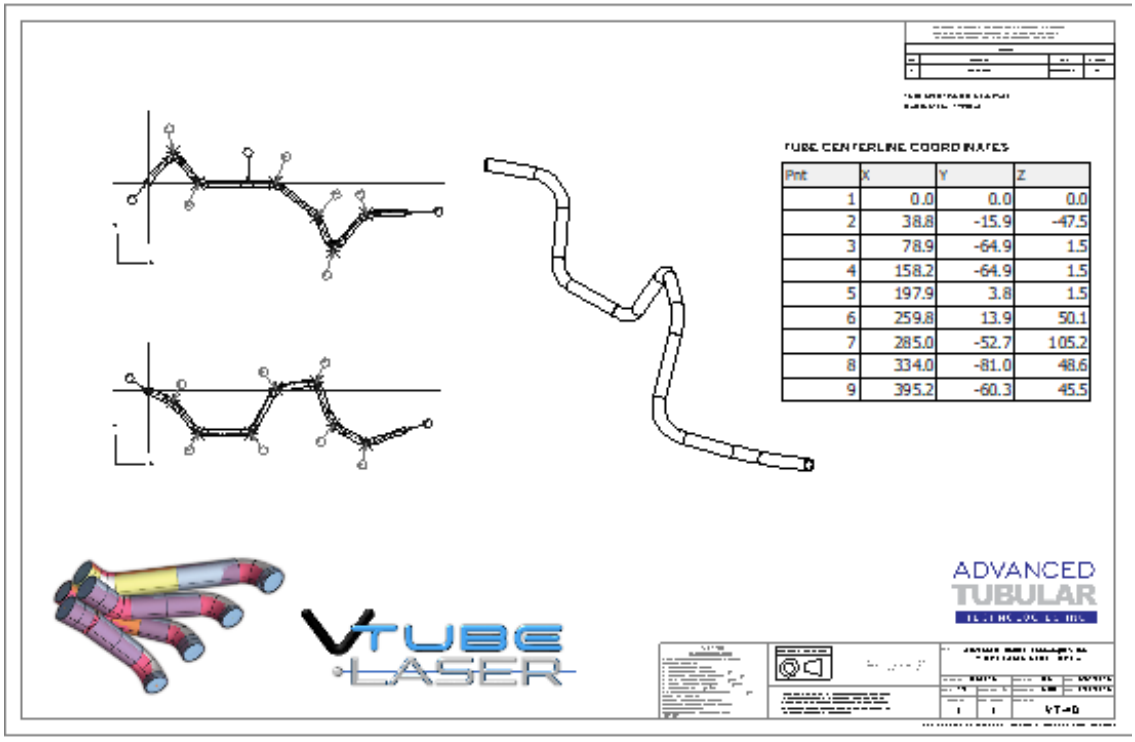
VTube-LASER Quick Start Guide for FARO QUANTUM from a Traditional Tube Print

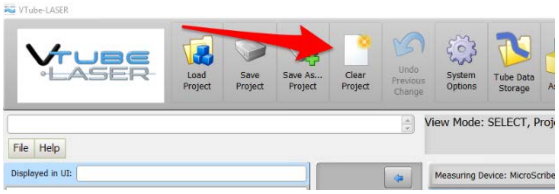
This guide shows how to setup VTube-LASER from a tube print and then measure and qualify demo tube 4 using a FARO ScanArm. A copy of the following tube print is included on the last page of this guide.



The steps in this workflow are from version 2.9.11 with the FARO v6 driver used for the Quantum model arms.

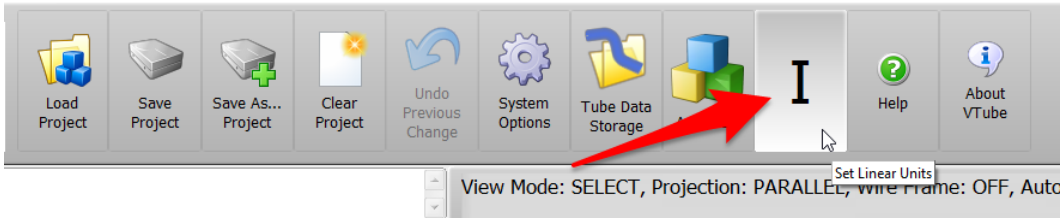
Document Revision Date: July 31, 2018

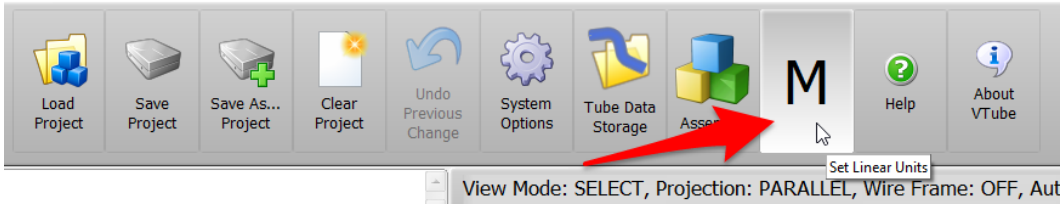
Follow these steps:



1. Press the **Clear Project** button in the tool bar on the top of the VTube-LASER window.

2. About **LINEAR UNITS -** Before you start entering data, look at the "linear units" button in the TOP TOOLBAR. It will say "I" or "M" depending on whatever default linear units your system is currently using. The VTube-LASER print uses millimeters, so switch the I to M if necessary. (Mixing up the linear units during entry would create some problems for us down the road.)





Fortunately, changing the linear units is easy in VTube-LASER. Just press the I or the M, and the units will toggle.

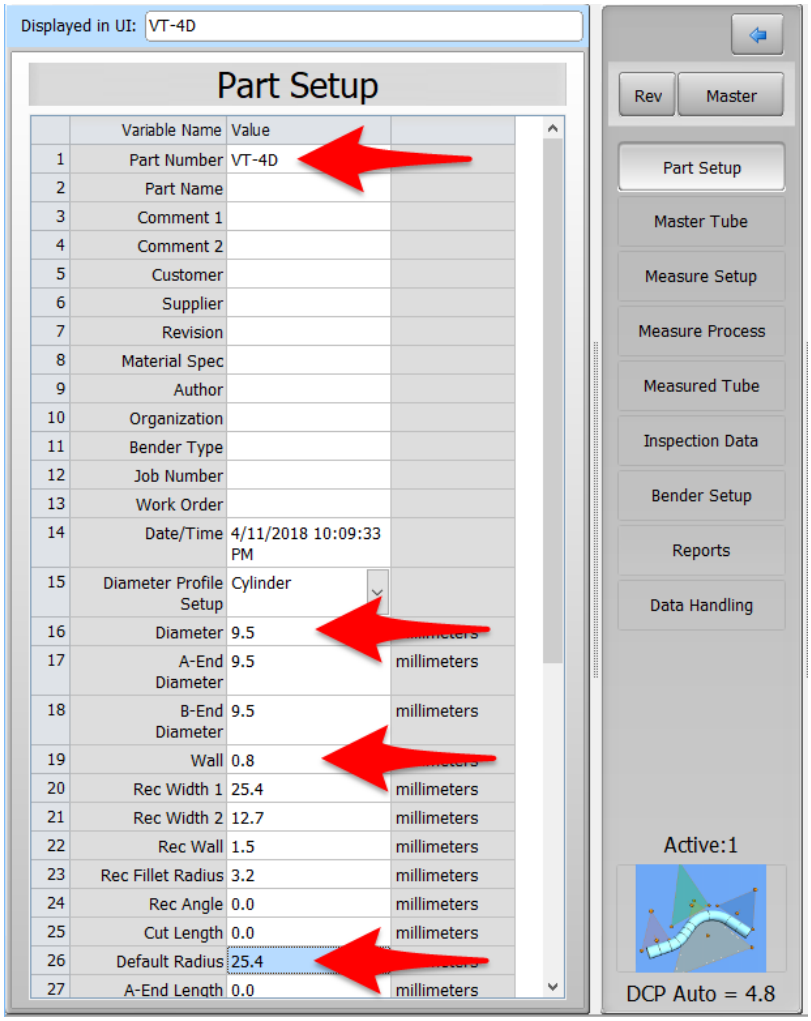
Use this feature to your advantage. For example, if you need to enter 0.125" somewhere in the system for a metric part (because that's the way you think), then just switch the units to INCHES, enter 0.125, then press the Linear Units button to switch back to MILLIMETERS. VTube-LASER will convert it for you. (It's 3.2).

Or how about "25.4 mm" as another example? That's a one-digit value in inches (a 1). So just press the Linear Unit button and enter "1" and Enter, then press the Linear Unit button again.

3. When cleared, VTube-LASER automatically switches to the **Part Setup** menu on the left. Start at the top and enter **Part Number** in row one and press the Enter key.

   Pressing the Enter key puts the new value into memory. This is how you enter and save data inside any menu that is based on a grid like Part Setup.

4. Either press Enter or the down arrow, or use the mouse to find and click on the Diameter value in row 16. Enter the **Diameter** from the print. (Be sure you are in the correct Linear Units!)



