A yellow hard hat is centered within a circular graphic composed of concentric rings of varying line densities, creating a technical or scanning effect. The background of the slide is white, with the circular graphic on the left side.

Electromagnetic Acoustic Transducer (EMAT) Inspection of Furnace Tubes Using Fast Scan Technology

by Robert S. Grandahl

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Robert S. Grandahl

■ 15 Years NDE experience

- Standard NDE Techniques (UT, MT, PT, RT, VT)
- Boiler Condition Assessment Techniques (FST-GAGE®, NOTIS®, Hone & Glow®, Acoustic Ranger® and Replication collection).
- Been involved with fast scan EMAT inspections since deployment of EPRI/Babcock & Wilcox developed FST-GAGE® and has been involved with the development of Innerspec® temate® Inspection System

Current job

- Acuren Inspection Operations Manager in Iron Mountain, MI working closely with customers and inspection personnel in developing inspection solutions.



Electromagnetic Acoustic Transducer (EMAT)

■ EMAT

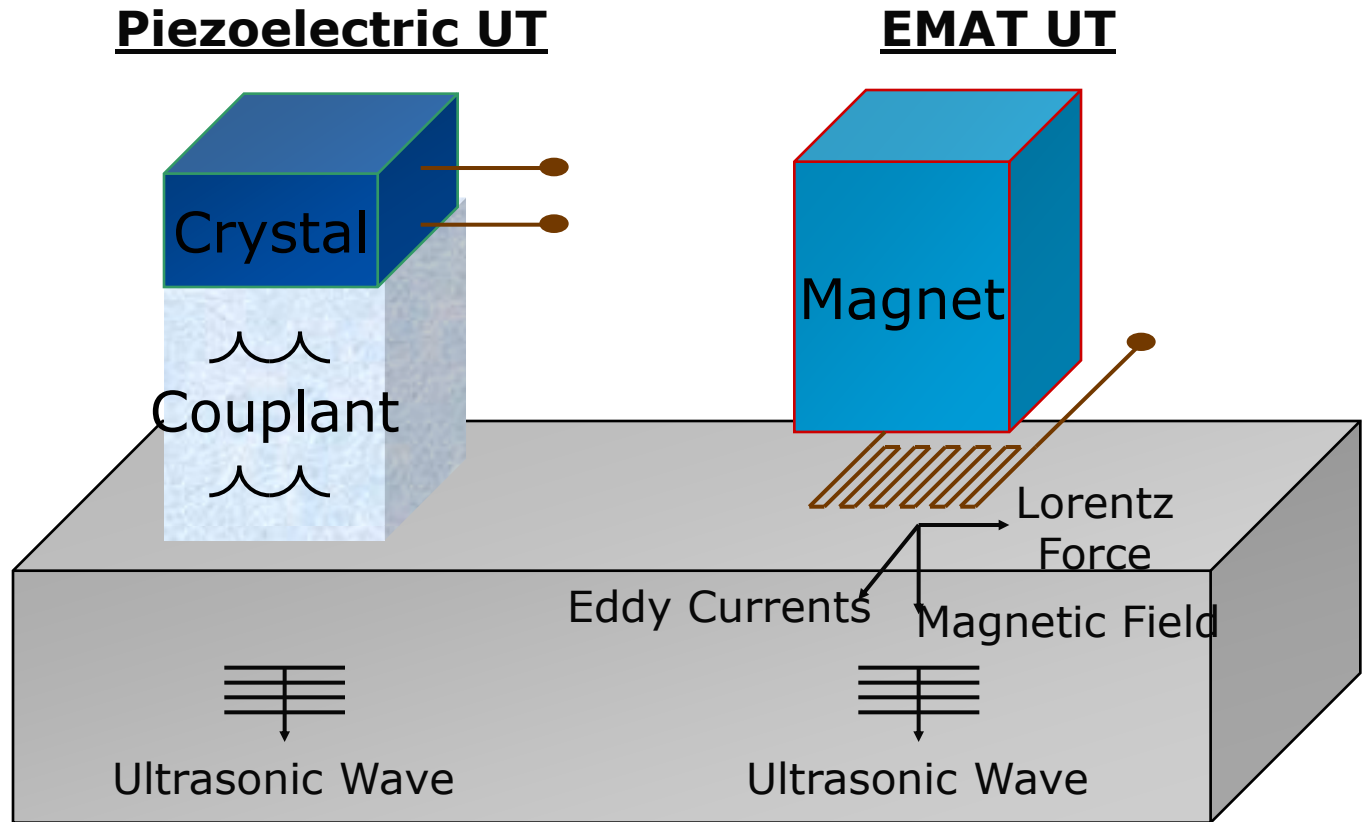
- What is it and how does it work?
- What are its advantages?
- How can I use it?
 - Thickness Examinations
 - Flaw Detection

