

# International Chemical & Petroleum Industry Inspection Technology

## *DEPLOYMENT OF CELLULAR-BASED ULTRASONIC CORROSION MEASUREMENT SYSTEM FOR REFINING AND PETRO-CHEMICAL PLANT APPLICATIONS*



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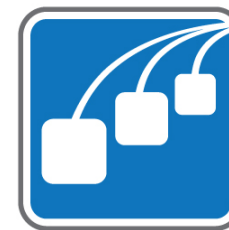
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GALVESTON ISLAND CONVENTION CENTER

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# BIO

Steve Strachan is the VP of sales for Sensor Networks, Inc. for North America. Sensor Networks, Inc. is a technology company focused on remote monitoring of critical assets in industrial sectors using ultrasonic installed sensors for corrosion/erosion & crack detection and mitigation. Steve is a graduate from Pennsylvania State University. Prior to joining Sensor Networks, Inc. Steve worked for GE Inspection Technologies for seven years in their Commercial Leadership Program and as a Product Manager for Ultrasound, Digital Radiography and Handheld XRF (PMI). Steve is based in Sensor Networks' Houston office.



**SENSOR**<sup>®</sup>  
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Inspection, Testing & Asset-Integrity Solutions

# Outline



- Historic Overview
- Evolution of the TML
- Five Applications of installed UT sensors
- Case Studies
- Conclusions

# Historic Overview



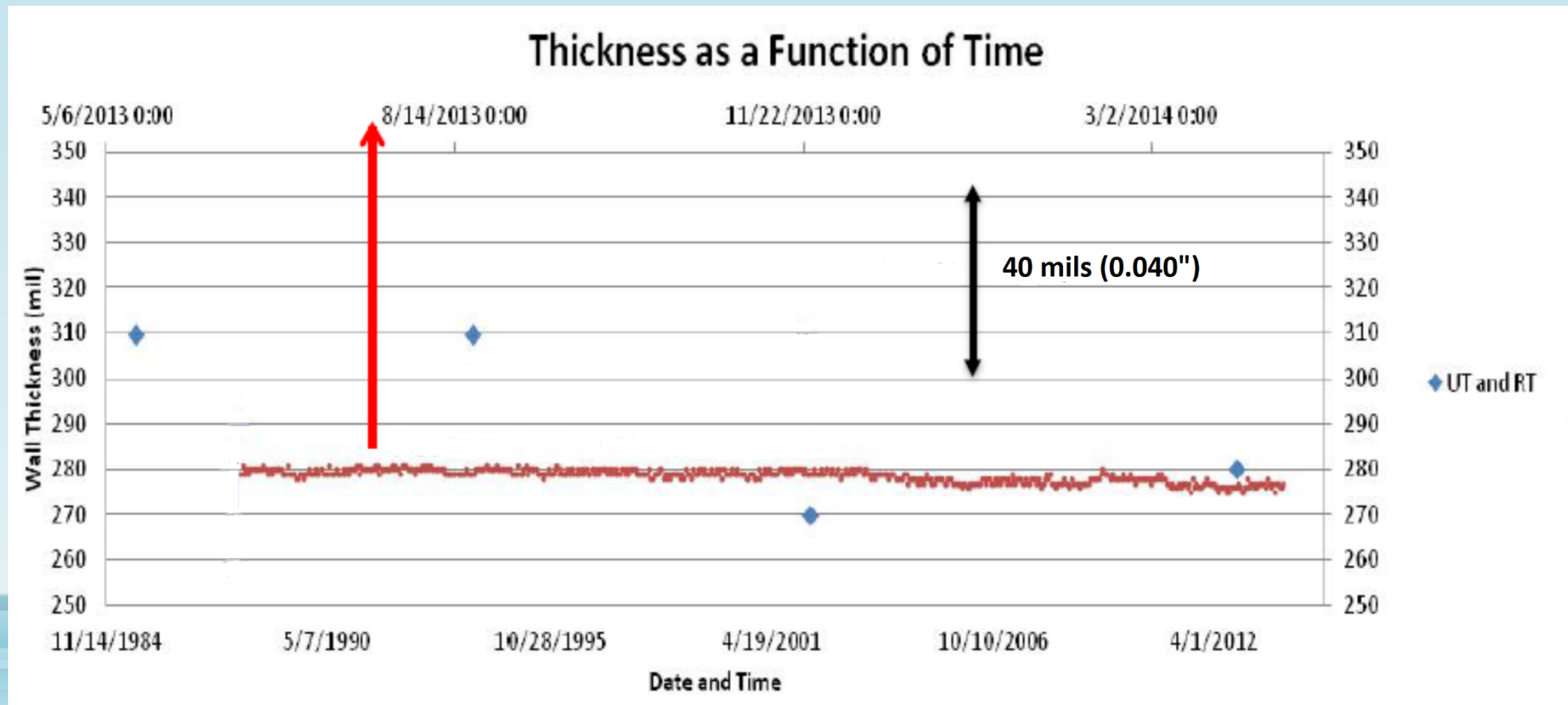
**When it comes to corrosion monitoring ... how good is “good enough?”**

