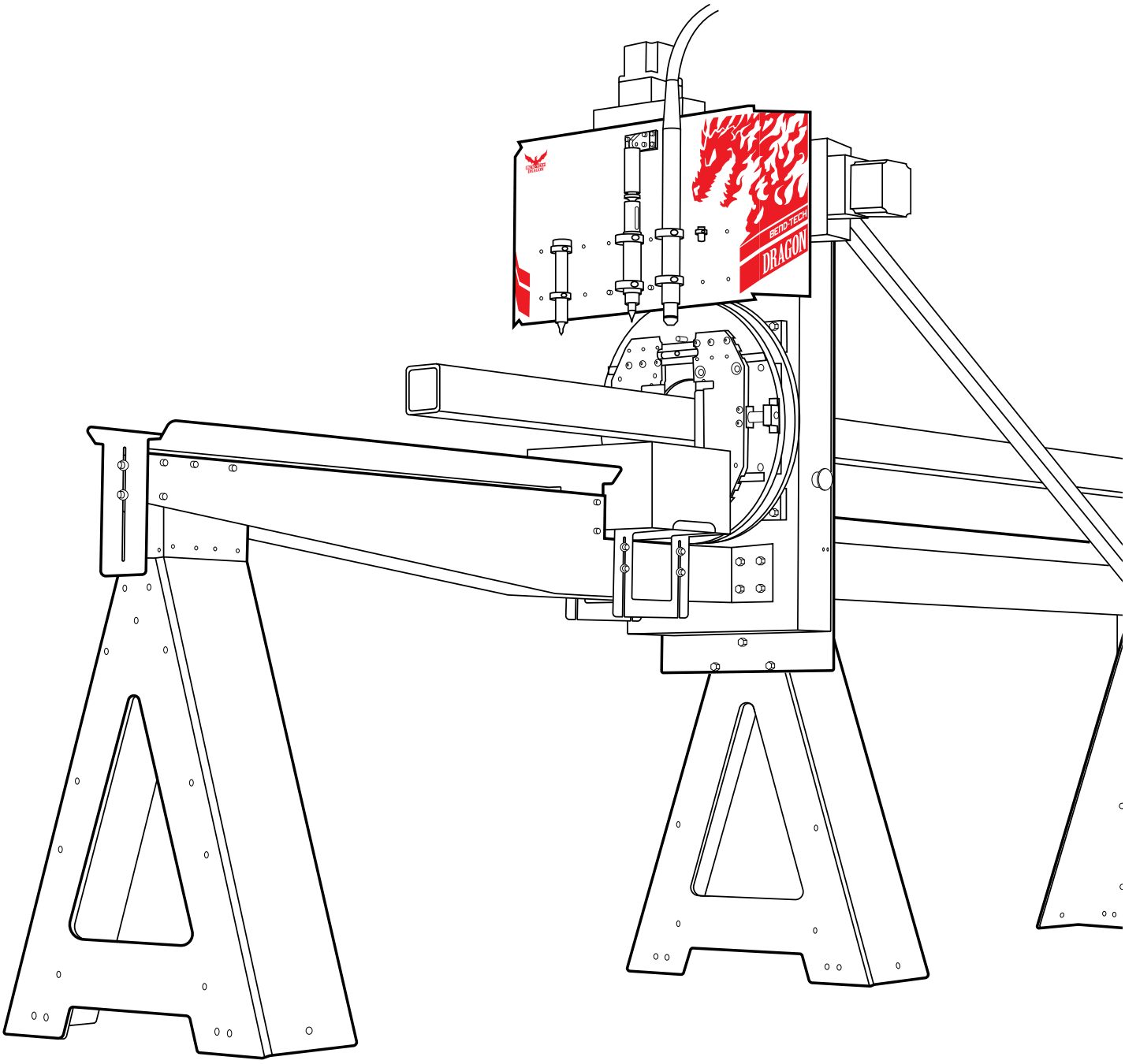
Part 3 of 3

BEND-TECH

# DRAGON A400

## Startup and Training Manual

### Part 3: Torch Mount, Software Overview, Side Offsets




Revision 6 | English

# Dragon A400

**Startup and Training Manual**
Revision 6

English
Original Instructions

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

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

# Contents

# 01 Tube and Pipe Library

## 1.1 Tube and Pipe Library Overview

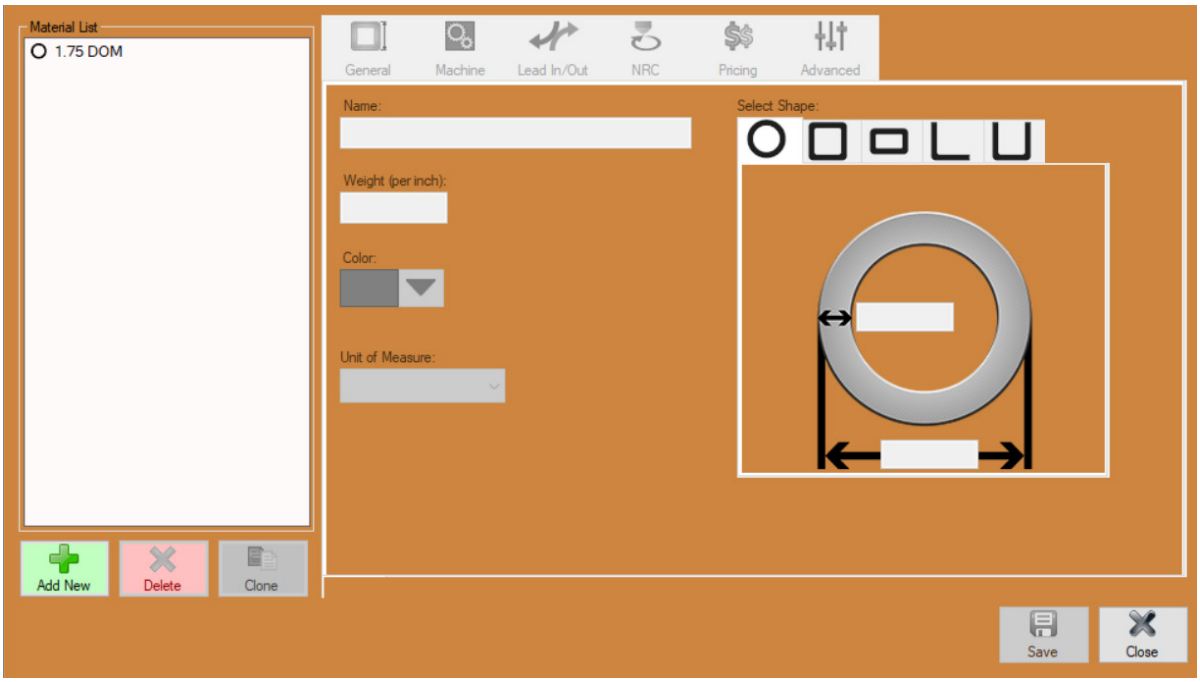
The Tube and Pipe Library is where the operator creates a material list that will be used in a given project. Before a project can be started, the type and specifications of the material must be entered into the Tube and Pipe Library.

### 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.

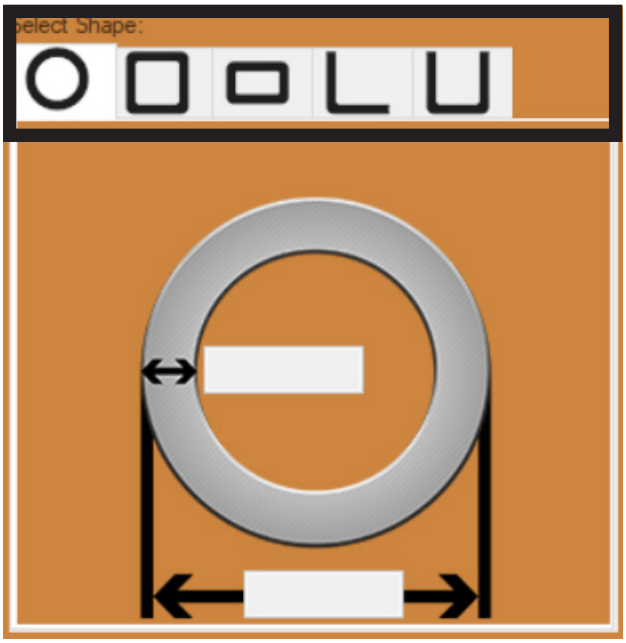



*Once a material is entered into the Tube and Pipe Library, it allows the Operator to quickly choose a given material from the Library without having to re-enter the dimensions of the material.*

## 1.1.2 Add New Material Into The Tube and Pipe Library

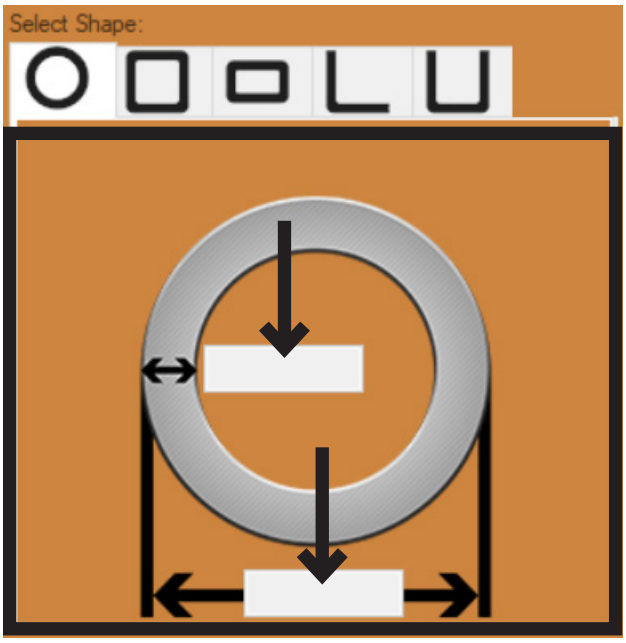

To enter a new material into the Tube and Pipe Library, click the green “Add New” icon at the bottom left hand corner of the screen.

