

Difficult to pig and to inspect offshore pipes

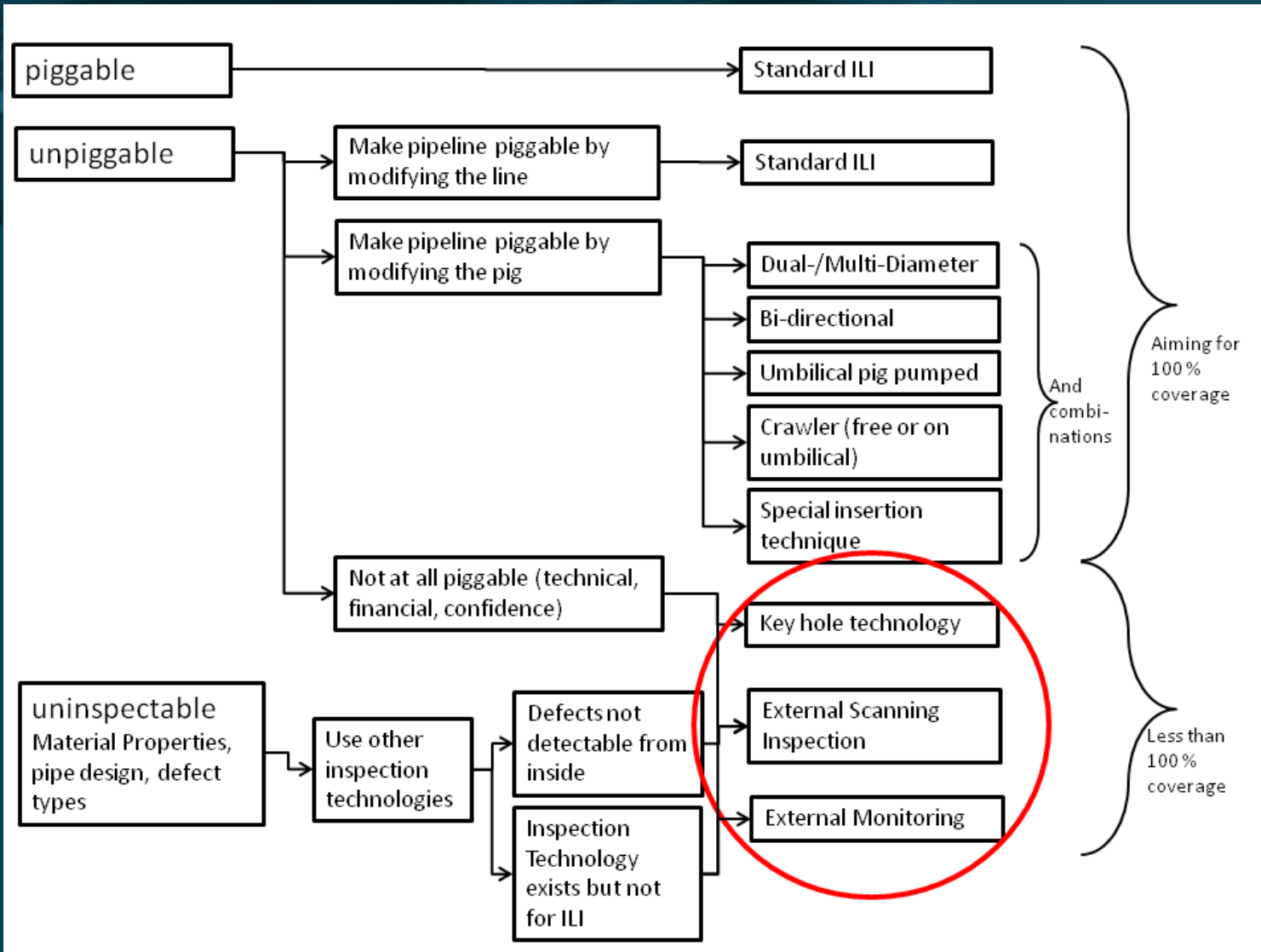
K. Reber, Innospection Germany GmbH, Stutensee

