WORLDWIDE KNOWLEDGE – LOCAL SOLUTIONS®

Coiled Tubing Vibrational Analysis

Dan Regehr – ICoTA Roundtable – October 25 / 2017

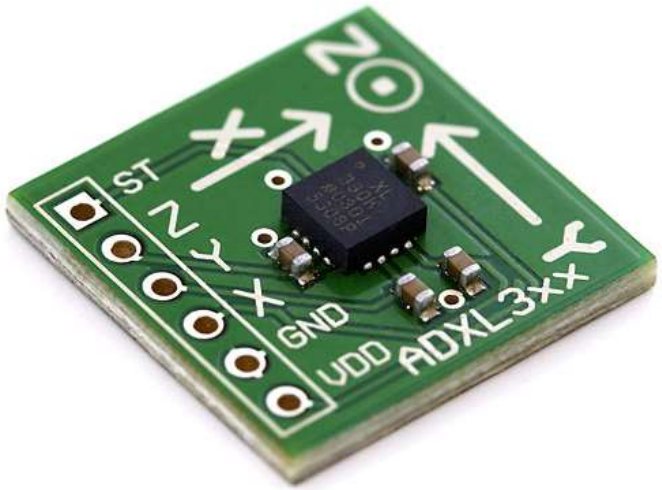
Perception

Severe vibration associated with water hammer tools cause premature wear / fatigue on surface equipment and coiled tubing.

Water Hammer Tool – Vibration Video

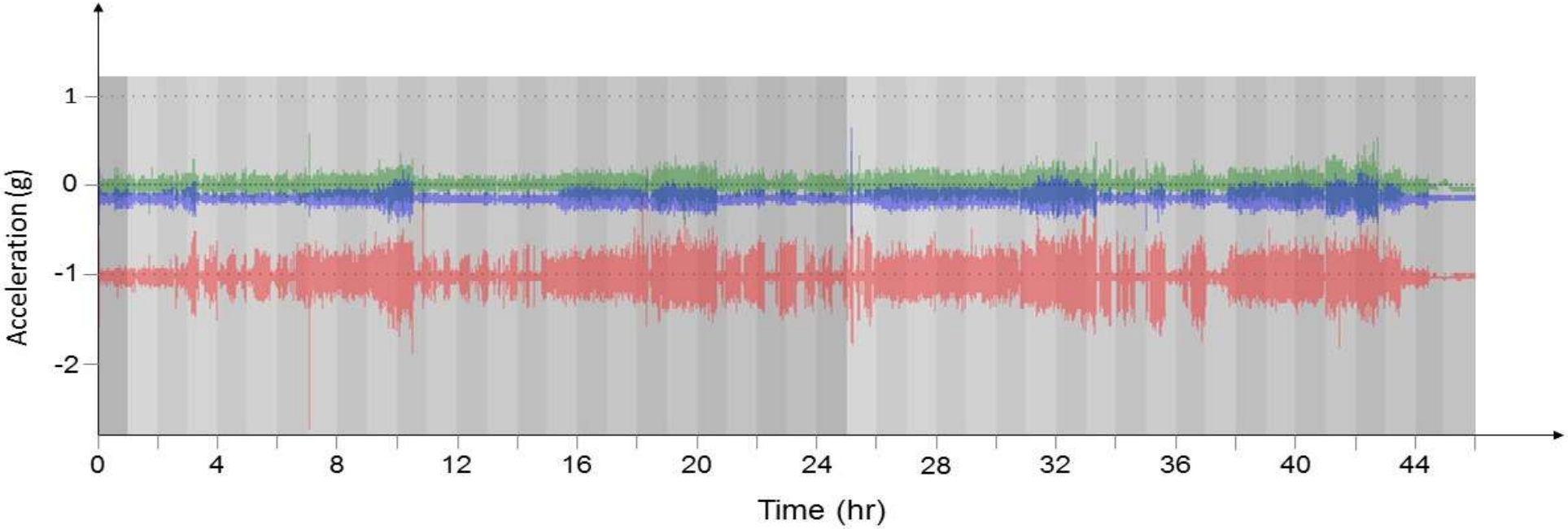
How To Validate?

