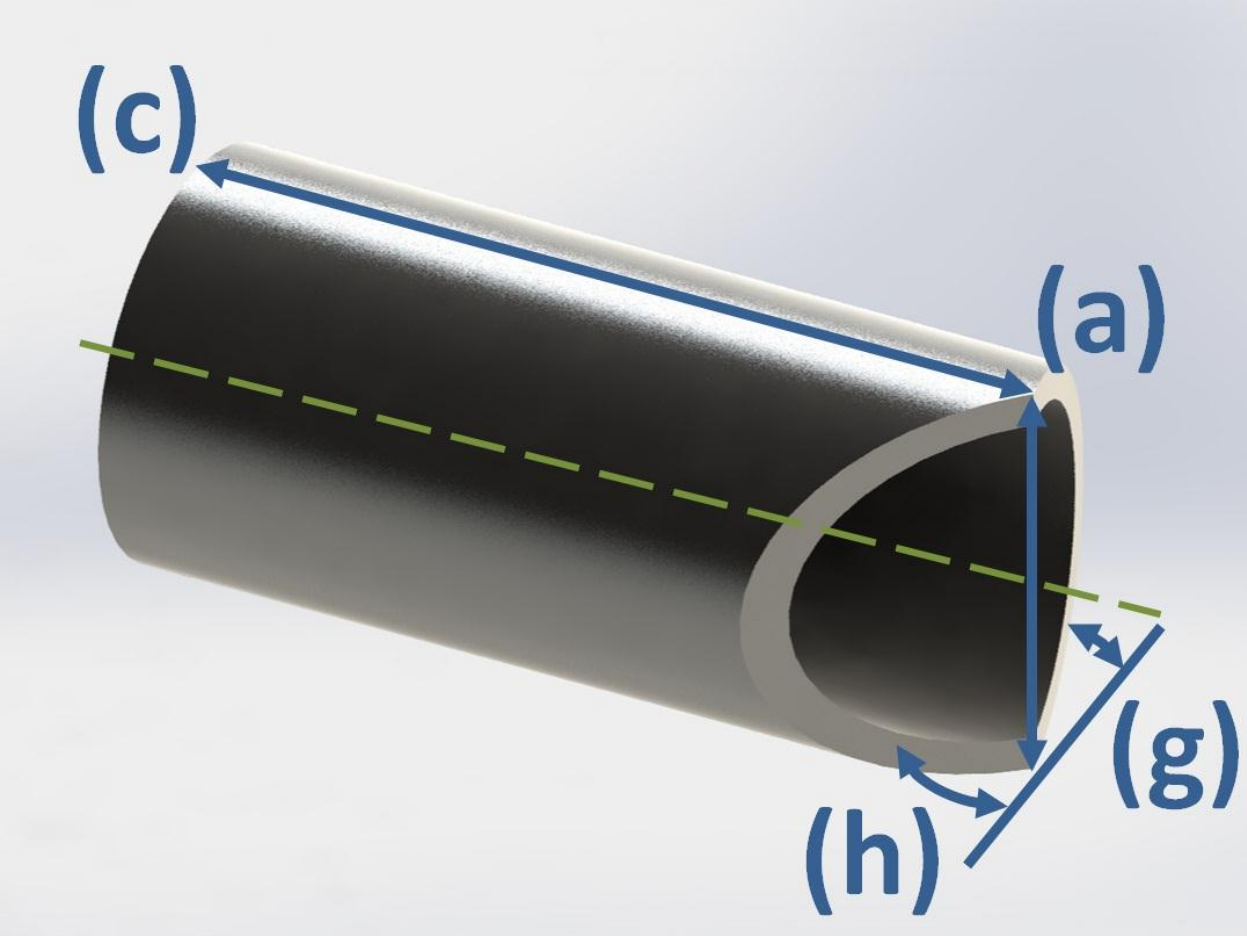

Figure 40 Double Miter Cut

7.3 Creating a Program

If you want to add a cut to an existing program, load in the program. However, if you want to create a new program, press **Close Program**. See Loading & Closing Programs on page 13.

Now after entering in the correct parameters, press **End Cut**, **Hole Cut**, **Chop Cut**, or **Double Miter** to create your program or to add to an existing program. The code will always be added to the end of the program.

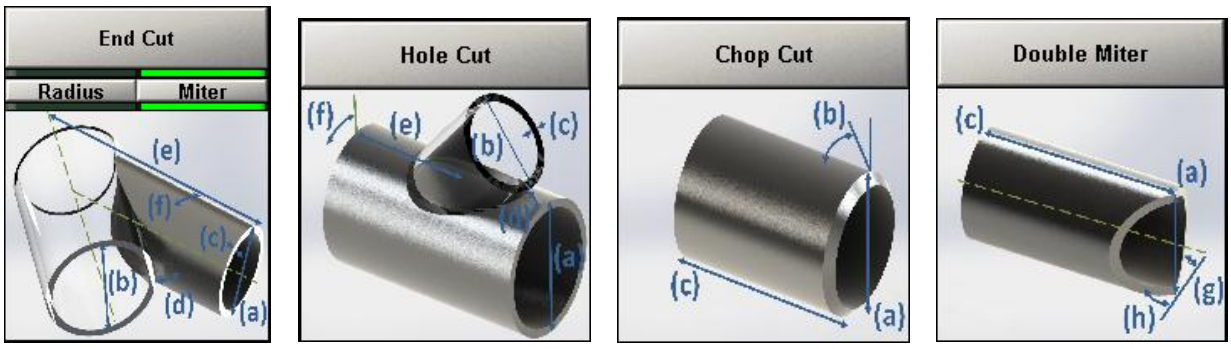

Figure 41 End Cut, Hole Cut, Chop Cut, Double Miter Buttons

If any of your parameters are incorrect, an error will pop up. If no errors exist and if no program is loaded, it will ask you to type in a name for new program.