S. Hartmann, Innospection Ltd., Aberdeen

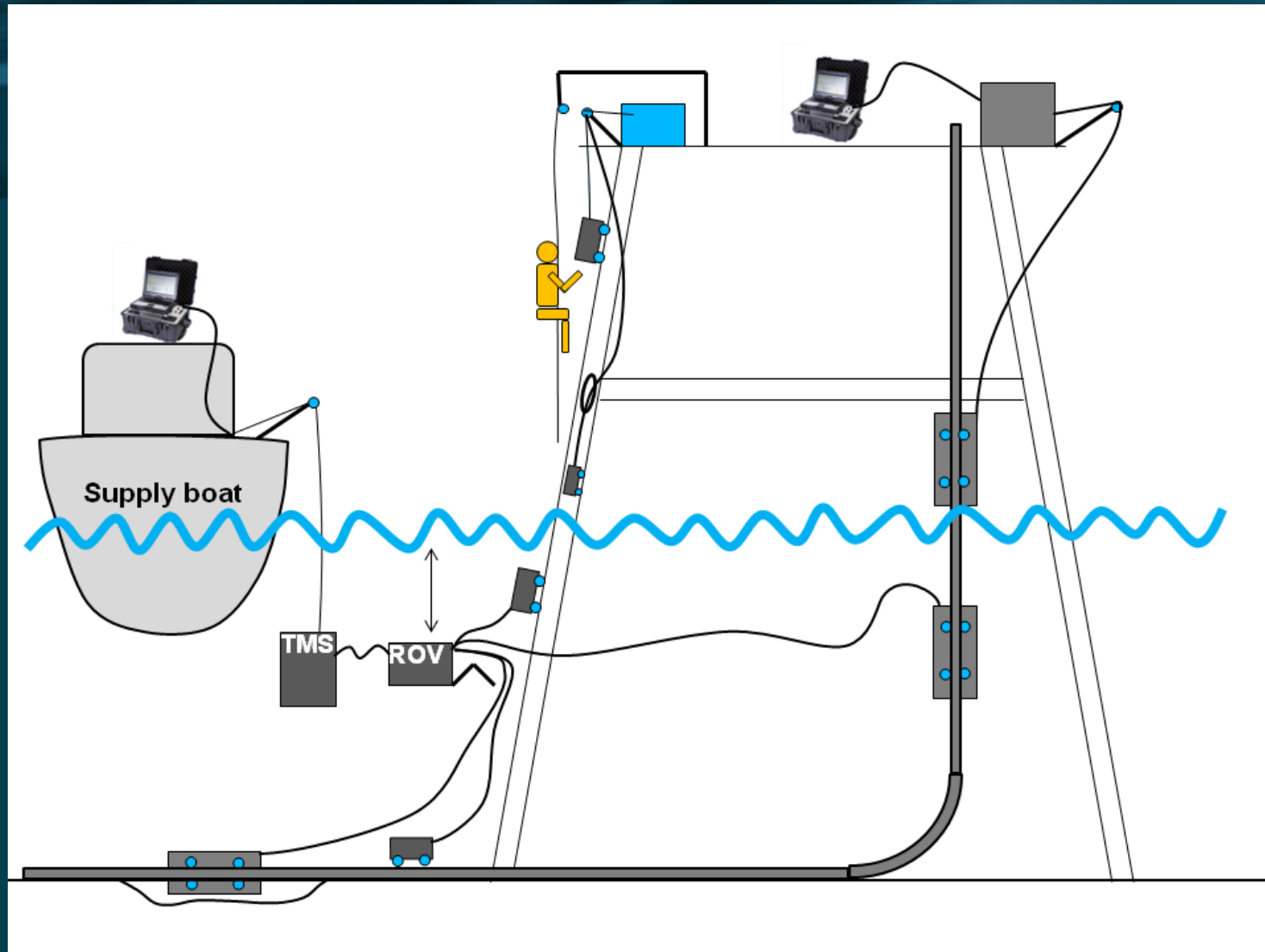
A. Boenisch, Innospection Ltd., Aberdeen

*PPSA Seminar November 20th 2013, The Ardoe Hotel,
Aberdeen*

Overview piggability of Pipelines



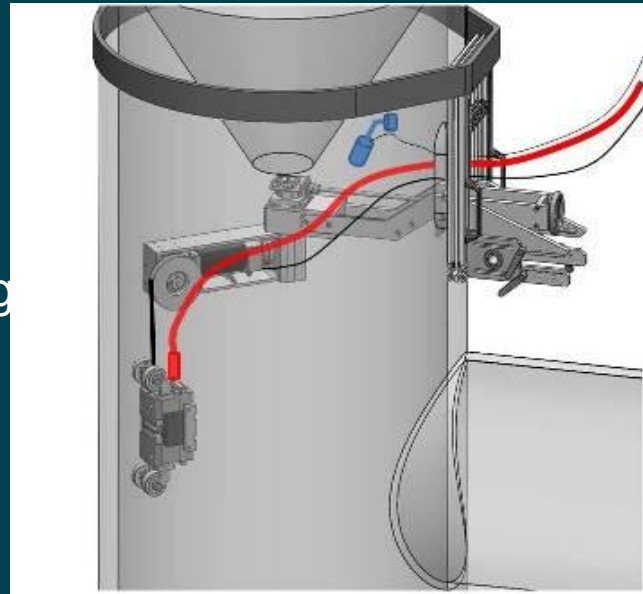
Deployment Methods for External Inspection