### 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.).

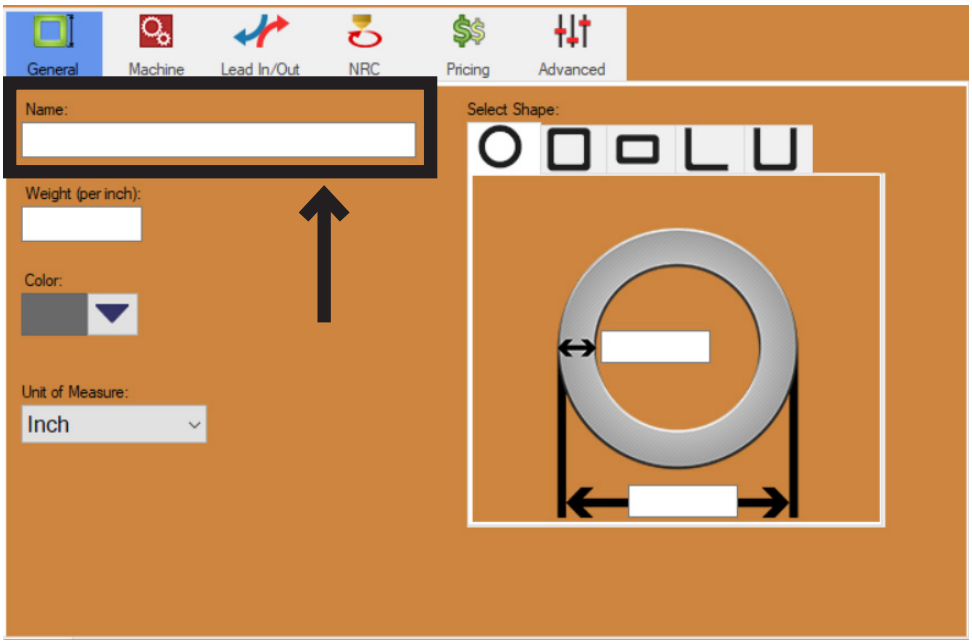
### 1.1.4 Dimensions




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.

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

## 1.1.5 Naming the Material




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


Click Save.


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 for the operator to ensure 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 or rectangle 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.

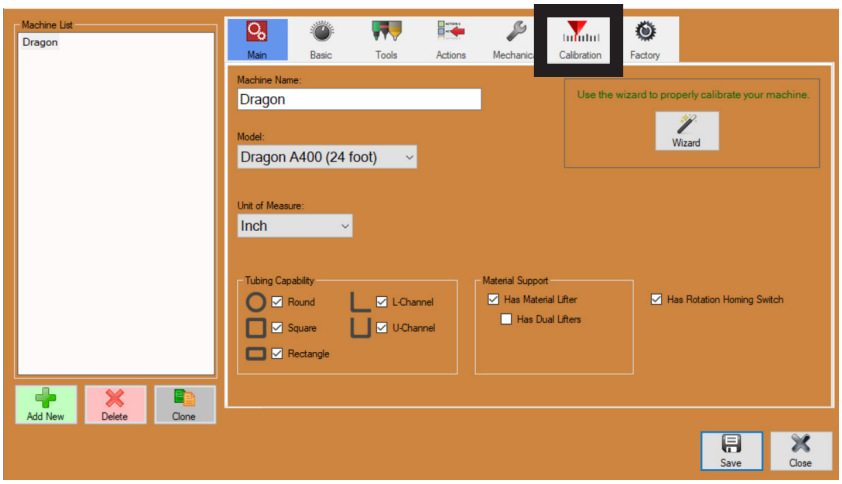
*Before the Torch Mount procedure can begin the machine must be powered on and all Axes homed.*

**! 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.

## 2.1.1 Launch Torch Calibration Tool

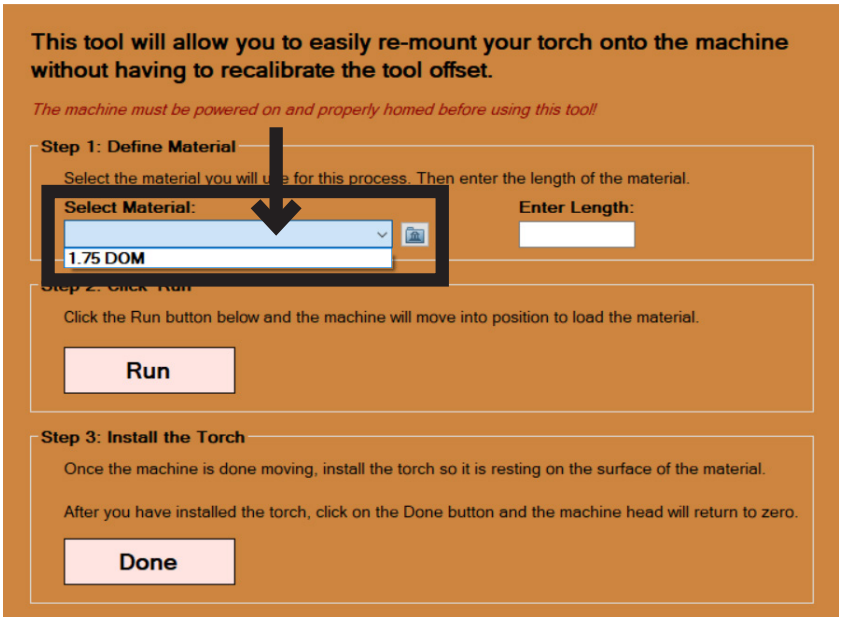

To begin the Torch Mount procedure in Dragon CAM, Got to the Tools dropdown menu and click Machine List. Select “Dragon” from the Machine List.




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

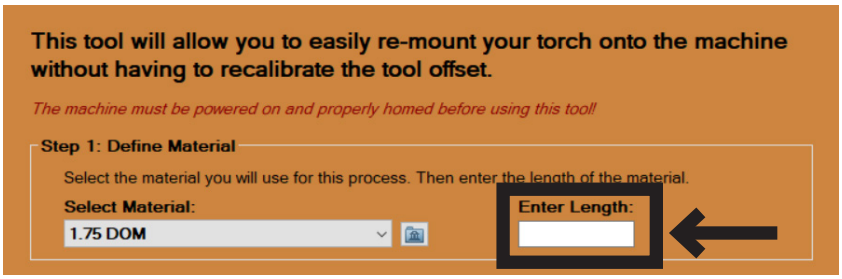

Click Torch Mount at the bottom right of the new interface. This will open the Torch Mounting Utility interface.

## 2.1.2 Torch Mount Utility

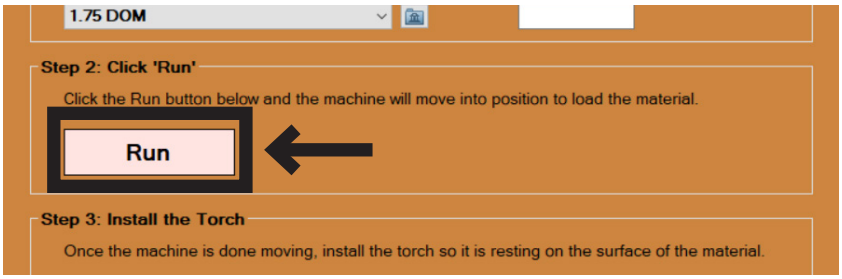



In the Torch Mount Utility interface click the Select Material drop down and select a material type that's been entered in the Tube and Pipe Library that will be used for the Torch Mounting process.

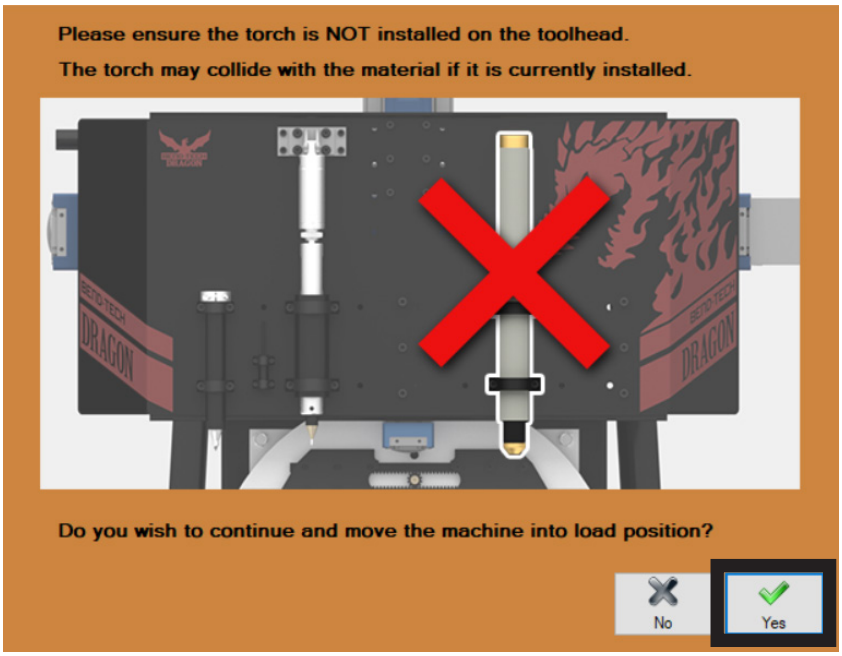
Refer to Section 1 of this manual for material creation process.




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 Run.




A Torch Collision Warning interface will appear. Check to confirm the Torch is raised enough that it will not contact the material before it can be adjusted. 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.

*It may be necessary to manually adjust the Torch in order to load the material.*

### 2.1.3 Load The Material

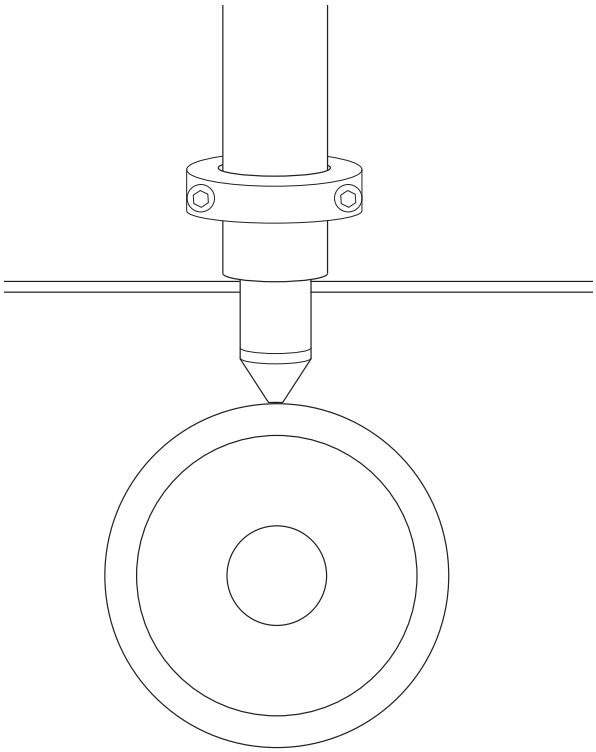
Using a ¼ in. Allen wrench, the operator should adjust the Gate openings wide enough to accept the material using the front and rear Gate Lead Screws. Feed the material through the Gate, then adjust the front and rear Gate Lead Screws so they are finger tight with the material. When mounted in the Gate, 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.