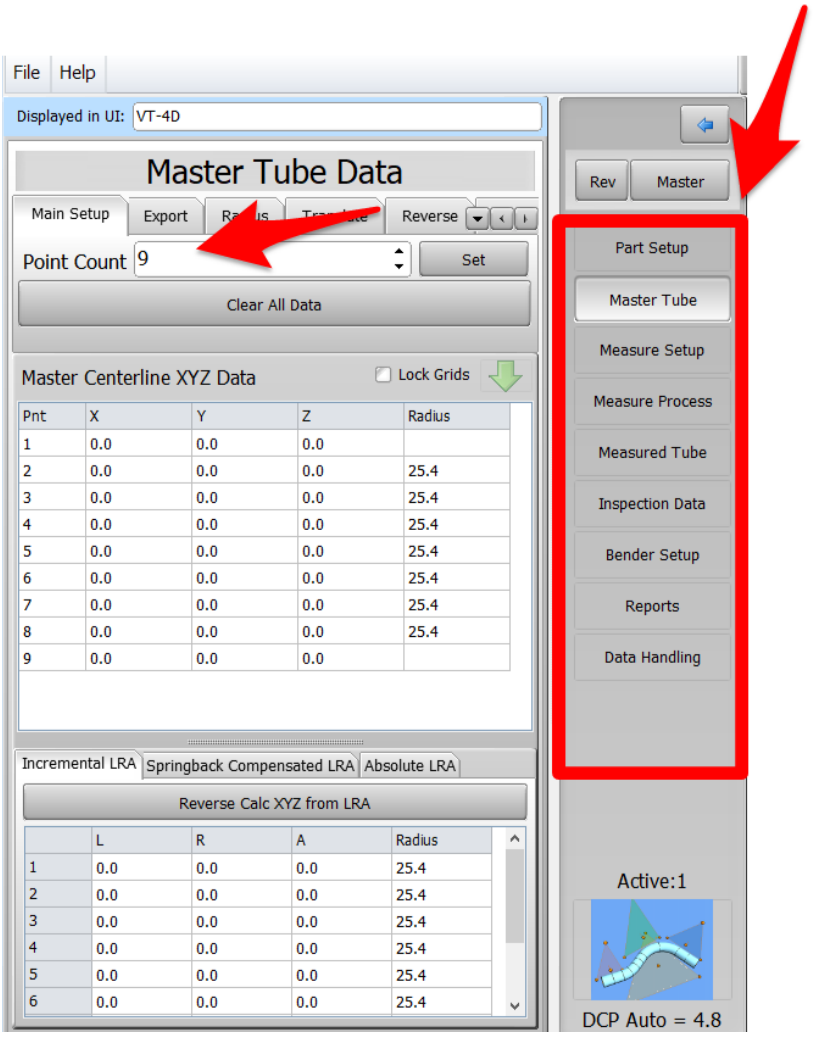
5. Move down to row 19. Enter the **Wall** thickness.

6. Move down to row 26. Enter the **Default Radius** – which is the radius used most on the print.

7. The **Navigation Pane** is the panel with buttons stacked just to the right of the left menu. Click on the **Master Tube** button in the Navigation Pane.

8. Increase the **Point Count** value to the number of centerline points on the print. You can enter the value or press the up or down arrow keys to come to the value. You can then press Enter or the Set button.

   Note that VTube automatically fills in the default radius cells with the Default Radius value from row 26 in the Part Setup menu. This saves you time.



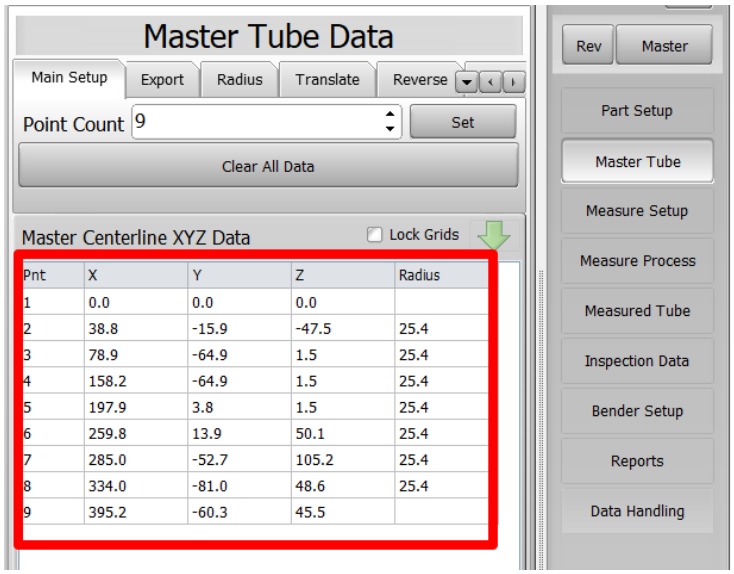
9. Click on the first X cell and enter the X value. Press Enter when you are finished with the number. If the number is already correct, then just press Enter. For this Quick Start, you can use the coordinates from the coordinate block in the sample print:

   VTube will always forward you to the next cell down. When you complete data in the last row, VTube will automatically select the cell in the next column on the top.

TUBE CENTERLINE COORDINATES

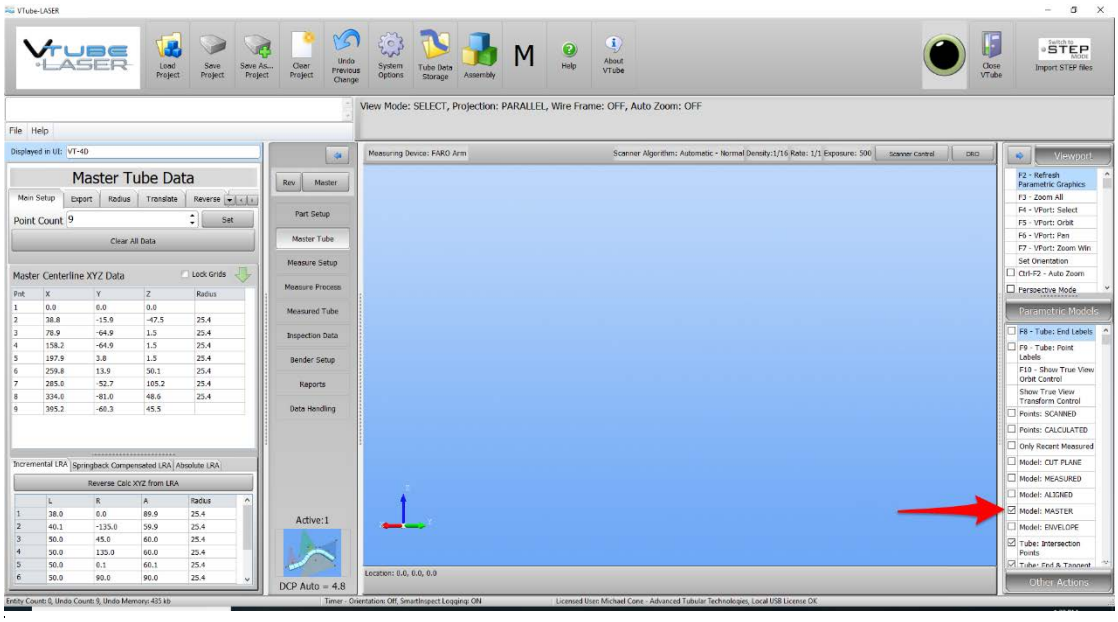
Pnt	X	Y	Z
1	0.0	0.0	0.0
2	38.8	-15.9	-47.5
3	78.9	-64.9	1.5
4	158.2	-64.9	1.5
5	197.9	3.8	1.5
6	259.8	13.9	50.1
7	285.0	-52.7	105.2
8	334.0	-81.0	48.6
9	395.2	-60.3	45.5

When you've got all the data entered, it should like this:

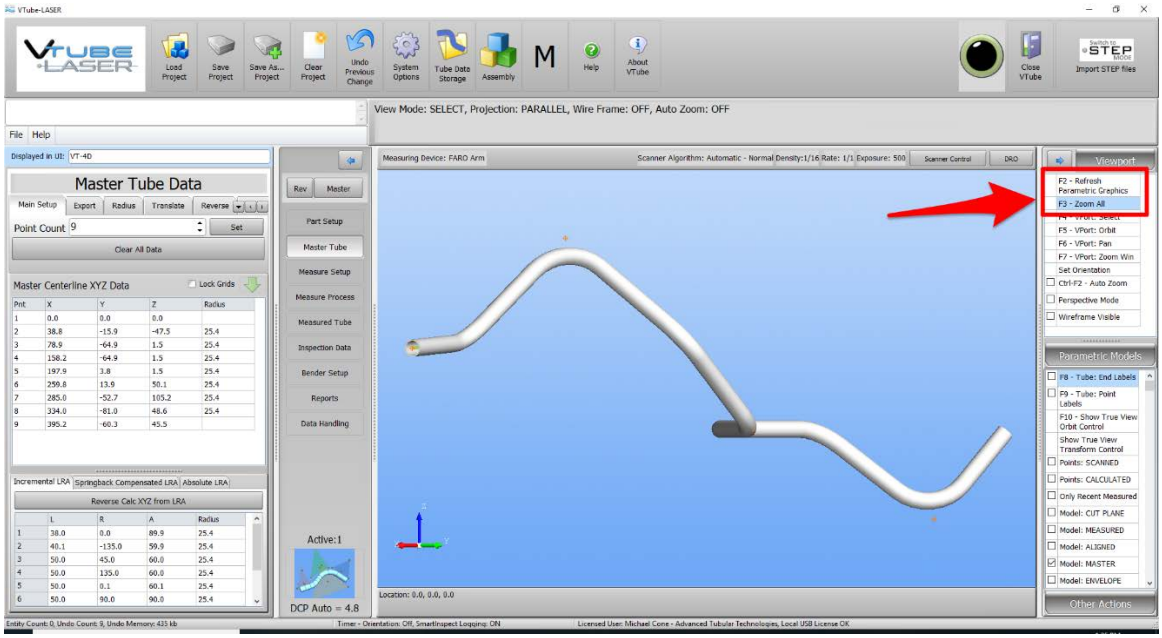


Pnt	X	Y	Z	Radius
1	0.0	0.0	0.0	
2	38.8	-15.9	-47.5	25.4
3	78.9	-64.9	1.5	25.4
4	158.2	-64.9	1.5	25.4
5	197.9	3.8	1.5	25.4
6	259.8	13.9	50.1	25.4
7	285.0	-52.7	105.2	25.4
8	334.0	-81.0	48.6	25.4
9	395.2	-60.3	45.5	

10. On the far right side of the screen, find the Model Control menu. Uncheck every model type except for MASTER. Be sure that MASTER is checked like this:

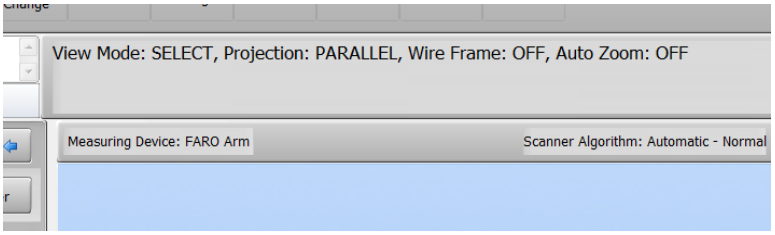


11. To refresh the graphics, press F2. To Zoom All, press F3. (Get used to this combination – because you will use it a lot in the future.)



