

Costly Lessons Learned from Inspection Pitfalls of Coke Drums

RefComm
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Galveston, TX

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Company Background



Overview

- Inspection of cone side of skirt attachment
- Smoothing of laser data
- Internal inspection of seam weld cracks

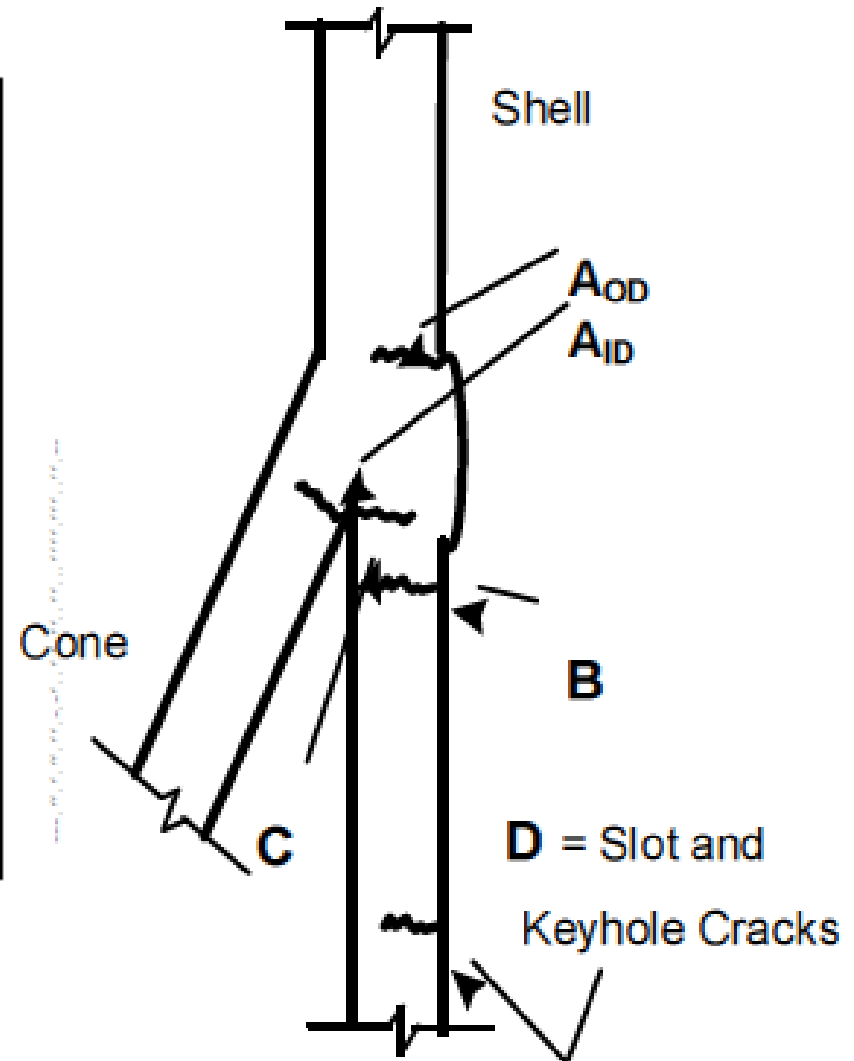
Inspection of Cone Side of Skirt Attachment

In-Line Skirt

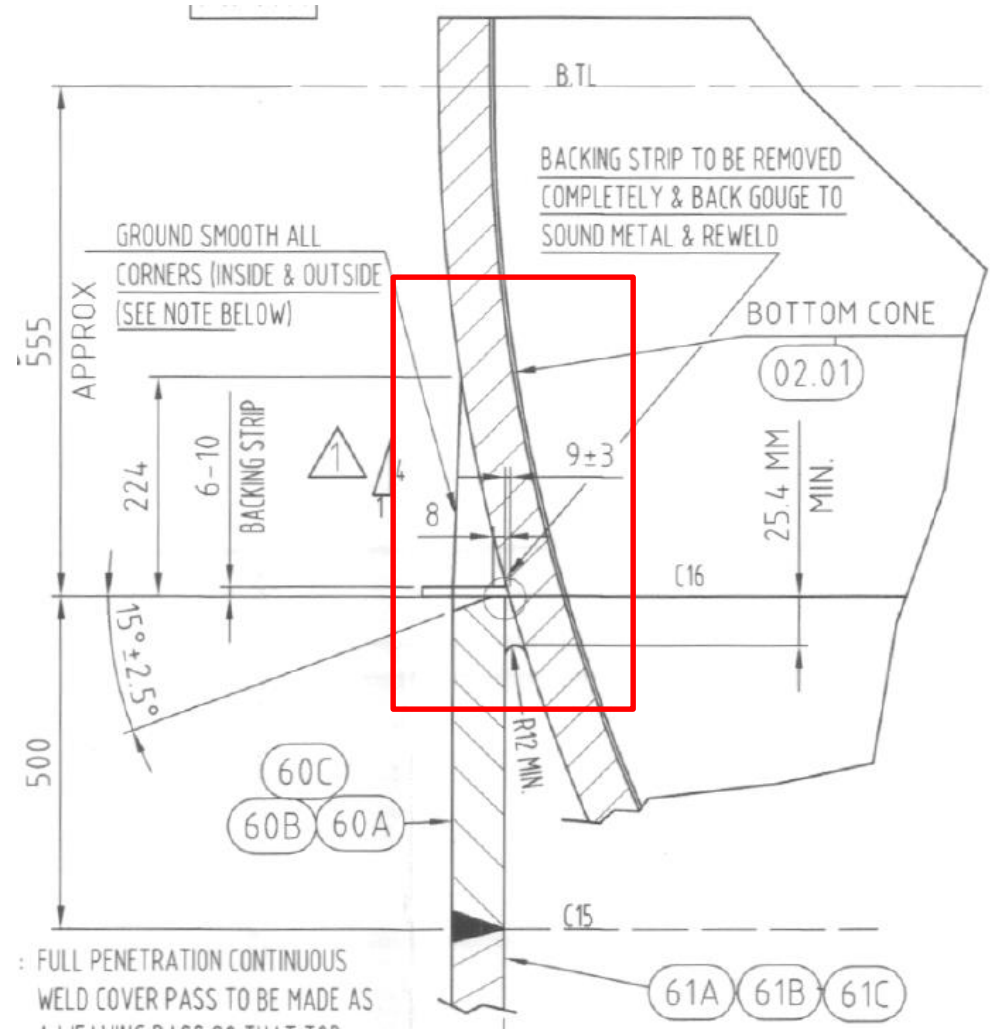
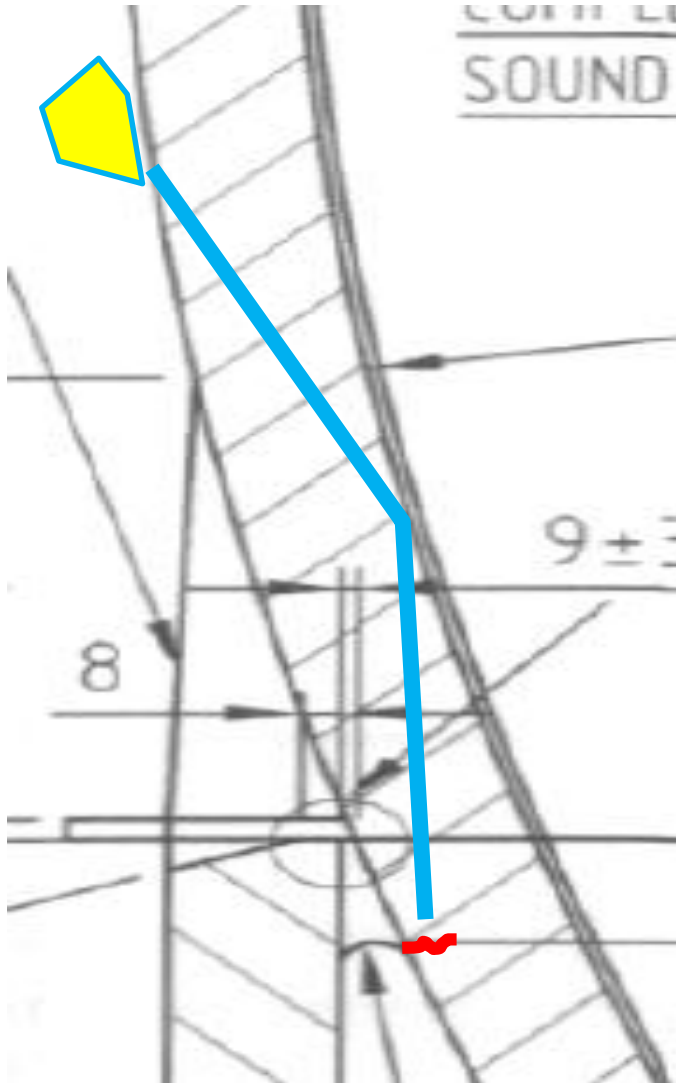
Skirt Cracking Results

