BEMIS™ Laser Scanner Changing Oilfield Inspection

Houston based **Laserstream, LP** is changing what you think you know about the ID of oilfield tube and line pipe. Through an exclusive relationship with Laser Techniques Company**, Laserstream, LP** has introduced the Bore Erosion Measurement & Inspection System (BEMIS™) laser scanning technology to the oil field and pipeline markets.

The BEMIS™ laser sensor rotates at a high rate of speed as it is driven the length of a tubular, typically generating upwards of 5000+ data points per revolution. The result is a high resolution 3D map of the component inner surface. The linear resolution (how tight the helix is - think of a Slinky™) can be as tight as .010" or as loose as 5", depending on the application. For example, a 40' joint scanned at .5" resolution gathers over 2.4 million data points. This data provides information about wall loss (erosion, corrosion), mechanical wear (wireline, coil tubing), ovality, and exact dimensions and volumes. Typically, depth and sizing measurements are accurate to +/- .002" or better.

Up until recently, this technology has been primarily used by organizations such as NASA, Nuclear power companies and for DOD gun turret erosion inspection applications. It has only recently been introduced to the oil field and midstream pipeline industries. **Laserstream, LP** can customize its equipment and software applications to meet specific needs, varying sizes, or different applications.

Laserstream Awards, Certifications and Recognition

In 2014, Laserstream, LP was formed and partnered with Laser Techniques Company to bring ID Laser Profilometry to the oil industry.
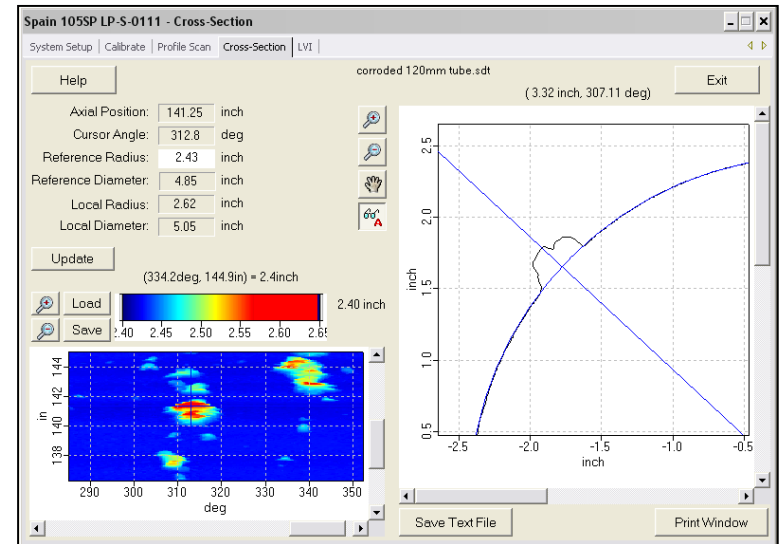

"Excellence in laser-based measurement and inspection"

Portable Large Caliber BEMIS™ System

BEMIS™ Pipe Scanner

Laserstream works with LTC to adapt the BEMIS™ Pipe Scanner and creates delivery systems for oilfield applications.
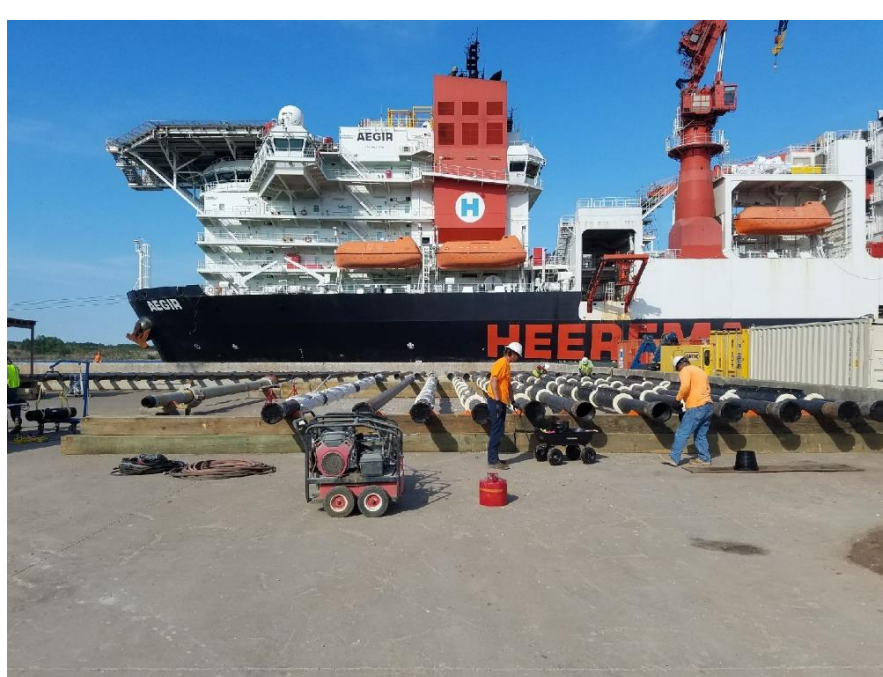
- Tubing
- Casing
- Risers
- Drillpipe
- In-plant Systems

BEMIS™ Laser Scanner Oilfield Capabilities

To date, we have inspected close to 1 million feet of oilfield tubulars as well as line pipe to include:

- Tubing & Casing
- Drilling Risers & Production Risers
- Drill Pipe & Line Pipe

Two Inspection Techniques

Dimensional Data

- Faster, collecting millions of accurate ID measurements.
- Covering every millimeter of the tube, end to end.
- Ability to quickly measure ovality/out of roundness.
- Ability to scribe the orientation of the data collected to compare to a caliper log.

Feature Detection

- Longer scan times, identifying requested feature size (pit).
- Including ends where other techniques struggle and damage can be more severe/critical.

Feature Detection

- Identifying features that meet depth criteria due to:
  - Erosion
  - Corrosion
  - Mechanical Wear – Keyseating (Wireline and Drillpipe)
  - Manufacturing Defect
- Visual signature of flaw to help identify the cause of damage.
- Measure exact material loss at the pipe ends and D1 area of coupled connections.