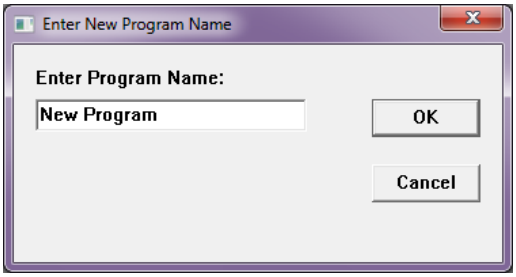

Figure 42 Enter New Program Name

Type in the program name and press **OK**.

If an existing program with the same name already exists, a warning message will pop up asking if you want to erase the existing program.

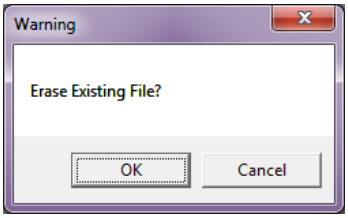

Figure 43 Erase Existing Program?

If you press **Cancel** you will have to start over again by pressing one of the cut buttons. Press **OK** to overwrite the old program and create your new program.

At times you may get the following warning: “Pipe Join Angle outside of hardware limit.” The A axis can cut no lower than 45 degrees and certain cuts may require a little more angle than that. Just press **OK** if you see this warning, but know that your part may not turn out exactly as programmed.

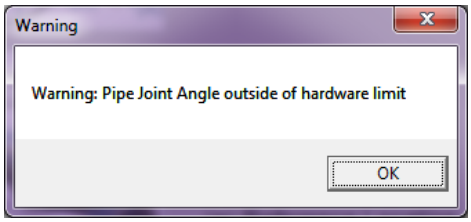

Figure 44 Pipe Joint Angle Warning

7.4 Vector Measurements

All distances in the pipe coping software are vector measurements. Vector measurements are based off of the center of two intersecting pipes. The distances are measured where the two lines intersect. The *Pipe Join Angle* is the angle between the two intersecting lines.

For example, the *Reference Distance* for the *Hole Cut* in Figure 45 is D1. If the *Hole Cut* had a *Pipe Join Angle* other than 90 degrees then the vector length would be different. The *Reference Distance* for the end cut is D1 + D2. Notice that it is much longer than the actual cut. That is because the 2 vectors intersect beyond the actual pipe length.

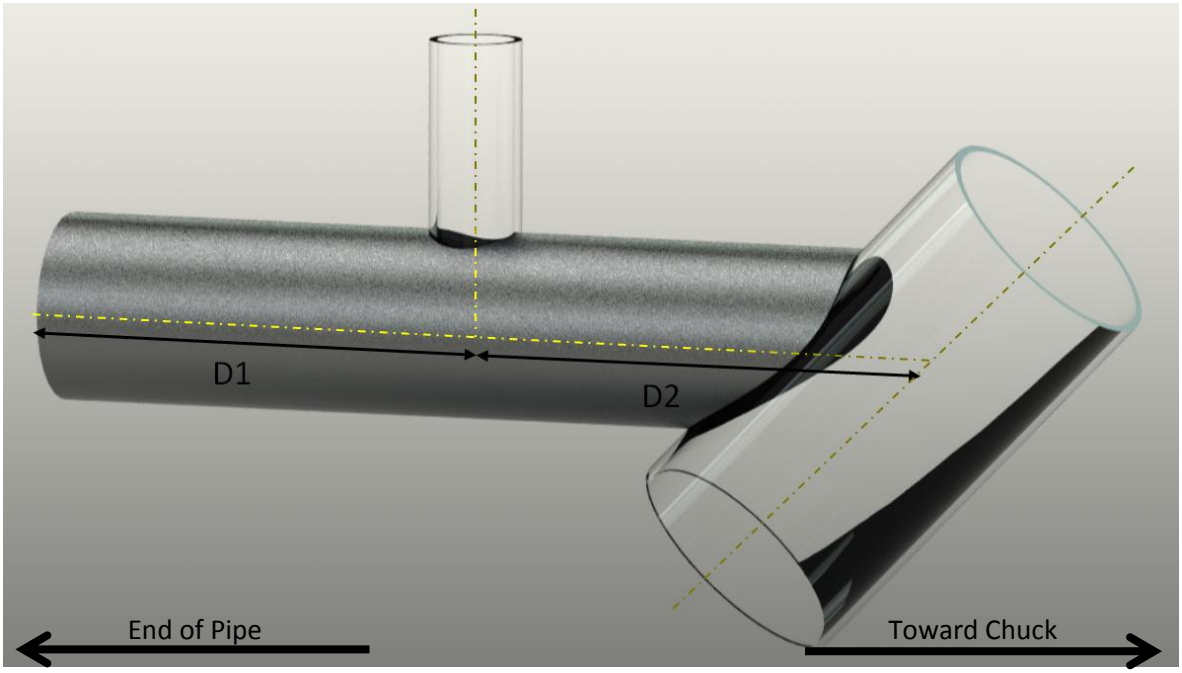

Figure 45 Vector Measurements

7.5 Examples

Below are a few examples showing how to use the different types of cuts.

7.5.1 End Cut Radius

Below are the parameters for a 55 degree radius end cut for a 6 inch cut pipe and an 8 inch uncut pipe.

