

DETECTION OF CORROSION UNDER INSULATION (CuI) USING ADVANCED PIPE INSPECTION TECHNOLOGY

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A New Perspective

- ▶ With the aging of most Oil & Gas Infrastructure, the trend in NDE innovation has been towards large area screening capabilities, whether for internal or external (CUI) damage mechanisms.
- ▶ There has always been an inclination to work on an electromagnetic approach based on the need for the application to be non-contact.
 - Use of EM tools is relatively widespread in the NDT industry with well-established techniques for piping, tubing, and plates applicable to a wide range of materials.

Bracelet Probe™

- ▶ Developed by Russell NDE – an established world leader in remote field and advanced electromagnetic inspection applications.
- ▶ Initial platform of tools used to detect internal damage on bare plates and piping. These proved to be very useful for screening large swaths of bare or coated/wrapped piping for areas of internal/external general corrosion and/or isolated pitting



No insulation



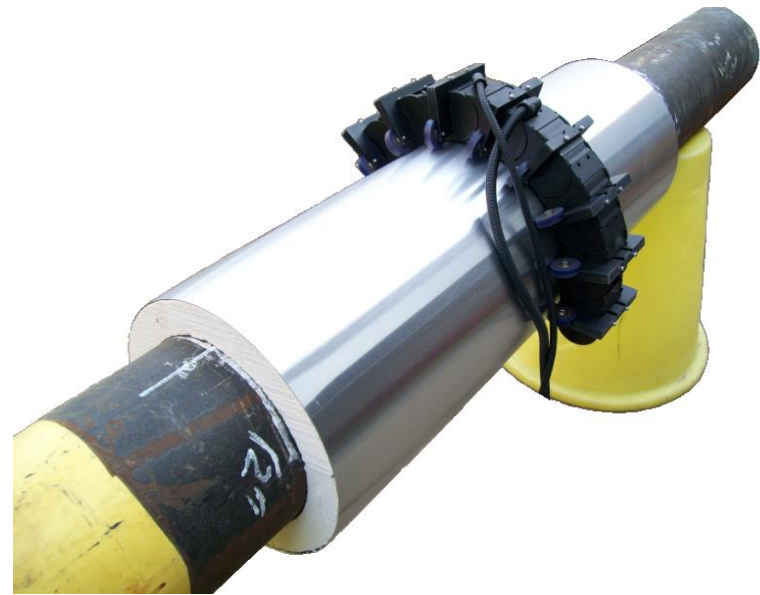
2" insulation



2.75" insulation



A Bracelet[™] probe in its stretched out state (above)
and on bare and insulated pipes (below)





Bracelet Probe™

- ▶ Probe configuration further tweaked to allow for better detection capabilities when further removed from the pipe surface.
- ▶ This has led to current generation CUI probe.



Bracelet Probe™

- ▶ Bracelet Probe design means that it covers a wide circumferential extent of piping as it scans axially.
 - Effective area coverage
 - Can cover entire pipe circumference in series of scans; each scan covers 10" of circumferential width.