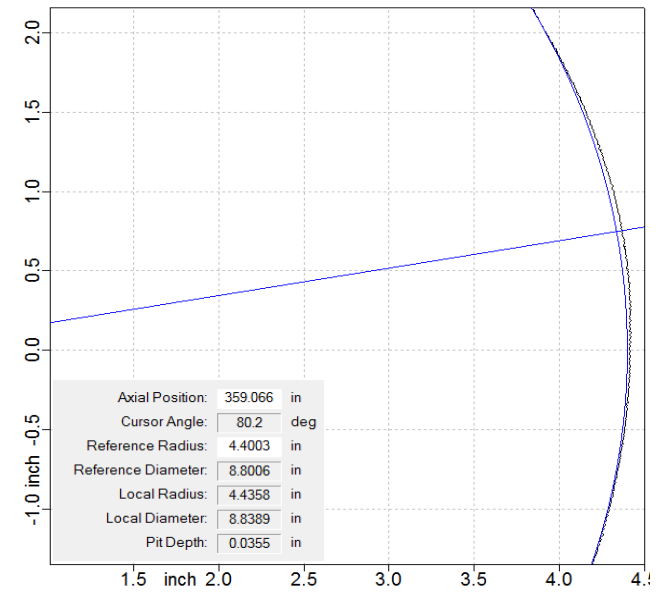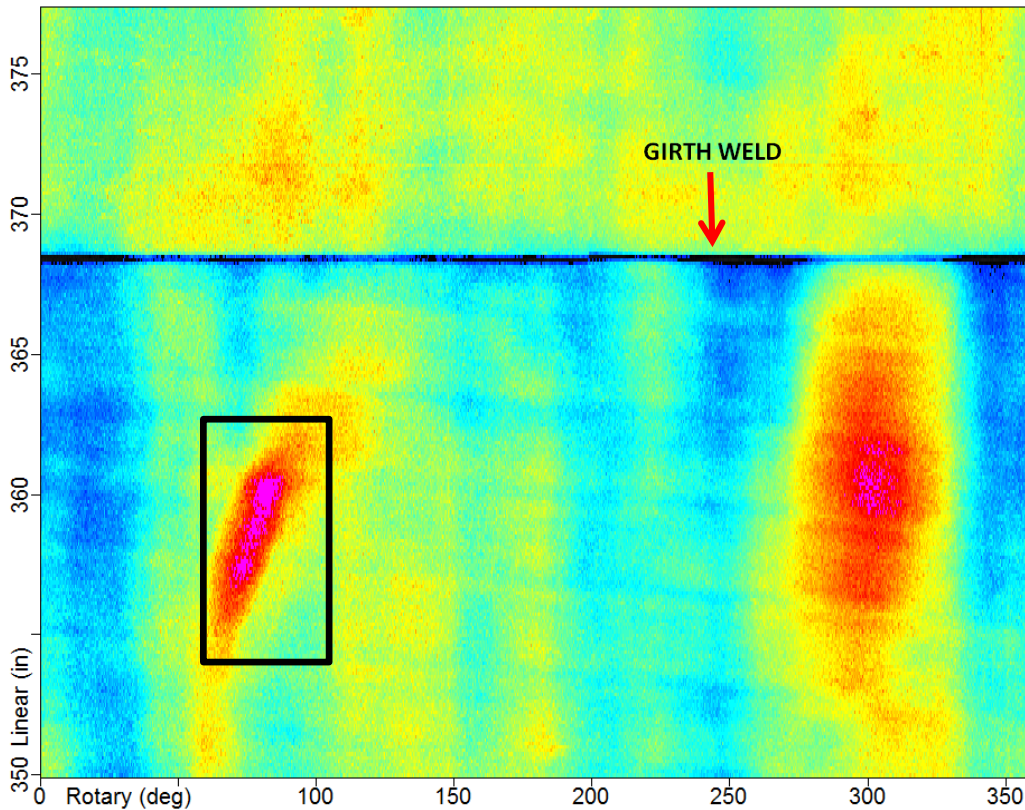# Measuring and Characterizing Keyseat Damage

Full Joint

Pin Threads Tool Joint

Axial Position:	490.049	in
Cursor Angle:	65.3	deg
Reference Radius:	6.1545	in
Reference Diameter:	12.3090	in
Local Radius:	6.2079	in
Local Diameter:	12.3800	in
Pit Depth:	0.0534	in
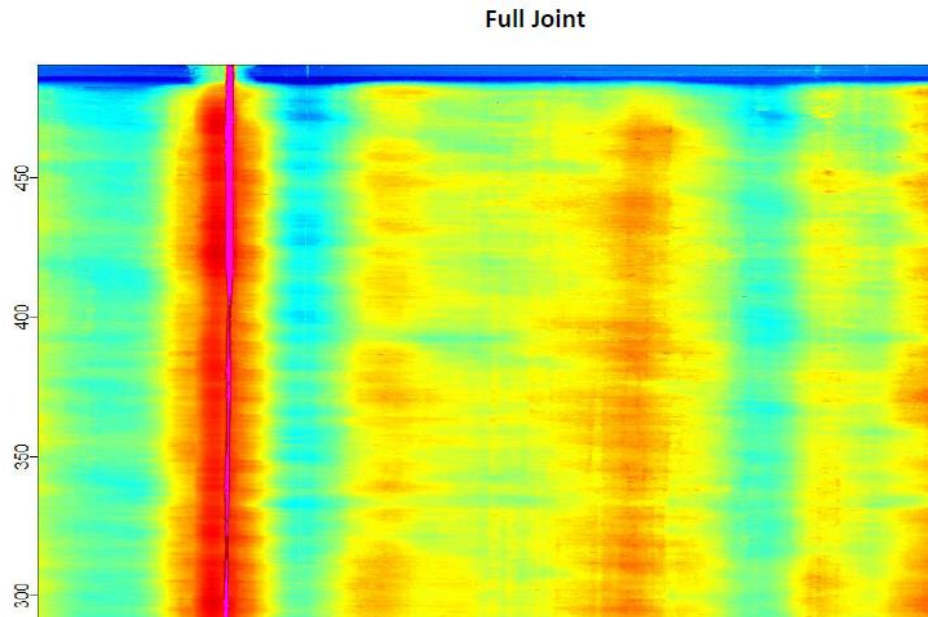
- Colors Reflect Radii measurements
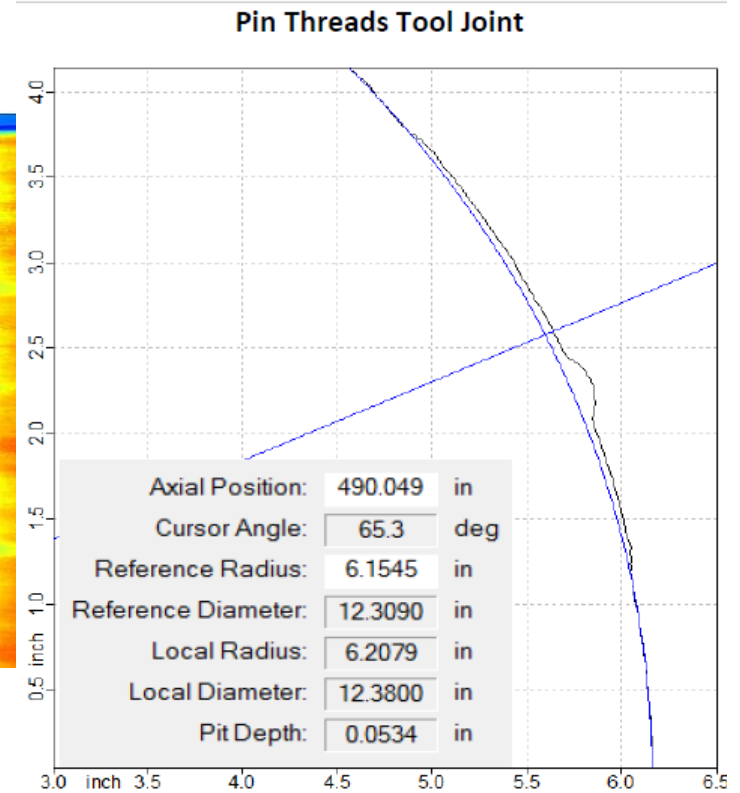
3D Models
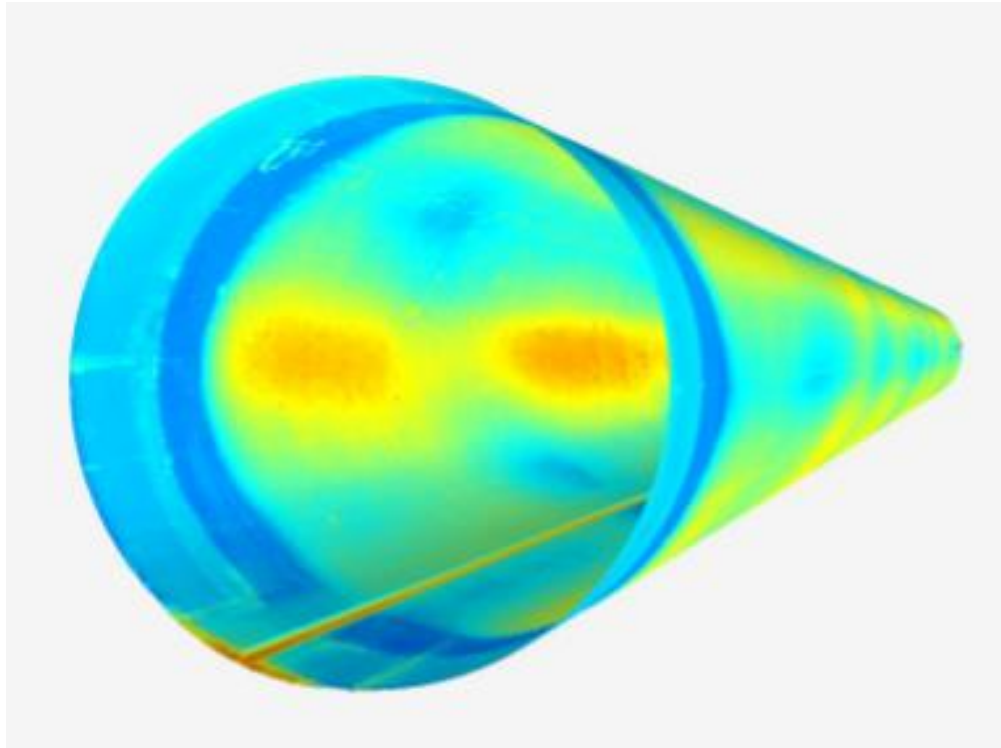
Damage Features