Feed Rate	65 (in/min)
Kerf Width	0.0800 (in)
Lead In Length	0.250 (in)
(a) Cut Pipe Diam.	6.000 (in)
(b) Bevel Angle	0.0 (deg)
(c) Cut Pipe Thick.	0.230 (in)
Set Pipe Diameter	

Figure 46 General Parameters

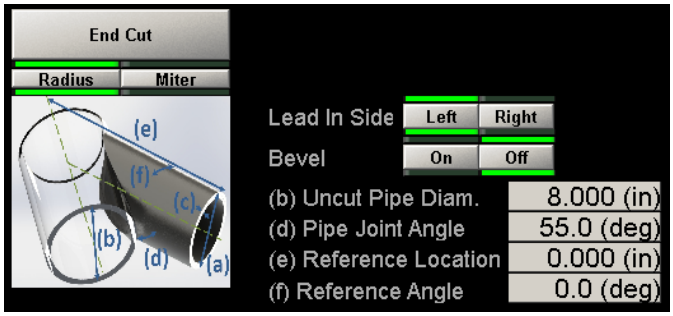

Figure 47 Radius End Cut Parameters

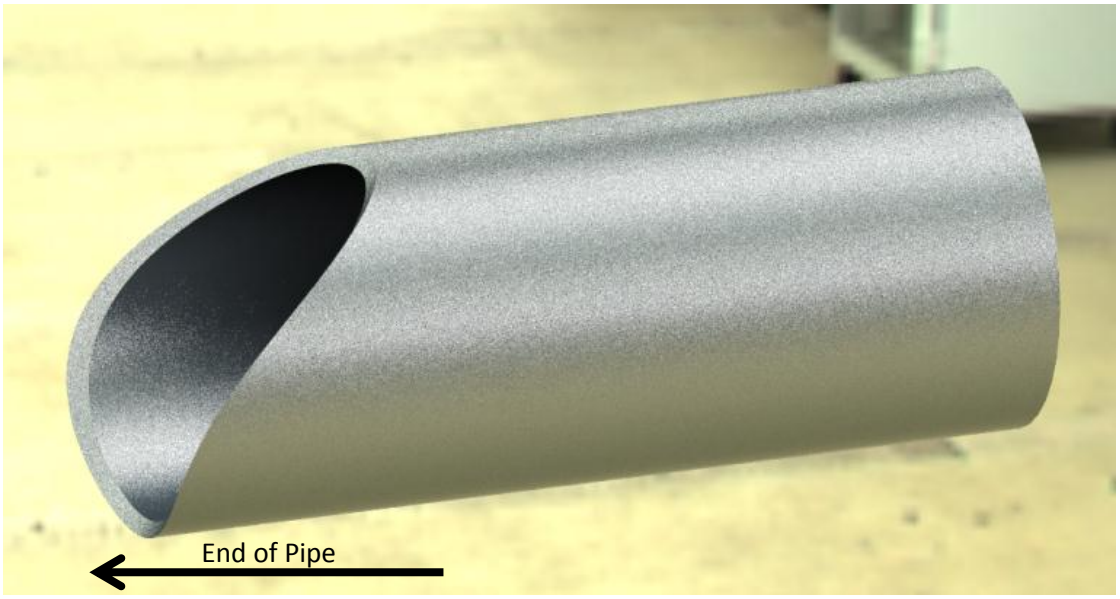

Figure 48 End Cut Radius Example

7.5.2 End Cut Miter

Below are the parameters for a 45 degree miter end cut for a 6 inch cut pipe.

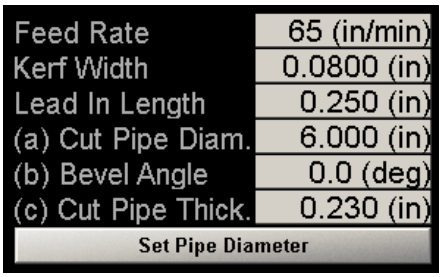

Figure 49 General Parameters

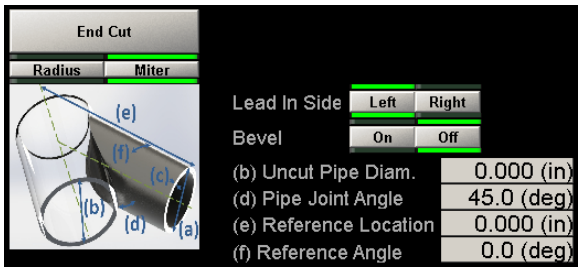

Figure 50 Miter End Cut Parameters

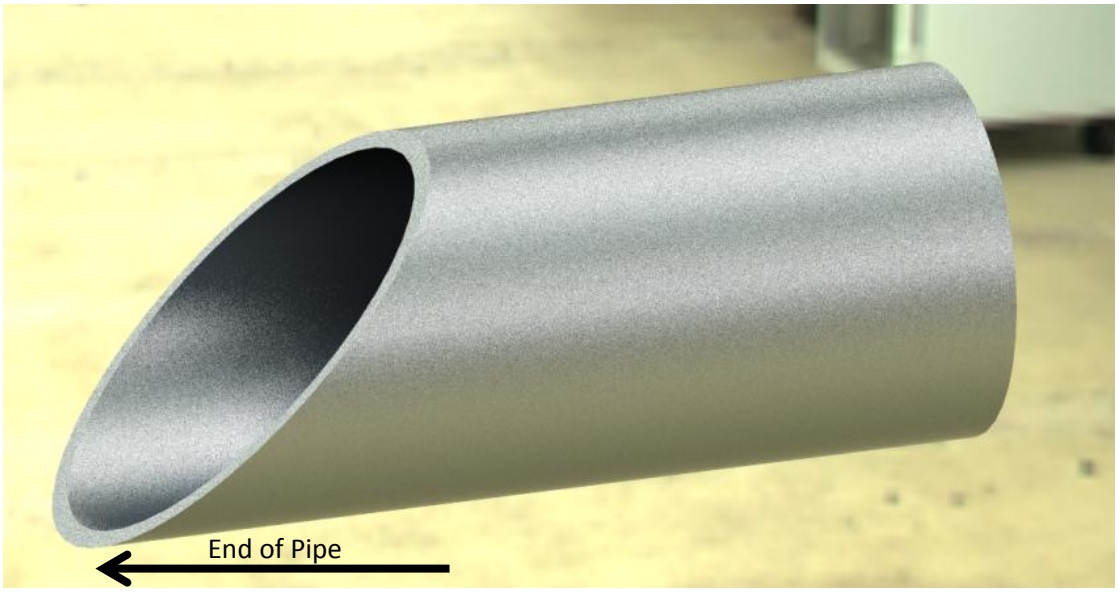

Figure 51 End Cut Miter Example

7.5.3 Hole Cut

Below are the parameters for a 90 degree hole cut for a 6 inch cut pipe and a 2 inch uncut pipe.

