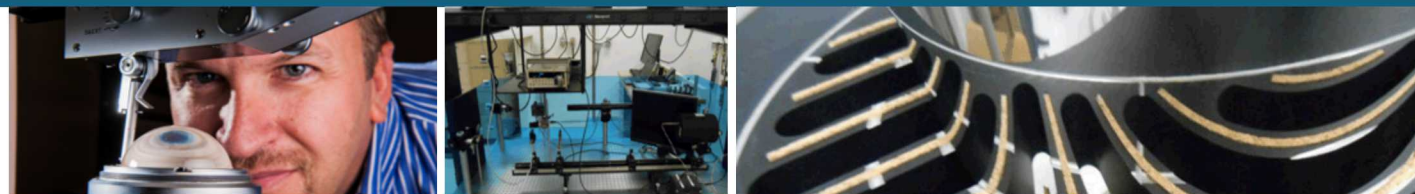


Lessons Learned: Tension Member Failure on Force Calibration Frame



PRESENTED BY

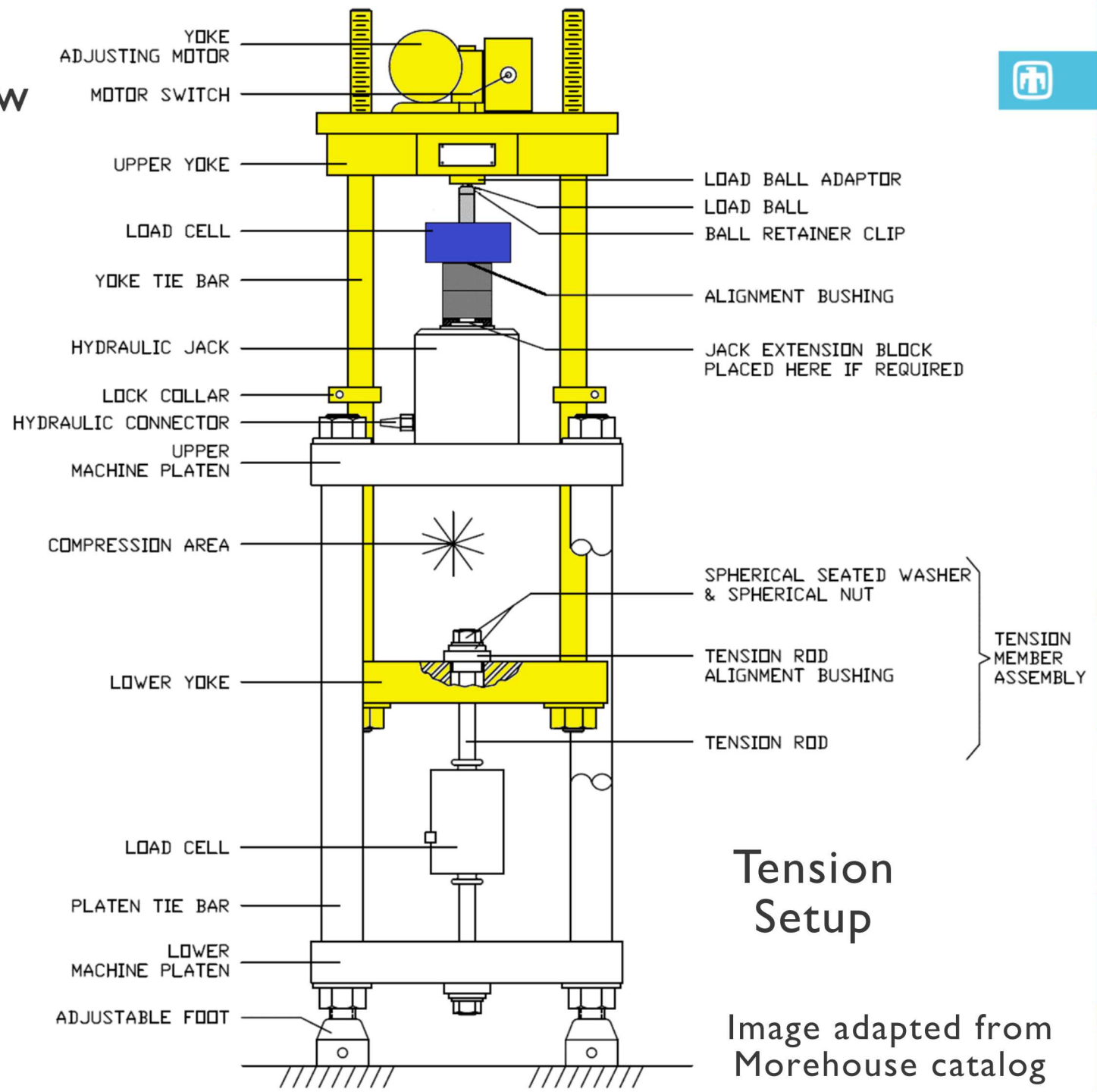
Andrew Mackrory

Project Lead: Length, Mass, Force Lab
DOE Primary Standards Lab, Sandia National Laboratories