- **Left:** Laser scan image
- **Above:** measurement of wall loss

The Wear Signature: What is causing it?
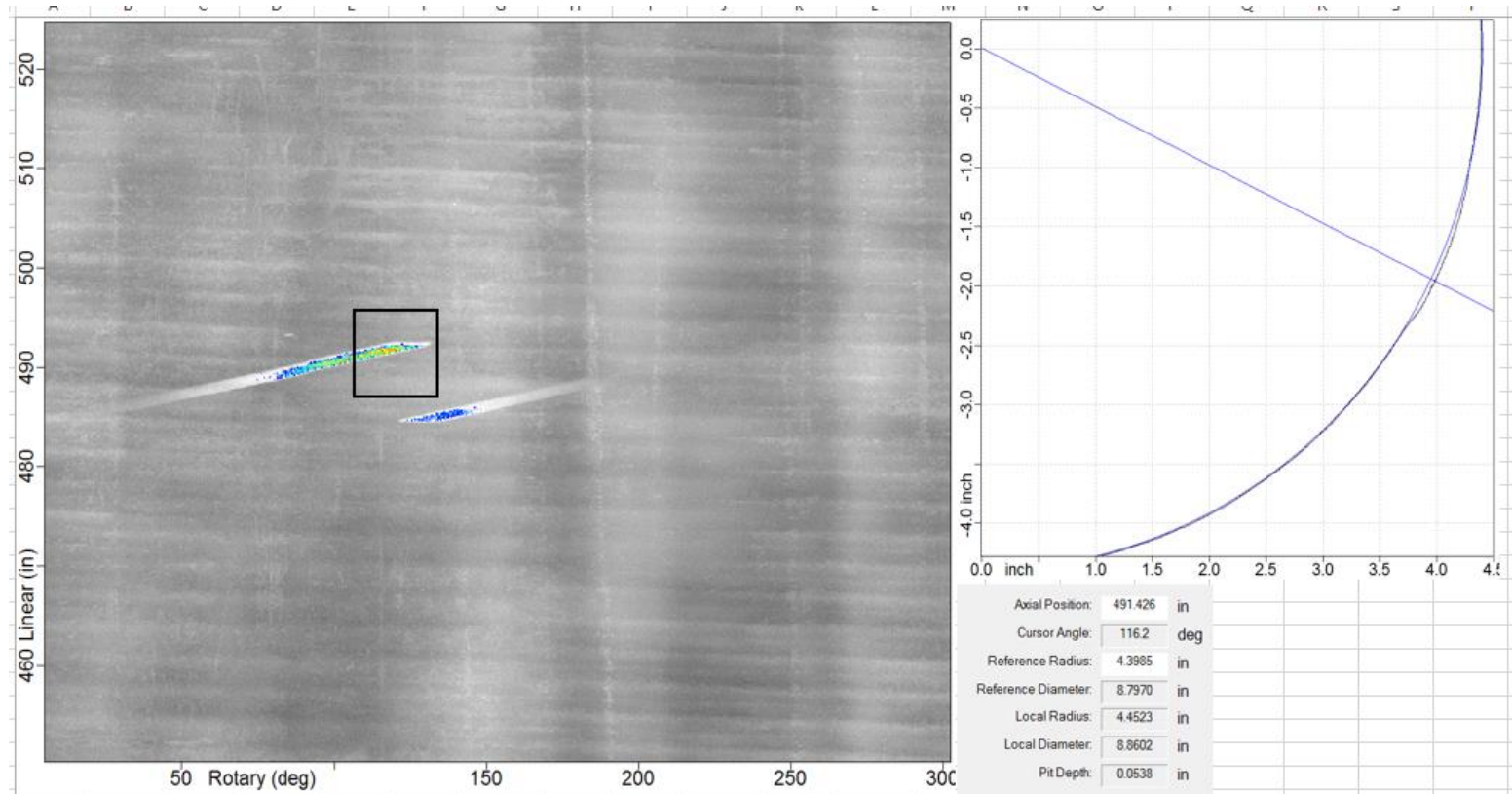
