

Ultrasound in bearing maintenance

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Text: Arial, minimum 16 points



What is Ultrasound?

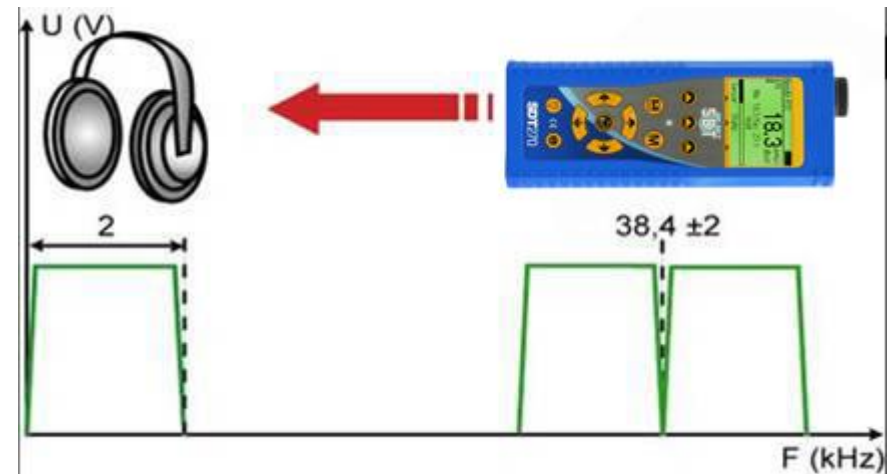
- High frequency sound beyond human hearing
- Working in the range 36-40kHz
- Sound travels through gases, liquids and solids

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Processing Ultrasound

- Convert ultrasound to sound
- Maintain characteristics of original signal
- Measure for trending
- Capture for analysis

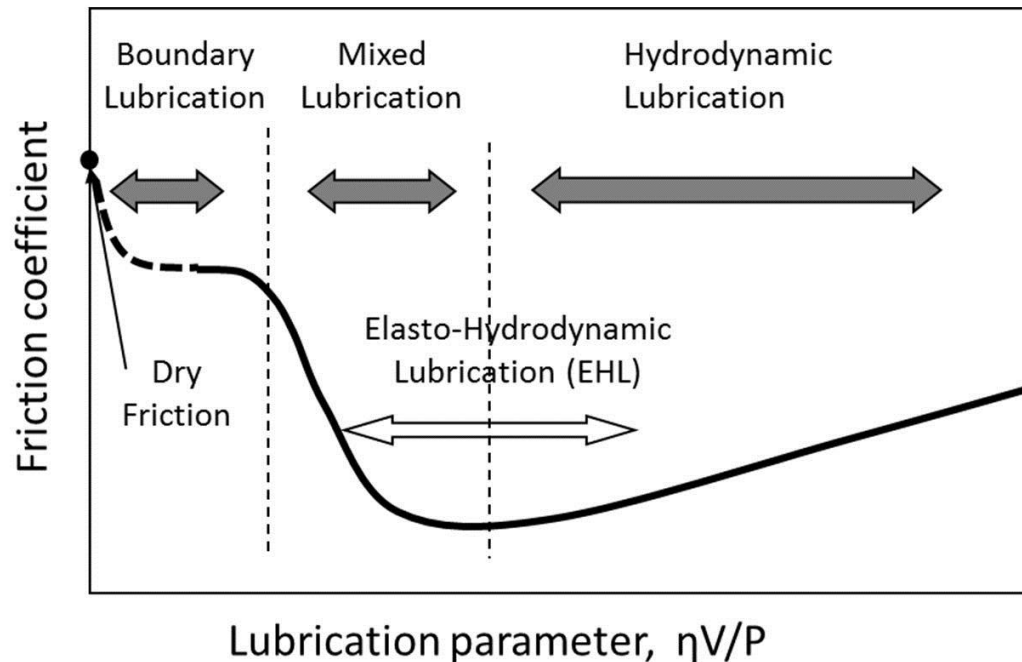


Why Ultrasound?

