



3D Visual Measurement Technology

3D PHASE MEASUREMENT
3D STEREO MEASUREMENT

Imagination at work.

The Importance of Measurement Accuracy

Purpose of measurement:

- Verify asset condition
- Verify asset serviceability

Example applications:

- Surface wear
- Corrosion/erosion pitting
- Blade tip clearance
- Stator vane rock
- Weld condition



Three Types of Measurement Users

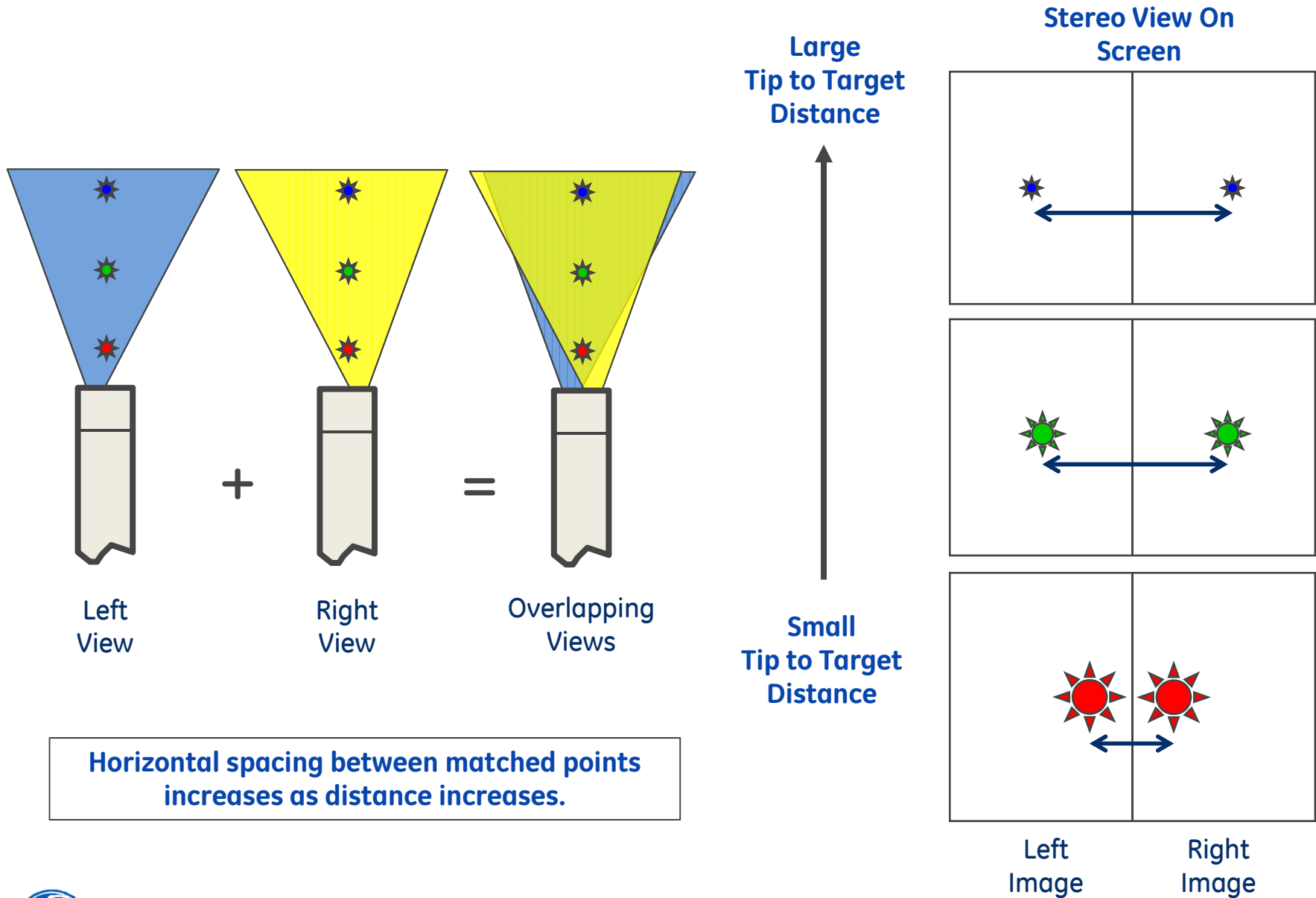
- Have yet to add measurement to their inspection program
- Advanced users looking for the next technological advancement
- Use measurement today but are not using industry best practices