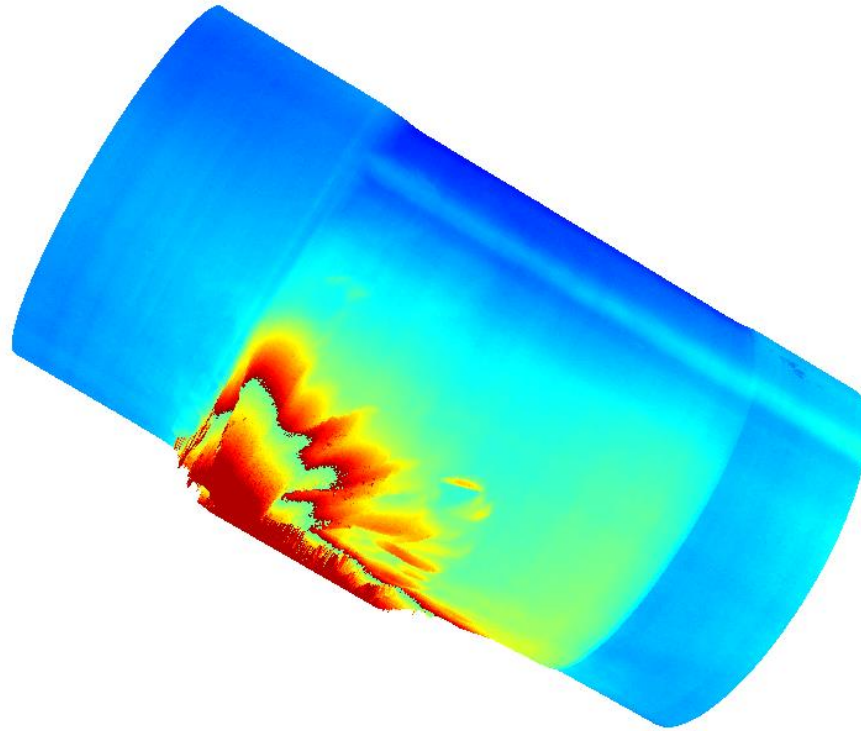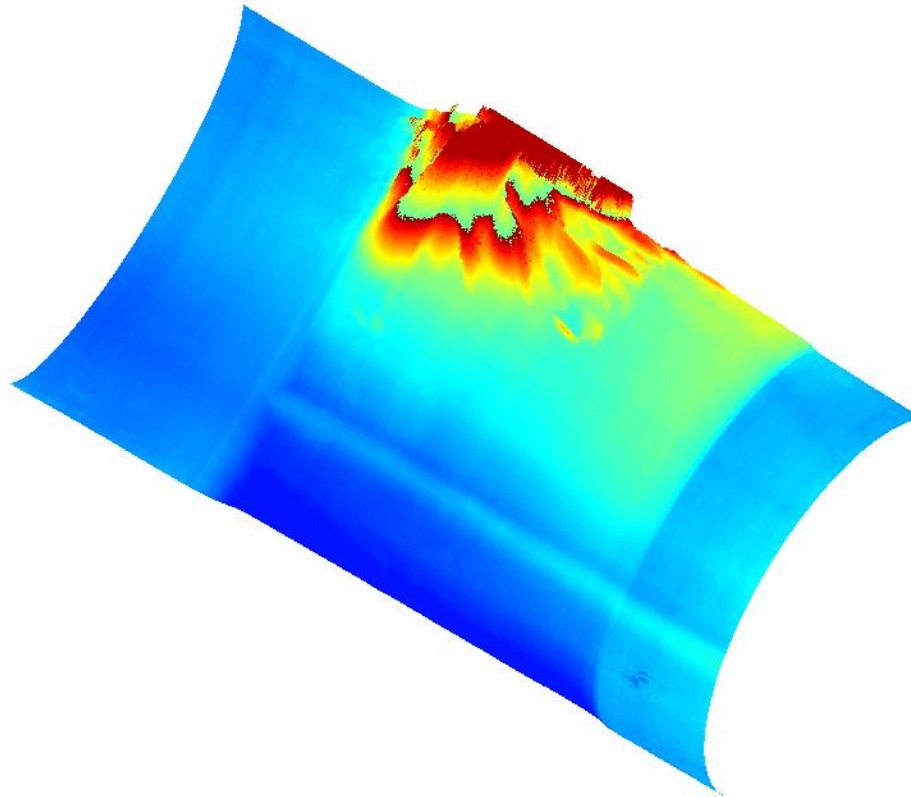# CRA Tubing – Wireline Cut
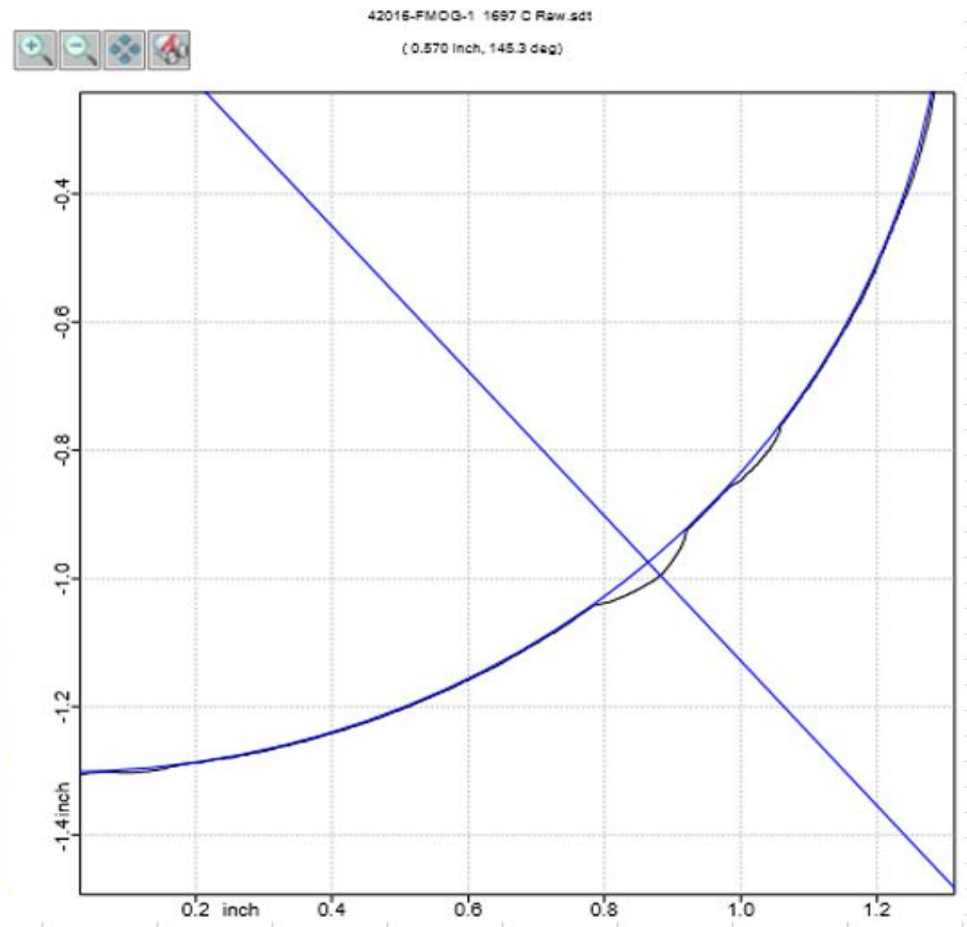