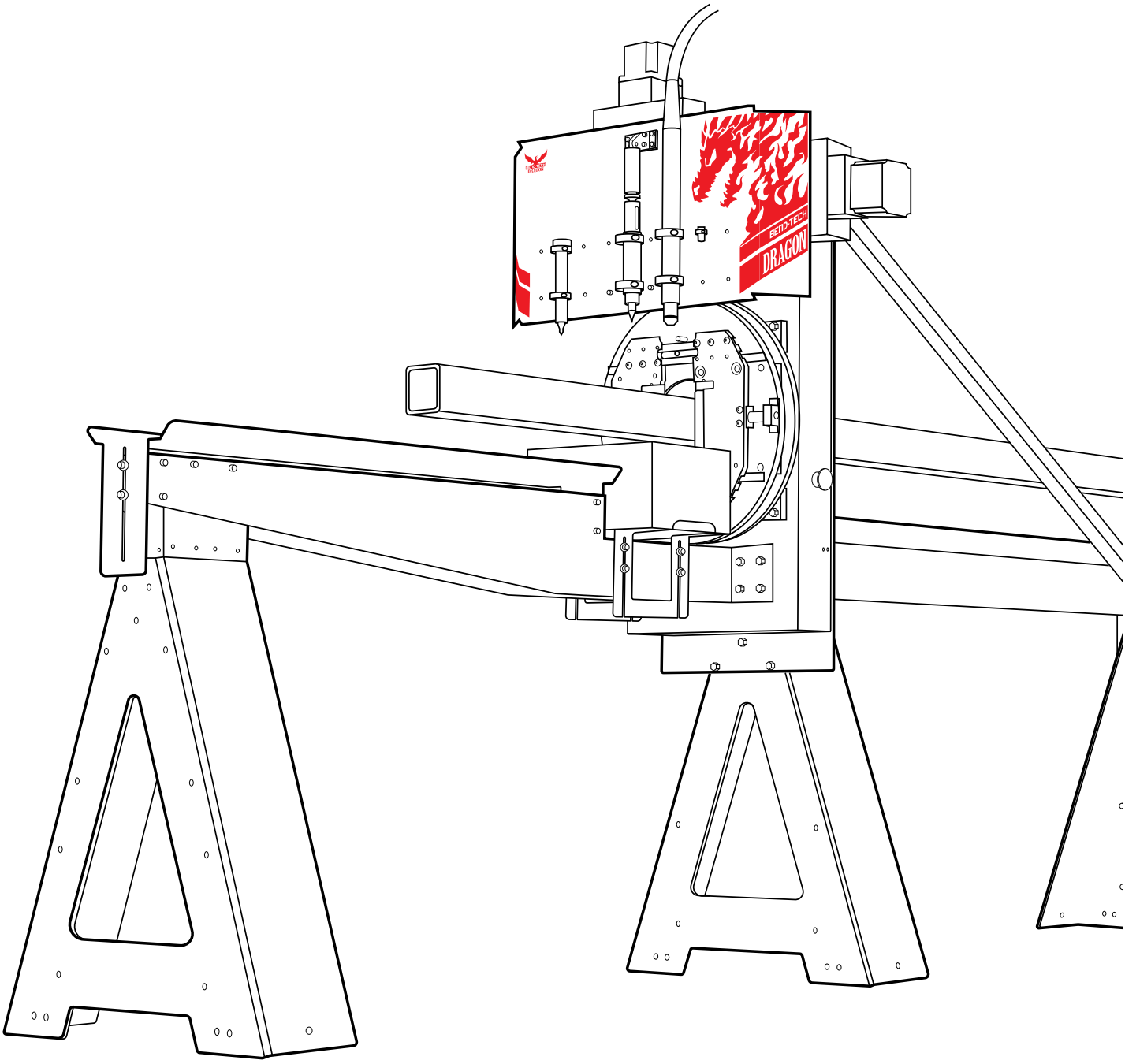
Part 3 of 3

BEND-TECH

DRAGON A400

Startup Manual

Part 3: Torch Mount, Software Overview, Side Offsets



Revision 7.1 | English

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Dragon A400

Startup Manual
Revision 7.1

English
Original Instructions

October 2022

Bend-Tech LLC
729 Prospect Ave.
Osceola, WI 54020 USA

(651) 257-8715
www.bend-tech.com
support@bend-tech.com

Contents

Contents iv

01
Tube and Pipe Library 7

1.1 Tube and Pipe Library Overview 7
1.1.1 Open The Tube and Pipe Library 7
1.1.2 Add New Material Into The Tube and Pipe Library 8
1.1.3 Choose The Type Of Material . . 9
1.1.4 Dimensions 9
1.1.5 Naming the Material. 10
1.1.6 Additional Settings 10

02
Torch Mount 11

2.1 Torch Mount Overview 11
2.1.1 Launch Torch Calibration Tool . 12
2.1.2 Torch Mount Utility 13
2.1.3 Load the Material 14
2.1.4 Install the Torch 15
2.1.5 When to Perform Torch Mount Calibrations 15

03
Dragon CAM 16

3.1 Dragon CAM 16
3.2 Create New Part. 16
3.2.1 Dragon CAM Preparation Checklist 17
3.2.2 Die And Material 17
3.2.3 Part Name 17
3.2.4 Tube Length. 18
3.2.5 3D Interface Control. 18
3.3 Cutting 19
3.3.1 Adding a Cut 19
3.3.2 Changing the Cut Location . . . 19
3.3.3 Changing the Type Of Cut 19
3.3.4 Additional Cuts. 19
3.3.5 Material 20
3.3.6 Rotation, Angle, & Offset 20
3.3.7 Cross Tube Display 20
3.4 Holes 21
3.4.1 Add A Hole 21
3.4.2 Hole Location. 21
3.4.3 Hole Width 22
3.4.4 180-Degree Hole 22
3.5 Edit Flat 22
3.5.1 Opening Edit Flat. 23
3.5.2 Adding Part ID 23
3.6 Nest Part 24
3.6.1 Nest Part Procedure 25
3.6.3 Parts 26
3.6.4 Part Functions 26
3.6.4 Shifts 27
3.7 Run Project 27
3.7.1 Run Project Procedure 27
3.7.2 Load Material. 28
3.7.3 Pre-Run Checklist 28
3.7.4 Start 28

04
Import Project Process 29

4.1 Import Project Process Overview. . . 29
4.2 Importing A Part To Dragon CAM . . . 30
4.2.1 Opening A File In Dragon CAM 30
4.3 CAM Auto Import Interface. 30
4.3.2 Nest Part 31
4.3.3 Creating Temporary Materials . 31
4.3.4 Complete Temporary Material . 32

4.3.6 Setting Lead In/Lead Out 33
4.3.7 Other Basic Settings 34
4.4 Running A Nesting Project 34
4.4.1 Preparing The Parts. 34
4.4.2 Setup 35
4.4.3 Parts 36
4.4.4 Part Functions 36
4.4.5 Stick Functions 36
4.4.6 Adding Material 36
4.4.7 Saving 37
4.4.8 Opening a Saved Nesting Project. 37
4.4.9 Running A Nested Project 37

05

Dragon CAM Side Offsets Calibration..... 38

5.1 Side Offsets Calibration for Square and Rectangle Tube 38
5.1.1 Open Bend-Tech 7x. 38
5.1.2 Add Square Or Rectangle Material 38
5.1.3 Chuck Grip Settings. 39
5.1.4 Corner Rotation Extension. . . . 39
5.1.5 Open Side Offset Calibration . . 40
5.1.6 Disable Feature 40
5.1.7 Power On The Machine. 40
5.1.8 Homing Procedure. 40
5.1.9 Load The Material 41
5.1.10 Torch Distance. 41
5.1.11 Run Test Cuts 42
5.1.12 Measure Test Cuts. 42
5.1.13 Save Calibration 43

06

Angle and Channel Material Setup 44

6.1 Angle and Channel Material Overview44
6.2 Adding Angle and Channel Material. 44
6.3 Angle and Channel Material Machine Settings 44
6.3.1 Corner Radius 45
6.3.2 Y-Axis (Chuck) Acceleration. . . 45
6.3.3 Corner Rotation Extension. . . . 46
6.3.4 Edge Cut Offset 46
6.3.5 Lead In/Out Settings 47
6.4 Side Offsets Calibration 47
6.4.1 Open Bend-Tech 7x. 47
6.4.2 Begin The Calibration Process 47
6.3.3 Disable Feature 47
6.4.4 Power On The Machine. 48
6.4.5 Homing Procedure. 48
6.4.6 Load The Material 48
6.4.7 Angle Material Spacers 48
6.4.8 Channel Material Spacers 49
6.4.9 Torch Distance. 50
6.4.10 Run Test Cuts 51
6.4.11 Measure Test Cuts. 51
6.4.12 Save Calibration 51

01 Tube and Pipe Library

1.1 Tube and Pipe Library Overview

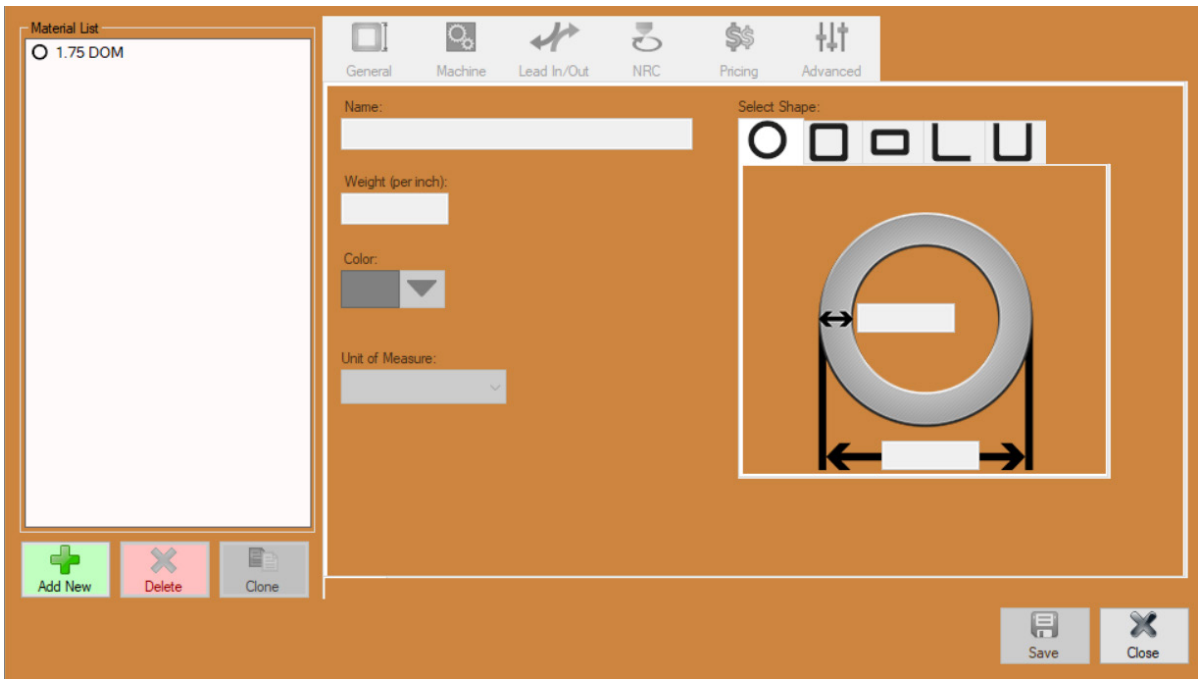
The Tube and Pipe Library is where the material list is created that will be used in a project. Before a project can be started, the type and specifications of the material must be entered into the Tube and Pipe Library.

1.1.1 Open The Tube and Pipe Library

Before performing any type of cutting on the Dragon A400, the material being cut needs to be added the Tube and Pipe Library.

To begin this process, click TUBE LIBRARY from the Bend-Tech Task Menu.

This will open the interface for logging material types and sizes into the Library.



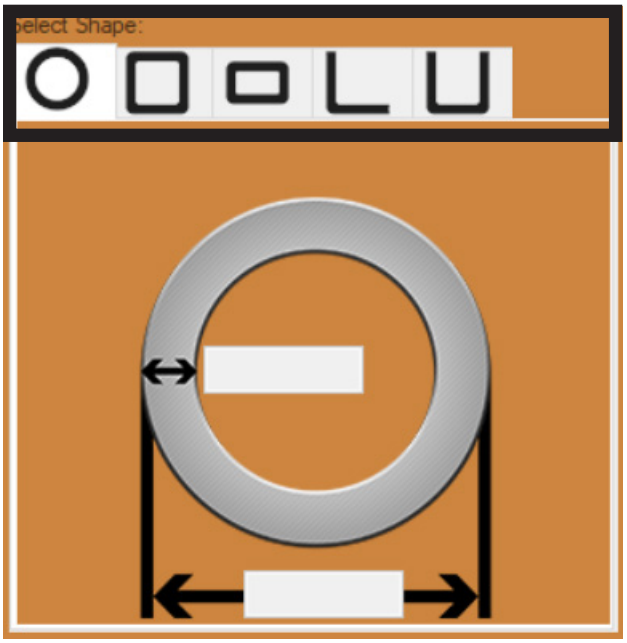
Note

Once a material is entered into the Tube and Pipe Library, it can be selected from the Library without having to re-enter the dimensions of the material each time it is used.

