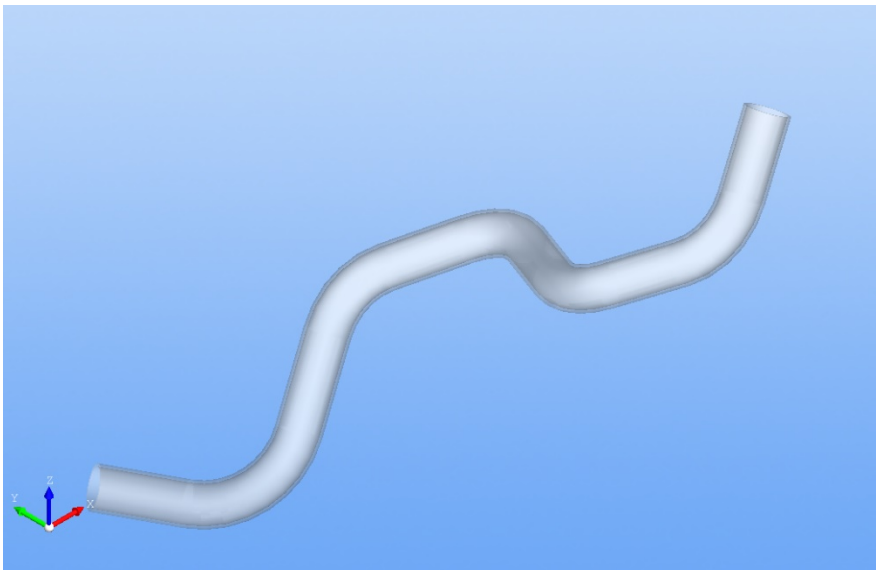
VTube-LASER Quick Start Guide for a HEXAGON 8-Series Arm – How to Import a STEP or IGES file then Measure and Qualify

The steps in this workflow are from VTube-LASER version 2.9.18.

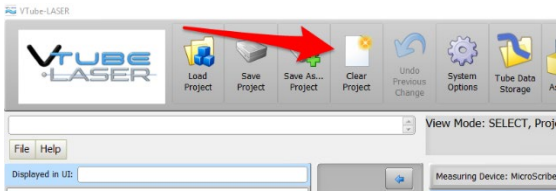
This guide uses file "VTube-LASER Demo 5.stp." However, you can use any tube model.

In this case, this imported STEP file will be a "clean" model – which means the tube model will have no components other than the tube shape.



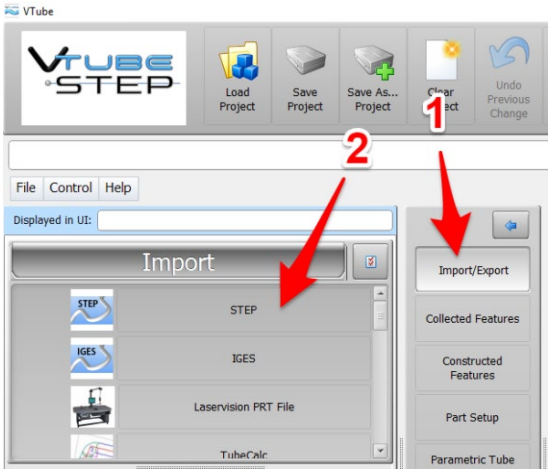
Document Revision Date: March 15, 2019

VTube-LASER always starts in the LASER mode window.

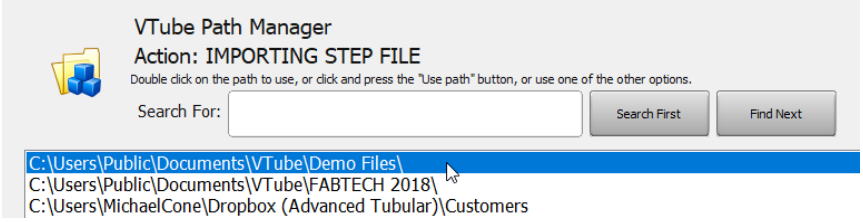


1. If VTube has a tube showing in the viewport, then press the **Clear Project** button in the tool bar on the top of the VTube-LASER window.

2. On the far-right side of the toolbar, press SWITCH TO STEP MODE button. This will allow switch you to the window that allows you to import solid models into VTube.

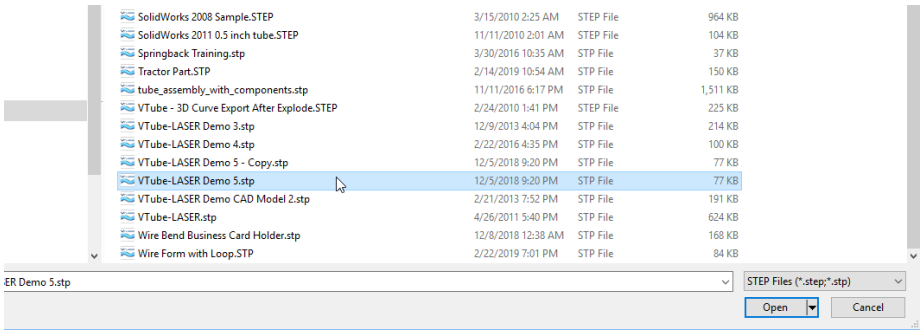


3. You are now in the VTube-STEP Window. Press the **Import/Export** button in the Navigation Pane, then press the **Import STEP** button in the Import menu.

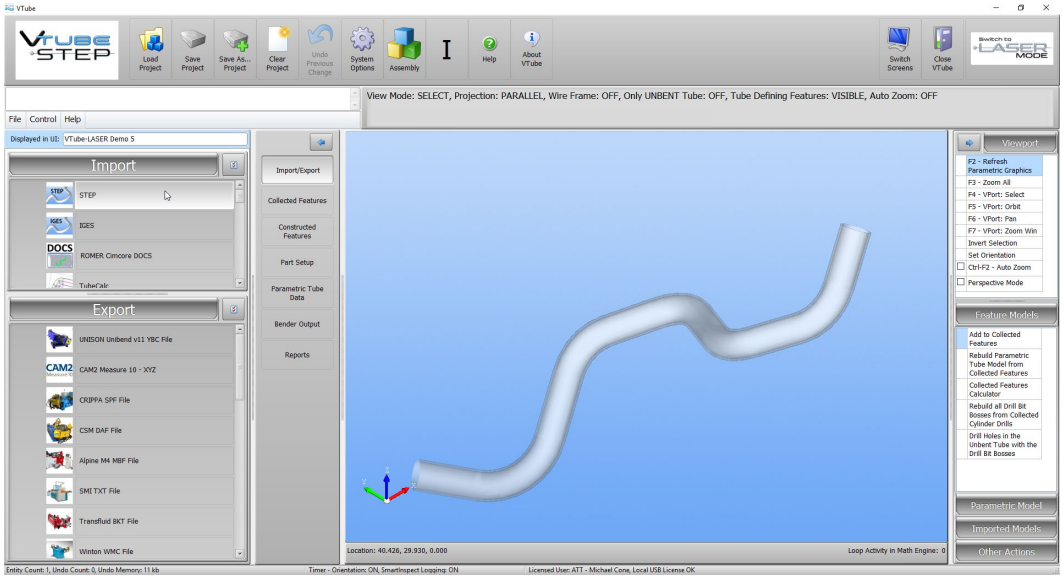


4. Double-click on the VTube path in the Path Manager.

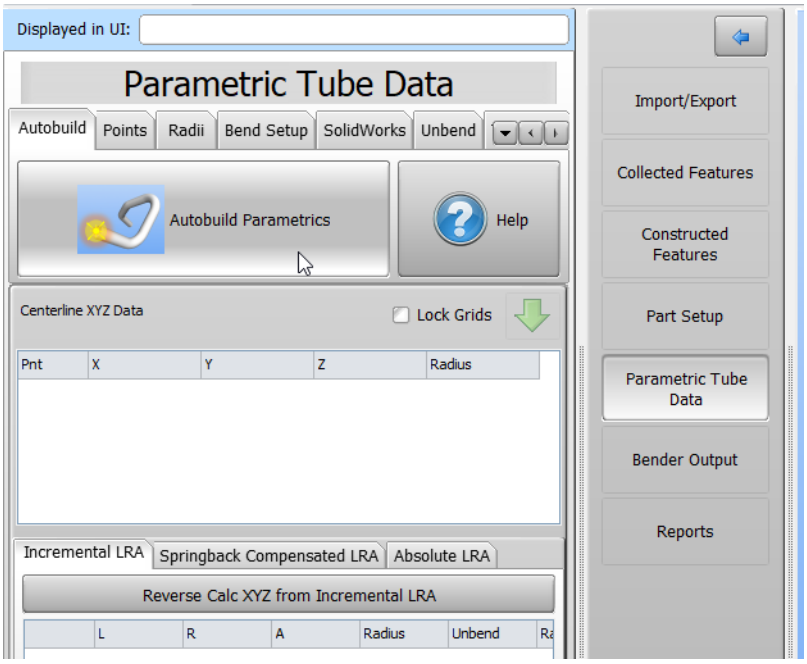
Find **VTube-LASER Demo 5.stp** file and load it into VTube-STEP.