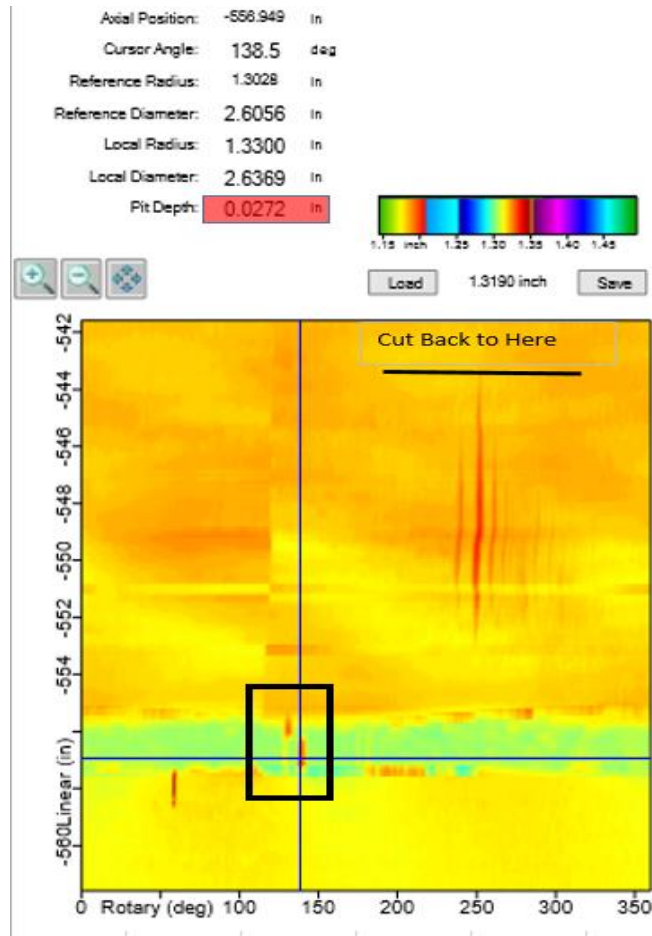
Digital Record of Tubular Ends vs. Visual
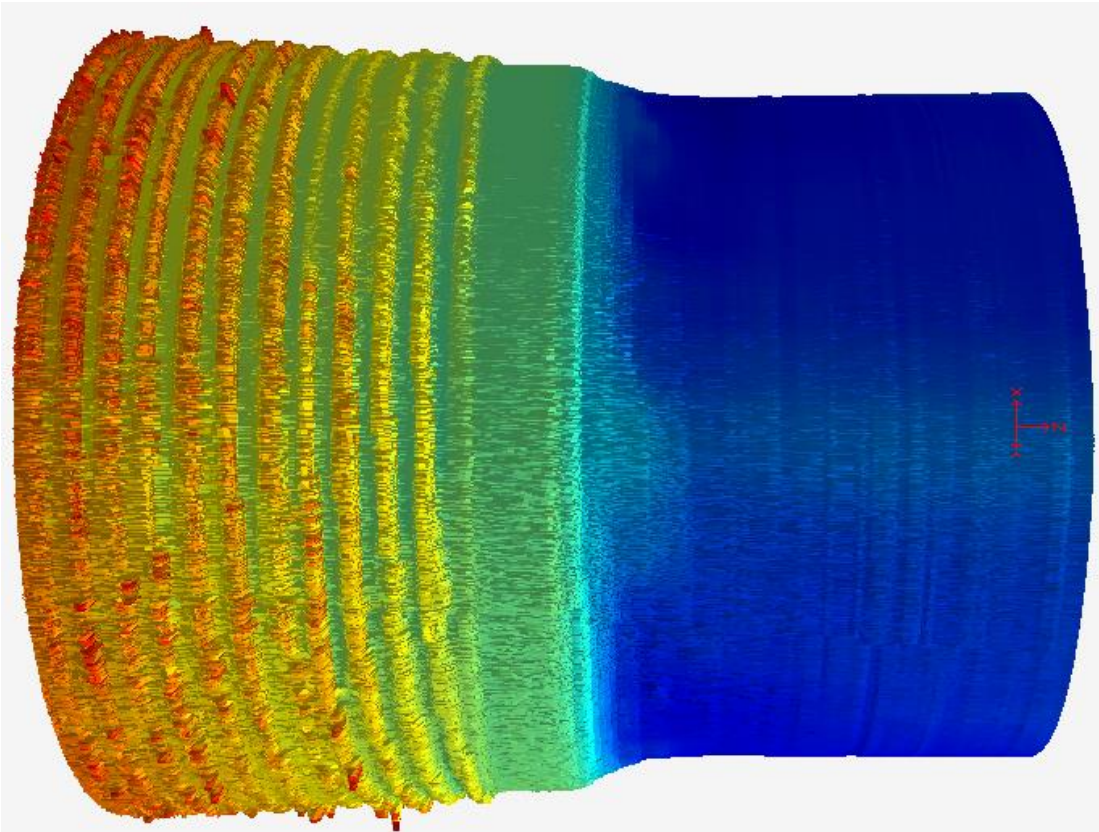
Tool Joint