■ Information Sources

- Innerspec Technologies
- Babcock & Wilcox / EPRI
- Acuren Inspection
- American Society for Testing & Materials (ASTM)



What is EMAT



Using Lorentz forces and magnetostriction, the **EMAT** and the metal test surface interact and generate an acoustic wave within the material

Advantages of EMAT Inspections

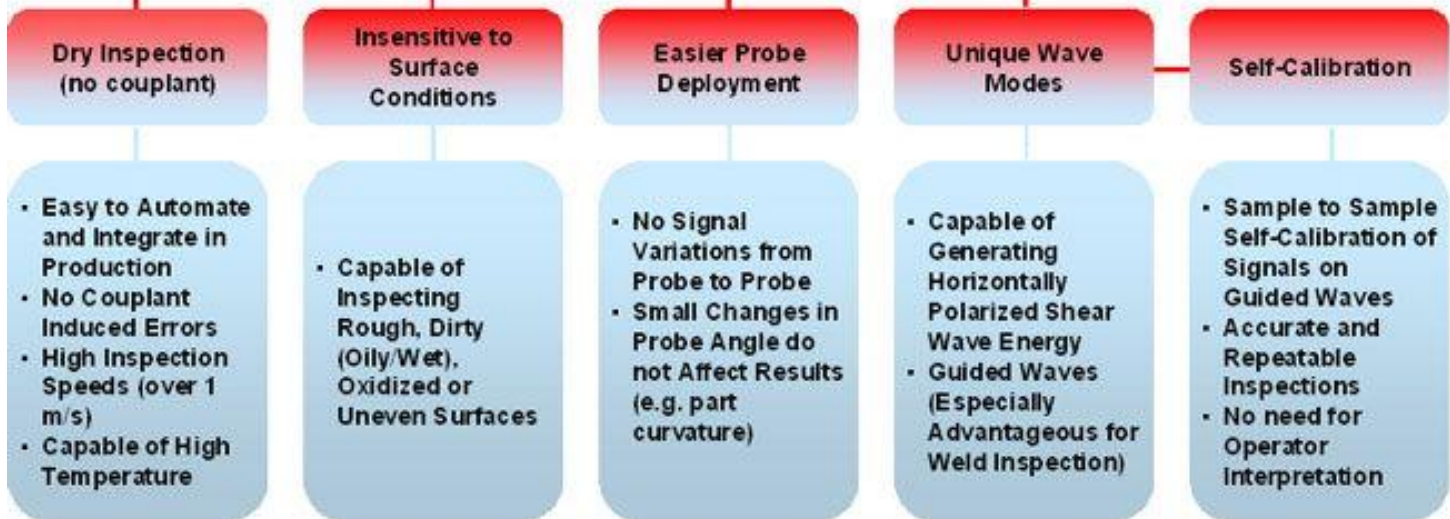


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- Ultrasonic Technique**
- Volumetric Inspection
 - Easy One-Side Access to Difficult to Reach Areas
 - Safe and standardized

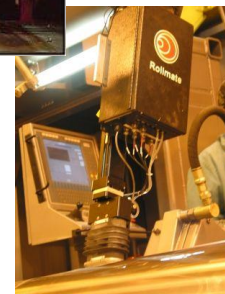
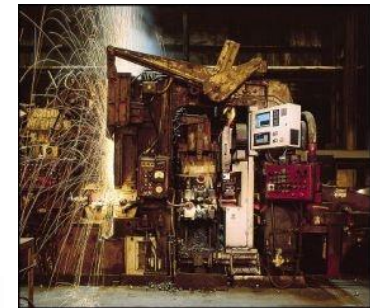
Ultrasound is Generated in the Part Inspected



What are the Uses?

