



Quantapoint PRISM 3D

Pipe Size Estimation

ABSTRACT

Helping You Extract the Greatest Value from Your Investment in As-Built Laser Documentation

Quantapoint PRISM 3D™ is the most advanced and cost-effective technology available for managing, sharing and extracting dimensional and other information from as-built documentation using laser scanning. With PRISM 3D, companies can fully leverage their investment in as-built laser documentation to reduce risks through the entire project lifecycle. The result is reduced costs, optimized schedules, increased quality and improved safety, with up to an 80% reduction in construction rework.

This document was extracted from the full PRISM 3D manual.

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USAGE

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QUANTAPOINT WHITEPAPERS

As the acknowledged industry leader in laser scanning technology, Quantapoint has published several papers, some of which are listed below. These are available in the Resources section of www.quantapoint.com.

- A Project Manager Guide To Laser Scanning
- Seven Things Every Project Manager Should Know About Laser Scanning
- Specifying Laser Scanning Services
- Uncovering the Value of As-Built Laser Documentation for Engineering Firms
- Uncovering the Value of As-Built Laser Documentation for the Power Industry
- Uncovering the Value of As-Built Laser Documentation for the Processing Industries

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Using 2-Dimensional PRISM 3D 5.0 Tools

PRISM 3D 5.0 provides a robust set of tools for 2-dimensional measurement and individual laser scan data viewing. The following sections highlight PRISM 3D 5.0's 2D tool set.

Pipe Measurement Tool

Pipe diameter and centerline measurement information may be extracted using the pipe measurement tool. To do so, please follow the below procedure.

Note: To ensure the highest accuracy, the point selection tool can only be used on points that have enough high-quality measurements to be validated. Not all visible points are validated due to small or low quality measurements. These points are filtered and cannot be used for measurements. If a filtered point is clicked, the pointer will change to a crossed-out circle (⊗).

Note: The pipe measurement tool should only be used on individual lines.

1. Select the pipe measurement tool button in the tool bar



Figure 1: Pipe Measurement Tool Button in the Tool Bar

2. Select a point to estimate the direction of the pipe's axis by pressing and holding the Control (CTRL) key and clicking a point near the center of the desired pipe in the individual laser scan. A red dot will be shown to indicate the point selected.



Figure 2: Red Dot Indicating Selected Pipe

3. Draw a line to initially estimate the pipe diameter by pressing and holding the Control (CTRL) key and clicking a point near one edge of the pipe and then pressing and holding the Control (CTRL) key and clicking a point near the opposite edge of the pipe. A green line will be shown between the two points selected.

Note: This line should be a distance from the red dot, roughly perpendicular to the edges of the pipe and should not cross outside the pipe.

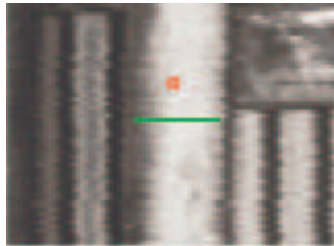


Figure 3: Green Line for Initial Pipe Diameter Estimate

4. Select an area of the pipe that will be used to calculate its diameter and centerline. Press and hold the Control (CTRL) key and click points near the edges of the pipe. To complete the area selection, hold down the Shift key and click. A blue box will be shown indicating the area selected. More than one pipe area can be selected, if so desired.

Note: For greatest accuracy, it is recommended that the edges of the pipe not be included in the box and that a rectangular area be used. While selecting a greater area will provide more information for the calculation, it will also take more time for the calculation to complete.

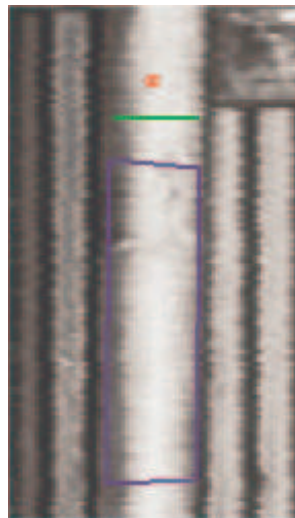


Figure 4: Blue Box for Pipe Area Selection

5. Once all selections are made, press the Enter or Return key to begin calculating the pipe measurements. Once the processing is complete, pipe measurement information, such as the pipe diameter, slope, and azimuth angle, will be displayed in the output window.

Note: The actual pipe diameter is reported, not the nominal diameter. To report the nominal diameter, hold the Control (CTRL) key when pressing the Enter or Return key. The diameter will be calculated as normal and then fit the result to the closest nominal pipe size.