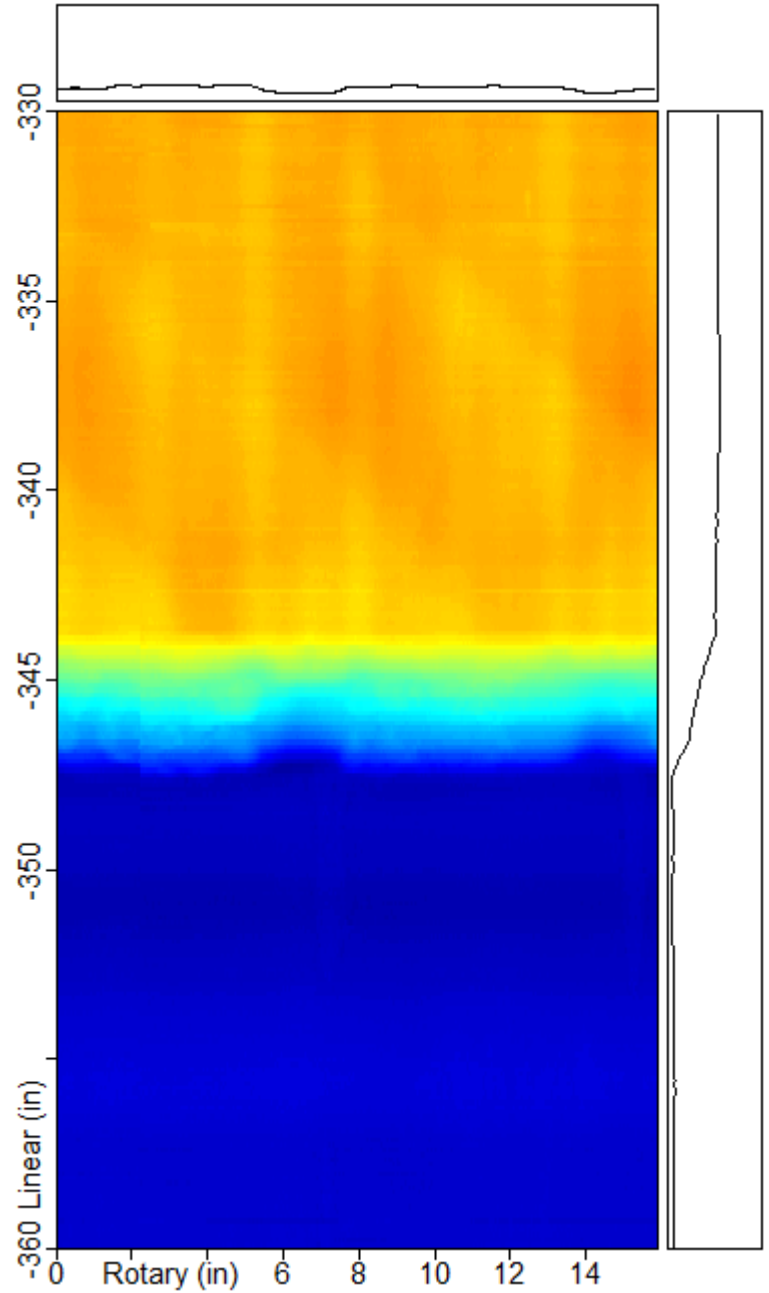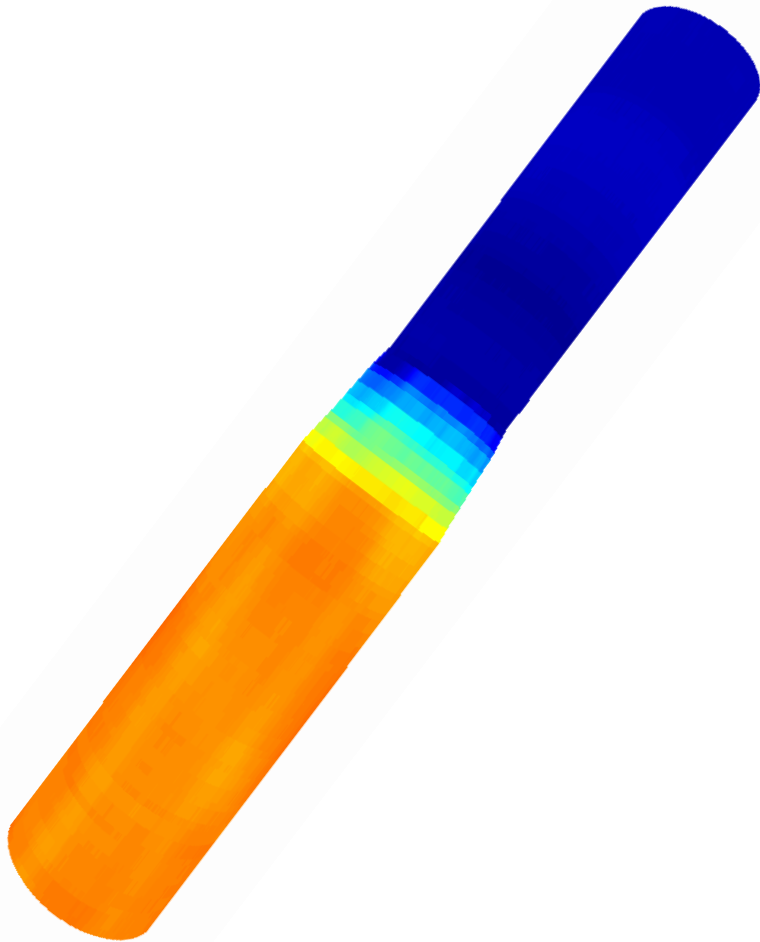
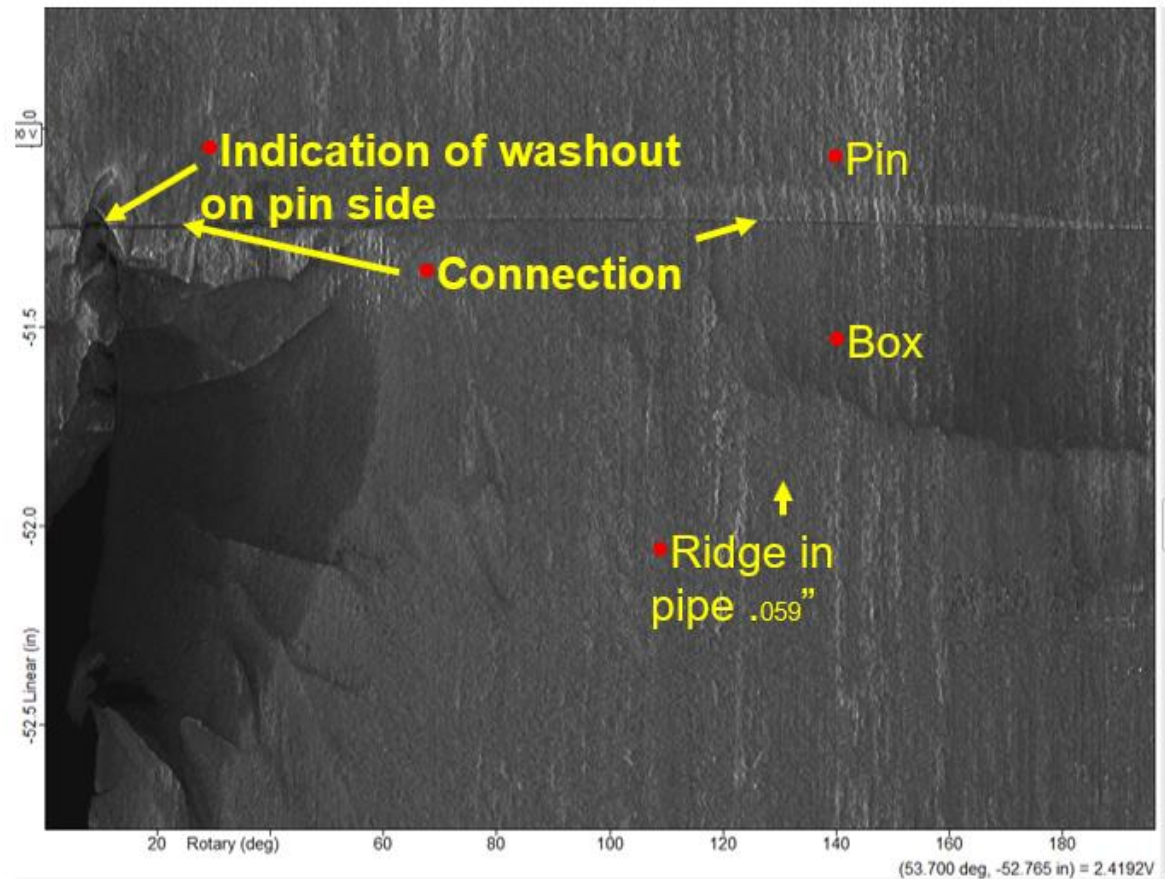# Blowout CSI: 3D at Connection

