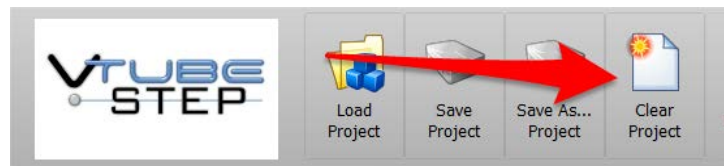# VTube-LASER Quick Start Guide

This guide shows how to import a STEP file and then MEASURE and qualify demo tube 4 using a FARO ScanArm.

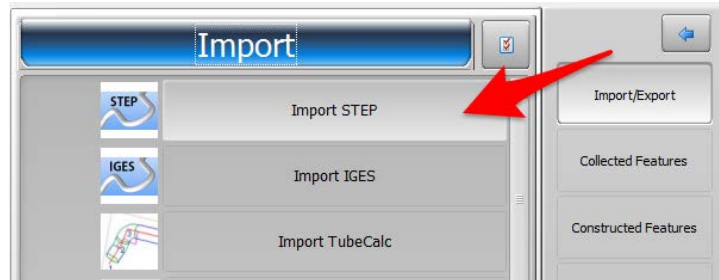**The steps in this workflow are from version 2.8 and higher.**

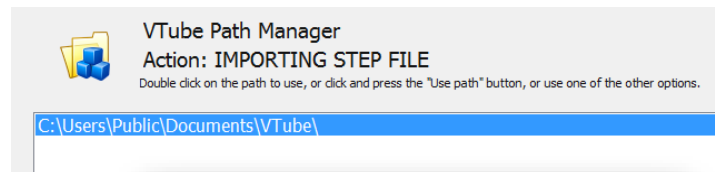VTube always starts in the STEP mode window.

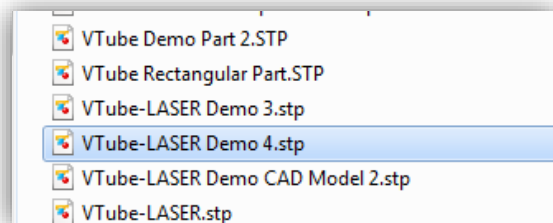1. Press the **Clear Project** button in the tool bar on the top of the VTube-STEP window.

2. Press the **Import/Export** button in the Navigation Pane, then press the **Import STEP** button in the Import menu.
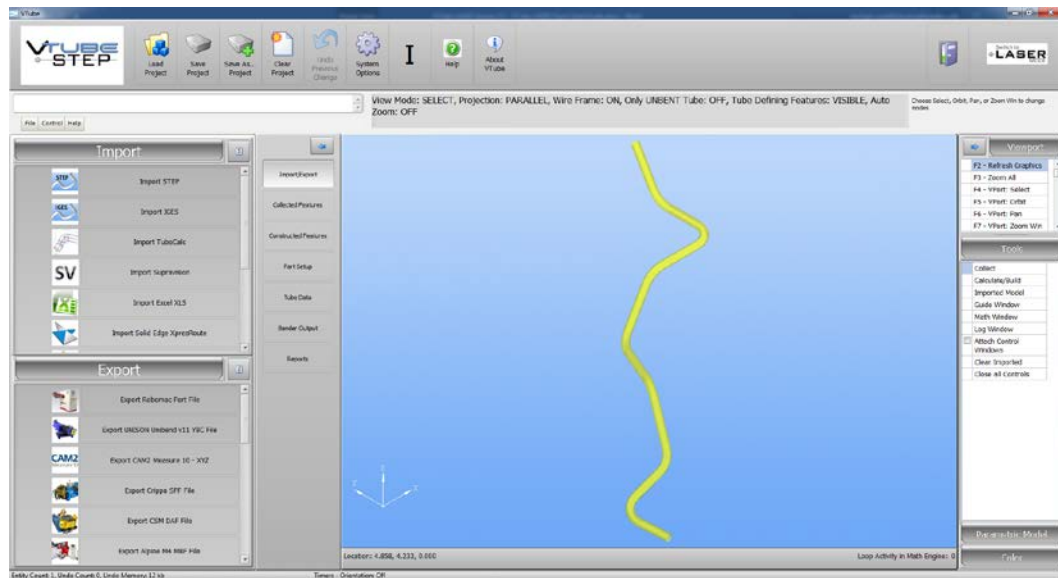
3. Double click on the VTube path in the Path Manager.

   Find **VTube-LASER Demo 4.stp** file and load it into VTube-STEP.

Document Revision Date: August 1, 2017

4. The screen will appear something like this:

5. Press the **Add to Collect Features** on the right side of the screen in the Feature Models menu.

6. Check on both the checkboxes in the **Straight from Cylinder SURFACE** option.

7. 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.
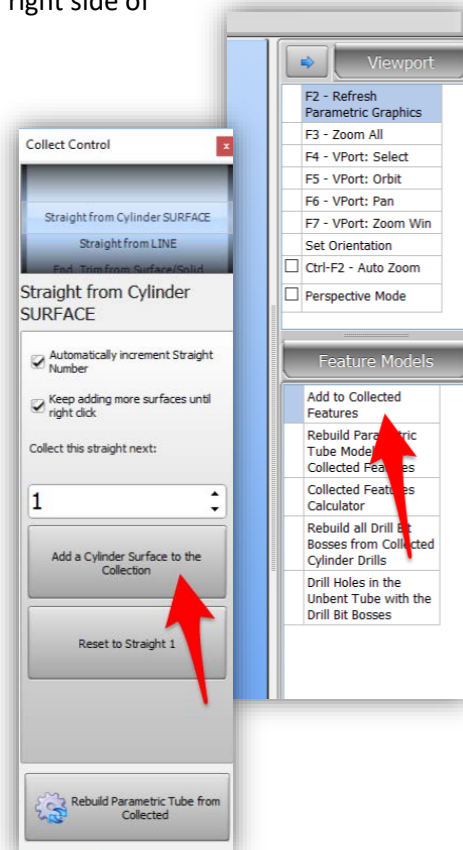
8. Select the surfaces of the tube straights in order. We recommend that you choose the shorter of the two end straights as the first straight.