1.1.2 Add New Material Into The Tube and Pipe Library

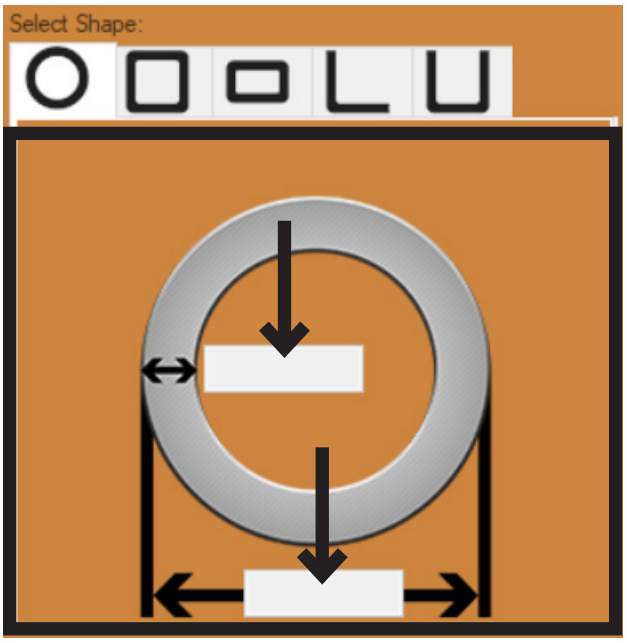
To enter a new material into the Tube and Pipe Library, click the ADD NEW button at the bottom left hand corner of the screen.

1.1.3 Choose The Type Of Material



On the right hand side of the screen, choose the type of material that will be loaded into the machine by clicking the icon displaying the appropriate shape (round, square, etc.).

1.1.4 Dimensions

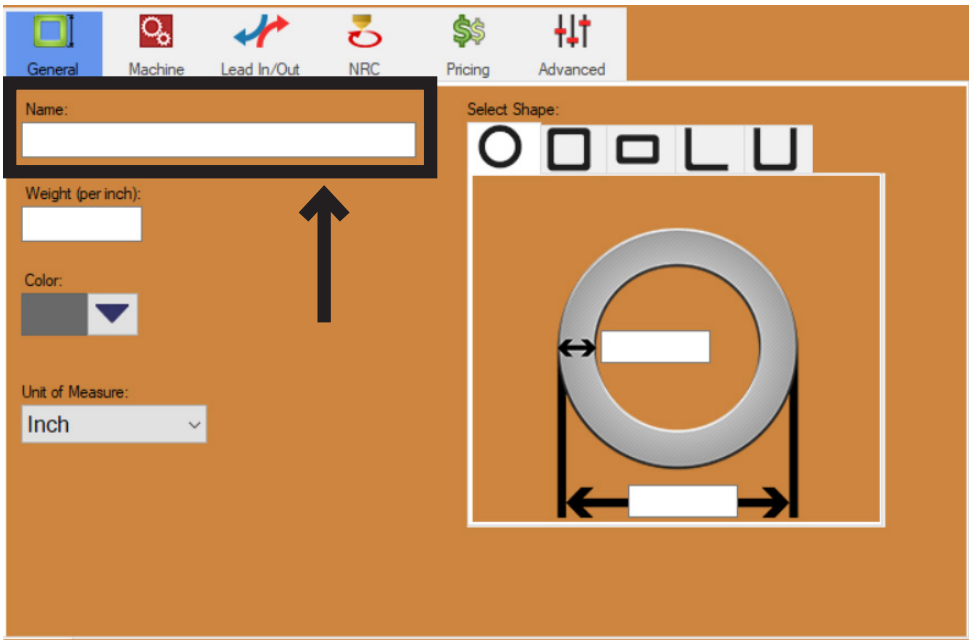


Depending on the type of material chosen, the operator will need to enter dimensions for the material. Enter the dimensions of the material in the text boxes.

Important

Entering accurate material dimensions is critical to achieving precise machine operation.

1.1.5 Naming the Material



Enter a name for the material. The majority of operators simply enter the material dimensions for this, but any naming system works.

Click SAVE, then click CLOSE.

With material logged into the Tube and Pipe Library, the Dragon A400 is now ready to accept the material.

1.1.6 Additional Settings

Tube Library Settings will automatically default to preset values in Bend-Tech software. However, it is important to verify such things as default stock length, Chuck Grip, and Lead In/Out settings are appropriate for the material being run. Side Offsets Calibration is necessary before processing square, rectangle, angle, or channel material.

02 Torch Mount

2.1 Torch Mount Overview

Before cutting with the Dragon A400, the torch must be calibrated. The torch calibration process requires the operator to run the torch Mount calibration feature found in the Machine Library. The Torch Mount procedure sets the torch to the correct height and readies the torch for the cutting process.

Important

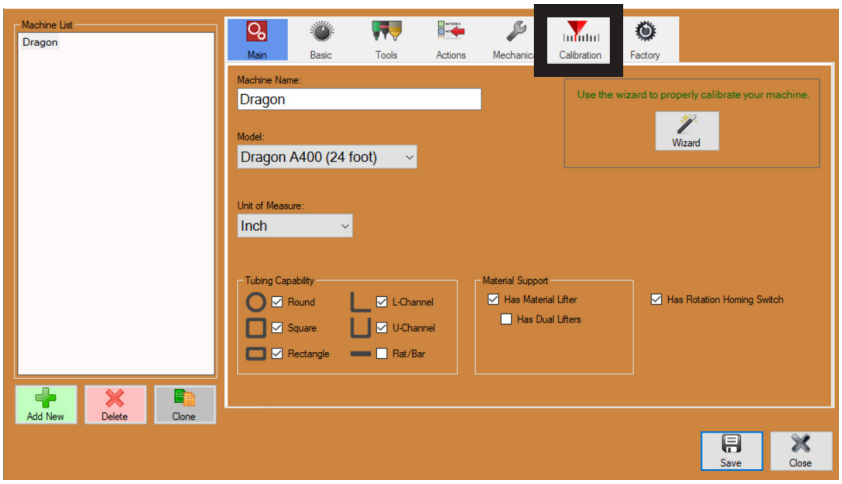
Before the Torch Mount procedure can begin the machine must be powered on and all Axes homed.

! Caution !

Ensure the torch wand is not installed on the Toolhead or is mounted only in the top collar before starting the Torch Mount procedure to avoid torch damage.

2.1.1 Launch Torch Calibration Tool

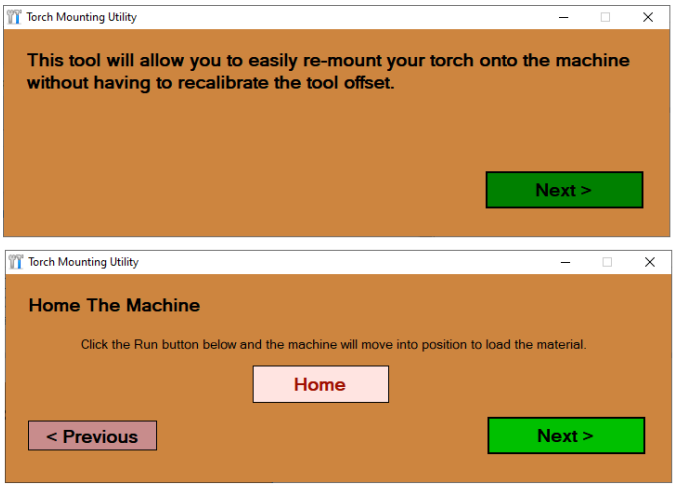
To begin the Torch Mount procedure in Dragon CAM, Go to the Tools drop down menu and click Machine List. Select “Dragon” from the Machine List.



In the menu bar at the top of the interface click CALIBRATION. This will open a new interface.

Click TORCH MOUNT at the bottom right of the new interface. This will open the Torch Mounting Utility interface.

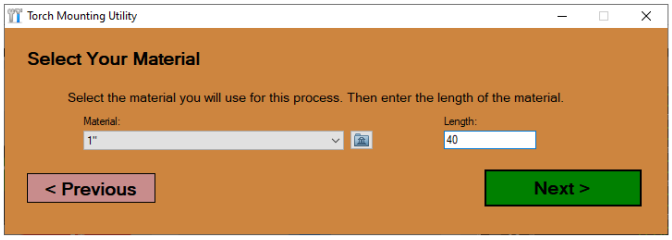
2.1.2 Torch Mount Utility



Click the HOME button to home the machine. Once the machine finishes homing, click NEXT.

In the Torch Mount Utility interface click the Select Material drop down and select a material type that's been entered in the Tube and Pipe Library that will be used for the Torch Mounting process.

Refer to the previous chapter for material creation process.

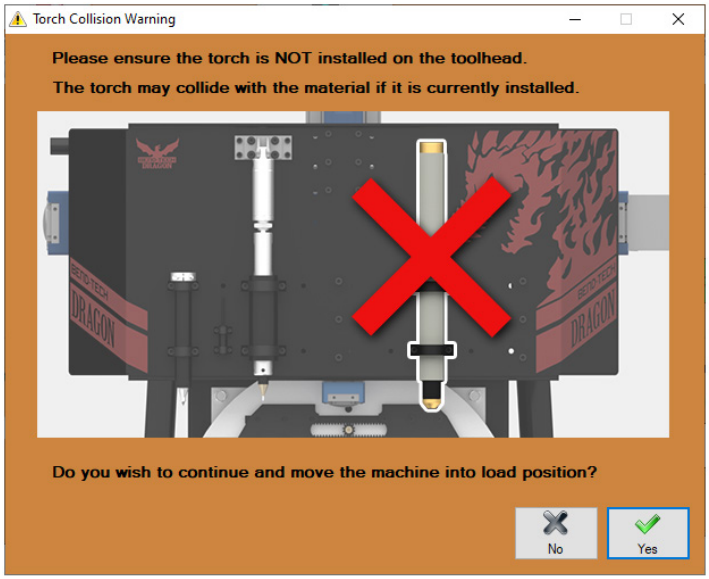


Enter the length of the material that will be loaded into the machine. Bend-Tech recommends using a piece of material 3-6 ft. in length to avoid material sagging. Click NEXT.

Click RUN to order the Dragon to move into load position. Use COORDINATED ROTATION to open the coordinated rotation for Powered Gate Machines. Click NEXT.

Note

Standard Gate Dragon Machines will not have the Coordinated Rotation button.



A Torch Collision Warning will appear. Ensure the torch is either un-installed or positioned high enough that there is zero risk of it colliding with the material. If the Torch is too low, adjust it so it is clear of the material.

Click YES. At this point the Trolley will move into position based on the length of the material as entered in the Torch Mount Utility interface. The Toolhead will move into position based on the size of the material. The machine is now ready for material to be loaded.

Important

Bend-Tech recommends not installing the torch until instructed to do so in order to minimize the risk of it colliding with the material during the Torch Installation process.

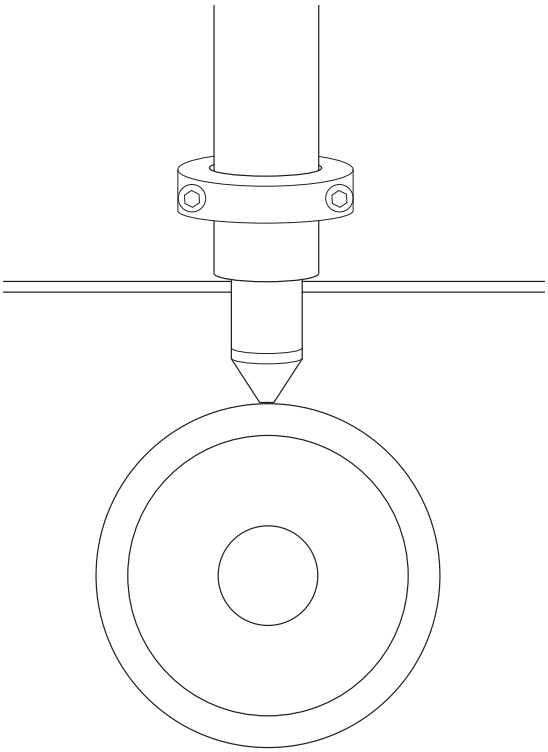
2.1.3 Load the Material

Using a ¼ in. Allen wrench, adjust the gate openings wide enough to accept the material using the front and rear Gate Lead Screws. Feed the material through the gate, then adjust the front and rear Gate Lead Screws so they are finger tight with the material. When mounted in the gate, the material should move freely forward and backward with no play side-to-side. Adjust the chuck to accept the material using the Chuck Key. Feed the material into the Chuck and tighten the Chuck with the Chuck Key. The torch is now ready to be adjusted in relation to the material.

Note

At this point if the material is not in the correct position for Torch Calibration go back a couple step and adjust the value of the material length to feed material forward or backward. After a new value is entered press RUN and the Dragon A400 will adjust the position of the Trolley accordingly.

2.1.4 Install the Torch



Manually lower the Torch so the tip is resting on the surface of the material. Tighten the torch mounting collars using a 3⁄16 in. Allen wrench until they are snug.

The torch is now set and the Dragon A400 is ready for operation.

2.1.5 When to Perform Torch Mount Calibrations

Once the torch is set into position it is ready to cut any material loaded into the machine without further adjustment. However, there are two exceptions:

1. If the torch head is removed from its mounting clamps, the Torch Mount Utility procedure will need to run to re-establish the Torch position.
2. Different torch consumables such as fine cut consumables may require different torch positioning.

03 Dragon CAM

3.1 Dragon CAM

The Dragon CAM software is used to design and create new parts for production using the Dragon A400. Dragon CAM software is designed to be an easy-to-use interface that allows for one-off custom parts to be produced, or for complete project production. Parts can be easily designed and saved for immediate production as well as production at a later date.

Note

Bend-Tech recommends beginning operations using round material.