*At this point if the material is not in the correct position for Torch calibration the Operator can change the value in 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 Setting 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 Future Torch Mount

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 Operator will need to perform the Torch Mount Utility procedure 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

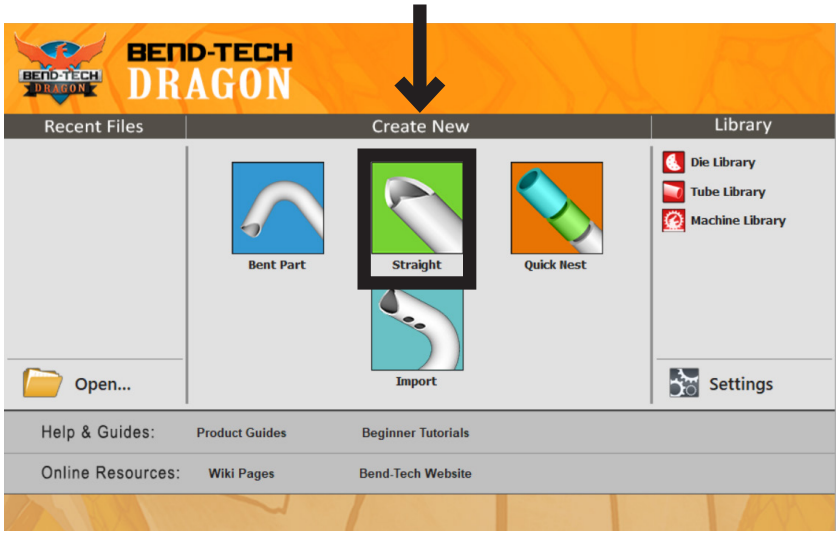
The Dragon CAM software is used to design and create new parts for production using the Dragon A400. Dragon CAM software is designed to be an easy-to-use interface that allows for one-off custom parts to be produced, or for complete project production. Parts can be easily designed and saved for immediate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

*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.

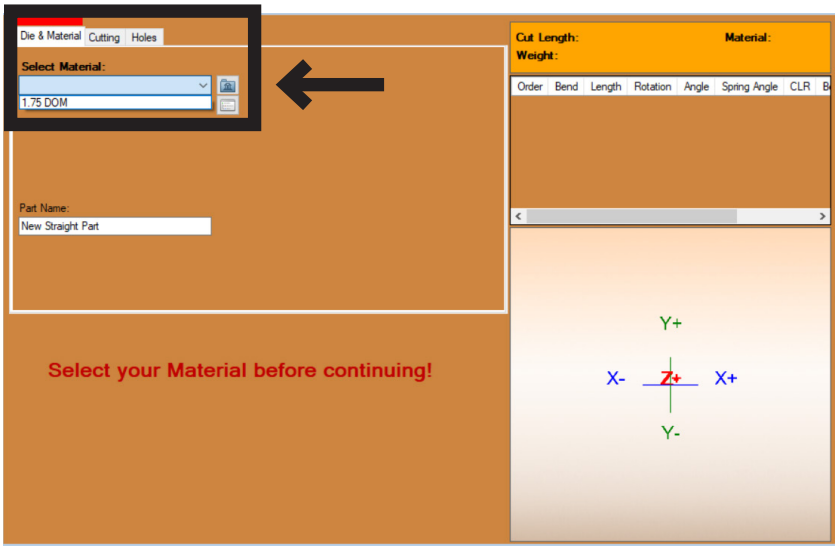
For this tutorial, under Create New, we will choose Straight to create a new straight part. This will open a new interface which will include a 3D, five axis design window in the bottom right.




## 3.2.1 Dragon CAM Preparation Checklist

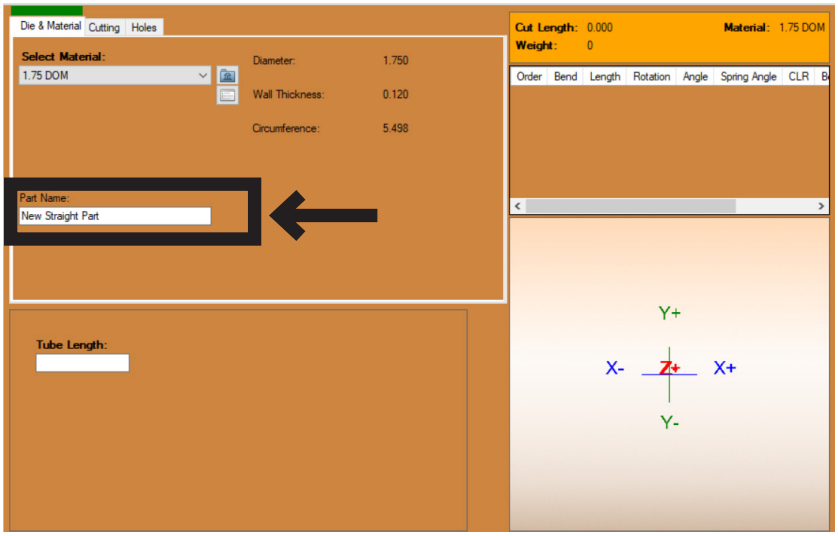
| Dragon CAM Support Asset | Action |
|---|---|
| Tube and Pipe Library | Has material been entered and named in the Tube and Pipe Library as outlined in Chapter 1 of this section? |
| Torch Mount | Has the Torch been mounted and calibrated as outlined in Chapter 2 of this section? |

## 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 section to see how to enter material into the Tube and Pipe Library.

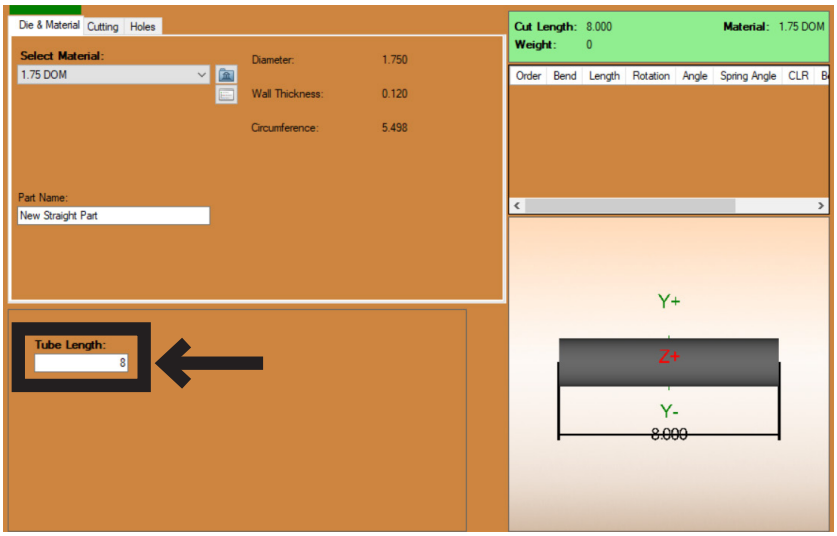
## 3.2.3 Part Name




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

*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.

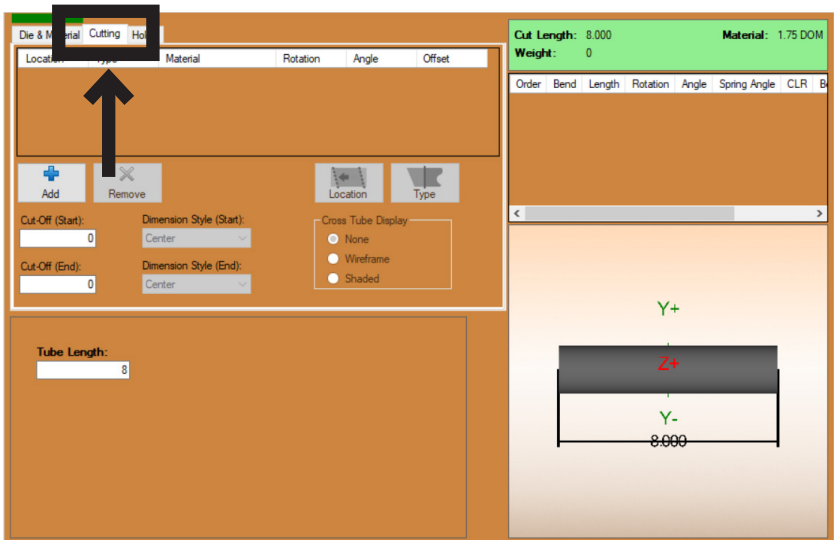
*Tube Length is not the material stock length.*

### 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 allows the operator to choose 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

If the Operator Clicks Add a second time, the program 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 allows the operator to change 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 |

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

### 3.3.6 Rotation, Angle, & Offset

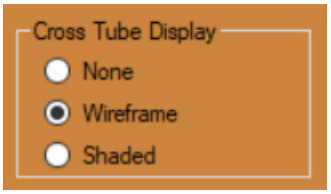
The rotation property moves the cut around the circumference of the material, the angle property changes the angle of the cut, and the offset property changes tthe offset of the cuts in relation to the centerline of the part.

