

26th World Gas Conference

1 – 5 June 2015, Paris, France



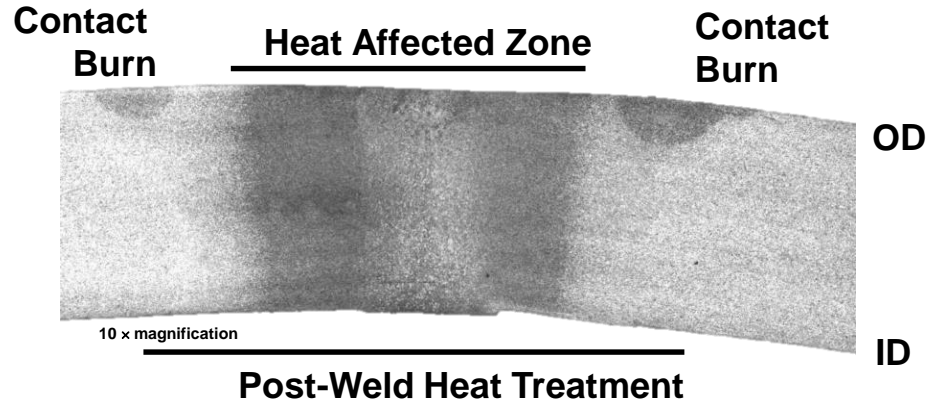
Thematic Session (WOC 3-3)

Assessment of ERW and EFW line pipe defects by EMAT and
CMFL Inline Inspection

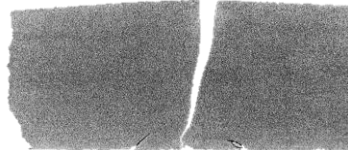
Martin Runde
Rosen



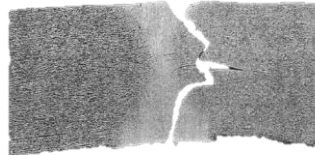
Motivation and Scope



Lack Of Fusion (LOF)



Hook Crack

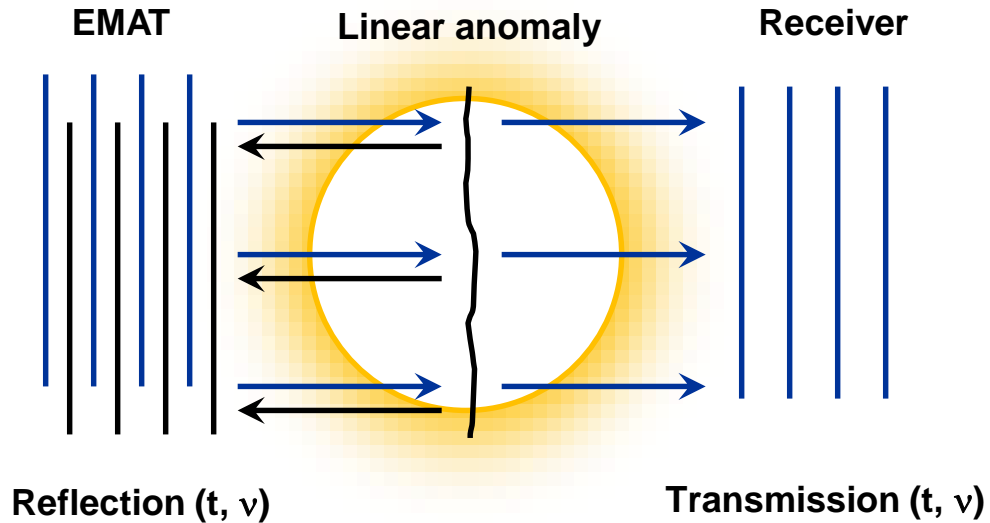
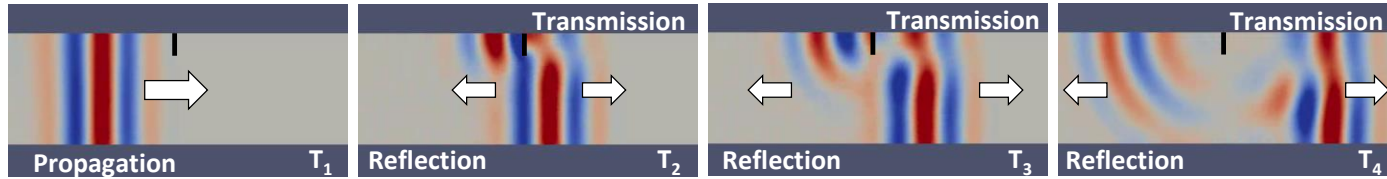


Selective Seam Corrosion (SSC)