- Detects three important parameters:
 - Friction
 - Impacting
 - Turbulence
- When you perform your FMEAs how many times do you find one of these three?

Friction

- Surfaces rubbing past each other
- Friction is not a constant – Stribeck (1902)



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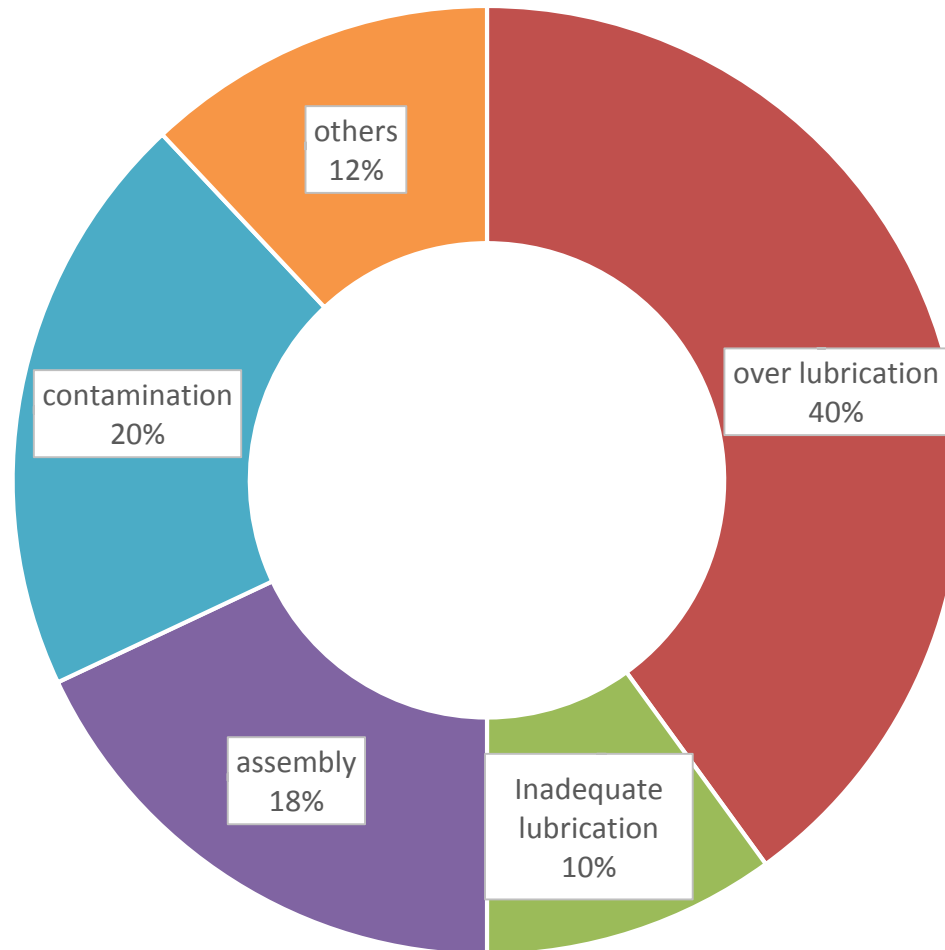
Friction

- Generates high frequency energy
- Clearly detectable by ultrasound
 - Contact
 - Airborne

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What the RCAs say



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Big hitters

- Prevent overlubrication
 - Prevent underlubrication
 - Improve lubricant handling and storage
 - Improve installation practices
-
- Nearly 90% of failure modes addressed
 - Over 50% addressed by Ultrasound

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When things go wrong

- Overlubrication is caused by people doing the right thing:
 - If grease is good, more grease is better
 - I am following the PM
 - The PM was given to us by the OEM
 - The OEM must know what's best
 - They must have talked with the bearing manufacturer

Doing the right thing



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What amount of grease?