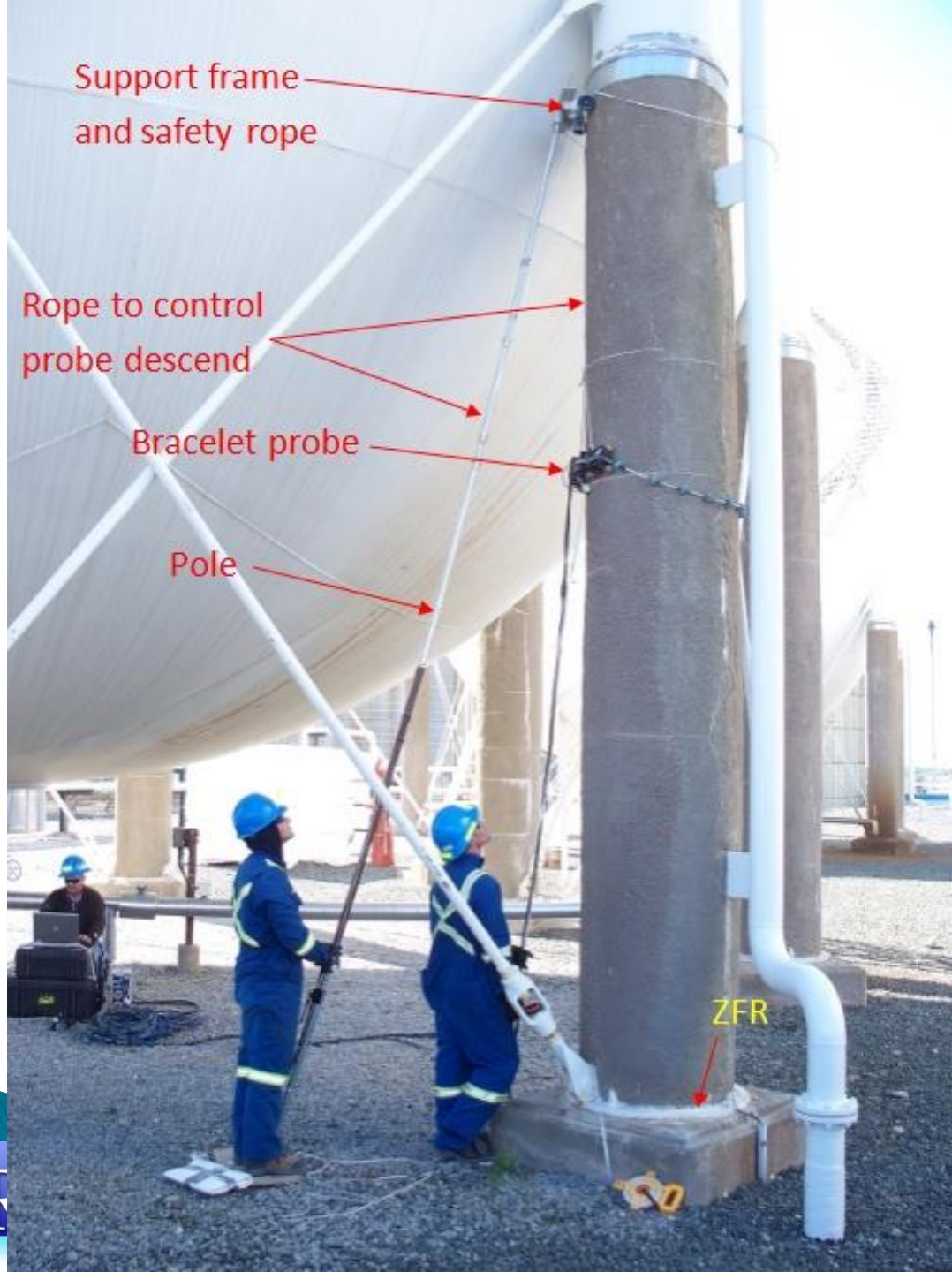
Not limited to a single tangent view or the need to perform grid scans

- ▶ Axial speeds of up to 12 feet per minute.
- ▶ Probe performance relies on a number of operational variables such as:
 - Test frequency (air gap, sample thickness)
 - Insulation thickness
- ▶ This not only dictates scan speed but also the threshold of detection.