3.2 Create New Part

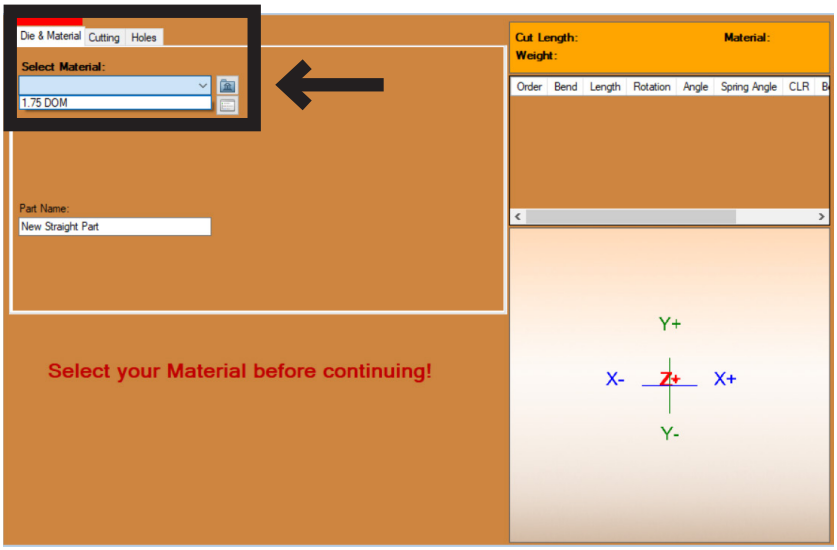
In the Bend-Tech Dragon software task menu, under Create New, choose the type of part you wish to design.

For this tutorial, under Create New, we will choose Straight to create a new straight part. This will open a new interface which will include a 3D, five axis design window in the bottom right.

3.2.1 Dragon CAM Preparation Checklist

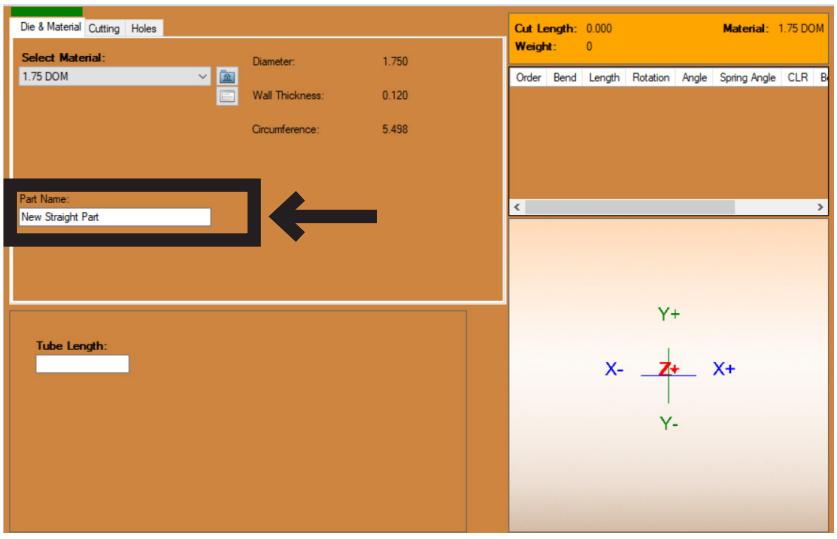
Dragon CAM Support Asset	Action
Tube and Pipe Library	Has material been entered and named in the Tube and Pipe Library as outlined in Chapter 1 of this section?
Torch Mount	Has the Torch been mounted and calibrated as outlined in Chapter 2 of this section?

3.2.2 Die And Material



Select the Die & Material tab near the top left of the interface. In the pull down menu choose the type of material you will be working with from the Tube and Pipe Library. Refer to Chapter 1 of this book to see how to enter material into the Tube and Pipe Library.

3.2.3 Part Name

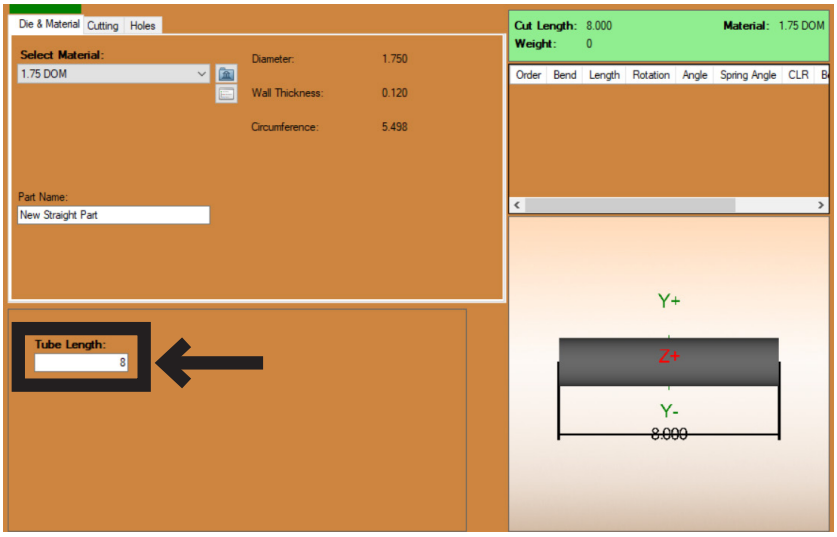


Choose a name for the part and enter it in the text box under Part Name.

Note

The Part Name will show up in Nest Part once the project is entered and saved in the Nest Part feature.

3.2.4 Tube Length



For the tube length, enter the length of the part you wish to create. The part will appear in the 3D, five axis design window.

Important

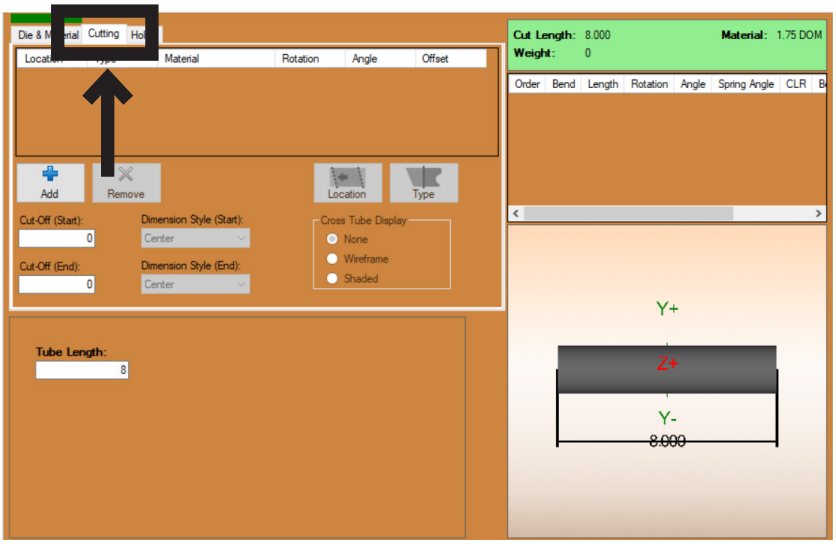
TUBE LENGTH is the part length, not the material stock length.

3.2.5 3D Interface Control

Once the part is visible in the 3D design window the operator can use the mouse to rotate the part, zoom in/zoom out, or drag the entire part by holding the scrolling wheel down.

3D Interface Control	
Zoom	Scroll in/out
Drag	Hold down scroll wheel, or click and hold both mouse buttons
Rotate	Hold down right button
Reposition	Press the Home button

3.3 Cutting



Click the Cutting tab. The Cutting interface is used to select and set up a variety of cuts on the material.

3.3.1 Adding a Cut

Click ADD to add a cut or notch to the part. The program will default to cope/notch. The program will default the cut location to the Start end of the material.

3.3.2 Changing the Cut Location

Under the Location tab, click START. Clicking the Location tab will flip the cut to the other end of the part.

3.3.3 Changing the Type Of Cut

Clicking TYPE will switch the cut from Cope/Notch to Miter.

3.3.4 Additional Cuts

Clicking ADD a second time will add a cope/notch to the other end of the part as the default cutting action.

Location	Type	Material	Rotation	Angle	Offset
Start	Cope/Notch	.75 DOM	0	90	0
End	Cope/Notch	.75 DOM	0	90	0

3.3.5 Material

The MATERIAL drop down menu changes the size of the material for which the cuts are being produced. Choosing the material determines the cutting profile of the cope/notch.

Location	Type	Material	Rotation	Angle	Offset
Start	Cope/Notch	1.75 DOM	0	90	0
End	Cope/Notch	1.75 DOM	0	90	0

Important

The Material feature is only for cope/notch, it does not apply to miter cuts.

3.3.6 Rotation, Angle, & Offset

The rotation property moves the cut around the circumference of the material, the angle property changes the angle of the cut, and the offset property changes the offset of the cuts in relation to the centerline of the part.

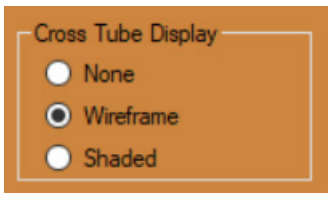
Location	Type	Material	Rotation	Angle	Offset
Start	Cope/Notch	1.75 DOM	0	90	0
End	Cope/Notch	1.75 DOM	0	90	0

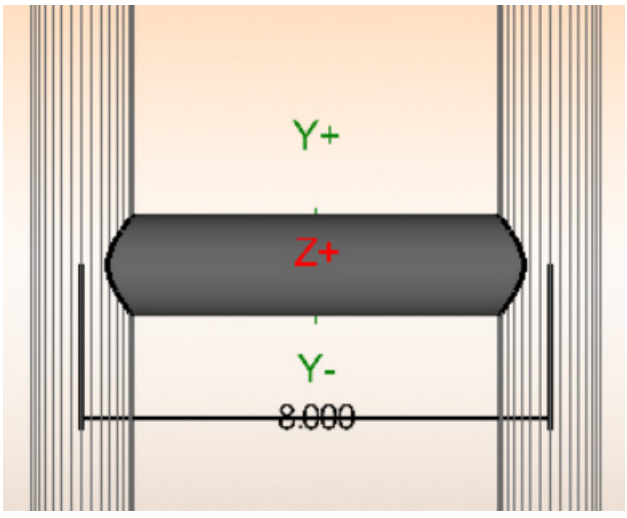
Important

The offset value must not be larger than the overall diameter of the material.

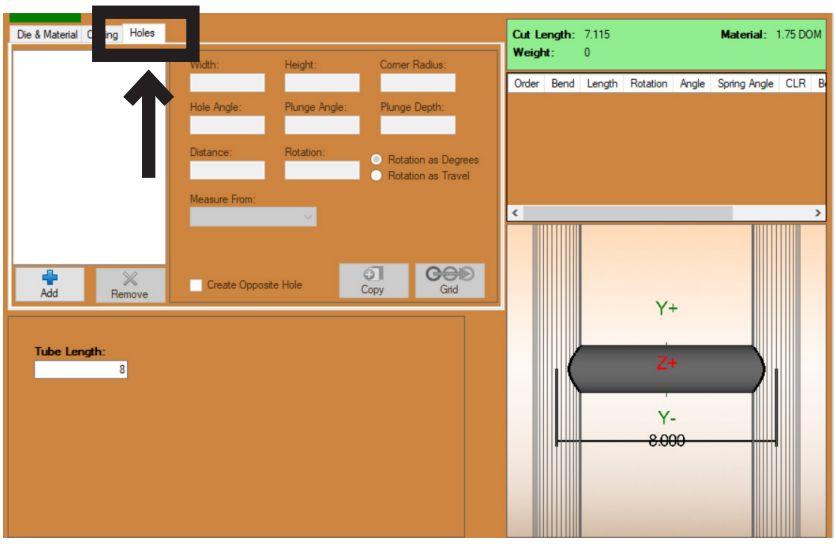
3.3.7 Cross Tube Display

Choose the WIRE FRAME display or the SHADED display to assist in visualizing how the part will interface with the overall project. Choose NONE for parts display only, with no visualization display.





3.4 Holes



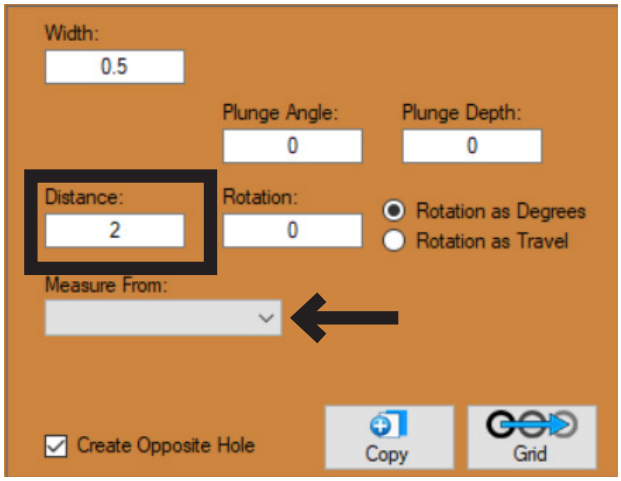
Click the Holes tab. The Holes interface is used to select and set up a variety of holes that can be cut into the material.

3.4.1 Add A Hole

To add a hole to the part click ADD. The Add New Hole window will appear.

Use the drop down menu to choose the type of hole needed for the part. Choose Round. Click OK.

3.4.2 Hole Location



Change the Distance value to move the hole location along the length of the tube.

Choose the desired Measure From value from the drop down menu.

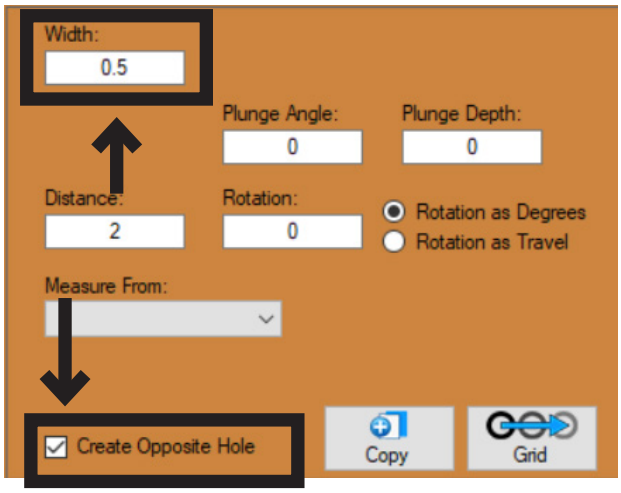
3.4.3 Hole Width

The program chooses a default size for the hole (½ in.). Change the Hole Width value to change the size of the hole.

