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INNOVATIVE AUT PIPEWIZARD: ELEVATING PIPELINE INTEGRITY THROUGH STATE-OF-THE-ART TECHNOLOGY

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INTRODUCTION

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BACKGROUND

Pipelines perform a critical function in the global energy infrastructure, transporting huge volumes of gas, oil, water, and other chemicals over long distances.

Pipes are girth-welded on-site, typically using automated welding systems. For construction of pipelines, welds are the “weak spot” as this is where defects tend to occur. Due to the demanding construction cycle, it is important that weld defects be detected and analyzed very quickly.

Ensuring the integrity of these pipelines is paramount to prevent environmental damage, ensure safety, and maintain operational efficiency. Conventional inspection methods, while effective, often involve significant downtime, poor detection of planar defects, and no vertical sizing capability.

The AUT PipeWizard addresses these concerns by introducing cutting-edge technology into the pipeline inspection process.

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OBJECTIVES

The primary objectives of this presentation are to:

- Introduce the AUT PipeWizard as an innovative solution for pipeline integrity assessment.
- Highlight the advanced technologies integrated into the AUT PipeWizard.
- Discuss the benefits and advantages of using the AUT PipeWizard in comparison to Conventional inspection methods.
- Project deployment of the AUT PipeWizard.

OVERVIEW OF AUT PIPEWIZARD TECHNOLOGY

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AUT PIPEWIZARD

The PipeWIZARD is an automated girth weld inspection system using phased array and conventional UT techniques (AUT), providing comprehensive inspection coverage and accurate defect detection and sizing. Specially designed for in-site weld-to-weld inspection in extreme environments, on-shore and off-shore.

The PipeWIZARD system is specially designed to work in extreme environments, from cold Siberian regions to hot Middle-East deserts; in humid, salty or dry conditions. Extensive tests have been also performed to ensure the PipeWIZARD capability to resist to vibrations, shocks, and electromagnetic interferences.

PipeWIZARD fits all configurations of circumferential welds:
Any type of weld profiles: CRC-Evans, J-bevel, V-bevel, double V, X, etc.
Typical pipe wall thickness: from 6 mm (0.25 in.) to more than 35 mm (1.4 in.) Options are available for thicker pipes

Typical pipe diameter: from 6 in. to more than 56 in.

Pipe material: from standard carbon-steel to more complex configurations like Inconel, cladded pipe, seamless pipes with wall thickness variation, etc.

Typical detected defects are lack of fusion, incomplete penetration, porosity, burn through, undercut, hi-low, crack, cold lap, inclusion, etc. The inspection cycle time is between 2 min and 6 min depending on the type of weld, pipe diameter, location, and environment.

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PipeWIZARD Equipment

Computer and Software

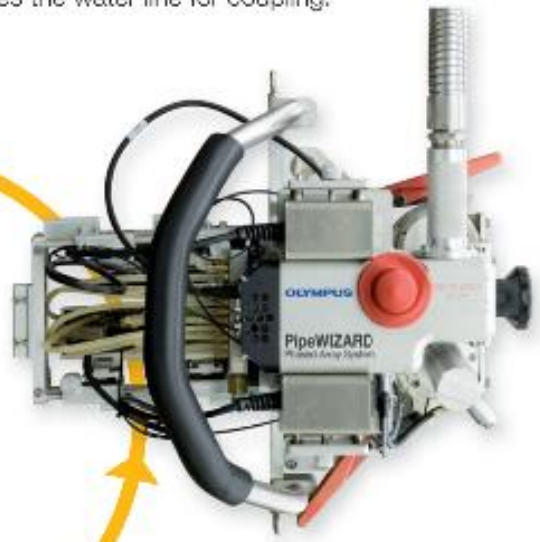
Ruggedized laptop with Microsoft Windows and PipeWIZARD data acquisition and analysis software installed. Software package includes Microsoft Office and all necessary software accessories.

Scanner

The PipeWIZARD scanner is a compact, robust, field-proven unit offering stable and repeatable scans.

The scanner head is designed for IP66 rating and houses a driving motor, an encoder, two phased array probes and wedges, two TOFD probes and wedges, and one temperature sensor.

An heavy-duty umbilical cable shields all necessary cables, it also includes the water line for coupling.



Instrumentation Box

The instrumentation box is a compact, ruggedized, IP64 rated, heavy-duty housing for the TomoScan FOCUS LT and the PWZ-MCDU. It is equipped with a heat exchanger mounted on the front cover and internal shock absorbers for equipment protection. An external power outlet is available on the connection panel to connect accessories.

