

VERSION 2.9.20

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VTUBE-LASER ADVANTAGES

COMPARED TO OTHER SYSTEMS

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ICON LEGEND



This icon means Advanced Tubular Technologies invented and/or were the first to introduce this technology for the tube fabrication industry.



This icon means that the technology is unique to VTube-LASER and scan arms when compared to other tube fabrication measuring systems.

ADVANTAGE 1 – EXTREME MULTI-LEVEL CYLINDER QUALIFICATION

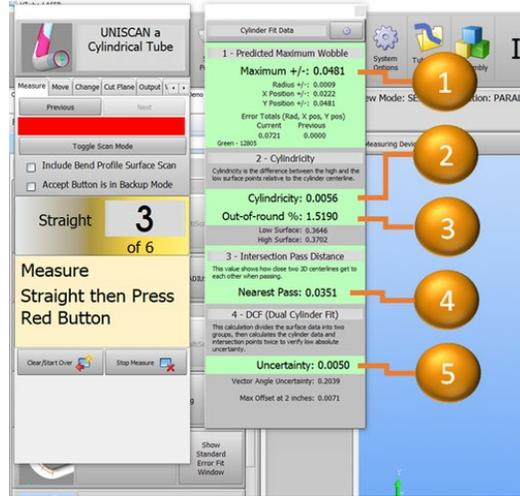
VTUBE-LASER USES A 5-LEVEL CYLINDER FIT TEST TO QUALIFY EVERY CYLINDER MEASUREMENT IN REALTIME



VTube-LASER is the first tube fabrication application to use the idea.



This is unique to VTube-LASER. No other system uses this feature like VTube-LASER.



Every cylinder that is scanned is required to pass a **5-level cylinder test** that ensures that the surface points and calculation are excellent before moving to the next scan.

1. **Wobble Deviation:** The math engine reports this value to indicate how much possible wobble it predicts in deviation in the centerline of the cylinder. The smaller the wobble, the higher the confidence in the cylinder calculation. If the wobble is too high, then VTube-LASER asks for a remeasure.
2. **Cylindricity:** This is the measurement of the distance between the highest point and the lowest point in the cloud relative to the centerline. When this value is too high, VTube-LASER asks for a remeasure.
3. **Out-of-round%:** Every tube cylinder is out of round. This calculation tests for too much out of round in the surface data. If the OOR% is too high, then VTube-LASER asks for a remeasure.
4. **Near Pass:** This feature checks how near the two 3D lines are when they intersect. If the lines do not pass near enough, then VTube-LASER asks for a remeasure.
5. **Dual Cylinder Fit (DCF) Uncertainty:** DCF splits the odd stripes and the even stripes into two subgroups and then calculates two centerline end points for comparison to each other. (See the Advantage 2 on the next page.) If the uncertainty value is too high, then VTube-LASER asks for a remeasure.



ADVANTAGE 2 – DUAL CYLINDER FIT (DCF)

WE INVENTED THE **DCF** ENGINE TO ENSURE REDUCED UNCERTAINTY IN MEASUREMENTS



We invented DCF in 2017.



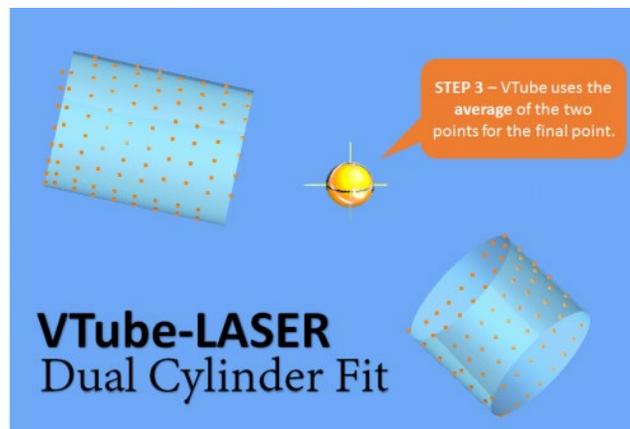
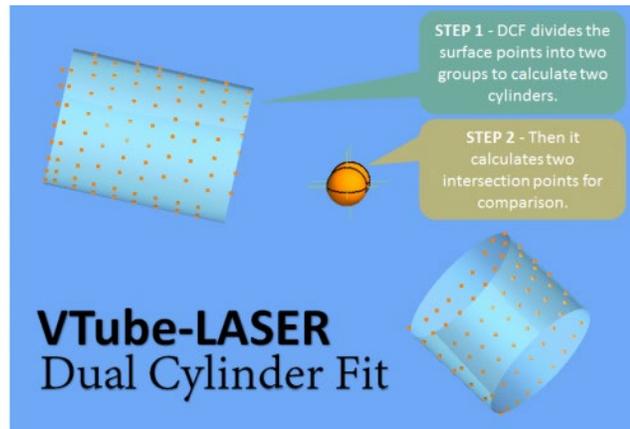
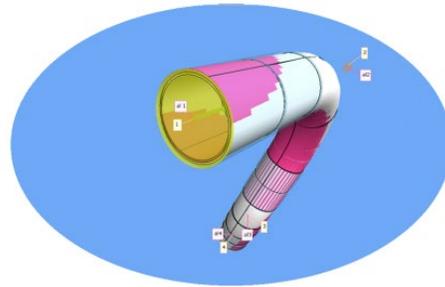
This is unique to VTube-LASER. No other system uses this feature.

4 - DCF (Dual Cylinder Fit)
This calculation divides the surface data into two groups, then calculates the cylinder data and intersection points twice to verify low absolute uncertainty.
Uncertainty: 0.0050
Vector Angle Uncertainty: 0.2039
Max Offset at 2 inches: 0.0071

This was a major invention for the tube fabrication industry in 2017. It introduced a better way to ensure that the incoming data is good.