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Center:      (X = 1509.195 m   Y = 335.896 m   Z = 35.581 m) ± 0.003 m  
Diameter:    0.101 m ± 0.003 m  
Slope: 88.96°  
  
Pipe Side East = 1509.245 m   Pipe Side West = 1509.145 m  
Pipe Side North = 335.946 m   Pipe Side South = 335.846 m
```

Figure 5: Pipe Measurement Estimates in the Output Window

Confidence Values

The center value and the diameter measurement estimated by the pipe measurement tool include a confidence value, represented as \pm measurement. This indicates the certainty of the output. A lower the confidence value indicates higher quality estimated results.

Error Messages

Occasionally the pipe measurement tool will fail to converge on an estimate and an error message similar to the below error message will be displayed. This error can occur for a variety of reasons, such as an inaccurate pipe diameter estimate (too small or outside of the actual pipe diameter), too small a pipe area being selected, a non-linear section of pipe being used, etc. If this error message is received, please use the pipe measurement tool again while avoiding the listed potential issues. If you are unable to receive an answer, please contact Quantapoint customer support.

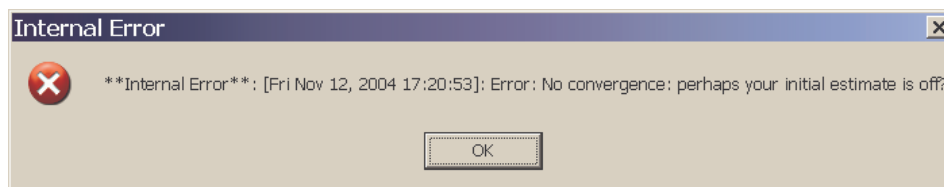


Figure 6: Pipe Measurement Tool Error Message

PRISM 3D

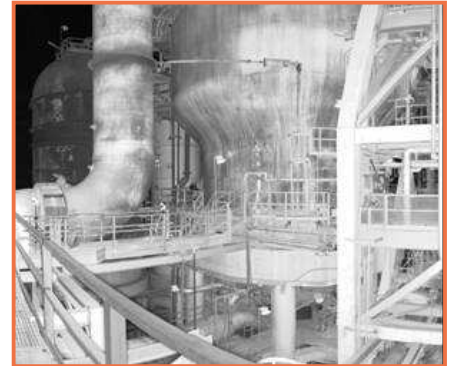
PRISM 3D is software for managing, sharing and extracting critical information from as-built laser documentation. PRISM 3D is specifically designed to support the work process and information requirements of the process and power industries by providing a single, consistent repository for highly accurate facility dimensional information that is accessible using an intuitive and interactive photo-realistic 3D image (a “digital plant”). Proposed modifications can be imported into the as-built documentation as CAD (computer-aided design) models. This can help identify potential clashes with the facility, enhance design and constructability reviews and more easily share proposed updates with team members that do not have CAD software. Searchable hyperlinks can be added from the as-built laser documentation to 2D drawings, asset data sheets, best practices, etc. This provides a single entry point from an intuitive 3D visual image to other plant information, improving usability and accessibility.

PRISM 3D can also help you make integrated quality and work processes a reality, with users being able to fully leverage asset as-built documentation to improve designs and make decisions based on more accurate information. The outcome is reduced costs, optimized schedules, increased quality and improved safety compared to other as-built technologies or traditional surveying techniques, reducing our construction error by 80% and saving millions of dollars and thousands of man-hours.

What's New in PRISM 3D

PRISM 3D contains a number of new capabilities based on user feedback. The top 5 new capabilities are:

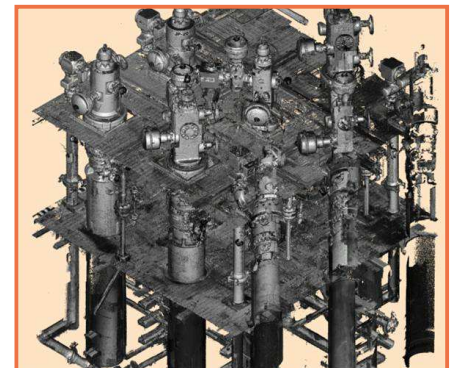
1. View interactive photo-realistic 3D laser models of the as-built laser scan data.
2. Interact with the 3D laser model by zooming, panning, and removing obstructions.
3. Hyperlinks 3D laser models to 2D drawings, asset data sheets, best practices, etc.
4. Import and display CAD models with the 3D laser models.
5. Clash detection between imported CAD model and 3D laser models.



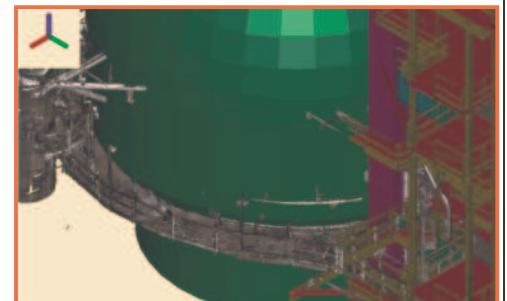
2D Image of Quantapoint Laser Scan for Refining (not a picture)



2D Image of Quantapoint Laser Scan for a Power Plant (not a picture)



Actual PRISM 3D Image for an Offshore Platform



Actual PRISM 3D Image with a CAD Model for a Refinery

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