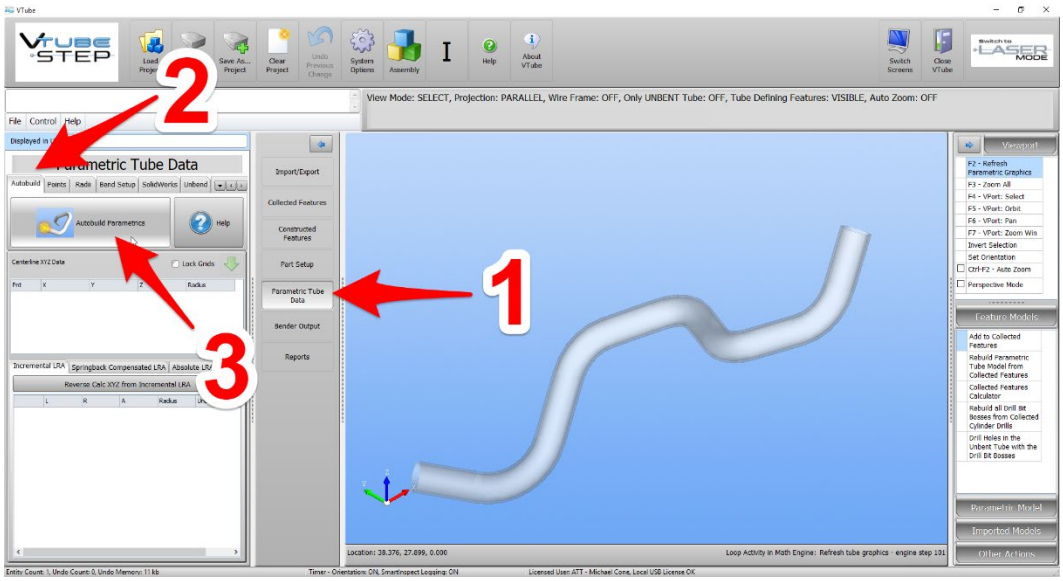
5. You will see a model like this after the STEP or IGES import:



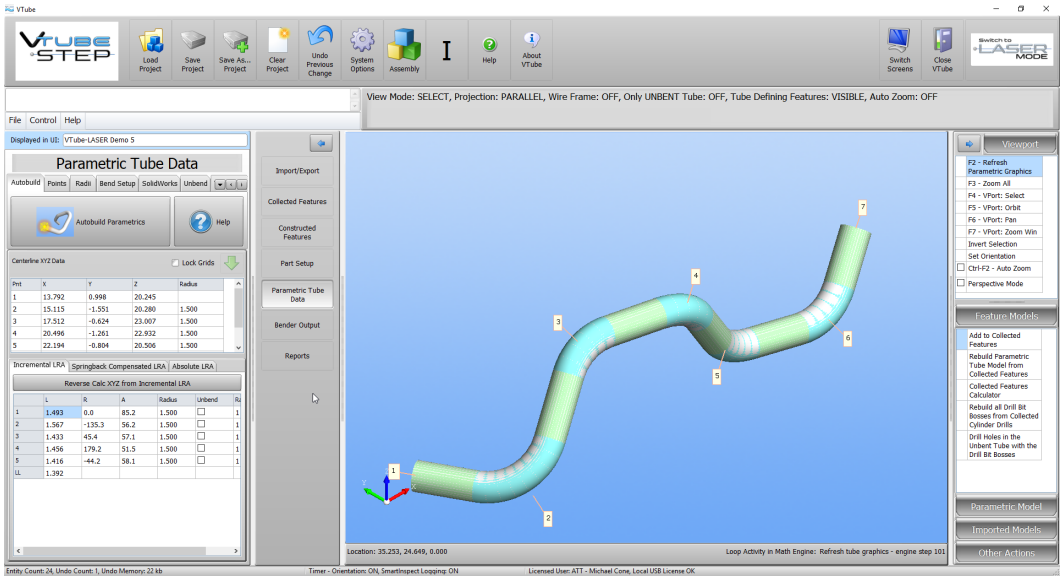
6. As of version 2.9.17, there are two methods for importing solid models and converting them to parametric data. The most efficient method is the newer **Autobuild Parametrics** method in the Parametric Tube Data menu.



7. Click on **Parametric Tube Data** in the navigation pane. Click on the **Autobuild** tab menu if necessary. Click on the Autobuild Parametric button.

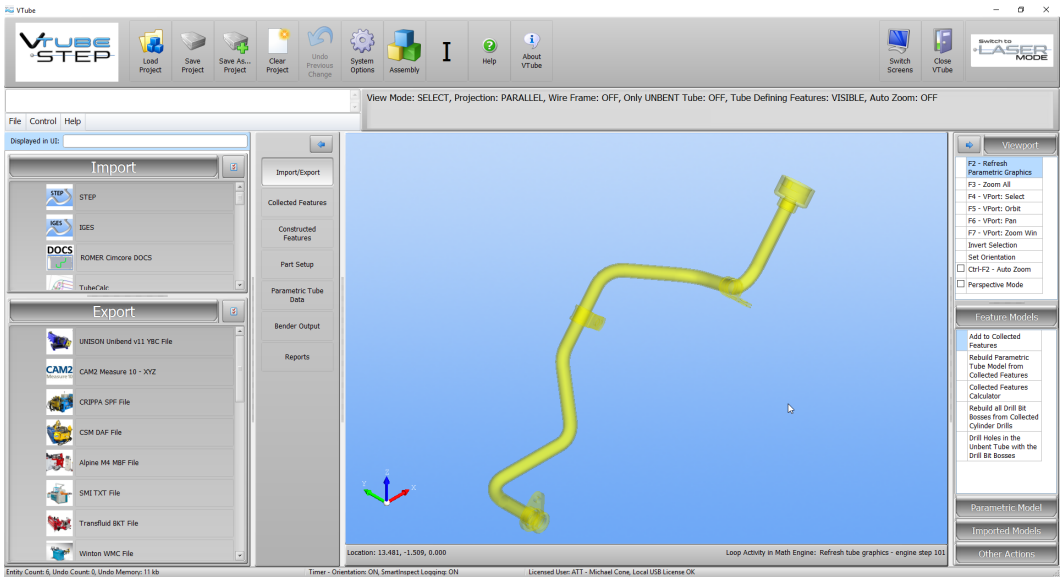


8. After the Autobuild process is complete, then you will see a tube that is shaded with greens and blue sections. There will also be a solid white tube drawn on top of the imported model.

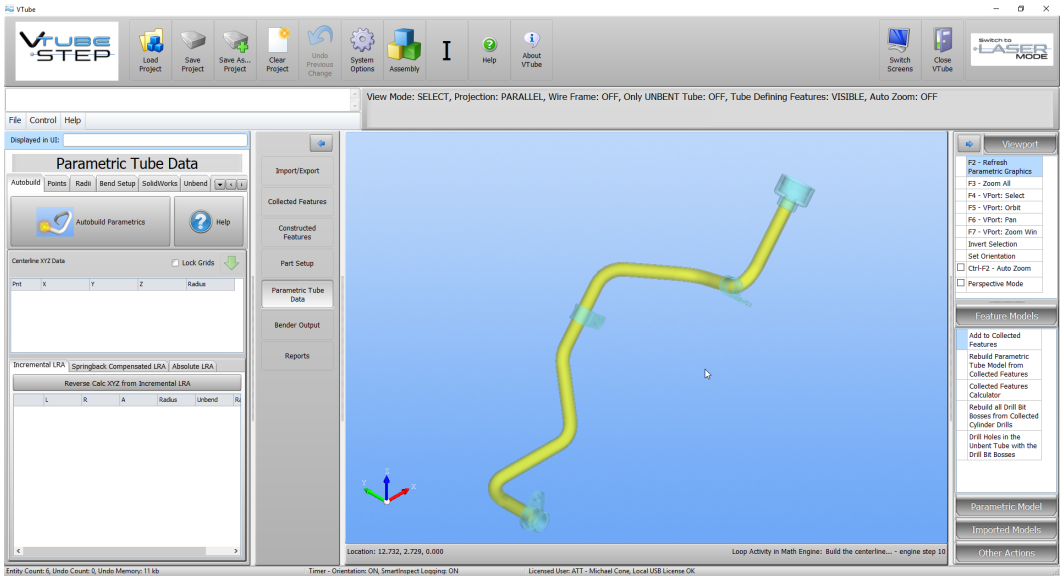


9. Orbit around the part to be sure that the parametric tube perfectly superimposes the imported tube.

10. This next section shows how to import a non-clean tube model. For this part of the tutorial, we import “model sample 2b.stp.” It will look like this one the screen:



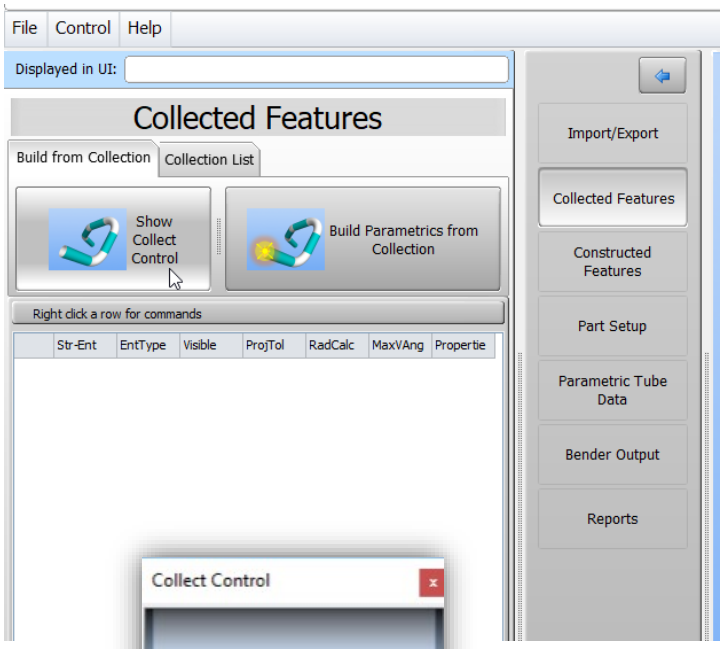
The model has components on the ends of the tube and brackets in the middle. If you try to use Autobuild Parametrics, no parametric centerline solution will be found. You will see something like this on the screen after pressing Autobuild Parametrics:



11. To overcome this issue, we switch to a process called COLLECTION where we will select and collect each of the straights manually.

12. Click on the Collected Features button in the navigation pane. Then press the **Show Collect Control** button.

    The Collect Control floating window will display like shown to the right below.



13. If necessary, use the spinner to find the **Straight from Cylinder SURFACE** option.

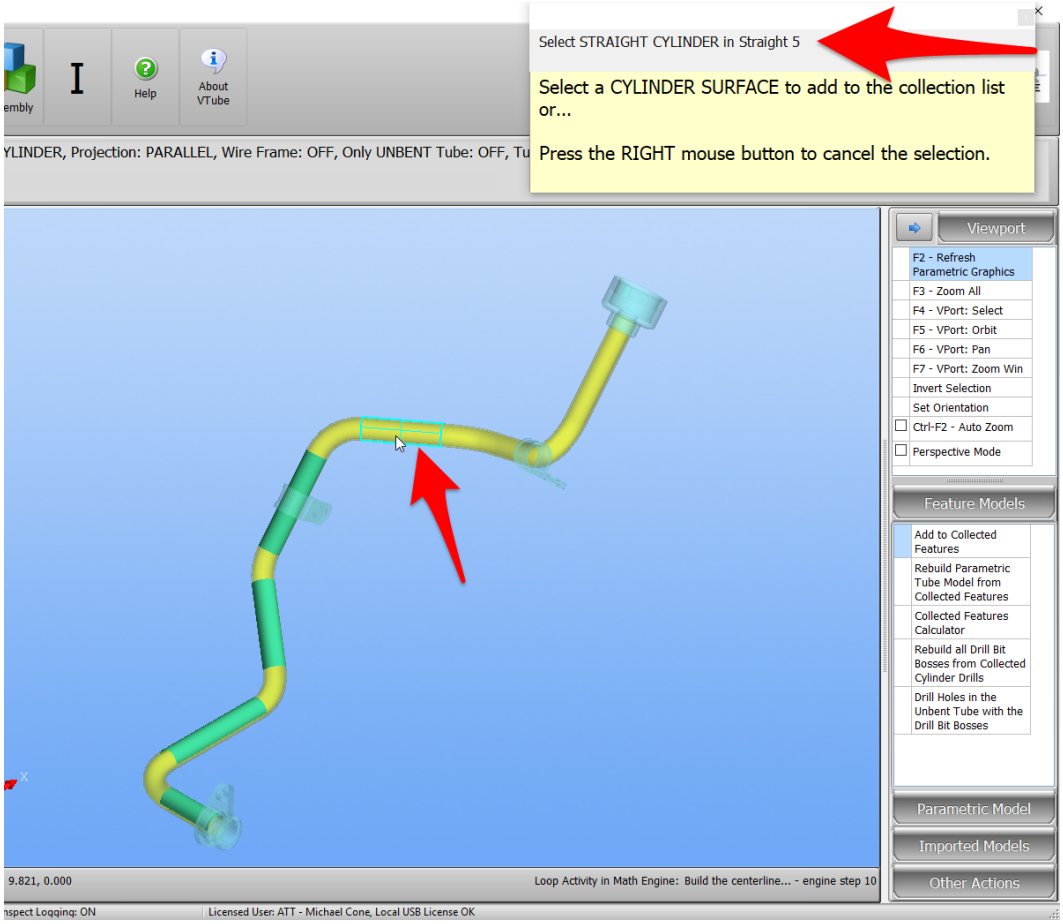
    To spin the wheel, click on the wheel, then spin the mouse wheel or press the up and down arrow keys.

14. Press **Add a Cylinder Surface to the Collection** button.

    Note that with the **Keep adding more surfaces** option enabled, VTube will continue to press the "Add Cylinder Surface to the Collection" button automatically after every straight surface selection.

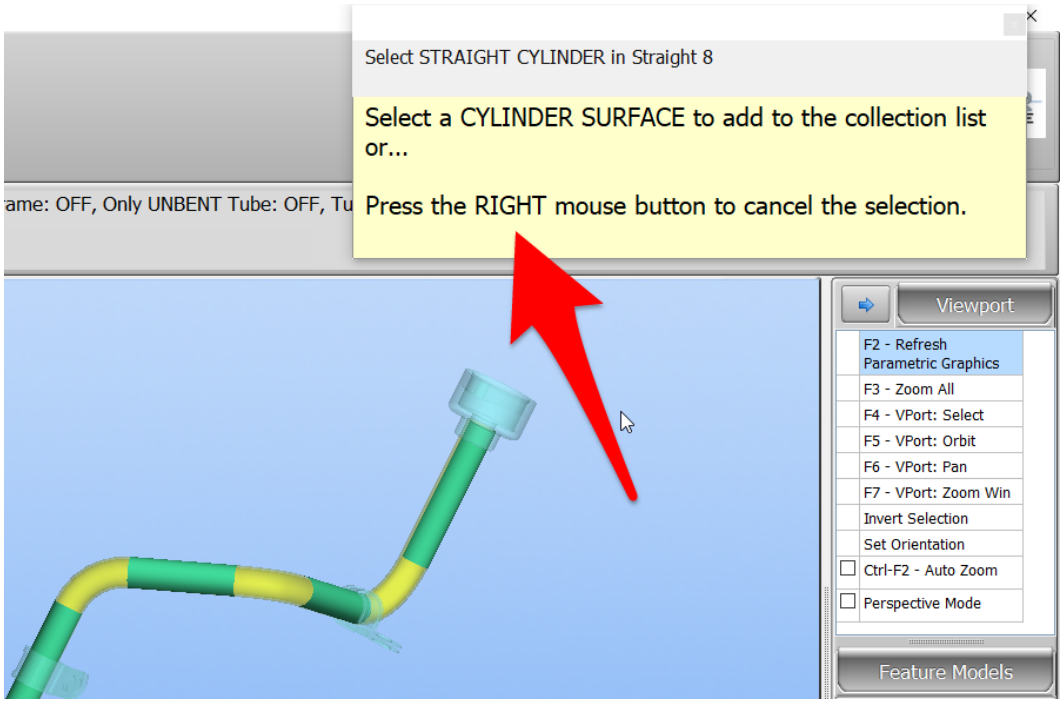
15. Select the surfaces of the tube straights in order. We recommend that you choose the shorter of the two end straights as the first straight.

    Follow the instructions in the yellow guide box. Be sure to NOT select any of the non-tubular components.



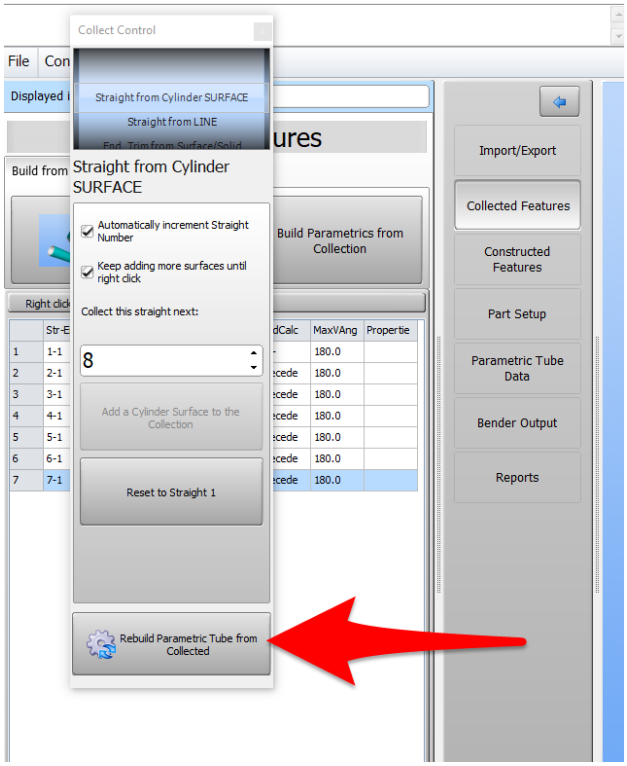
16. It is acceptable to collect both outer diameter surfaces and inner wall surfaces in any straight. If you collect a variety of both, then VTube will calculate the wall thickness as well as the diameter.