Blowout CSI: 3D at Connection

Half Pipe at 0 - 180

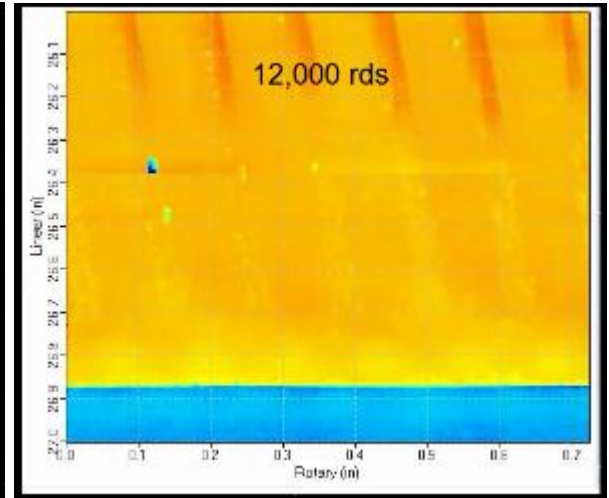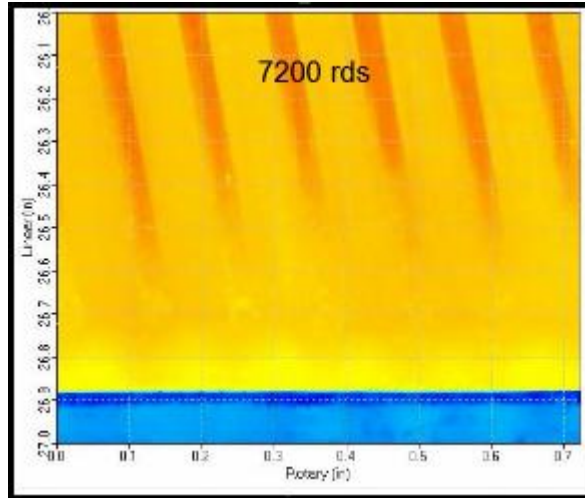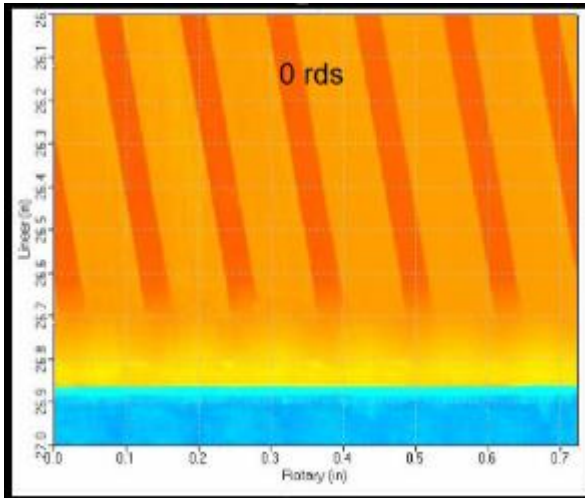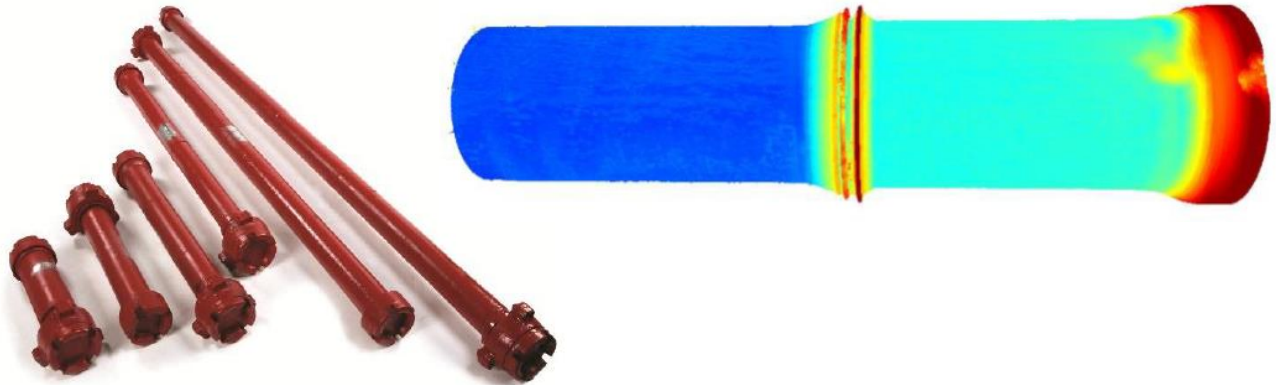# Blowout CSI: 3D at Connection

Bottom Casing
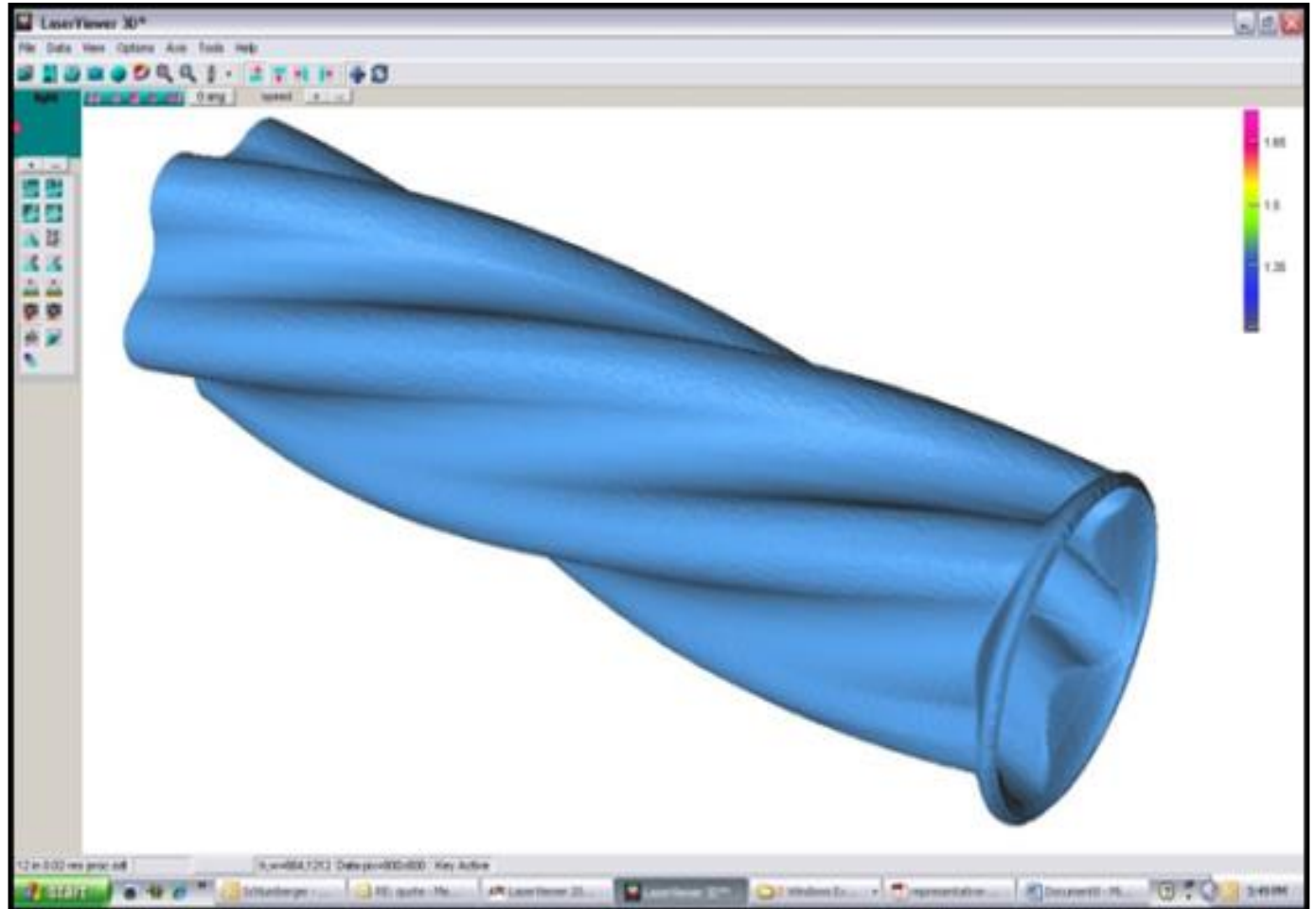

Laser Video Image of Box 0 deg – 180 deg

Erosion Measurements

- Frac Iron
- HP Iron
- Strings
- Trees

0 rds   7200 rds   12,000 rds

Erosion measured in a rifled barrel.