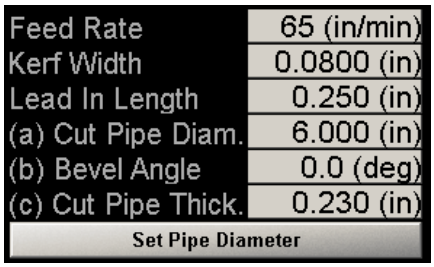

Figure 52 General Parameters

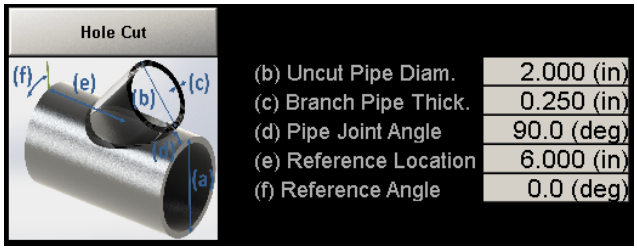

Figure 53 Hole Cut Parameters

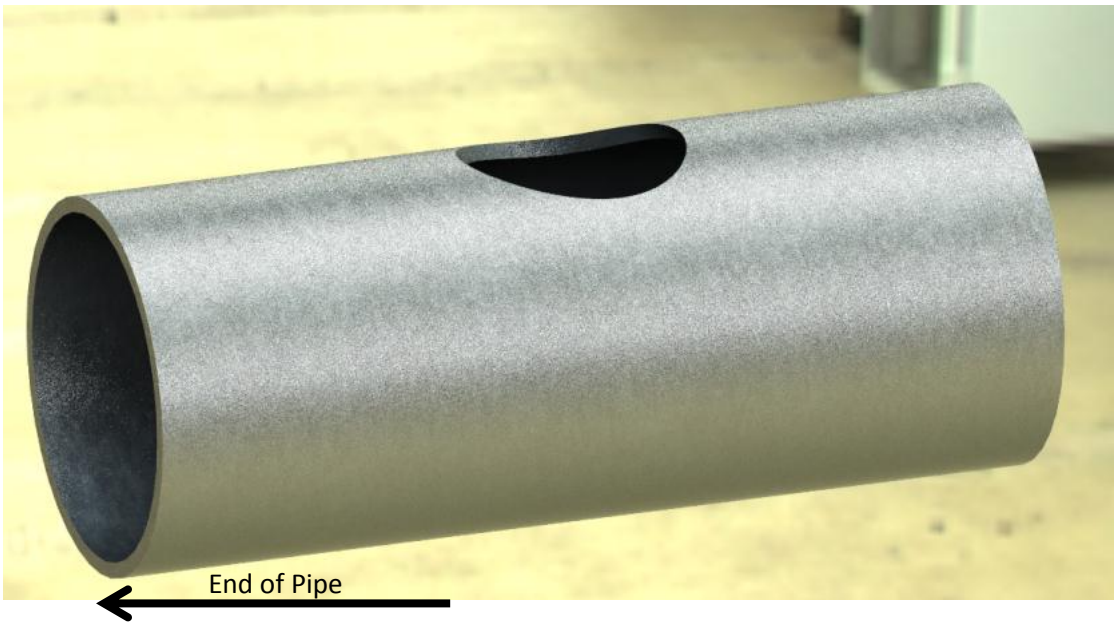

Figure 54 Hole Cut Example

7.5.4 Chop Cut

Below are the parameters for a chop cut for a 6 inch cut pipe.

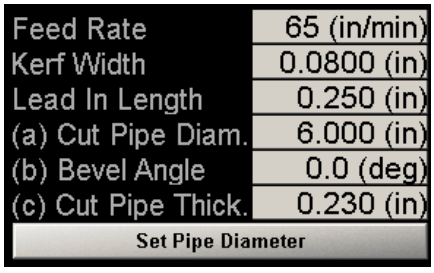

Figure 55 General Parameters

Figure 56 Chop Cut Parameters

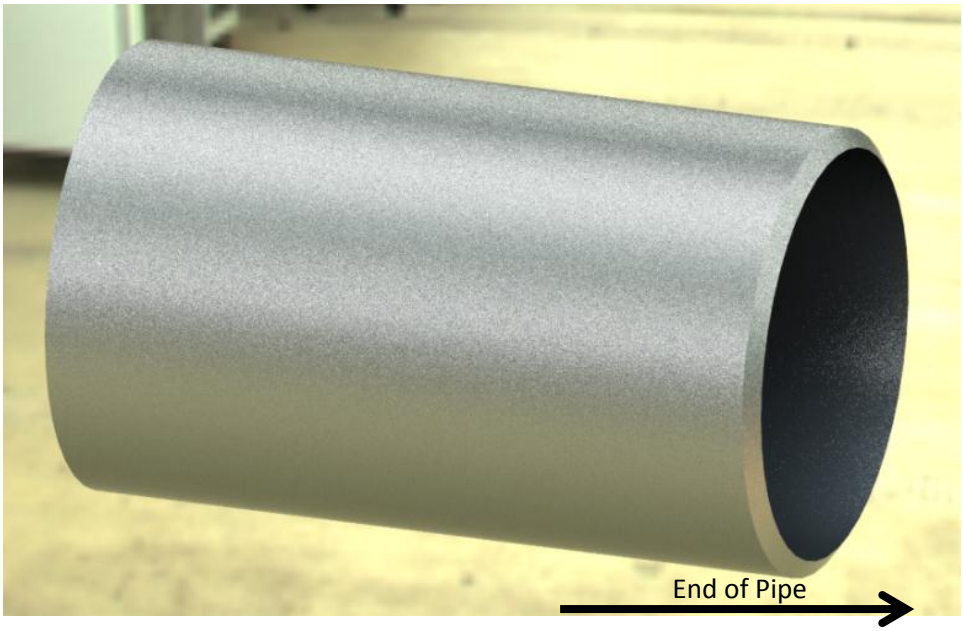

Figure 57 Chop Cut Example

7.5.5 Double Miter

Below are the parameters for a double miter joining three 6 inch pipes together. The pipes are separated by 135 degrees, 90 degrees, and 135 degrees.