    When you have selected all the straights, VTube will continue to ask for straight 8. There is no straight 8 in this part, so stop the collection process by RIGHT clicking the mouse on the viewport.

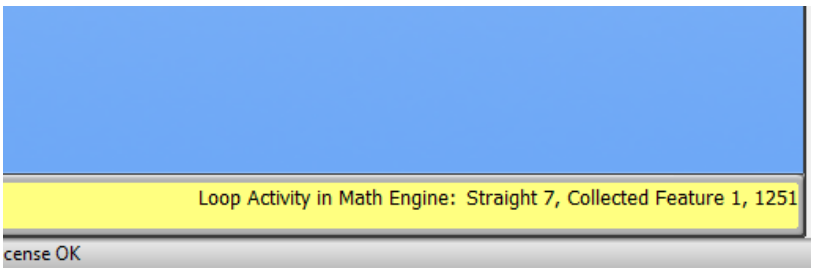


17. The CAD mouse mode will change to SELECT mode, which means that the process of adding to the collection is stopped.

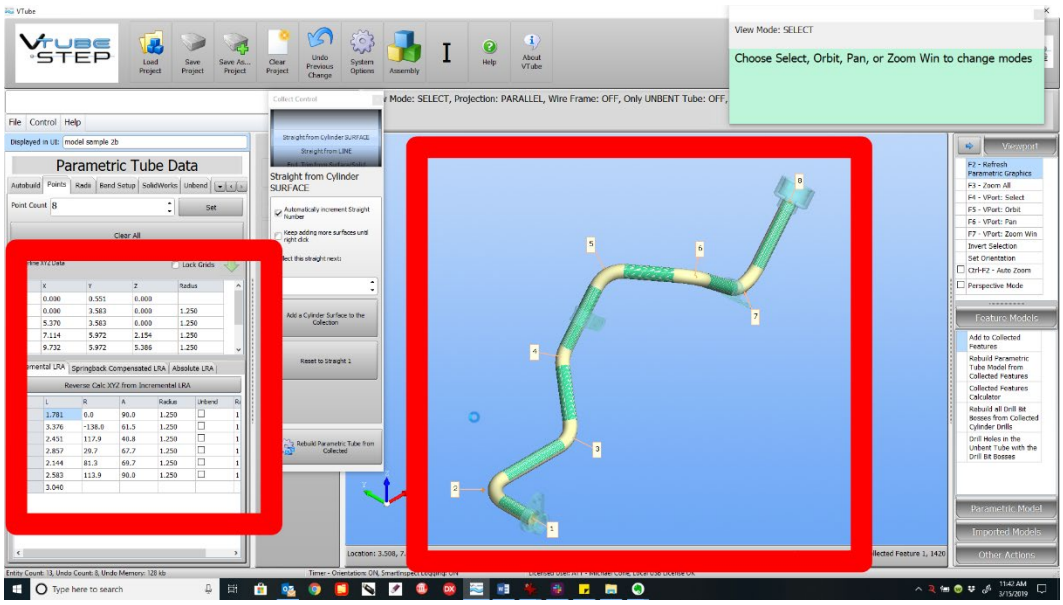
18. Click on **Rebuild Parametric Tube from Collected** at the bottom of the Collect control.



19. In the lower right corner of the viewport, you will see the math engine work its way through the straights to solve for the centerline end and intersection point positions.



20. When the calculation is complete, you will see new XYZ data in the Tube Data menu. You will also see the white parametric tube model superimpose on the imported model.



21. Click on the **Part Setup menu** in the navigation pane to see how VTube automatically calculated what it could determine from the model.

During the calculation, VTube calculated…

a. The **diameter** (row 16)
b. If you selected an inner wall in the collection, the **wall thickness** (row 19)
c. The **cut length** (row 25)
d. The default **Radius 1** (row 26)

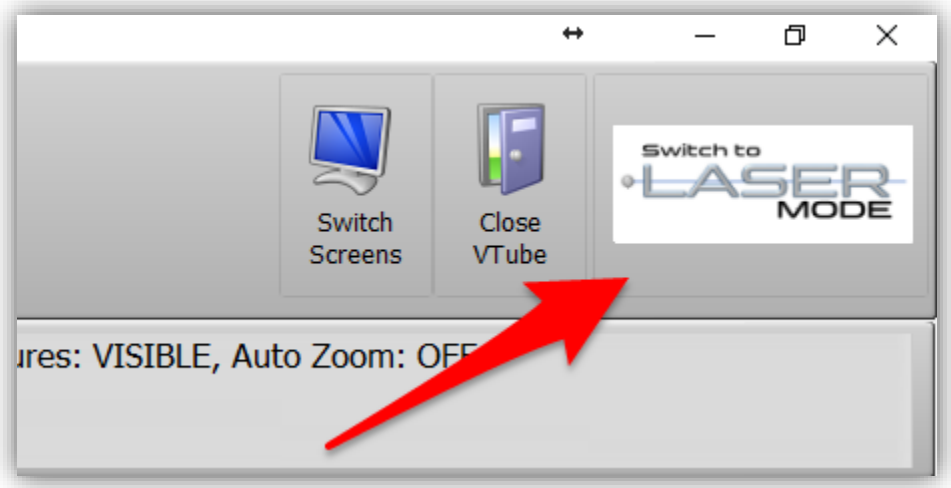
12	Job Number		
13	Work Order		
14	Date/Time	3/15/2019 10:34:18 AM	
15	Diameter Profile Setup	Cylinder	
16	Diameter	0.625	inches
17	A-End Diameter	0.625	inches
18	B-End Diameter	0.625	inches
19	Wall	0.001	inches
20	Rec Width 1	1.000	inches
21	Rec Width 2	0.500	inches
22	Rec Wall	0.059	inches
23	Rec Fillet Radius	0.125	inches
24	Rec Angle	0.0	deg
25	Cut Length	27.388	inches
26	Radius 1	1.250	inches
27	Radius 2	0.000	inches
28	Radius 3	0.000	inches
29	A-End Length Adjust	0.000	inches
30	B-End Length Adjust	0.000	inches

22. The import and calculation of the master data is complete.

The **Tube Data in VTube-STEP** will become the **<u>Master</u> Data in VTube-LASER** automatically. The Master Data is used to tell us if we have a good part after measurement.

Press the LASER button in the upper right corner to change to LASER mode. The LASER window is the only one that connects to the HEXAGON arm.

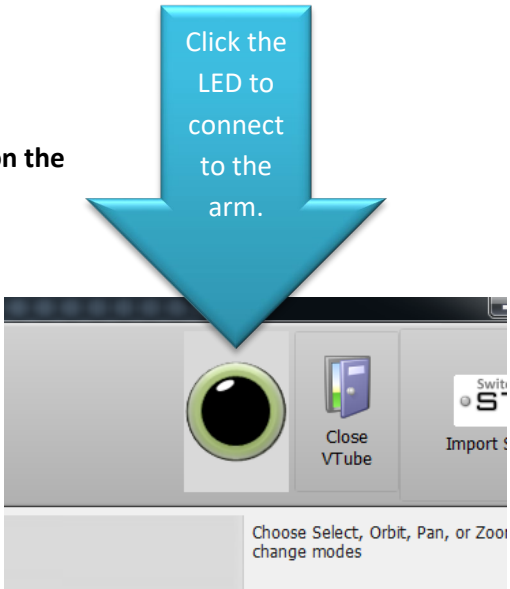
When you press this button, VTube-STEP will automatically close any control and guide windows.



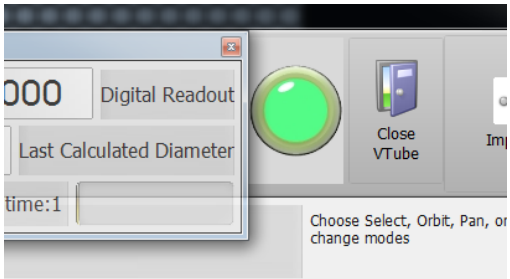
Measuring and Qualifying the Tube Shape

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.



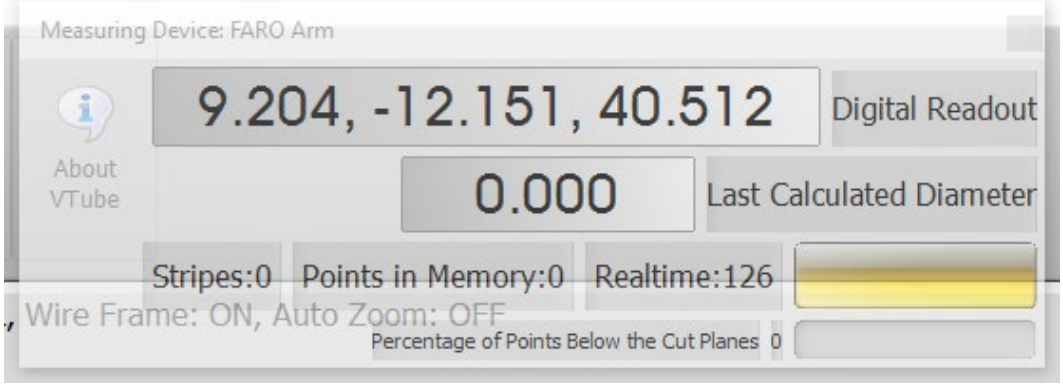
When the connection to the arm is active, the LED turns green, you will hear a connection sound, and the transparent DRO (Digital Readout) window will appear.