Applications for **EMAT** include inspection of pipelines, rail track inspection, and various shop inspection techniques ranging from on-line butt weld inspection, seamless pipe inspection, to hot billet inspection. It is also commonly used to **detect wall wastage and hydrogen damage on boiler and furnace tubes.**

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Using EMAT for Tube Wastage and Hydrogen Damage Inspections

InnerSpec ® Powerbox ®



Using EMAT for Tube Wastage and Hydrogen Damage Inspections



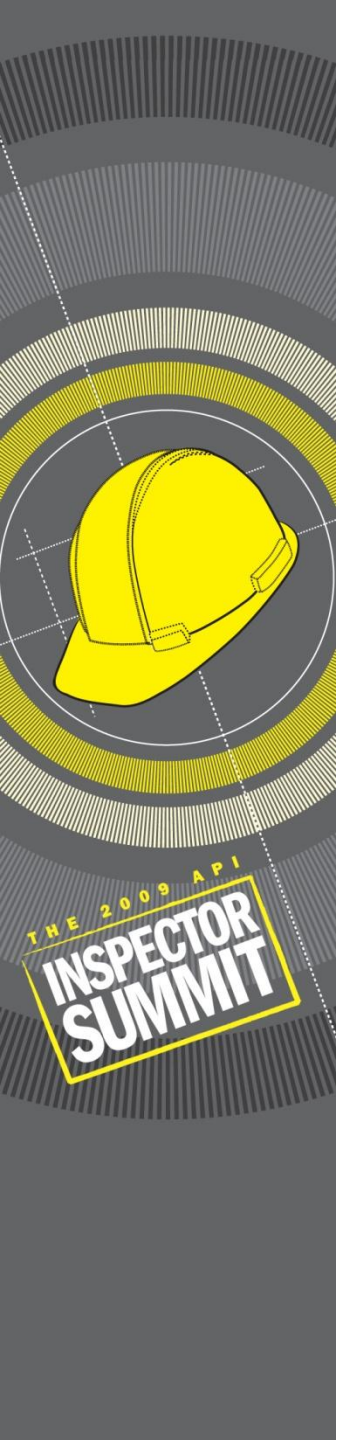
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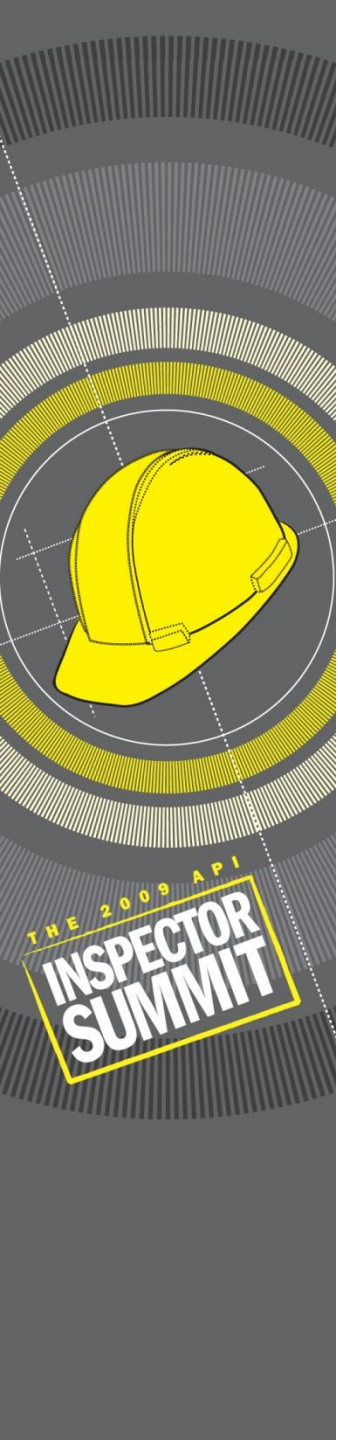
Using EMAT for Tube Wastage and Hydrogen Damage Inspections

Video of Data Acquisition



Preparation and Production

- Provide access & lighting to the exam area, AC Power and a power wash of the tube surfaces
- Scan speed is 6 inches per second
- Depending on scanning mode and inspection requirements, a two person team can typically complete 500 - 700 linear feet per hour