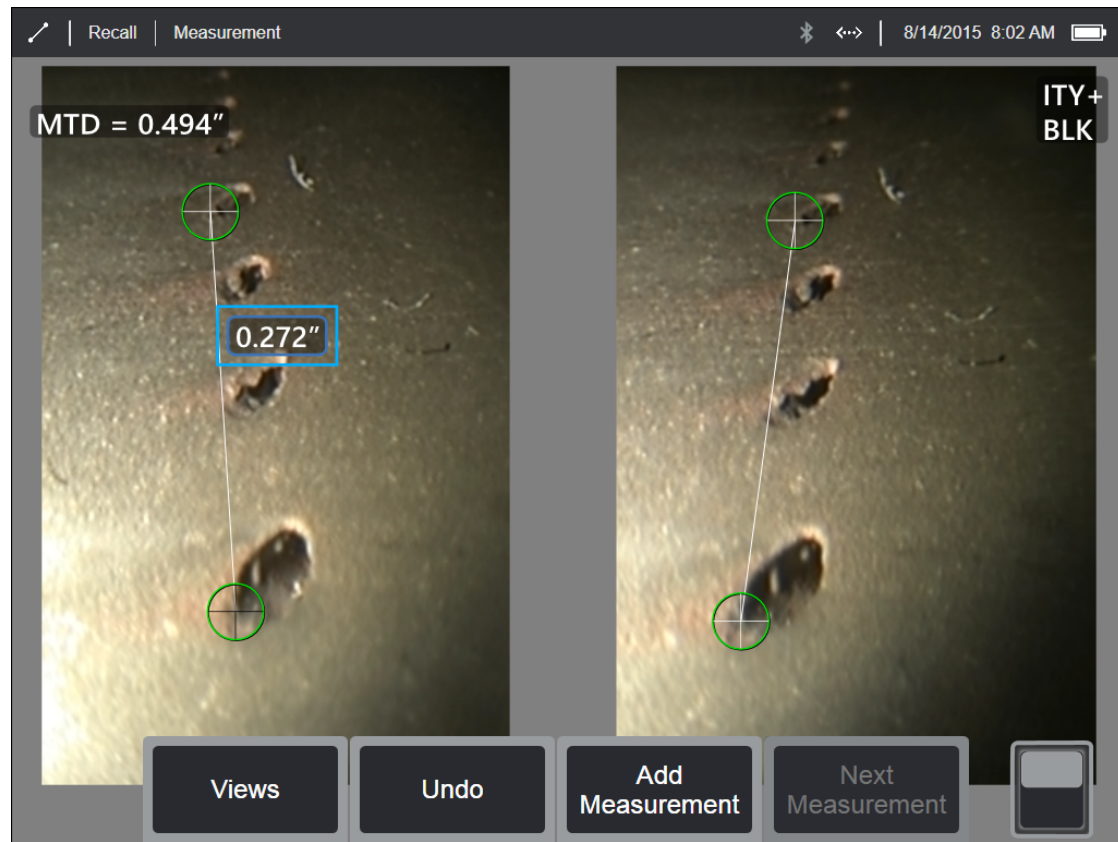
Any borescope with measurement can give you an answer, but you might be asking the wrong question (and not know it!)