Description	Location	Percent Cracking
Cracking at Weld	A,B&C	56%
Cracking into Shell	A	43%
Cracking from Skirt OD	B	63%
Cracking From Skirt ID	C	26%
Cracking at Slots / Keyholes	D	76%
Total Cracking in Skirts	A,B,C,&D	78%

API 1996 Survey



Shear Wave Ultrasonic Testing



Case Study

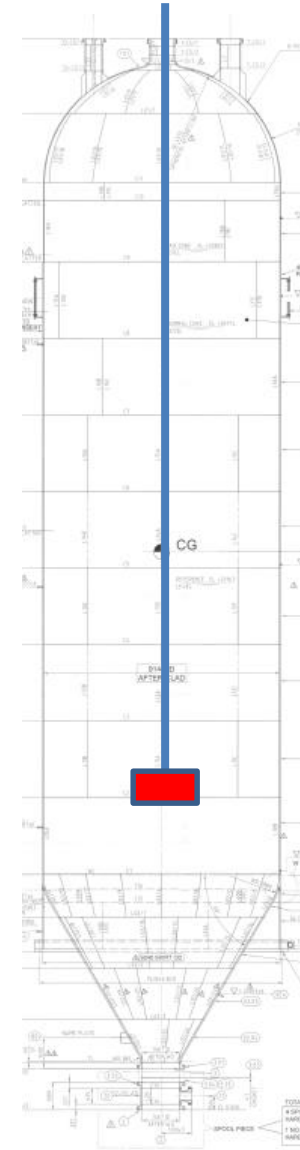


Through-wall crack not detected

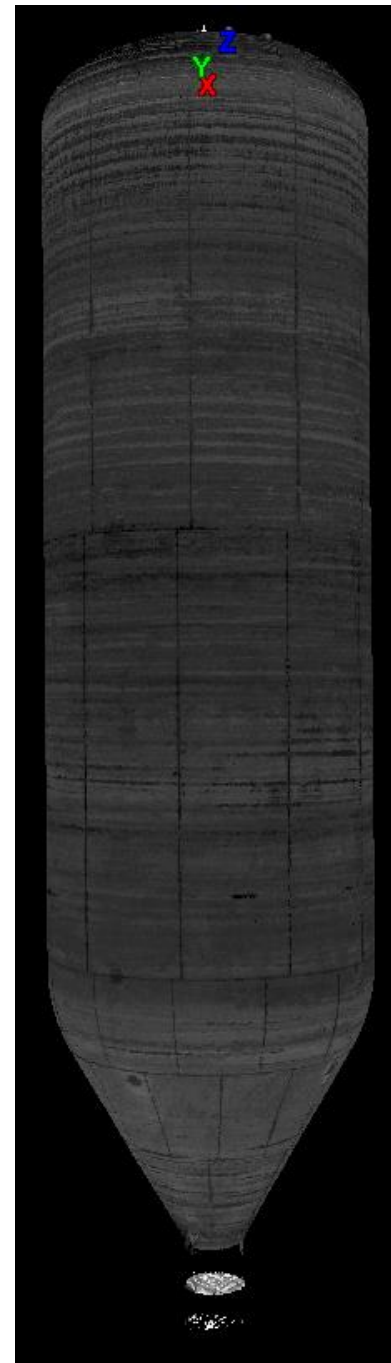
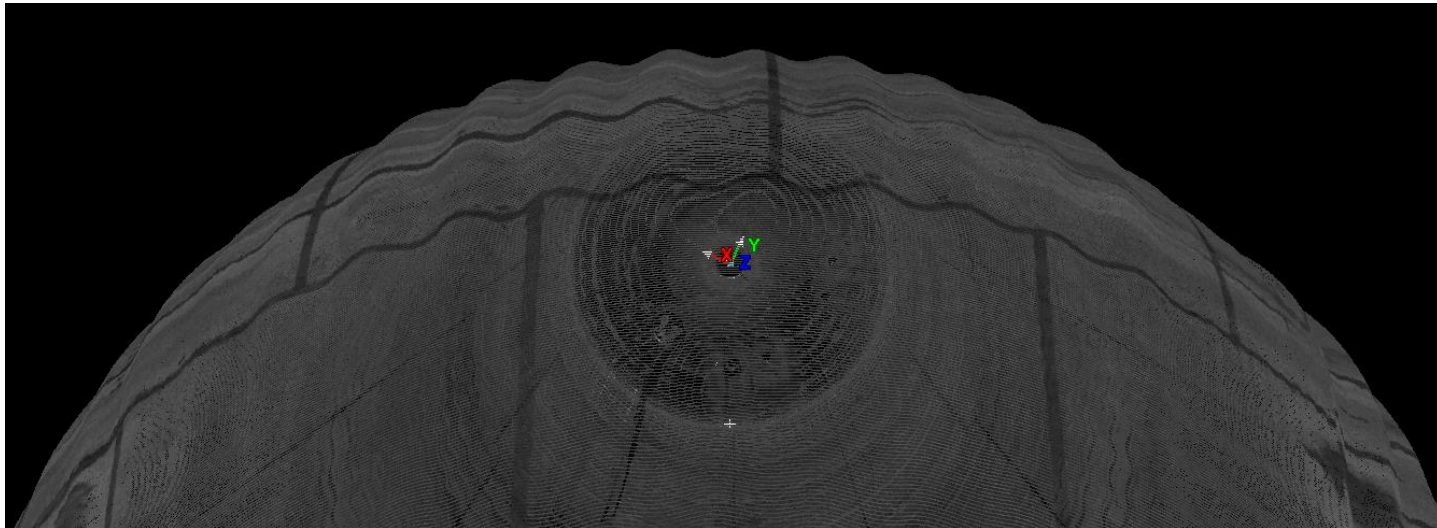
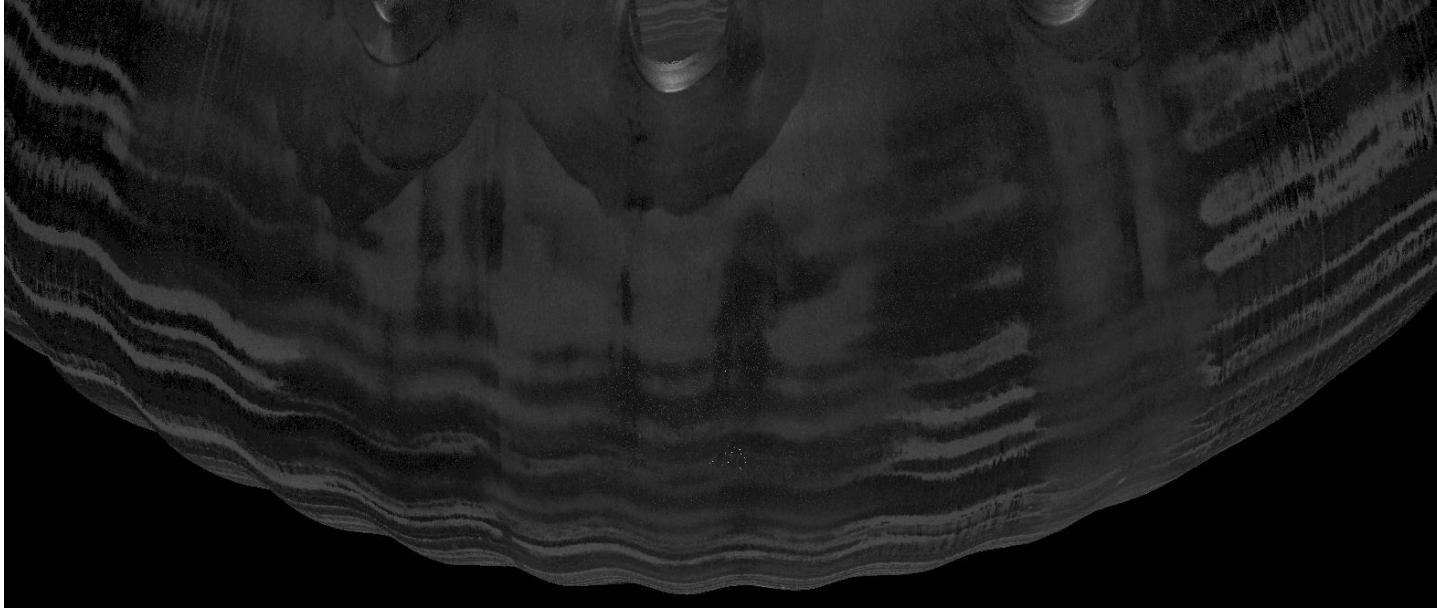
Smoothing of Laser Scan Data

Why?