1. It measures the tube twice in one pass when the user measures the tube the first time.
2. This approach effectively detects flyers in the incoming surface data.

VTube-LASER DCF
Dual Cylinder Fit



ADVANTAGE 3 – SCANS A DENSE CLOUD OF SURFACE DATA

VTUBE-LASER SCANS TAKE IN MORE DATA AND SCANS MORE THAN JUST THE DIAMETER EDGE



Some measurement systems only scan the edge of tubes - but VTube-LASER scans a dense point cloud from the actual surface of the tube. This allows VTube-LASER to calculate more information from the tube than the edge-only systems.

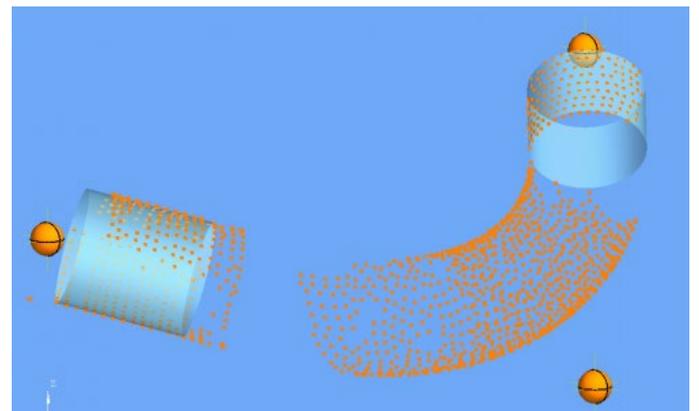
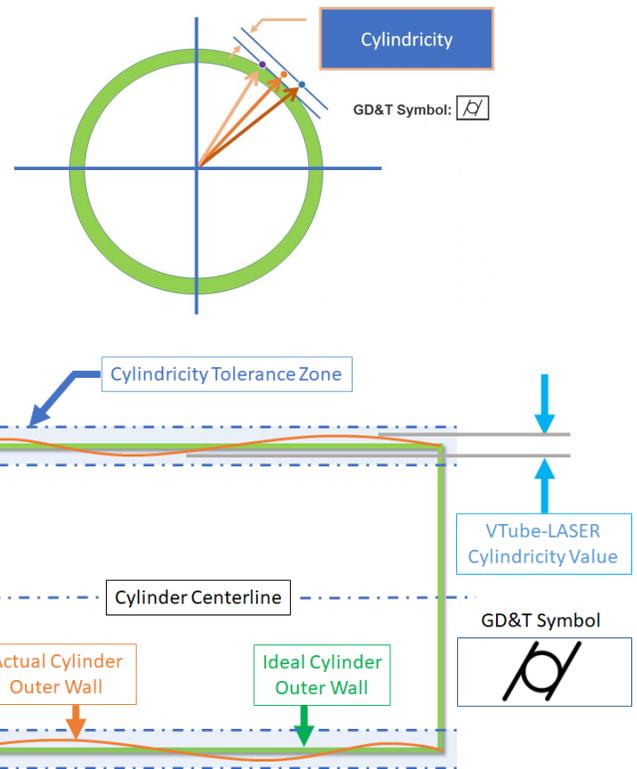
Vision-based systems only examine the OD silhouette (like the shadow or edge). Most fork-probe systems take in 2 surface points from either end of each straight for a total of 4 points used to calculate the centerline. This limits their ability to return calculated information about the diameter.

With the laser scanner, VTube-LASER always takes in a dense point cloud of the diameter surface then solves for a cylinder centerline. This allows VTube to do additional checks on every straight that other systems cannot do – like **Out-of-round%** and **cylindricity**.

This is also why VTube is immune to changing diameters – because it calculates diameters on-the-fly with all that surface data.

VTube-LASER has built-in filters that let you control the density of the point cloud on the scanned surface.

If you want to, VTube can even scan the bend sections to give you the actual average radius value (shown in the image).



ADVANTAGE 4 – LAY THE PART ON THE TABLE OR FLOOR WITHOUT THE NEED FOR TUBE HOLDERS

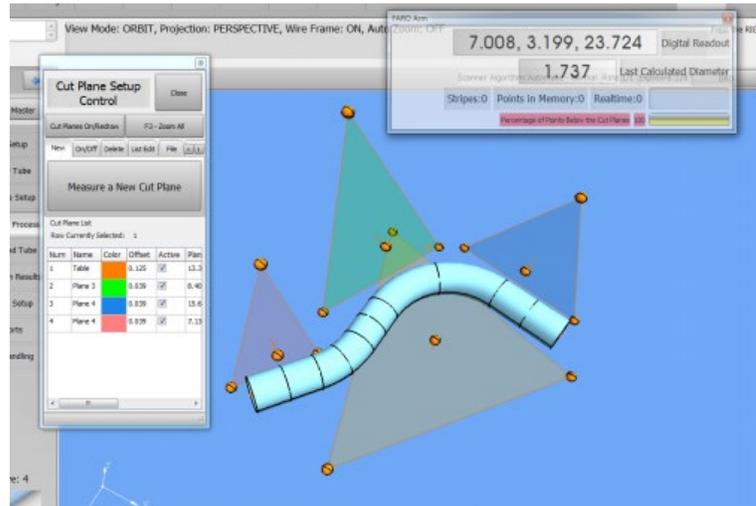
MEASURE TUBES ON ANY TABLE OR FLOOR USING OUR “CUT PLANE” FEATURE



VTube-LASER is the first tube fabrication application to use the idea.