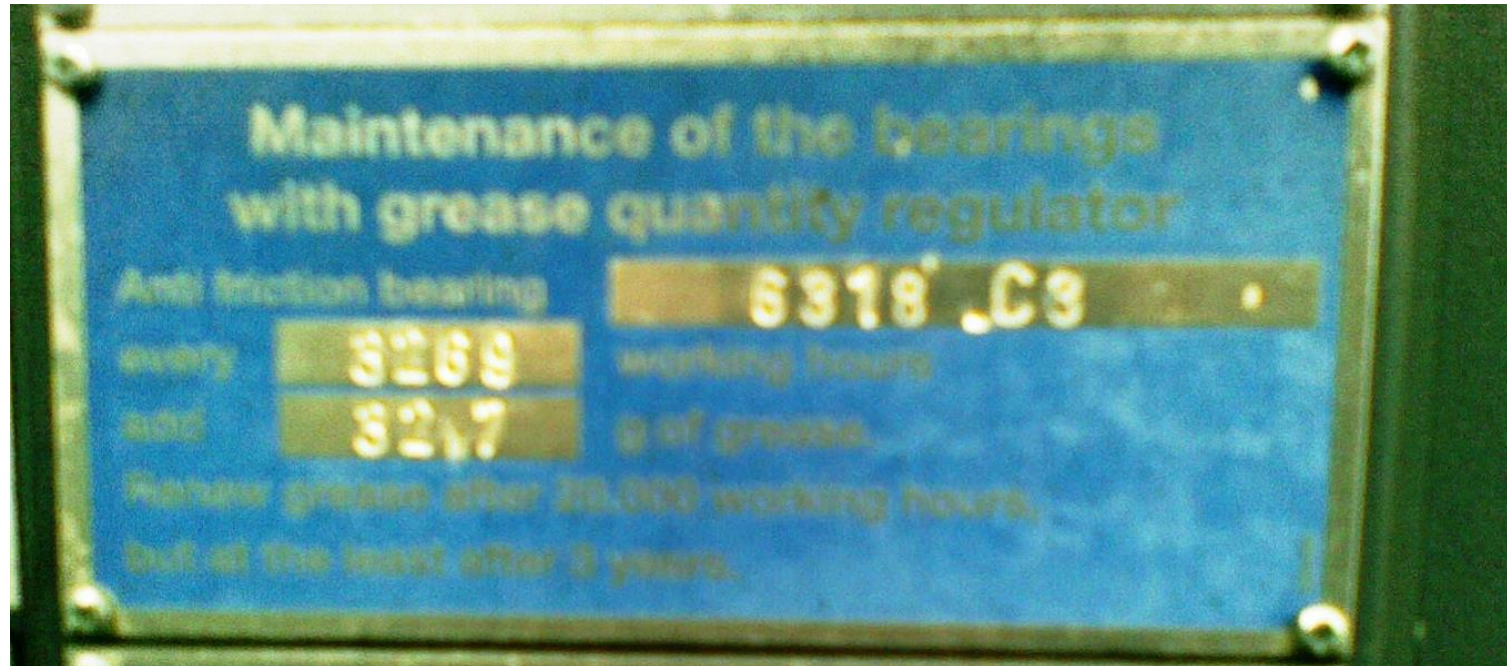
- Can calculate a replenish volume using guidelines such as:

$$\text{Grease mass/gm} = \text{OD/mm} * \text{W/mm} * .005$$

- What is the justification for time-based lubrication?