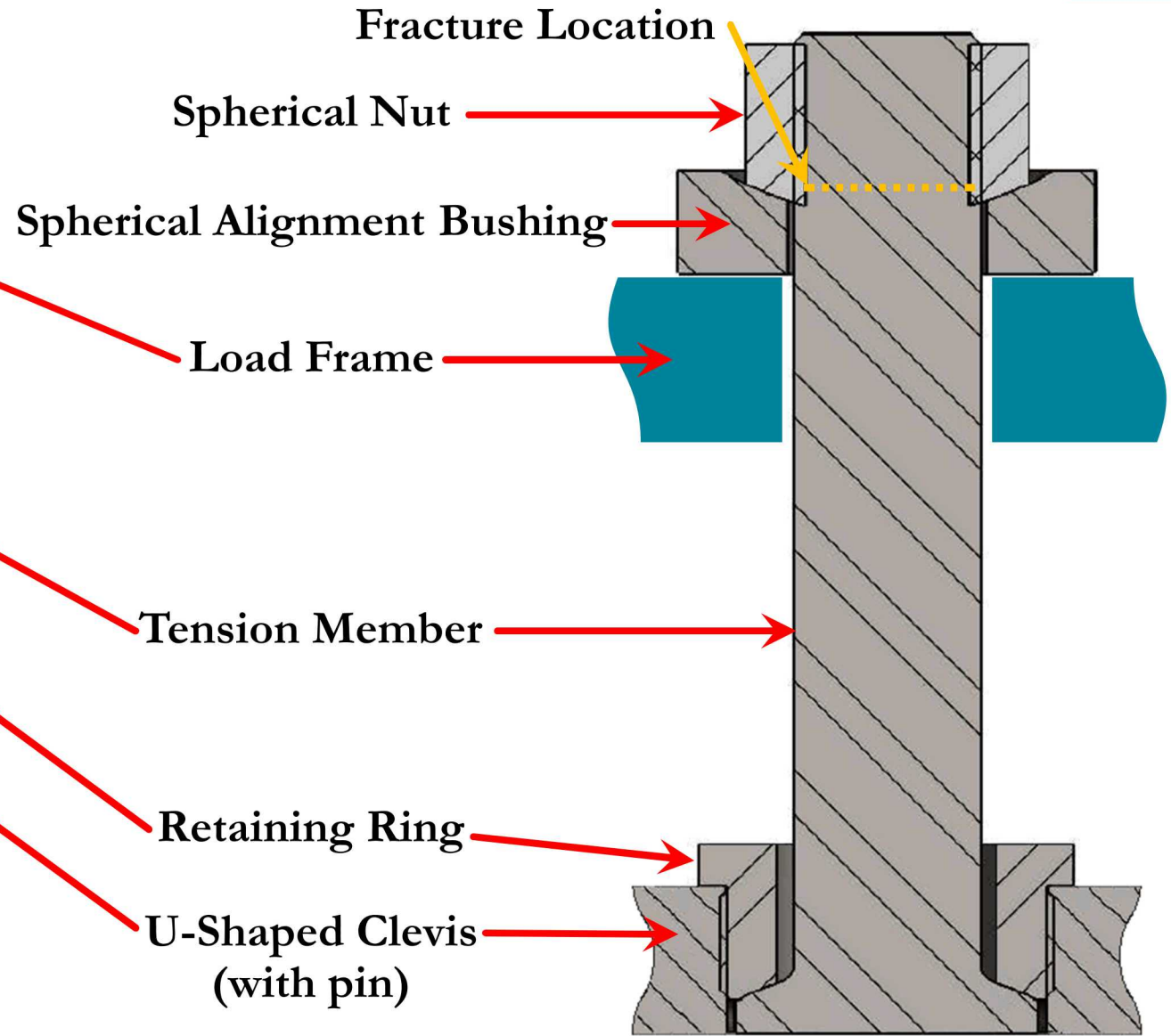