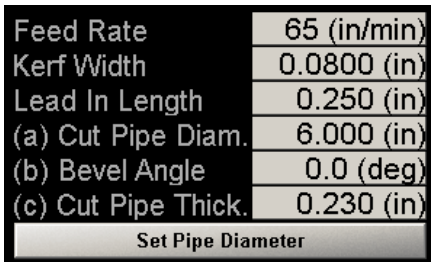

Figure 58 General Parameters

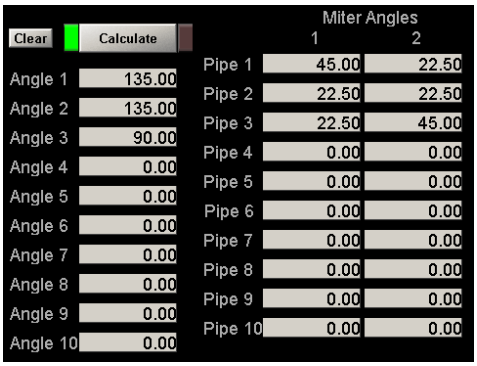

Figure 59 Double Miter Calculator

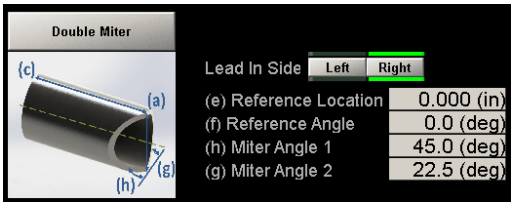

Figure 60 Double Miter Parameters Pipe 1

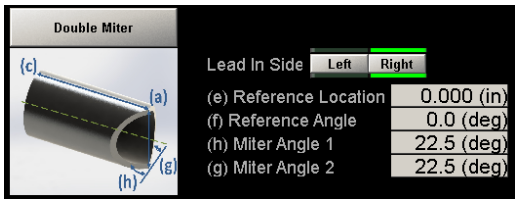

Figure 61 Double Miter Parameters Pipe 2

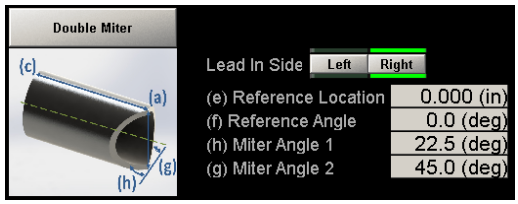

Figure 62 Double Miter Parameters Pipe 3

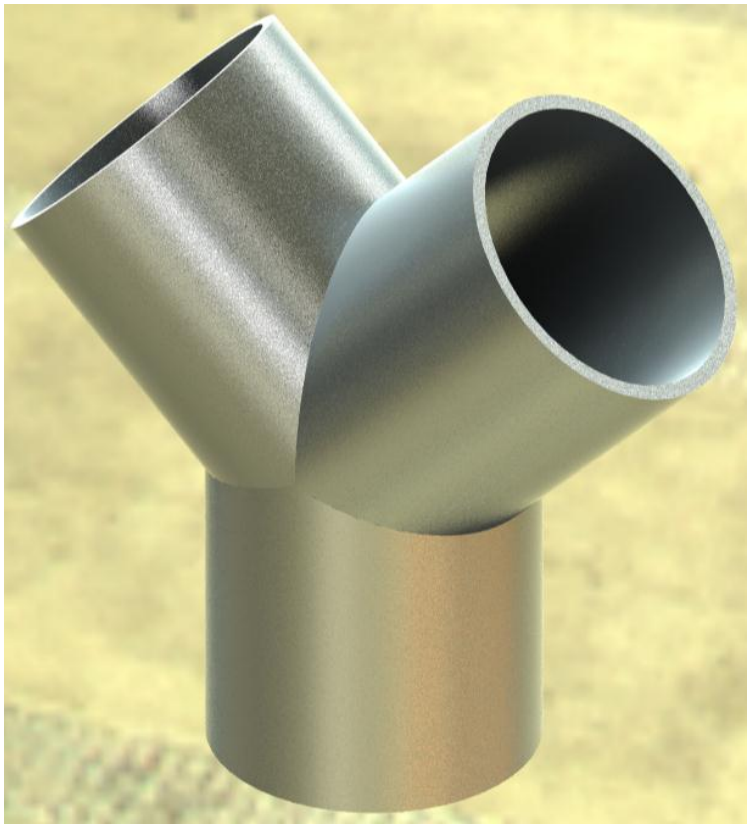

Figure 63 Double Miter Example

7.5.6 Hole Cut and End Cut

Below are the parameters for a 45 degree radius end cut for a 6 inch cut pipe and an 8 inch uncut pipe along with a 90 degree hole cut for a 6 inch cut pipe and a 2 inch uncut pipe.