Time-based lubrication

- Sometimes the recommendations can seem crazy:



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Some horror stories



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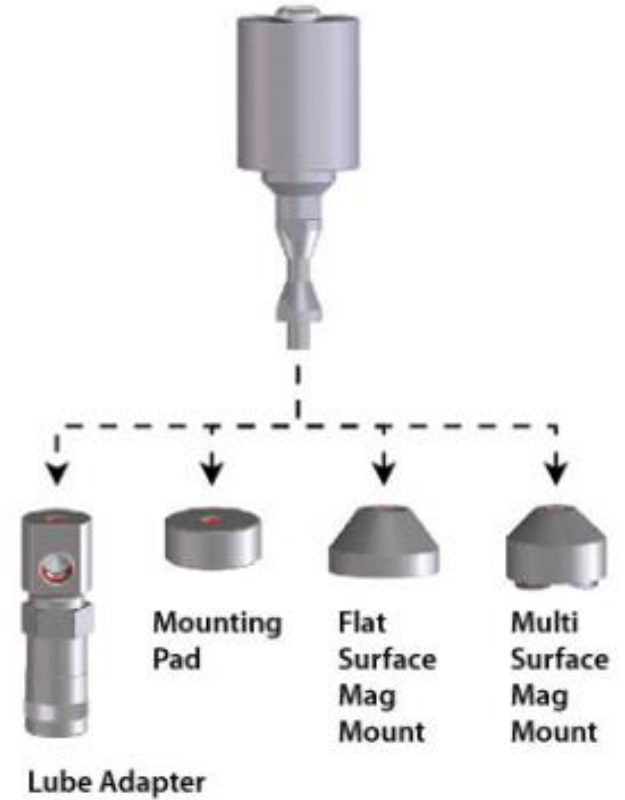
Tools of the trade