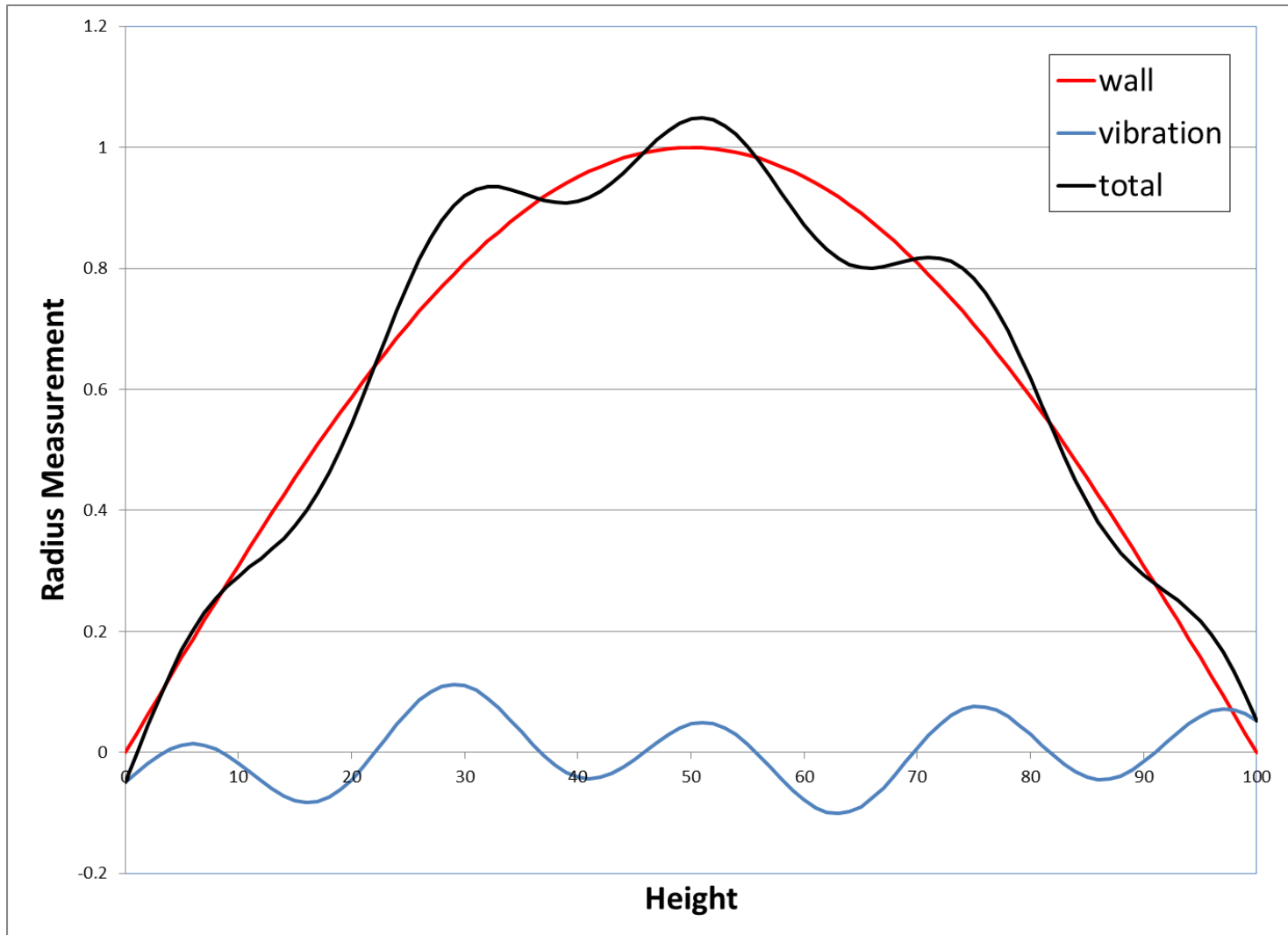
- Drill-stem vibrations
- Digital noise



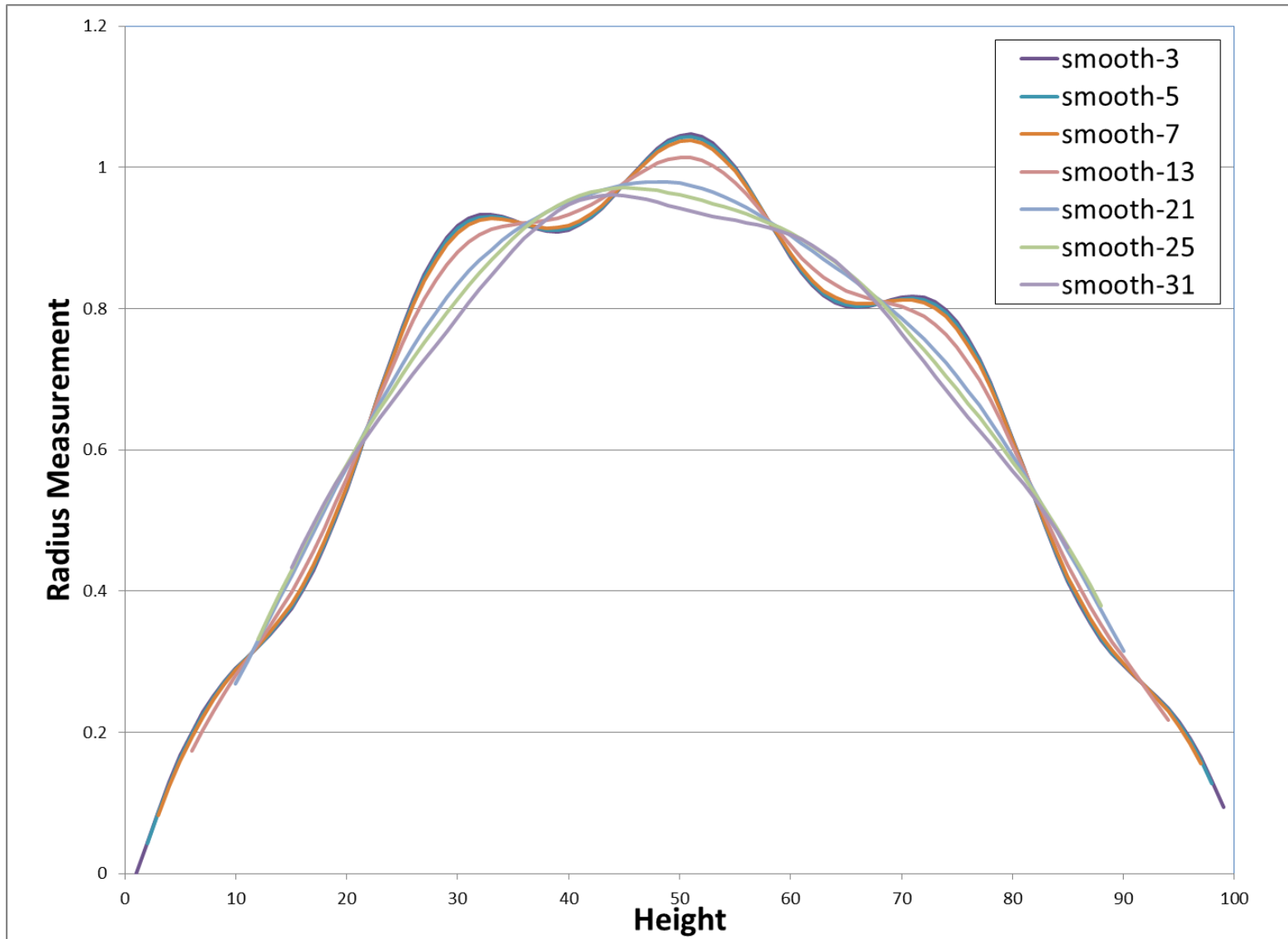