Acquisition Unit

The acquisition unit, a TomoScan FOCUS LT 64:128, offers up to 64 focusing channels and 128 P/R for multiple combinations of phased-array and conventional probes.

Motor Controller and Drive Unit

The PWZ-MCDU drives one DC servo motor using an Ethernet link.

Source: Evident Scientific

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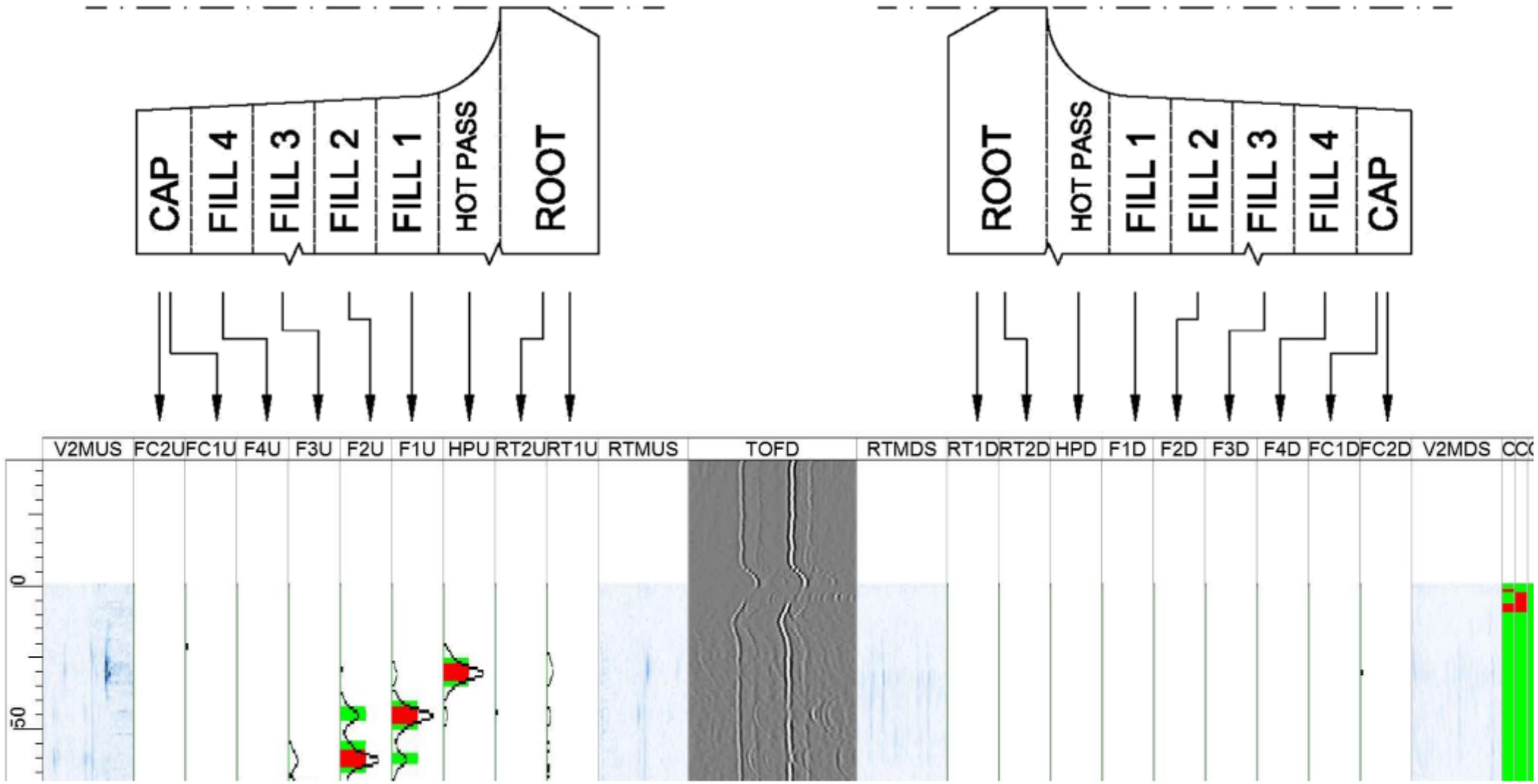
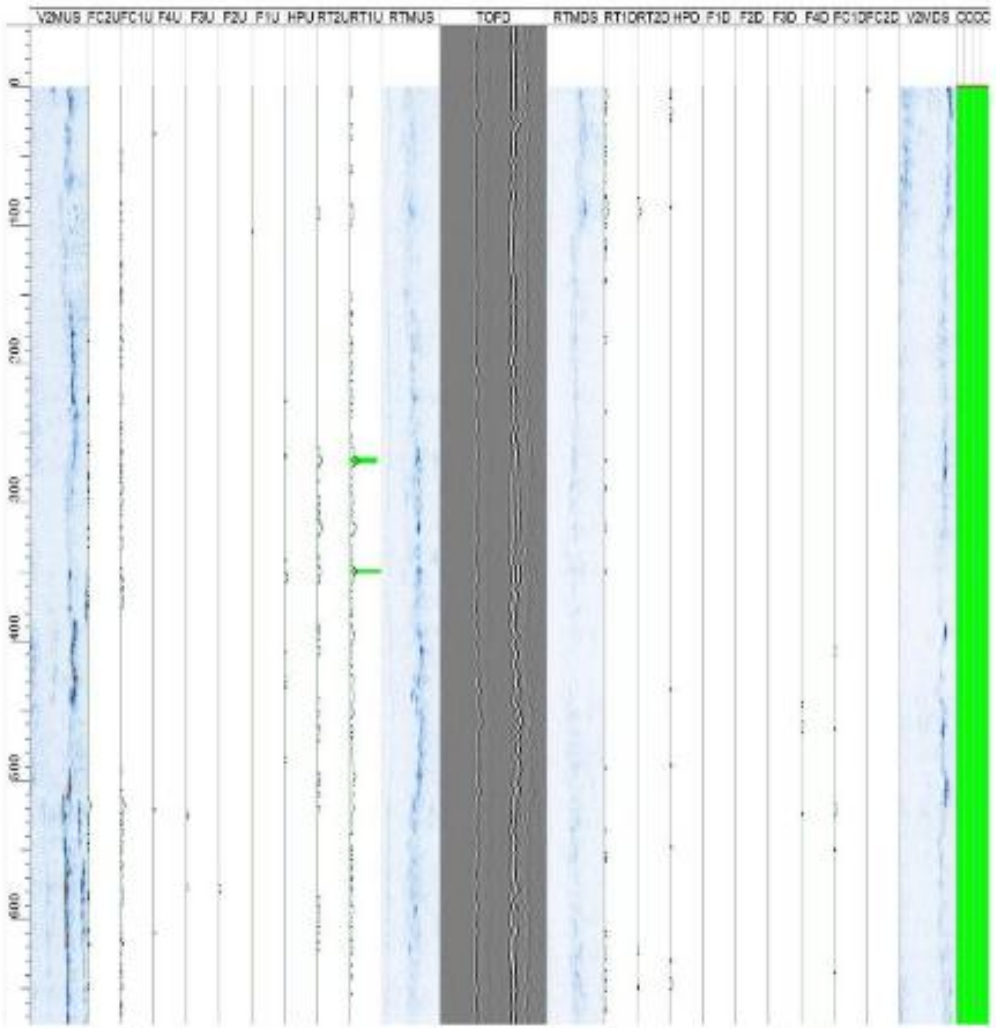
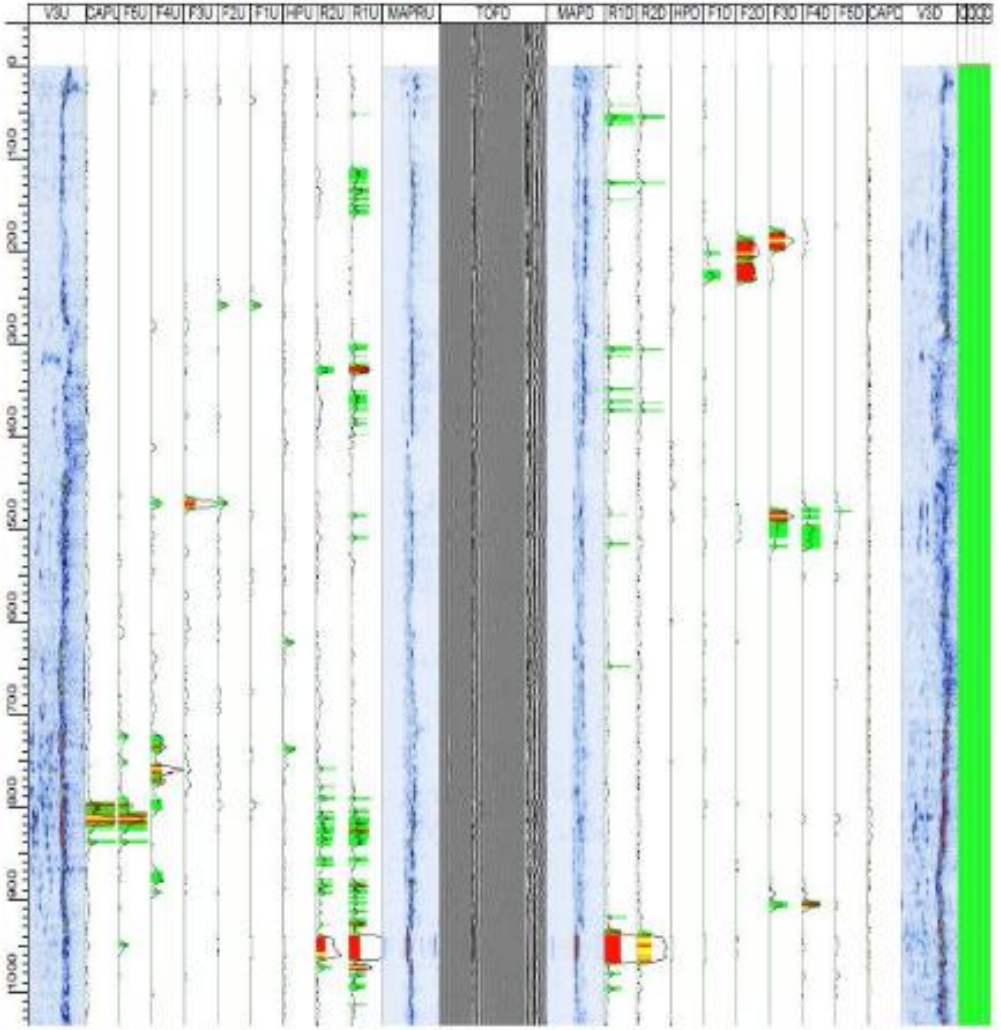
Strip-chart layout



