

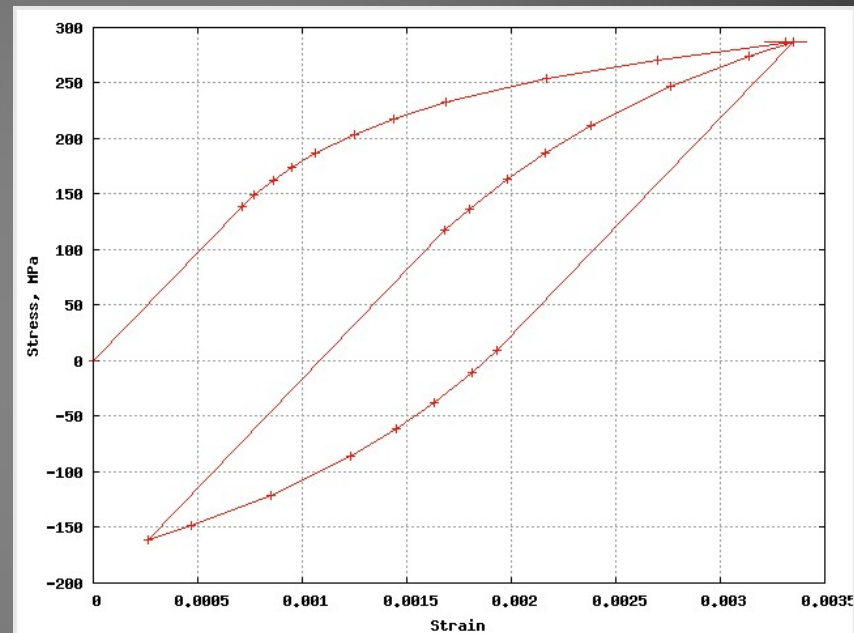
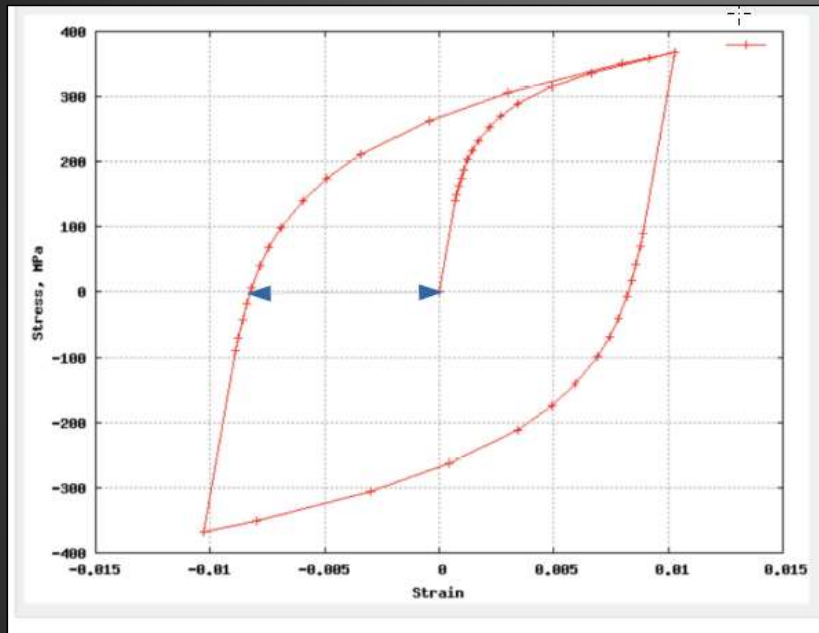
SAE FD&E Residual Stress Committee Update