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.

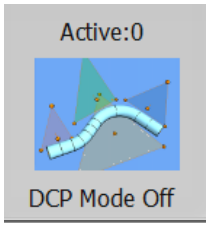
   This is the **DRO (Digital Readout):**



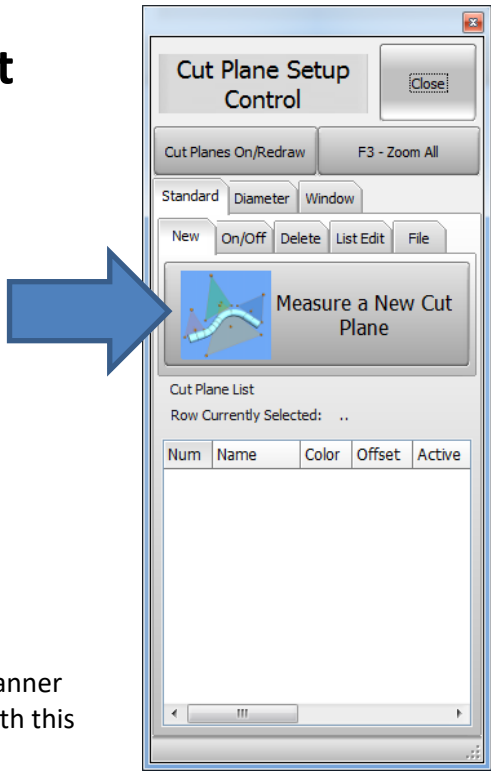
If the laser is not on, then you will see the XYZ data changing whenever you move the arm. In this mode, the data will represent the **center of the ball probe**.

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

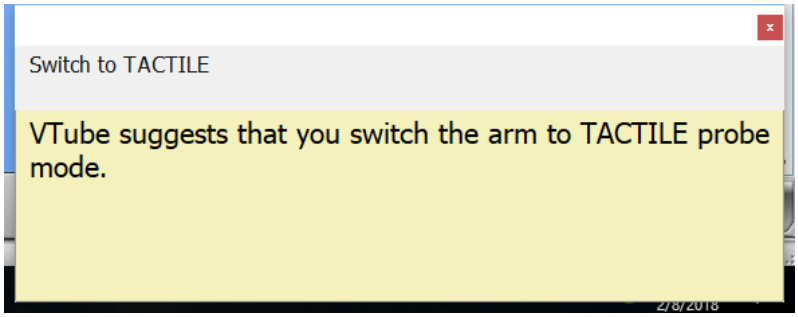
   Click on the **Cut Plane icon** at the bottom of the navigate pane.



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



VTube-LASER will suggest that you set the scanner switch on the arm to TACTILE probe mode with this guide box:



On the 7 series scanners, slide the switch on the back of the scanner like this:

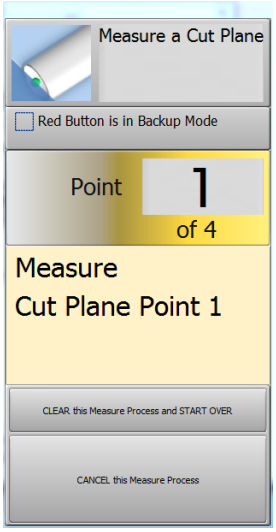
On the 8-series scanners, a rocker switch is moved to the front just above the trigger:

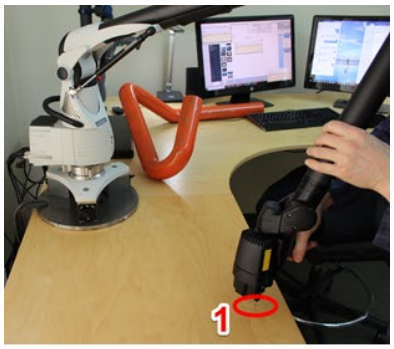
Pull the rocker switch to the right until you see a lightening bolt on the small screen on top of the scanner, then press the rocker switch into the gripper to change to ball probe. The icon will change so that you know that the ball probe is being used rather than the scanner.

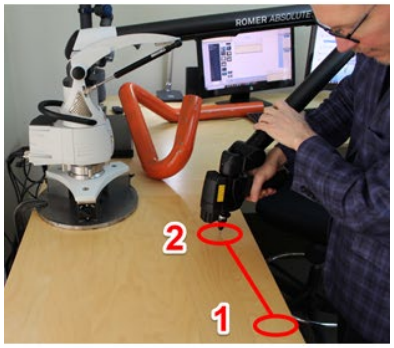
5. **Press the red button for all four points.**

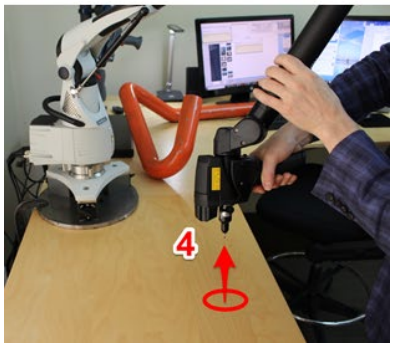
Take the first three points on the plane of the table surface using the red button.

Take the last (fourth) point is at least 1 millimeter above the table also with the red button.

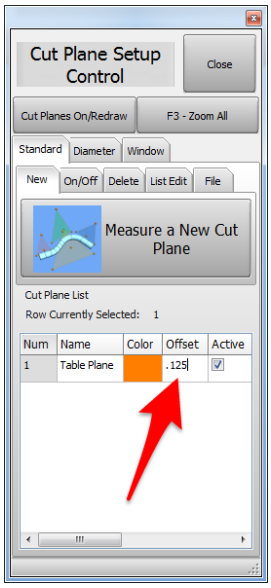








6. The **Active** label in the Cut Planes icon will now show “1”.



7. 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.

8. Now switch back to laser mode. On the 7-series, slide the scanner switch back to the right. On the 8-series, pull the rocker to the right until you come to the ball probe icon, then pull back on the rocker switch to show the lightning bolt. Now the scanner is in laser mode.

9. Important Things About Cut Planes

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

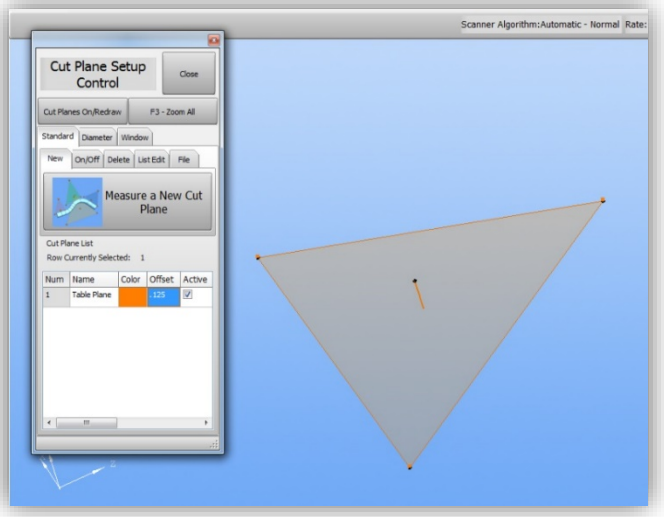
b. Cut Planes are only used for laser scans. They are **IGNORED when using the ball probe**.

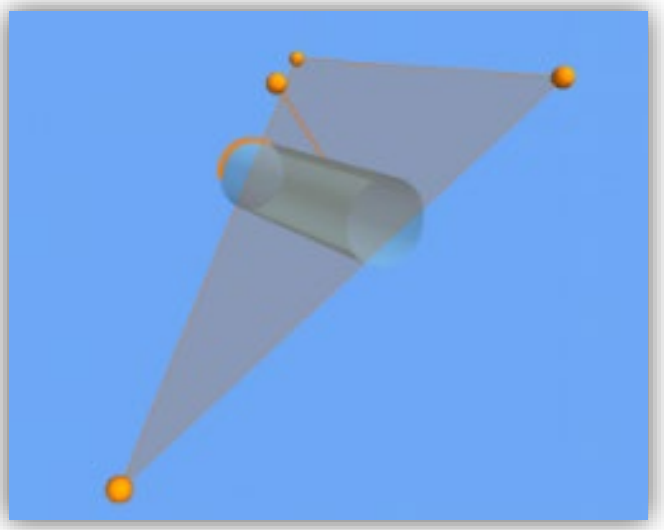
c. Make changes to the Cut Plane at any time during any other measurement.

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.