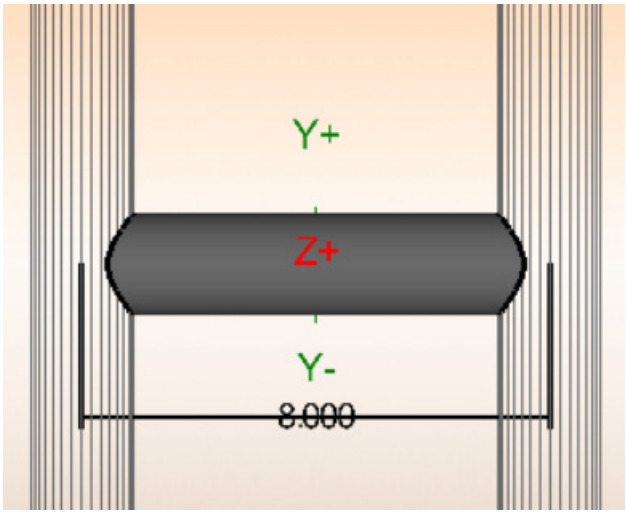
| Location | Type | Material | Rotation | Angle | Offset |
|---|---|---|---|---|---|
| Start | Cope/Notch | 1.75 DOM | 0 | 90 | 0 |
| End | Cope/Notch | 1.75 DOM | 0 | 90 | 0 |

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

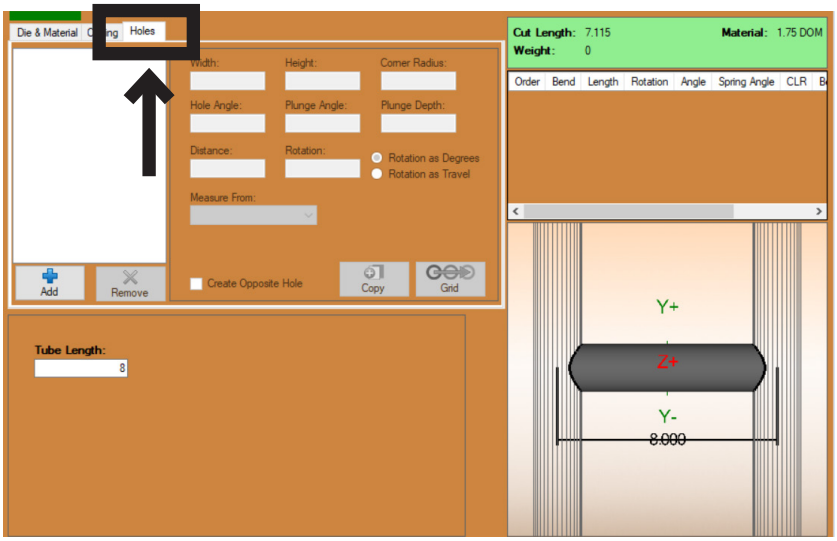
### 3.3.7 Cross Tube Display

The Operator can 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.



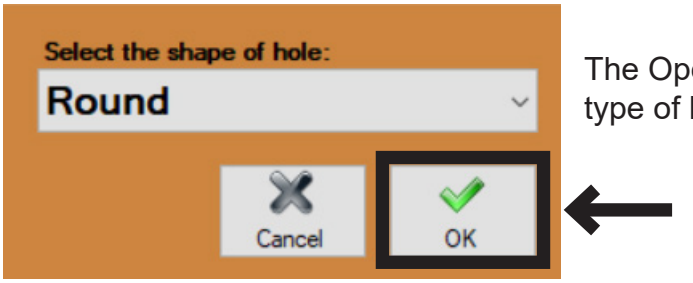
# 3.4 Holes




Click the Holes tab. The Holes interface allows the Operator to choose and set up a variety of holes that can be cut into the material.

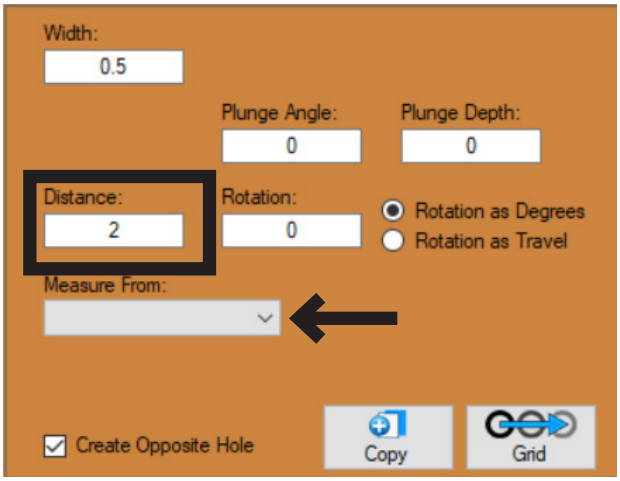
## 3.4.1 Add A Hole


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




The Operator can use the drop down menu to choose the type of hole needed for the part. Choose Round. Click OK.

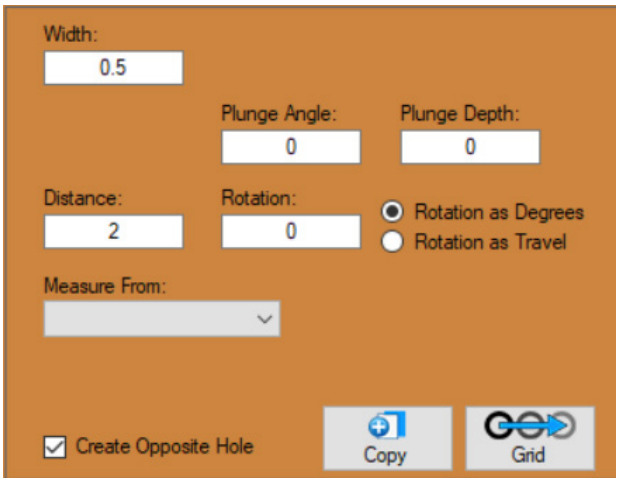
## 3.4.2 Hole Location




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

Choose the desired Measure From value from the dropdown menu.

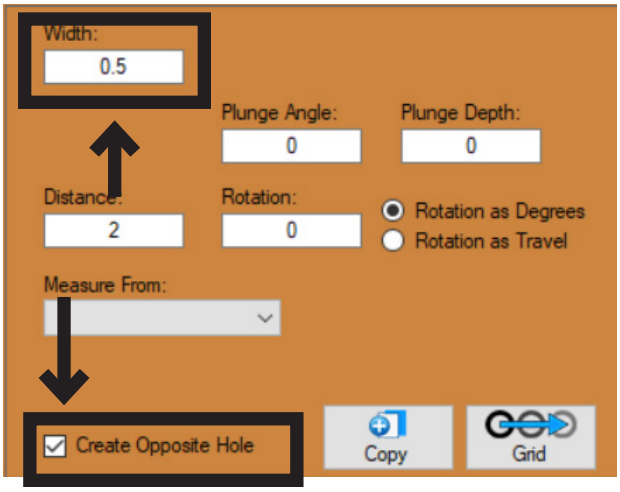
## 3.4.3 Hole Width




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

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

## 3.4.4 180-Degree Hole




For this tutorial we will use the interface to create a second hole 180-degrees from the original hole.

To do this, check Create Opposite Hole to create a hole on both sides of the part.

# 3.5 Edit Flat

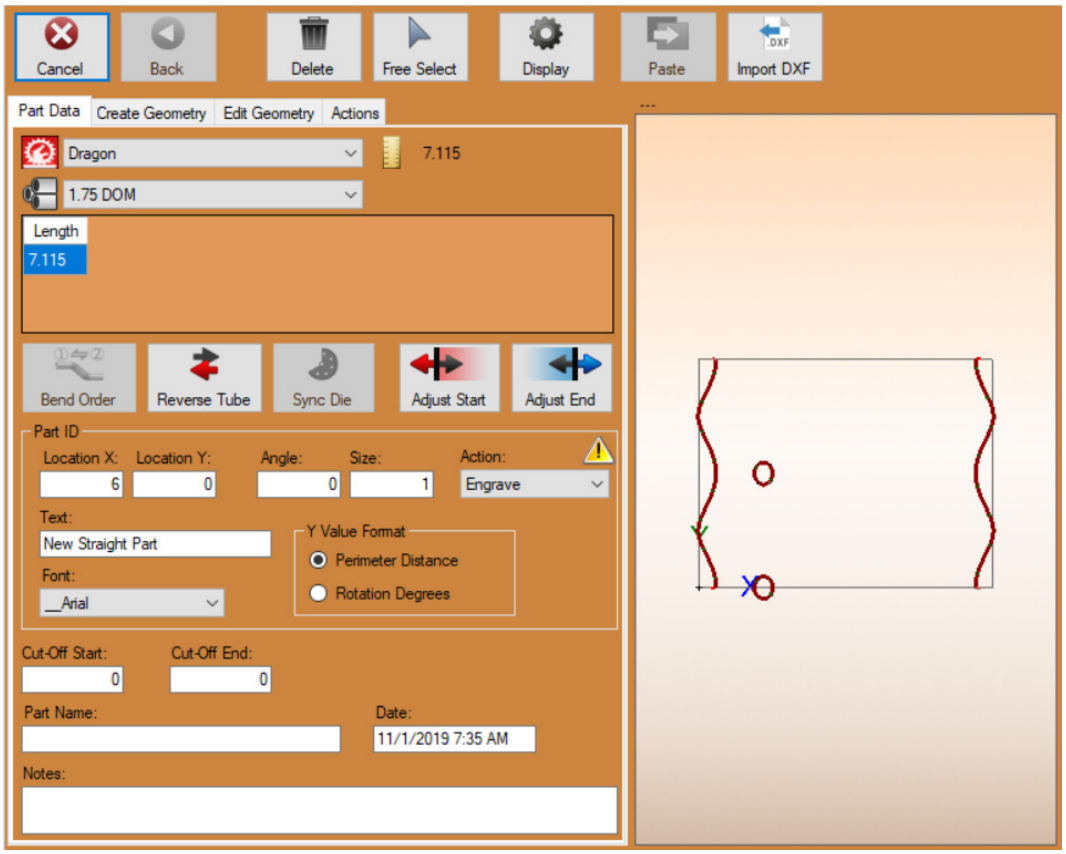
In some cases it may be helpful to see a flat version of the part that the Operator has designed. This is performed easily in the Bend-Tech Dragon software. The Operator can also use this interface instead of the 3D interface to edit and create a part.