Spring 2022

Casey Gales

John Deere

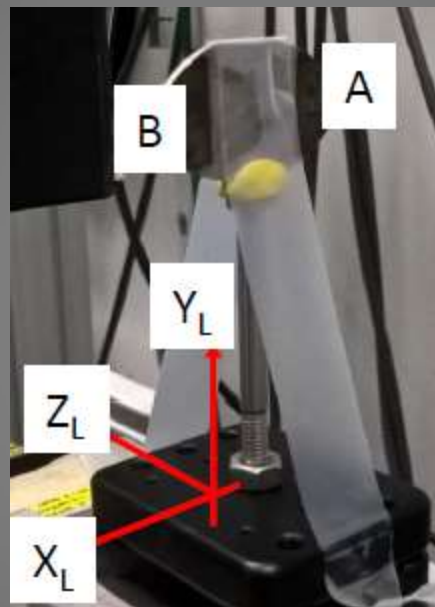
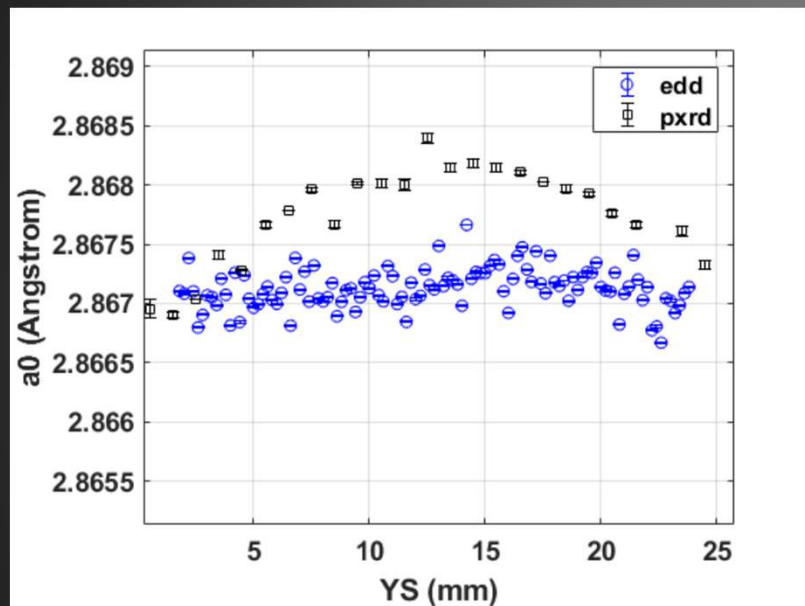
Residual Stress Relaxation Testing



Figures courtesy of Al Conle

- Large Plasticity vs Less Plasticity
- Published paper on high load
- Study low load next

Residual Stress Correlation

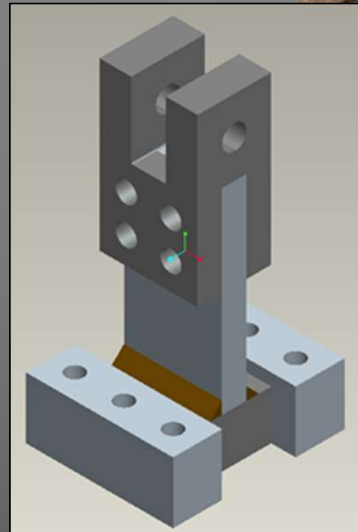


- D_0/A_0 investigation
- Average lattice parameter = 2.8672 Å
- Standard deviation = 0.0011 Å
- Part is back at Proto
 - Measure with Lab 6 powder
 - Check effects of part curvature

Figures courtesy of Jun Park (APS)