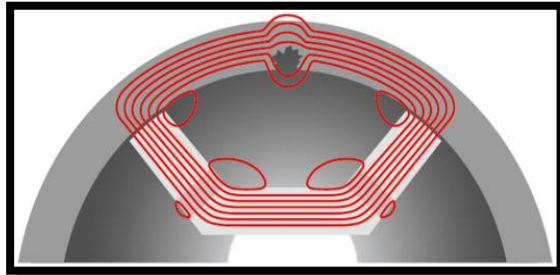
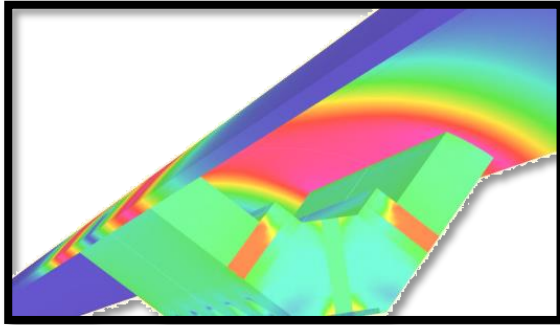


Top: Leis, Nestleroth; Characterizing Failure in ERW Line Pipe; Final Interim Report – Task 2.6
Bottom: Kiefner; History of line pipe manufacturing in North America, ASME, CRTD-Vol. 43

Introduction of EMAT and CMFL

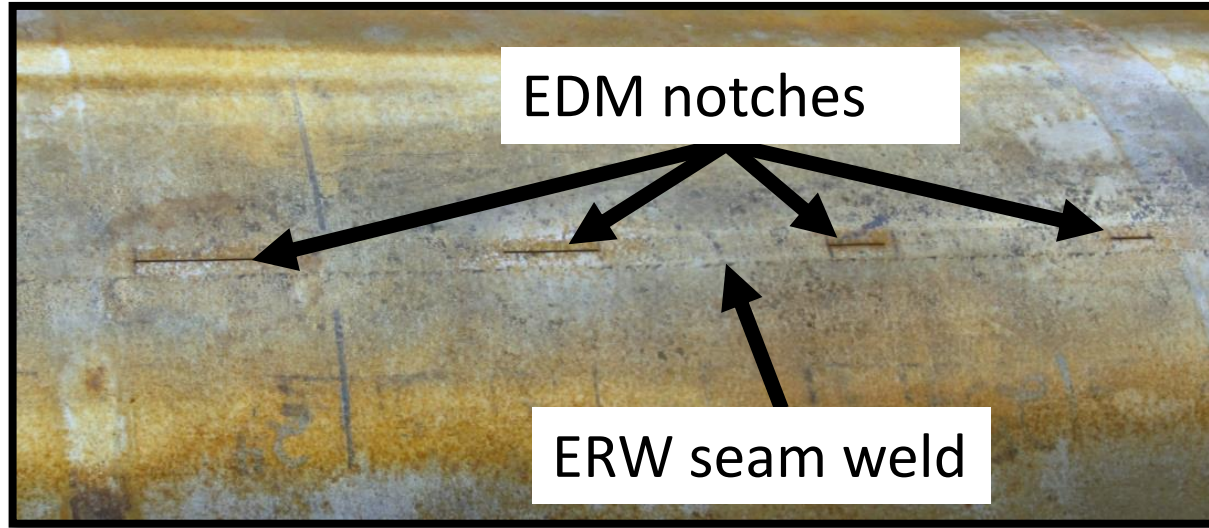


Introduction of EMAT and CMFL



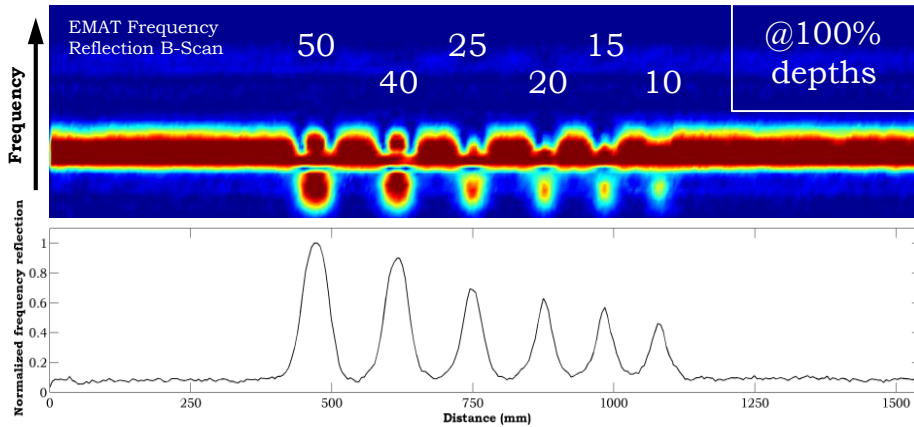
- The magnetic field is oriented in circumferential direction
- Primarily axially oriented volumetric anomalies are targeted such as corrosion.
- Axially oriented planar anomalies can be successfully detected when they exceed a minimum opening.