*Edit Flat is typically used by the Operator to mark or engrave part IDs, or move lead-in locations.*

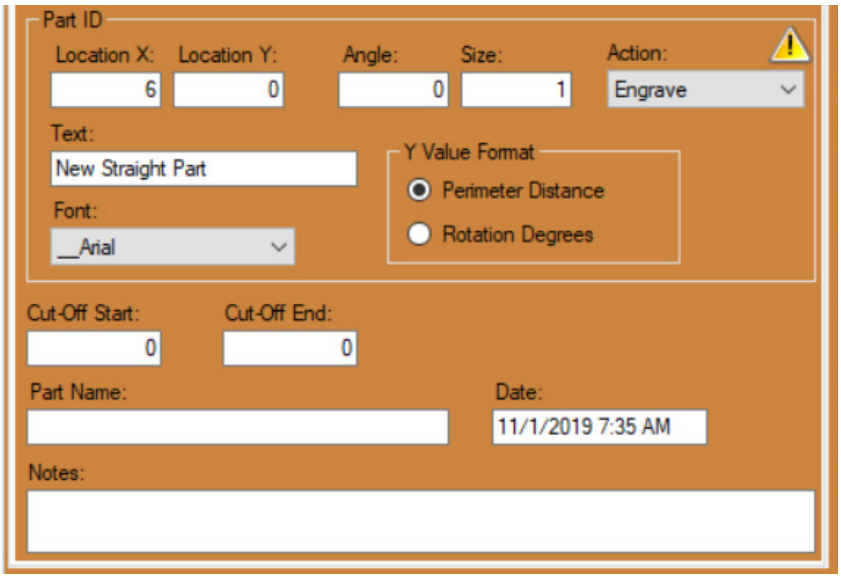
## 3.5.1 Opening Edit Flat


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, the operator can add a Part ID to the part and program the machine to add the ID to the part.

In Edit Flat, 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 give the Operator 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.

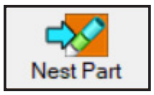
In the Text text box, enter the text that should appear on the material.

In the Font dropdown, choose the desired font that will be used with the Part ID.

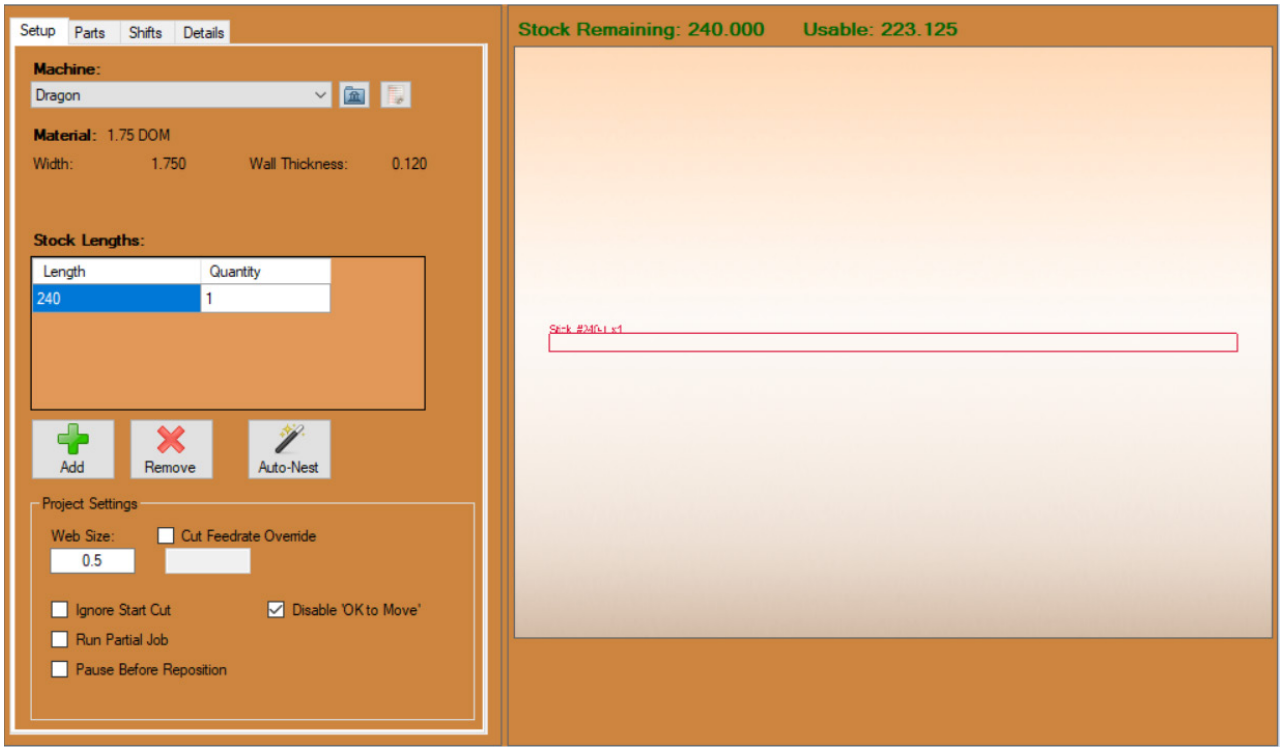
In the Y Value Format box, choose the measurement metric the software will use to program how the machine places the text on the circumference of the part. Perimeter Distance will place the text from the start of the part as viewed in Edit Flat, Rotation Degrees will place the text according to Y Axis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

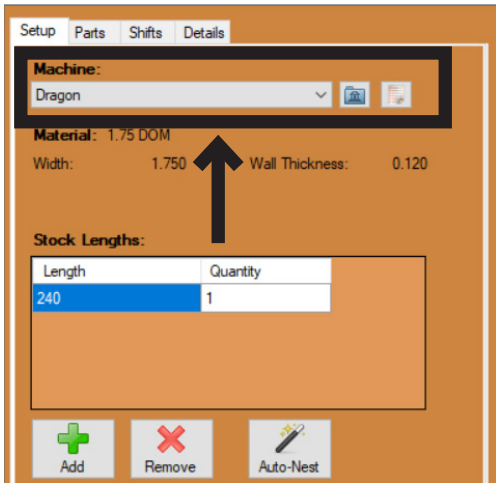
# 3.6 Nest Part




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.

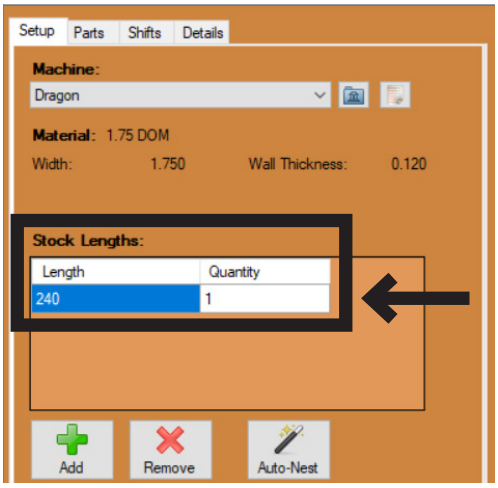



## 3.6.1 Nest Part Procedure




The Operator will choose a machine where the Nest Part project will be run.

## 3.6.2 Stock Length

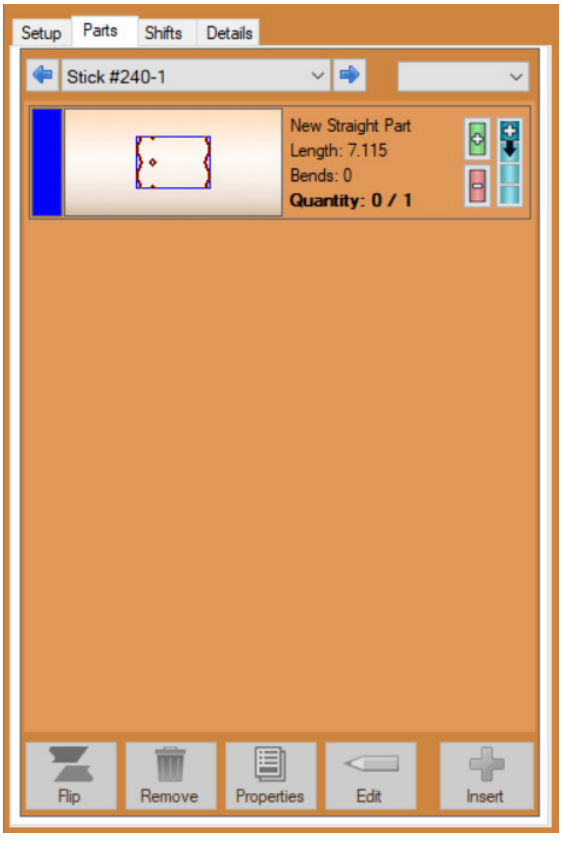



The Stock Length is the length of material that will be used when the Nest Part is produced. In the text box below the machine selection drop down menu, enter the length of the material.

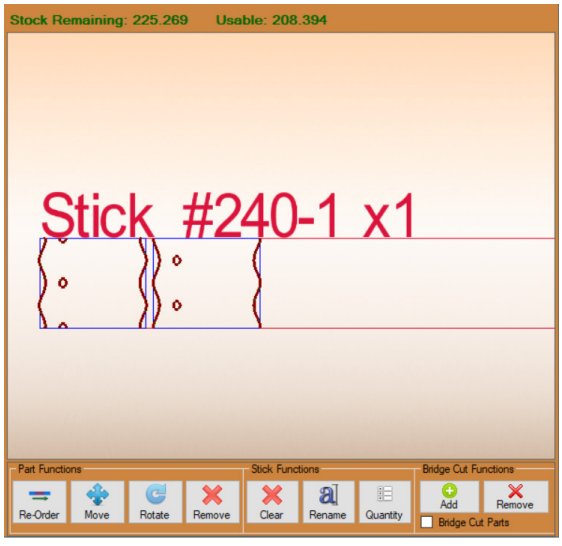
Enter how many pieces of material will be used to create the Nest Part(s). The operator can choose a set material length or choose multiple different lengths based on what is available at the shop location.

*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).