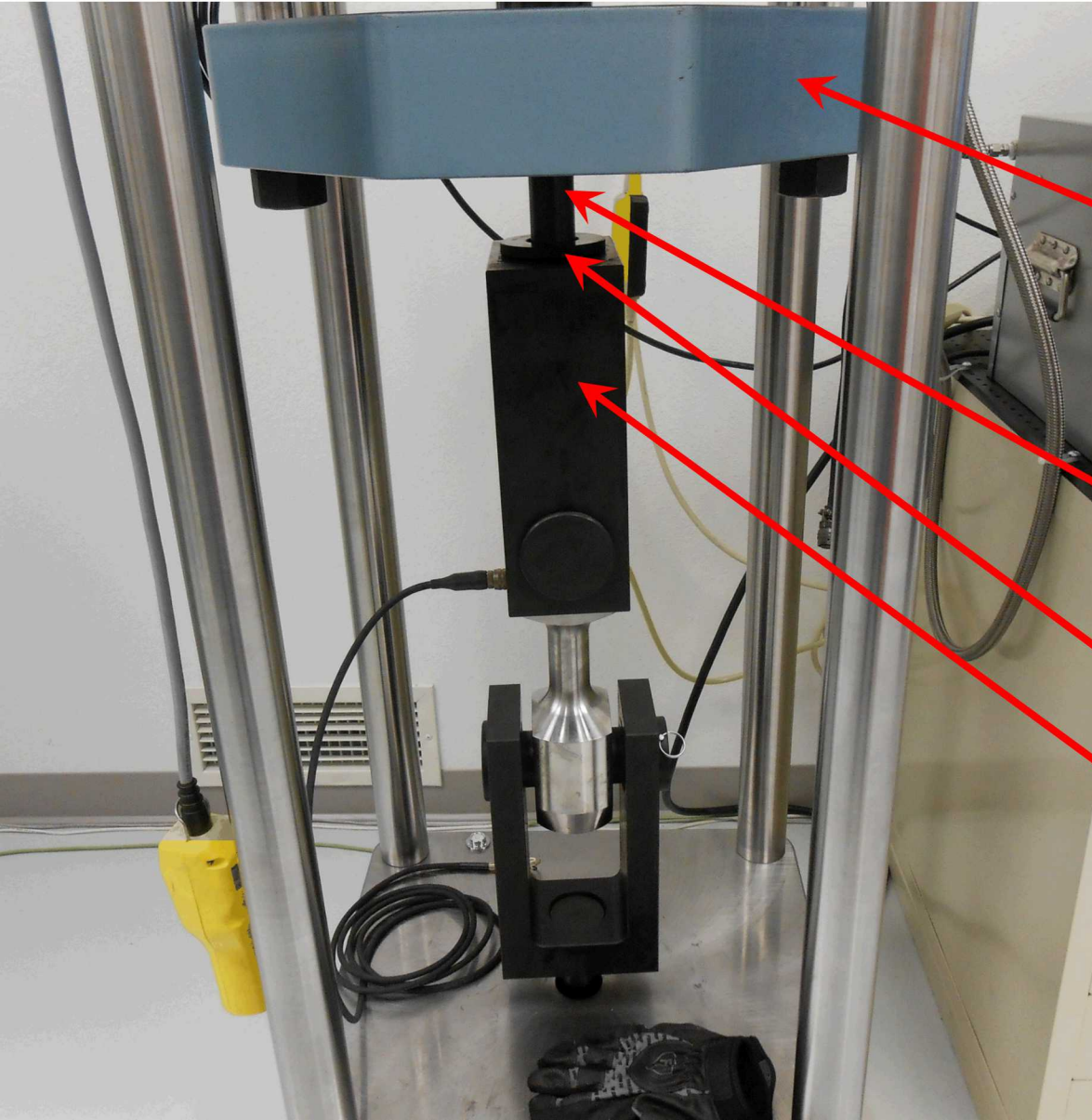