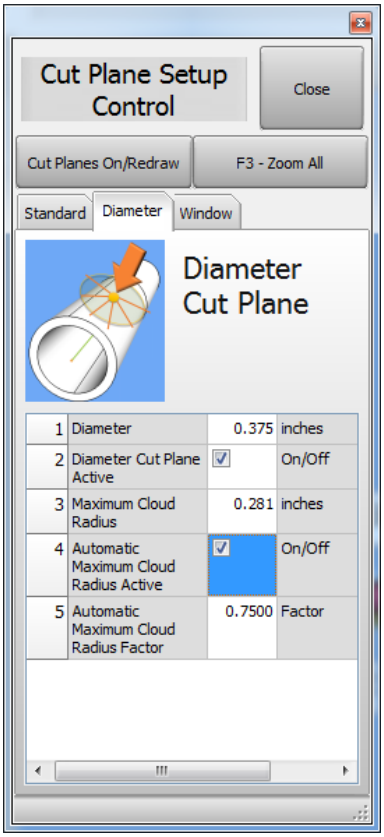
f. If you move the arm relative to the table, then you will need to remeasure the cut planes – or the cut plane will be in the wrong place relative to the table.





10. 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 three 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.

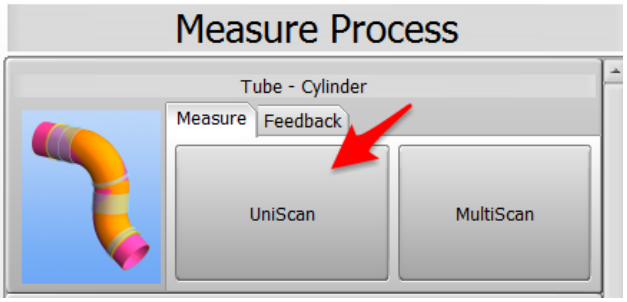
b. DCP only applies to **cylinder scans** and **bend profile scans**. **It does not have any effect on <u>END</u> scans.**

c. **DCP values are not remembered persistently across all projects like regular Cut Planes.** The DCP setting can be different for every project, unlike the Cut Plane settings which will carry across to other projects.

11. 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**.



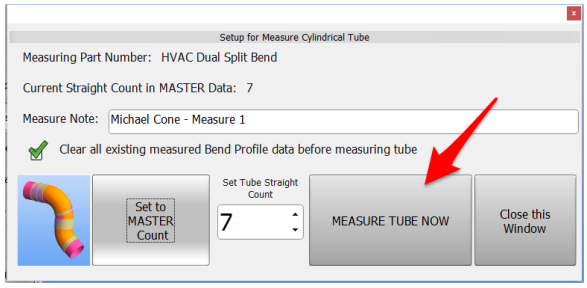
UNISCAN versus MULTISCAN Note: We are going to use the **UNISCAN** method to measure tubes. The UNISCAN motion feels like spray-painting the tube with laser stripes. When you press the green button, then VTube takes in the laser stripes. You can release the green button to pause scanning to move over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

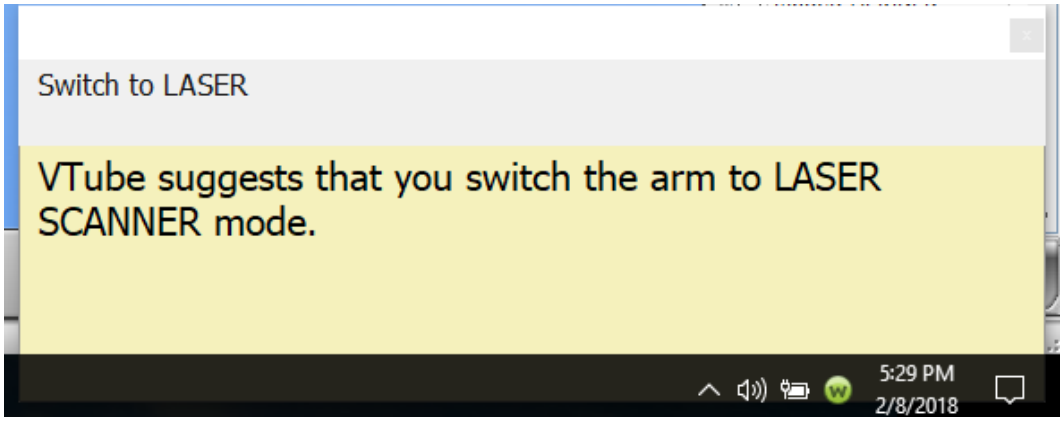
For most measurements, we recommend UNISCAN, because this mode takes in much more data and is able to give operators better assurance that the scan is good. For example, using DCF – Dual Cylinder Fit, UNISCAN can reduce uncertainty significantly because it takes many more surface points than MULTISCAN,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

12. Press

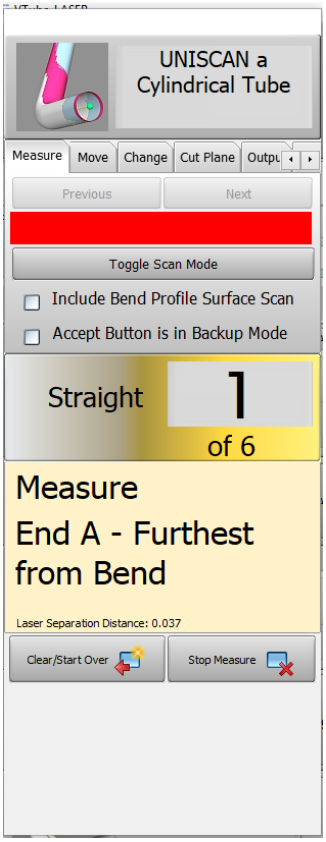
    MEASURE TUBE NOW.



If the scanner switch is still in ball probe mode, then VTube-LASER will suggest that you switch it to LASER SCANNER mode (if you are using the default setup).



13. 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:

http://www.advancedtubular.wiki/index.php/VTube-LASER_Videos_for_HEXAGON_ROMER

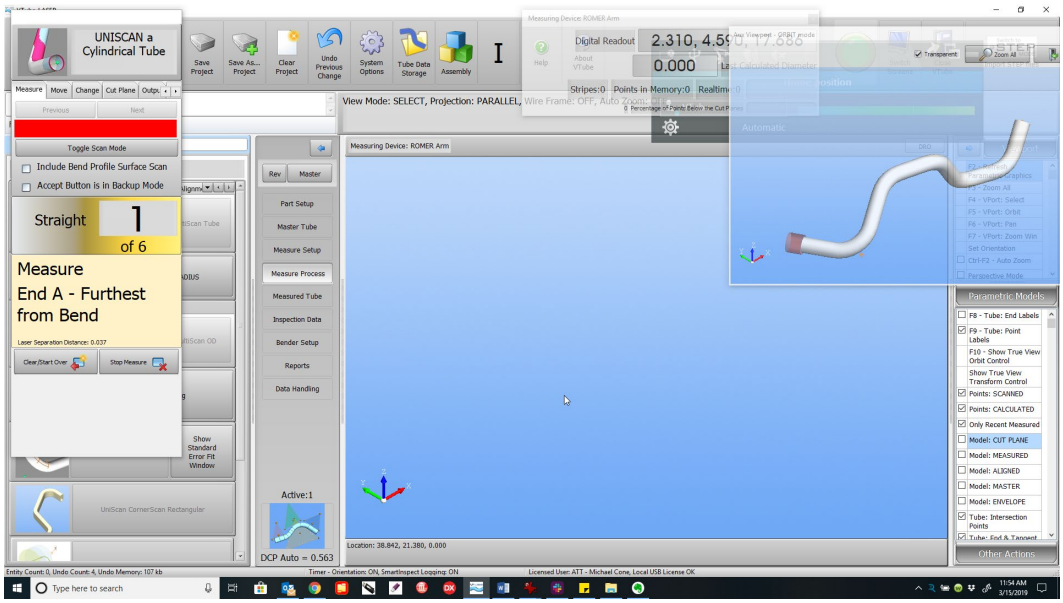
Video 2: "Scanning Speed Test on Two Types of Tube"

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

Note: You will use the accept button to finish certain measurements. On the 7-series the accept buttton is on either side. The accept button motion on the 8-

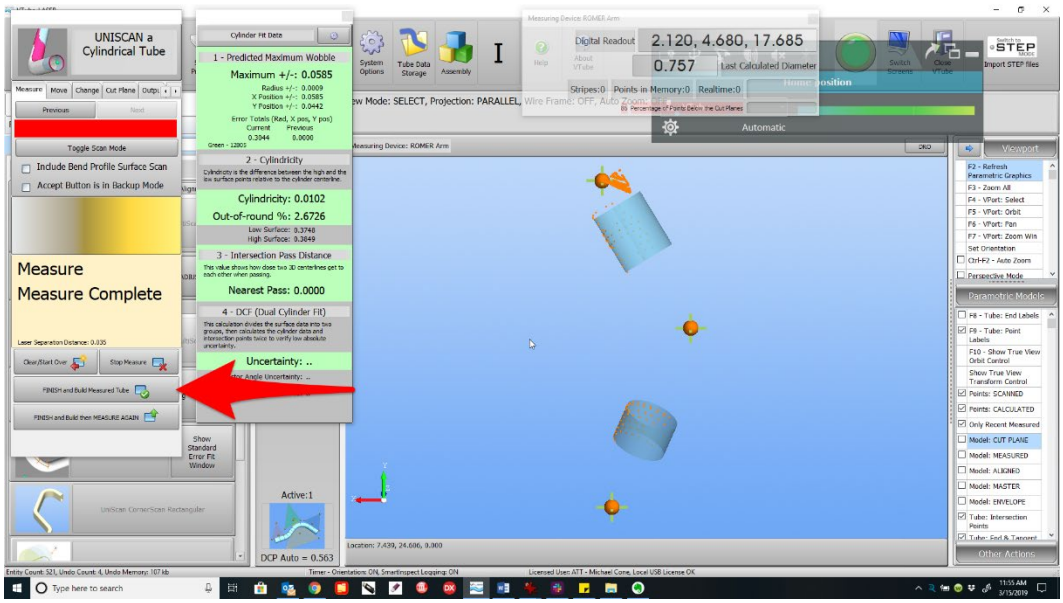
series is to toggle the black toggle switch to the right or left.