Pressing these two keys will cause the MASTER image of the tube to appear in the window. The orientation that you see may be different – but it will be the same tube.

12. At the top of Viewport, you will find the **View Mode** value. The modes vary depending on how you want the Viewport to act. The default mode is **SELECT**. In Select mode, you can click on objects to select them or drag a window to select multiple objects.

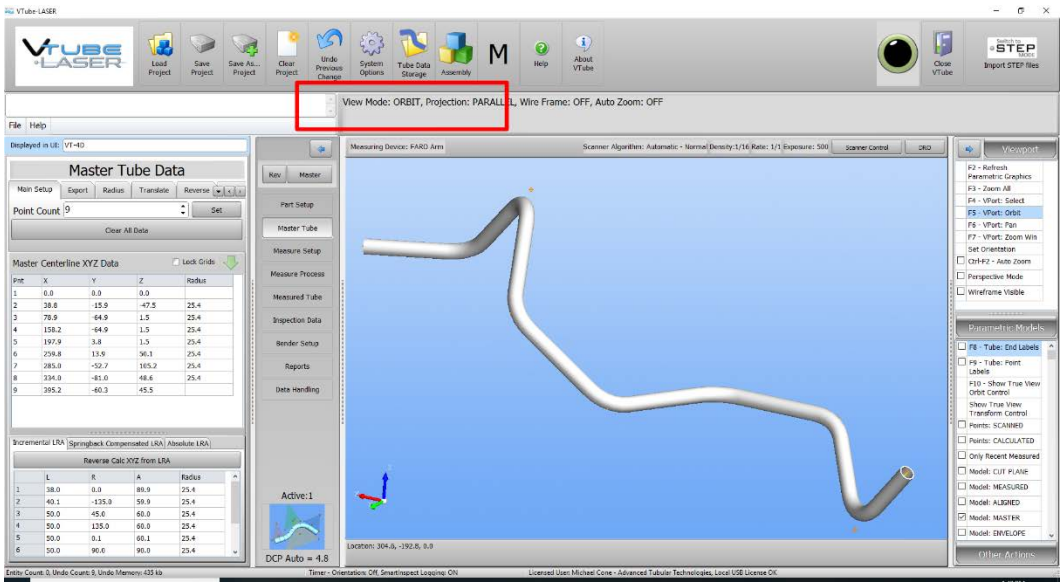


Here are some other things to know about SELECT mode:

a. You can always get back to SELECT mode by RIGHT CLICKING the mouse.

b. When in SELECT mode, right clicking on the mouse will cause a popup menu to display. No other mode will allow the popup menu.

13. Probably the most-used View Mode is **ORBIT** that allows you to orbit the part in the Viewport. Enter ORBIT mode by press F5 or pressing on the mouse well as a button.

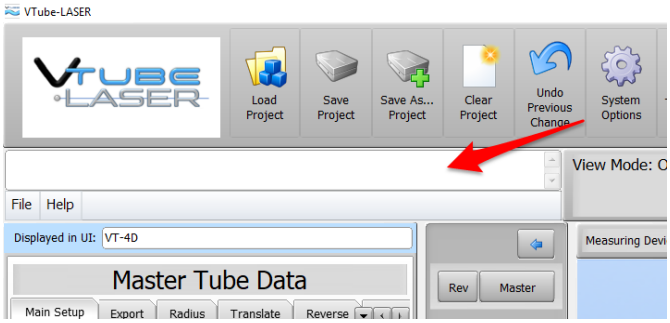


Pressing on the mouse wheel the first time will switch VTube into ORBIT view mode. Pressing the mouse wheel a second time will switch VTube into PAN view mode. Press the mouse wheel again, and VTube will toggle back to ORBIT mode.

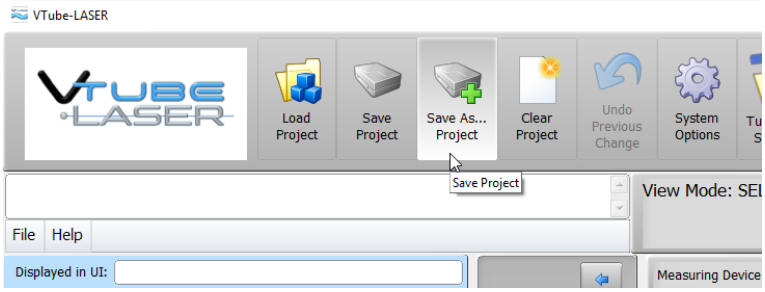
Try dragging the mouse (by holding the left mouse button down) in both modes.

14. The MASTER data is completely entered. At this point, we need to save the save the current VTube state to a VTube project file (VTP file). The VTube project file will store everything for reuse in the future.

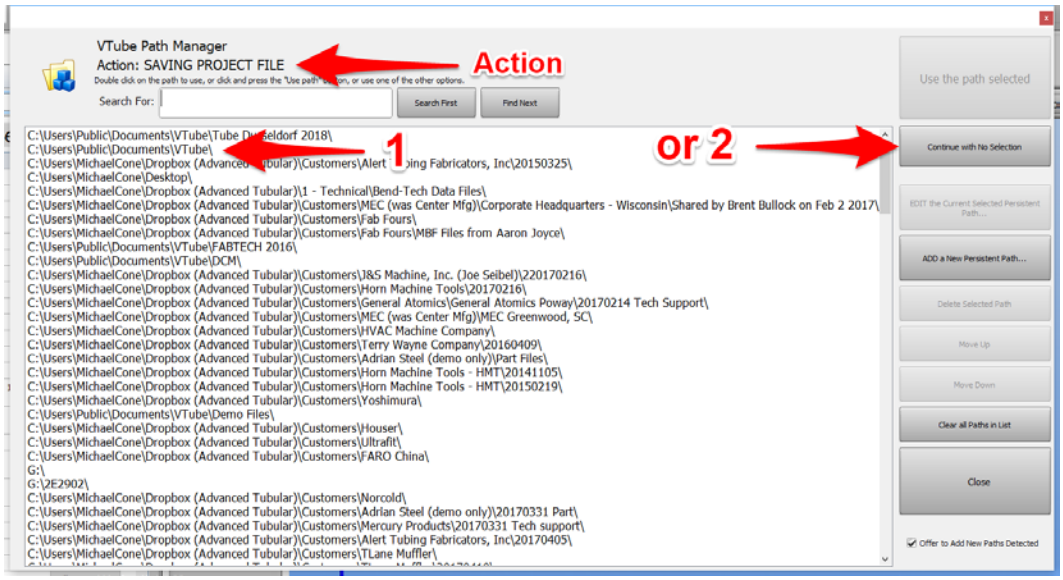
Look just below the VTube-LASER logo. You will see a white **project filename box** that will show the current path and filename of the project if it is has been saved previously. There is nothing currently in the box – so the project has not yet been saved.



In this state (with nothing I the project filename box), you can press either **Save As… Project** or **Save Project**, and VTube-LASER will perform "Save As" because it does not have a filename to overwrite with the "Save Project" yet.



15. Press **Save As…Project**. The **Path Manager** will display like this.

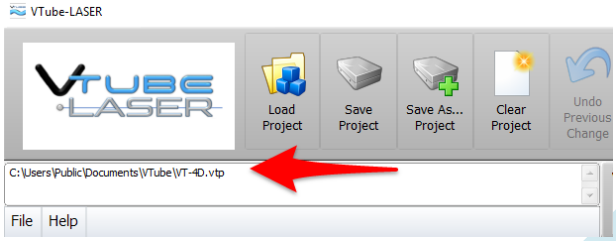


The Action tells you what the current reason the Path Manager is opening. In this case, it is to SAVE a PROJECT FILE.

The Path Manager is a list of paths to where files are. You can add to these paths any time.

Double click on one of the paths in the list, or press the Continue with no selection button to just display the File Save Dialog.