Measurement Technologies: Stereo Measurement



Measurement Technologies: Stereo Measurement

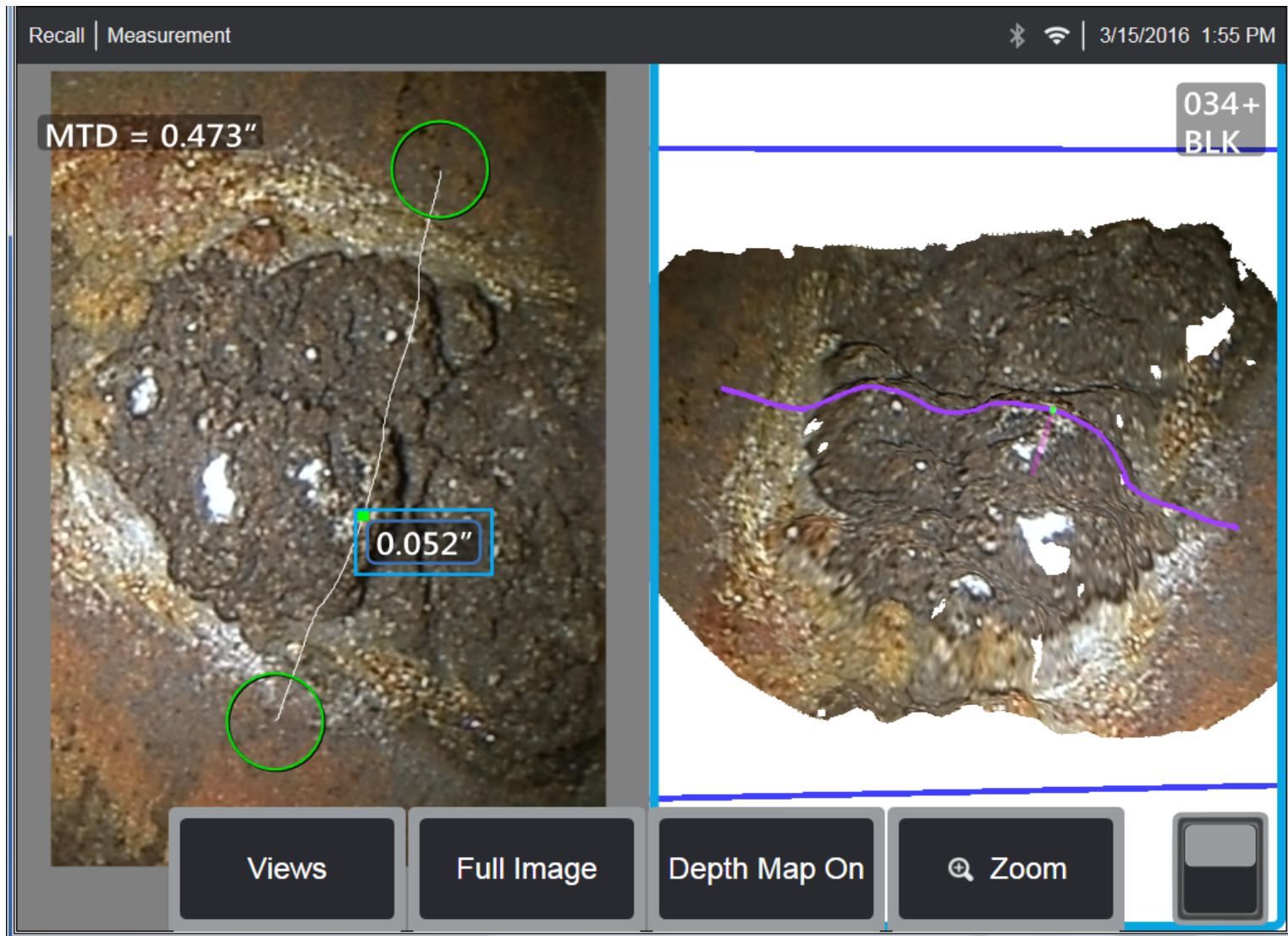


Operator's Image

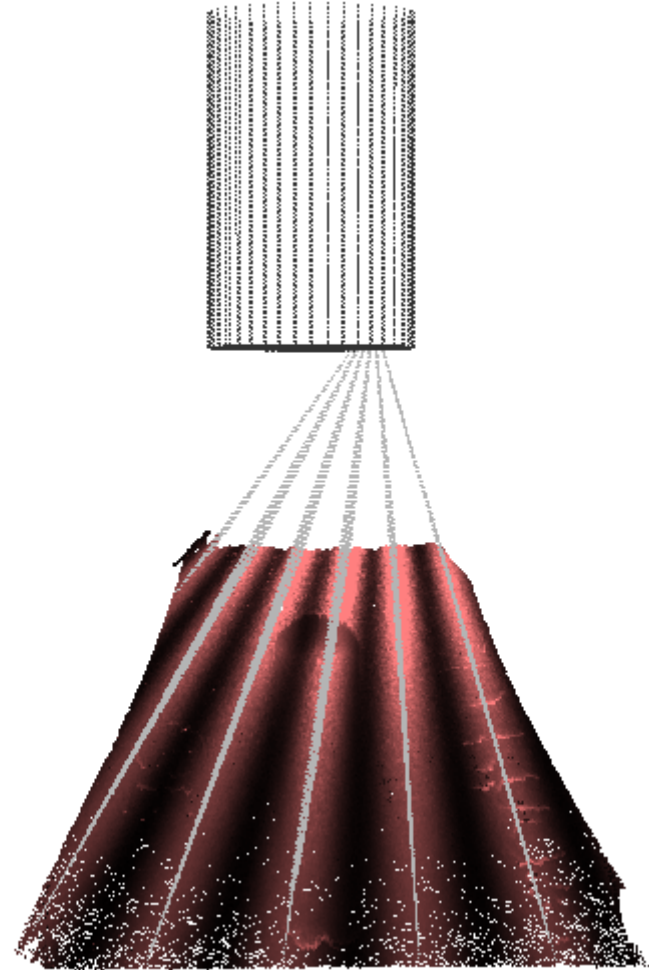
Processor's Image



Measurement Technologies: 3D Stereo Measurement