Progressive Cavity Stator ID Scan

Heat Exchangers and Special Application

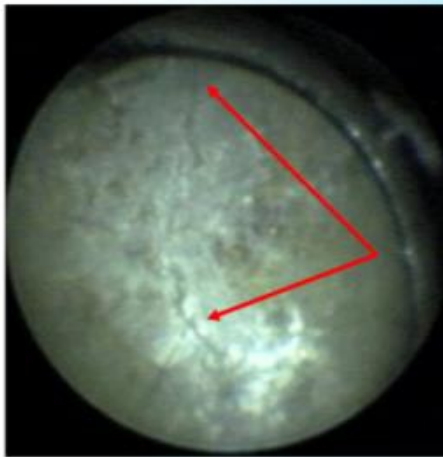0.2" – 0.5" BEMIS (5.5mm -12.5mm)

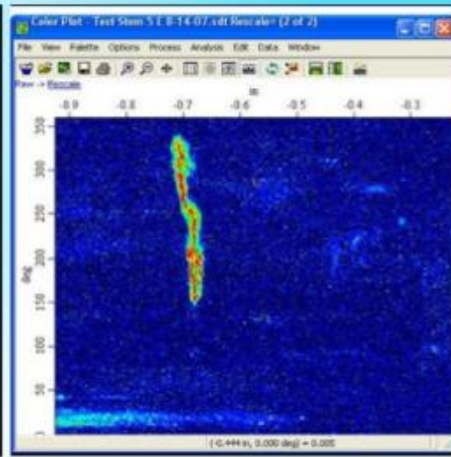Sizes and delivery mechanism built to suit varying special applications.

Custom builds for special applications
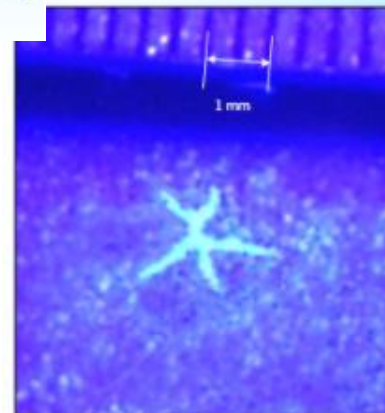
Ultraviolet Penetrant Crack Mapping (FPI)

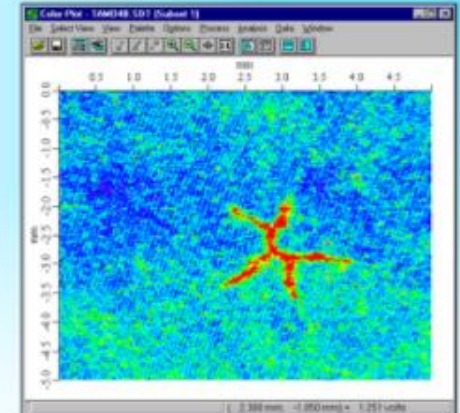Bore Scope

Laser FPI

Tune the laser to UV spectrum to map cracks. Permanent, digital record.

Circumferential crack in validation sample

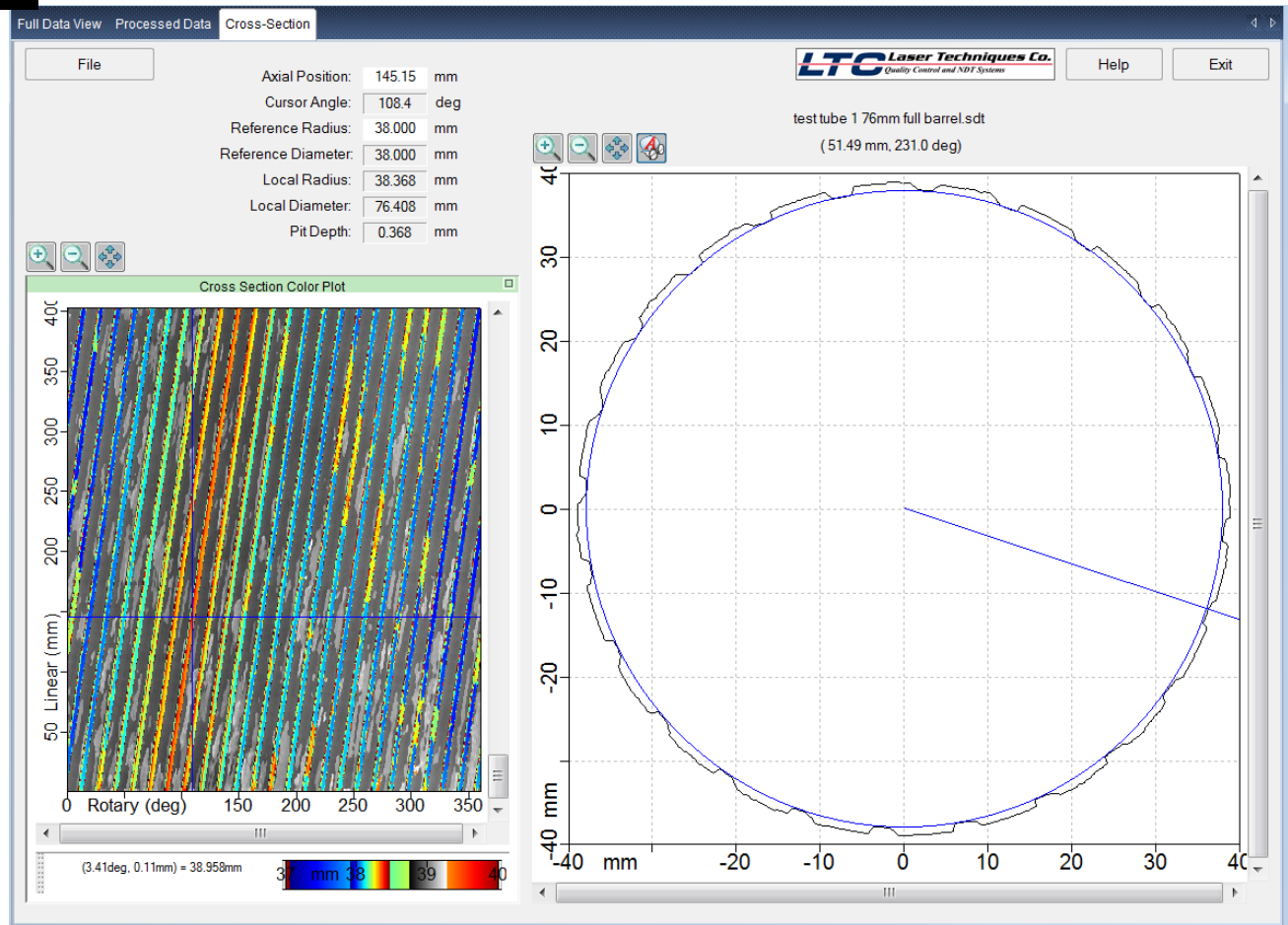Mature technology already in use in the aerospace industry.

Photograph

Laser FPI Scan

LASERSTREAM, L.P.

Cross Section: Rifled Barrel

The cross section tab displays a scaled two-dimensional cross-section of the scan data.

Enhanced Capabilities – Available Now

- Automated Feature Detection - software automatically identifies all features that meet a certain depth or volume criteria

- Combine with Eddy Currents and UT

- Ultraviolet Penetrant Crack Mapping (FPI)

- Feed FMEA Models for Remaining Life Analysis vs. Cycle life

For More Information:

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