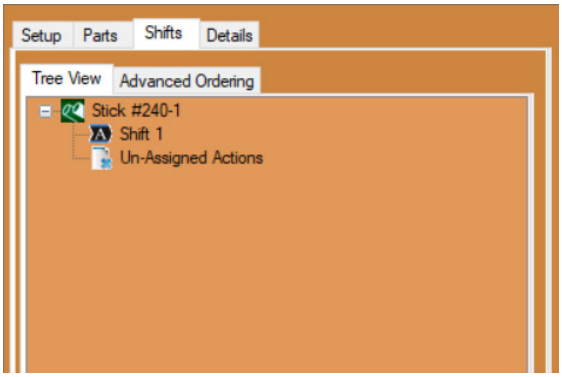


### 3.6.4 Part Functions

In the part display interface, the operator can use Part Functions to edit parts after they have been placed on a stick of material. Part Functions can help the Operator 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

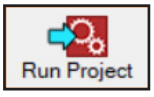



The Shifts tab will display the order of operation the machine will use for its cutting path. The Operator can use the Shifts feature to rearrange cutting actions, unassign or remove actions from the list.

## 3.7 Run Project

With a part created and nested, the operator can choose to Run Project to begin the cutting and production procedure.

### 3.7.1 Run Project Procedure




At the top of the interface, click Run Project. This will open the Machine Control screen. Click Start. In the Status window the Travel, Laser and Load icons will light up.

*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.*

*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.*

*Clicking Start does not initiate the cutting process. It initiates the entire project process, walking the Operator through each step.*

### 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 Operator should have thoroughly readied the machine 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.

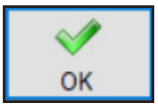
Also, it is often the case that the parts drafter/designer is separate from the Operator. With the Nest Part feature the designer can set up an entire nesting project and pass it on to the Operator. The project can then be opened to the computer from an external drive such as a USB drive. The Bend-Tech 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 dropdown menu click Import.

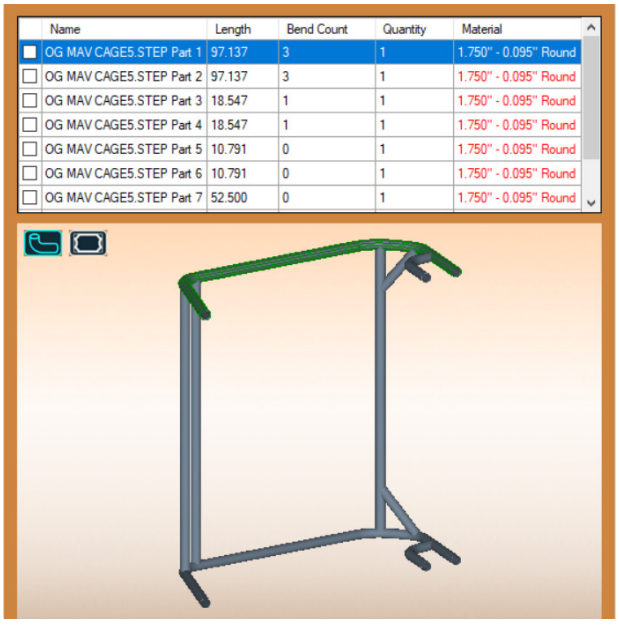



Choose the type of file you're importing. Click OK.

## 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.

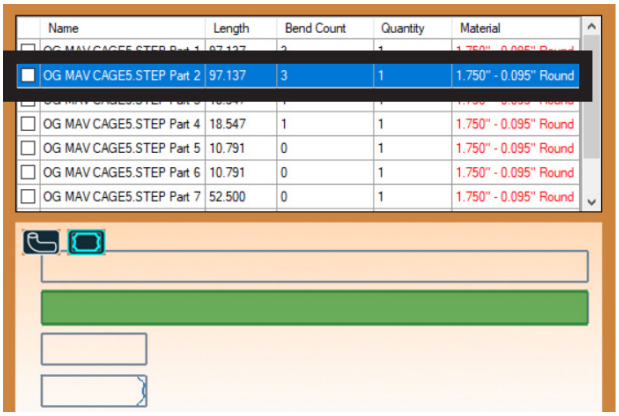
# 4.3 CAM Auto Import Interface




The Project Interface will feature a parts listing and a diagram of the assembly. The Operator can 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.

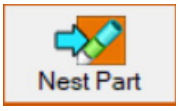



The Part Listing interface above the part Display interface will show the arrangement of the parts by their part name. Clicking on one of these will highlight that particular part in the part interface.

The Operator can double click the Name text box and change the name of the part. Double click the Quantity text box to change the part quantity.

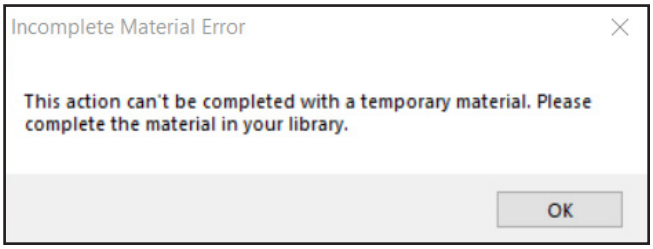
*This example uses Auto Import. Other import processes may require additional steps.*

## 4.3.2 Nest Part



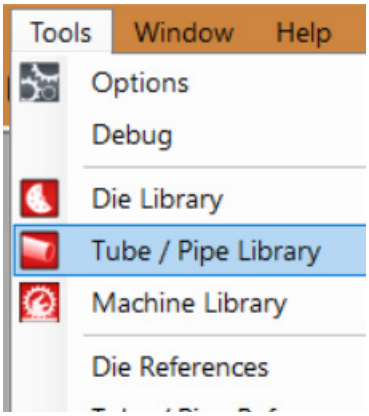

At the top of the interface, click the Nest Part icon. This will begin the process of arranging the parts on the given material for cutting. The Operator must select which parts will be nested from the import list. If the project has multiple material sizes, the Operator will need to create a Nesting Project for each material size.

## 4.3.3 Creating Temporary Materials

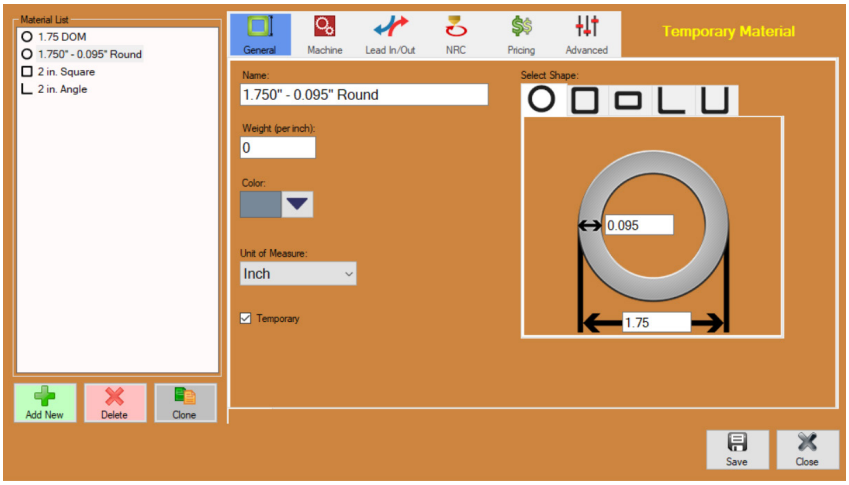



If all the material sizes are not entered in the Tube and Pipe Library, a warning will appear that says, “The action cannot be completed with a temporary material. Please complete the material in your library.” Click OK. The software will automatically create a temporary material in the Tube and Pipe 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 dropdown, then click Tube and Pipe Library. This will open the Tube and Pipe Library.

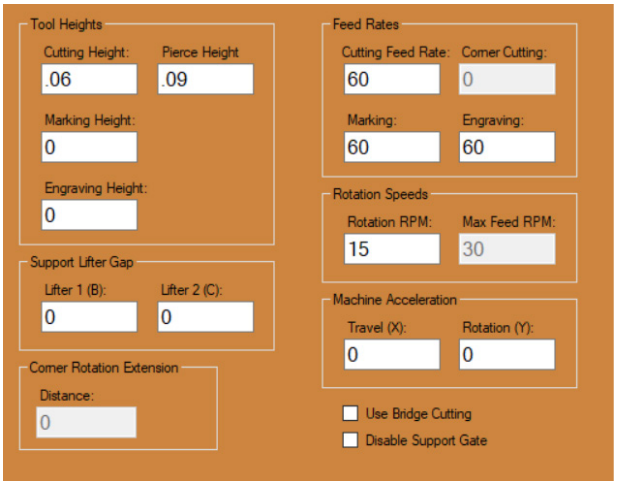



Search the Material List for the temporary material the software created. Click on the material. The interface will now say “Temporary Material” in the upper right.

*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, the Operator will need to fill in certain 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.”

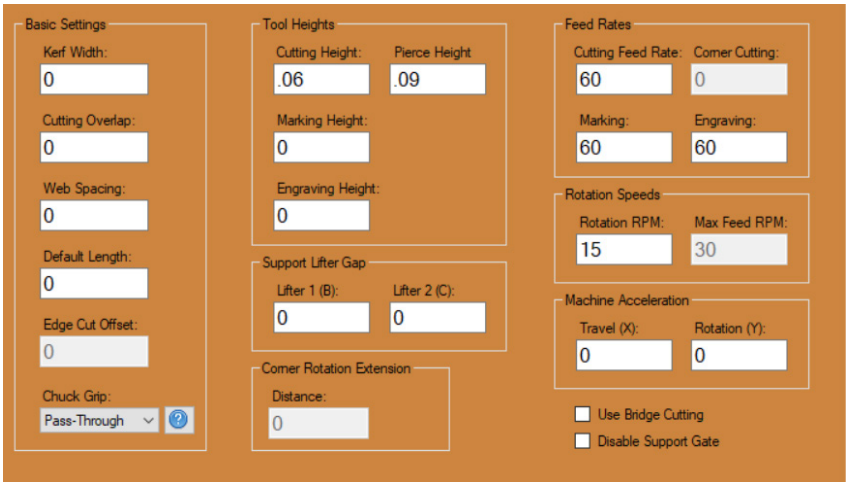

Click Save.

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

*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.