RS1 Needle Contact Probes



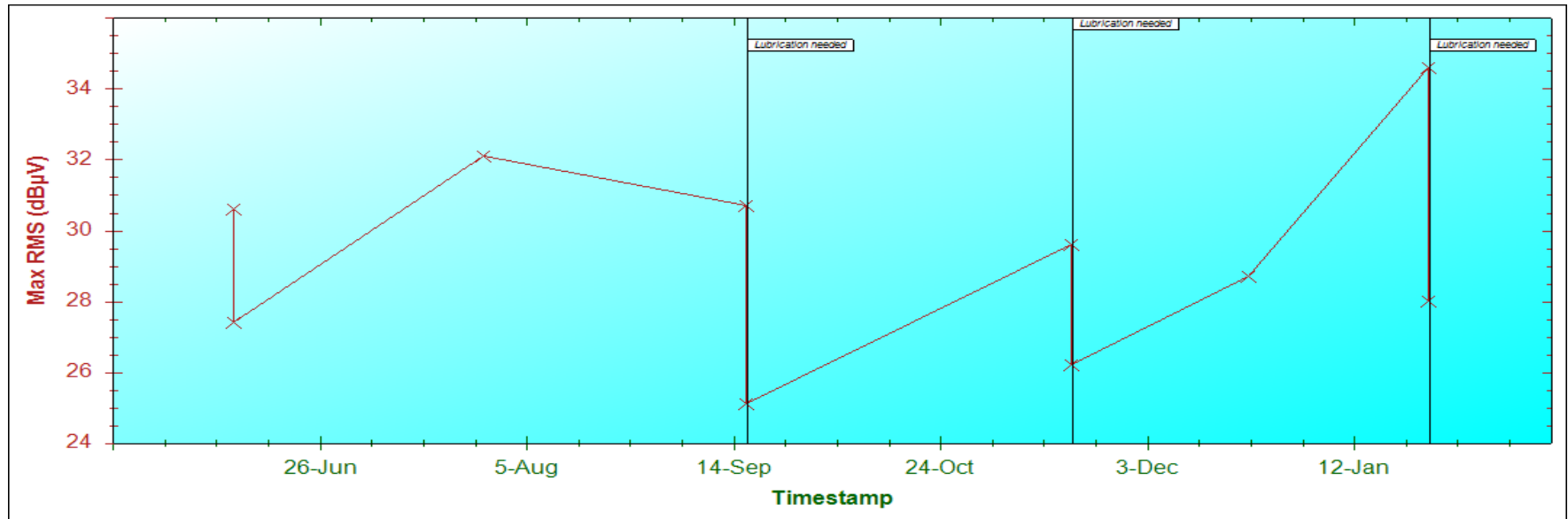
RS1 Threaded Sensor



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Trending friction condition

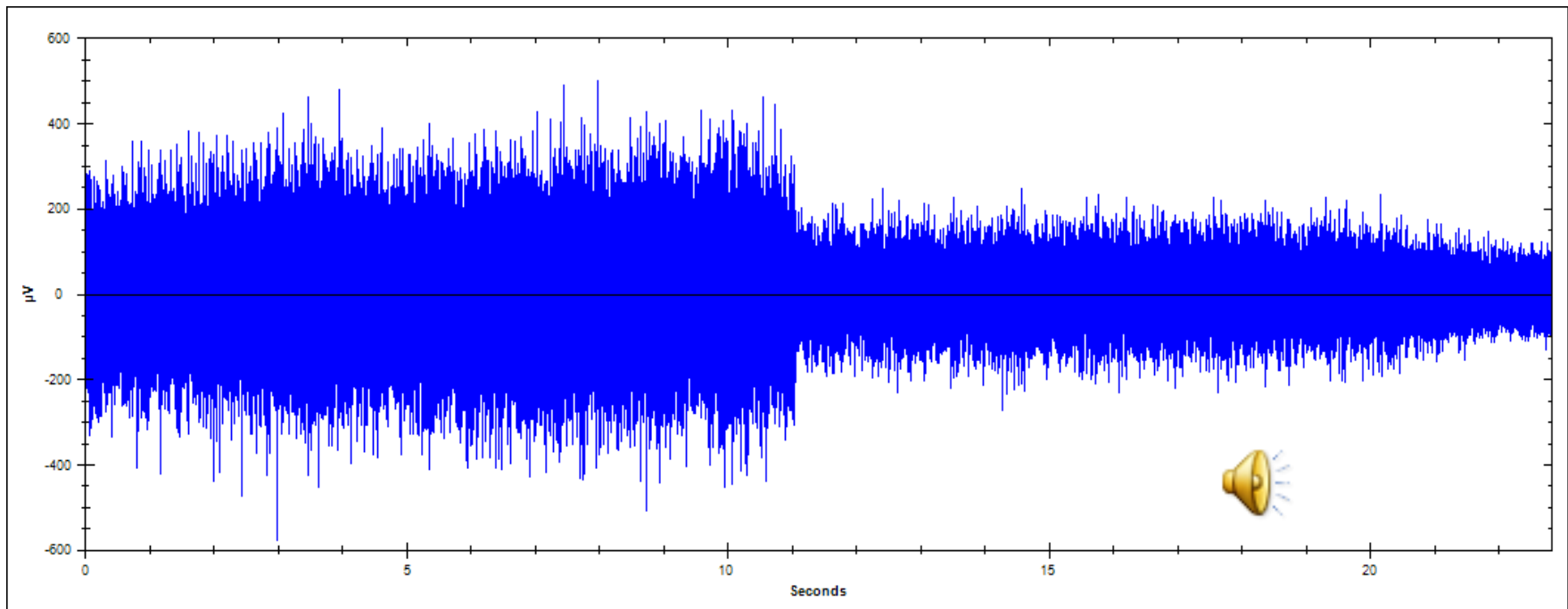


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On-condition lubrication

- Bearing needed grease:

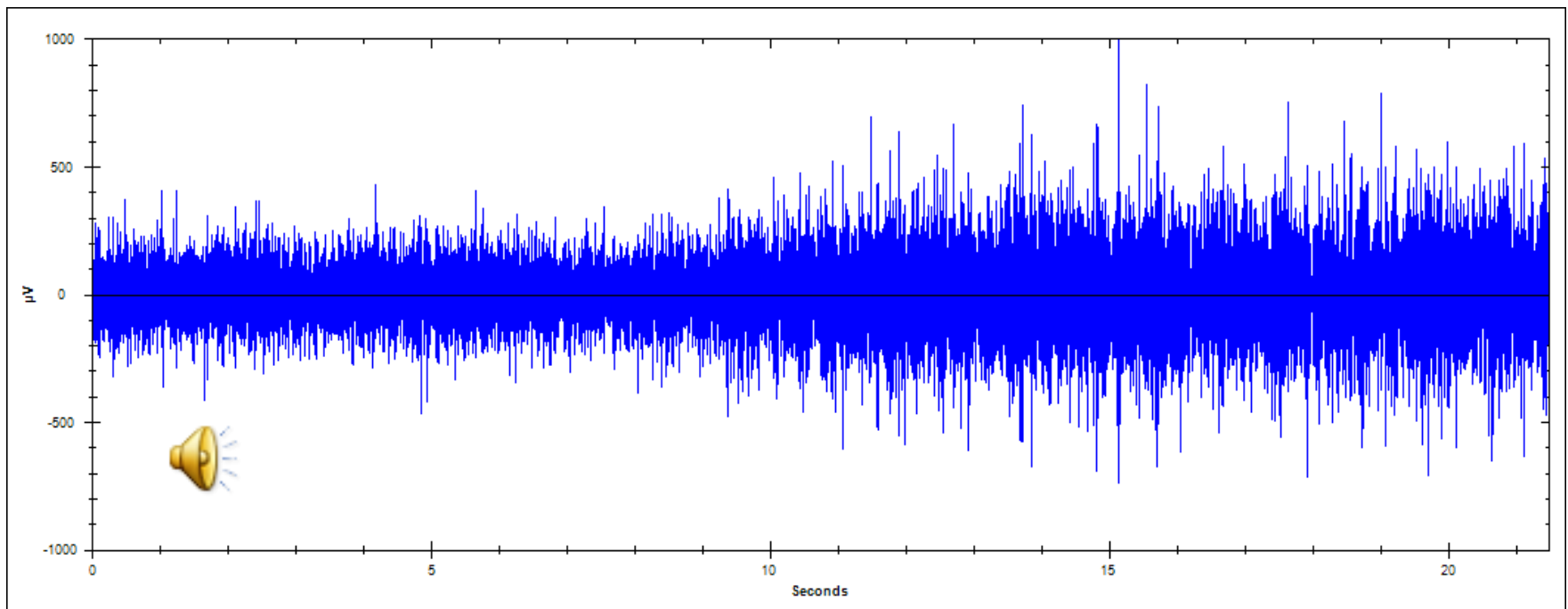


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On-condition lubrication

- Bearing already overgreased:



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Proof that it works

- The two bearings that you just saw were on the same pump!
- One customer reported a reduction in grease consumption by 95% in 9 months!
- Two more to finish off with.....



Is it green?

- For a manual grease gun, 1 stroke delivers approx 3 grams
- 1 kilo of grease \approx 300 strokes
- If every point in a plant has 2 more strokes than necessary twice a year
- for every 1000 lubrication points there will be 4000 unnecessary strokes equal to 13.3 kg of grease wasted

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Success stories

- Implemented a lubrication program for Rayonier Inc. Fernando Beach Florida
- Bearing failures reduced by over 45%
- Introduction of ultrasound took place along with other improvements in lubricant management

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Success stories

- Paper mill in Louisiana recruited a team of 12 just to take care of lubrication
- Chevron in Australia have their lubrication team in place and trained at the installation phase of a new plant
- Water treatment plant in Florida, no motor failures in the last 3 years

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Success stories

- Ultrasound is performing front line condition monitoring and lubrication at the same time with just one person
- Ultrasound finds the blocked, broken, cracked and stupidly-designed grease lines
 - Without ultrasound to measure and no eyes to see, how will you know that the grease isn't just ending up on the floor?

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Conclusions

- Lubrication methods are important in a reliability strategy
- Ultrasound detects friction and early stage bearing failure
- Ultrasound plays an important role in bearing maintenance
- Any questions?

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