Scan output of a weld without indication



Scan output of a weld with indications



The weld is accepted or rejected according to the acceptance criteria

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SUMMARY OF PIPEWIZARD DEPLOYMENT

- PipeWIZARD phased array systems are used in the largest onshore and offshore pipeline construction projects throughout the world.

- More than a million welds have already been inspected with PipeWIZARD systems.

- Major oil and gas companies have already qualified the PipeWIZARD systems for pipeline construction projects:
  - NNPC Ltd
  - Exxon Mobil
  - Shell
  - TOTAL
  - BP
  - Chevron
  - Eni
  - Petrobras
  - Gazprom

- Hundreds of operators in the world are already trained on PipeWIZARD systems.

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ADVANTAGES OF AUT PIPEWIZARD

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ADVANTAGES OF AUT PIPEWIZARD

- ✓ No Radiation Hazard, Hence no work stoppage at site unlike Radiographic Testing (RT)
- ✓ High Probability of Detection (POD) especially for Cracks and Lack of Fusion
- ✓ Ultrasound tends to detect Planar Flaws better than Radiography
- ✓ Very Short Inspection Cycle Time for High Production Rate
- ✓ Better Detection and Sizing Accuracy Leading to Lower Rejection Rate
- ✓ Enables use of Engineering Critical Assessment (ECA) acceptance criteria resulting in lesser rejects/repair
- ✓ Ultrasound allows defect height measurement allowing volumetric consideration of flaw severity versus just type and length
- ✓ No Chemical, Waste material and Dark Room required like Radiographic Test (RT)
- ✓ Real-time analysis for Instant Evaluation and feedback to Welder
- ✓ Setup and Inspection reports in Electronic format compared to film-based Radiography

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PROJECT DEPLOYMENT

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AUTOMATED ULTRASONIC
TESTING ACTIVITIES

CONCLUSION

The AUT PipeWizard represents a significant leap forward in pipeline integrity assessment. It offers a comprehensive solution that enhances accuracy, efficiency, and cost-effectiveness.

As the industry evolves, the AUT PipeWizard stands at the forefront of innovation, ensuring the continued reliability and safety of critical pipeline infrastructure.

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YOU