

Tool Box Talk – Ultrasound Assisted Lubrication...



“From Time Based to Condition Based”

Key Points to Know:

1. Lubrication related bearing failures account for 60% to 80% of premature bearing failures. These bearing failures are due to either a lack of lubrication, under lubrication, or using the wrong lubricant for the wrong application.
2. Using an ultrasound instrument to listen to the bearing while applying lubricant and watching the decibel level, one can determine when enough grease has been applied and when the threshold where over lubrication has begun.

General Issues

If the majority of bearing failures are lubrication related, implementing an ultrasound instrument to use when lubricating bearings has the potential to greatly decrease the amount of bearing and equipment failures that can be traced back to improper lubrication procedures.

The areas of focus for this Tool Box Training Session will be:

1. What is ultrasound?
2. How is it used for bearing lubrication?
3. What are the advantages to using ultrasound for bearing lubrication?

What is Ultrasound?

Airborne & structure-borne ultrasound is high frequency sound that is above the range of normal human hearing.

These high frequency sounds travel through the air, or via a solid. The ultrasound instrument senses and listens for the high frequency sound, and then translates the high frequency sound into an audible sound that is heard via the headset by the inspector. The unit of measurement for sound is a decibel (dB) level, which is indicated on the display of the ultrasonic instrument.

Typical applications for ultrasound, in addition to Condition Based Lubrication with ultrasound, are:

- Compressed Air & Gas leak detection
- Electrical Inspection of energized electrical equipment to detect corona, tracking, and arcing
- Steam traps, and Mechanical Inspection of Rotating Equipment including

Bearing Lubrication with Ultrasound

There are various sources of ultrasound. In regards to compressed gas leak detection, turbulence is created when the high pressure leaks to the lower pressure atmosphere. The source of ultrasound with bearing lubrication is friction. When there is an increase in friction, there is an increase in the decibel level or more noise.

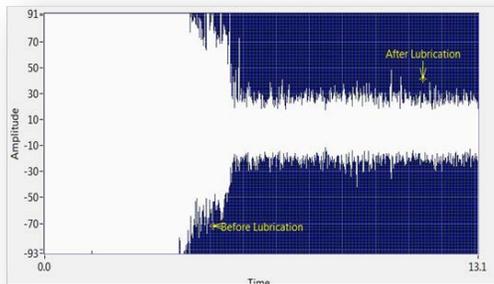
When a bearing is in a lack of lubrication state, there is an increase in both friction and noise. When using the ultrasonic instrument, the inspector listens to the bearing and watches the decibel level on the instrument. As grease is applied, there is less friction and less noise.

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Once a proper lubrication level is reached, the dB Level will remain steady and constant. If grease continues to be applied, the dB level will gradually start to increase. At this point, lubrication would need to cease because the threshold for over lubrication has been reached. An over lubrication condition also increases both pressure and friction inside the housing, thus creating more noise.



The image above is the time series view from a recorded ultrasound of a bearing in the process of being lubricated. The sound file was approximately 13 seconds in length. Notice the before lubrication on the far left, compared to the after lubrication on the far right.

Advantages of Ultrasound Assisted Lubrication

1. More bearing problems will be found because PM's will be done while listening to the bearing rather than just going out with a grease gun and not listening to the bearing.
2. Bearing failures will be detected earlier.
3. Lubrication related bearing and equipment failures will decrease, potentially reducing unscheduled downtime. (\$\$ saved)

4. The lubrication program moves away from time based to condition based.
5. The amount of lubricant used will decrease. (\$\$ saved)
6. The amount of time spent greasing equipment will decrease, and more time can be spent on more productive PM's.
7. Savings can also be realized in motor & equipment repair costs due to a reduction in lubrication related problems.
8. Ultrasound works complementary to vibration analysis and other PdM technologies.



Condition Based Lubrication