MFL INSPECTION OF PIPELINES
DACON AND INLINE INSPECTION

- Dacon well-known for pipeline inspection solutions using UT, MFL and LRUT
- UT tools provide unrivaled inspection accuracy compared to MFL
- Wide variety of pipelines (size, service, access, length, possibility to shut down)
  - UT pigging not always the best solution due to operating conditions
  - Dacon developed its own fleet of MFL tools
- Dacon is one stop solution provider for all pipeline inspection requirements
- Dacon now provides MFL inline inspection
MFL PIGGING

- MFL Pigging
  - Works on the principle of magnetic flux leakage at defect locations which can be picked up by hall sensors and coils
  - Can be used without couplant
  - Suitable for very long pipelines
  - More suitable for screening as accuracy is low compared to UT intelligent pigging
The MFL Tool

An MFL Tool is an autonomous inspection tool with on-board: computer, sensors, Batteries and odometers.
The MFL Tool

Magnets  Primary and Secondary sensors
Magnetic flux leakage (MFL) principle

• Require saturation level in a pipe wall.
• A defect will generate a variation in magnetic signal, which is related to size and depth of the defect.
• Defects on either internal surface or external surface provide signals having similar shape.
• Converting magnetic signal to metal loss or defect depth employs reference method.
MFL Application range

MFL Inspection can be used for:

• Oil-gas and water pipelines
• Carbon steel pipelines
• Wall thickness range depending on pipe size from 5 up to 25 mm
• Pressure up to 230 bar
• Temperature from -5 up to 80 °C
• Length up to 500 km
Our MFL Tool

- 20% diameter reduction
- Bi-directional design
- Low friction (ODO wheels)
- Tri-axial Hall sensors
- Integrated ID/OD
- Extra High Resolution
- Current range 6” – 48”
- Short Radius Bends
- Multi diameter
- Low Flow pipelines (< 0.5 m/s)
- High Flow pipelines (> 4.0 m/s)
DATA PRESENTATION

- Provide C Scan
- Extra high resolution tool class with 6mm Hall sensor spacing and ID/OD discrimination sensors.
- XYZ unit can be installed as an option.
Data Presentation in Gray Scale
Optional XYZ Mapping

- Construct pipeline path with assists of above ground markers (AGMs), i.e., every 500-meter interval.
- Can be used as either an optional tool or a standalone tool.
- Report bend radiuses/angles of pipeline.
- Accuracy equal to 10m:1000m can be expected from MEMS sensor. FOG sensor (on-going research) yields accuracy up to 1m:1000m.
MFL Analysis and Reporting

- Types of corrosion: General corrosion, Pitting, Pinholes, Slotting and Cracks*
- Accuracy: 10% WT
- Distance and Clock Position
- Internal and External corrosion
Each pixel represents a defect!

Data presentation easily showing the distribution of defects along your pipeline.
Results and Field Verification
MFL vs UT

**Magnetic Flux Leakage**
- Error up to 20% of nominal wall thickness, no absolute wall thickness measurements
- More suitable for screening
- Complex and lengthy data analysis
- Large tool, sometimes crane required for handling

**Ultrasonic Testing**
- Absolute wall thickness measurements, accuracy $\pm 0.1$ mm
- Detailed and accurate inspection results
- Instant results with easy to interpret data
- Small portable tool
  - Allows for launching without launcher
  - “Un-piggable” pipelines

- Can be used in all media, no couplant required
- For very long pipelines
- Only on carbon steel

- Need liquid filled pipe, water or clean product.
- Length up to 50 km
- On all type dense materials, including plastics and HDPE
MFL Pigging Demonstration Rayong Thailand

Preparing the Line, pumps and MFL pig
MFL Demonstration Rayong Thailand

Launching the pig
MFL Demonstration Rayong Thailand

Pumping receiving and Data download.
How We Can Help?

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