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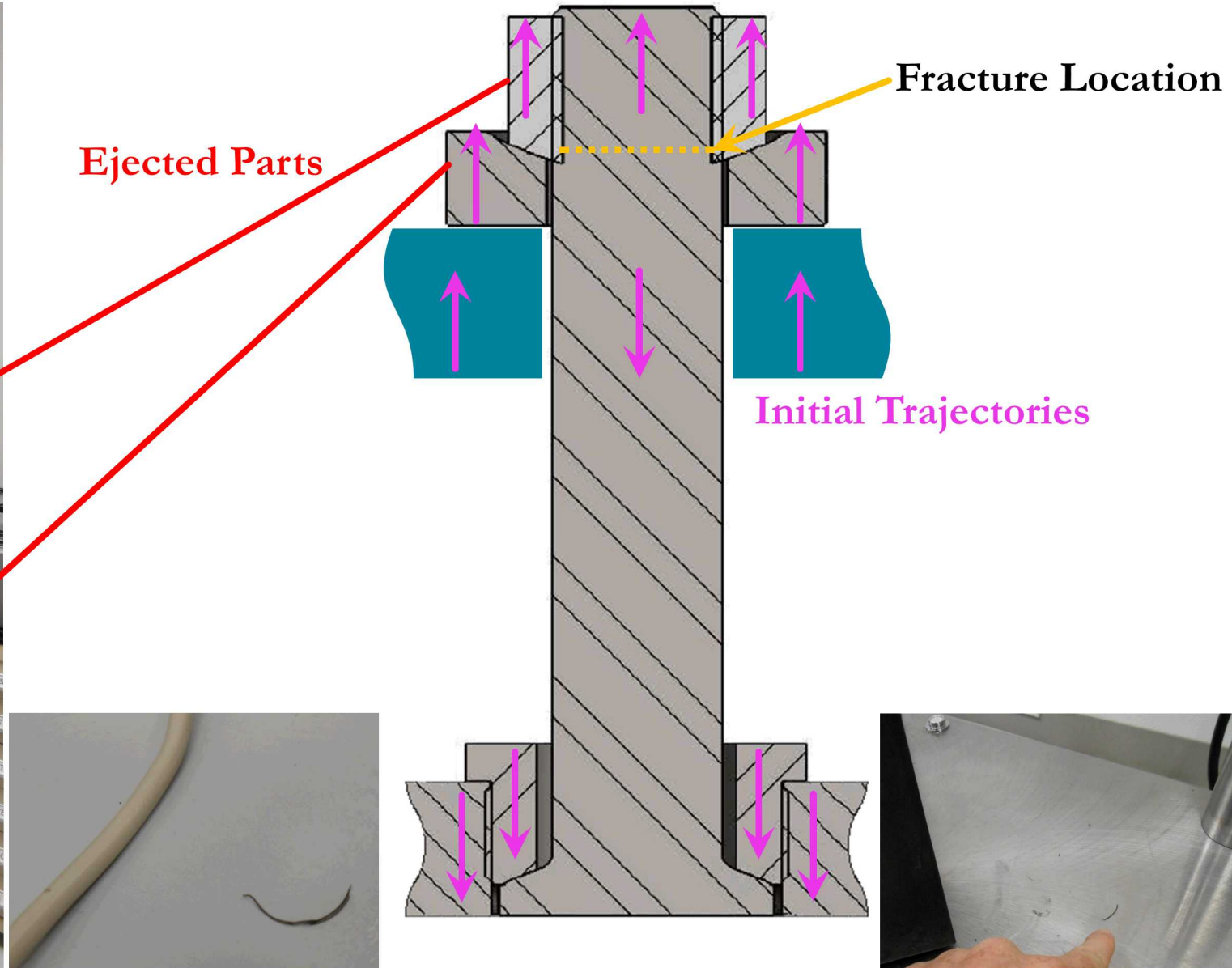