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

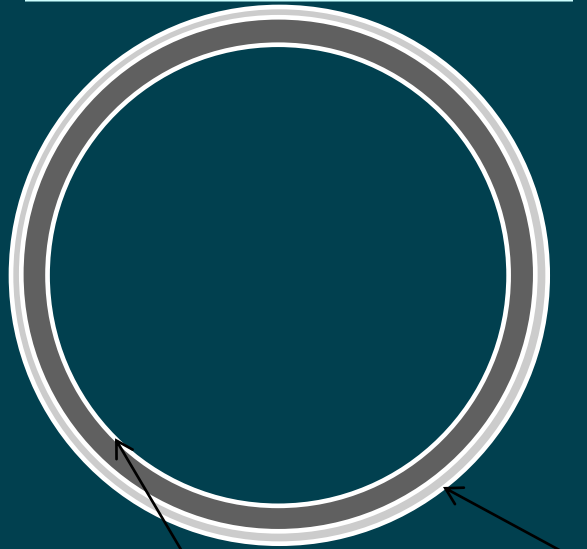
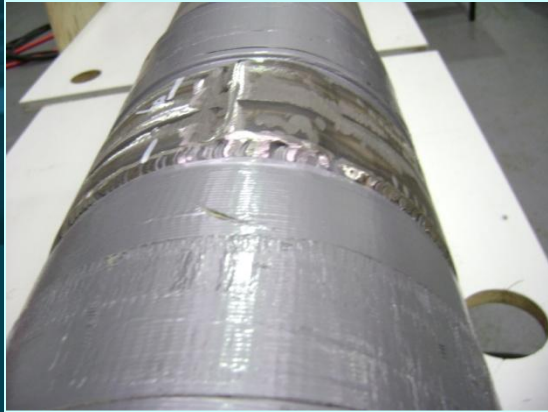


Non Inspectable Pipelines



- *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*

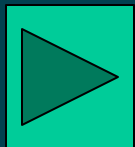
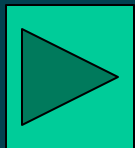
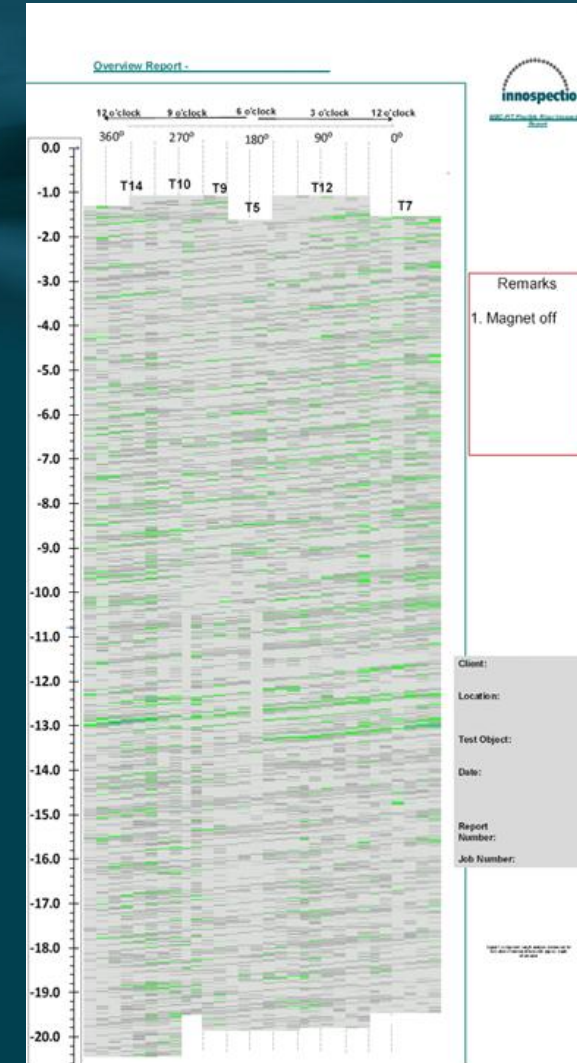
Externally Clad Pipeline