- How much data is enough (or not enough)?
- Can we trust the data (how precise/accurate)?
- If I could have access to data 24/7, are there things I could learn that would improve:
  - Efficiency
  - Save time/money/resources
  - Improve safety

# Historic manual vs. installed UT sensors



- Manual: years b/t measurements with +/- 20 to 50 mils in variation (corrosion rate not discernable)
- Automated: readings every 12 hrs with +/- 1 mil in variation (corrosion rate <1 mpy)



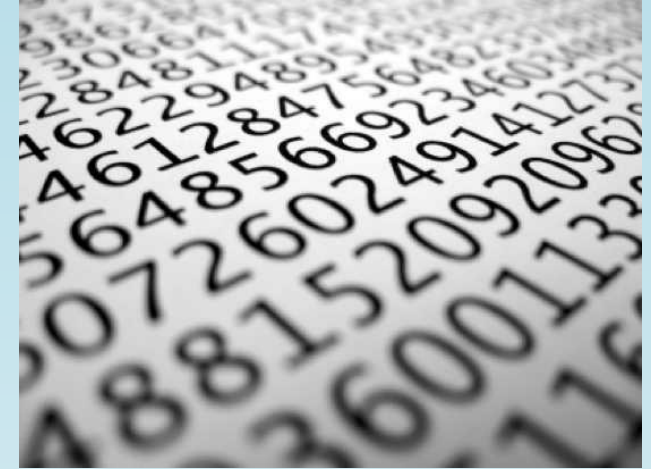




# Evolution of the TML/CML



- Good idea taken to extremes
- Some sites have >3,000,000 TML's
- Repeatability, Variation and Growths
- Manpower Intensive and more and more difficult
- Moderate site estimate of 25,000 TML's over 3 years to be \$75 per TML



# Five Applications for Installed UT Sensors



1. Corrosion RATE calculations
2. Monitoring pitting or “low spots”
3. In lieu of (or in conjunction w/) invasive technology (coupons, ER probes, etc.)
4. Reducing recurring costs
5. Access to more (quantity) and better (accurate) data



Flow Accelerated Corrosion (FAC)  
Microbiological corrosion  
High pressure steam lines  
High point vent  
Baseline of new assets



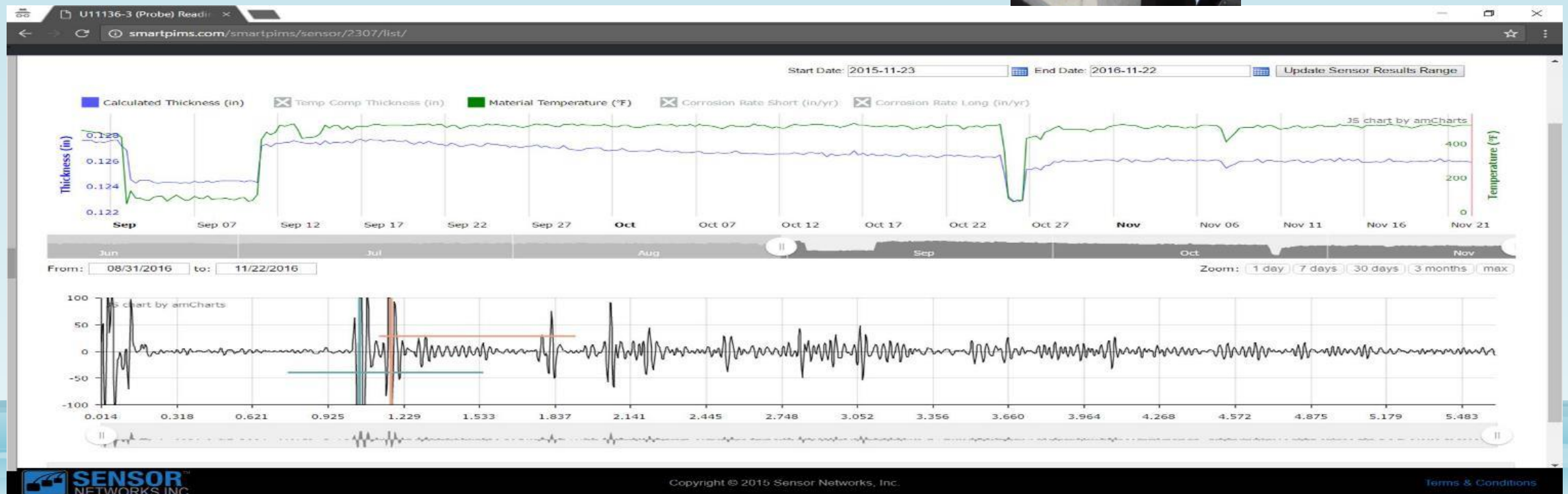
Chemical inhibitor process control  
Localized corrosion mgmt.  
Napthenacid (HT) monitoring  
Pipeline Integrity (River/Road Crossings)