Important

If a hole that is too big for the material is chosen, the program will shade all text boxes red until the hole size is corrected.

3.4.4 180-Degree Hole



To create a second hole 180-degrees from the original hole, check CREATE OPPOSITE HOLE to create a hole on both sides of the part.

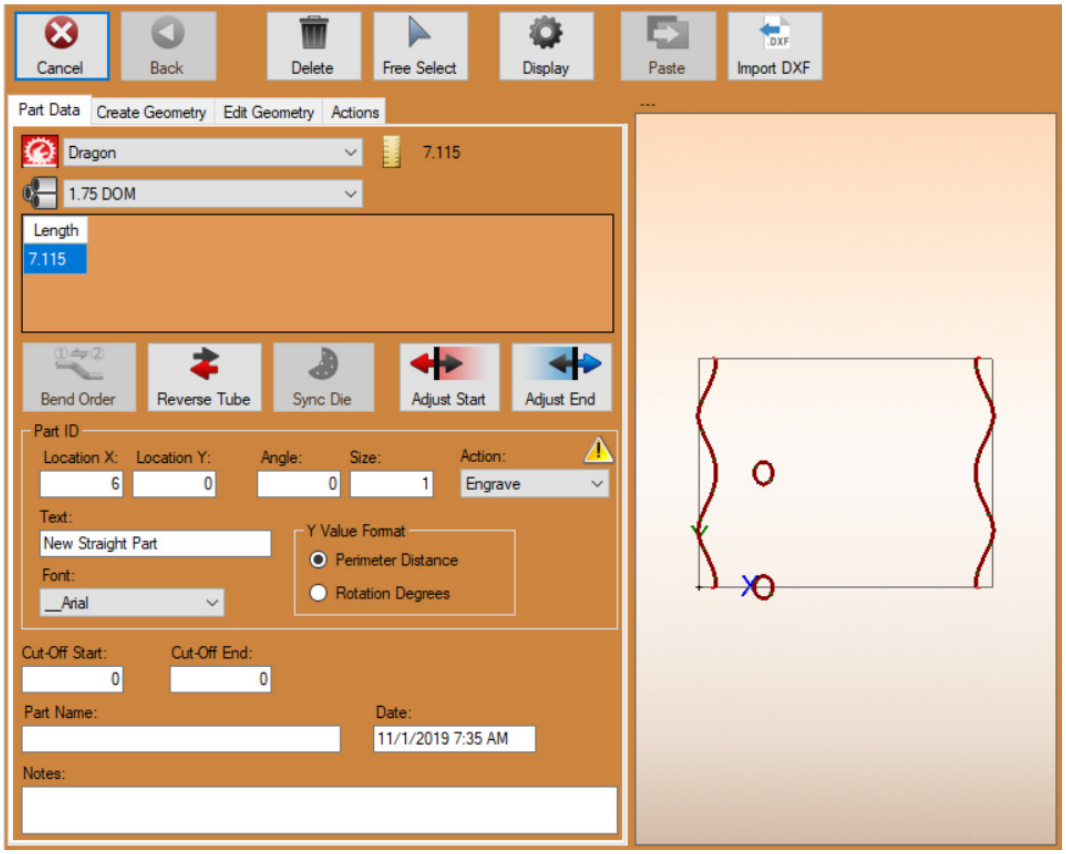
3.5 Edit Flat

In some cases it may be helpful to see a flat version of the part that is being designed. This is performed easily in the Bend-Tech Dragon software. Edit Flat can also be used instead of the 3D interface to edit and create a part.

Note

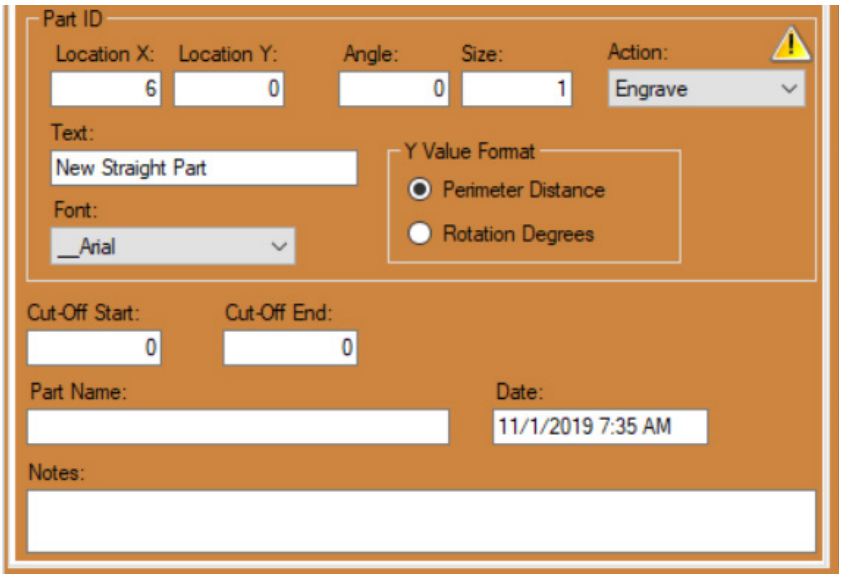
Edit Flat is typically used to mark or engrave part IDs, create custom geometry, or move lead-in locations.

3.5.1 Opening Edit Flat



At the top of the screen click the EDIT FLAT icon. A flat version of the part will appear in the design window.

3.5.2 Adding Part ID



In Edit Flat, a Part ID can be added to the part.

In the Part ID box, edit the value in the Location X text box to position the Part ID on the material from the start of the part. Edit the value in the Location Y text box to position the Part ID on the circumference of the material.

In the Angle text box, enter the angle at which the Part ID should appear on the material. A value of 0 will align the text lengthwise along the material.

In the SIZE text box, enter the size of the font as it should appear on the material. The part display interface will size the text accordingly on the part. This will show a visual of the size of the text in relation to the part.

In the ACTION drop down menu, the operator can choose how the machine will apply the Part ID to the material. Typically the Part ID will be Mark or Engrave.

In the TEXT text box, enter the text that should appear on the material.

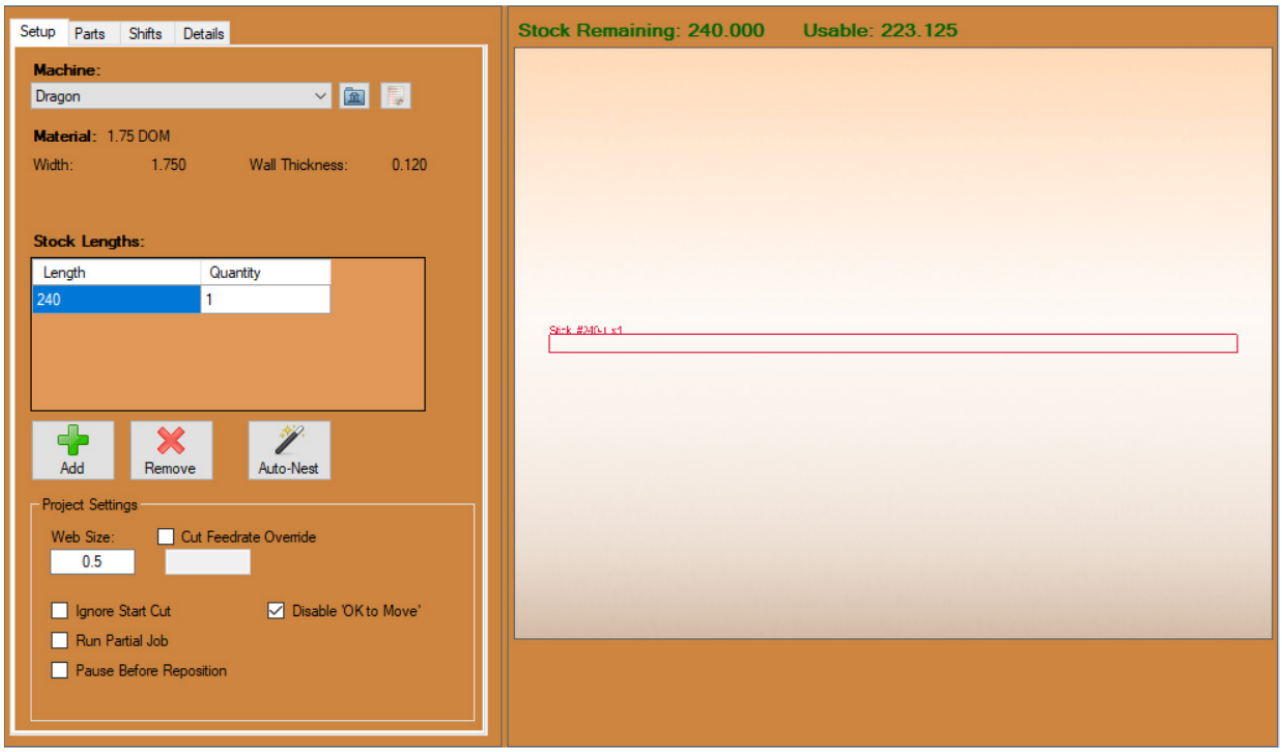
In the FONT drop down, choose the desired font that will be used with the Part ID.

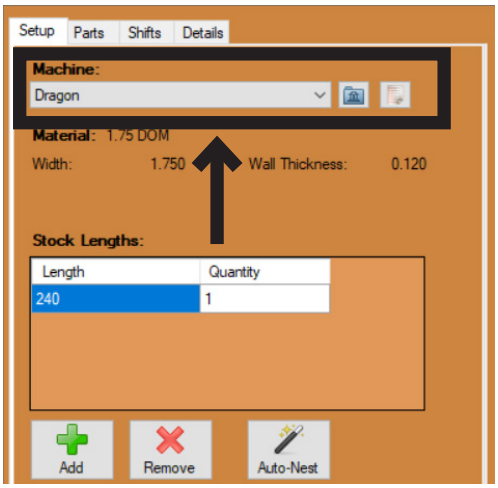
In the Y VALUE FORMAT box, choose the measurement metric the software will use to program how the machine places the text on the circumference of the part. Perimeter Distance will place the text from the start of the part as viewed in Edit Flat, Rotation Degrees will place the text according to Y Axis rotation.

At the bottom of the interface, the operator can choose a name for the part by typing the desired name in the text box under Part Name. The Part Name is not necessarily the same as the Part ID.

3.6 Nest Part

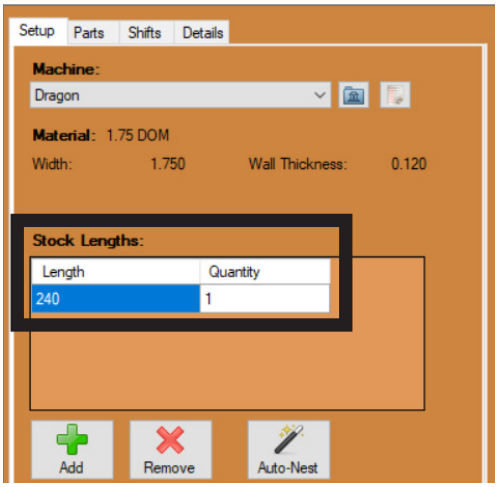
After the part has been designed, at the top of the screen, click NEST PART. This will open a new interface. Nest Part allows the designer to arrange the designed parts on a full material length for cutting. The parts can be arranged to optimize the given amount of material.





3.6.1 Nest Part Procedure

Select the machine where the Nest Part project will be run.



3.6.2 Stock Length

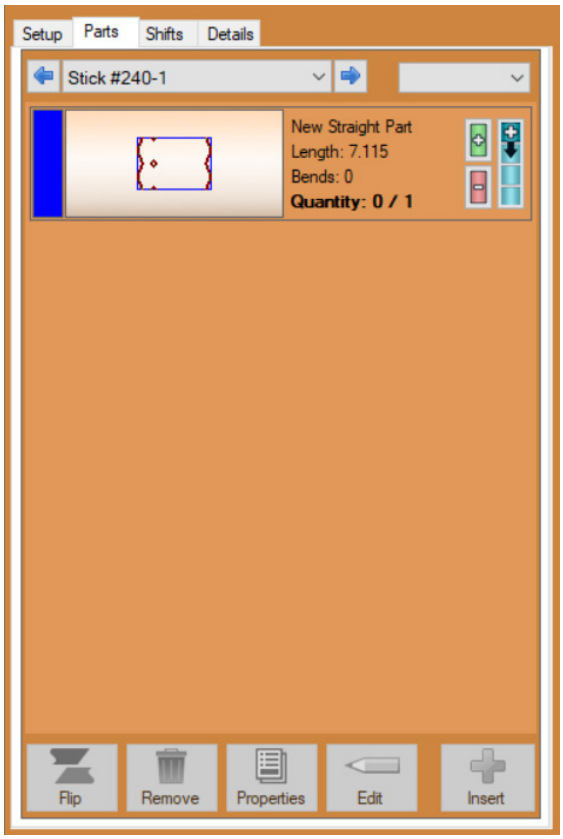
The STOCK LENGTH is the length of material that will be used when the Nest Part is produced. In the text box below the machine selection drop down menu, enter the length of the material.

Enter how many pieces of material will be used to create the Nest Part(s). A set material length or multiple different material lengths can be chosen based on what is available at the shop location.

