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Ultrasound Assisted Lubrication

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Ultrasound Assisted Lubrication

- Today's Topics:
- What is Airborne/ Structure Borne Ultrasound
- Where can we apply Ultrasound
- Time Based Lubrication vs. Condition Base Lubrication
- Ultrasound Assisted Lubrication and proper execution

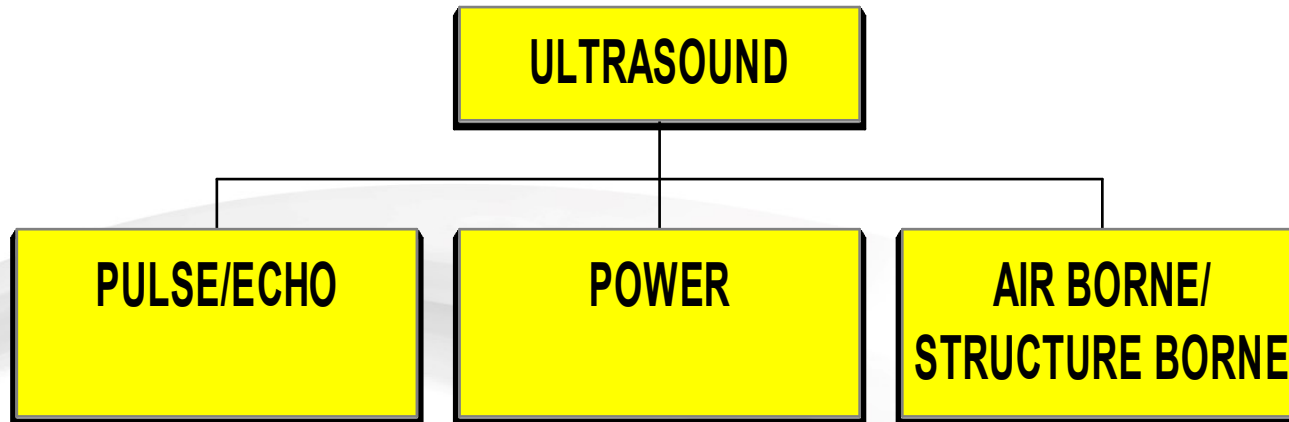


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Maintenance and Reliability can be fun!



Generic Divisions Of Ultrasound



Airborne/ Structure Borne Ultrasound Theory

- Detects frequencies between 20kHz to 100kHz
- Does not transmit high frequency
- Receives high frequencies from Turbulence and Friction
- Heterodynes HF to the audible range (LF)
- Uses dB's from Turbulence & Friction to measure ultrasound
- Uses structure borne mediums (solids) and airborne mediums (gases) to detect ultrasonic emissions
- Fast, accurate (directional) and repeatable
- Trend and record data & sounds - troubleshoot
- Multiple Applications

Three Primary Application Groups

- Leak Detection:

- Compressed Air and Gases
- Pressure and Vacuum
- Qualify and Quantify

- Electrical Inspection:

- Corona, Tracking, Arcing – Mechanical Vibration/ Looseness
- Open or closed systems

- Mechanical Inspection:

- Valves
- Steam Traps
- Hydraulics
- Bearings:
- **Motors**
- **Pumps**
- **Gear Boxes**
- **Lubrication**

Condition Monitoring Applications

- Structure-Borne Applications
 - Bearings
 - Valves
 - Pumps
 - Gearboxes
 - Lubrication
 - Under/Over