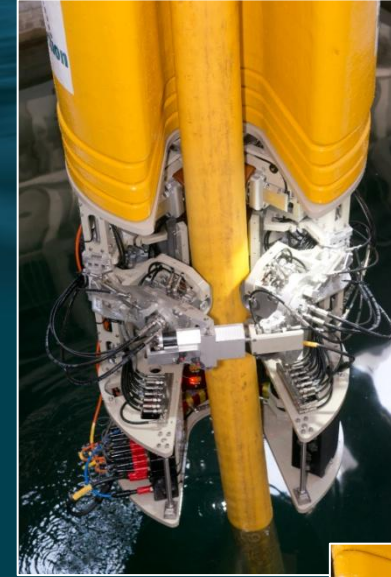
Carbon Steel

Non-ferritic
metal
Monel,
StainlessSteel

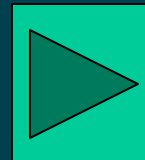
MEC-HUG on Flexible Riser



How the MEC-HUG works



Subsea Pipeline Inspection



MEC Combi-Crawler on Subsea Pipeline



XLX 32
Dive 26

02:45:47
01.06.2013

HDG: 251.62
DEPTH: 61.24



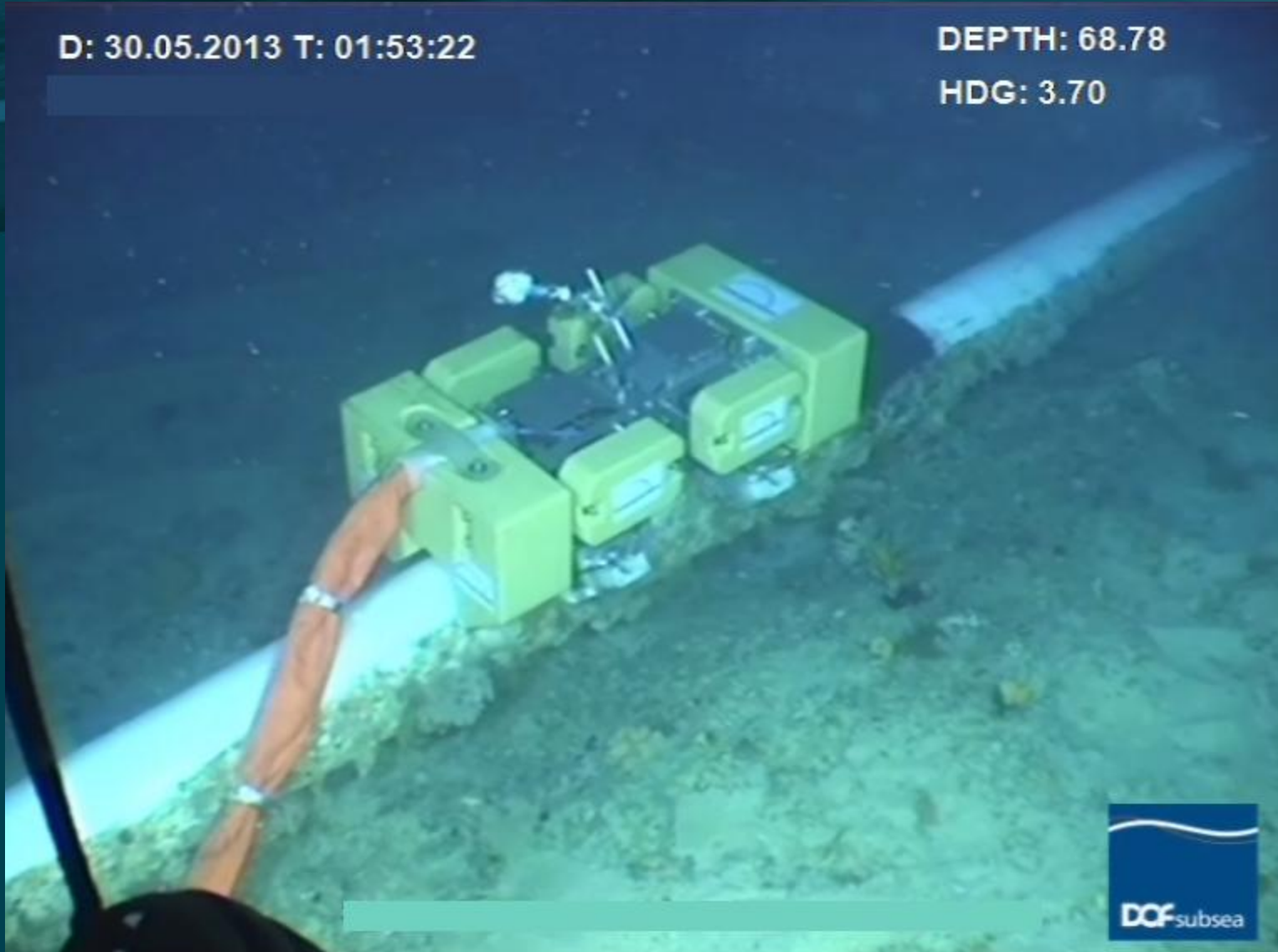
MEC Combi-Crawler on Subsea Pipeline



D: 30.05.2013 T: 01:53:22