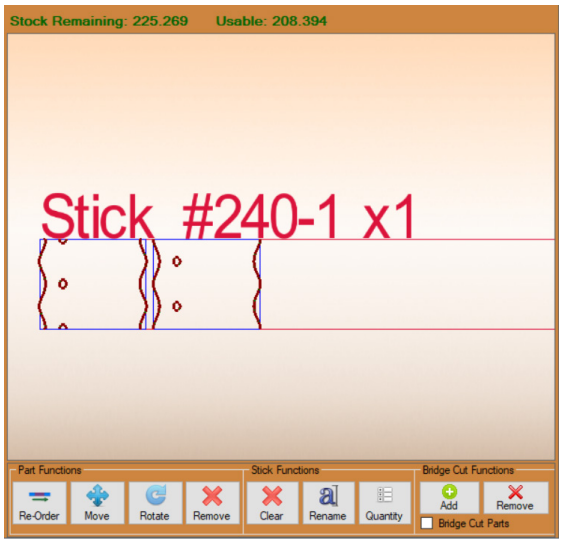
Tip

The default length of the material can be set in the Tube and Pipe Library per material.

3.6.3 Parts



The parts tab is used to arrange single, or multiple parts onto a specified number of stock length(s).

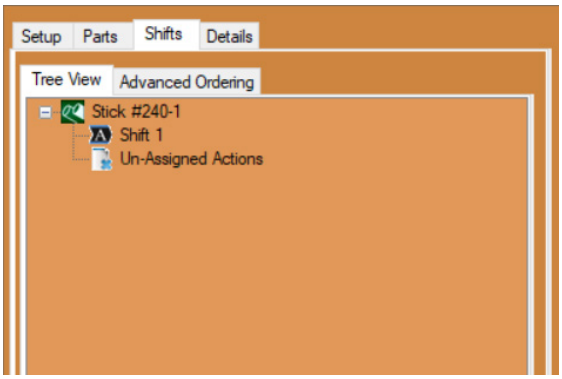


3.6.4 Part Functions

The Part Functions are used to edit parts after they have been placed on a stick of material. Part Functions can help to create a more efficient Nesting Project.

Part Function	Operation
Re-Order	The Operator can use the Re-Order function to adjust the order of parts as they are placed on the stick.
Move	The Move feature allows the Operator to move either one or a group of nested parts along the stick.
Rotate	The Rotate function allows the Operator to rotate the part on the material so parts can be fit closer together, reducing scrap. This can also help the Operator make more efficient transition between parts.
Remove	The Remove function allows the Operator to remove a part from a stick.

3.6.4 Shifts



The Shifts tab will display the order of operation the machine will use for its cutting path. The Operator can use the Shifts feature to rearrange cutting actions, unassign or remove actions from the list.

3.7 Run Project

With a part created and nested, click RUN PROJECT to begin the cutting and production procedure.

3.7.1 Run Project Procedure

Clicking RUN PROJECT will open the Machine Control screen. Click START. In the Status window the Travel, Laser and Load icons will light up.

Important

If the Operator selects Run Project, then clicks Start, the software may display a prompt to Home the machine. If this message appears, the Operator will be required to Home the machine before proceeding.

Note

Clicking Run Project sends a G-code to the machine driving software (Mach3) readying the machine to perform an operation. It does not start the cutting process.

Important

Clicking Start does not initiate the cutting process. It initiates the entire project process.

3.7.2 Load Material

When the status light for Load appears, load material into the Gate, and then secure it into the Chuck as outlined in section 2.1.3.

3.7.3 Pre-Run Checklist

By this point the machine should be ready to perform cutting procedures. However, Bend-Tech recommends always ensuring the machine is ready to run before each job. Never assume the machine is ready without a pre-cutting check.

Pre-Run Checklist

- ☐ Is the laser on the material lined up with the centerline of the material?
- ☐ Is the Chuck tightened on the material?
- ☐ Are the Gate Lead Screws finger tight on the material?
- ☐ Are the Gate Lead Screws at 12 o'clock and 3 o'clock?
- ☐ If cutting round material on non-powered Gate machines, is the Gate locked?
- ☐ Is the Torch unit powered on?
- ☐ Is the compressed air connected to the machine and the Torch unit?
- ☐ Are there replacement Torch consumables on hand?

3.7.4 Start

Once the checklist has been completed, the project is ready to be run. Click START. The machine will begin the cutting procedure.

04 Import Project Process

4.1 Import Project Process Overview

The Dragon A400 is capable of producing single parts, multiples of a single part, or complete projects composed of multiple unique parts. Using the Import and Nest Part feature, the operator can arrange and cut multiple unique parts from the same piece of material. This is especially effective when producing parts for such things as a handrail assembly, which may be composed of 20 parts or more.

Also, it is often the case that the parts drafter/designer is separate from the operator. With the Nest Part feature the designer can set up an entire nesting project and pass it on to the operator. The project can then be opened to the computer from an external drive such as a USB drive. The Bend-Tech software allows the operator to import CAD designs from the computer and prepare them for production using the Nest Part feature.

When the Operator initiates the Nest Part feature, the Bend-Tech software creates a Nesting Project. Once the Nesting Project is created, the operator can save the Nesting Project for use later.

4.2 Importing A Part To Dragon CAM

There are two ways to import a file into Dragon CAM. For the first method, click IMPORT from the Dragon CAM task menu interface under Create New.

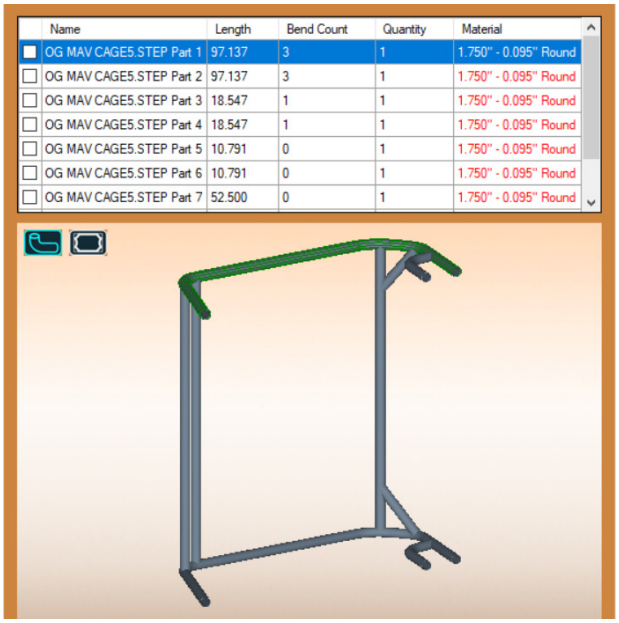
The second method is to go to the menu bar at the top of the screen, click File and in the drop down menu click IMPORT.

Choose the type of file you're importing. Click OK.

4.2.1 Opening A File In Dragon CAM

After choosing the file type to import, a file browser will open. Search for the file to import. Navigate to the file's location; select it, and click open. The file will open in Bend-Tech CAM. Depending on file size, this could take several minutes.

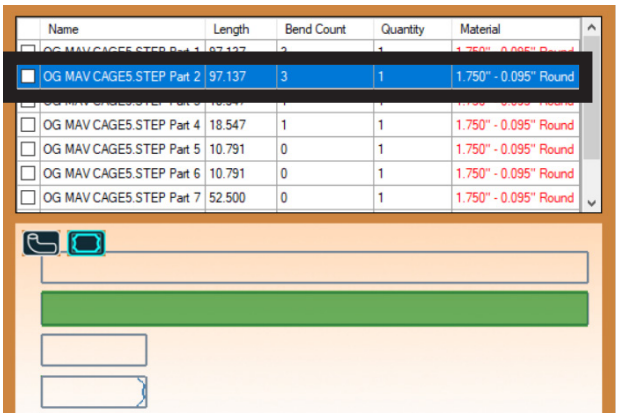
4.3 CAM Auto Import Interface



The Project Interface will feature a parts listing and a diagram of the assembly. Toggle between a diagram of the assembly and a flat layout by clicking the bent tube icon or the flat part icon in the top left corner.

Click the bent tube icon to show the assembly.

Click the flat icon in the upper left to show the individual parts.



The Part Listing interface above the part Display interface will show the arrangement of the parts by their part name. Clicking on one of these will highlight that particular part in the part interface.

Double click the NAME text box to change the name of the part. Double click the Quantity text box to change the part quantity.

Note

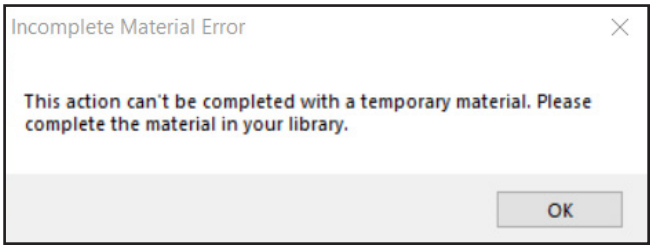
This example uses Auto Import. Other import processes may require additional steps.

4.3.2 Nest Part

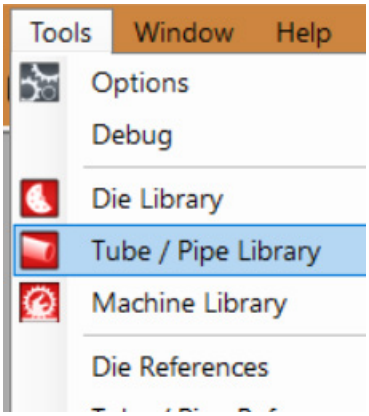
At the top of the interface, click the NEST PART icon. This will begin the process of arranging the parts on the given material for cutting. Select which parts will be nested from the import list. If the project has multiple material sizes, a Nesting Project for each material size will be created.

4.3.3 Creating Temporary Materials

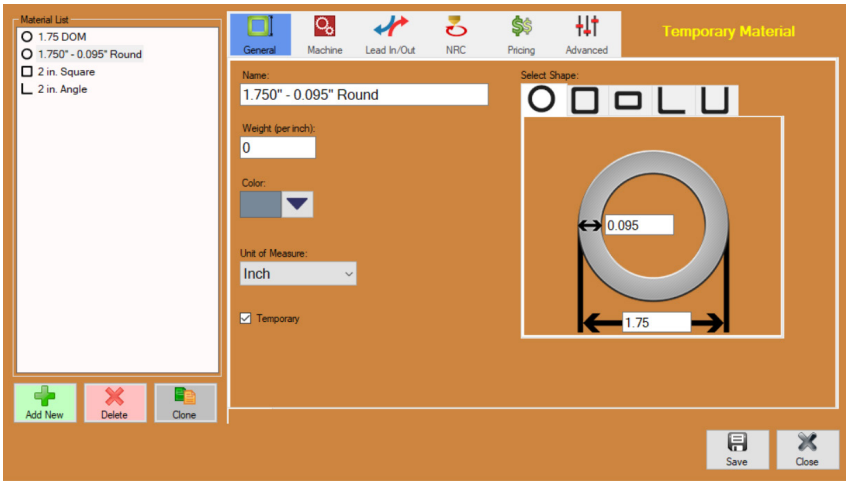
If all the material sizes are not entered in the Tube and Pipe Library, a warning will appear that says, “The action cannot be completed with a temporary material. Please complete the material in your library.” Click OK. The software will automatically create a temporary material in the Tube and Pipe Library. The Import List will display material already entered in the Material Library in green type. Material not entered in the Material Library will be displayed in red type.



4.3.4 Complete Temporary Material



In order to process a temporary material, the operator will need to complete the temporary material in the Tube and Pipe Library. Click the TOOLS drop down, then click Tube and Pipe Library. This will open the Tube and Pipe Library.

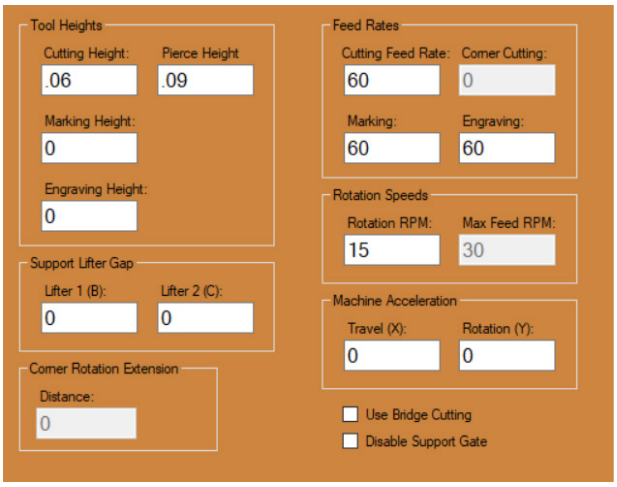


Search the Material List for the temporary material the software created. Click on the material. The interface will now say “Temporary Material” in the upper right.

Note

The name of the material will be the name of the material in the import parts list.

4.3.5 Setting Cutting Parameters

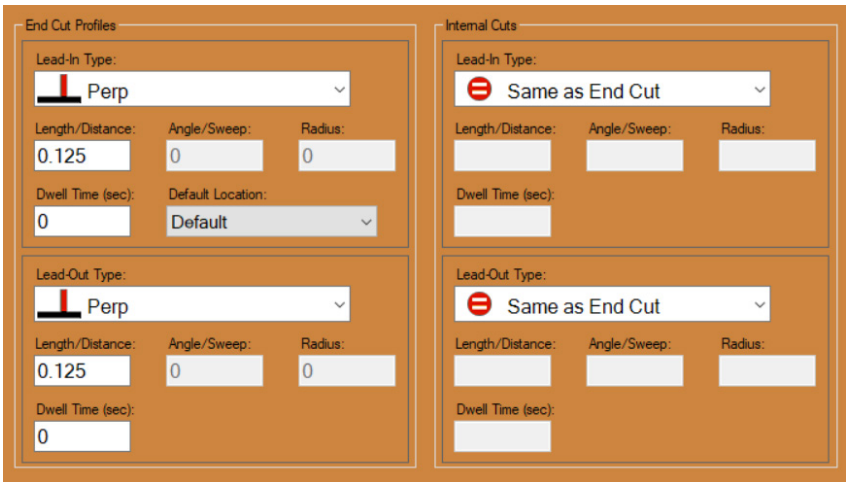


Under the Machine icon, fill in the parameters in the text boxes as listed.