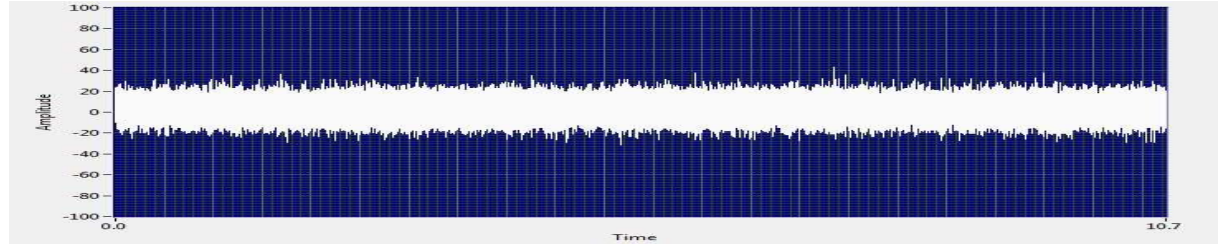


Condition Monitoring and Ultrasound Assisted Lubrication

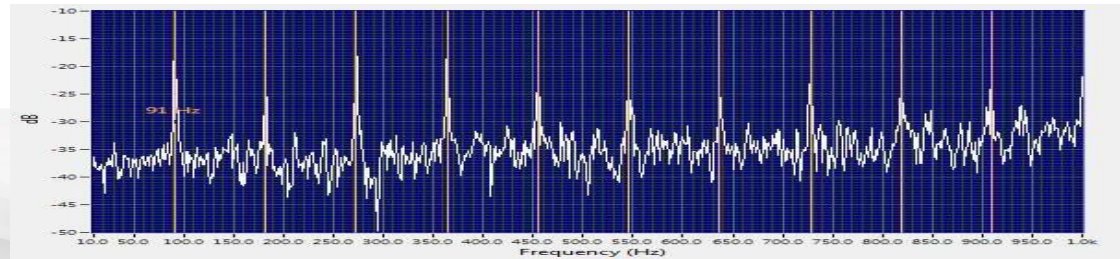
- Provides Earliest Warning of Failure – I-P-F Curve
- Isolates Sound Source
- Quality of Bearing can be Heard – Friction
- Monitor bearing wear - Trending
- Helps prevent **lubrication** related failures
- Large number of points can be tested in a short amount of time
- Can identify previously unknown conditions quickly
- Can be used on extremely slow speed bearings