**Butane
Sphere Leg.
Inspection
through
Fire
Proofing**







Standard 16-ch Bracelet™ Probe

Pole scan system

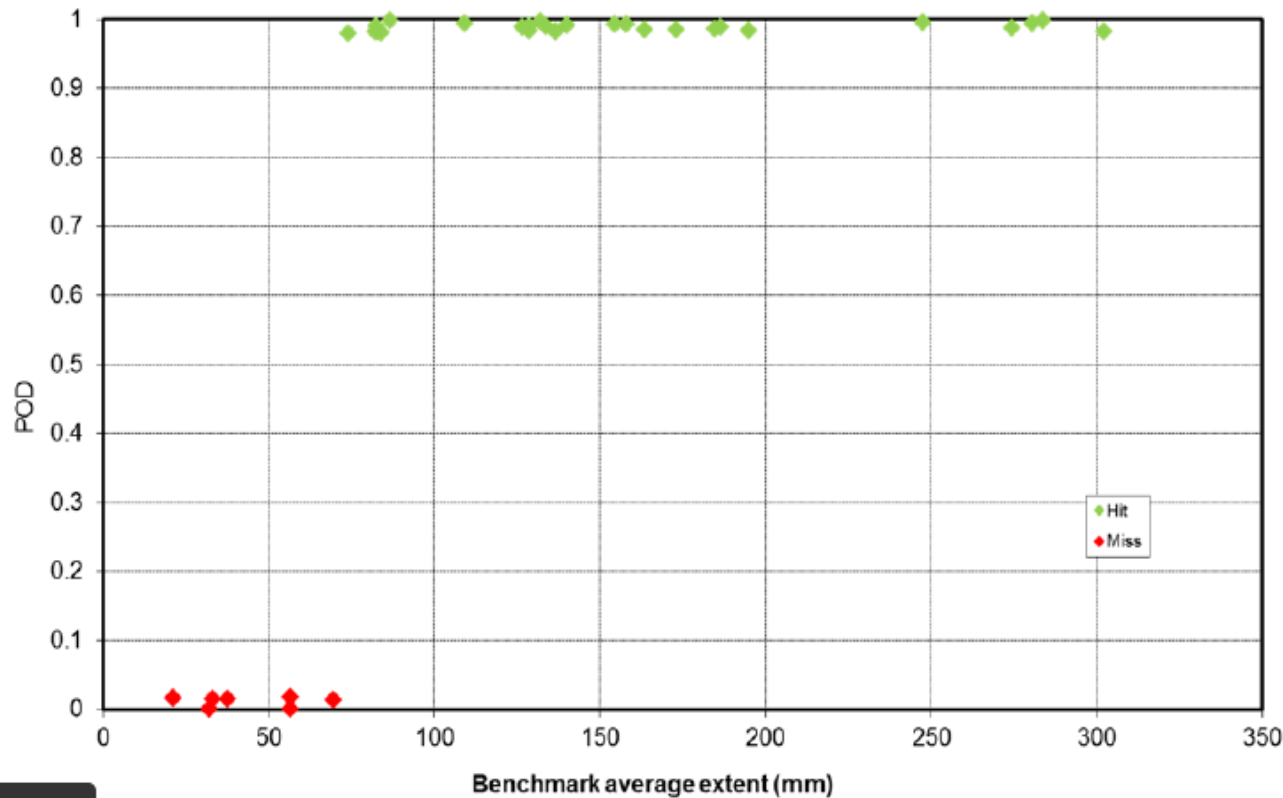




Bracelet Probe™

- ▶ Application has undergone extensive client-specific blind and field trials, in addition to having participated in industry-sponsored trials with HOIS

Results of Recent HOIS blind trials showing 95% POD for damage exceeding 25% wall loss



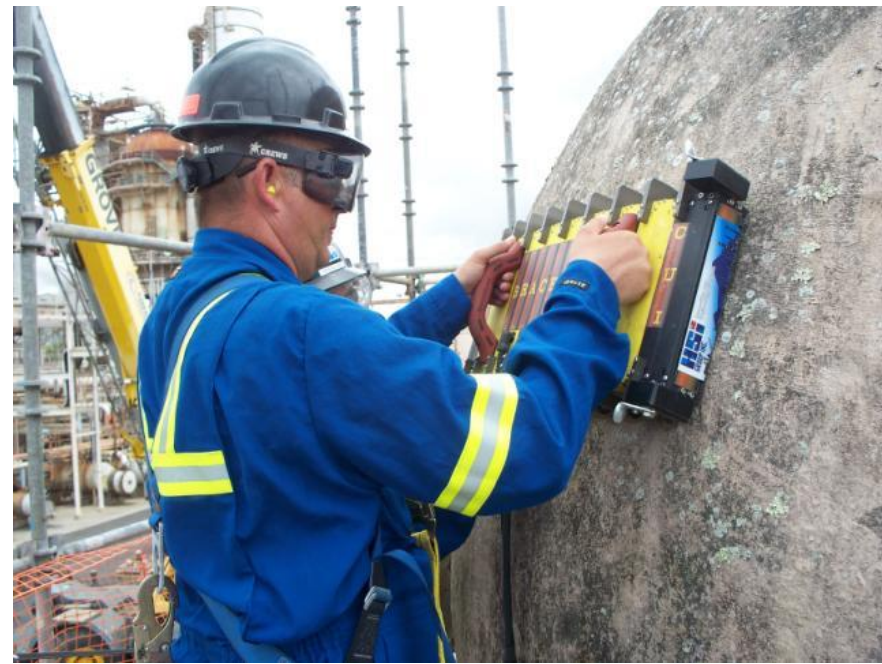
Applications

- ▶ Applications Include:
 - Insulated facility and cross-country piping
 - Insulated vessels and storage tanks
 - Sphere legs – with fireproofing.



Applications

- ▶ Application on insulated tanks and vessels provides a means for active CUI screening where none existed before.
- ▶ Able to handle corrugated non-ferromagnetic weather-proofing.