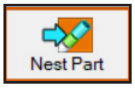



Enter the following values:

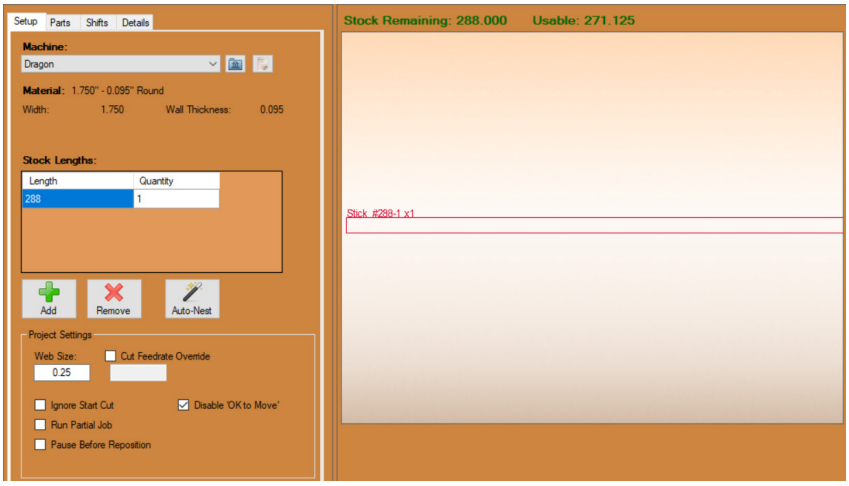
**Kerf width**: .06
**Web spacing**: .25
**Default length**: 288


Click Save.


Click Close.




Click Nest Part.



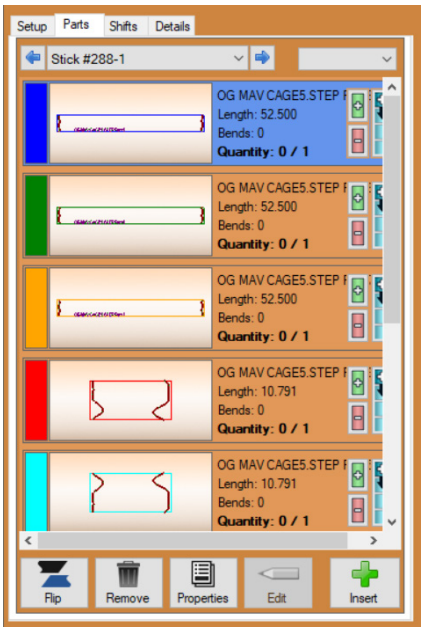

After clicking Nest Part, the software will open a Nesting Project interface for each size material used in the project. For example, if there are two different tube sizes, two separate interfaces will open, one for each size material. If there is only one size material, one interface will open.

At this point the project is Nested.

# 4.4 Running A Nesting Project

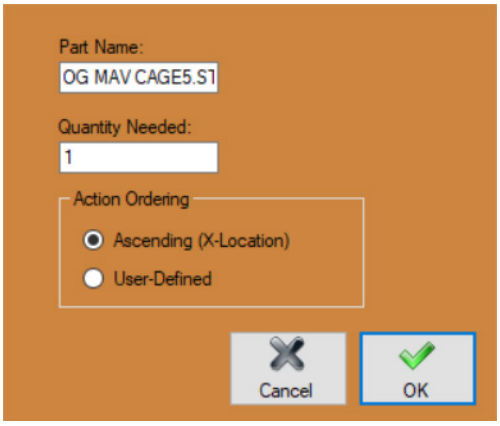
Once a Nesting Project is created, it can be saved and run at any time. The software will save the project until the Operator decides to delete it.

## 4.4.1 Preparing The Parts



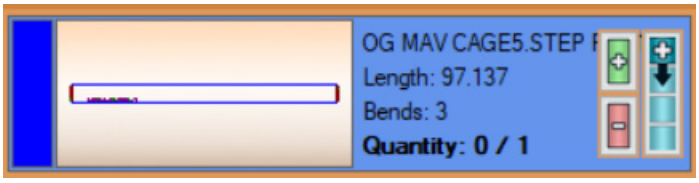

In the Nesting Project interface, the operator can change the quantity of a part in the project. To do this, click the Parts tab. Click on an individual part in the parts listing.


Below the parts listing Click Properties.



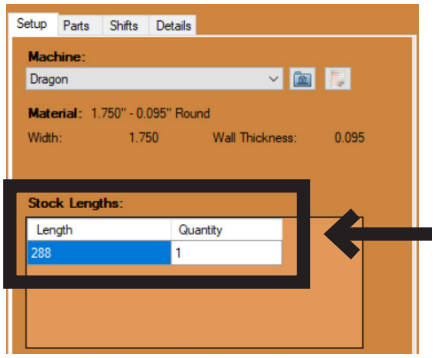

This will open an interface that will allow the operator to enter or change a Part Name and a Quantity Needed. The Operator can also change the Action Ordering. Click OK. Repeat this process as needed for the parts listed.

*It is advised the Operator 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.

*If the Operator enters 0 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 the Operator has 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 |

When the Operator clicks the green + icon or red - icon a popup will 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, the operator can 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.

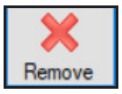
### 4.4.5 Stick Functions

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.

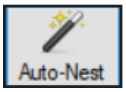
Click the Quantity icon to add identical sticks to the Nesting Project. Adding duplicate sticks will change the number that appears above the stick in the interface.

### 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.

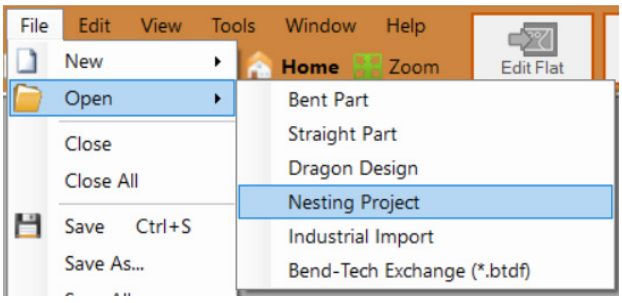



Click Auto Nest. The software will automatically change the Quantity to what is needed to run the project.

### 4.4.7 Saving

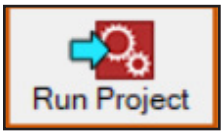
To save the Nested project, click File in the drop down menu at the top of the page, click Save As and enter a name and location where the project will be saved. The Operator can now X out of the interface. The project can be opened from its saved location for future production.

### 4.4.8 Opening a Saved Nesting Project




There are two ways to open a Nesting Project. The Operator can open a Nesting Project by clicking 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 Operator can also drag and drop a Nesting Project 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

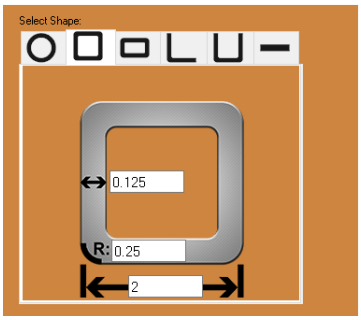
Square and rectangle tubing have measurable sides which makes the procedure for setting up these materials in the Dragon A400 different than setting up round tubing. The following process will walk the operator through the procedure to set up a piece of square tubing, but rectangular tubing will be similar.

### 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


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 dropdown menu within the Basic Settings box. To reference which Chuck Grip to choose, click the question mark icon next to the Chuck Grip dropdown. 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.

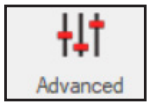
(wall thickness + kerf) - radius = Corner Rotation Extension

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.

*Bend-Tech recommends using a corner radius gauge to determine material corner radius. If a corner radius gauge is not available the Operator can 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.

*Ensure Machine Control is open before clicking the Calibrate icon.*

### 5.1.6 Disable Feature

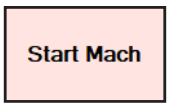
The next interface will give the Operator the option to Disable the Side Offset Calibration feature and use the machine's default measurements.

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


Click Next.

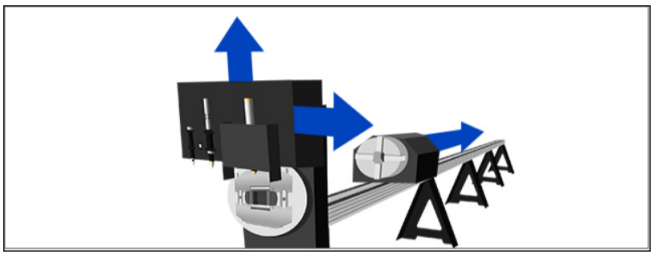
### 5.1.7 Power On The Machine

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.

Next > After the Homing process is complete, click Next.

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

### 5.1.9 Load The Material

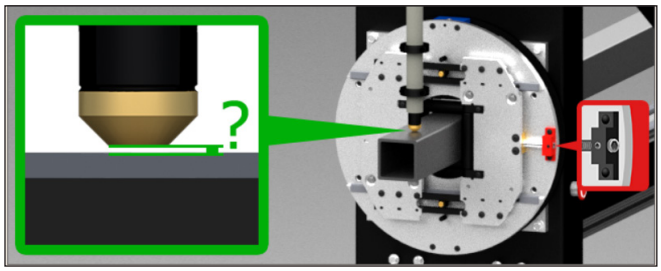
The machine will ask the Operator to enter the length of the material. The Side Offsets Calibration should use a piece of material between 3 ft. and 6 ft. in length. This will move the Trolley into place so the Operator can load the material into the machine.

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.

Next > 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.

Move Torch

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.

Next >

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.

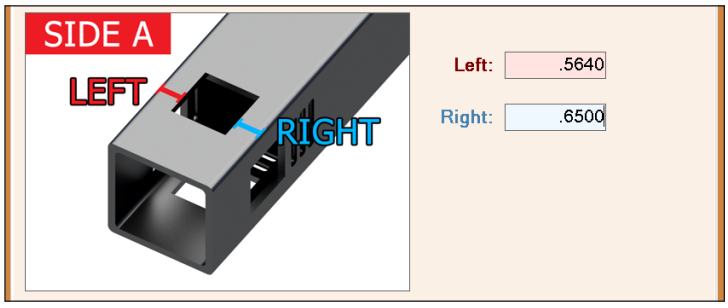
Run

Click Run to begin this process.

Next >

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.

Next >

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 everytime that particular material is run through the machine.