Condition Monitoring With Ultrasound

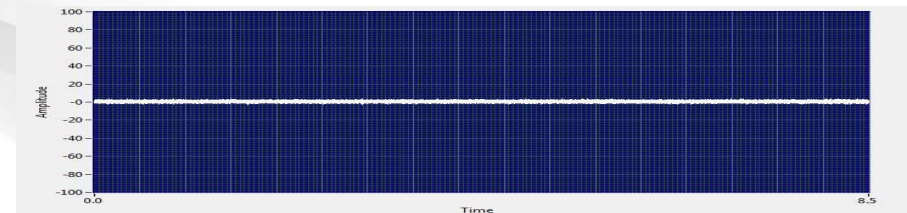
- Good bearing



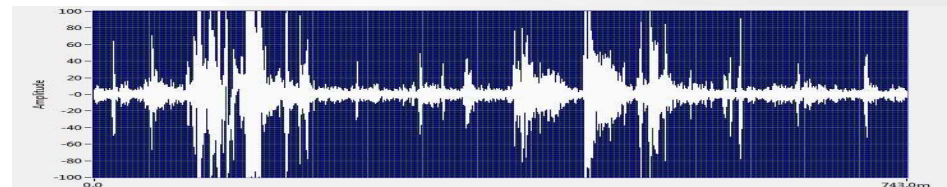
- Defective bearing

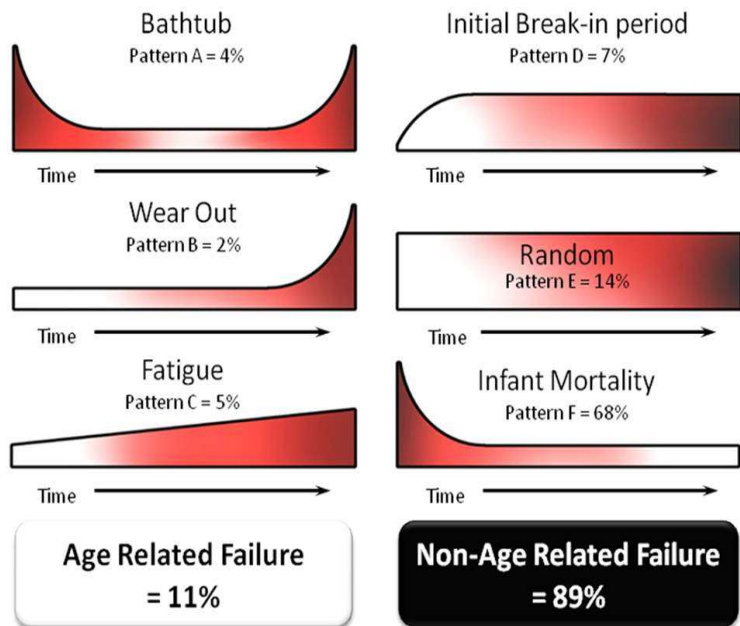


- Good slow speed bearing



- 0.75 rpm Bearing





Nolan & Heap

RCM & FMEA

- Almost 90% of failures are random in nature
- What technology for what failure mode - FMEA
- sixty-eight percent will have a defect introduced that will then travel down the curve of the P-F becoming more prone to functional and catastrophic failure.
- Meaning most failures are man made
- This includes bad lubrication practices and installation
- Improper lubrication is the #1 cause of bearing failure ..!

Ultrasonic Lubrication Best Practices

- If we can decrease or eliminate improper lubrication practices, we can increase the MTBF of the assets
- Questions:
- How much lube is too much or too little?
- Time based lubrication vs. condition based lubrication?
- On installation or commission, how do you know the proper amount of lube has been applied?



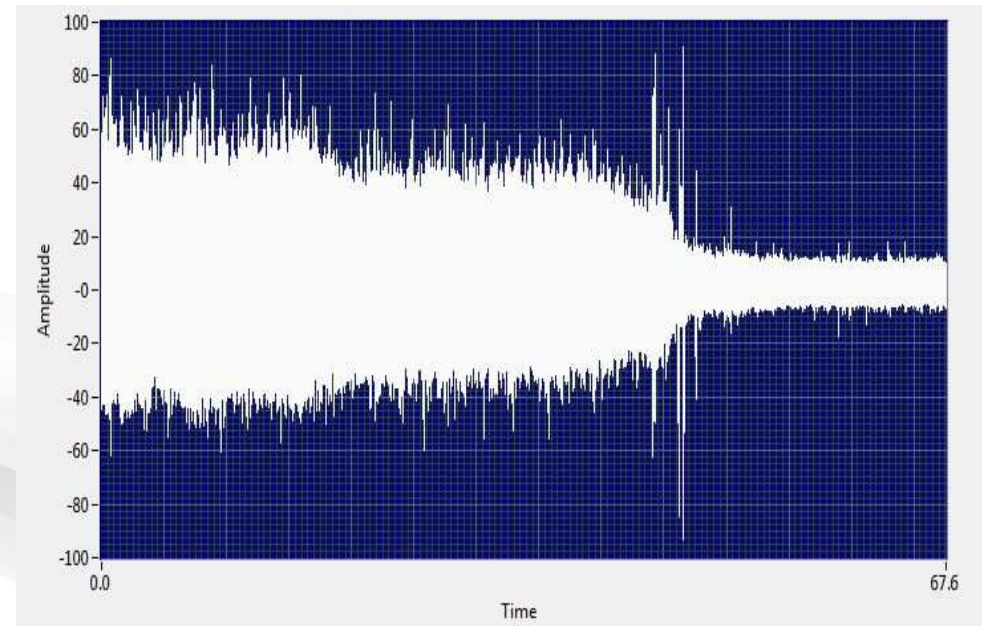
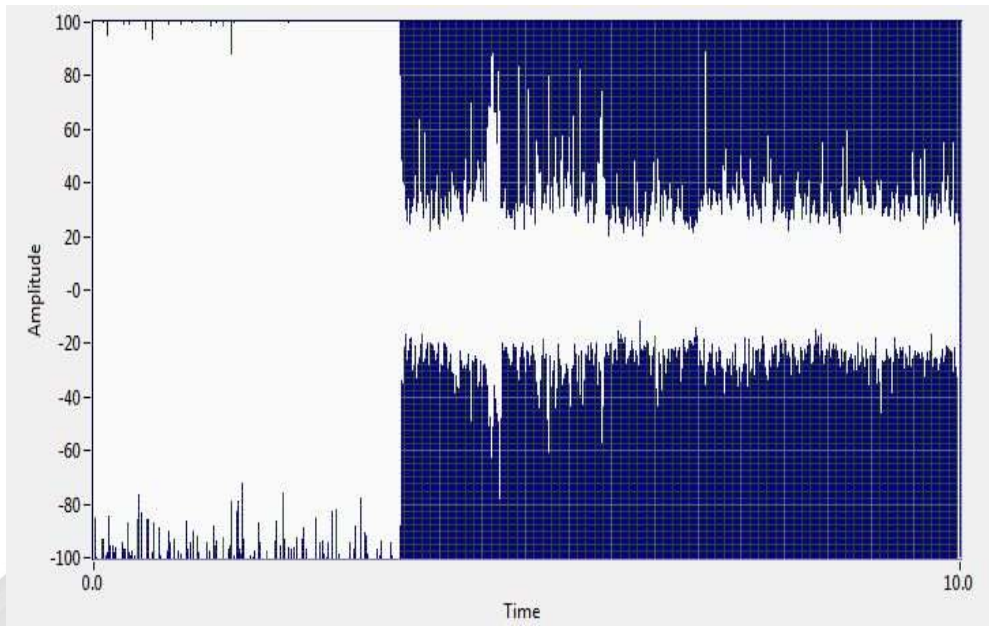
What is Ultrasound Assisted Lubrication?