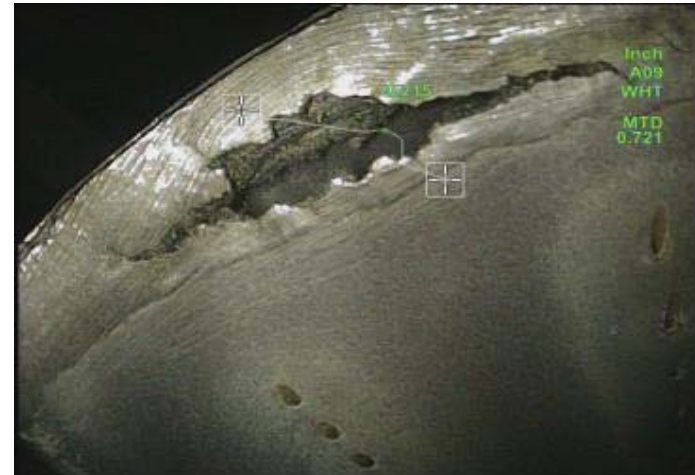


Measurement Technologies: 3D Phase Measurement

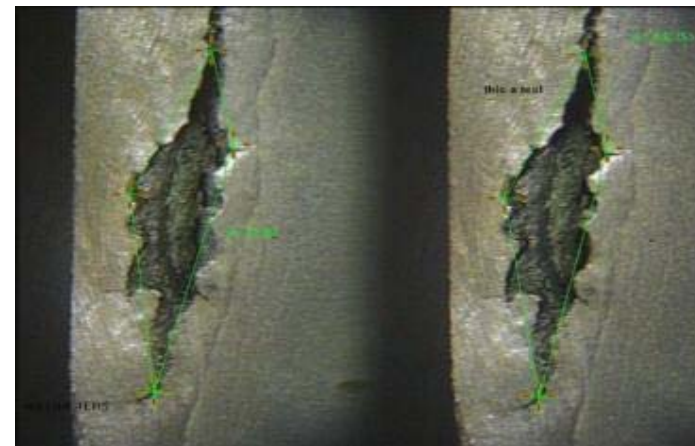


3D Phase Measurement Key Features

- Measurement on Demand
- Measure from any attack angle
- Wide-view 105° FOV
- Auto Tip-ID
- 7+ Measurement Types