This is unique to VTube-LASER because fork-probe measuring systems cannot use this feature.



Tube holders are not needed with VTube-LASER. Measure the table surface as a Cut Plane, then lay the tube on the table during scanning. VTube-LASER will automatically ignore the table.

This has an advantage of allowing flexible tubes to rest on a large surface to control flexing - rather than placing them in tube clamps.

- See [VTube-LASER Cut Planes](#)



ADVANTAGE 5 – SUPERIOR LASER POINT-CLOUD END SCANS

VTUBE-LASER LASER SCANS A DENSE POINT CLOUD ON THE END FOR ANY DIAMETER SIZE



We invented this style of end-scan for VTube-LASER in 2010.



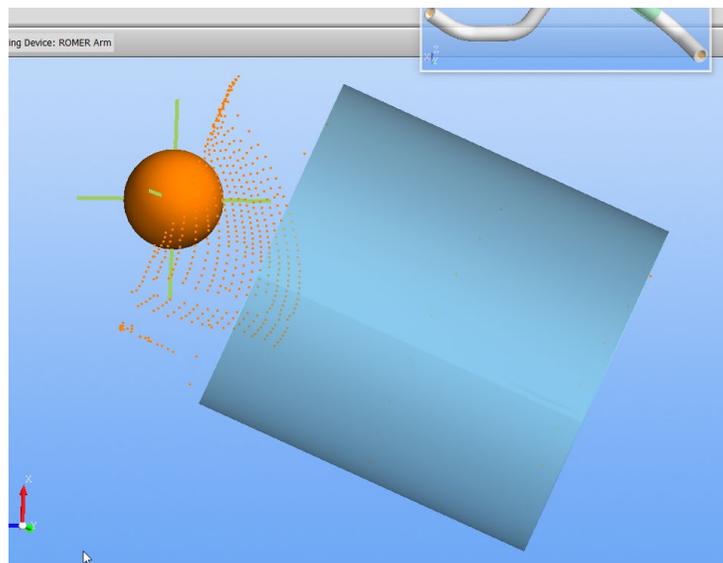
This approach is unique to VTube-LASER.

Infrared fork-probe systems often struggle with acquiring the end measurements on smaller diameter parts because it is hard to find the ends of small tubes.

Some measurement software assumes a plane at the end of the tube.

VTube-LASER scans any shape and size of tube end by laser scanning a *point cloud*. The shape of the end (flat or not) has no effect on VTube-LASER.

Also, because this method using a visible and very accurate laser line, it is not possible to miss the end of the tube – even if the diameter is very small.



ADVANTAGE 6 – MEASURE NEAR OTHER PARTS

THE **DCP** (DIAMETER CUT PLANE) FEATURE REMOVES LASER TAIL DATA AUTOMATICALLY



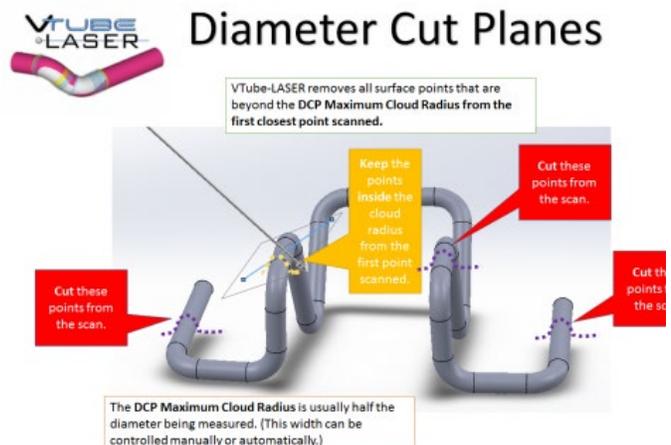
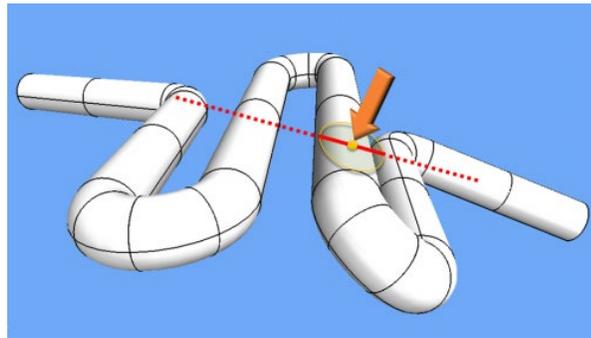
We invented DCP in 2016.



This is unique to VTube-LASER because no other tube measuring system uses this feature.

Only VTube-LASER uses DCP (Diameter Cut Planes) to keep the first tube the laser finds and remove any other tube (or any object) scanned beyond allowed DCP radius width limit.

For example, Holly MSD uses this feature to scan tube headers.



- See [DCP - Diameter Cut Planes](#)

ADVANTAGE 7 – SUPER EASY TUBE AVERAGING

THE **MTA** (MEASURED TUBE AVERAGING) FEATURE ALLOWS USERS TO EASILY MEASURE BOTH SIDES OF THE TUBE OR PIPE THEN CREATE AN AVERAGED TUBE



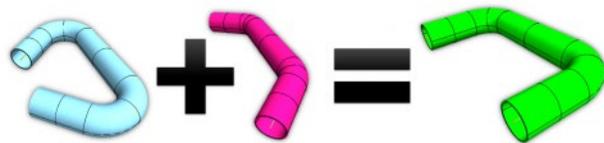
We added MTA in 2018.



This is unique to VTube-LASER because no other tube measuring system allows for an unlimited number of averaged tube measures from surface data on all sides of the tube.