Vibration Effect



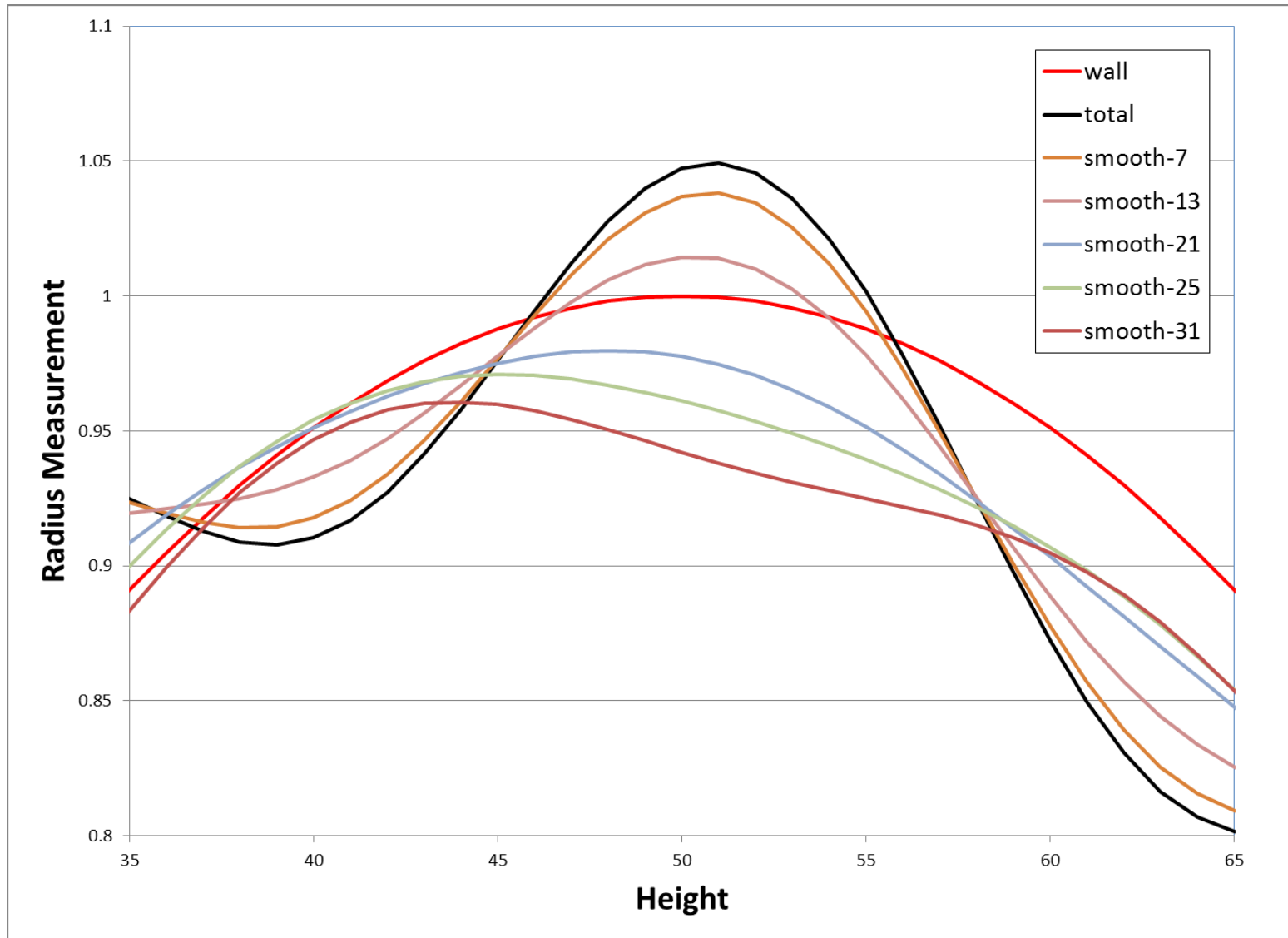
Signal Distortion



Signal Filtering

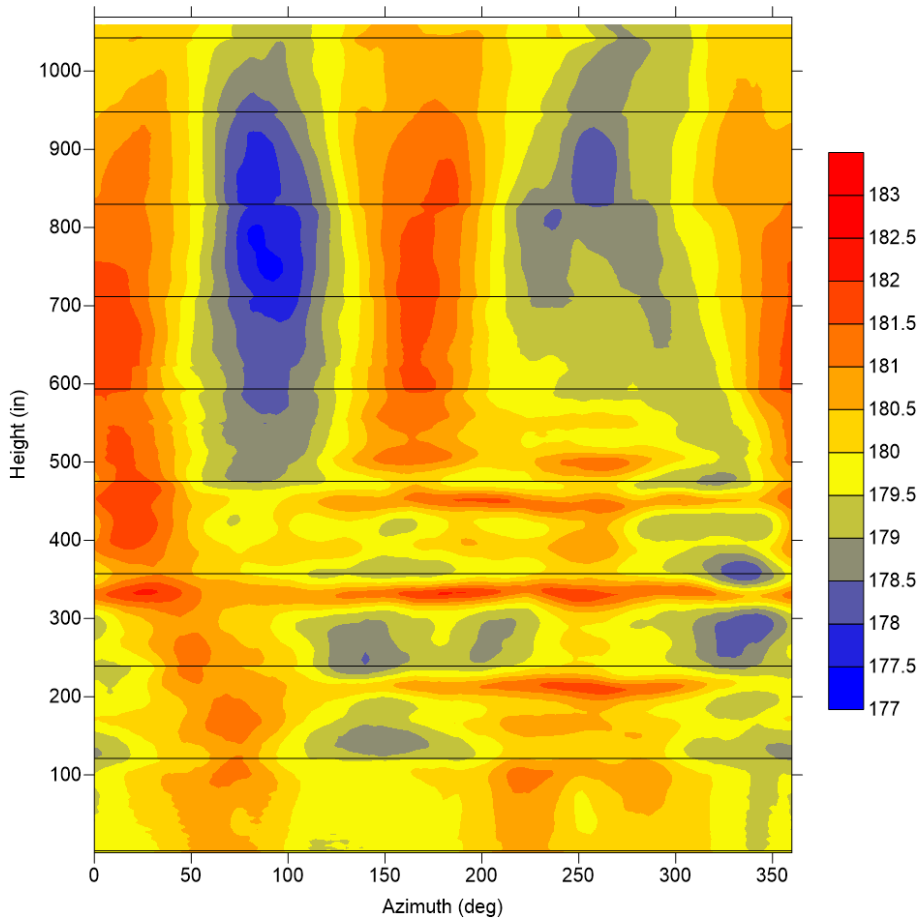