This is how the screen will appear when you start the measure:

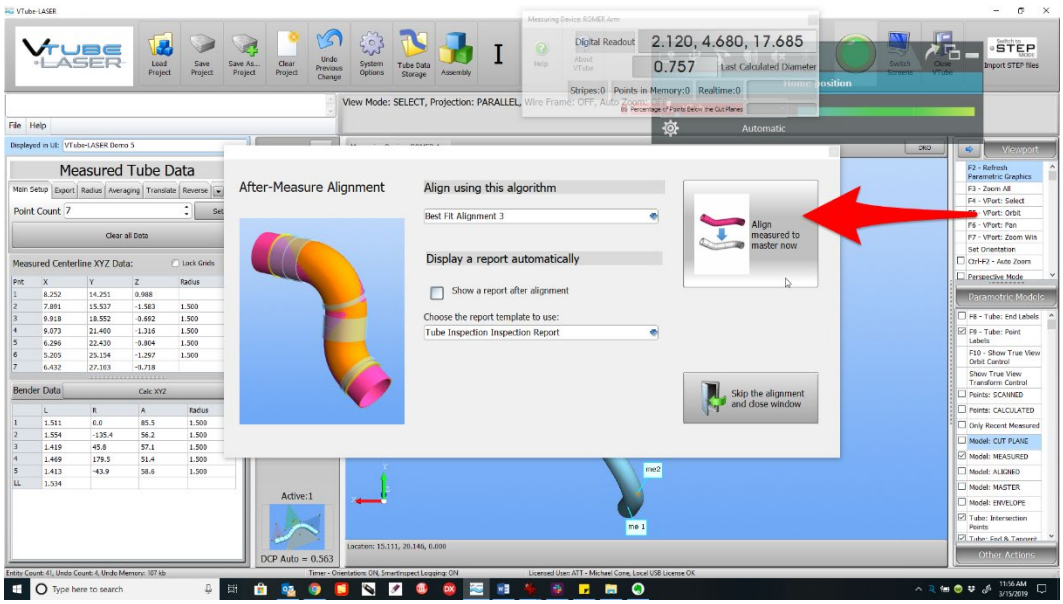


The small guide box should appear in the upper right corner (that is its default location). If the guide box does not display, then the option can be turned on with the Measure Setup, Other, Automatic Display of Master option.

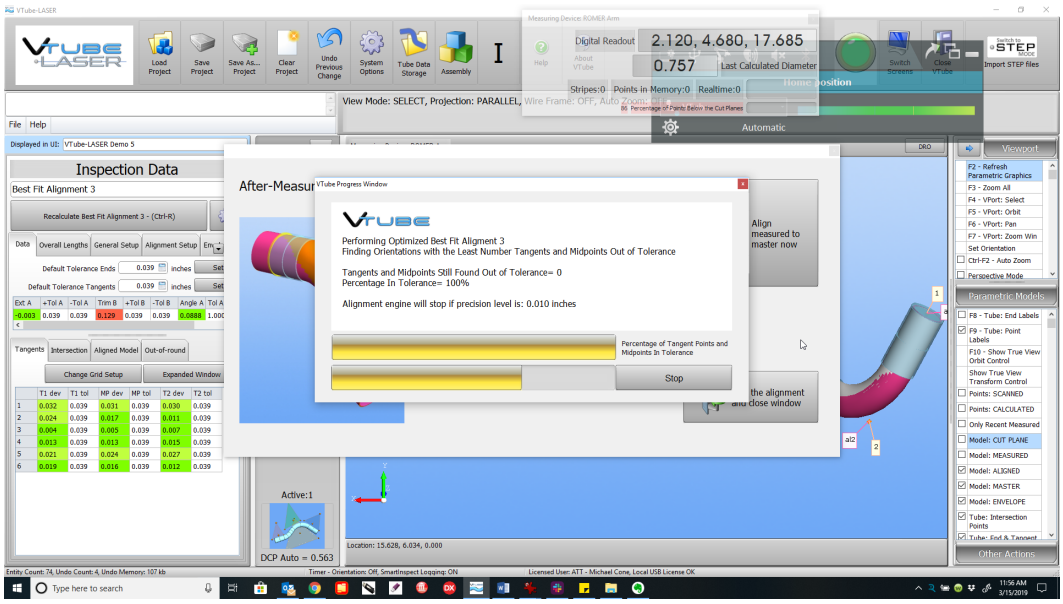
14. After measuring End B, press the **Finish and Apply** button.



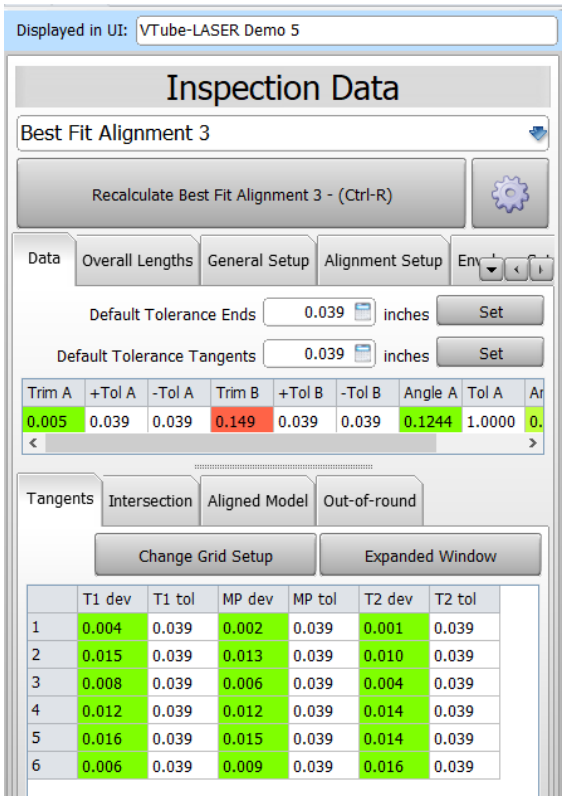
15. Press the **Alignment button** with the image of the two tubes.



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



17. 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 **default tolerances** can be set at the very top. If you set these tolerances, then press the Set button after you make the change. The values will be propagated to the cells in the appropriate grid below.

The **end lengths** are qualified at the top grid of the menu. There is always a plus and minus tolerance – which can be set independently of each other.

The **Tangents** deviation grid qualifies the profile of the straights as a virtual gauge for the tube shape.

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. In this case, the deviation is 0.001 inches (25 microns).

The first tangent deviation and the last tangent deviations are not really tangents because they represent the end of the tubes. For example, **T1-1** and **T2-6** cells in this grid are trimmed end points (not tangent points). So, be careful to not confuse these deviations with the end length deviations – which are untrimmed.

WHAT QUALIFIES?

In this case, the shape of the part qualifies. A-End is within tolerance. B-End is too long by 0.149 inches (3.8 mm) in this alignment.

CORRECTING BENDERs with COMMUNICATIONS

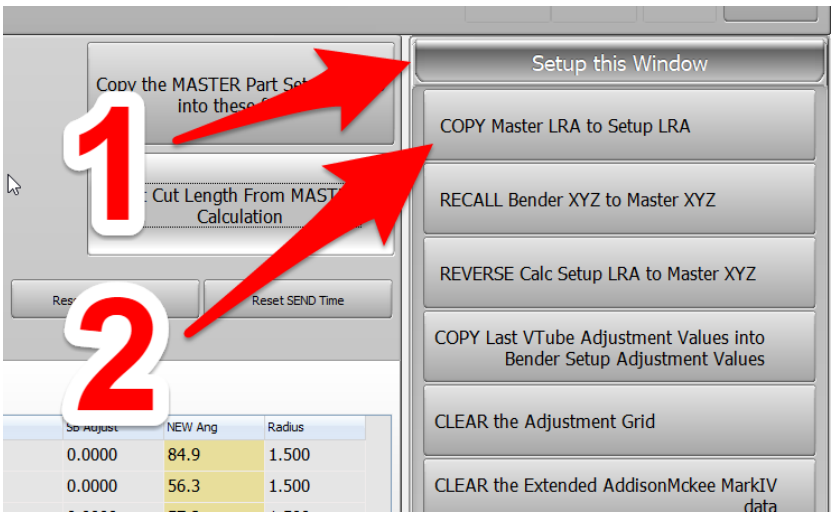
This next section works through how to communicate with the bender. This is only an example correction communication. It simulates the Benderlink feature to teach the principles of communications to benders.