We worked with MEC Inc. (Mayville Engineering) to prove the concept of MTA. We found that calculating the true centerline of larger pipes is possible with MTA because VTube-LASER gathers data from all sides of the surface of the pipe.

While tube measure averaging is not a new concept, using VTube-LASER MTA with cylinder *surface* data is new. Other systems either detect only the tube edges or take only 8 points per straight. VTube-LASER takes in thousands of points on *all parts of the surface*. **Then, with MTA, VTube-LASER can see nearly all sides of a tube fabrication. This allows for a very precise calculation of a true centerline.**



MTA – Measured Tube Averaging



ADVANTAGE 8 – EASY REVERSE-ENGINEERING TO SOLIDWORKS

MEASURE THEN AUTOMATICALLY BUILD TRUE PARAMETRIC 3DSKETCH PARTS IN SOLIDWORKS



This is unique to VTube-LASER because we are unaware of any other tube measuring system that can build directly to SOLIDWORKS – both parts and assemblies.

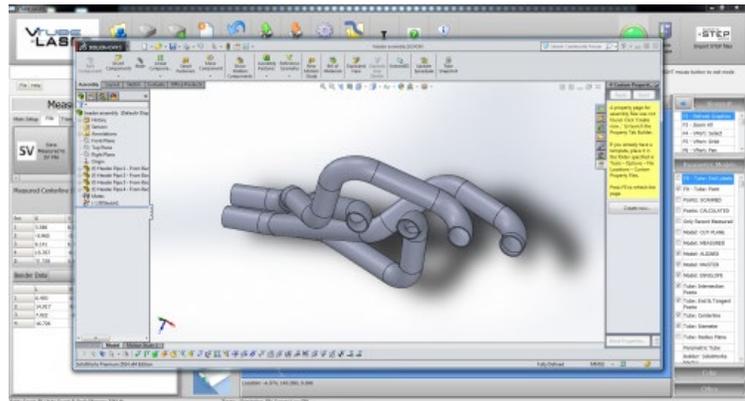
VTube-LASER can draw measured individual parts or an assembly of parts in SOLIDWORKS in just a few seconds.

Multiple tubes can be built in the same SOLIDWORKS part file, or in a SOLIDWORKS assembly.

- See examples in videos 58 and 77 in the videos pages.

Link to [Video 77](#)

Link to [Video 58](#)



ADVANTAGE 9 – SUPERIOR 180-DEGREE MEASURES USING “SPLIT BEND”

THIS FEATURE HANDLES 180-DEGREE BENDS ACCURATELY EVERY TIME



We invented the SPLIT BEND feature in 2011 to accurately measure bend angles from e 180-degrees through 359-degrees.



This is unique to VTube-LASER because no other tube measuring system uses this feature.



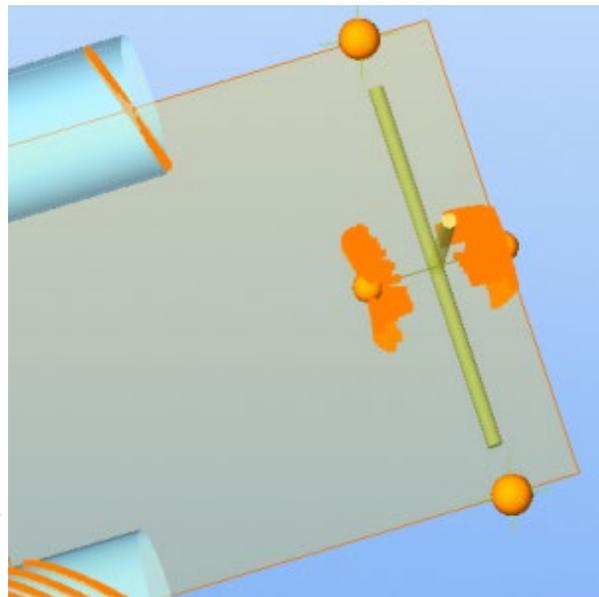
This feature solves a huge accuracy problem that other measuring centers have when trying to handle 180-degree (or greater) bends.

VTube-LASER uses the SPLIT BEND process to accurately measure any bend that equals or exceeds 180 degrees using math based on point-cloud data from the inside and outside apex area of the bend.

Any collapse or ovality in the bend region **does not reduce the accuracy of the Split Bend centerline placements** in VTube-LASER.

VTube-LASER assumes that the bend is an unpredictable shape and uses math that finds the exact center of *whatever shape it measures* at the apex of the bend.

- See [VTube-LASER video 40](#)
- See [VTube-LASER video 56](#) for how to setup for a Split Bend.



For details, see the [VTube-LASER Split Bend Feature](#) page.