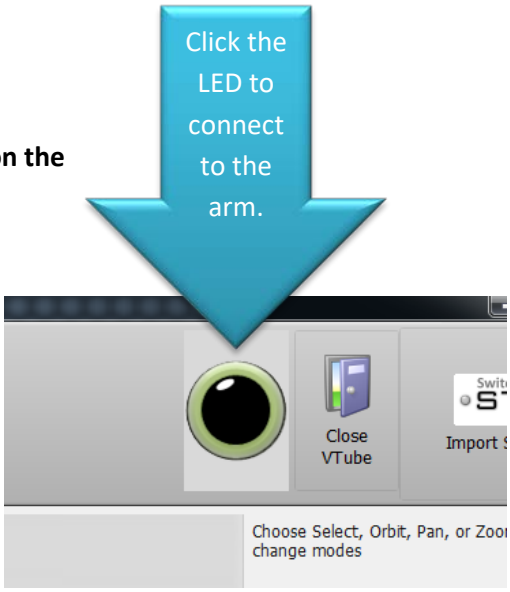
16. After the project file save is complete, the project filename box will show the current path and filename like this:



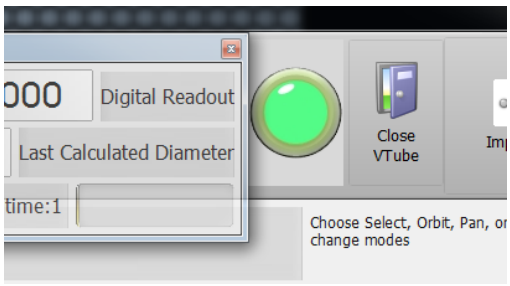
Measuring and Qualifying the Tube Shape

Follow these steps to setup to measure the tube:

1. If the arm is not connected to VTube-LASER, then **click on the black LED** in the upper right corner.



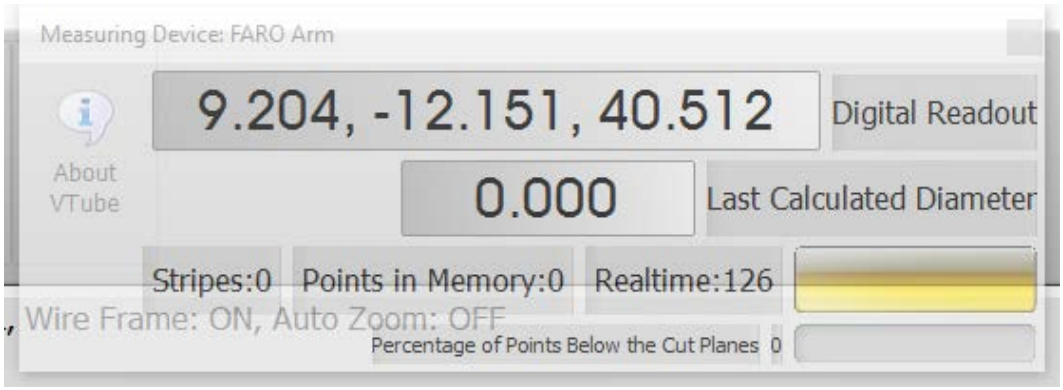
When the connection to the arm is active, the LED turns green, you will hear a connection sound, and the transparent DRO (Digital Readout) window will appear.



2. Pull the arm aware from its resting position and watch the values in the DRO (Digital Readout) move.

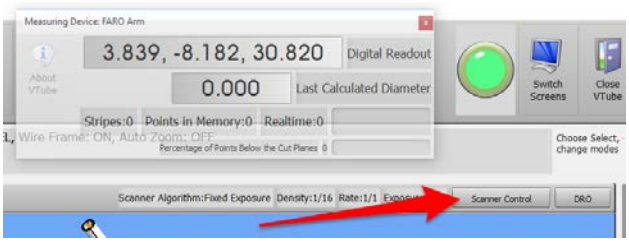
   If the laser scanner is on, then you can point the scanner about 6 to 8 inches from any object, and you will see XYZ data change in the DRO.

   This is the **DRO (Digital Readout):**

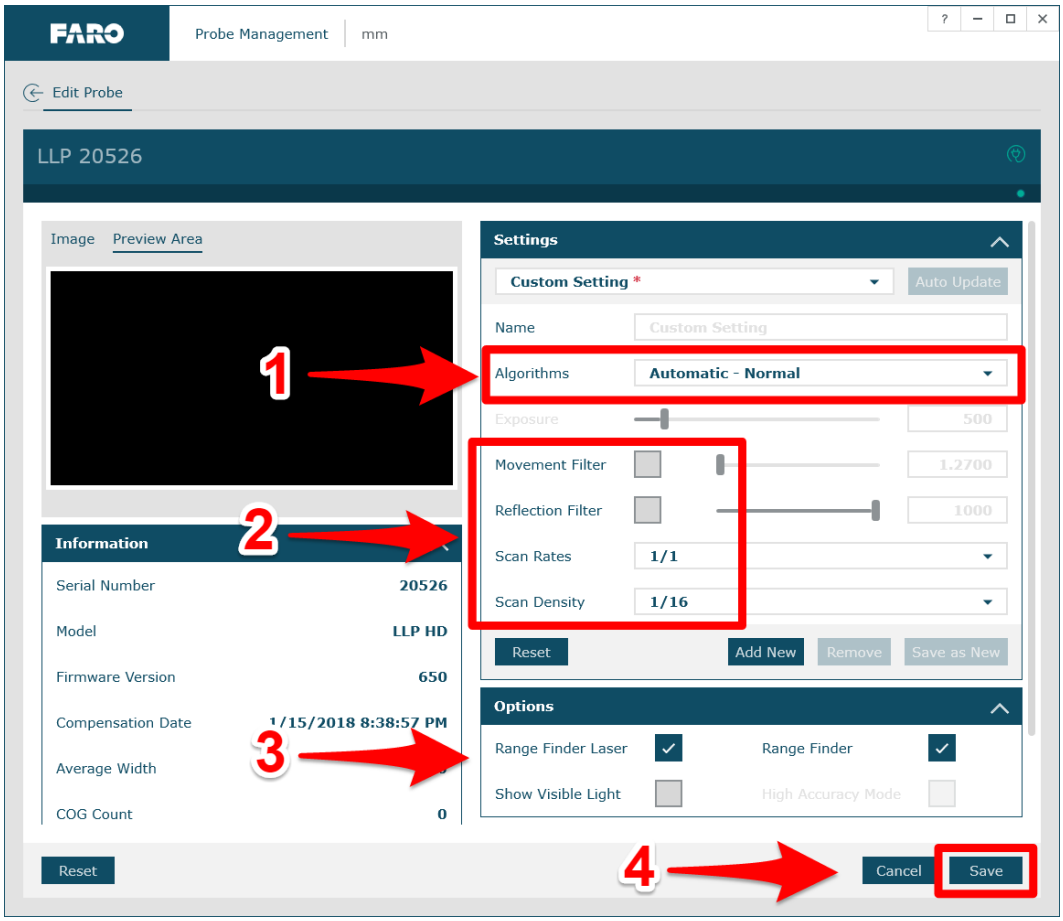


   If the laser is not on, then you will see the XYZ data changing whenever you move the arm. In this mode, the data will represent the **center of the ball probe**.

3. If you are using a scanner (rather than the ball probe), then click on the FARO **Scanner Control** button. The FARO Laser Line Probe Control window will load.



4. We recommend that you set this scanner with these values:

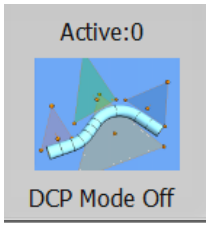


If you are scanning a highly reflective part in a very bright environment (like bright halogen lights), then you might also try the HDR (High Dynamic Range) algorithm.

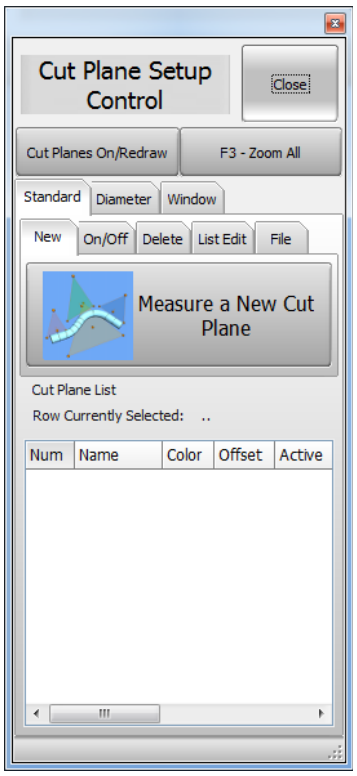
5. Save the changes (see arrow 4 in the image above) and then press the close button in the upper right corner, or press the “Edit Probe” text on the upper left to close the menu.

6. Setup CUT PLANES if you are measuring the part on a table surface. Cut Planes will remove any laser points beyond the measured plane.

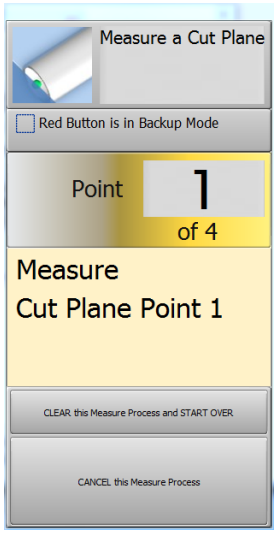
   Click on the **Cut Plane icon** at the bottom of the navigate pane.



7. Press the **Measure a New Cut Plane** button in the NEW tab.



8. **Press the GREEN button for all four points.**

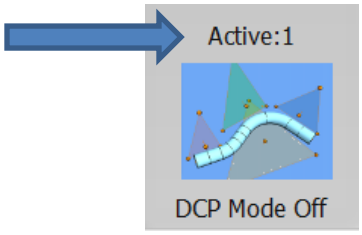


Take the first three points <u>on the plane of the table</u> surface using the GREEN button.

Take the last point is at least 1 millimeter above the table also with the GREEN button.

(Again - do not push the red button in this operation.)