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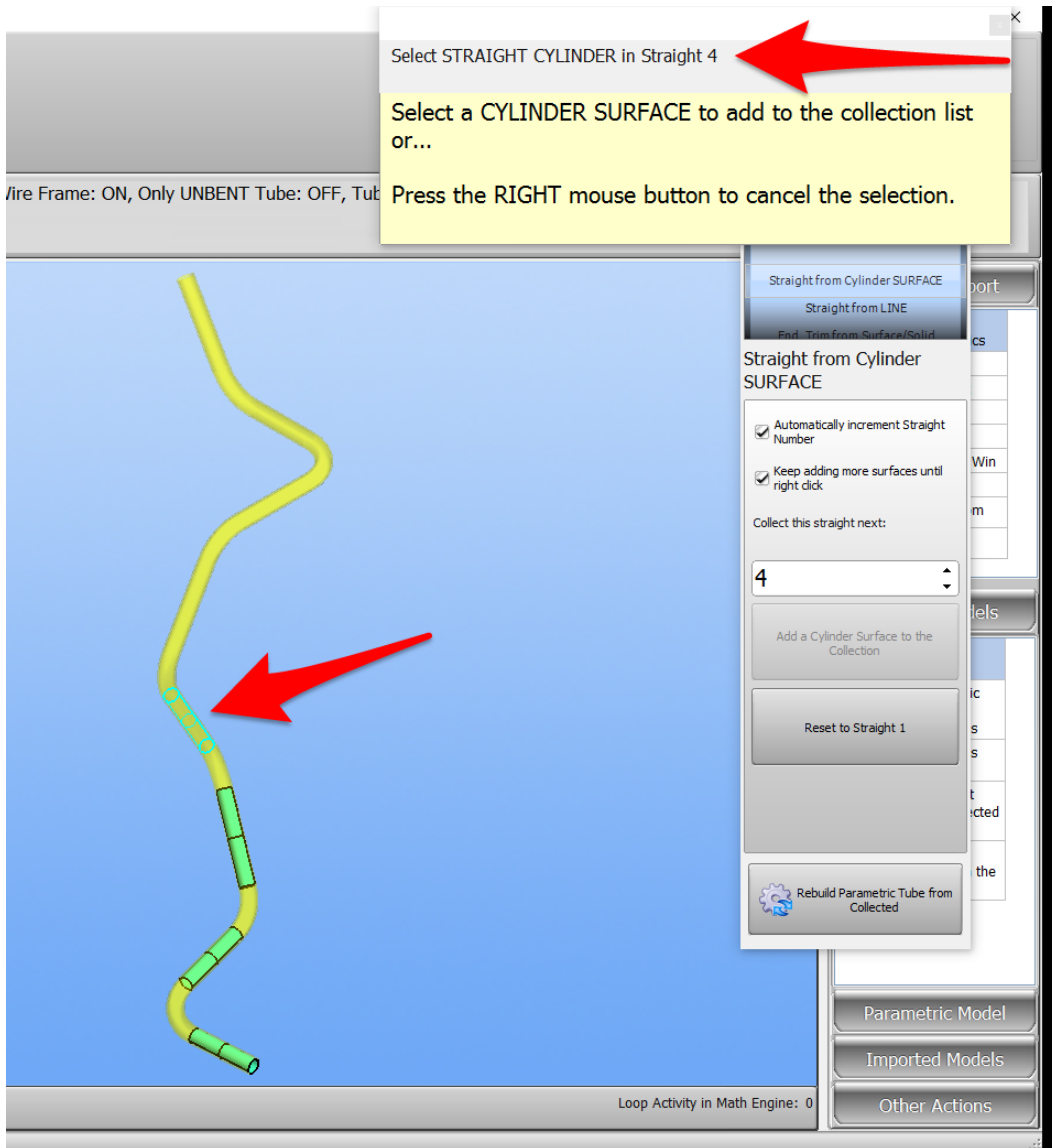
9. It is acceptable to collect both outer diameter surfaces and inner wall surfaces in any straight. If you collect a variety of both, then VTube will calculate the wall thickness as well as the diameter.