ADVANTAGE 10 – SOPHISTICATED IMPORT OF STEP AND IGES ASSEMBLIES

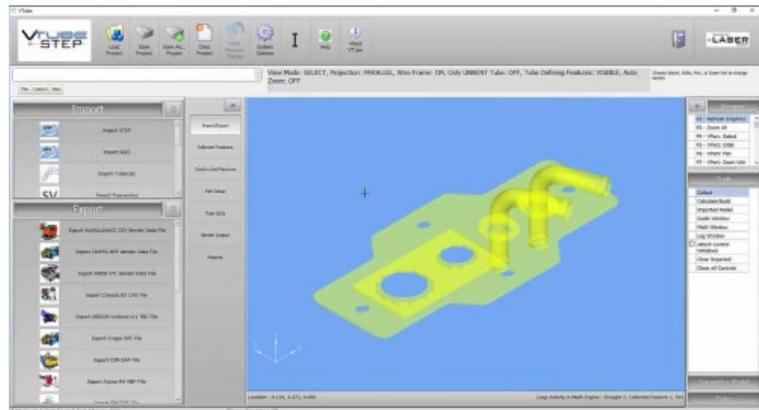
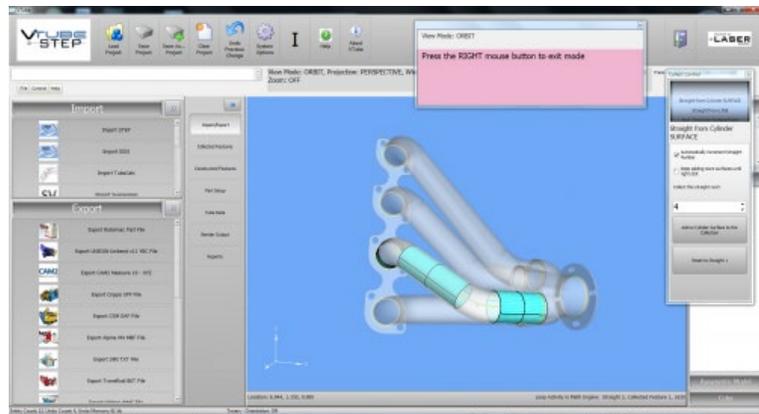
TROUBLE-FREE IMPORT OF TUBE MODELS FROM ENTIRE ASSEMBLIES WITH COMPONENTS



Unlike other systems that often struggle with importing tubes with extra objects in the file, VTube-LASER can easily import entire assemblies that include components other than tubes.

VTube-LASER can import entire assemblies in STEP and IGES formats. This software lets you find the centerline of any solid model tube inside any assembly.

VTube-LASER can even find the centerlines of straights that are drilled with holes or end copings.



ADVANTAGE 11 – INCLUDED COMMUNICATIONS WITHOUT EXTRA CHARGES

COMMUNICATE WITH UP TO 100 BENDERS OUT OF THE BOX



Only VTube-LASER allows you to connect to up to 100 benders for no additional charge. Also – all embedded interfaces are included in the license purchase price.

VTube-LASER includes communication with up to 100 benders with no additional license charge for any bender type embedded in VTube-LASER.

This means that, unlike other systems, there are no charges for connection to multiple benders.

- See one protocol example: [Setup VTube for Supervision Network Communication](#)



ADVANTAGE 12 – NO NEED FOR SEPARATE PROBES OR SCANNERS

ONE SCANNER WORKS FOR ALL DIAMETERS



Only VTube-LASER uses the same scanner for all diameters.

This means that there is no purchasing of extra probes for unusual diameters (like is required for fork probes). Also, VTube-LASER is completely immune to diameter changes **because it measures the diameter on-the-fly**. (The diameter value entered in Part Setup is only for visualizing the model on the screen.)

This means that VTube-LASER can measure ANY diameter without changing the probes or scanners. The same scanner can measure a paper clip or a 12-inch diameter pipe.

VTube-LASER uses either a ball probe or the laser probe in the same tube. This feature lets you alternate measuring technique depending on what works best for each straight.

VTube-LASER even has a feature for measuring CENTERLINE STRINGS. We added this for the US Navy.



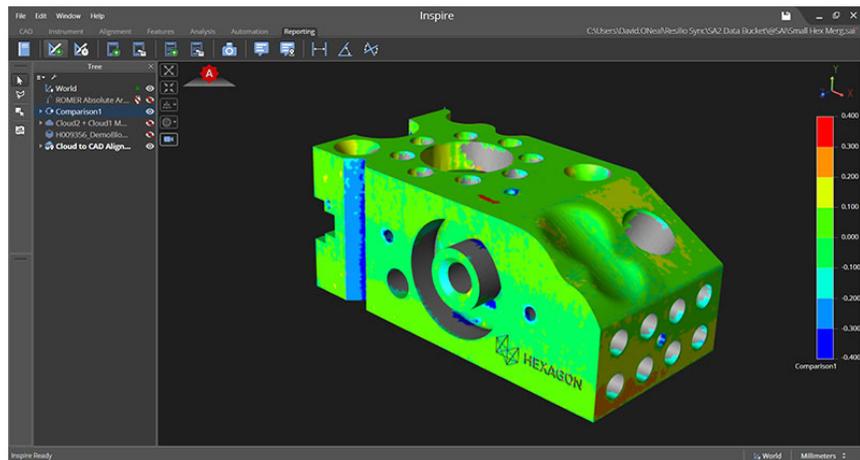
ADVANTAGE 13 – SCAN ARMS CAN SCAN ANYTHING WITH THE RIGHT SOFTWARE

CHANGE THE SOFTWARE TO MEASURE ANY SHAPE

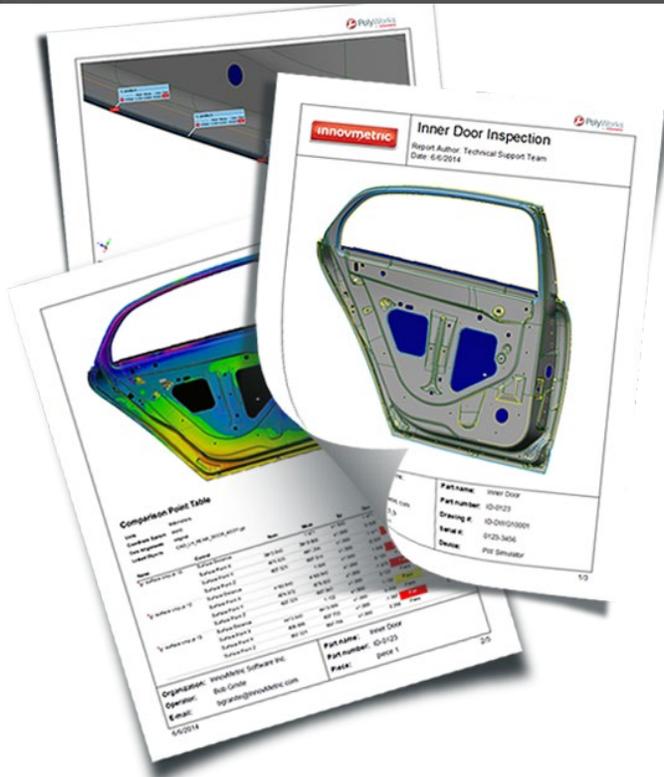


Laser scan arm systems are super flexible compared to other tube-only systems.