DEPTH: 68.78

HDG: 3.70



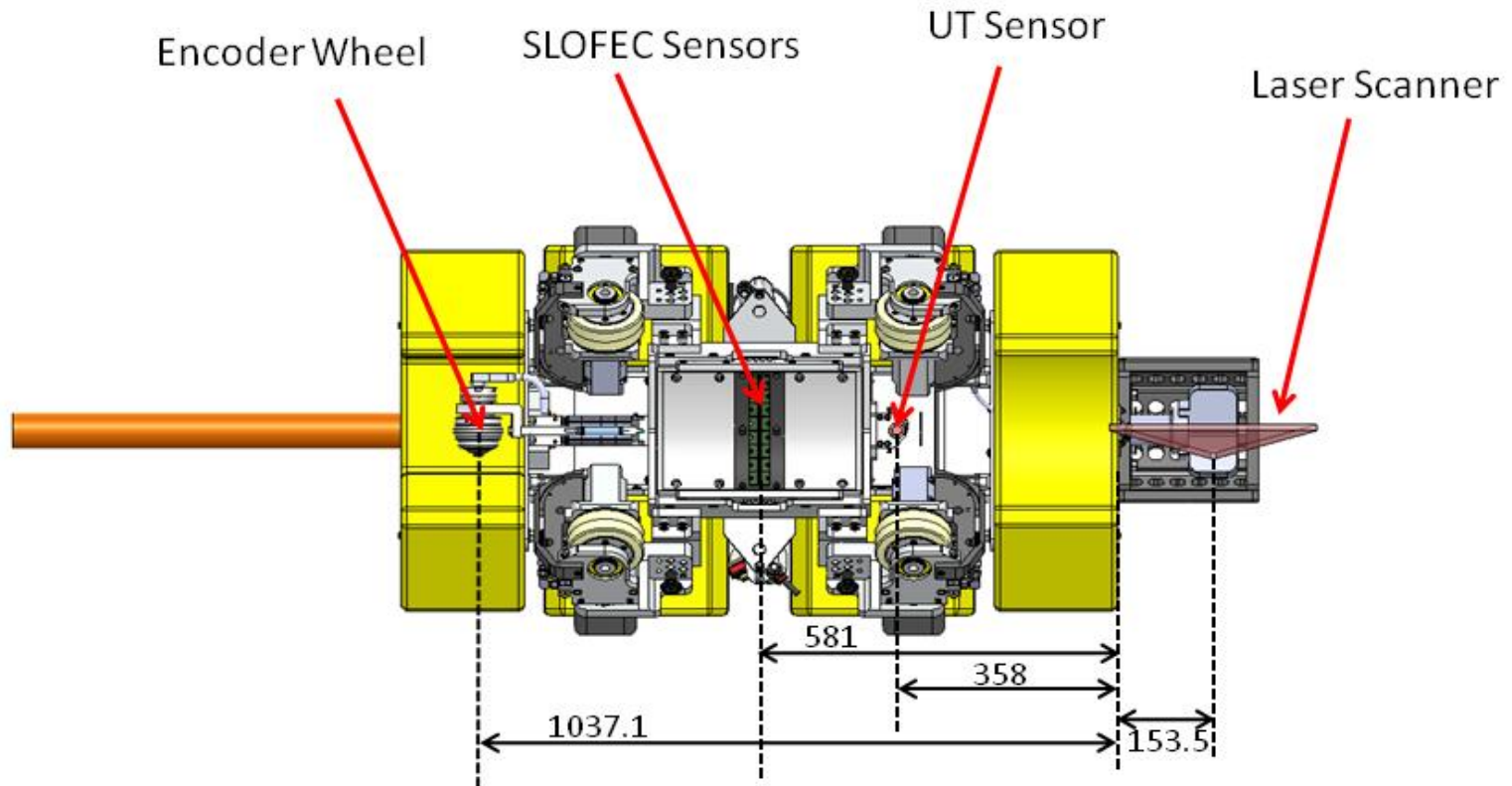
Cleaning



- *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

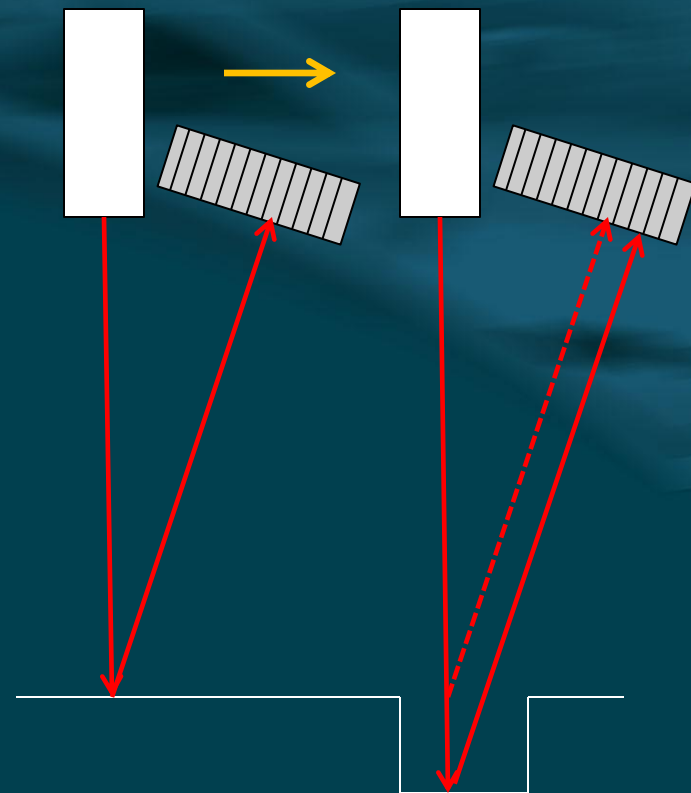
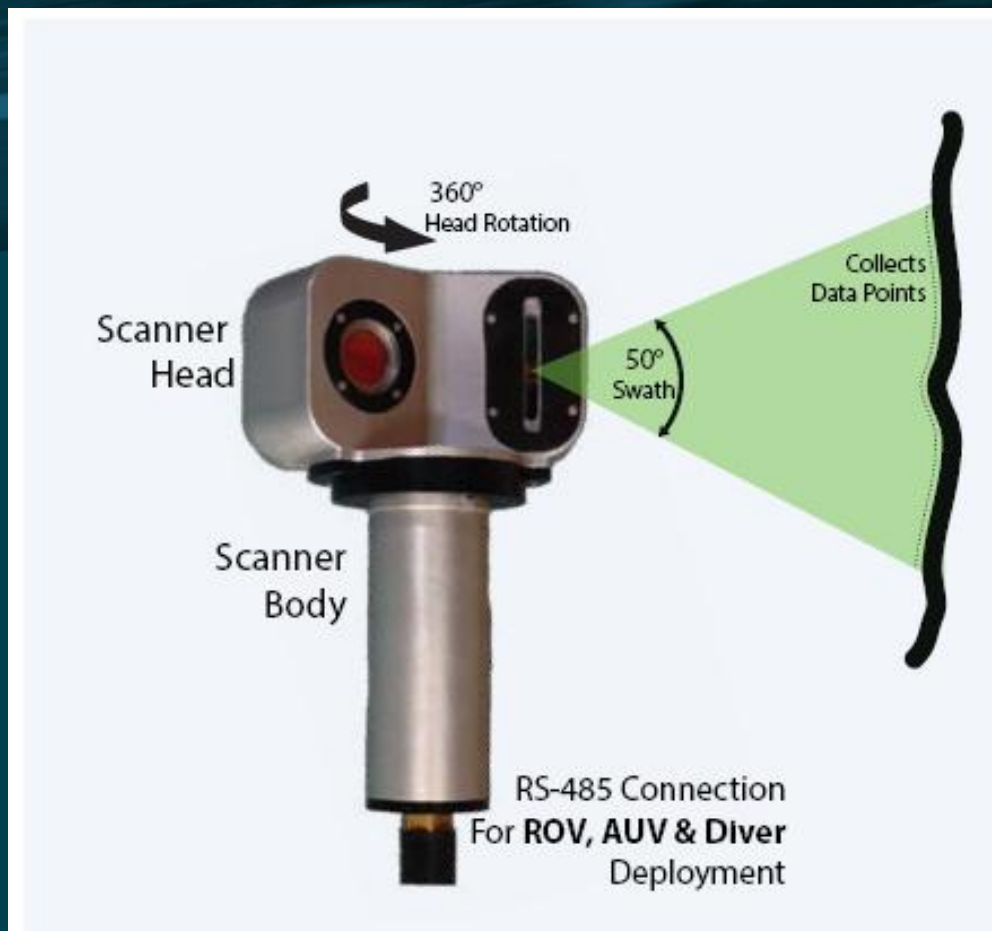