9. The **Active** label in the Cut Planes icon will now show “1”.

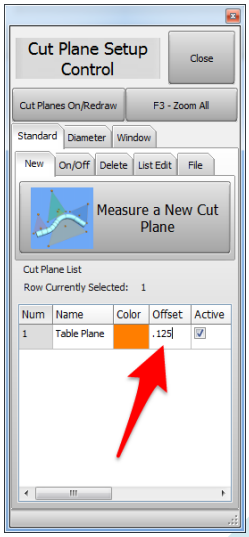


10. Enter an offset for the new cut plane of up to half of the diameter of the tube.

    An offset is important, or the scanner may pickup surface outliers. The greater the offset, the less chance of outliers.

    For most tables, we recommend 0.125” or 3 mm as a starting point. Some surfaces will require a larger value.

    Enter the offset, then press the **Enter button** to allow the value to be entered into memory.



11. Important Things About Cut Planes

a. Cut Planes are always stored until you delete or change them – even if you shut VTube-LASER down.

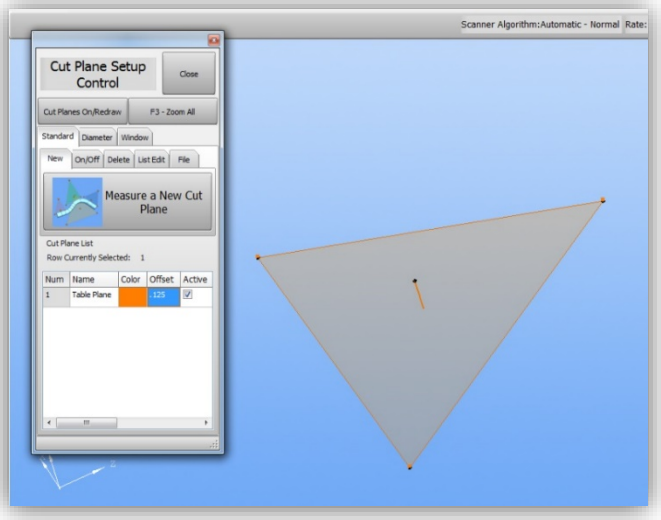
b. Cut Planes are only used for laser scans. They are **IGNORED when using the ball probe**.

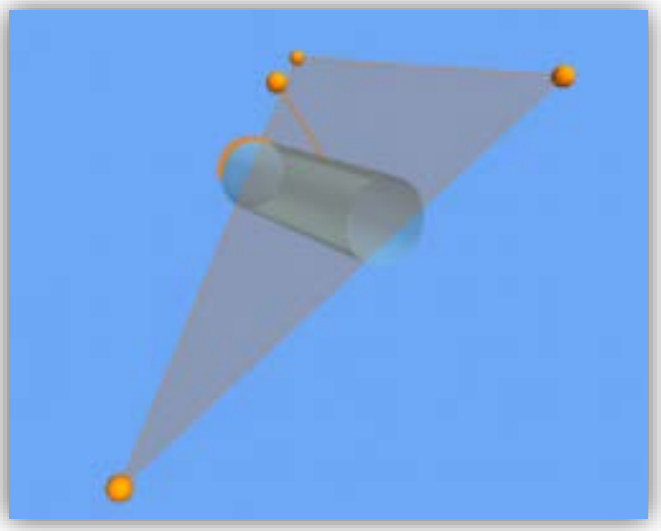
c. Make changes to the Cut Plane at any time during any other measurement.

d. You can add as many cut planes as you want.

e. You can activate or deactivate the cut planes any time. Each cut plane has its own active switch and offset value.

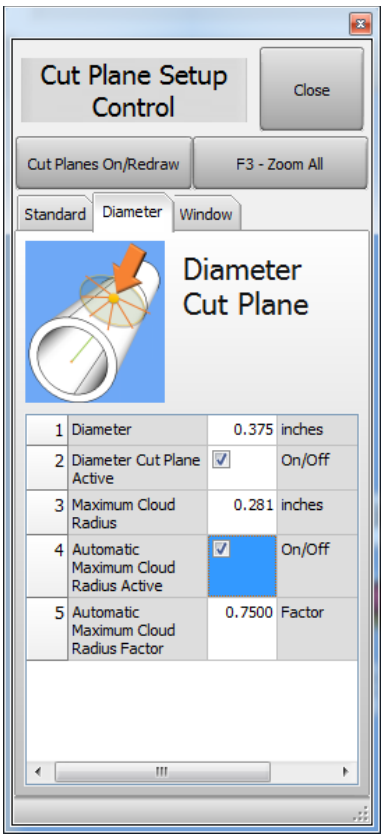
f. If you move the arm relative to the table, then you will need to remeasure the cut planes – or the cut plane will be in the wrong place relative to the table.





12. Next, let's cover the

DCP - Diameter Cut Plane



It is powerful – and yet it is easy to understand and use.

The DCP feature will find the top diameter and remove all other objects behind the first diameter (closest to the probe) that it finds. Because it does this, DCP can not only remove unwanted objects from the scanner, it can also remove outliers or flyers that enter the data.

When in AUTO MODE, DCP relies on the nominal diameter to know how big the Cloud Radius should be – so it is important to have the diameter set to the actual value before you measure using the DCP command.

If you turn DCP on, and also enable the **Automatic Maximum Cloud Radius** feature, then be careful to enter the actual nominal DIAMETER, and the Cloud Radius FACTOR in row 5 should be anywhere from 0.75 to 1.0 in normal situations.

With this setup, VTube will find the first (nearest) surface point it encounters, then keep any surface point within a distance of 0.281" from that first point.

Here are two Important notes about DCP:

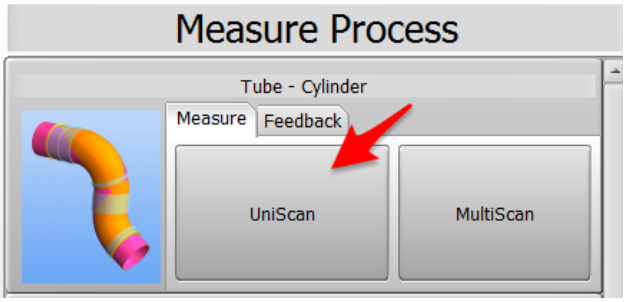
a. DCP only works when the scanner is active - **not the ball probe** - because it requires multiple points per scanned line to work.

b. DCP only applies to **cylinder scans** and **bend profile scans**. **It does not have any effect on <u>END</u> scans.**

13. Go to the Navigation Pane and press

    MEASURE PROCESS

    menu and find the Tube - Cylinder panel at the top of the choices on the left side of the screen. Press the **UniScan**.



UNISCAN versus MULTISCAN Note: We are going to use the **UNISCAN** method to measure tubes. The UNISCAN motion feels like spray-painting the tube with laser stripes. When you press the green button, then VTube takes in the laser stripes. You can release the green button to pause scanning to move over obstacles. During scanning, when you release the green button, new scanned points will draw on the screen.

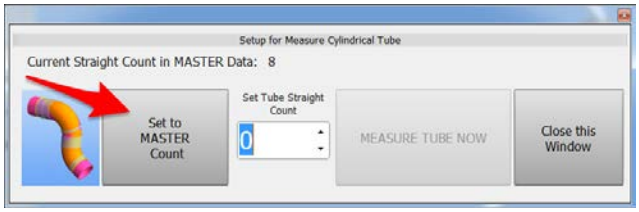
There is another method called **MULTISCAN** that is ideal for for situations where the straights are bowed or curved. In MULTISCAN, you aim near the first tangent, then hold the arm still, then press and hold the green button until you hear the scan complete sound. Then you do the same at the other end of the straight.

For most measurements, we recommend UNISCAN, because this mode takes in much more data and is able to give operators better assurance that the scan is good. For example, using DCF – Dual Cylinder Fit, UNISCAN can reduce uncertainty significantly because it takes many more surface points than MULTISCAN, then uses this to your advantage.

14. Press

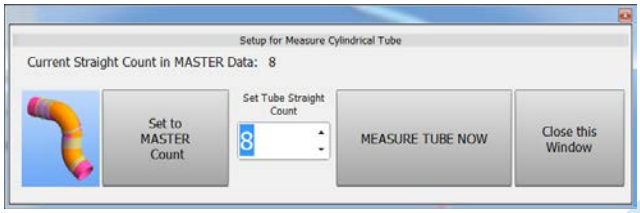
    Set to MASTER Count

    button.

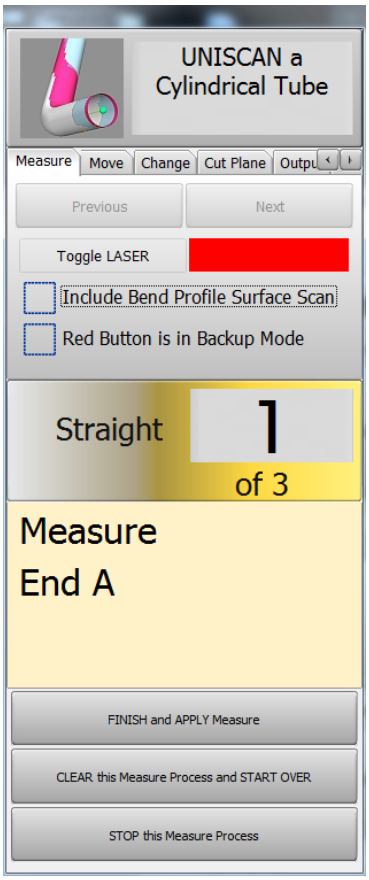


15. Press

    MEASURE TUBE NOW.