Cutting Feed Rate: 60
Marking: 60
Engraving: 60
Cutting Height: .06
Pierce Height: .09

Click SAVE.

4.3.6 Setting Lead In/Lead Out



The operator can set the Lead In/Out for the material. Click Lead In/Out at the top of the interface.

In the End Cut Profiles box, under Lead-In Type, click the text box drop down menu, then click the type of lead-in needed for the material. Typically this is set to Perpendicular. Also within the End Cut Profiles box, enter .125 in the Length/Distance text box for both the Lead-In Type and Lead-Out Type.

Click the text box under Lead-Out Type and choose the type of lead-out needed for the material. This is typically set to Perpendicular. Repeat this process in the Internal Cuts box, choosing “Same as End Cut.”

Click SAVE.

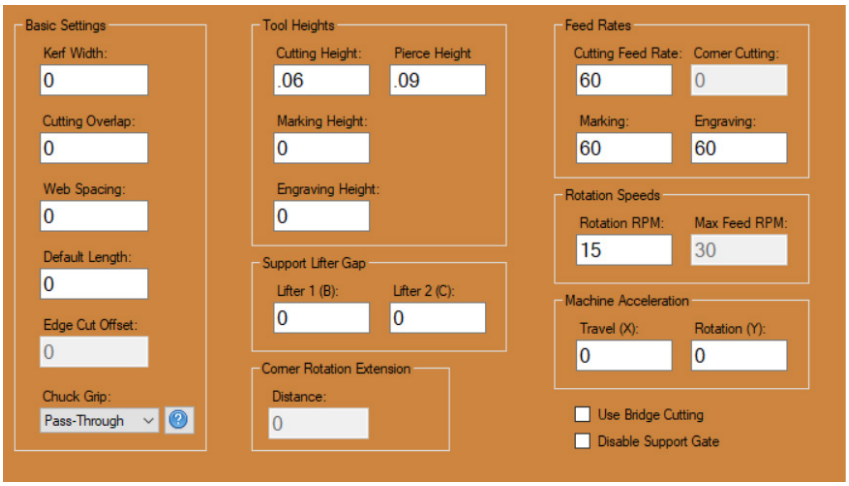
Important

Angle and Channel material typically require different Lead-In settings.

Note

The settings in sections 4.3.5 and 4.3.6 are general settings and may not be optimal for all materials.

4.3.7 Other Basic Settings

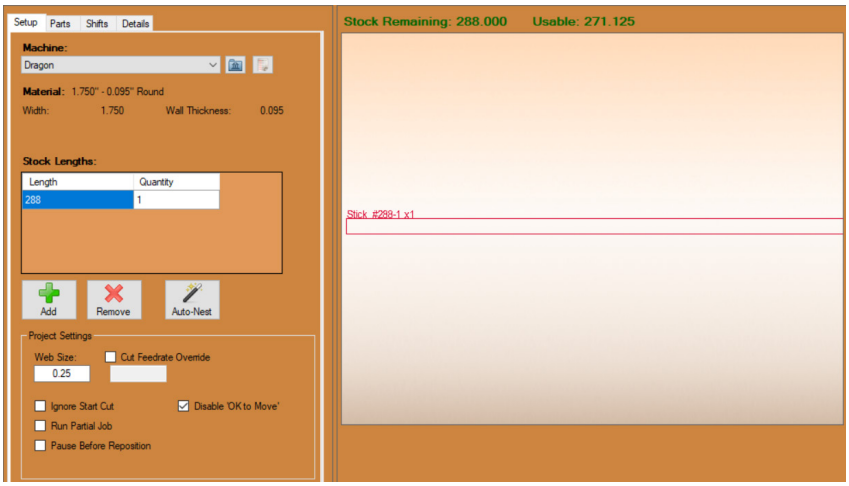


There are other basic settings the operator should enter when setting up Temporary Material in the Nesting Project. Click Machine in the menu bar at the top of the interface.

Enter the following values:

Kerf width: .06
Web spacing: .25
Default length: 288

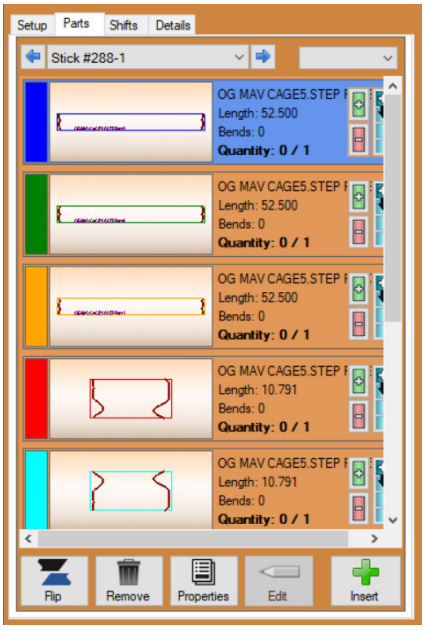
Click SAVE. Click CLOSE. Click NEST PART.



After clicking Nest Part, the software will open a Nesting Project interface for each size material used in the project. For example, if there are two different tube sizes, two separate interfaces will open, one for each size material. If there is only one size material, one interface will open.

At this point the project is Nested.

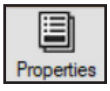
4.4 Running A Nesting Project



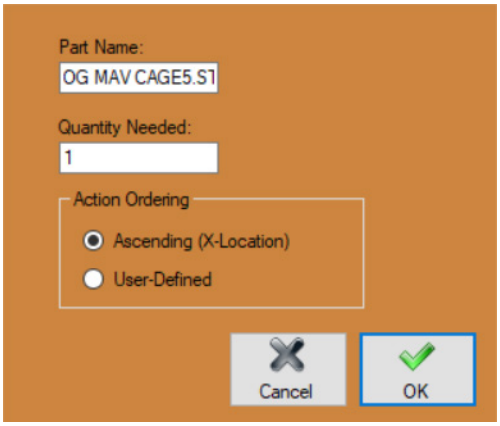
Once a Nesting Project is created, it can be saved and run at any time. The software will save the project until the Operator decides to delete it.

4.4.1 Preparing The Parts

In the Nesting Project interface, the operator can change the quantity of a part in the project. To do this, click the Parts tab. Click on an individual part in the parts listing.



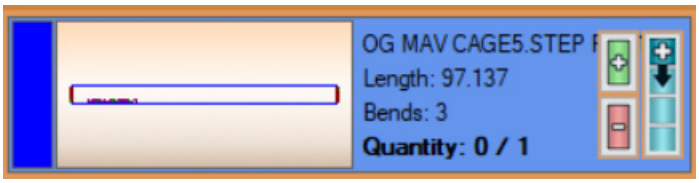
Below the parts listing click PROPERTIES.



This will open an interface that will allow the operator to enter or change a Part Name and a Quantity Needed. The operator can also change the Action Ordering. Click OK. Repeat this process as needed for the parts listed.

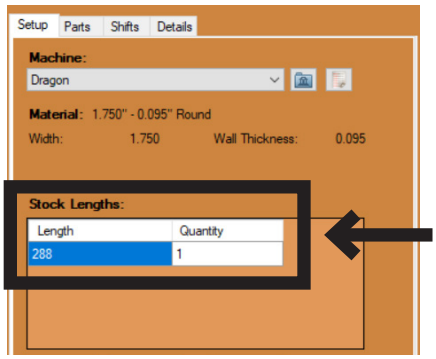
Important

It is advised to choose Ascending unless highly experienced.



A second way to change the quantity of a part is to click the part in the list. This will highlight the entire part box to its designated color. The operator can now change the quantity by clicking the green +, the red - or the blue +, which will fill an entire piece of material with the same part.

4.4.2 Setup



In the Nesting Project click the Setup tab. Ensure the length of the material used is correct in the Stock Lengths interface.

Near the center of the Setup interface, click AUTO NEST. By clicking Auto Nest, the software calculates if the total number of parts can be produced on the material entered in the Stock Lengths interface. If there is not enough material the Operator will need to enter a larger number under Quantity.

Note

If 0 is entered under quantity in stock lengths, the software will apply the correct number of material sticks.

4.4.3 Parts

In the Nesting Project, under the Parts tab, the operator can edit how many parts are nested on a stick as well as the order the parts are placed on the stick. Each part will be displayed on the left hand side of the interface and will automatically be assigned a default color by the software. Next to each part there are three options to add or remove parts in the project.

Icon	Function
Green +	Add part(s) to the stick
Red -	Remove part(s) from the stick
Blue +	Fill a stock with a part

Clicking the green + icon or red - icon will cause a popup to appear where the number of parts being added or removed can be entered.

4.4.4 Part Functions

Under the stick display interface, in the Part Functions box, click Re-Order to move a part to a different location on the stick. Click RE-ORDER, mouse over the part and the part will be highlighted. Click the part and the software will show an outline of the part tethered to the mouse cursor. Move the outline to the desired position on the stick along the edge of another part nested on the stick. Click to place the part in the new position.

Click the MOVE icon, click on a part on the stick, and the software will allow that part to be moved along the stick or to a different stick.

Click the ROTATE icon, click a part on the stick, then move the mouse cursor to rotate the part on the stick. Click to place the part in the new, rotated position.

Click the REMOVE icon then click on a part and it will remove it from the stick.

4.4.5 Stick Functions

To clear all parts off a stick, click the CLEAR button located under the stick display interface in the Stick Functions box. When the Clear icon is clicked a popup will appear that reads: “Are you sure you want to remove all parts from the stick?” Click YES. This will clear the stick.

Click the RENAME icon to add a name to the stick.

Click the QUANTITY icon to add identical sticks to the Nesting Project. Adding duplicate sticks will change the number that appears above the stick in the interface.

4.4.6 Adding Material

In the Setup tab under the Stock Lengths interface, Click REMOVE.

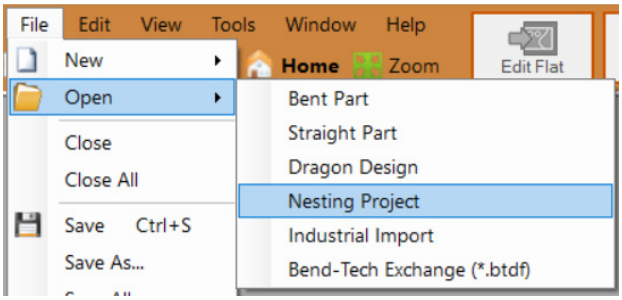
Click ADD. Enter the length of the material being used. Enter the quantity the software displayed as grayed-out material.

Click AUTO NEST. The software will automatically change the Quantity to what is needed to run the project.

4.4.7 Saving

To save the Nested project, click File in the drop down menu at the top of the page, click SAVE AS and enter a name and location where the project will be saved. The operator can now exit out of the interface. The project can be opened from its saved location for future production.

4.4.8 Opening a Saved Nesting Project



There are two ways to open a Nesting Project. To open a Nesting Project click the File tab at the top of the Interface, mouse over Open, then click Nesting Project. This will open a complete list of saved Nesting Projects. With the Nesting Project interface already open, the Nesting Project can be dragged and dropped into the interface, which will open the file.

4.4.9 Running A Nested Project

To run a Nested Project on the Dragon A400, having completed all previous steps outlined in this chapter, and with the Nested Project open, click RUN PROJECT at the top of the interface. If not already open, Mach3 will open.

The Machine Control interface will open. Assure all Axes on the machine are homed. Click START. When the Load icon lights up, load the material into the machine. Click START a second time to start the cutting process.

Dragon CAM Side Offsets Calibration

5.1 Side Offsets Calibration for Square and Rectangle Tube

Square and rectangle tubing have measurable sides which makes the procedure for setting up these materials in the Dragon A400 different than setting up round tubing. The following process will walk the operator through the procedure to set up a piece of square tubing, but rectangular tubing will be similar.

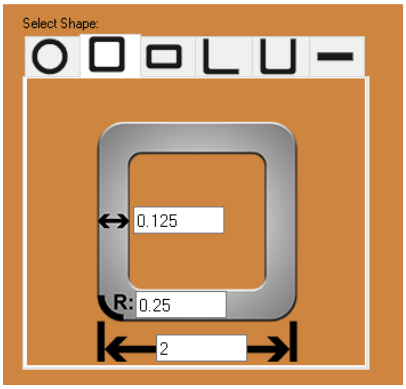
5.1.1 Open Bend-Tech 7x

To begin the Side Offset Calibration process, open Bend-Tech 7x. Click Dragon CAM near the center of the interface.

5.1.2 Add Square Or Rectangle Material

Important

Spacers are required for rectangle material. The Channel Material Spacers described in Section 6.4.8 can be used with Rectangle Material.



On the Bend-Tech Dragon Home Interface click Tube Library, then click Add New, below the Material List in the bottom left of the interface.

Select the shape of the material that will be used in the Select Shape box on the right hand side of the interface. Enter the dimensions of the material in the appropriate text boxes. Enter a name for the material.

Click SAVE.

5.1.3 Chuck Grip Settings

Before proceeding with Side Offsets Calibration, it is important to ensure the Chuck Grip setting in the Bend-Tech Dragon software matches how the material is chucked into the machine.

In the Tube / Pipe Library, under the Machine tab, locate the CHUCK GRIP drop down menu within the Basic Settings box. To reference which Chuck Grip to choose, click the question mark icon next to the Chuck Grip drop down. Set Chuck Grip appropriately.