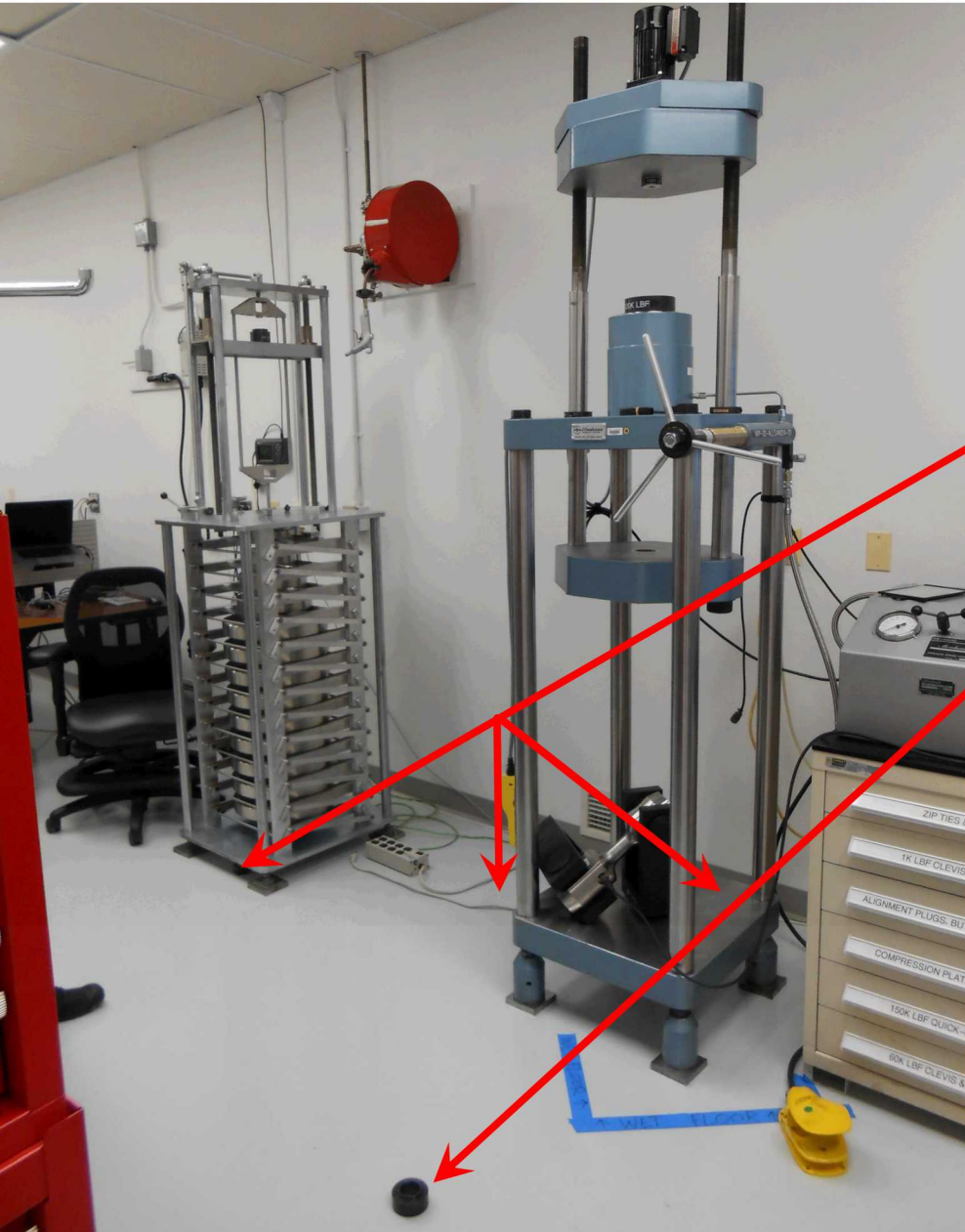
150 000 lbf Load Frame Overview