16. Measure the part following the instructions in the guide box like the one shown here. The yellow box tells you the current step.



If VTube is setup to measure the ends with the ball probe, the red laser box will turn black. If you want to measure the end with the laser, then just press the **Toggle LASER** button.

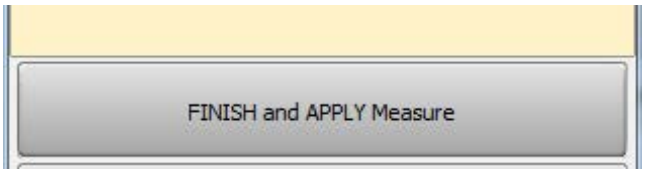
At this point, the trainer will show you the exact technique to use for scanning the ends and the staights. If you are learning without the help of a trainer, then it's important to see at least one of these two videos in the knowledgebase first:

Video 37: "**Measuring Demo Part 3 with the HD Scanner in a Tube Clamp**" or

Video 38: "**Measuring Demo Part 3 with the HD Scanner on a Table Surface**"

Knowledgbase Videos for VTube-LASER are in this web page: http://www.advancedtubular.wiki/index.pp/VTube-LASER_Videos

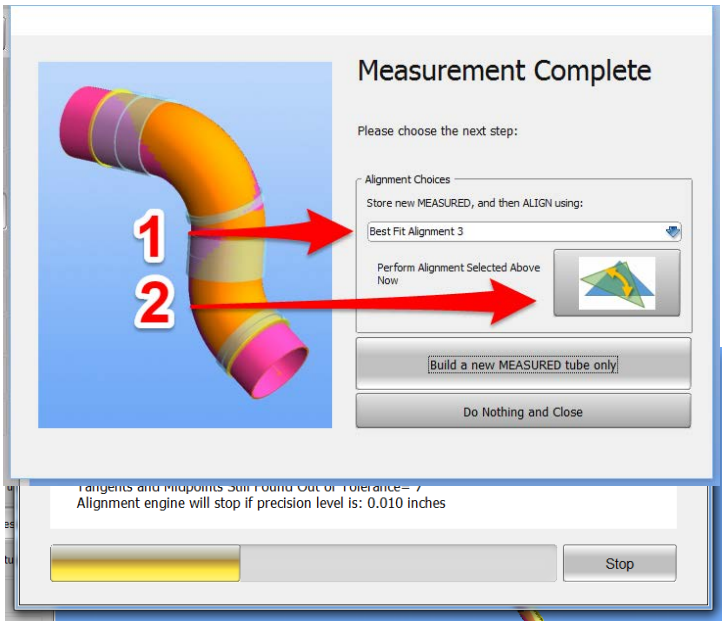
17. After measuring End B, press the **Finish and Apply** button.



18. Change the **alignment type to #3** and then press the **Alignment button** with the triangles.

19. Press **Inspection Results** in the navigation pane.

20. VTube will align the measured part to the master part. It will show a progress bar as it is doing the alignment.



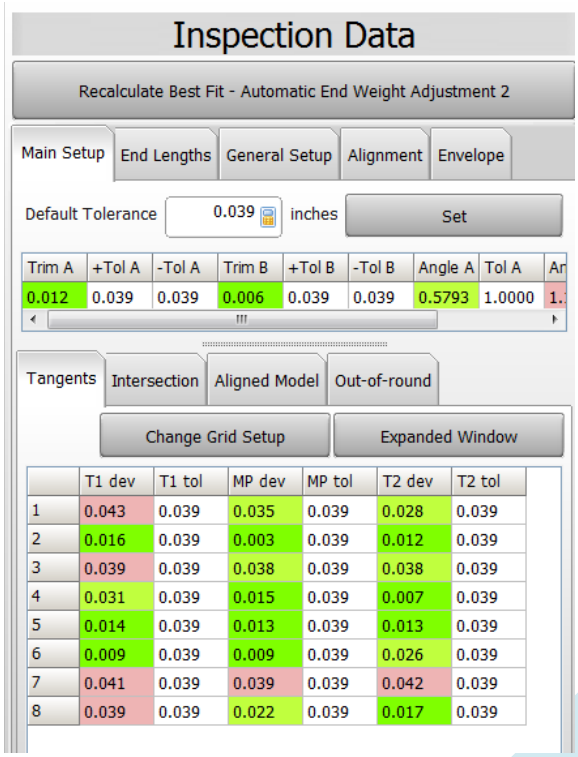
For the demo tube, don't be surprised if you see a lot RED cells in the Inspection Data menu. This tutorial is designed to show you how to determine if a part is out of profile deviation – and then how to correct that situation. (The out of tolerance condition is expected.)

21. You will see **Inspection Data** menu display on the left with color-coded deviations. End length and tangent point deviations are always shown here.

The **Tangents** deviation grid qualifies the profile of the straights as a virtual gauge. Tangents are where the straights meet the bends. For example, the **T2 dev, row 1** cell shows the deviation where the first straight meets the first bend on the centerline.

Note that **T1-1** and **T2-8** cells in this grid are really trimmed end points (not tangent points).

The end lengths are qualified at the top of the menu. The default profile tolerance can be set at the very top.

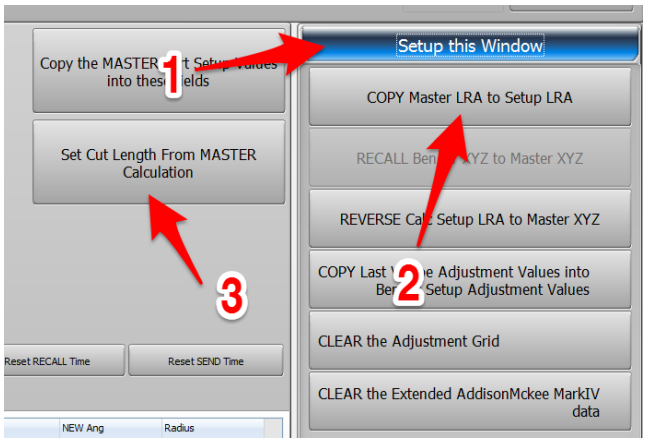


CORRECTING BENDERs with COMMUNICATIONS

This next section works through how to communicate with the bender. This is only an example correction communication. It simulates the Benderlink feature to teach the principles of communications to benders.

To make communications work (and not just simulate), the Benderlink feature must be setup by an experienced technician. The Benderlink setup steps are not covered in this document because it's too complex to be covered here.

1. Press **Bender Setup** to show the Bender Setup screen (for communicating with the bender).

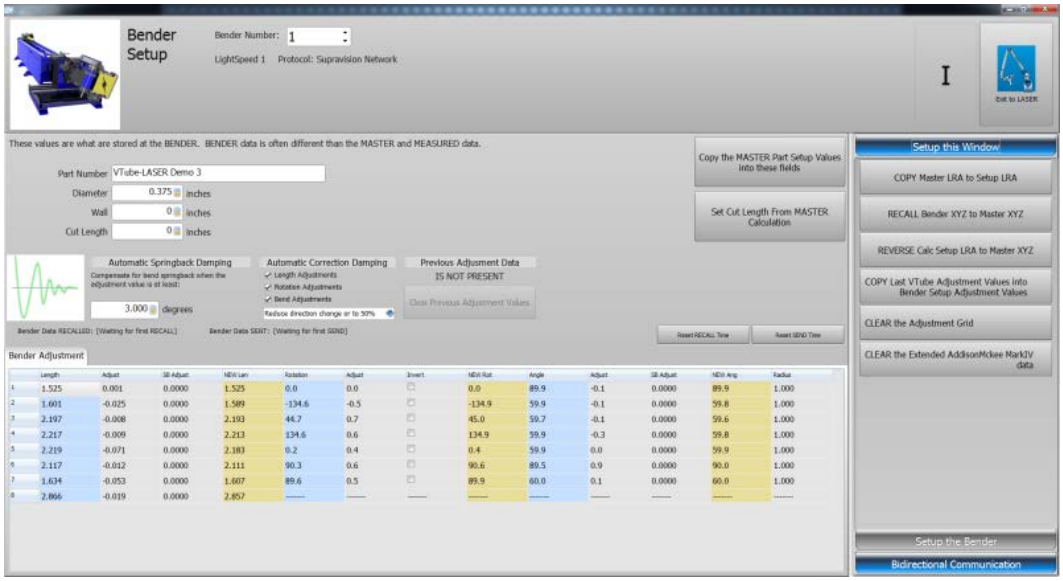


2. Press **(1) Setup This Window on the right side.**

3. Press **(2) COPY Master LRA to Setup LRA**. (Press the Continue in the Confirmation dialog if it appears.)

4. If the cut length is zero, then press **(3) Set Cut Length From MASTER Calculation**.

   This will fill the starting values into the bender setup like this:



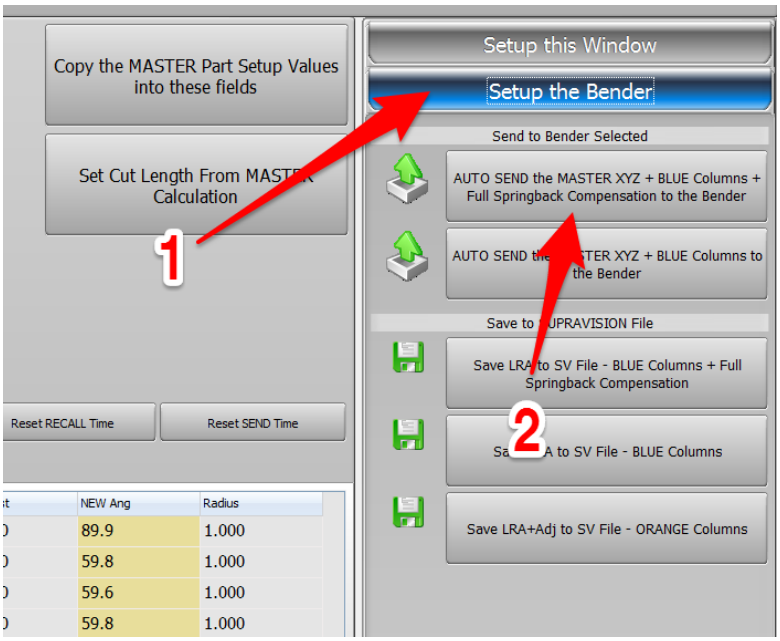
The BLUE columns represent bender data before correction. The ORANGE columns represent corrected data to be sent to the bender. The columns in between the BLUE and ORANGE columns are ADJUSTMENT columns.