Signal Zoom

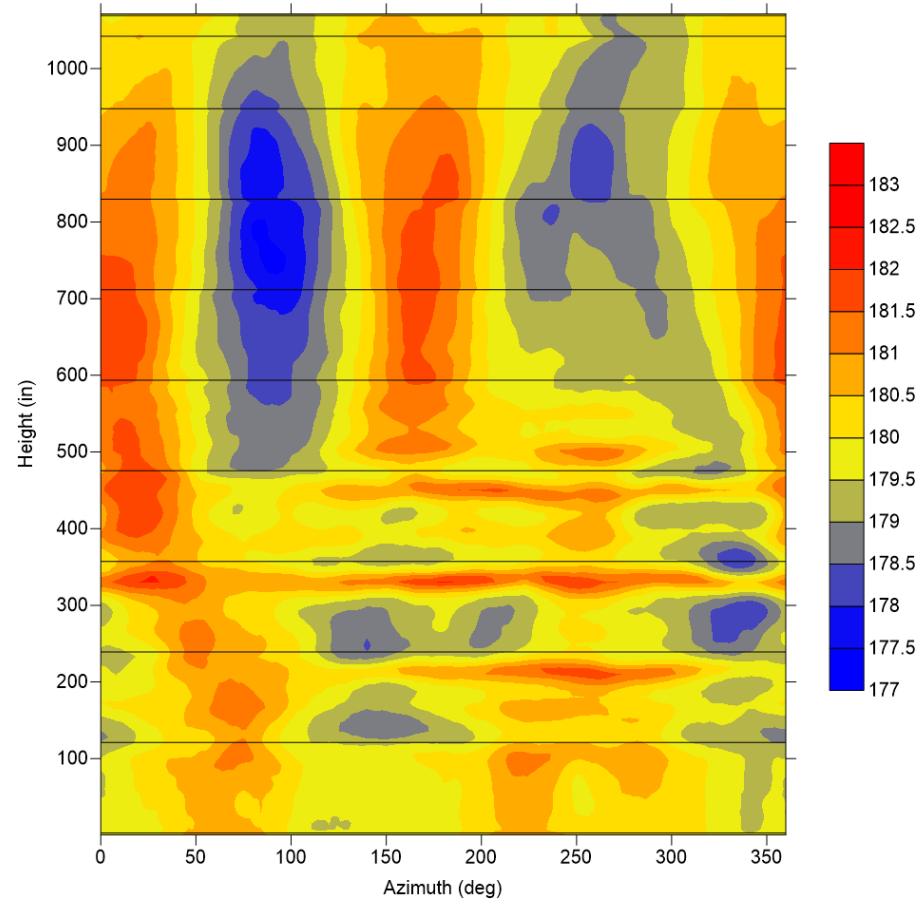


Case Study

Radius map



Less smoothing