While other tube-measuring systems measure only tubes, the arms that VTube-LASER works with allow for scanning anything just by switching software.



- Inspire
- PC-DMIS
- PolyWorks
- DesignX
- VISI Reverse



ADVANTAGE 14 – SUPERIOR VISUAL FEEDBACK

BETTER REALTIME VISUAL FEEDBACK GIVES HIGHER CONFIDENCE TO OPERATORS DURING MEASURING

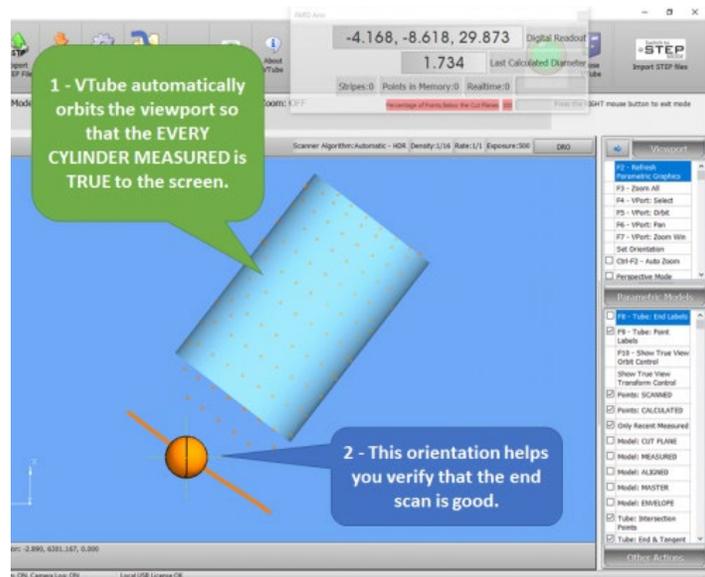


We introduced the idea of *enhanced visual verification* with displayed models that give important feedback while measuring. For example, users can easily prove with our visual models when ends scans are perfect (and when they are not).

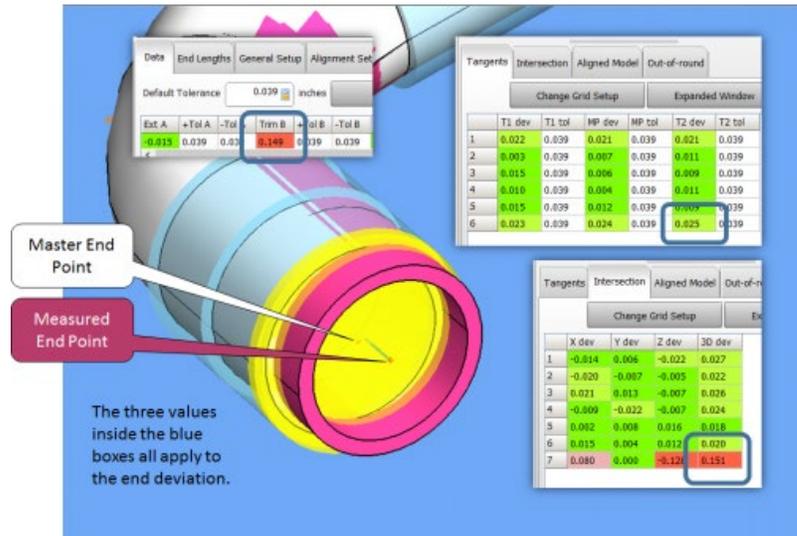


Only VTube takes advantage of graphic model close-ups to help users qualify the measurement in real-time. This removes stress from the operator by allowing them to prove that a measure is good.

VTube-LASER shows you the actual model of the scanned points on the screen immediately after the scan in its TRUE VIEW orientation. This allows the operator to visually verify that the scan was good before moving to the next straight or end. If there are outliers or flyers - you can easily see them in this screen.

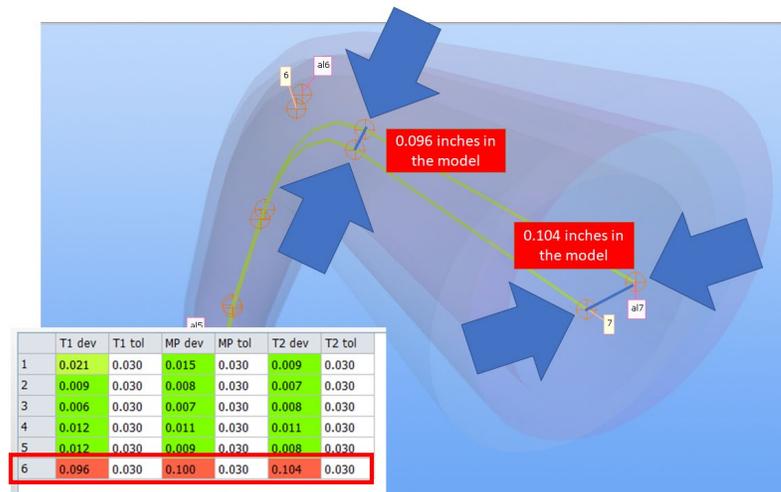


After the inspection is complete, VTube-LASER creates solid model images that are designed to clearly show you where the tube passes or fails the tolerance envelope. In this image, it is easy to see that the measured-aligned tube (the pink tube) is too long because it moves far past the end length tolerance envelope - which has turned bright yellow because the measured tube is outside the envelope.