Standard 84-ch Bracelet™ probe

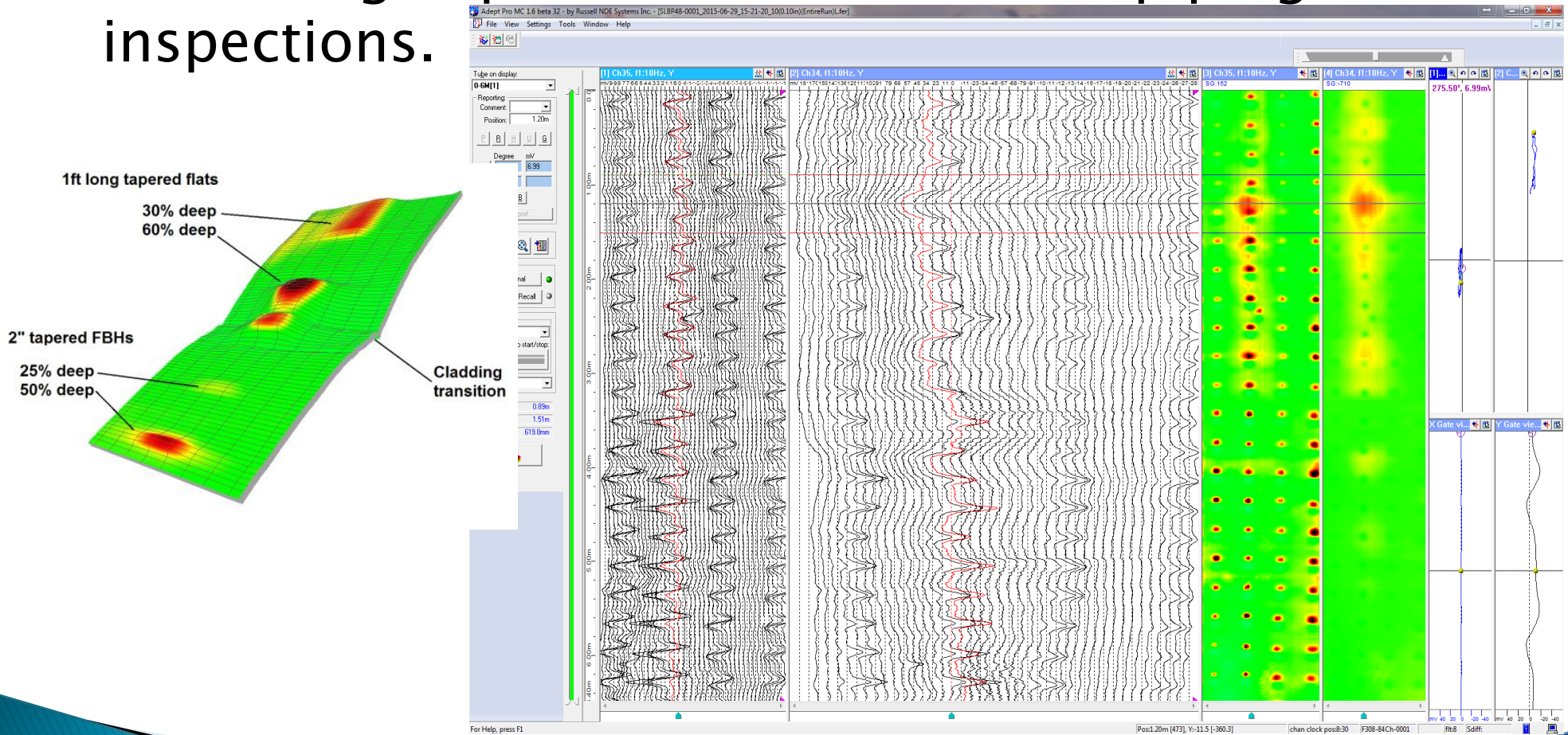
Crawler scan system

Scanning Width: 44"
Scanning Speed: 1-2
m/min



Bracelet Probe™

- ▶ Easy to understand graphical representation of data using experience with tube and piping inspections.



Bracelet Probe™

- ▶ A major benefit of a system such as this is in the data it provides to the end user.
- ▶ Due to the nature of the application, a CUI location is fully mapped with length and width, in addition to an estimate for wall loss.
- ▶ These are metrics that can be fed into a fitness for service calculation and used to articulate a response to the find.
 - *A response based on sound engineering judgment, with input providing a whole picture of the damage being assessed.*