Difficult to pig and to inspect offshore pipes

K. Reber, Innospection Germany GmbH, Stutensee
S. Hartmann, Innospection Ltd., Aberdeen
A. Boenisch, Innospection Ltd., Aberdeen

PPSA Seminar November 20th 2013, The Ardoe Hotel, Aberdeen
Overview piggability of Pipelines

- Piggable
  - Standard ILI

- Unpiggable
  - Make pipeline piggable by modifying the line
    - Standard ILI
  - Make pipeline piggable by modifying the pig
    - Dual-/Multi-Diameter
    - Bi-directional
    - Umbilical pig pumped
    - Crawler (free or on umbilical)
    - Special insertion technique
  - Not at all piggable (technical, financial, confidence)
    - Key hole technology
  - Use other inspection technologies
    - Defects not detectable from inside
      - Inspection Technology exists but not for ILI
      - External Scanning Inspection
      - External Monitoring

Aiming for 100% coverage and combinations and combinations
Less than 100% coverage
Deployment Methods for External Inspection
Keyhole inspection of a leg

- Key hole of 15x35 cm
- Inspection device had to fit through
- External access blocked because of heavy coating
- Internal Installations to be considered
- Technologies: SLOFEC, PEC, Visual
Non Inspectable Pipelines

- If the pipeline cannot be inspected with ILI based technology because of the POD of flaws, even though the pipeline can be pigged

- Pipeline is uninspectable

- Examples
  - Flexible Riser
  - Cladded pipe
  - High wall thickness
Externally Clad Pipeline

Carbon Steel

Non-ferritic metal
Monel, StainlessSteel
MEC-HUG on Flexible Riser
How the MEC-HUG works
Subsea Pipeline Inspection
MEC Combi-Crawler on Subsea Pipeline
MEC Combi-Crawler on Subsea Pipeline

D: 30.05.2013 T: 01:53:22
DEPTH: 68.78
HDG: 3.70
Cleaning can be done by:

- Scraping
- Brushing
- Water Jetting

Cleaning devices are usually mounted similar to inspection devices (crawlers, cages)
MEC-Combi-Crawler equipped with Laser Scanner
Employed inspection Technologies

• **SLOFEC**
  – *Saturation Low Frequency Eddy Current* or *Magnetic Eddy Current (MEC)*
  – *Eddy Current Inspection Technology that also sensitive to far-side defects.*
  – As an electromagnetic method is always relative to calibration defects
  – Less sensitive to cleaning and allows to measure through polymer layers (coating)

• **UT Wall thickness**
  – For reference of Wall thickness and local corrosion

• **Laser Scanning**
  – Laser triangulation for measuring out of roundness of pipes
Laser Triangulation

ULS-100 by 2GRobotics
Coverage of pipe section by Inspection Technology

- Laser Scan
- SLOFEC
- UT Readings

Coverage chart showing the orientation and distance for each method.
Sample measurement
Conclusions

• Compared to ILI Inspection External Scanning inspection methods are still at an early stage of development

• This is true for NDT method but also for the method of reporting

• The combination of electromagnetic, UT-based optical solutions yield the maximum information on particular inspection objectives