Feed Rate	65 (in/min)
Kerf Width	0.0800 (in)
Lead In Length	0.250 (in)
(a) Cut Pipe Diam.	6.000 (in)
(b) Bevel Angle	0.0 (deg)
(c) Cut Pipe Thick.	0.230 (in)
Set Pipe Diameter	

Figure 64 General Parameters

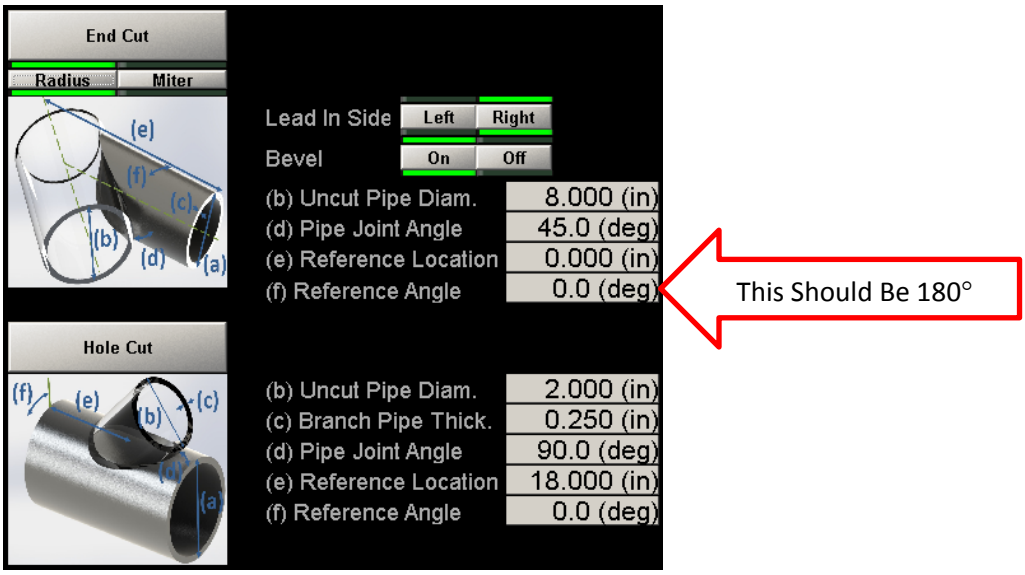

Figure 65 Radius End Cut and Hole Cut

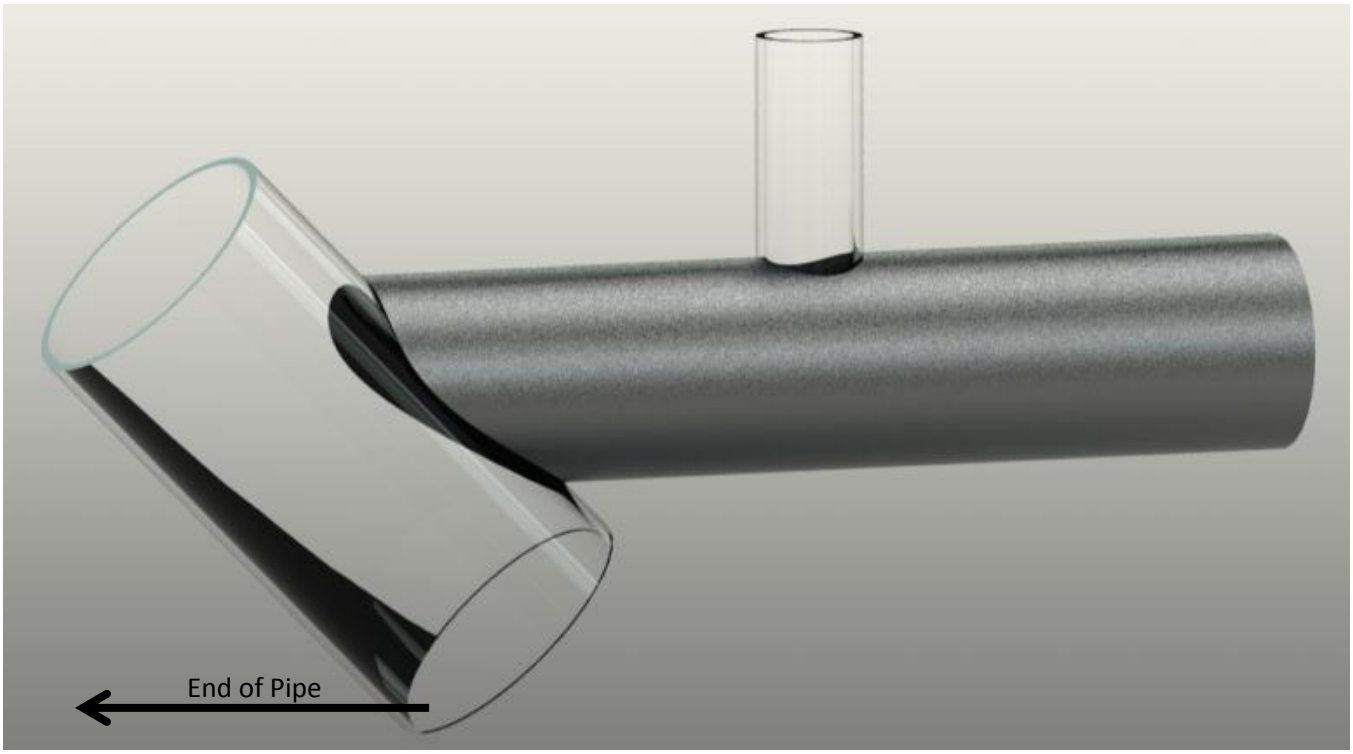

Figure 66 Hole Cut and End Cut Example

8 Running Programs

The functions of each button used for executing programs are defined below. However, to begin cutting a part, follow the procedure outlined in Run Procedure on page 40.

8.1 Control Buttons

8.1.1 Cycle Start

Cycle Start will run the loaded program. You can press **Cycle Start** on the control screen or on either of the operator panels.