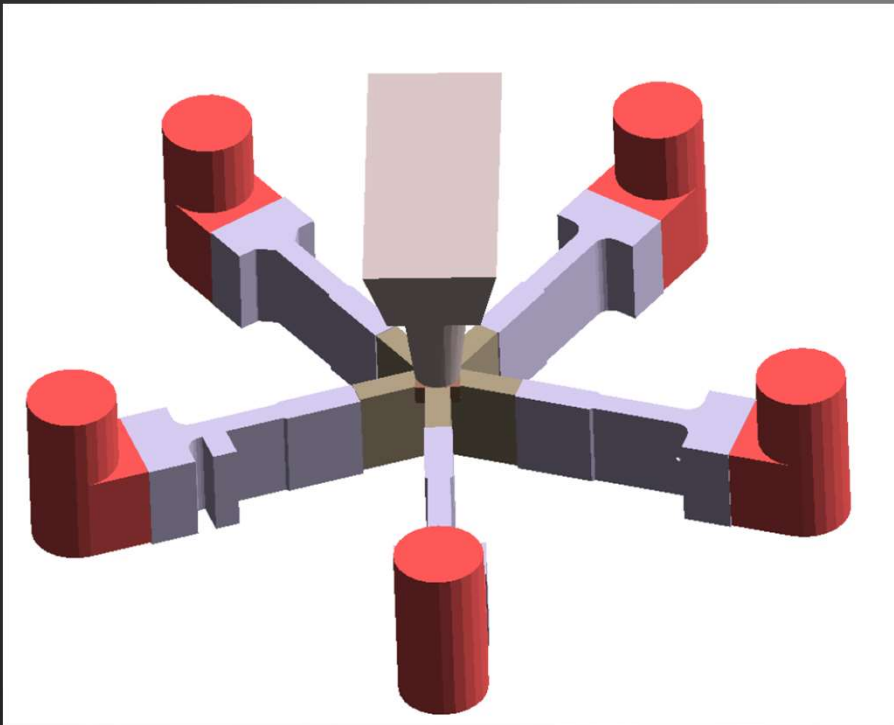
T-Sample Testing (Total Life)

- Long Life Cycling
 - 1 Million reversals
- Important Factors
 - K_f
 - Material Properties
 - Stress Field
 - Residual Stress
- More details in following presentation



Testing courtesy of John Deere

Steel Founders Cast T-samples



- Various inclusions
- 1700F Normalization
- Prepare for test rig
- Strain gage???
- Predict life – taking volunteers
- Test to Total Life

ICF – 15 Call for RS Abstracts

- Co-chairing RS Workshop
- June 11-16, 2023
- Atlanta, GA
- Inducing RS
 - Localized Processes (i.e. – LP, CX, etc.)
 - Bulk Processes (i.e. – forging, welding(?), heat treatment, etc.)
- Simulation
- Modelling Val/Ver
- Characterization and Measurement
- Corrosion
- Changes Over Time
- Multi-scale Considerations
- Applications

[ICF15 | ICF15 \(gatech.edu\)](https://gatech.edu/icf15)