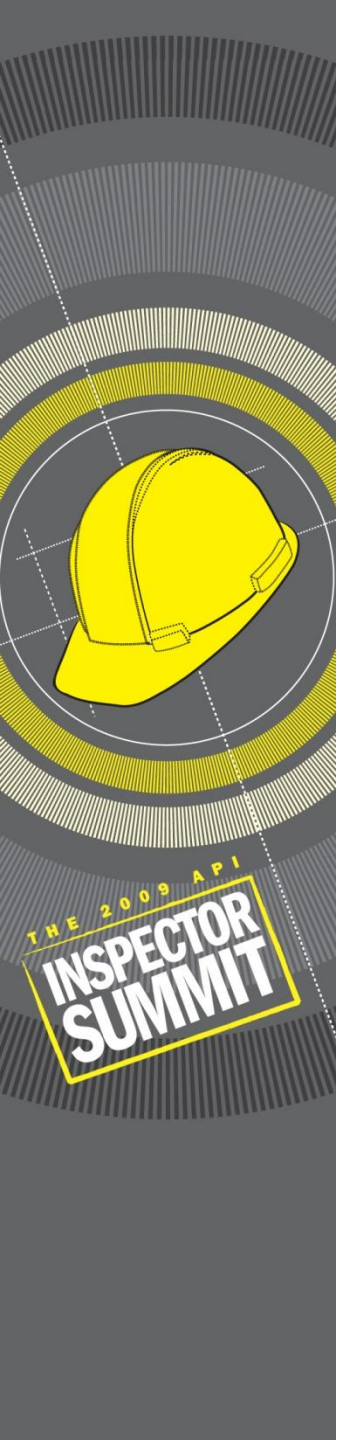


EMAT Reporting

Client is left with all of their data along with a *Read-Only Data Viewer Utility*

The Viewer, allows them to view, zoom, pan and print the data

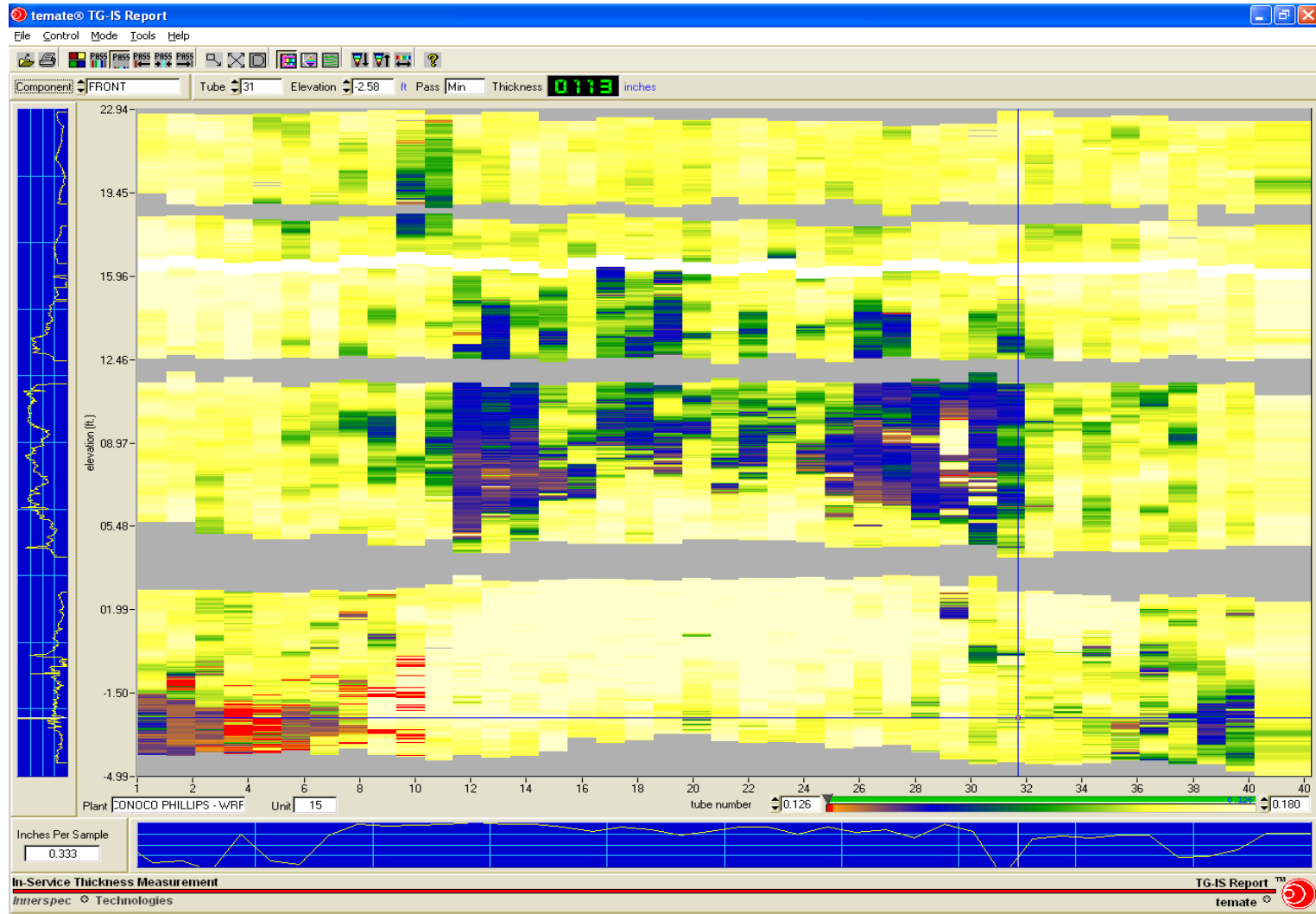
If thickness trending is needed, the **EMAT** data can be exported to many different formats allowing reporting, trending, analysis, etc.