Setup: First 100 000 lbf Tension Calibration



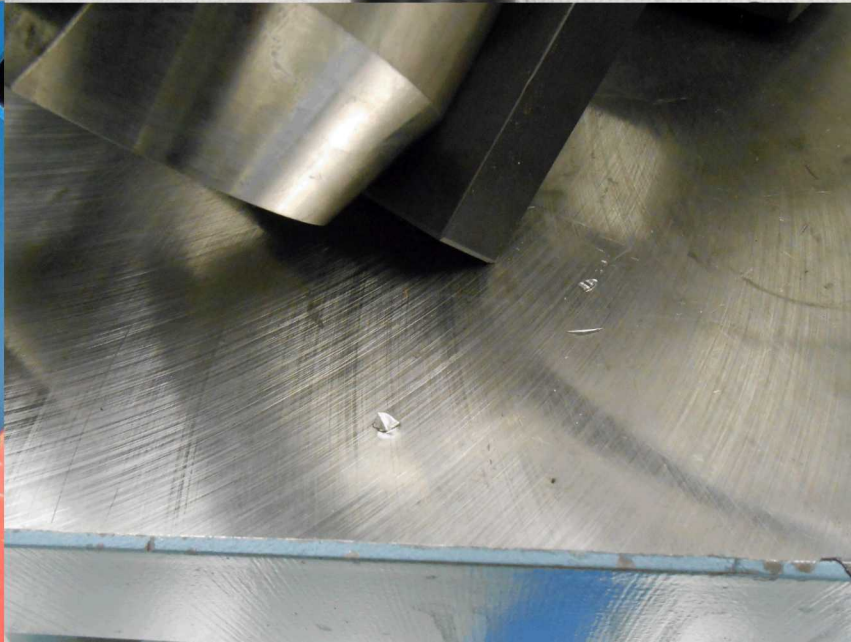
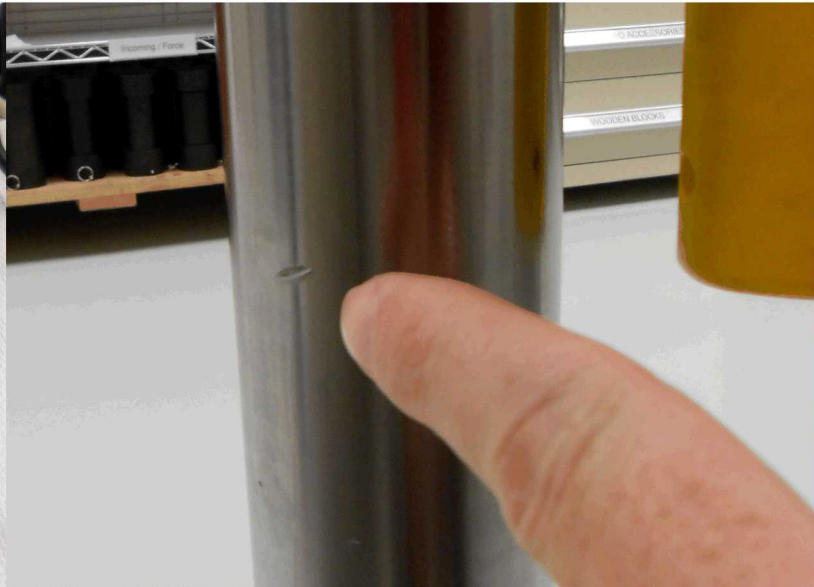
The Big Bang