Questions & Contact

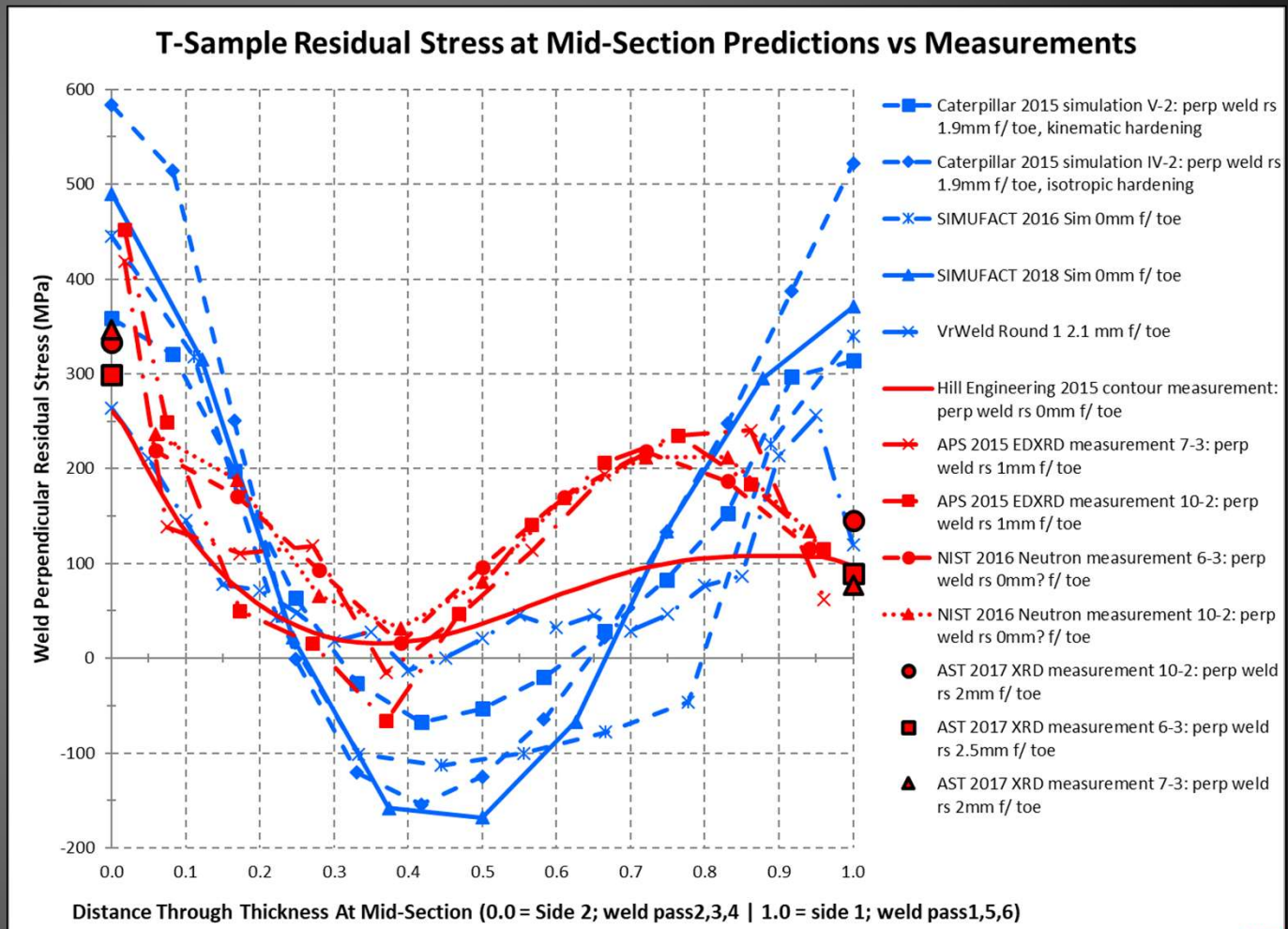
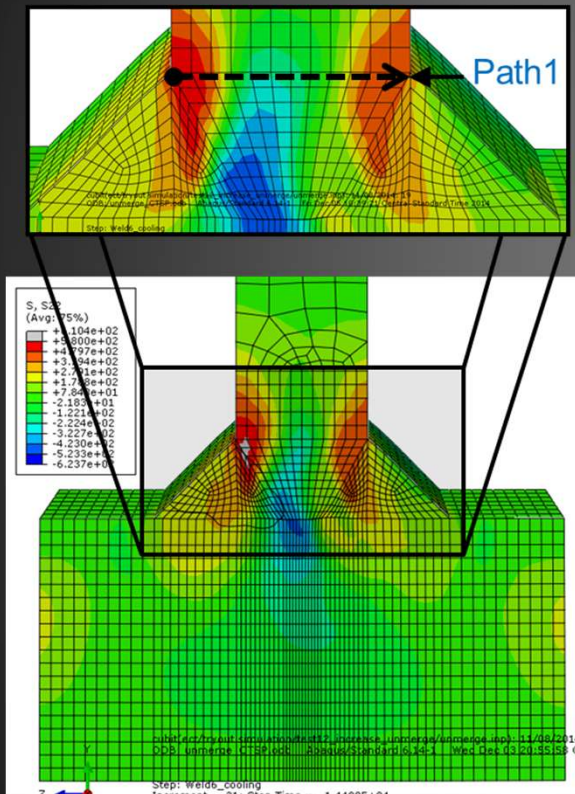
Thank you!