You can see exactly how far it exceeds the tolerance by looking at the Inspection Results grids.

You can visualize any deviation by pressing Ctrl-T to toggle the model transparency then zooming in on the area of interest.



ADVANTAGE 15 – ACCURATE MEASURE OF LONG TUBES

USES THE SUPER-ACCURATE LEAPFROG METHOD



VTube-LASER uses very accurate leapfrog technology. It is more accurate than the tube MOVE method typically used in other systems.

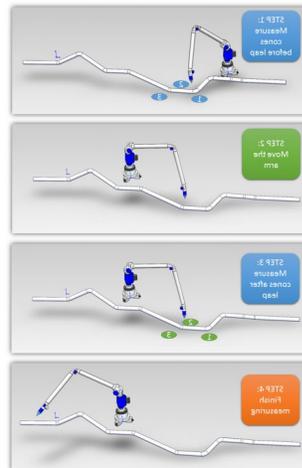
The LEAPFROG feature allows VTube-LASER to measure any length tube shape accurately by moving the arm around longer tubes and pipes.

This method of measuring tubes longer than the arm's reach is far more accurate than operations that use TUBE MOVES.

Leapfrog also works regardless how long the preceding straight is. When other systems use a MOVE command, they require you to measure a preceding bend or two. VTube-LASER can measure even a straight tube with no bends that is longer than the arm reach with leapfrog.

- See [VTube-LASER Leapfrog](#)

Combine our TRAX rail system with leapfrog technology to measure very long tubes.



Extend the reach of your measuring center arm with the Advanced Tubular **TRAX** rail system.

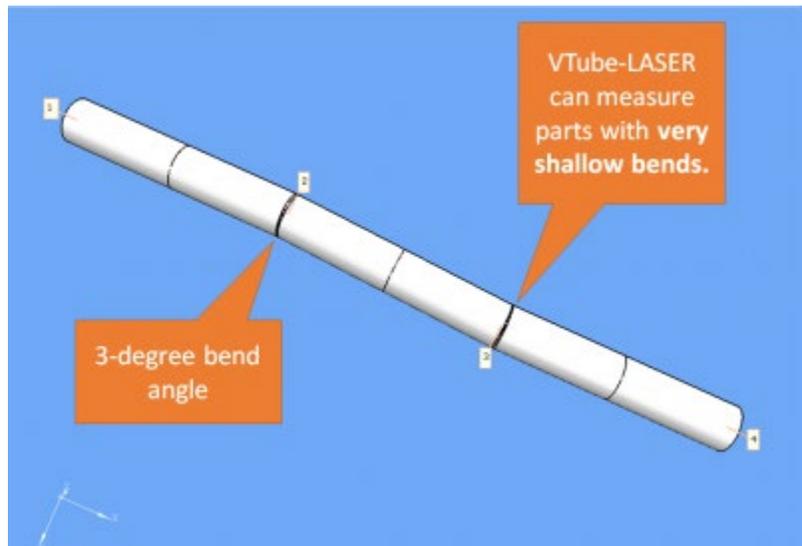
ADVANTAGE 16 – MEASURES EVEN SMALL ANGLES

SMALL-ANGLED BEND MEASUREMENT IS POSSIBLE



VTube-LASER handles small-angled bends.

Unlike other systems, VTube-LASER can measure tubes with very small bend angles because it does not have a lower limit on the smallest bend angle allowed.



ADVANTAGE 17 – HANDLES CURVED STRAIGHTS

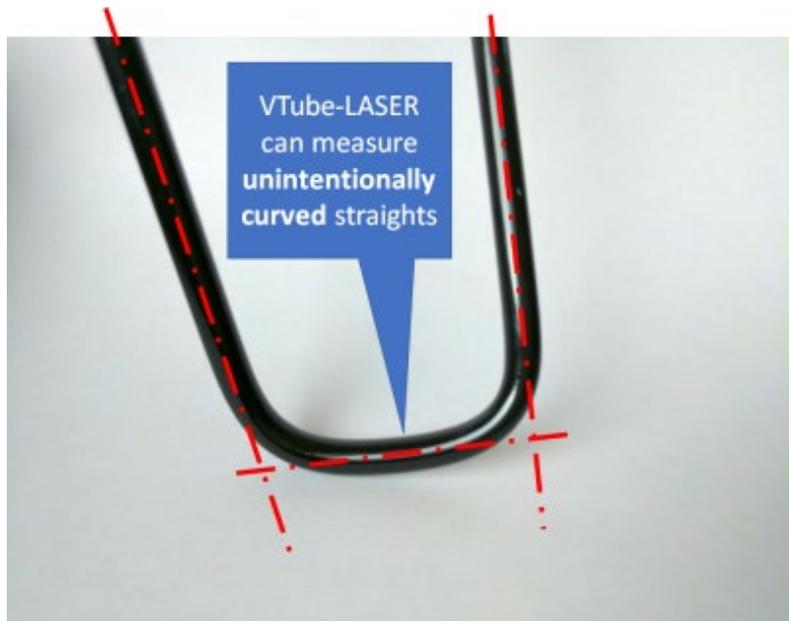
THE ALTERNATIVE MULTISCAN ALLOWS OPERATORS TO MEASURE LESS THAN PERFECT STRAIGHTS



Only VTube-LASER can switch between UniScan and MultiScan modes to measure very curved/bowed straights when necessary.