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

# 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.

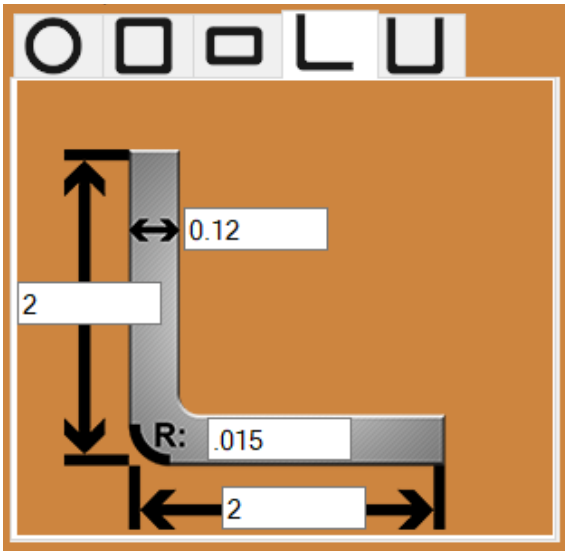
## 6.2 Adding Angle and Channel Material

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.

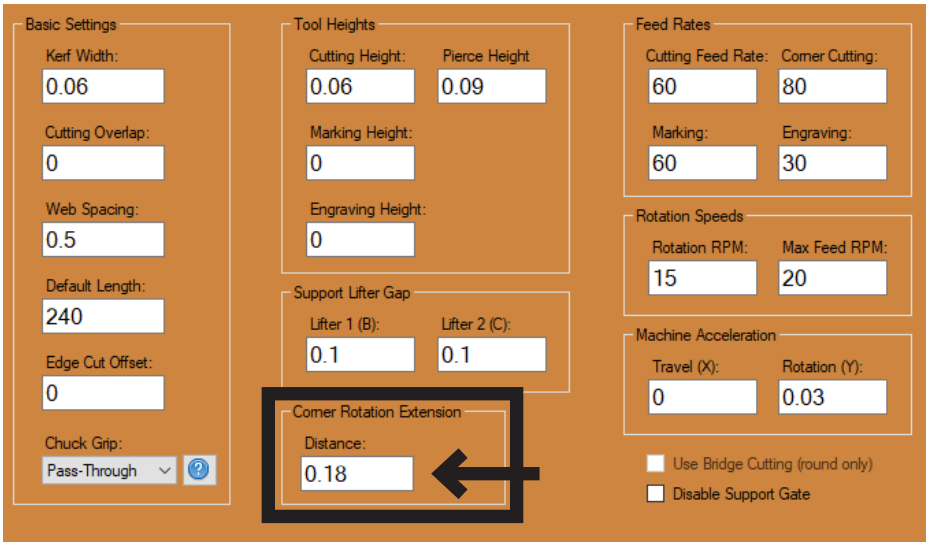
### 6.3.2 Y-Axis (Chuck) Acceleration

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



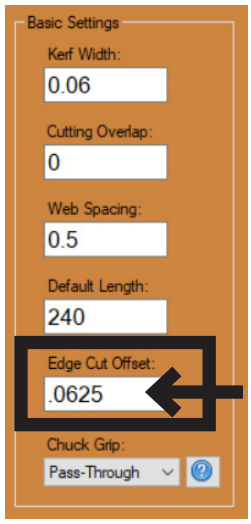

When processing angle and channel material, or any material with a sharp radius, it is necessary to slow the Torch and give it a larger radius as it passes over the corner. Bend-Tech has calculated a formula for this:

**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.*

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

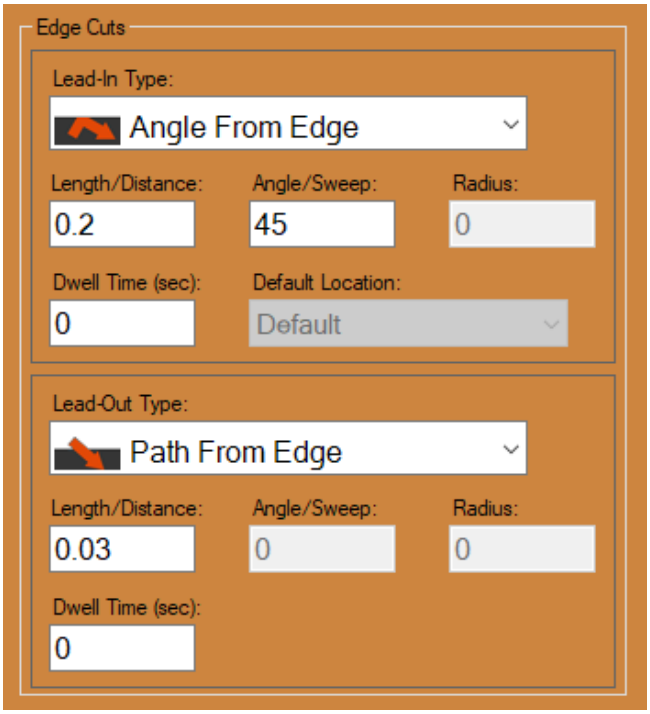
## 6.3.4 Edge Cut Offset




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.

*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

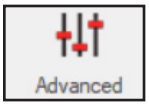
As with square or rectangular tubing, the Operator must perform a Side Offsets calibration prior to processing angle and channel material.

### 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.


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

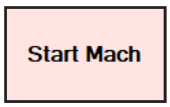
### 6.3.3 Disable Feature

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

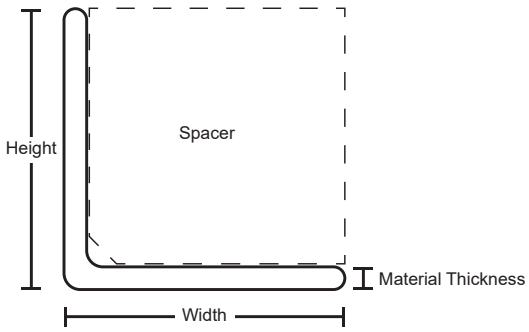
The machine will ask the Operator to enter the length of the material. This will move the Trolley into place so the Operator can load the material into the machine. Always load angle material with one flat down and one flat on the left (Marker side) of the machine. If one flat is larger than another,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

When loading angle material, the Operator will need to use a spacer to ensure the material is securely clamped in the Chuck. This may require fabricating a piece that fits the material. The spacer should be the size of the material minus the thickness of the material. The spacer should fit the angle material so it essentially creates a square.

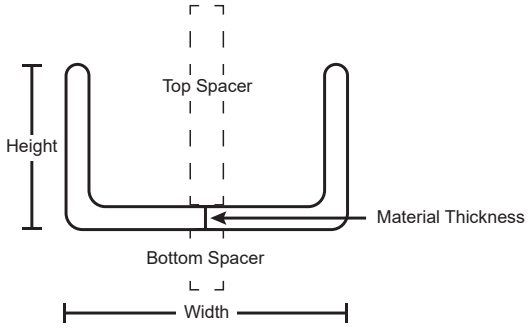



**Formula**
Size of material - material thickness

*For example, if the material is 2 in. angle, and is .25 thick, the spacer would measure 1.75 in. x 1.75 in. -- [2.0 - .25 = 1.75]*

## 6.4.8 Channel Material Spacers

When loading channel material, the Operator will need to use a spacer to ensure the material is securely clamped in the Chuck. This may require fabricating a piece that fits the material. Channel material will have a spacer above and below the material.

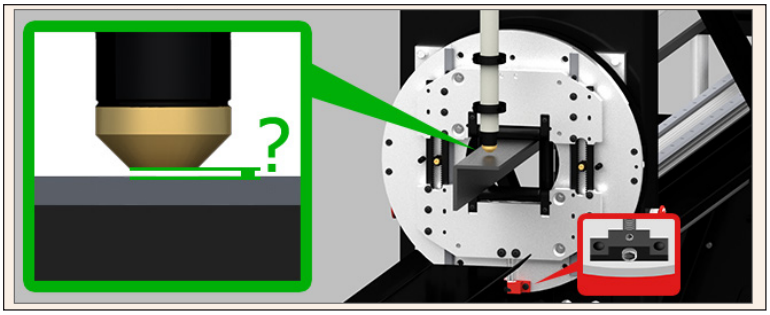



**Formulas**
Bottom Spacer: ((Width - Height) / 2)

Top Spacer: (Bottom Spacer + (Height - Material Thickness))

*For example, if the material is 3 in. x 2 in. channel, and is .25 thick, the top spacer would measure 2.25 in. and the bottom spacer would measure .5 in. -- [(3 - 2) / 2 = .5] and [.5 + (2 - .25) = 2.25]*

### 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.

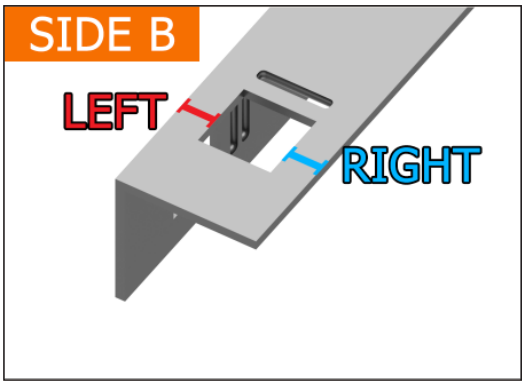

Type the gap distance into the text box and click Next. The machine will automatically move to the next side of the material. Perform this for all sides.

### 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.

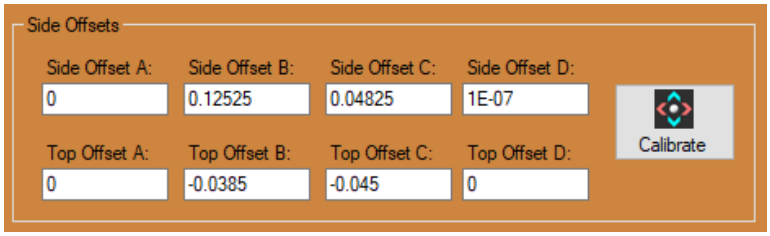
An interface will open showing the Side Offsets values for the material. The program will use the material size and the values entered in the Side Offsets Calibration to center the holes on each side.


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.

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

# Attention

After completing Startup and Training Manual Part 3, please contact Bend-Tech Customer Support if you need further assistance in operating the Bend-Tech Dragon A400.

**Bend-Tech, LLC**

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

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