This BLUE and the GREY cells can be manually adjusted for total control by the operator over the corrections being sent to the bender.

5. Press **(1) Setup the Bender** button.

6. Press **(2) AUTO SEND the MASTER…** button.

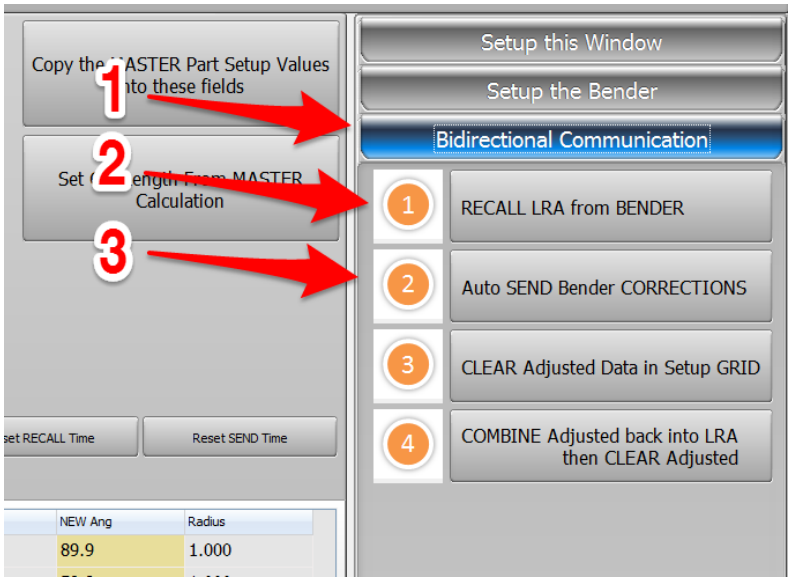
   If VTube-LASER was connected to a bender, then **this would have transferred new setup data** to the bender.



7. Press the **(1) Bidirectional Communication** button on the right bottom side.

   This sequence of button presses is how VTube can RECALL and SEND data for corrections loops to benders. VTube can communicate with up to 100 benders.

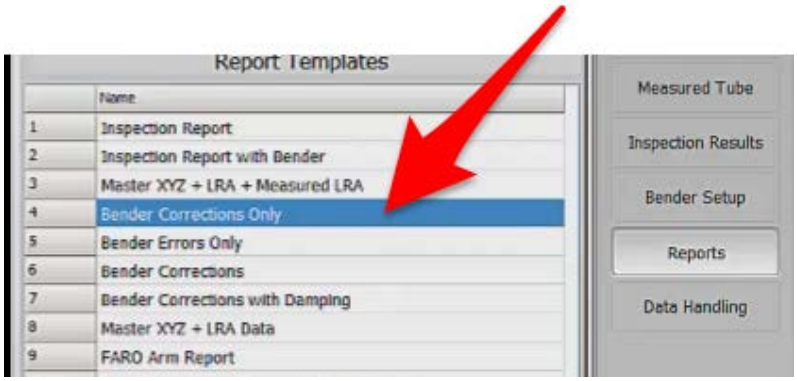
8. Press **Exit to LASER** on the top right corner of this window.



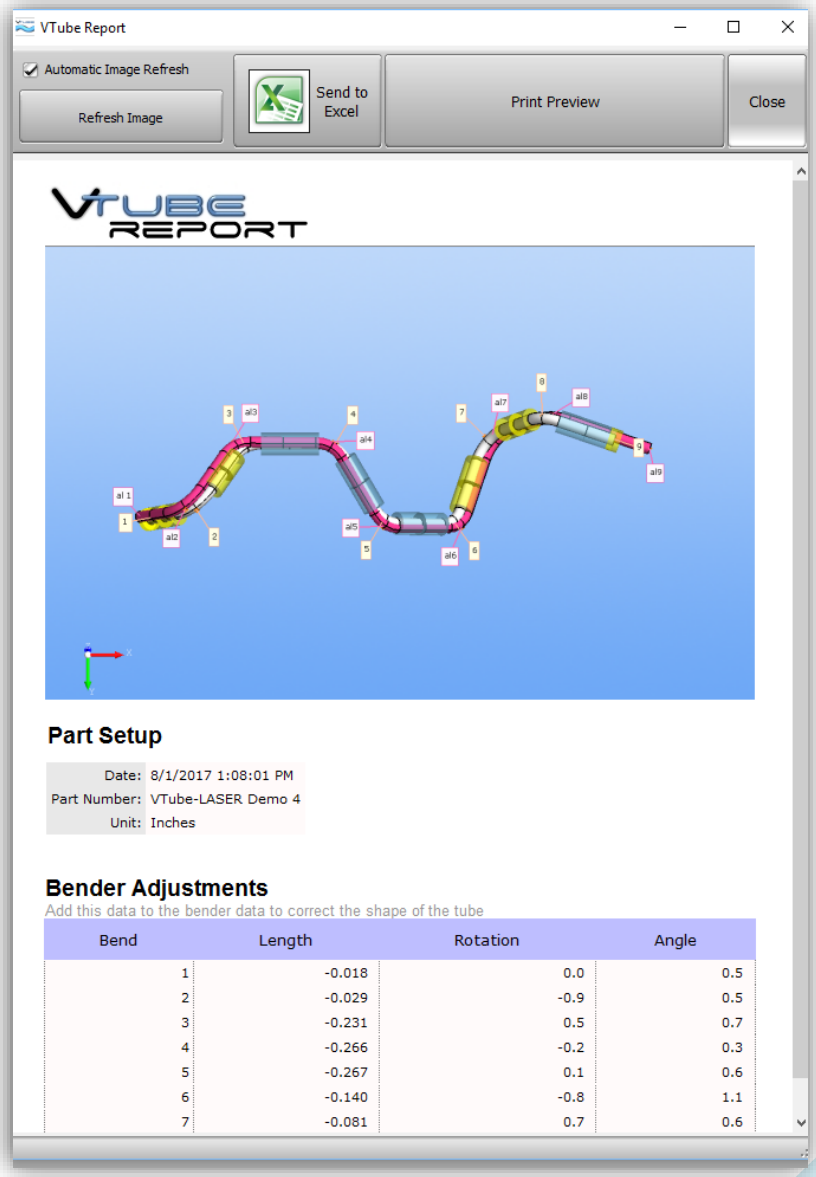
CORRECTIONS REPORT EXAMPLE

You may not have a connection to the bender. That's ok, because you can still get to the correction data using printed reports.

Click on **Reports** in the navigation pane.



Double-click on the **Bender Corrections Only** template cell in row 4.



If the tube image is not the same as the image in the main screen, then press **Refresh Image** at the top of the screen.

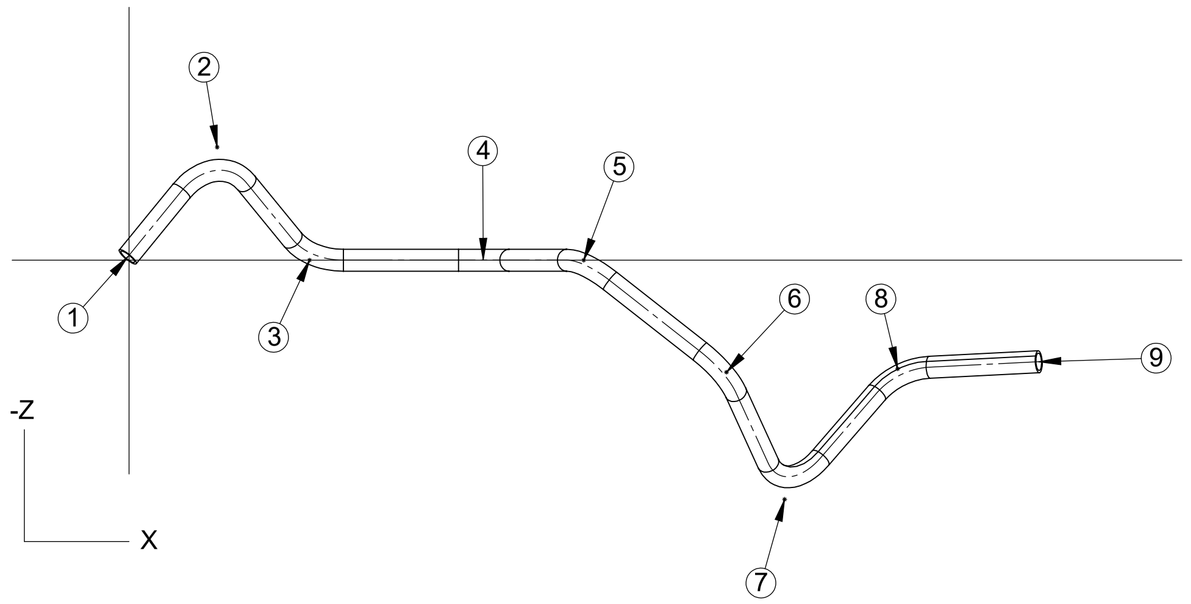
You can also tell VTube to always automatically refresh the image by putting a check in the **Automatic Image Refresh** switch at the top.