Figure 67 Cycle Start

8.1.2 Stop

Stop will stop the program and return the A and B axes to part zero. It is also used with **Simulate** to start a cut in the middle of a program. **Do NOT use this in place of emergency stop!**

Figure 68 Stop

8.1.3 Rewind

Rewind returns the loaded program to the beginning.

Figure 69 Rewind

8.1.4 Reset

Reset stops all motion, turns off all outputs, and stops the program. **Reset** must not be flashing to run a program.

Figure 70 Reset

8.2 Go To Buttons

Before running a program, you may want to use one of your *GoTo* buttons to move the machine to the correct location.

8.2.1 Load

Pressing the **Load** button will make the axes move to the load position. The load position is the location for the X and Y axes for material loading and unloading. You can change it in the Diagnostics screen (see Diagnostics on page 41).

8.2.2 Part Zero

The **Part Zero** button allows the machine to go to any of the last five defined part zeros.

Figure 71 - GoTo Buttons

8.3 Torch Settings

8.3.1 Torch

The **Torch** button toggles the torch on and off. When running a program it will turn on and off automatically.

Figure 72 - Torch and THC Controls

8.3.2 Pierce Counter

The pierce counter records the number of pierces the controller performs. It can be zeroed out by the operator at any time. It does not control anything, but is simply used as a reference.

8.3.3 Pierce Delay

The *Pierce Delay* is the time, in seconds, that the cutter head will pause while piercing. This allows time for the torch to go all the way through the material.

The *Pierce Delay* can be interrupted at any time by pressing the **Cycle Start** button to continue running the program. A good value for *Pierce Delay* can be found by looking in the consumables chart for the system's plasma cutter.

8.4 Simulate

The simulate function allows the operator to run the machine through a program without activating any of the outputs or turning on the cutter. This allows the operator to troubleshoot or test the program and get an idea of what it will look like without cutting anything. To switch states simply press **Simulate On/Off**. The green LED below the button will be on if the simulate function is on.

8.5 Lost Cut Recovery

8.5.1 Lost Cut Recovery Overview

When running a program and something happens to interrupt the process, *Lost Cut Recovery* can be used to pick up where the operator left off or it can be used to start a program part way through.

Here is a brief overview of the two lost cut recovery modes:

1. *Plasma Auto Lost Cut Recovery*: The machine will move to where the arc signal was lost and begin cutting.

   When to Use:

   - The plasma torch was on, but the arc signal was lost.
   - To re-start when the arc signal was lost.

2. *Plasma Manual Lost Cut Recovery*: The machine will begin cutting at the current location and then continue executing from the selected line of the program.

   When to Use:

   - The torch never started (there never was an arc ok signal).
   - The system cannot start at the position that lost the arc signal.
   - When starting between two lines of the program.

Use the following figure as a reference.

Figure 73 Lost Cut Recovery

8.5.2 Lost Cut Recovery Procedure

8.5.2.1 Auto

The procedure for conducting an auto lost cut recovery is as follows:

1. To start *Lost Cut Recovery* press **Auto Lost Cut Recovery** (See Figure 73). The *Auto Lost Cut Recovery* dialog will appear.

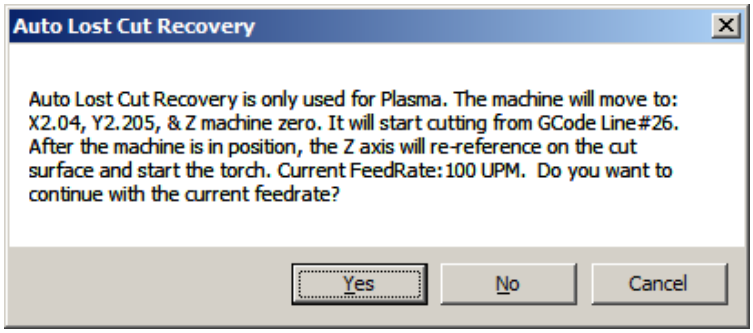

Figure 74 - Auto Plasma Lost Cut Recovery Dialog

2. Verify that the machine positions are correct. Press **Yes** to continue with the current feed rate or **No** to set a new feed rate.

The machine will move to where the arc was lost, re-reference the Z axis, and then begin cutting.

WARNING: The machine will move to the last location where an arc signal was lost. Make sure that the torch had been on. If not done properly, this mode could cause severe damage to the machine and/or material.

8.5.3 Manual

The procedure for conducting a manual lost cut recovery is as follows:

1. Scroll through the program to select the line to begin cutting on.

2. Move the machine to the EXACT X and Y position where you want the machine to begin cutting using the **Forward** and **Backup** buttons (See Figure 73). The **Forward** and **Backup** buttons will move the machine to the final commanded position of a program line.

Note: If you want to start in the middle of an arc or line segment you must turn Simulate on and press Cycle Start. The machine will begin moving along the profile. Press Stop when the cutter reaches the point that you want to begin cutting from.

3. To start *Lost Cut Recovery* press **Manual Lost Cut Recovery** (See Figure 73). The *Plasma Lost Cut Recovery* dialog will appear.

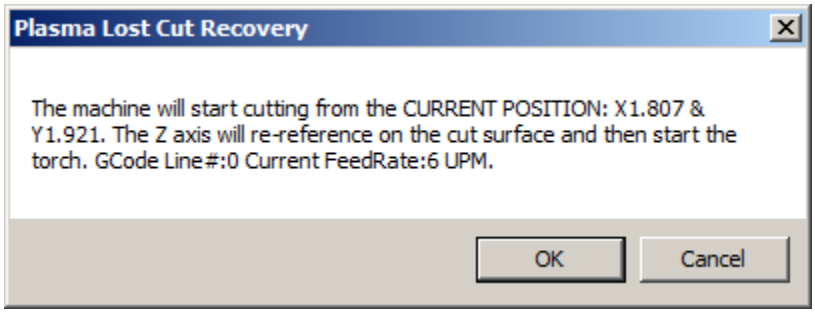

Figure 75 – Manual Plasma Lost Cut Recovery Dialog

4. Verify that the machine positions are correct. Press **OK** to continue.

Your machine will begin cutting from the current position.