# Case Studies – Corrosion RATE monitoring



- Atmospheric gas/oil line operating @ 450F
- Monitoring .130” thick 3” line using HT delay line probes
- Temperature correction
- Customer was able to keep unit in service until planned outage w/out having to send NDE techs weekly

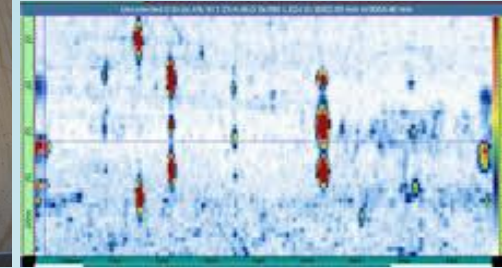


# Case Studies – Pit tracking

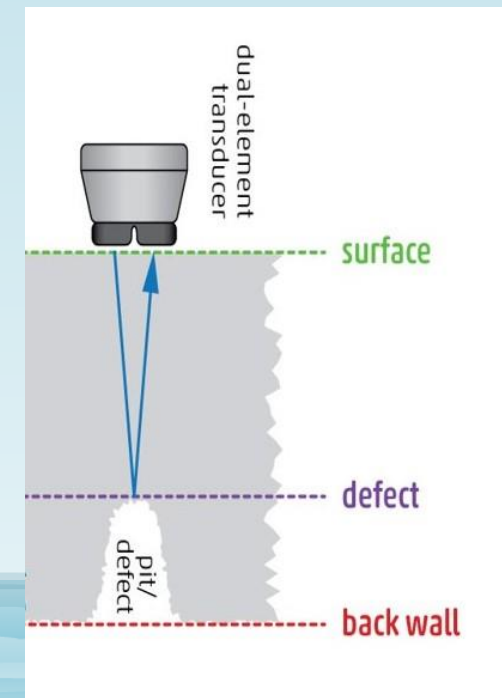


A unique ultrasonic hardware & software solution that allows asset owners to precisely monitor the growth of critical individual pits.

- **Dual-element transducer**
  - ~1/8” (3 mm) spot size (@ - 6 dB) at 3/8” (10 mm)
- Measure down to 0.040” (1 mm)
- Resolution to 0.0001” (2.5 micron)
- Temp range: -5° to 300 ° F (-20 ° to 150 ° C)



Multiple pits can be tracked with auto- alarm capability via e-mail. Used post ILI and /or in conjunction with conventional UT scan data Pit-track can precisely monitor pits.

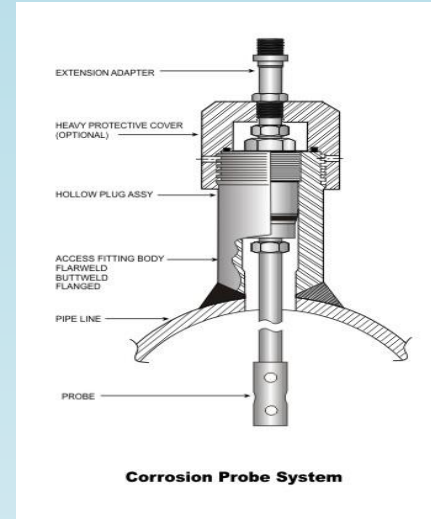




# Case Studies – Intrusive vs. Non-Intrusive



- Vacuum Fractionator & associated overhead lines
- Intrusive monitoring – coupons/ER probes measure corrosivity and INFER wall thickness
- Customer wanted to verify coupon data & not have to cut more holes in their pipes





# Case Studies – Recurring Costs Initiatives



Difficult to access

- Overhead lines
- Towers

Safety concerns

- Confined spaces
- Rope access

Economically Undesirable

- Insulation/re-insulation
- Excavations/buried
- Scaffolding



# Case Studies – Access to more/better data



## HF Alkylation Unit

- 55 mpy on extrados
- 20 mpy on intrados

## Maintenance cycle

- Extended 3 months passed “useful life”
- Saved \$2.5M off scheduled turnaround budget

## Safety

- Didn't have to send technicians 150' up in HF-Alky attire





# Conclusions



- The power of data can make a huge difference
- Think outside the box when it comes to TMLs (CMLs)
- Work smarter NOT harder – let technology do the work
- There are ways to work safely, improve efficiency, and provide oil & petrochemical refiners cost savings & better outcomes
- Embrace change, be an advocate of trying new things!



# Questions?

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