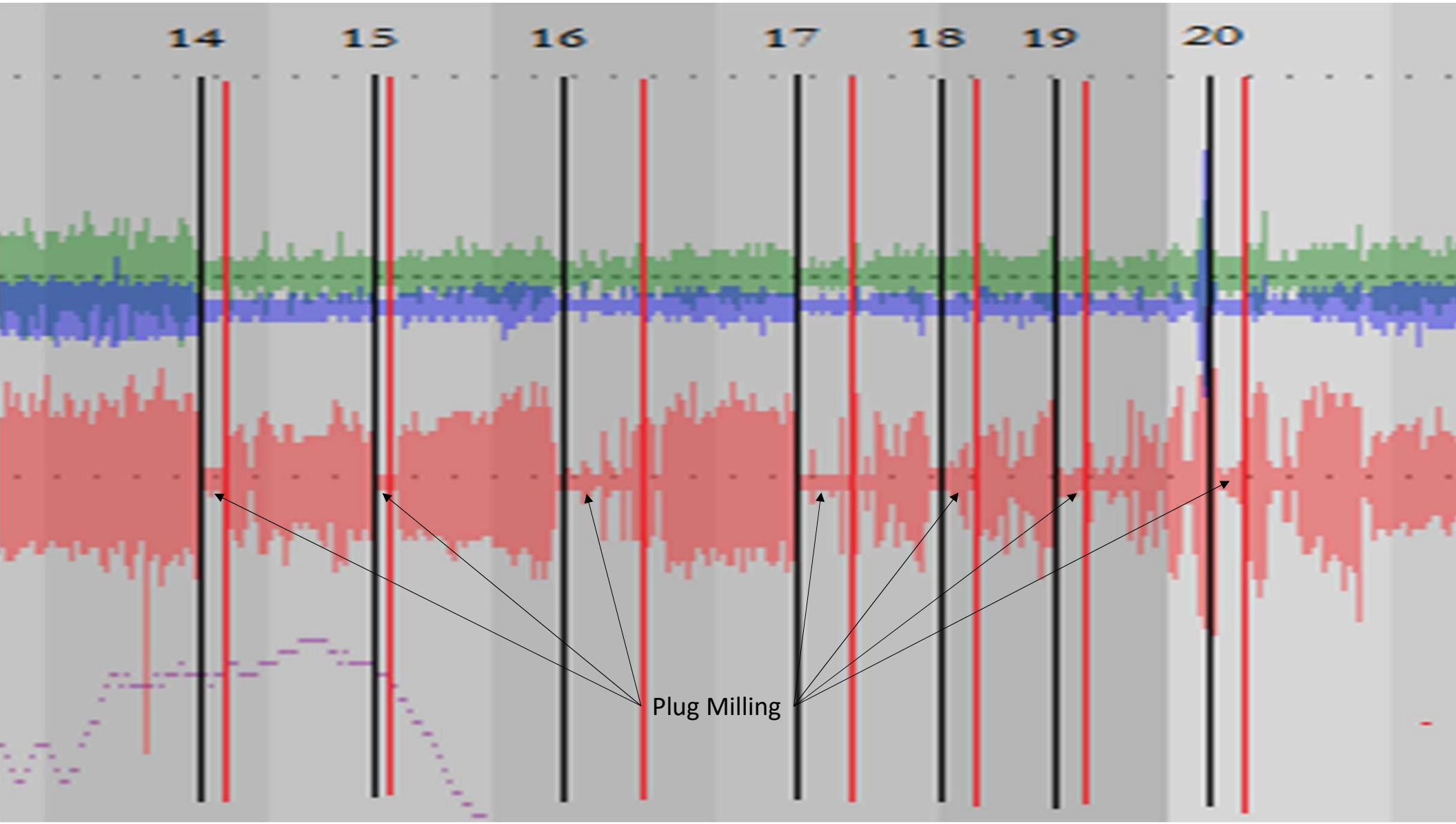
- 3-axis accelerometer to measure vibrations during milling
  - Mounted to injector at surface
  - Incorporate into bottom hole assembly
- Post job data analysis



What Did we Learn?

- On surface, vibrations from tool < vibrations from equipment
- No cause for concern – no damage to injector – nothing more than 1g