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.

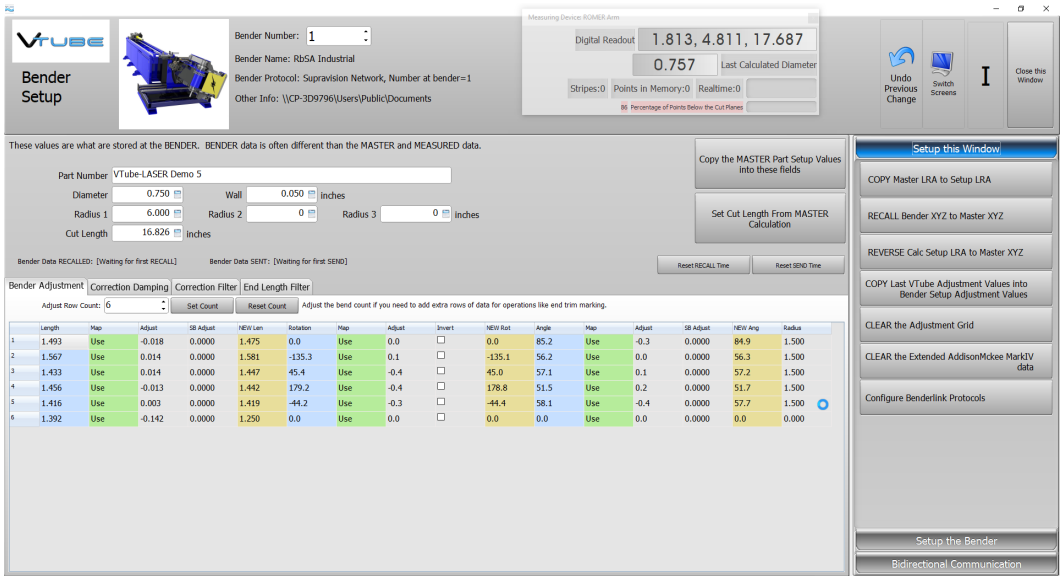
1. Press **Bender Setup** to show the Bender Setup screen (for communicating with the bender).

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



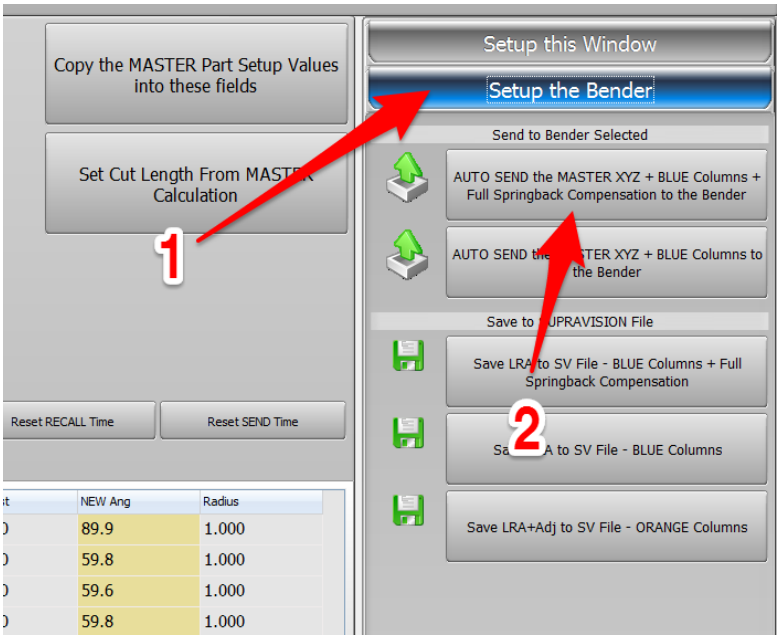
The BLUE columns represent bender data **before** correction. The ORANGE columns represent **corrected data** to be sent to the bender. The columns in

between the BLUE and ORANGE columns are **ADJUSTMENT** values.

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. **SIMULATION of BENDER SETUP**

This next step is a simulation of sending the first part for setup. In this case, we would not have even measured the first tube since it was not bent yet. You can easily send new data to the bender for bender setup. This is how to make that happen. First, press **(1) Setup the Bender** button.



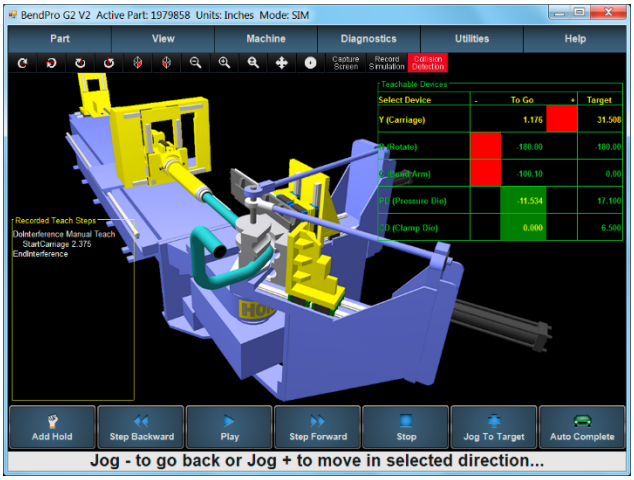
6. Second, press **(2) AUTO SEND the MASTER…** button.

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

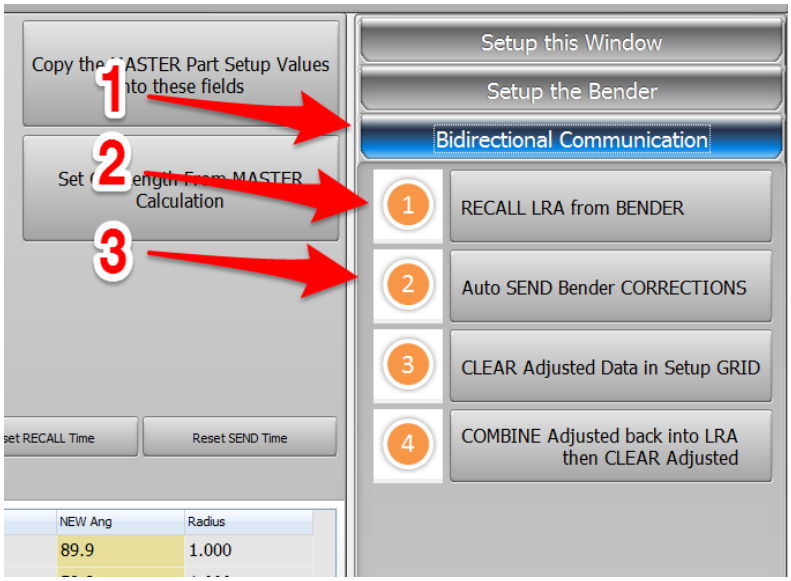
What Happens at the BENDER CONTROL (Simulation)

We would then move to the bender, then check to be sure that the new data has arrived, then setup and bend the first part.

Then we would bring the part back to VTube-LASER and the measuring center for a first measure. You would exit this window and measure the first part if it was not already measured.



7. SIMULATION of BENDER CORRECTION



After the first tube measure is complete, then enter the Bend Setup menu again. If the Bidirectional menu is not displayed on the far right, then press the **(1) Bidirectional Communication** button on the right bottom side.

Press **(2) RECALL** to recall data from the bender (you will have to cancel the recall to avoid a timeout if you have no connection to a bender). Press **(3) Auto SEND** to send the corrections out to the bender.

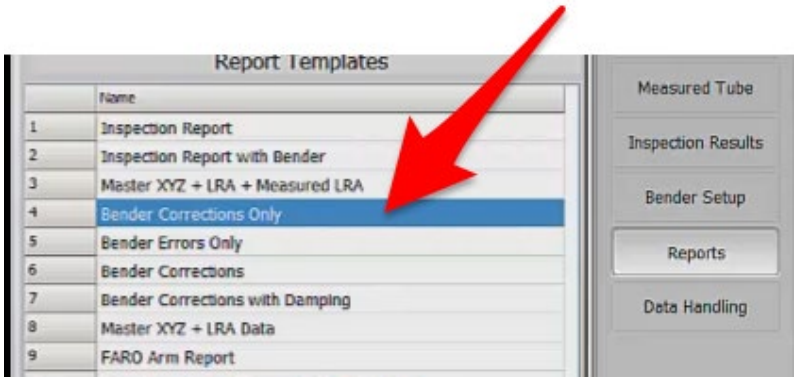
This sequence of button presses is how VTube RECALLs and SENDs data for corrections loops to benders. (By the way, VTube can communicate with up to 100 benders.)

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.

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.