   When you have selected all the straights, VTube will continue to ask for straight 9. There is no straight 9 in this part, so stop the collection process by RIGHT clicking the mouse on the viewport.
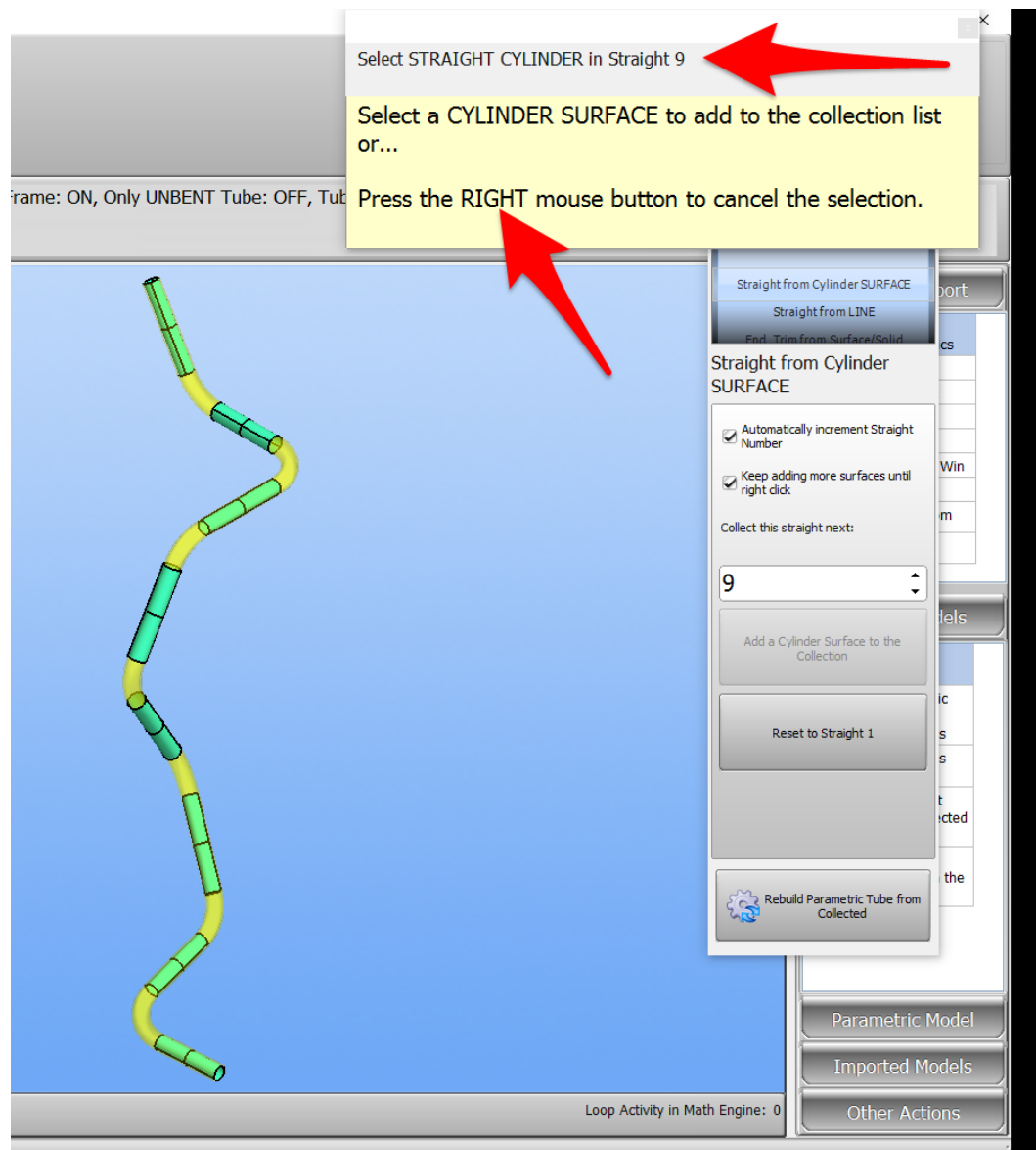
10. The CAD mouse mode will change to SELECT mode, which means that the process of adding to the collection is stopped.
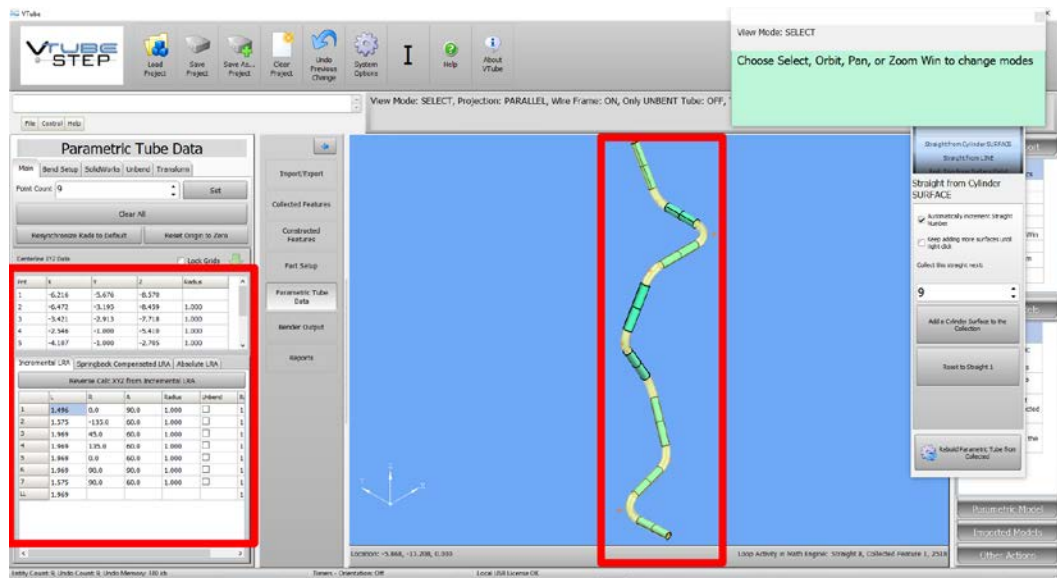
11. Click on