VTube-LASER can measure curved straights using the **MultiScan** feature, then switch back to UniScan to measure straighter cylinders using a dense point cloud.

This gives operators the ability to choose the best type of scan depending on the current straight.



ADVANTAGE 18 – SQUARE AND RECTANGULAR

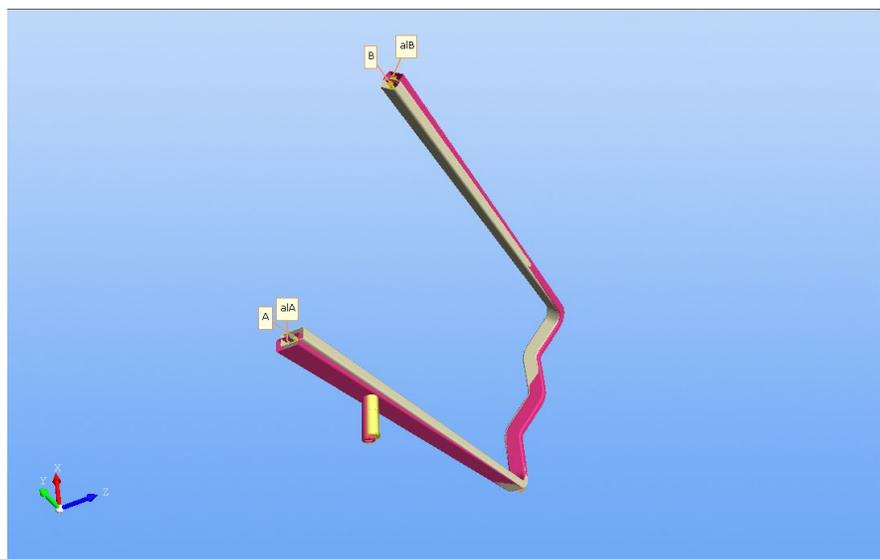
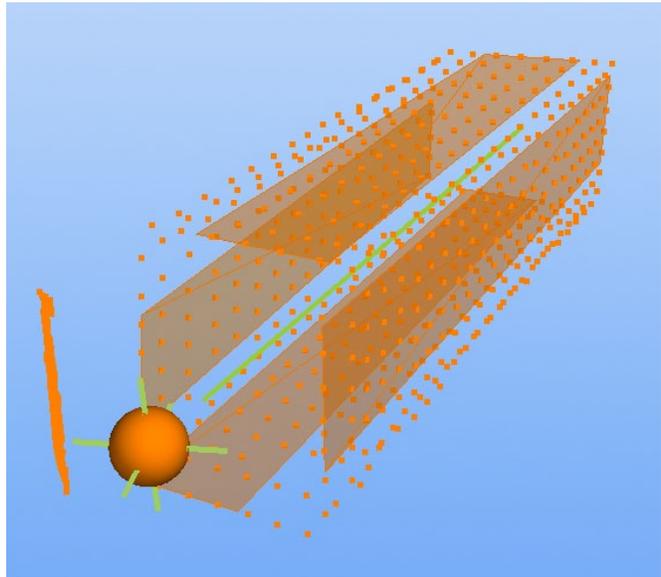
SCANS SQUARE AND RECTANGULAR TUBES WITHOUT ADAPTERS



Only VTube-LASER can measure square and rectangular tubes.

VTube-LASER can import and measure square and rectangular tubes with the ball probe or laser scanner.

Most other tube-measuring systems cannot measure square or rectangular tube without special adapters.



TARGET MARKET AND JUSTIFICATION

- VTube-LASER is for any customer that measures and qualifies tube shapes for CNC Bender correction.
- This is true even if the customer already uses a generic software solution like POLYWORKS or GEOMAGIC. Customers that use these packages always prefer to measure tube shapes in VTube-LASER because VTube-LASER is much easier to use for measuring tube shapes.
- Adding VTube-LASER to existing customer scanning systems is cost effective because customers do not have to purchase new systems for VTube-LASER.
- VTube-LASER is still one of the least-expensive licenses on the market compared to other solutions.
- VTube-LASER uses the same laser scan technology that can be used to scan anything else too. Just add the appropriate software to the system, then start scanning any shape.
- If the customer uses tube bending machines, then VTube-LASER is easy to justify because it can correct bending machine programs quickly and accurately. VTube-LASER saves hours per setup for each new part. One customer reported to us that **they reduced their setup scrap rate by 95% with VTube-LASER.**
- Unlike other tube measuring systems, VTube-LASER allows you to connect to up to 100 benders without additional charge per bender. (Some benders require extra costs like electronics and external transfer programs we call Benderlink. But when the protocol is embedded in VTube – we do not charge extra to activate them.)
- VTube-LASER can support any language in the user interface. It comes with English, Chinese, Japanese, German, Spanish, and French. The languages are stored in standard Microsoft Excel files. Anyone can easily edit them.

SOFTWARE MAINTENANCE AGREEMENT (SMA) SUPPORT

- Every new license that is purchased with on-site training includes **one year of free updates** with our SMA if training is purchased.
- Every new license that is purchased with on-site training includes one year of technical support by telephone, email, and/or remote internet connection with an active SMA.
- Every customer with an active SMA has direct access to the VTube-LASER software developers and engineers. We do not hide them from customers.
- An SMA can be renewed annually for 20% of the current license price of VTube-LASER.
- We never require SMA renewal. The license purchased is good forever.