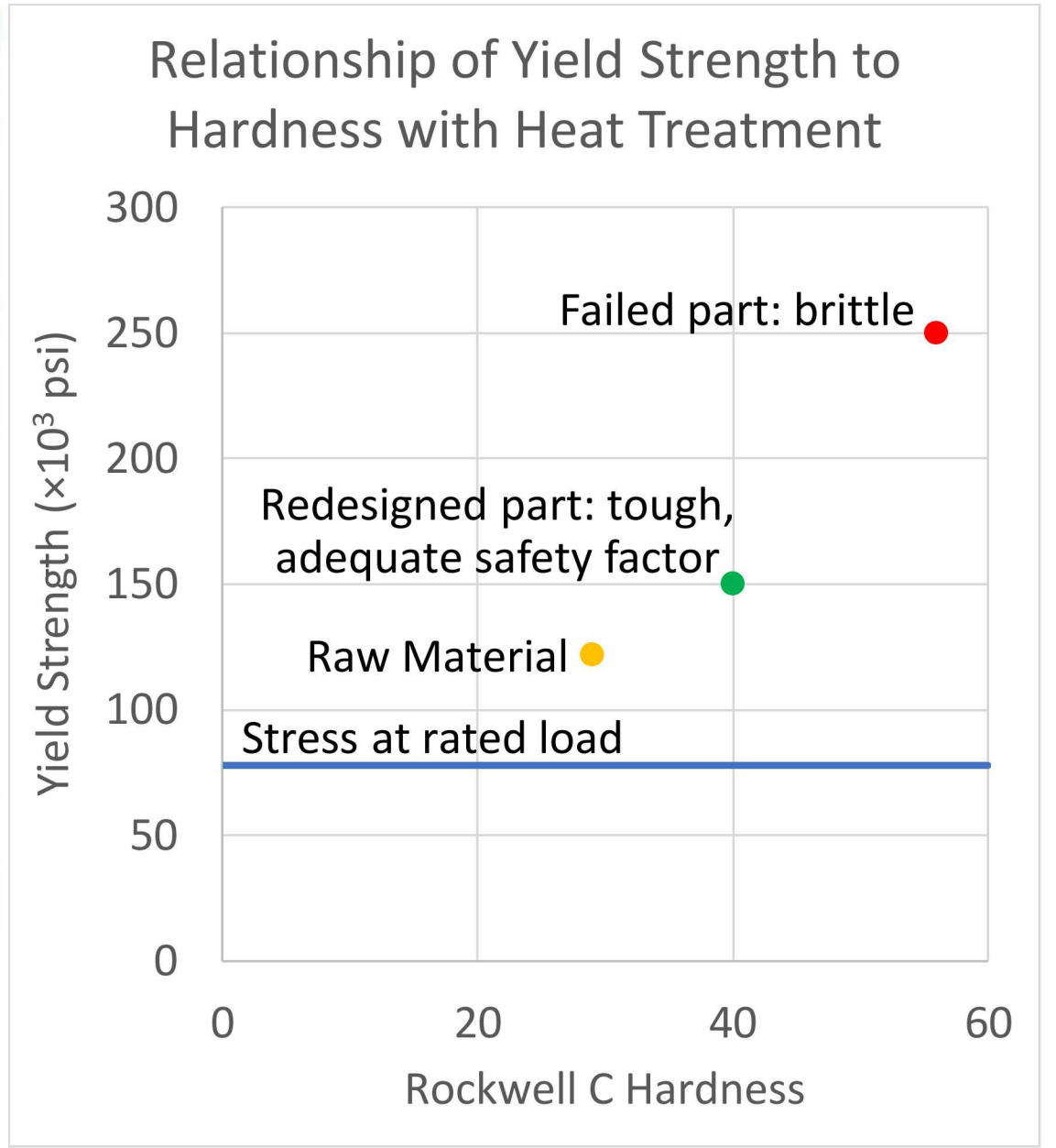


1. Confirm no injuries
2. Secure unstable equipment
3. Notify management
4. Begin taking photographs/documentation
5. Notify manufacturer
6. Hold first meeting with incident investigation team

6 Inventory of Damage



7 Investigation – Root Cause



- Use only fittings from a reputable manufacturer with identified load capacity
- Use precalibration safety checklist with independent verification
- Add force in stages when initially exercising the load cell
- Limit operating area to essential personnel
- Use the buddy system
- Use appropriate PPE (safety glasses and safety toe shoes)
- Dispose of parts at end of life (after 20 years or x number of uses)
- Share lessons learned between labs

- Determine extent of condition (PO search, DOE Metrology Committee alert)
- Contact Manufacturer:
 - Replacement of parts with proof testing
 - Failure analysis
 - Recall other affected parts
- Purge inventory of fittings beyond service life or of unknown pedigree
- Design and build containment
- Use a camera to view local displays (safety and ergonomic benefits)
- Proof test all future purchases

Corrective Action: Engineered Containment



- 2 layers of LEXAN™ (polycarbonate)
 - 1/4 inch
 - 3/8 inch
- 80/20 Framing
 - Minimal in-house machining required
- Sliding doors with large access area
- Rubber mat

Acknowledgements

Thanks to:

- LANL Standards and Calibration Lab
- Kirtland AFB PMEL
- Morehouse Instrument Company, Inc.

Questions?