One format of Reporting showing wastage



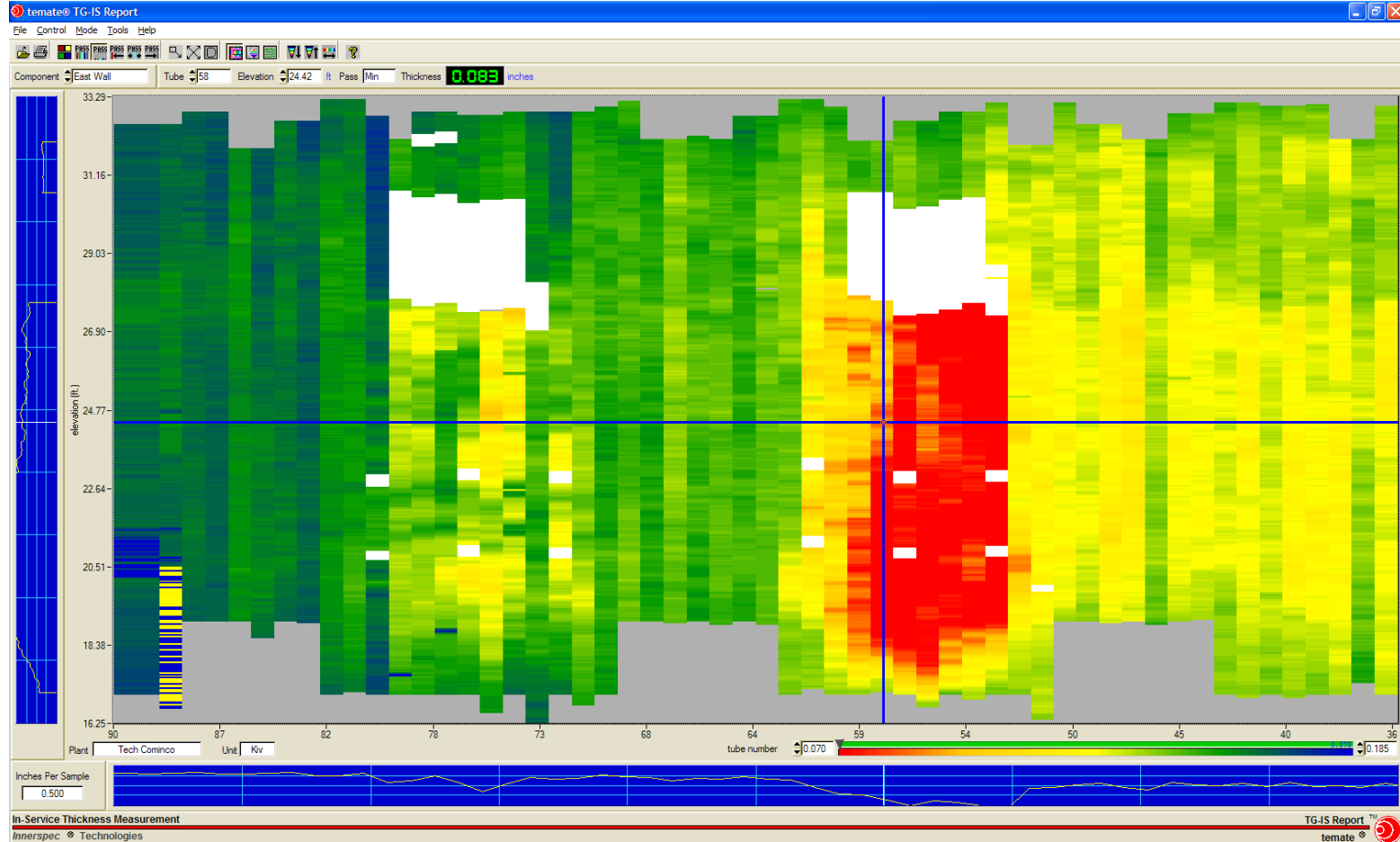
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Another Example of Report



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Questions ???



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