    Rebuild Parametric Tube from Collected at the bottom of the Collect control.
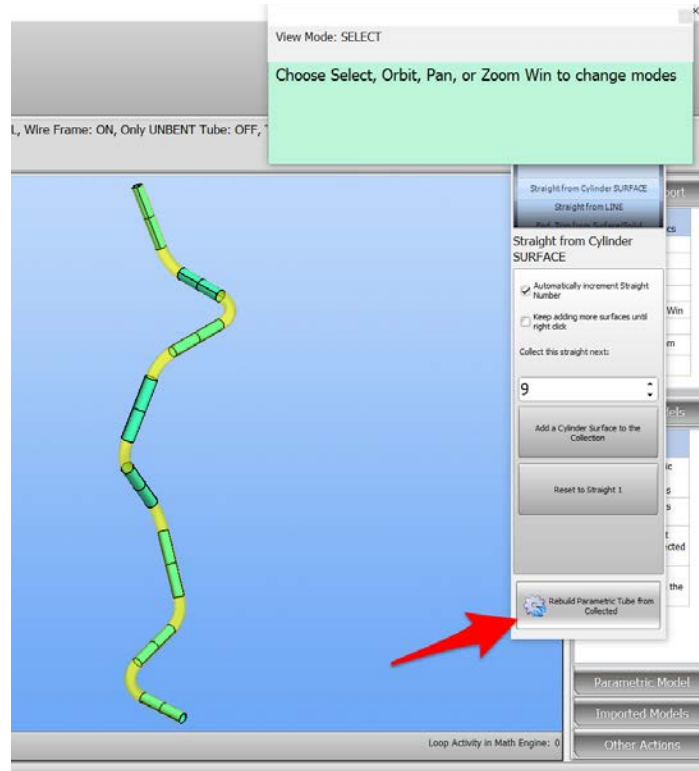
12. In the lower right corner of the viewport, you will see the math engine work its way through the straights to solve for the centerline end and intersection point positions.
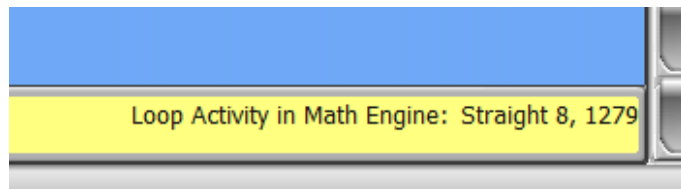
13. When the calculation is complete, you will see new XYZ data in the Tube Data menu. You will also see a white tube superimpose on the imported model.

14. 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** (row 26).

14	Date/Time	1/21/2016 7:22:05 PM	
15	Diameter Profile Setup	Cylinder	
16	Diameter	0.375	inches
17	A-End Diameter	0.375	inches
18	B-End Diameter	0.375	inches
19	Wall	0.032	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	24.775	inches
26	Default Radius	1.000	inches

15. 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 FARO arm.

    When you press this button, VTube-STEP will automatically close any control and guide windows.
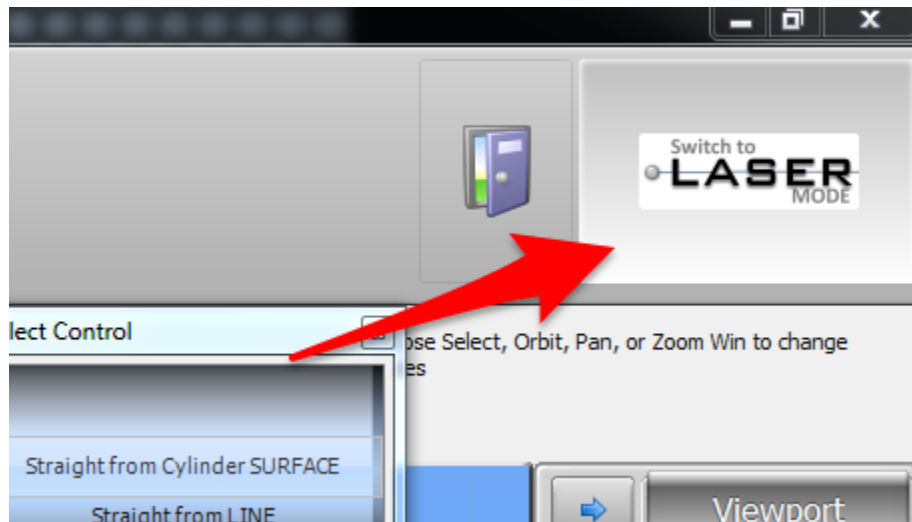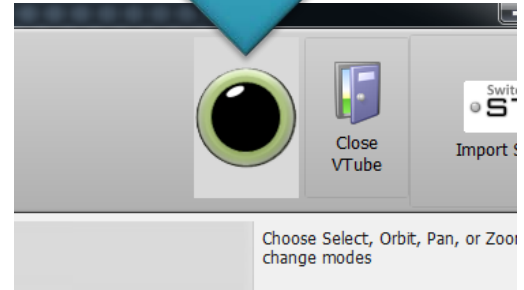
Measuring and Qualifying the Tube Shape

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.

Click the LED to connect to the FARO

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 automatically 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.
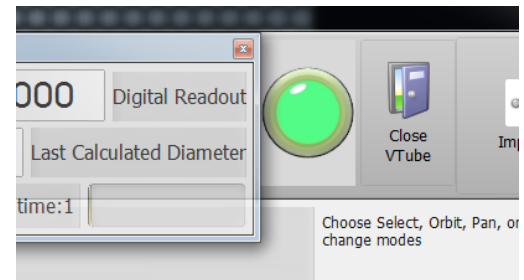
    This is the **DRO (Digital Readout):**
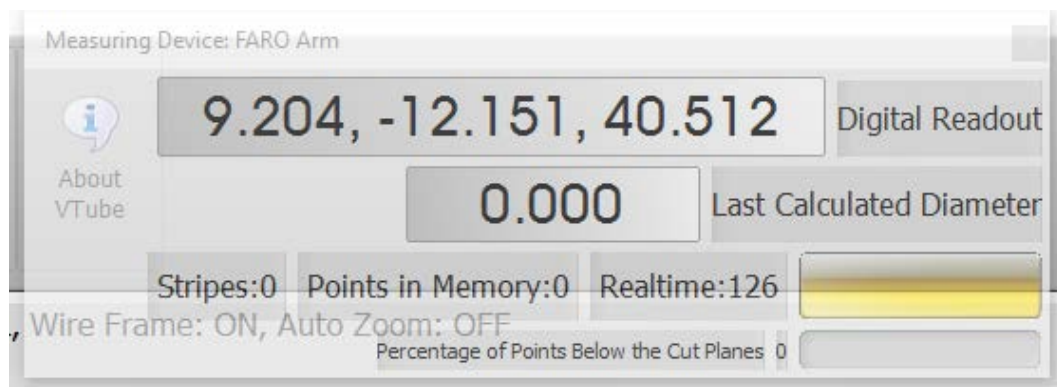
If the laser is not on, then you will see the XYZ data changing whenever you move the arm. In this mode, the data will represent the **center of the ball probe**.