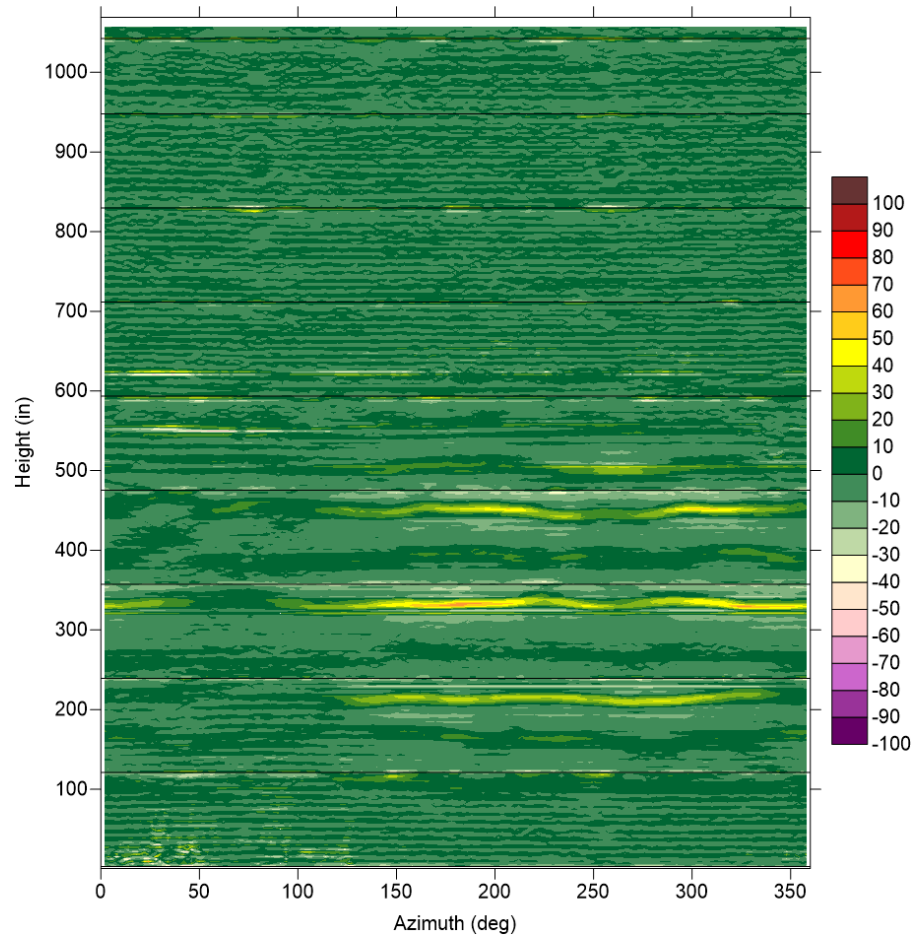


More smoothing

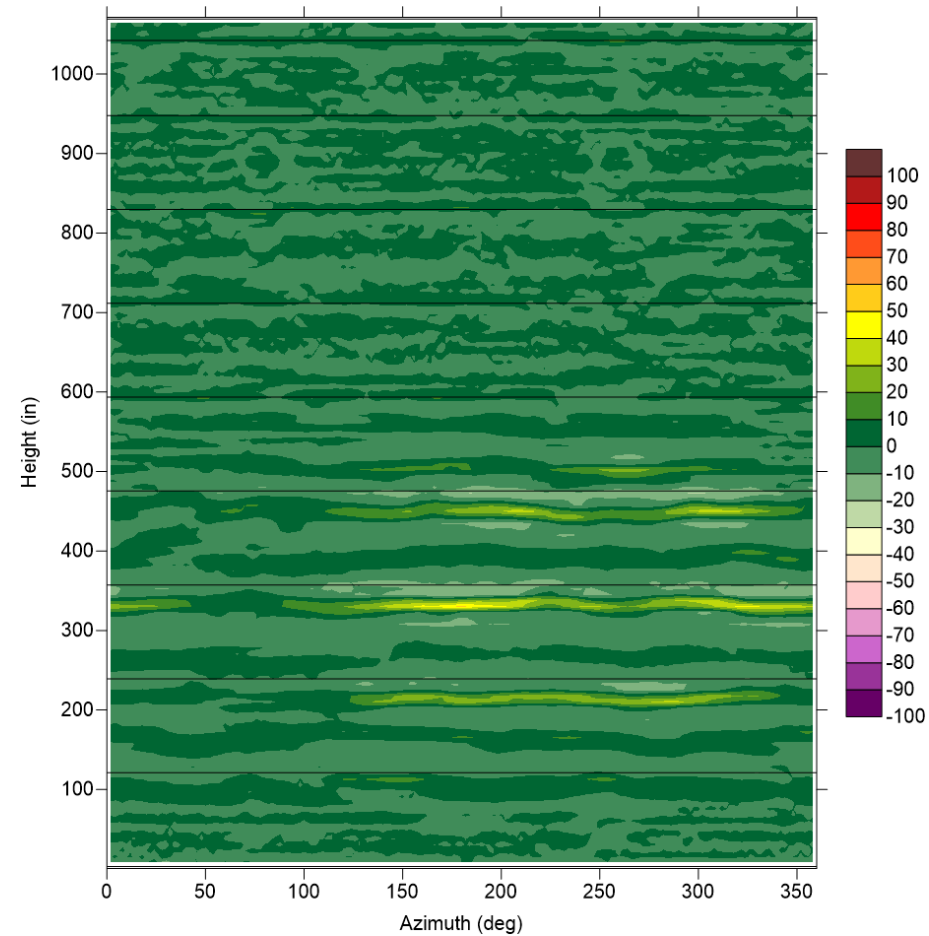
Case Study

Bulging Severity (PSI)