Data correlation and analysis results

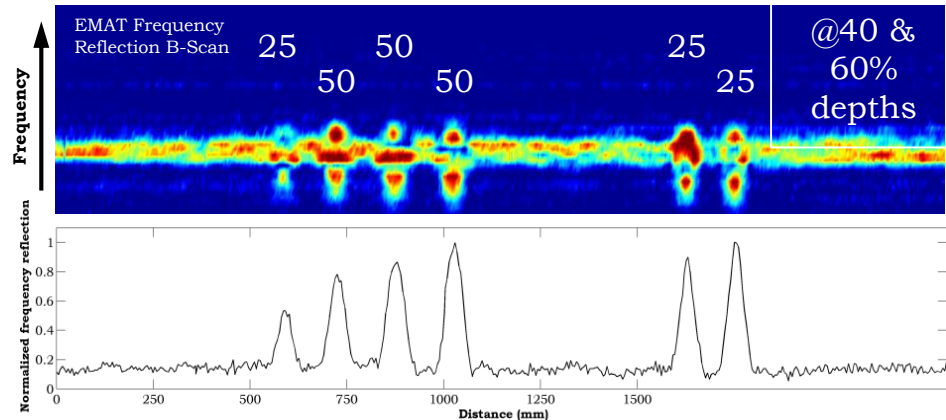


- Determine detection capabilities of machined EDM notches at centerline of the ERW seam-weld
- 22" test pipe previously removed from targeted pipeline

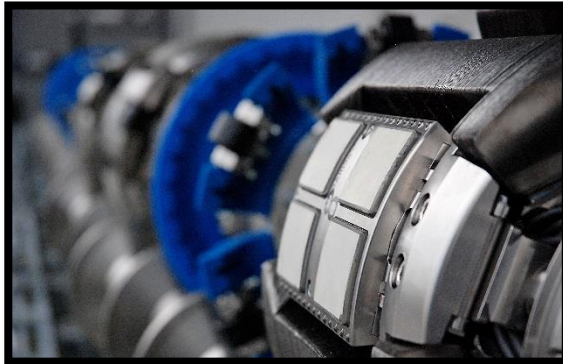
Data correlation and analysis results



- All lengths are given in mm
- WT 0.281 inch (7.2mm)

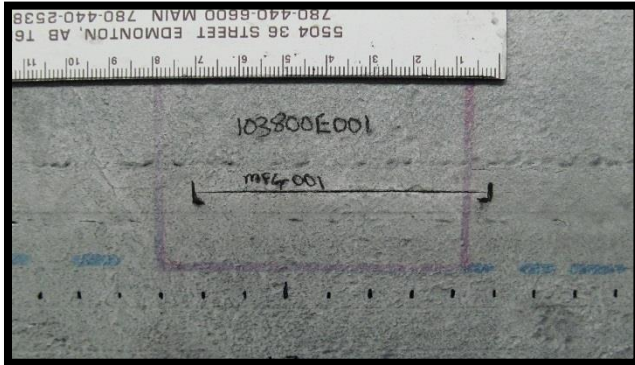


Data correlation and analysis results



- After joint review of the pull-test data ILI tool runs have been performed and data analyzed
- After initial validation of the ILI capabilities additional joints have been selected for excavation
- Following a developed dig prioritization process to further assess the ILI capabilities 11 spools have been cut-out and verified to date

Data correlation and analysis results



- Spools have been sandblasted and investigated using b/w MPI for the entire pipe surface
- PAUT depth profiles have been recoded for the entire seam-welds (10mm grid)
- Anomalies have been verified internally and externally

Data correlation and analysis results

CMFL + EMAT ILI					PAUT NDE			
Joint	Type	Depth (%)	Depth (mm)	Length (mm)	Type	Depth (%)	Depth (mm)	Length (mm)
#1	LSWA	53	3.8	70	LOF	57	4.1	15
#2	LSWA	54	3.9	62	LOF	53	3.8	40
#3	LSWA	44	3.2	1512	Hook Crack	40	2.9	1710
	LSWA	38	2.7	108	LOF	38	2.7	62
#4	LSWA	50	3.6	12828	Hook Crack	54	3.9	12060*

LSWA: Longseam Weld Anomaly
 * entire cut-out length

Summary

- Combined CMFL and EMAT show good correlation to PAUT profiles
- Linear anomalies exceeding 1mm depth have been detected and identified
- Max. PAUT depth sizing results confirm reported ILI depths
- Results support the current understanding of a min. effective cross-section being required in order to allow for a POD/POI at high certainty



Thank you

Thank you for your attention