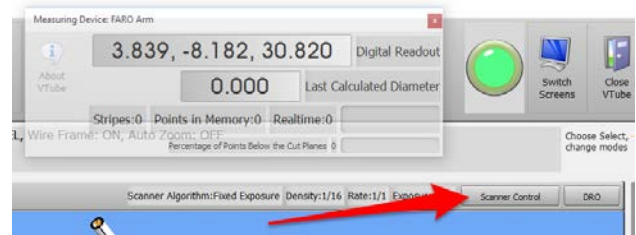3. If you are using a scanner (rather than the ball probe), then click on the FARO **Scanner Control** button. The FARO Laser Line Probe Control window will load.

4. Set the **Scan Density** to **1/16**.

5. Set the **Scanner Algorithm** to **Fixed Exposure**.

6. Turn the **Reflection Filter** OFF. (If the filter is ON, then the scanning can hesitate during scan motion. Also, VTube has its own built-in filter – called a "spike filter" that handles outlier points.)

7. Setup the exposure for Fixed Exposure mode like this:
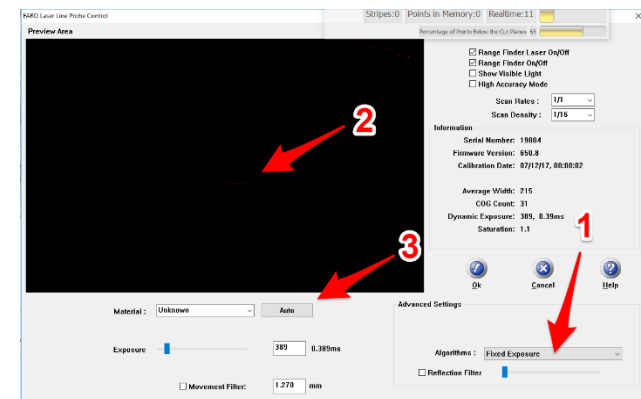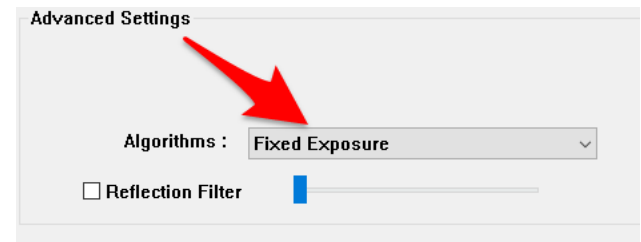
    1 – be sure the Fixed Exposure is selected.

    2 – Aim the scanner at the material you will scan.

    3 – Press the Auto button and hold the arm in that position until the Auto button re-enables.

    This will set the exposure value (below the Auto button).

8. 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.
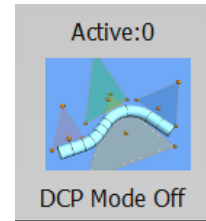
9. Press the **Measure a New Cut Plane** button in the NEW tab.

10. **Press the GREEN button for all four points.**
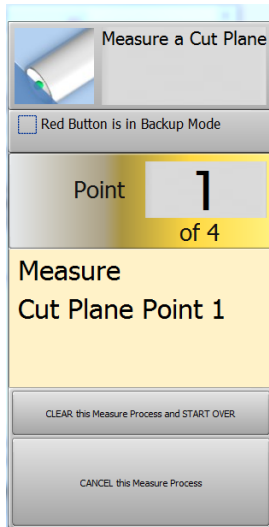
Take the first three points on the plane of the table surface. The last point is at least 1 millimeter above the table.

11. The **Active** label in the Cut Planes icon will now show "1".

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

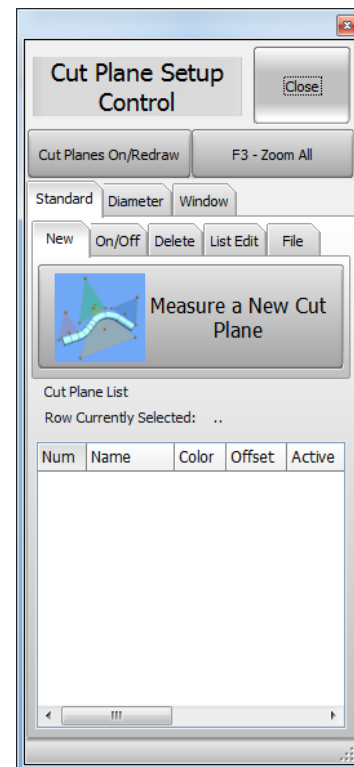An offset is important, or the scanner may pickup surface outliers. The greater the offset, the less chance of outliers.

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.

13. **Six things to know about Cut Planes**

a. You can make changes to the Cut Plane at any time – even during the middle of meaurements.

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

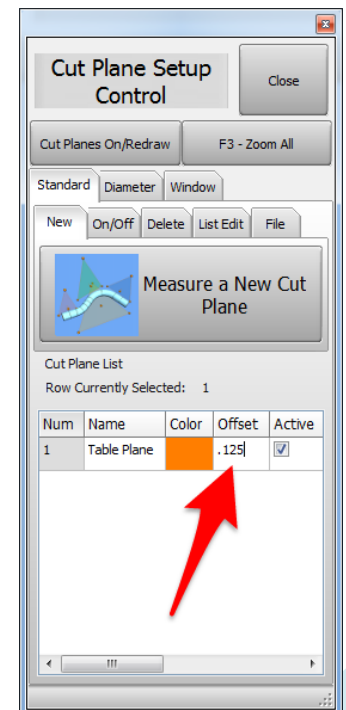c. You can activate or desactivate the cut planes any time. Each cut plane has its own active switch and offset value.

d. You can rename cut planes. VTube will always call the first cut plane "Table Plane".

e. You can change the color for each cut plane.

f. The Cut Plane list setup will be stored with the project.