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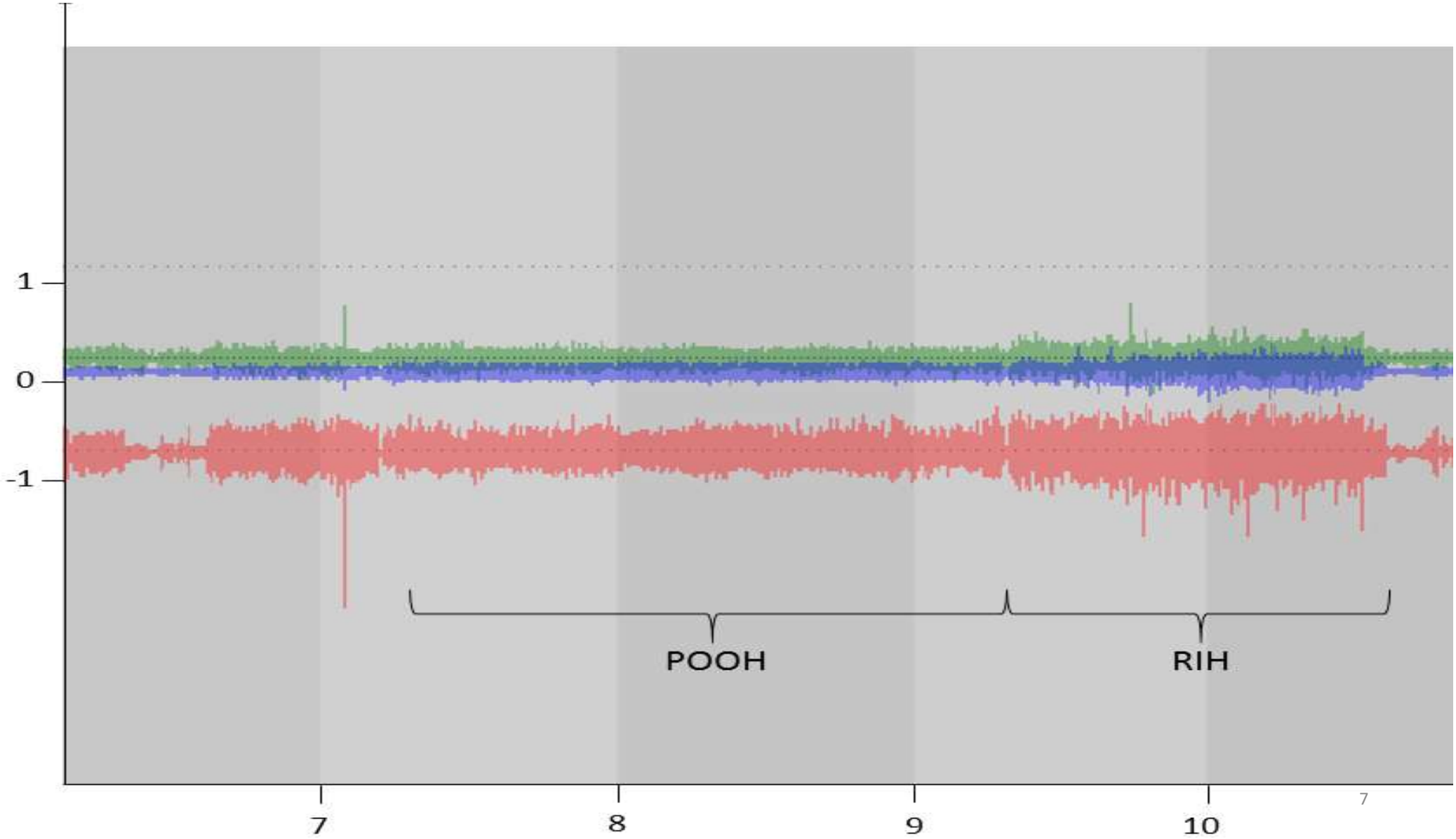
Plug Milling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-1
POOH
RIH
7
8
9
10

Challenges

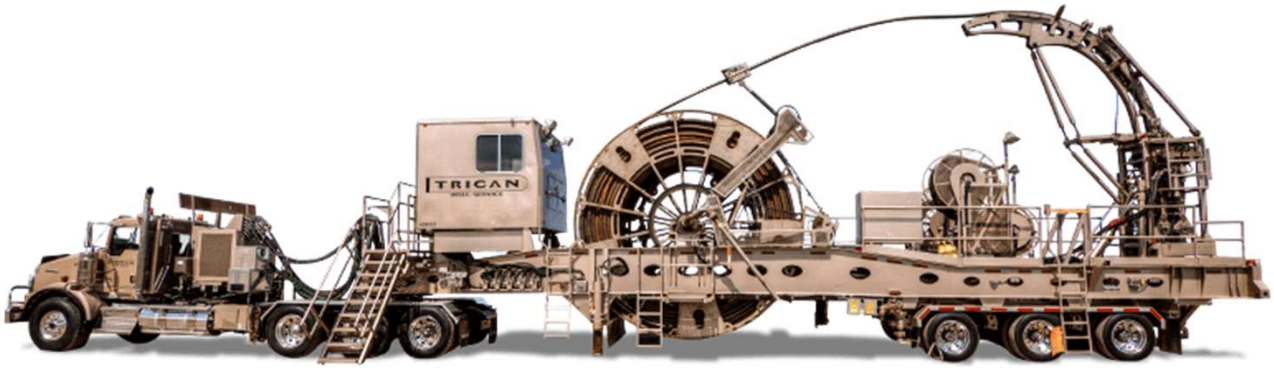
- Data processing – 3200 Hz – lots of noise to filter- MATLAB
- Initial accelerometer – downhole data was truncated @ max 16 g
  - Extrapolate to approximate peaks
- Time scale can be offset – coil DAQ vs. Excel – manageable
- Temperature – most accelerometers are limited to 80°C
- Tool Companies – not everyone wants comparative vibrational analysis

Summary

- Vibrations from the water hammer tools are much lower in magnitude than the vibrations from the equipment
- It is possible to see motor stalls / engagement with obstructions
- The vibration characteristics of the water hammer tools were not appreciably different at depth vs. at surface

Next Steps?

- We have a new accelerometer - incorporating into milling BHA
- Compare water hammer tools – vibration characteristics
  - Coanda effect style vs. PDM variable valve
- Natural coil twist ~ x /100m with xxx coil
- Should be able to approximate motor torque
  - 1000 ft-lb ~ 2.8° / m with 2.375” Coil



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