- Adding ultrasound monitoring to standard lubrication best practices can prevent potential over lubrication of bearings which can also lead to fewer bearing failures, extend motor and bearing life as well as lead to a decrease in the amount of lubricant used

This will produce:

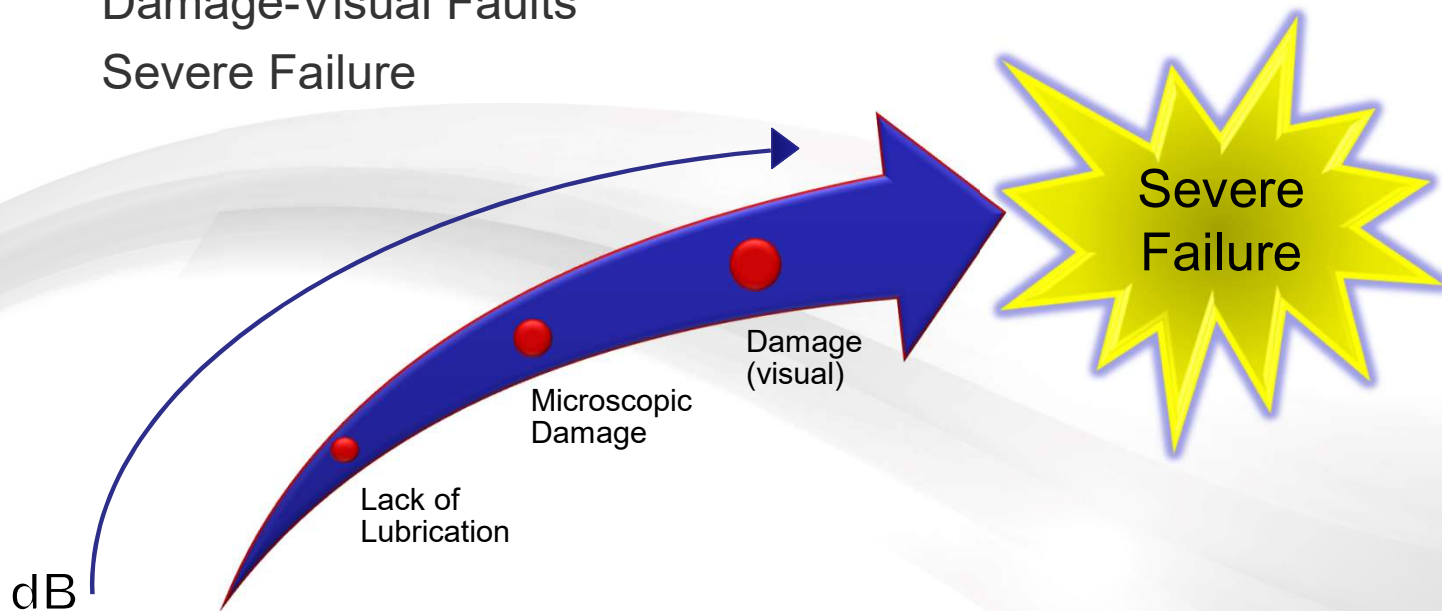
- Savings in maintenance costs, lubricant, man-hours
- And improved asset availability and reliability
- *Remember, the tendency for time-based lubrication is to over-lubricate*

Bearing Lubrication – Best Practices



Bearing Action/ Alarm Levels

- 8 dB Lubrication
- 16 dB Damage-Visual Faults
- 35+ dB Severe Failure



Procedure

- Prioritize equipment based on an asset criticality list
 - Likelihood of a failure, runtime, cost to repair, consequences of a failure
- Set up routes to collect ultrasound data including recording sound files
- Once initial readings have been taken, a baseline is set
- Continue historical trending on a set frequency and look for failure modes.