   If you don't move the arm relative to the cut planes in future measures, then you can reuse this setup. If you move the arm relative to the table, then you will need to remeasure the cut planes.
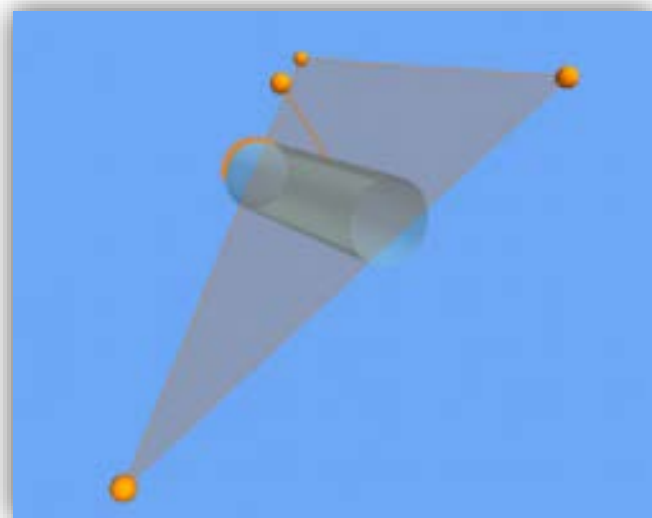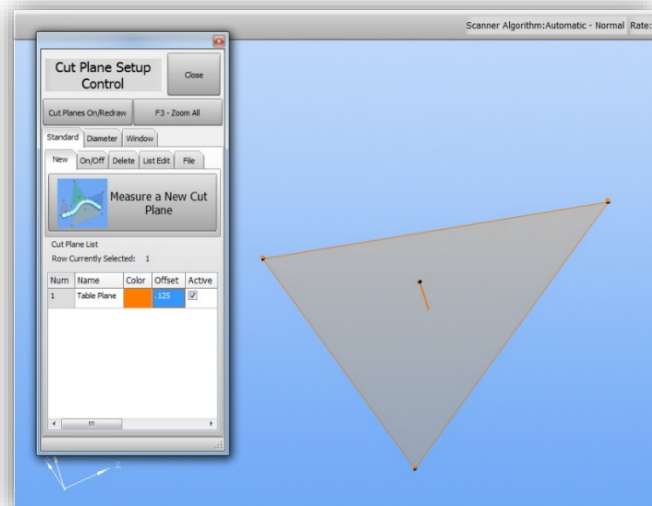
14. Next, let's cover the

DCP - Diameter Cut Plane feature.

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.
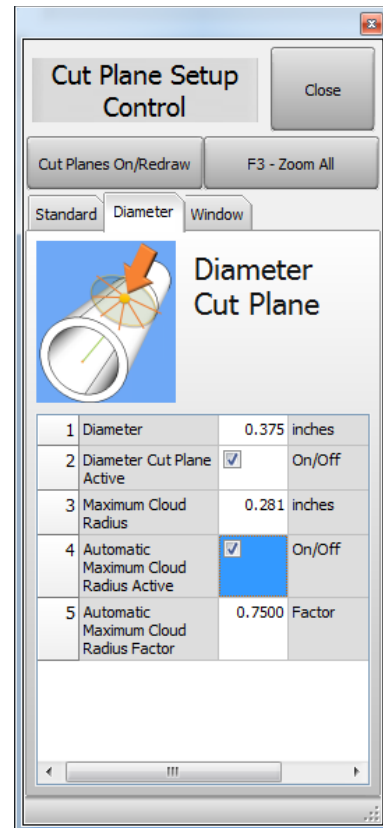
Here are two Important notes about DCP:

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 END scans.**

13

15. 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**.
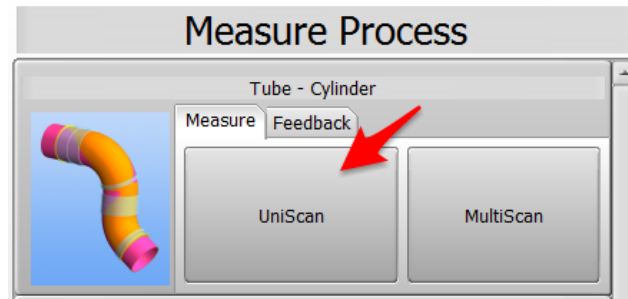
UNISCAN versus MULTISCAN Note: We are going to use the **UNISCAN** method to measure tubes. The UNISCAN motion feels like spray-painting the tube with laser stripes. When you press the green button, then VTube takes in the laser stripes. You can release the green button to pause scanning to move over 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.

16. Press

    # Set to MASTER Count

    button.
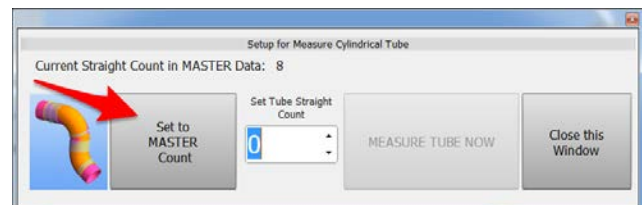
17. Press

    # MEASURE TUBE NOW.

14

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

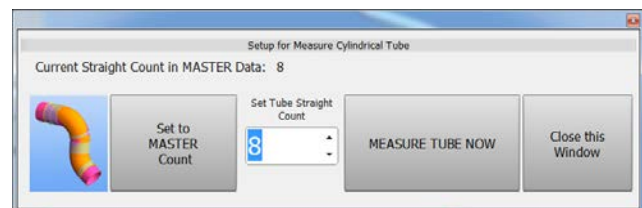   If VTube is setup to measure the ends with the ball probe, the red laser box will turn black. If you want to measure the end with the laser, then just press the **Toggle LASER** button.