WARNING: Your machine will pierce and then start cutting at the current position.

8.6 Run Procedure

After you've loaded in a program or created a new one, follow the procedure below to run the program.

1. Make sure that the carriage is all the way down by pressing the carriage toggle button (See Jogging on page 11).

2. Jog the X axis to the end of the pipe using the Carriage Operator Panel.

3. Press the **Set Part End** button. This zeros the Y axis and sets the X axis to reference off of this point.

Figure 76 Set Part End

4. Press **Cycle Start** and the program should begin running.

****

Emergency Stop

In case of emergency, press the large red Emergency Stop button on the operator panel. All motion will stop immediately. DO NOT PRESS STOP!

****

9 Diagnostics

The Diagnostics screen should only be used for troubleshooting or initial machine setup.

The *Load Location* changes the position the machine moves to when you press the *Go To Location* button **Load**.

The offset locations for A and B are also located under the Diagnostics screen.

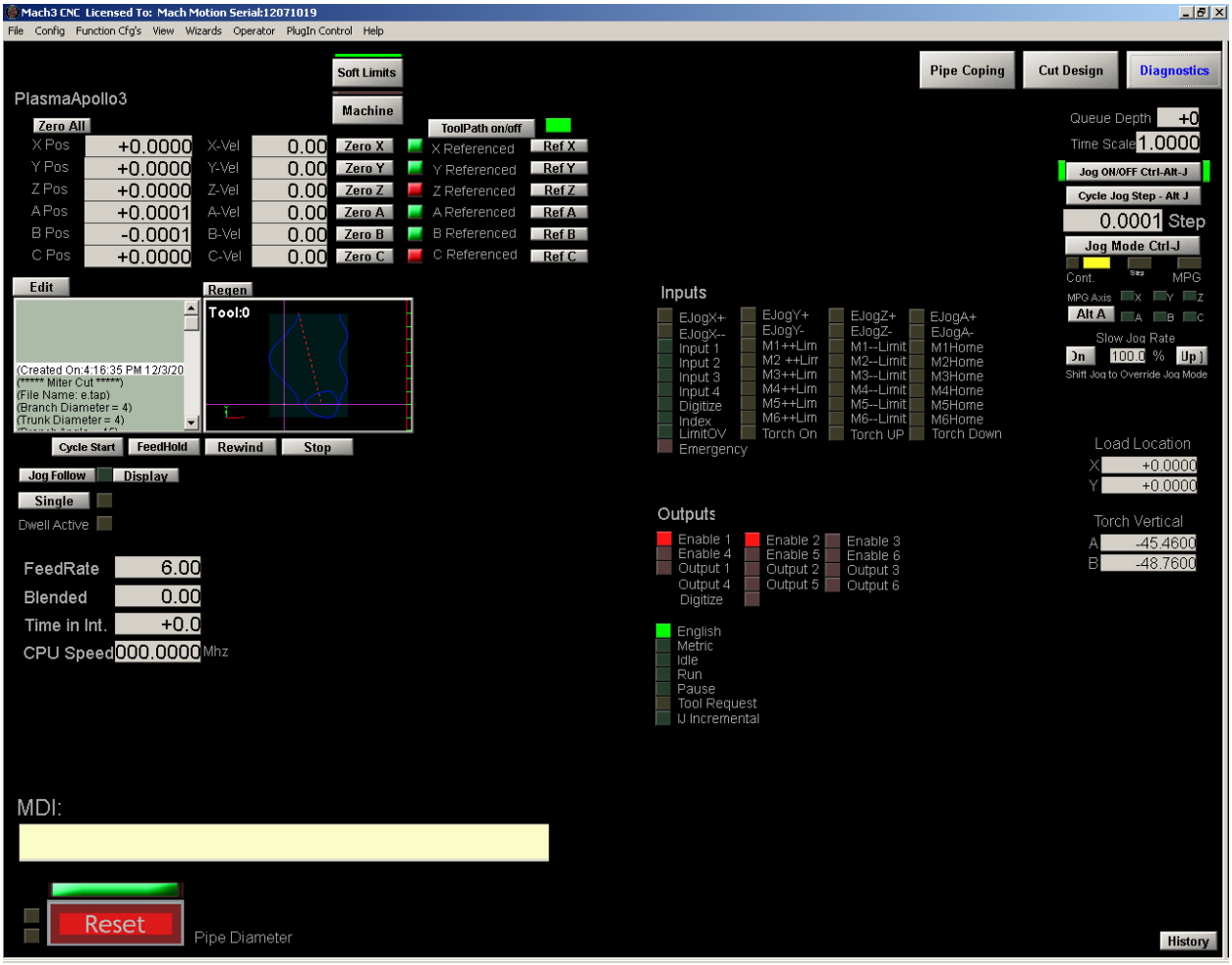

Figure 77 Diagnostics Screen

10 Shutting Down the Control

To power down your control, follow the steps outlined below.

1. Shut down the Mach3 software by clicking the exit button at the top right of the control. A window will pop up asking you if you are sure you want to end the session.

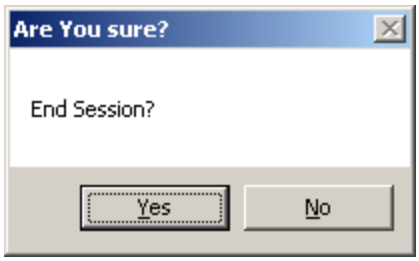

Figure 78 End Session

2. Rotate and release the key on the back right hand side of the control. You can also click on the **Start** menu and then press **Shut Down**. The Mach Motion control will turn off.

Note: Do not turn the key until the control's software has completely shut down. Also, do not remove the power of the machine until the control is completely off.