Incorrect assessment of
severe bulges



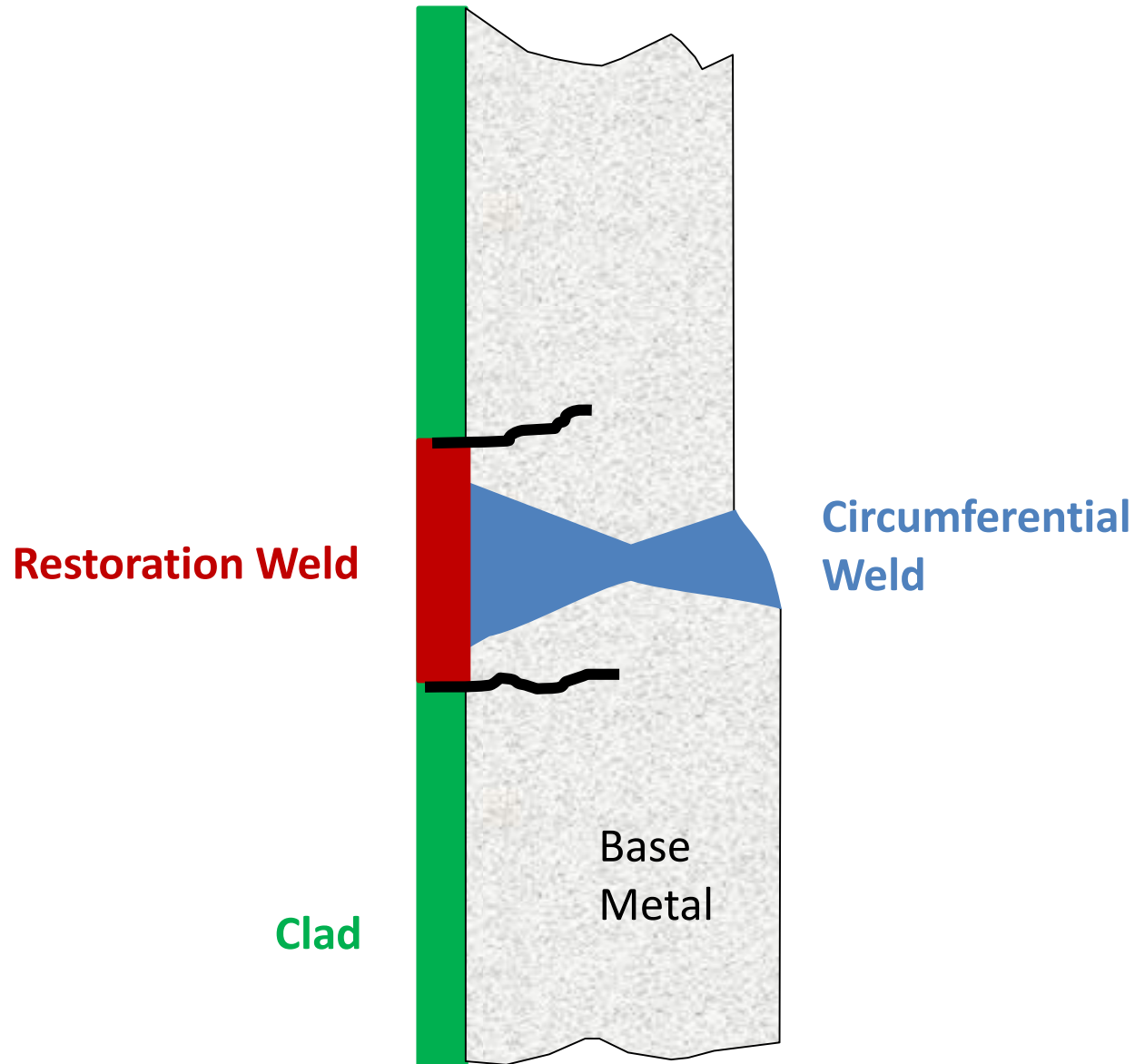
Less smoothing



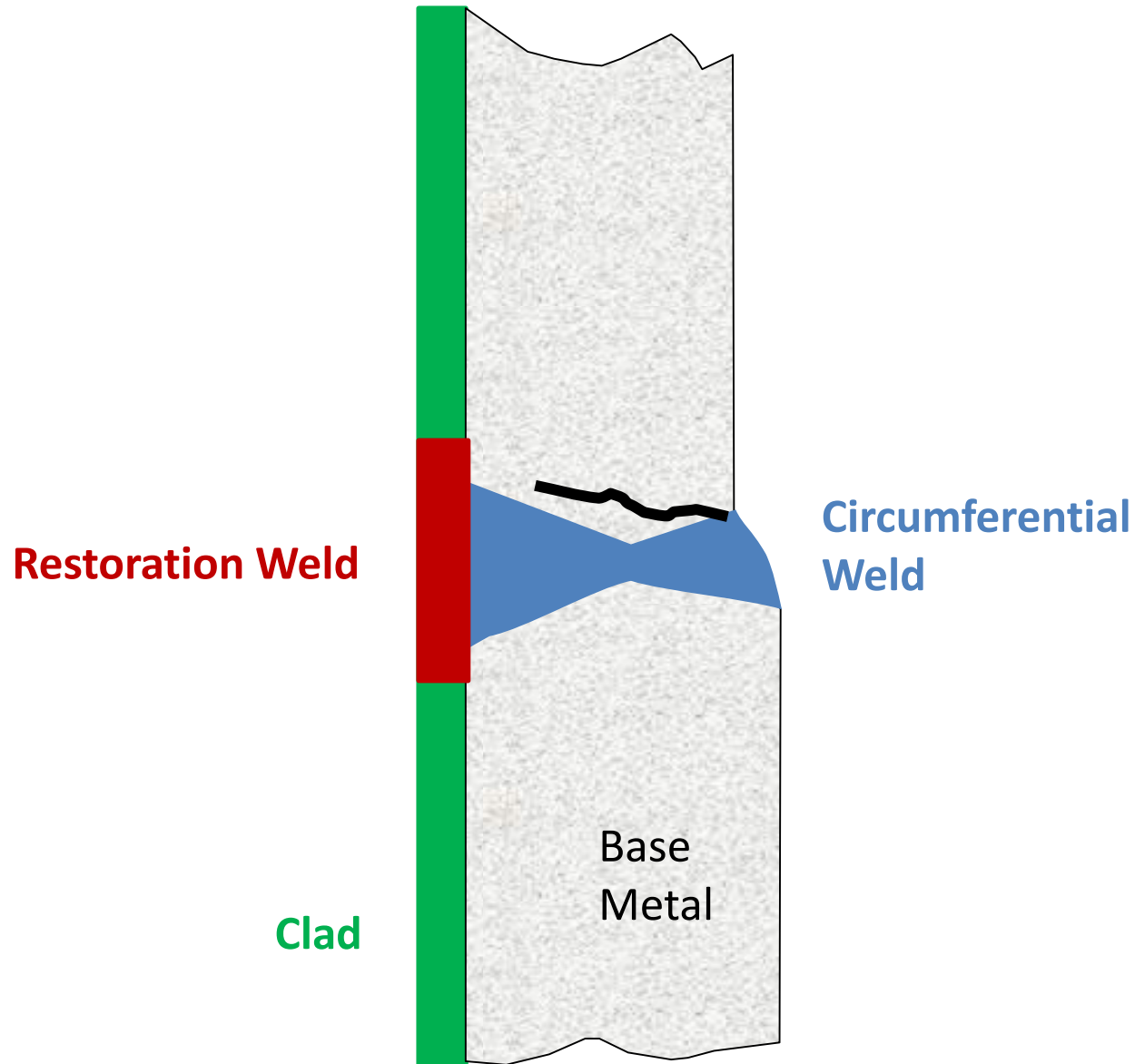
More smoothing

Internal Inspection of Seam Weld Cracks using Alternating Current Field Measurement (ACFM)

Classic Tri-Metal Joint Cracks