Casey Gales

galescaseye@johndeere.com

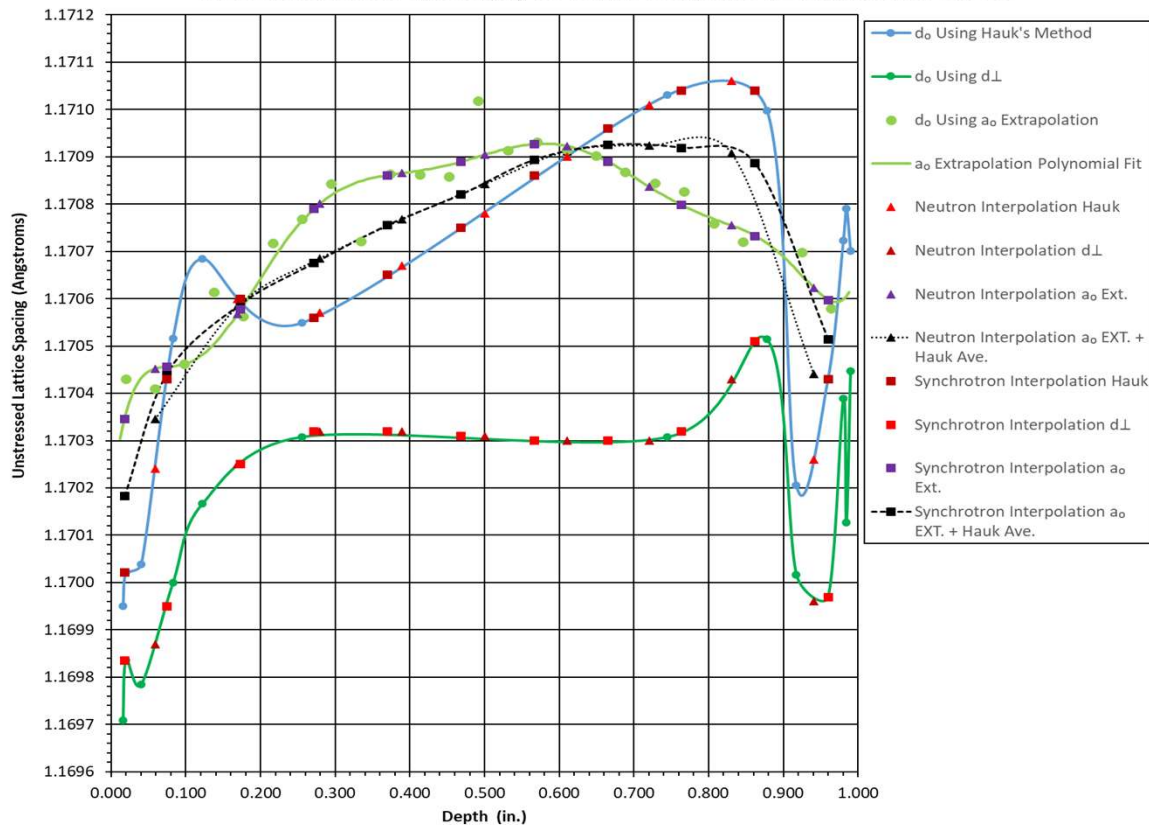
6/15/2022

T-Sample Residual Stress



Correlation of Measurement vs Predicted Residual Stress

Unstressed Lattice Spacing d_0 vs. Depth Using XRD : 1 mm from Weld Toe



- Improve diffraction measurement
 - Currently use constant D_0
 - Correct for D_0 changes through thickness
- ProtoXRD provided D_0 vs thickness
 - Hauk's Method
 - D-Perpendicular
 - Powder diffractometer

Data/Figures courtesy of ProtoXRD (James Pineault)