Employed inspection Technologies



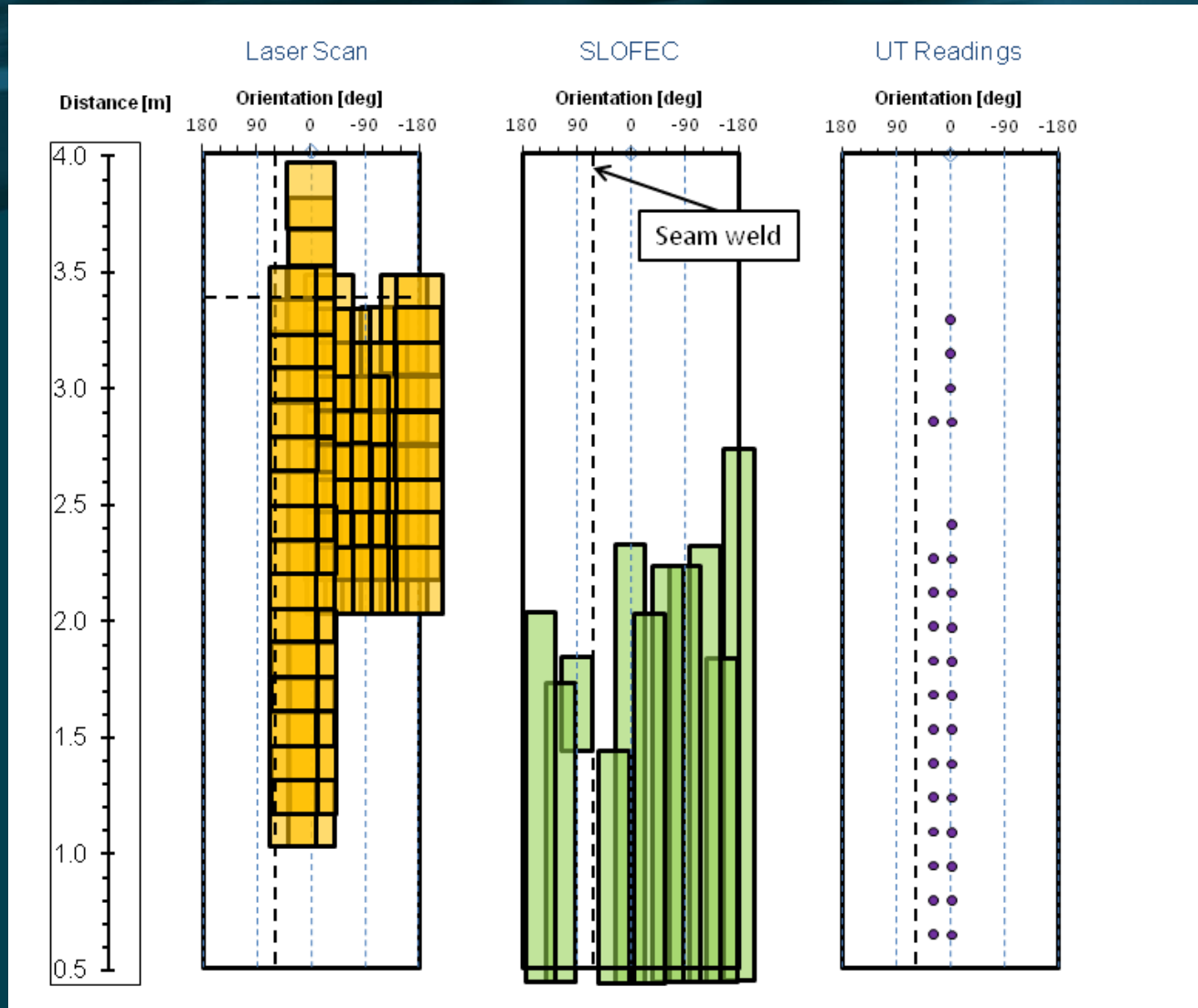
- **SLOFEC**
 - *Saturation Low Frequency Eddy Current or Magnetic Eddy Current (MEC)*
 - *Eddy Current Inspection Technology that also sensitive to far-side defects.*
 - *As an electromagnetic method is always relative to calibration defects*
 - *Less sensitive to cleaning and allows to measure through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