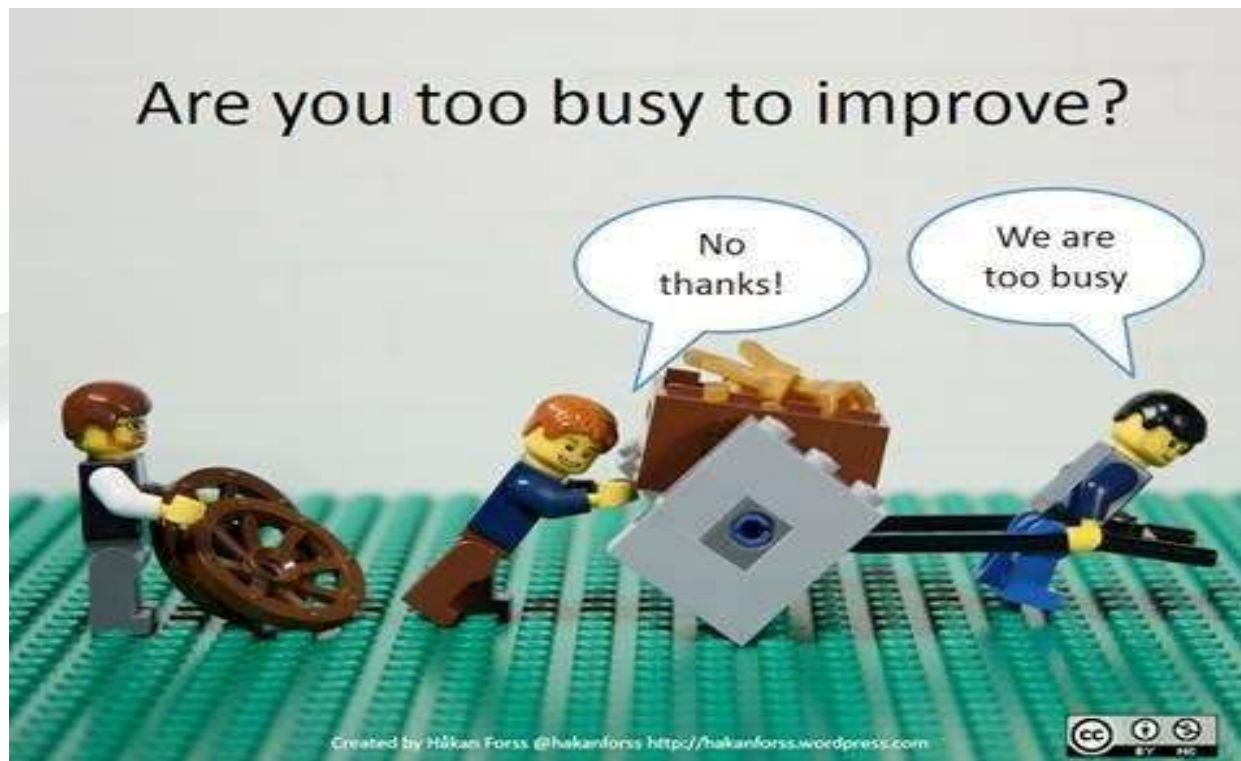
Ultrasonic Lubrication Best Practices – Case Study

- Domtar – Espanola, ON
- MTBF increased drastically as shown the KPI's in the picture
- Switched from Time based to Condition Based Lubrication practices
- MTBF continues to go up
- Saving \$200 per electric motor and they have 1100 motors at their facility



Info provided by Kim Hunt – Domtar, Espanola

Does this sound familiar at your facility?



Can we change our plant culture?



Questions?

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