5.1.4 Corner Rotation Extension

Corner Rotation Extension is the distance set before the tool reaches the edge of a given material prior to the machine beginning rotation of the material. If the Corner Rotation Extension is not set correctly it can lead to Torch collision, or the Torch cutting vertically into the wall of the material. It can also cause Torch failure.

In the Tube / Pipe Library, in the Machine interface, locate the Corner Rotation Extension box in the bottom center of the interface. Use the formula to calculate the value to enter in the Distance text box.

(wall thickness + kerf) - radius = Corner Rotation Extension

Example:
(.120 + .06) - .15 = .03

If the Corner Rotation Extension value is negative, leave it set to 0 in the software. For this material the CRE would be set to 0.

Note

Bend-Tech recommends using a corner radius gauge to determine material corner radius. If a corner radius gauge is not available multiply material thickness by 2 and enter that value as an estimated corner radius.

5.1.5 Open Side Offset Calibration

The material will appear in the Material List on the left hand side of the interface. Click on the material. In the menu bar at the top of the same interface click Advanced.

In the middle of the interface in the Side Offsets box, click CALIBRATE.

Important

Ensure Machine Control is open before clicking the Calibrate icon.

5.1.6 Disable Feature

The next interface will give the Operator the option to Disable the Side Offset Calibration feature and use the machine's default measurements.

Bend-Tech requires performing the Side Offset Calibration to achieve more accurate results when cutting square or rectangular material.

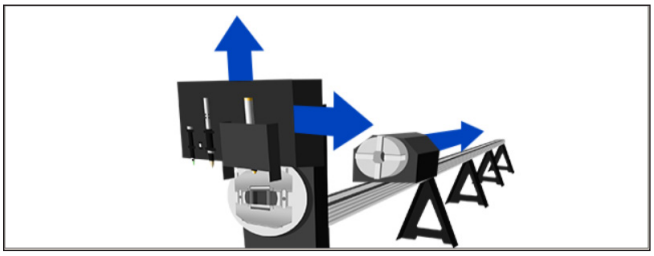
Click NEXT.

5.1.7 Power On The Machine

Select the machine, click Next, then ensure the machine is powered on. The interface will prompt the Operator to Start Mach3 by clicking the icon on the interface.

Click START MACH.

5.1.8 Homing Procedure



The Operator will be asked to perform the machine's Homing process. To begin the Homing process click the image in the interface.

After the Homing process is complete, click NEXT.

5.1.9 Load The Material

The machine will ask the Operator to enter the length of the material. The Side Offsets Calibration should use a piece of material between 3 ft. and 6 ft. in length. This will move the Trolley into place so the Operator can load the material into the machine.

Turn the Gate Lead Screws clockwise until the Gate rollers are snug to the material. The material should move freely in the Gate with no play. Ensure the Gate Lead Screws are in the 12 o'clock and 3 o'clock positions.

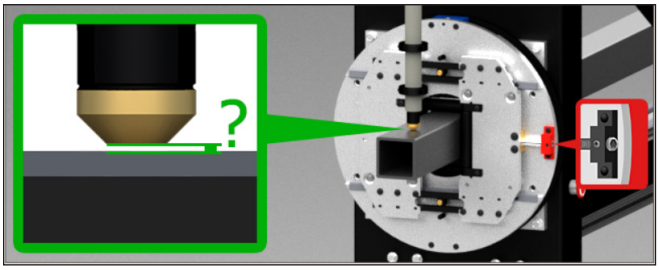
Feed the material into the Chuck, making sure the Chuck is adjusted so it will accept the material. Using a torpedo level on the material, secure it in the Chuck making sure it is as level side-to-side as possible. If the machine is equipped with a Powered Gate the Operator will not need to position the Gate Lead Screws or use a Torpedo Level on the material.

Note

During the homing process, the software will display a message in green text. Upon homing, the green text will disappear.

When the material is loaded into the machine click NEXT.

5.1.10 Torch Distance



The program will ask the operator to record the gap distance between the Torch and the material for each side of the material. This can be accomplished using a set of feeler gauges and Vernier calipers. Before beginning, verify the Gate Lead Screws are in the 12 o'clock and 3 o'clock positions.

To begin, click Move Torch. Measure the distance between the Torch and the material by stacking the appropriate number of feeler gauges. Measure the thickness with a caliper. This is the gap distance.

Type the gap distance into the text box and click Next. The machine will automatically move to the next side of the material. Perform this for all four sides.

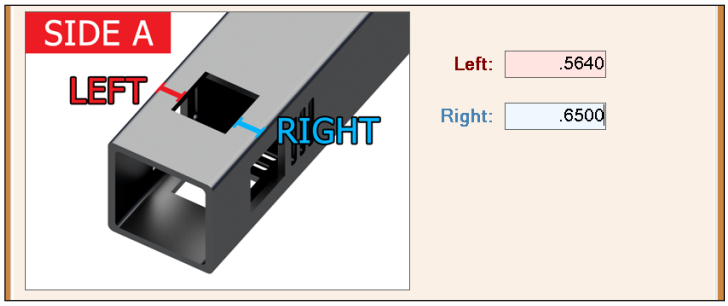
5.1.11 Run Test Cuts

The machine will now perform a test cut procedure based on the Torch height values entered by the operator.

Click RUN to begin this process.

When the process is complete, click NEXT.

5.1.12 Measure Test Cuts



The program will ask the operator to measure the distance of the left hand and right hand side of the hole to the edge of the material.

Use the images on the interface as a reference regarding which sides to measure. Enter the appropriate values in the text boxes.

After performing this for sides A, B, C, and D, click NEXT.

An interface will open showing the Side Offset values for the material. The program will use the material size and the values entered in the Side Offset Calibration to center the holes on each side.

To ensure the calculations are correct, click VERIFY and the machine will perform the test cut procedure again. If the holes are not centered after the second test cut. Click GO BACK to repeat the calibration process.

If the holes are centered, click FINISH.

5.1.13 Save Calibration

Once the calibration is finished, the program will return to the Tube and Pipe Library interface. The Side Offsets box will show the calibration values determined during the Side Offset Calibration.

Click SAVE to record the calibration values for that material. These values will be used every time that particular material is run through the machine.

Note

Material only needs to be calibrated when it is first entered into the Tube and Pipe Library.

06 Angle and Channel Material Setup

6.1 Angle and Channel Material Overview

In addition to round, square and rectangle tubing, the Dragon A400 is also capable of processing angle and channel material. Bend-Tech software allows the user to design parts and assemblies using angle and channel material. These designs cannot be imported into the Dragon software, these parts can only be designed in Dragon CAM.

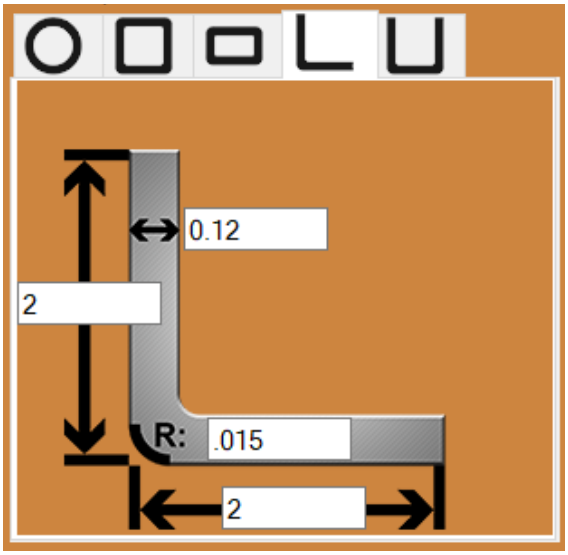
6.2 Adding Angle and Channel Material

Before processing angle or channel material, the operator will need to add the material to the Tube and Pipe Library. After creating and saving angle or channel material, the operator will be directed to the Lead In/Out tab in the material settings.

6.3 Angle and Channel Material Machine Settings

Angle and channel material brings unique challenges to the operator when trying to process this material in the Dragon A400. The operator must take into consideration the sharp radius on the outside corner, as well as the differing thicknesses of the material. It is important to follow the steps outlined in this chapter for proper processing of angle and channel material.

6.3.1 Corner Radius



It is advised that the operator enter .015 as the corner radius in the material dimensions when processing angle material.

Using a value less than .015 will cause rounding issues. Using a value greater than .015 will move the Torch closer to the material and possibly result in the Torch contacting the material.

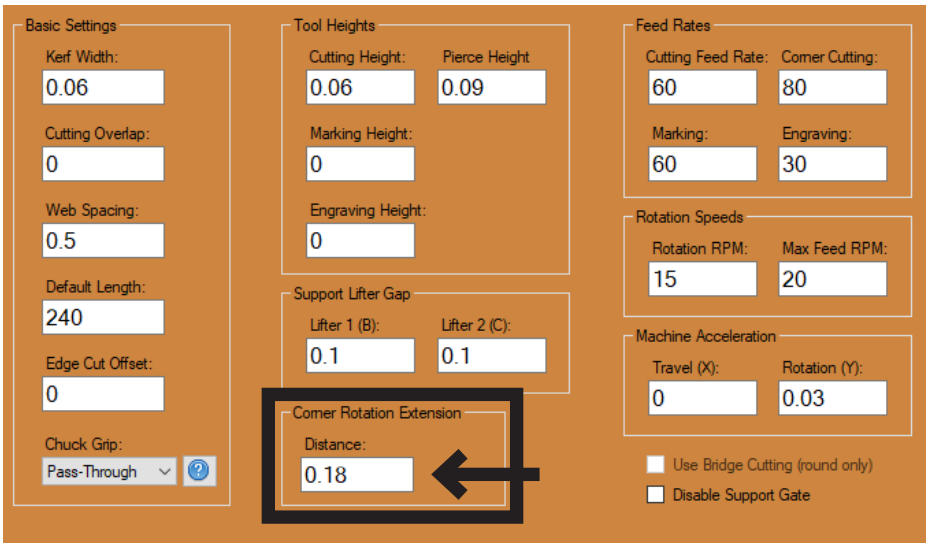
6.3.2 Y-Axis (Chuck) Acceleration

It is advised the Operator set the Y Axis acceleration value to .030 to ensure the angle or channel material is moved properly and stays secure and in position during machine operation. Another method the Operator can use to figure Y Axis acceleration is:

Radius x 2 = Y acceleration

To set Y-Axis acceleration, on the Bend-Tech Dragon home interface, under Library, click Tube Library, then click the Machine icon. In the bottom right, in the Machine Acceleration box, change the Rotation (Y) value to .030 in.

6.3.3 Corner Rotation Extension



When processing angle and channel material, or any material with a sharp radius, it is necessary to slow the Torch and give it a larger radius as it passes over the corner. Bend-Tech has calculated a formula for this:

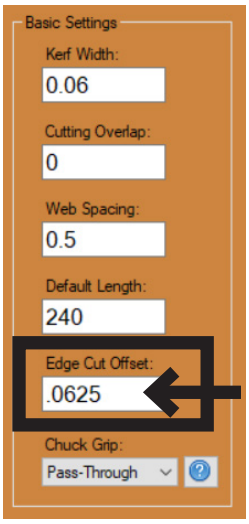
Material Thickness + Kerf Width

For example, if the Kerf Width is 0.060 in. and the material thickness is 0.25 in. the corner rotation extension would calculate to 0.31 in.

Important

Incorrect corner rotation extension (too close to the material or too far) could result in loss of Torch arc.

6.3.4 Edge Cut Offset

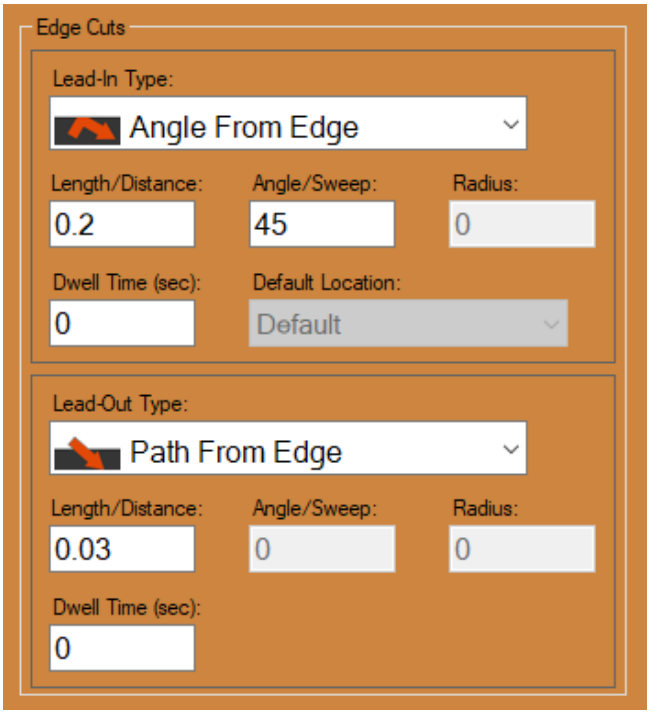


Under the Machine tab, in the Basic Settings box, set Edge Cut Offset to .0625. Edge Cut Offset is the distance beyond the edge of the material the Lead In/Out is allowed to extend when performing edge cuts. Bend-Tech has found .0625 to be the optimal setting when processing angle or channel material.

Important

Using a value greater than .0625 for Edge Cut Offset may cause the Torch to lose arc. A value smaller than .0625 will result in inconsistent cut quality.

6.3.5 Lead In/Out Settings



In the Lead In/Out settings, under Edge Cuts, set the Lead-In Type to Angle From Edge, the Length/Distance to 0.2 in. and the Angle/Sweep to 45-degrees.

Set the Lead Out Type to Path From Edge and the Length/Distance to 0.030 in.

Set all other values in Edge Cuts to 0 or leave at the default value. Internal cuts can be run with typical settings.

6.4 Side Offsets Calibration

As with square or rectangular tubing, the Operator must perform a Side Offsets calibration prior to processing angle and channel material.