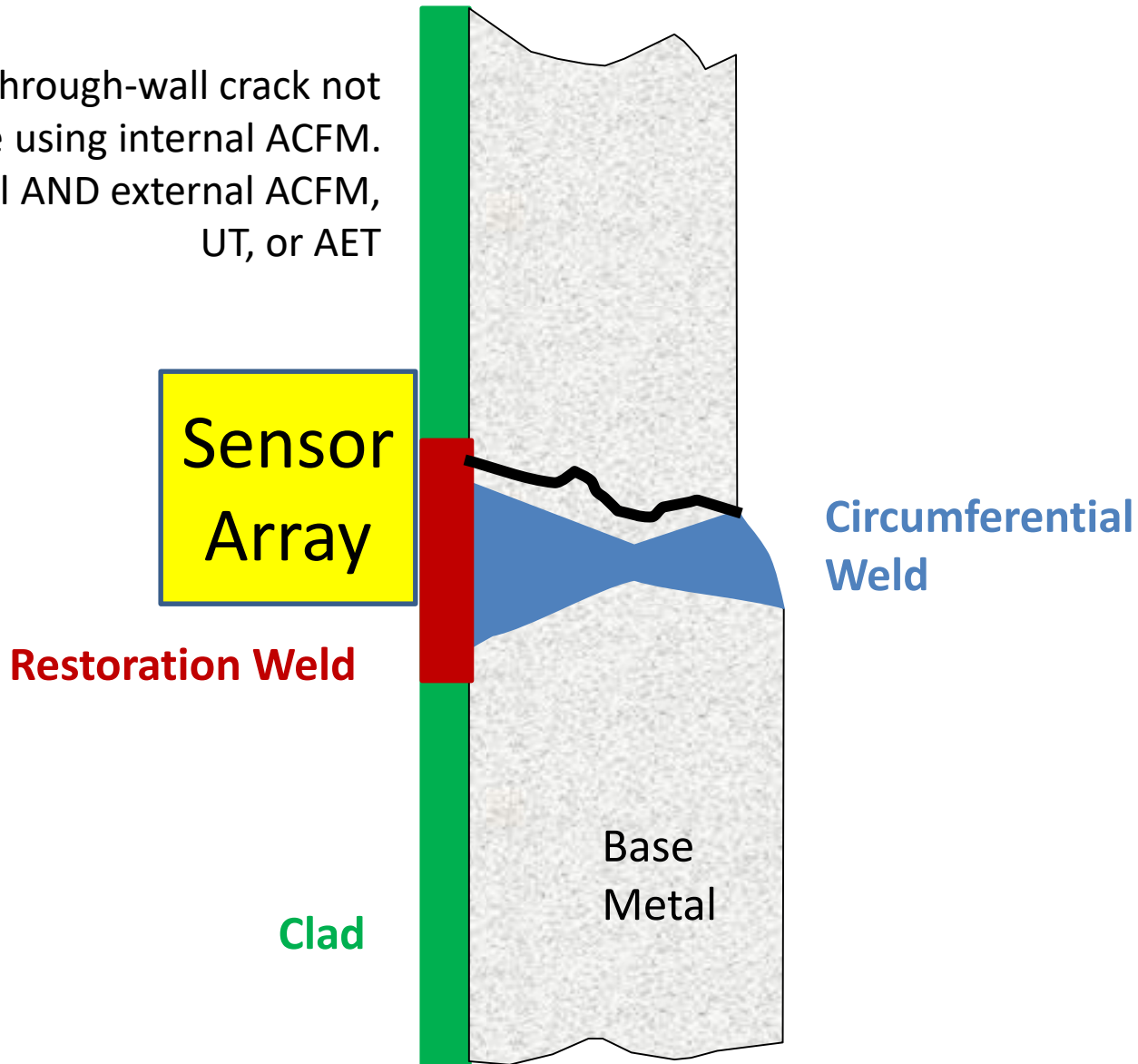


Common OD Cracks



Case Study

Almost through-wall crack not detectable using internal ACFM.
Need internal AND external ACFM, UT, or AET



Recap

- Inspection of cone side of skirt attachment
- Smoothing of laser data
- Internal inspection of seam weld cracks