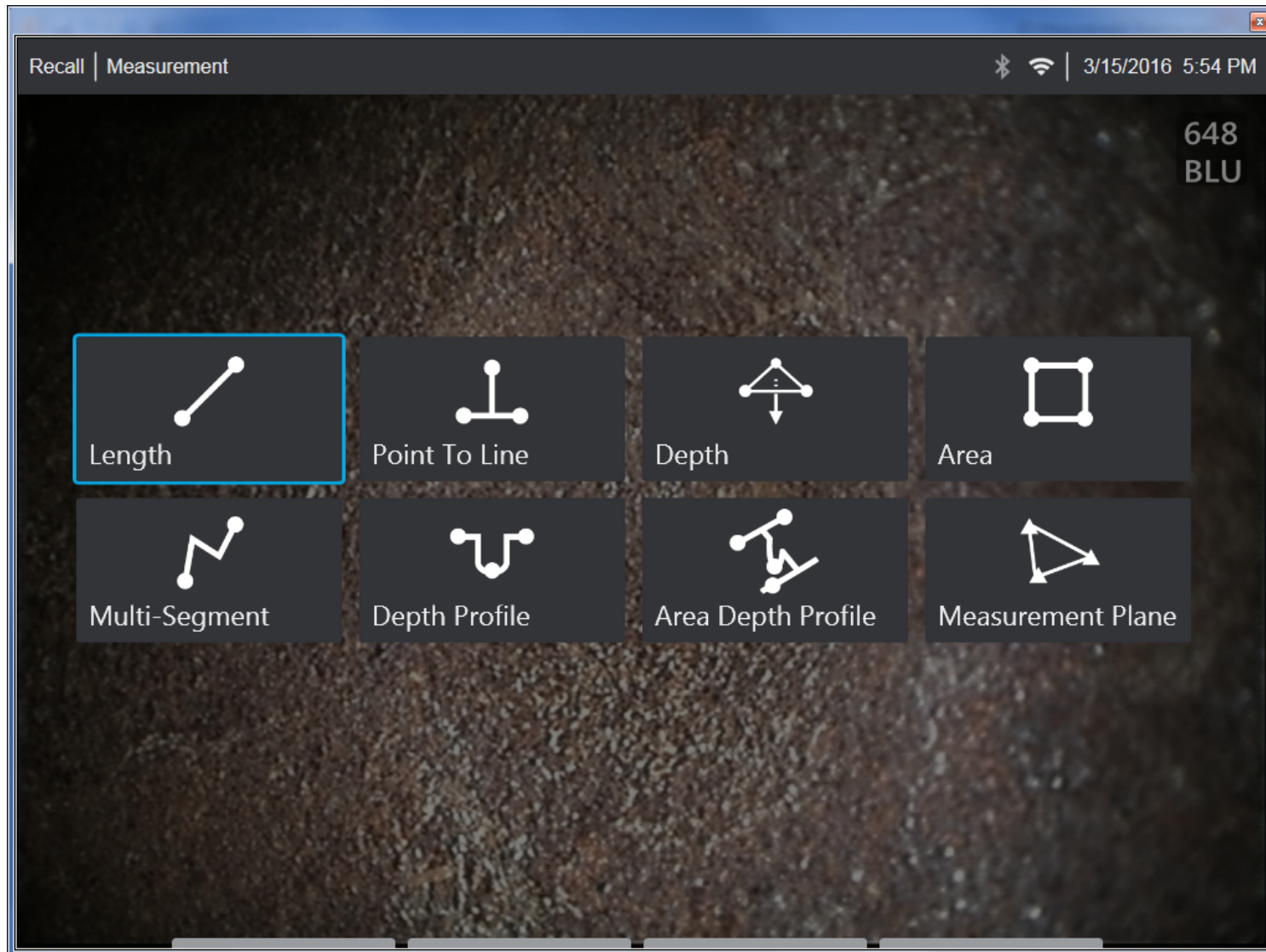
3D Surface Scan Measurement
(full-screen view)



Stereo Measurement
(two half screen views)



3D Measurement Types



The Power of 3D Visualization: Point Cloud Analysis

A **3D point cloud** is a large set of calculated X, Y, Z surface coordinates used to compute measurement results.