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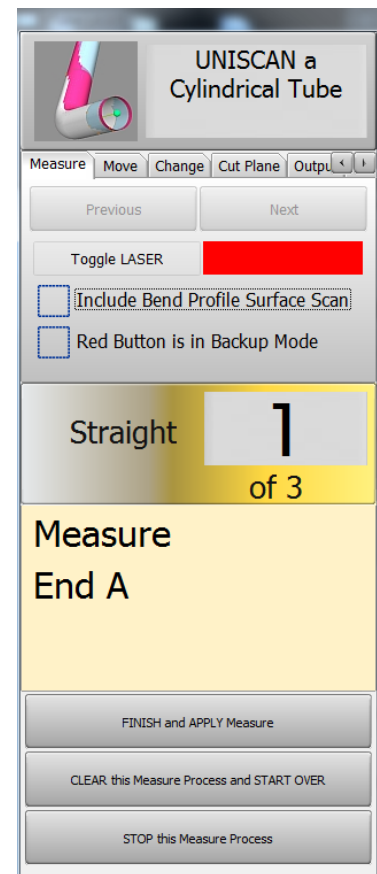
19. After measuring End B, press the **Finish and Apply** button.

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

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

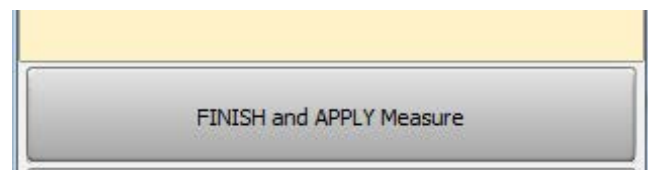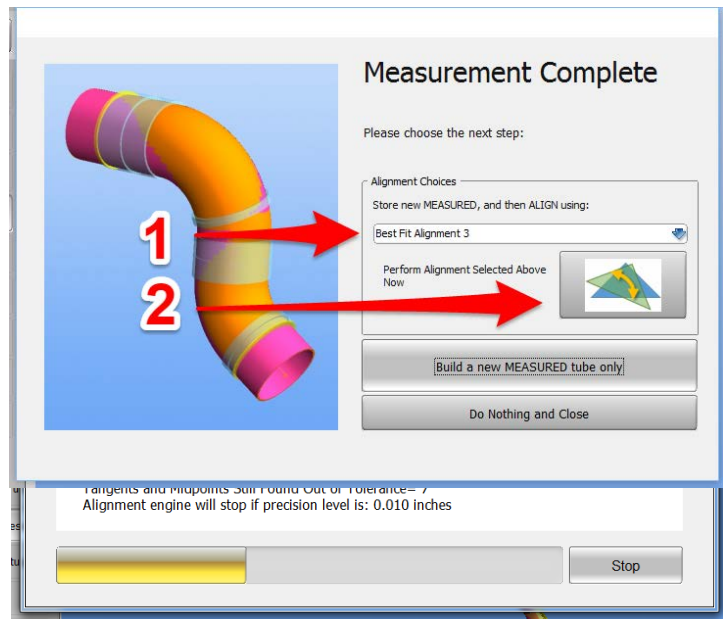22. VTube will align the measured part to the master part. It will show a progress bar as it is doing the alignment.

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.)

23. 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 <u>trimmed</u> 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.

	T1 dev	T1 tol	MP dev	MP tol	T2 dev	T2 tol
1	0.043	0.039	0.035	0.039	0.028	0.039
2	0.016	0.039	0.003	0.039	0.012	0.039
3	0.039	0.039	0.038	0.039	0.038	0.039
4	0.031	0.039	0.015	0.039	0.007	0.039
5	0.014	0.039	0.013	0.039	0.013	0.039
6	0.009	0.039	0.009	0.039	0.026	0.039
7	0.041	0.039	0.039	0.039	0.042	0.039
8	0.039	0.039	0.022	0.039	0.017	0.039

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**.
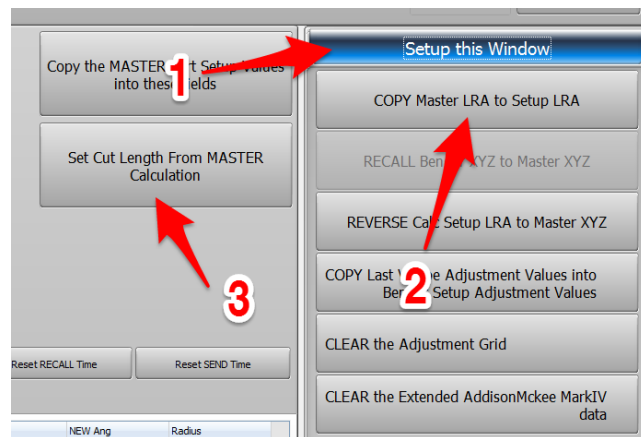
   This will fill the starting values into the bender setup like this:
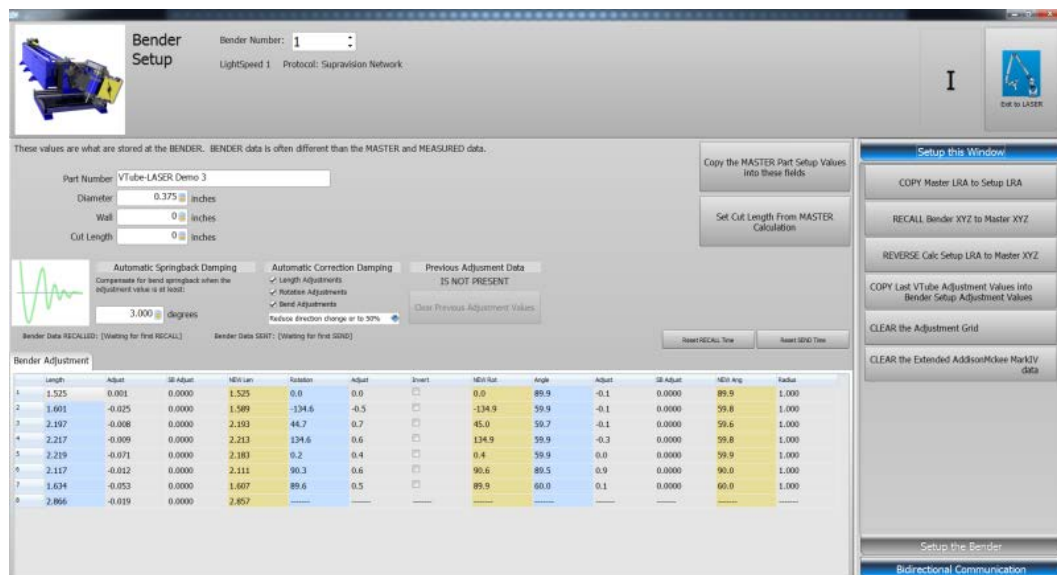
The BLUE columns represent bender data before correction. The ORANGE columns represent corrected data to be sent to the bender. The columns in between the BLUE and ORANGE columns are ADJUSTMENT columns.