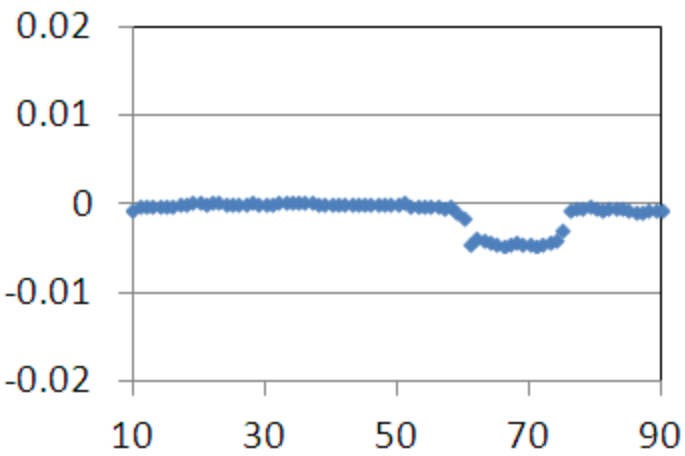
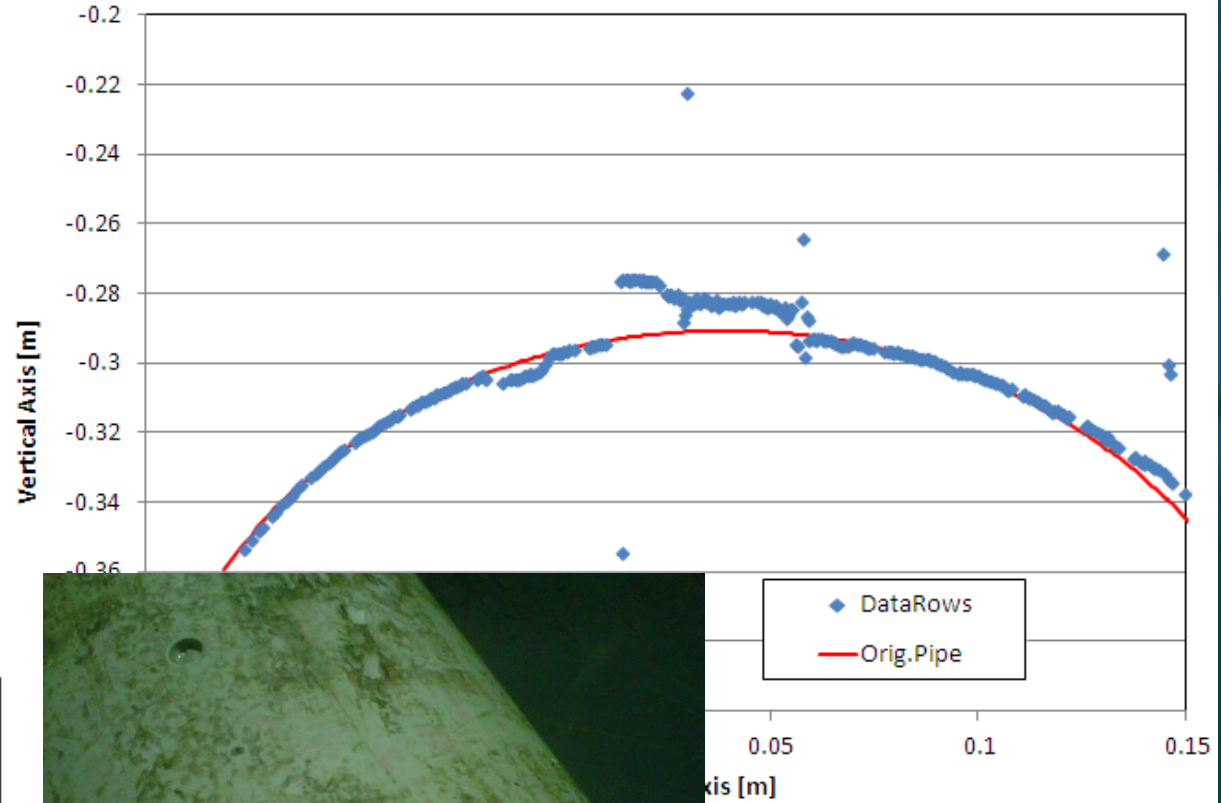
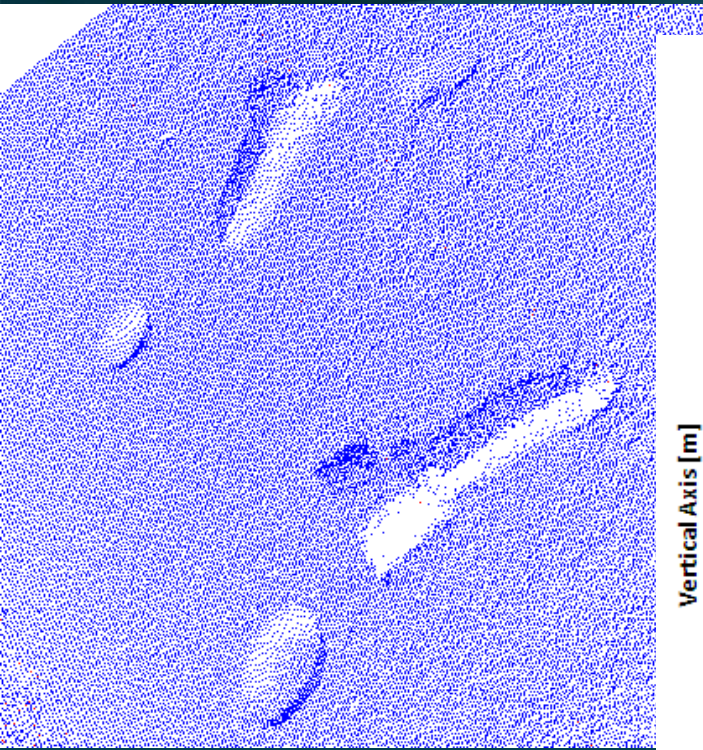


ULS-100 by 2GRobotics

Coverage of pipe section by Inspection Technology



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*