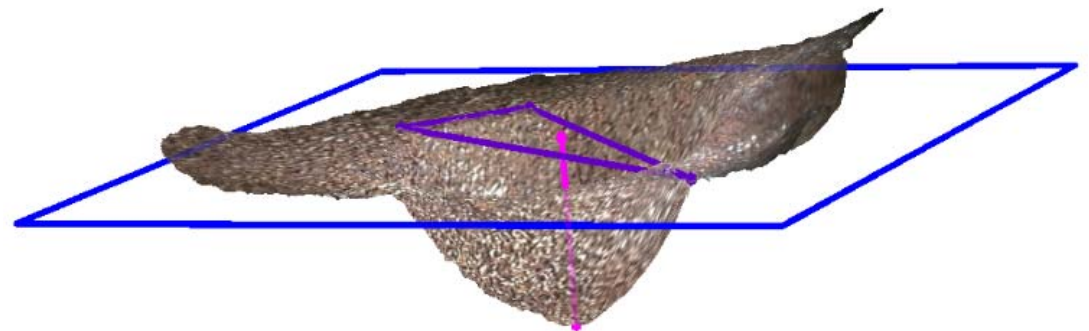
3D point cloud view allows inspectors to:

- Better understand surface contours
- Assess measurement data quality
- Check measurement cursor placement

2D Image



3D Point Cloud View



Area Depth Profile

Sweeps a series of depth profile slices over an area defined by three cursors and identifies the profile slice having the highest or lowest point.

Example Applications:

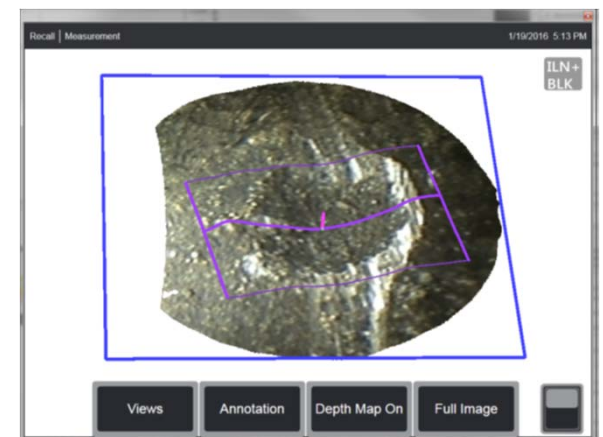
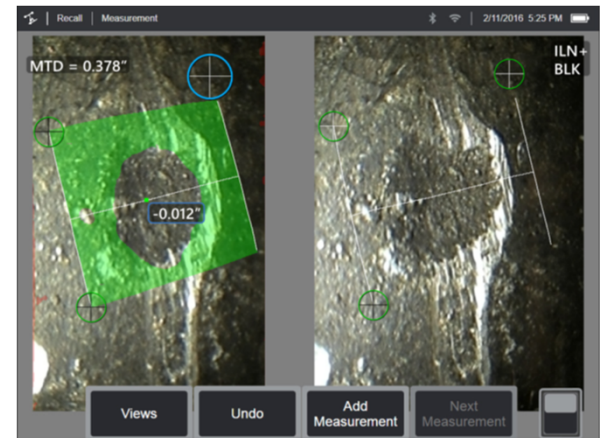
Corrosion, erosion and pitting

FOD impact damage

Maximum weld height including orbital welds

Maximum wear groove depth

NOTE: Compatible with 3D Phase and 3D Stereo measurement



Measurement Plane

Measurement aid used in conjunction with other measurement types to allow the placement of cursors in red areas where no 3D data is present or where noise in the 3D data may be reducing measurement accuracy.

Example Applications:

With Area to measure missing corners

With Point to Line for blade edge damage

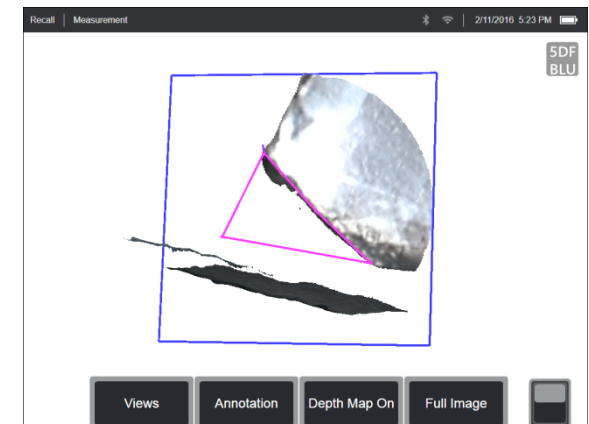
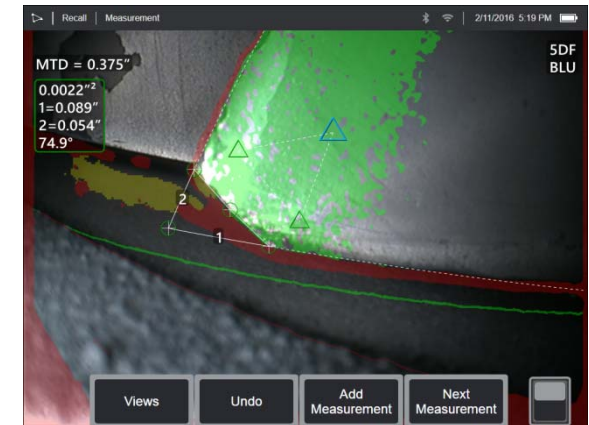
With Depth for blade tip to shroud gaps

With Length or Point to Line for small features when unable to get closer

With Area Depth Profile when measuring a field of pits on a flat surface

With Depth Profile when you cannot fit the cursors fully on a flat reference surface

NOTE: Compatible with 3D Phase and 3D Stereo technology



Depth Assist (Depth Measurement Automation)

Feature wherein the system searches the surface data in the vicinity of the first three cursors of a Depth measurement and automatically places the fourth cursor at the deepest point, highest point, or a point on a blade tip saving the user the time of locating those points manually.

Example Applications:

Auto Pit Depth

Tip Clearance

Pipe/Tube inner diameter



How to Avoid Common Measurement Errors Using the 3D Point Cloud



Common 2D Image Measurement Mistakes

- Measurement from too far away
- Misinterpretation of surface shape
- Missing deepest point
- Measuring at an angle
- Tilted reference plane



LIVE MEASUREMENT DEMO

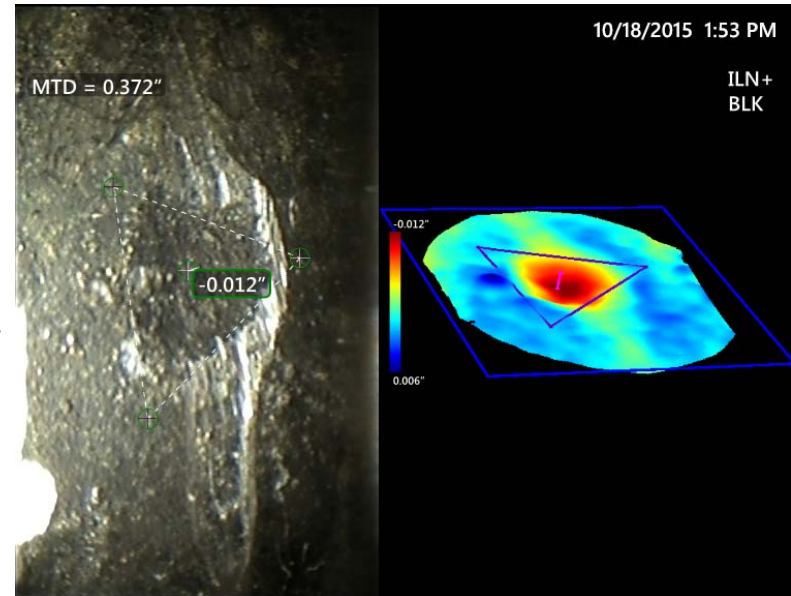
3D PHASE MEASUREMENT

3D STEREO MEASUREMENT



Take-Away: Improve Your RVI Measurement With 3D Point Clouds

- Measurement accuracy is essential in critical RVI applications where asset uptime and safety of life are critical
- 3D Phase & 3D Stereo bring point cloud analysis to multiple probe diameters to meet a variety of application needs
- 3D pivotable Point Cloud visualization helps inspectors to avoid common measurement pitfalls



3D Measurement Learning Resources



Free Download! -- 3D Measurement Handbook

<https://www.gemeasurement.com/download/videoprobe-3d-measurement-handbook>

Free Poster! – 3D Measurement Poster

<http://info.geoilandgas.com/3d-visual-measurement-poster.html>

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Questions ?