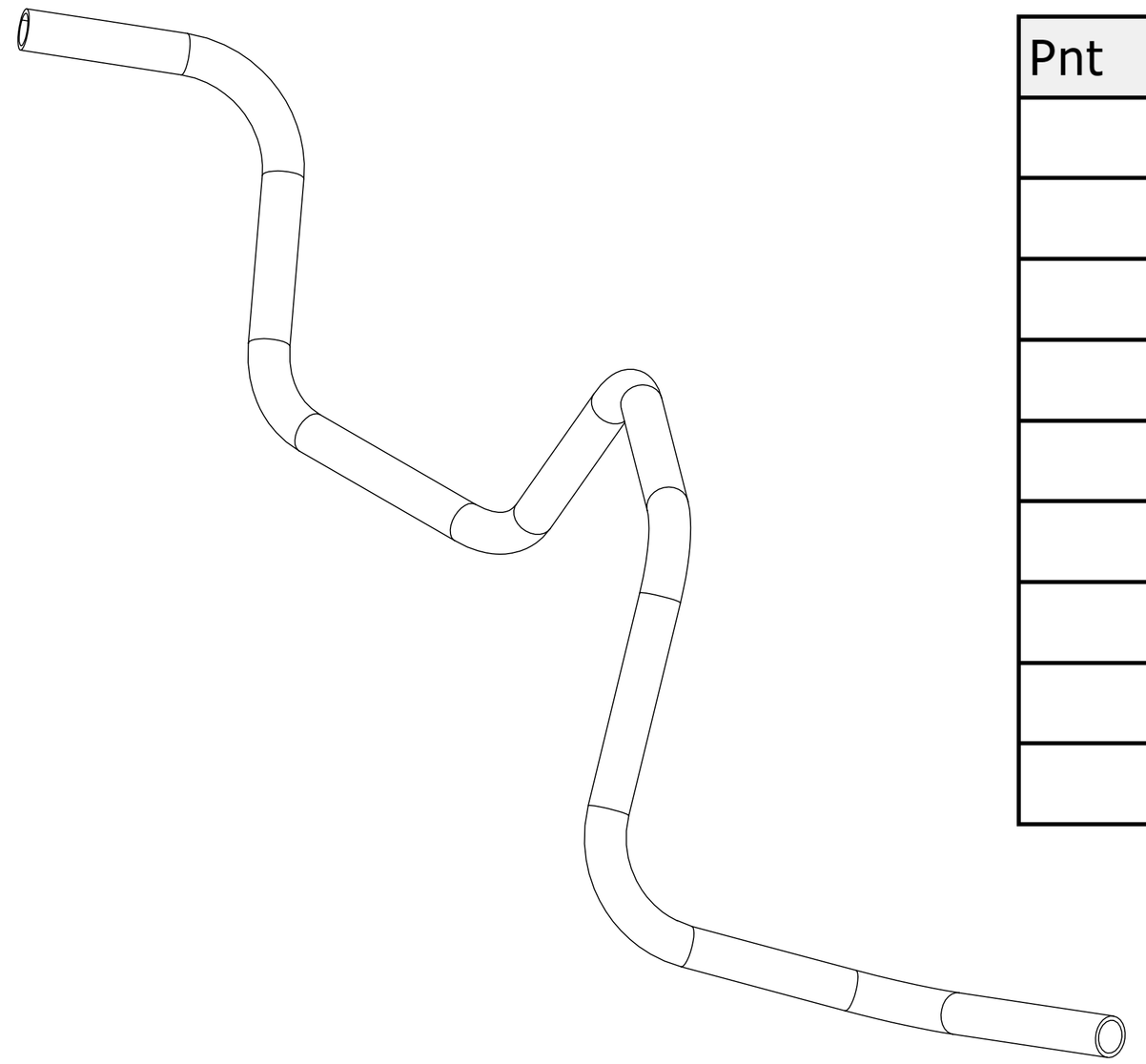
This is the end of the Quick Start Guide.

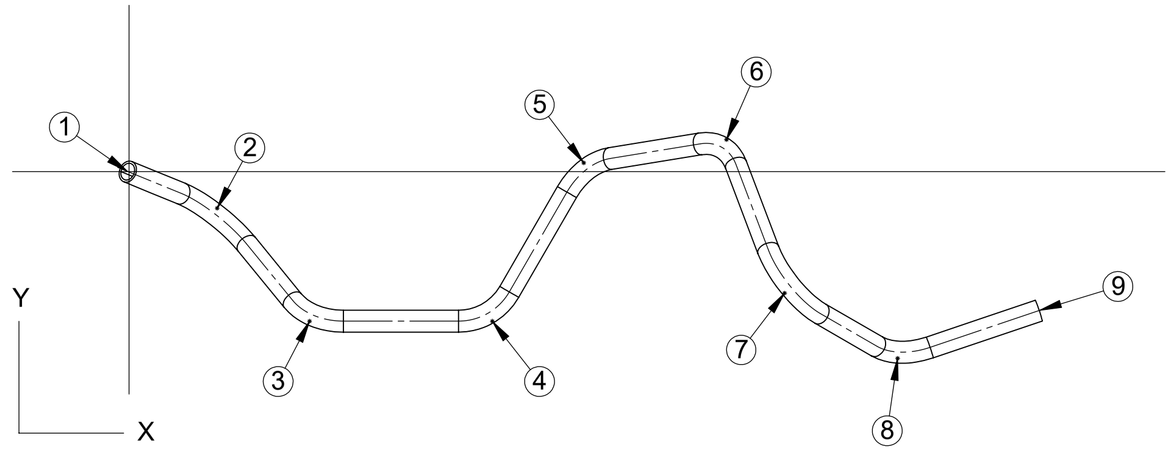
REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	SEE DRAWN DATE	XX

TUBE SPEC: 9.5 OD X 0.8 WALL
RADIUS: 25.4 TYPICAL

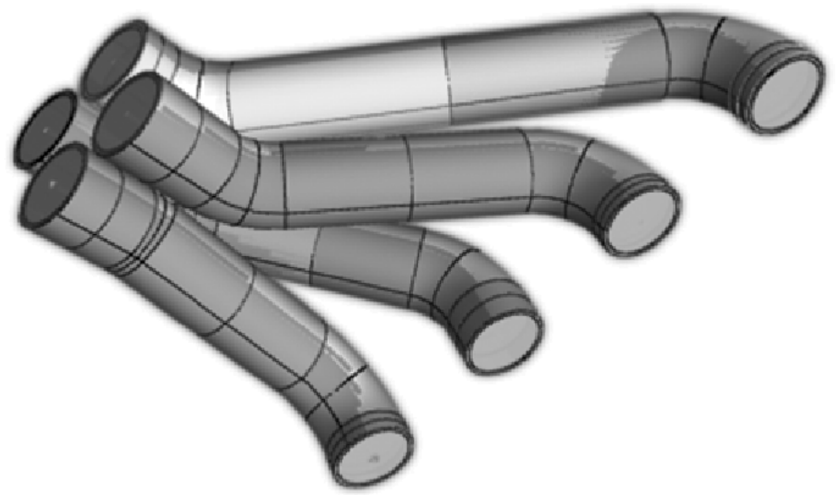






TUBE CENTERLINE COORDINATES

Pnt	X	Y	Z
1	0.0	0.0	0.0
2	38.8	-15.9	-47.5
3	78.9	-64.9	1.5
4	158.2	-64.9	1.5
5	197.9	3.8	1.5
6	259.8	13.9	50.1
7	285.0	-52.7	105.2
8	334.0	-81.0	48.6
9	395.2	-60.3	45.5



VTUBE-LASER

ADVANCED TUBULAR TECHNOLOGIES, INC

METRIC
UNLESS OTHERWISE SPECIFIED
SPARE PARTS INDICATED BY ASTERISK IN BILL OF MATERIAL
DO NOT SCALE DRAWING
ALL DIMENSIONS ARE IN MILLIMETERS
ALL STOCK AND CUT-OFF DIMENSIONS ± 1
ALL OTHER ONE PLACE DECIMAL DIMENSIONS ± 1
ALL TWO PLACE DECIMAL DIMENSIONS ± 0.10
ALL THREE PLACE DECIMAL DIMENSIONS ± 0.013
ALL MACHINED ANGLES ± 0°-15'
WELDMENT, CASTING AND BURNOUT DIMENSIONS ± 3.0
C'SINK ALL TAPPED HOLES
REMOVE ALL BURRS AND SHARP CORNERS
DO NOT USE REF. DIMENSIONS FOR MANUFACTURING
DIMENSIONS IN [XX] ARE IN INCHES
3.2 [125] OR BETTER ON ALL MACHINED SURFACES

THIRD ANGLE PROJECTION

TUBE BENDING COMPANY
Waterford, MI 48329 USA
www.tubebendingco.com

TITLE: **Advanced Tubular Technologies, Inc.**
VTUBE-LASER DEMO TUBE 4

PROJECT NO: QS2018		DRAWN BY: CN	DATE: 5/31/2018
SCALE: 1:2	SHEET SIZE: **D**	CHECKED BY: MBC	DATE: 7/20/2018
SHEET NO: 1	TOTAL SHEETS: 1	DRAWING NO: VT-4D	

TUBE BENDING SOLIDWORKS File Name: VTube-LASER Demo Tube 4.slddrw