Tracerco Discovery™ - The World’s First Subsea Pipeline Computed Tomography Scanner

Kim Thye Lee, Tracerco
A Familiar Problem

“It is believed that up to 40% of the world oil and gas pipelines are deemed to be unpiggable.”\(^1\)

A Familiar Problem

There are no reliable subsea detection tools to accurately detect and characterise hydrate, wax, scale and asphaltene blockages.
A Familiar Problem

Integrity

Flow
Why was Discovery Developed?

Flow Assurance Needs:

• Hydrate restrictions in production systems
• No reliable detection tools, especially for subsea use
• Need for high accuracy detection tools to identify and locate hydrate plugs
Why was Discovery Developed?

Pipeline Integrity Needs:

• No other reliable externally deployed technology is capable of measuring wall thinning of subsea **coated** pipelines…unless the coating is removed first

• No other reliable externally deployed technology is capable of measuring wall thinning of pipe-in-pipe systems and pipes within pipe bundles
Real-time data transmission
A Unique Solution – Discovery™

- Diagnosis of flow abnormalities, accurately detecting and characterising hydrate, wax, scale, and asphaltene blockages

- Provides detailed images of pipe wall integrity to +/-1mm wall thickness accuracy.

- Applicable to all types of pipelines, including pipe-in-pipe and flexibles
A Unique Solution – Discovery™

- No need to remove any type of coatings
- No interruption to normal pipeline operations and production rates
- Fully Operational and Field Proven—TRL 6
- DNV RP-A203 Certified
- 3000m Water Depth rated
# Applications

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<td>Integrity inspection without production interruption, meaning you don't have to reduce or defer production.</td>
<td>Cost effective life extension inspection projects by removing the requirement to modify unpiggable lines for inline inspection, or remove coatings for other external inspection technologies.</td>
<td>Characterize pipeline contents, and learn if your deposit or restriction is hydrate, wax, asphaltene or scale.</td>
<td>Reduce the risk of environmental issues during decommissioning activities by getting a full picture of exact pipeline contents and condition.</td>
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<td>Post-ILI verification of defect size.</td>
<td>The only solution for full integrity assessment of entire pipeline structure and content.</td>
<td>Exact knowledge allows you to select accurate remedial action first time, therefore eliminating the cost of ineffectual remediation.</td>
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Asset Integrity

Eliminate costly down time and keep production on target during the inspection campaign

Impact of production deferment on operator revenues

- Bringing the pipe offline and preparing for inspection
- Replace the coating
- Preparing the line to come back to full production

Revenue in lost production

USD 4,500,000.00
USD 4,000,000.00
USD 3,500,000.00
USD 3,000,000.00
USD 2,500,000.00
USD 2,000,000.00
USD 1,500,000.00
USD 1,000,000.00
USD 500,000.00
USD 0.00

Time
Asset Integrity – Wall Thickness

14.32 mm

22.49 mm

40.57 mm

14.36 mm

14.39 mm

22.41 mm

35.15 mm

14.29 mm
Asset Integrity – Wall Thickness
Integrity - Wall Thickness Measurements

Wall thickness (mm) vs. Angular position (deg)
Integrity - Wall Thickness Measurements

[Graph showing wall thickness measurements over angular position (deg).]
Integrity - Wall Thickness Measurements
Integrity - Wall Thickness Measurements
Feedback

“In just one 10-minute scan, Discovery™ has shown me more about the condition of this pipeline than I have obtained from all of my modelling over the last two years”

Senior Pipeline Integrity Engineer, GoM Operator
Life Extension Applications
Life Extension – Unpiggable Lines

Save as much as 35% on the total cost of life extension inspection projects by scanning through coatings
Concrete Coated Single Walled Pipe

1. Anti-Corrosion Layer
2. Reinforced Concrete
Life Extension – Unpiggable Lines

Get +/-1mm resolution data on a variety of integrity issues including wall thinning, pitting, and corrosion.

Eliminate the risk of damaging the pipeline during coating removal.
Pipe Bundle or Caisson

Oil Riser

Gas Riser
Pipe Bundle or Caisson
5-layer PP Insulated Pipe with Piggyback Line
5-layer PP Insulated Pipe with Piggyback Line
Flow Assurance Applications
Flow Assurance

High percentage of flow assurance remediation is ineffectual due to lack of information of the blockage and monitoring; wasting tens of millions of dollars and losing months of production time.
1. Locate deposits: Use Explorer™ to scan and identify the position - KNOW WHERE THE ISSUE IS.
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Conventional methods such as pressure cycling and “Flushing with hot oil or hot water [have] limited reach due to the water/oil cooling” – source: ‘Unconventional methods offer wax remediation options’, Fillipo Librino, Genesis, Offshore Magazine August 2015
Flow Assurance: 4 steps to cost effective remediation

1. Locate deposits: Use Explorer™ to scan and identify the position - KNOW WHERE THE ISSUE IS.
2. Quantify and characterise it: use Discovery™ to scan and identify the type and nature of the deposition - KNOW WHAT THE ISSUE IS.
3. Remediate efficiently and cost-effectively:

Choose the correct remediation method and plan the campaign with confidence.
Flow Assurance: 4 steps to cost effective remediation

4. Monitor the effectiveness of the Remediation: use Discovery™ to monitor effectiveness and optimize cleaning operations.

Static – Water/Oil/Gas  
Flowing Conditions  
Hydrate Formation
4. Monitor the effectiveness of the Remediation: use Discovery™ to confirm conditions during cleaning operations.
“Discovery™ finally fulfills the long awaited dream of having technology to help solve some of the most intriguing flow assurance challenges.”

Keijo Kinnari, Statoil Senior Specialist, Technology Excellence
Decommissioning Applications
Decommissioning

Ensure environmental compliance by characterising pipe contents, before commencing decommissioning”
Operational Excellence

- Test facilities in UK and US
- Pre-job Qualification and Test
- Pre-job Equipment Inspection
Summary

• Provides detailed images of all pipe walls and contents without need to remove any type of coatings

• Reduce costs and risks on Remediation campaigns:
  • Fully characterise the location, amount and types of deposits prior or during remediation

• Reduce overall integrity costs / lifetime extension costs:
  • No interruption or risk to production
  • No coating removal/replacement
  • For PiP, confirm integrity of outer and inner pipeline from the outside

• Fully Operational and Field Proven – TRL 6

• DNV RP-A203 Certified
Thank you

Questions?