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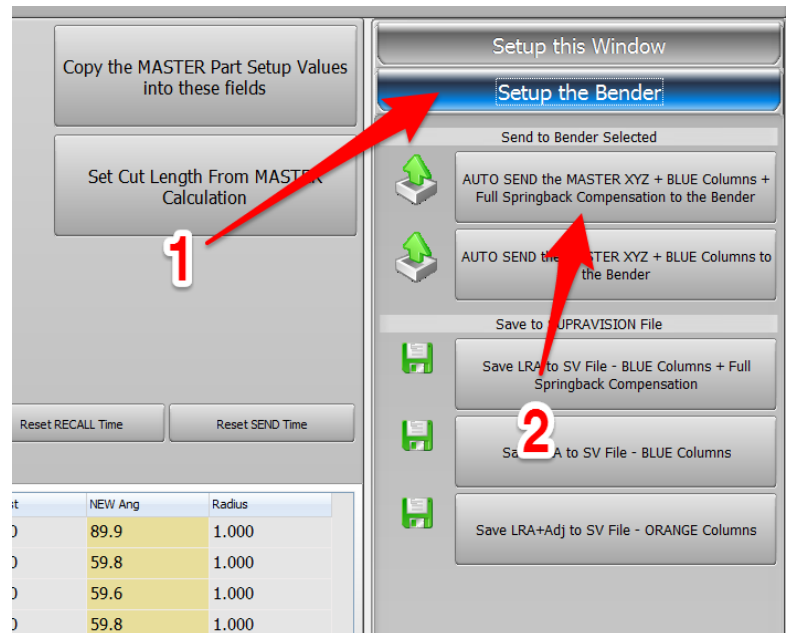
7. Press the **(1) Bidirectional Communication** button on the right bottom side.

   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

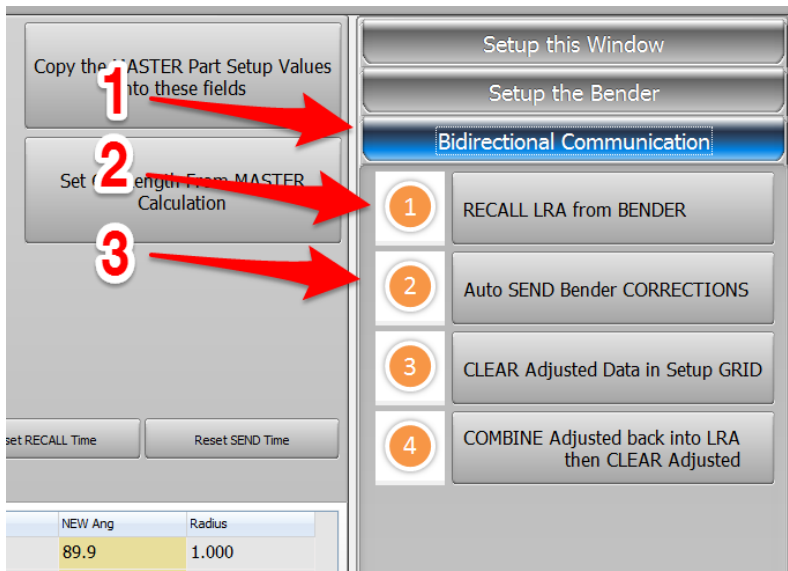You may not have a connection to the bender. That's ok, because you can still get to the correction data using printed reports.

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.

Report Templates

	Name
1	Inspection Report
2	Inspection Report with Bender
3	Master XYZ + LRA + Measured LRA
4	Bender Corrections Only
5	Bender Errors Only
6	Bender Corrections
7	Bender Corrections with Damping
8	Master XYZ + LRA Data
9	FARO Arm Report

- Measured Tube
- Inspection Results
- Bender Setup
- Reports
- Data Handling

Part Setup

Date: 8/1/2017 1:08:01 PM
Part Number: VTube-LASER Demo 4
Unit: Inches

Bender Adjustments
Add this data to the bender data to correct the shape of the tube

Bend	Length	Rotation	Angle
1	-0.018	0.0	0.5
2	-0.029	-0.9	0.5
3	-0.231	0.5	0.7
4	-0.266	-0.2	0.3
5	-0.267	0.1	0.6
6	-0.140	-0.8	1.1
7	-0.081	0.7	0.6

19