6.4.1 Open Bend-Tech 7x

To begin the Side Offsets Calibration process, open Bend-Tech 7x. Click Dragon CAM.

6.4.2 Begin The Calibration Process

On the Bend-Tech Dragon Home Interface click Tube Library then choose the angle or channel material to be calibrated from the Material List.

In the menu bar at the top of the same interface click Advanced. Click the CALIBRATE button located next to the Side Offsets section.

6.3.3 Disable Feature

The next interface will give the operator the option to Disable the Side Offsets Calibration feature and use the machine's default measurements. Bend-Tech requires performing the Side Offsets Calibration to achieve more precise results when cutting square, rectangular, angle or channel material.

Click NEXT.

6.4.4 Power On The Machine

Select the machine, click NEXT, then ensure the machine is powered on. The interface will prompt the operator to Start Mach by clicking the icon on the interface.

Click START MACH.

6.4.5 Homing Procedure

The Operator will be asked to perform the machine's Homing process. To begin the homing process click the image in the interface.

After the homing process is complete, click NEXT.

6.4.6 Load The Material

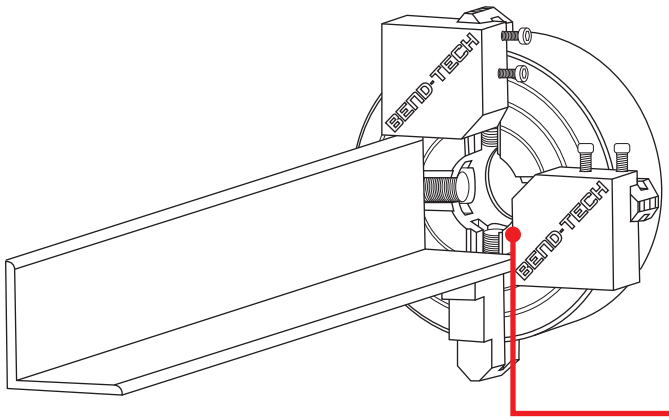
The machine will ask the Operator to enter the length of the material. This will move the Trolley into place so the Operator can load the material into the machine. Always load angle material with one flat down and one flat on the left (Marker side) of the machine. If one flat is larger than another, ensure the larger flat is down.

For channel material, load with the largest side down. Turn the Gate Lead Screws clockwise until the Gate rollers are snug to the material. The material should move freely in the Gate with no play. Ensure the Gate Lead Screws are in the 12 o'clock and 3 o'clock positions. Feed the material into the Chuck, making sure the Chuck is adjusted so it will accept the material.

When the material is loaded into the machine click NEXT.

6.4.7 Angle Material Spacers

Material alignment fixtures (spacers) have been designed for use with Angle material. These should be used to support the material in the chuck. They support the edges of the angle, while the chuck teeth support clamp the legs of the angle material in place against the spacers.

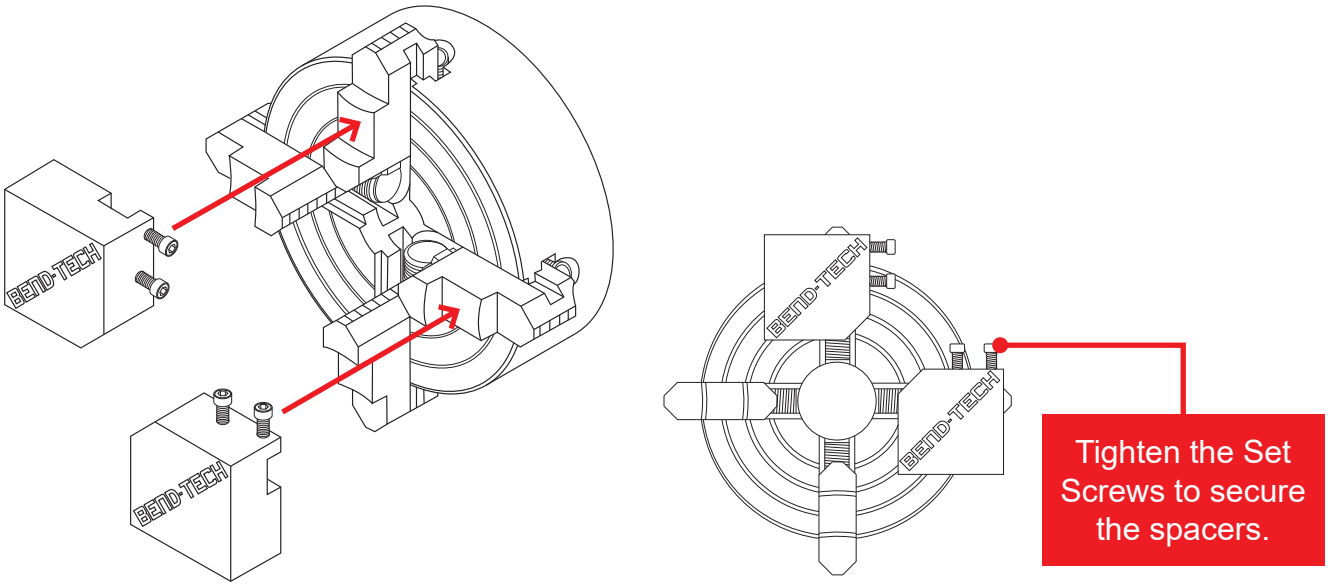


Important

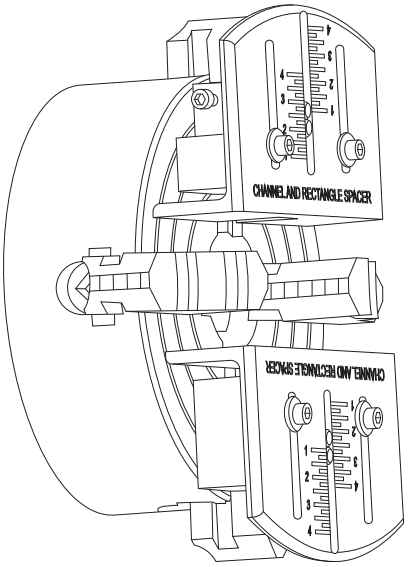
The Angle Spacers are unique, and need to be installed while the chuck is in Load Position.

Ensure the spacers are aligned and flush with the front edge of the chuck teeth.

Set the chuck to load position. Install the two blocks as shown. Align them so the edge is flush with the front edge of the chuck jaws. Tighten the set screw to hold the spacers in place, take care to not over tighten.



6.4.8 Channel Material Spacers



Material alignment fixtures (spacers) have been designed for use with Rectangle and Channel material. These should be used to support the material in the chuck and can be adjusted based on the material size. The spacer cannot be used with Channel material that has a depth dimension larger than the witdth. This would leave the other two chuck teeth unable to grip the material because the spacers are not meant to grip the material, only support it.

Important

The spacers cannot be used with Channel material with a depthj dimension longer than the width.

When the chuck is in Load Position, mount the spacers on the top and bottom teeth. Align the grooves in the spacers with the chuck teeth and push flush with the chuck face. The base of the spacer should align with the front of the chuck tooth.

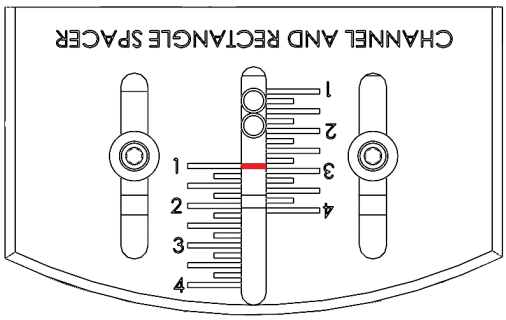
Tighten the set screw to hold the fixture in place. Adjust the spacers according to material dimensions.

The spacers are able to be used with both types of chuck teeth that are provided with the machine. Reverse the slider bar for use with the second style of chuck teeth.

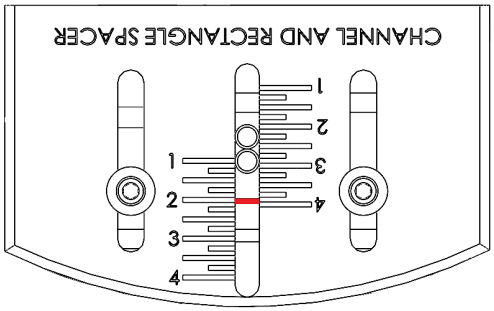
Important

Use the right side markings with the external chuck teeth set and the left side markings with the internal chuck teeth set.

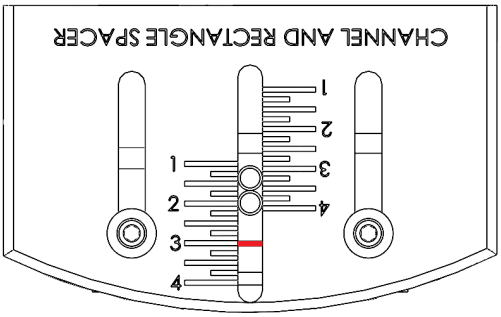
The Rectangle and Channel spaces can accommodate material sizes with up to a 4-inch difference between the Width and Depth of the material. If the material is 4” x 2”, for example, the difference is 2-inches (4 - 2 = 2). Set the spacers for this difference. Align the position marker with the hash marks as shown in the examples below. Use the screws on the front of the spacer to secure the spacer at the position needed.



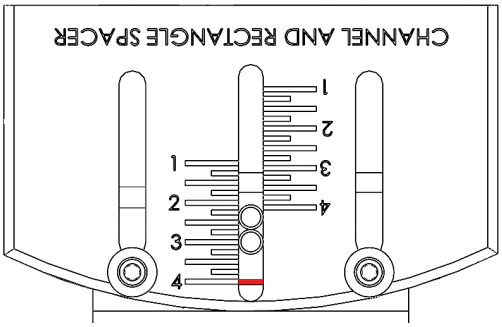
1-inch Step



2-Inch Step

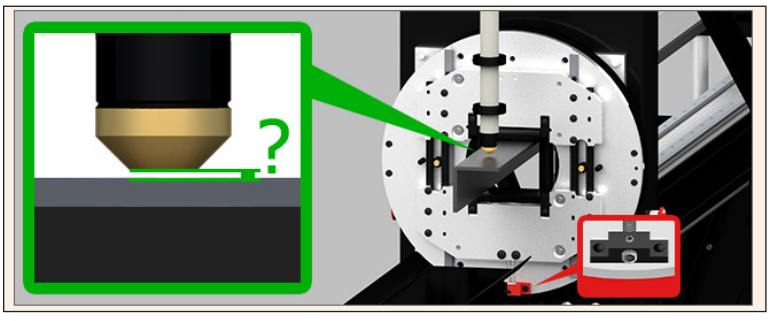


3-inch Step



4-Inch Step

6.4.9 Torch Distance



The program will ask the operator to record the gap distance between the torch and the material for each side of the material. This can be accomplished using a set of feeler gauges and calipers as outlined in chapter 5.

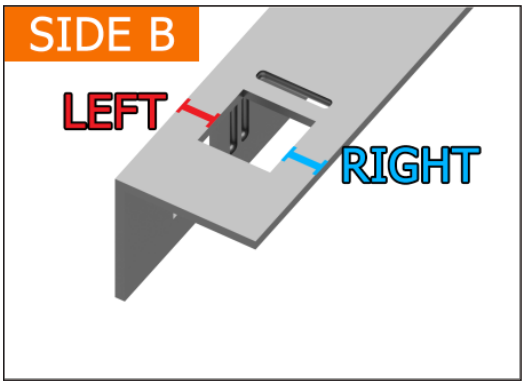
To begin, click MOVE TORCH. Measure the distance between the Torch and the material, this is the gap distance.

Type the gap distance into the text box and click NEXT. The machine will automatically move to the next side of the material. Perform this for all sides.

6.4.10 Run Test Cuts

The machine will now perform a test cut procedure based on the Torch height values entered by the Operator. Click Run to begin this process. When the process is complete, click NEXT.

6.4.11 Measure Test Cuts



The program will ask the operator to measure the distance of the left hand and right hand side of the hole to the edge of the material. Use the images on the interface as a reference regarding which sides to measure.

After performing this for each side of the material, click NEXT.

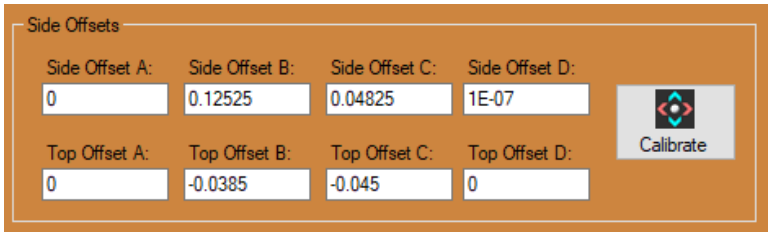
An interface will open showing the Side Offsets values for the material. The program will use the material size and the values entered in the Side Offsets Calibration to center the holes on each side.

To assure the calculations are correct, click VERIFY and the machine will perform the test cut process again. If the holes are not centered after the second test cut click GO BACK to repeat the calibration process.

If the holes are centered click FINISH.

6.4.12 Save Calibration

Once the calibration is finished, the program will bring the operator back to the Tube and Pipe Library interface. The Side Offsets box will show the calibration values determined during the Side Offsets Calibration process.



Click SAVE to record the calibration values to go along with the material. Whenever the saved material is run the machine will pull the calibration values saved in this process.

Note

Material only needs to be calibrated when it is first entered into the Tube and Pipe Library.

Attention

After completing the Startup Manual Part 3, if you need further assistance, contact Bend-Tech Customer Support.

Bend-Tech, LLC

729 Prospect Ave. Osceola, WI 54020
1-651-257-8715

sales@bend-tech.com
www.bend-tech.com