UE SYSTEMS INC

The path to

LUBRICATION EXCELLENCE

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WHEN BEARINGS FAIL PREMATURELY, POOR LUBRICATION PRACTICES ARE OFTEN THE CAUSE

In fact, over 80 percent of premature bearing failures can be traced to a problem with lubrication

The proper amount of bearing grease dampens the stress caused by the rolling element bearings, the housing and the shaft.

THAT DAMAGE CAN GO UNNOTICED UNTIL THE BEARING FAILS COMPLETELY, DISRUPTING WORKFLOW, CREATING DOWNTIME AND CAUSING FINANCIAL LOSS

Too little lubrication increases friction, creates heat and adds stress on the bearings

Too much lubrication, believe it or not, also increases friction and has the same effect

FORTUNATELY, THERE ARE EASY SOLUTIONS FOR POOR LUBRICATION PRACTICES

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THE CHALLENGE FOR MAINTENANCE PROFESSIONALS IS TO

DEVELOP A BEARING LUBRICATION PROCESS THAT ENSURES THE CORRECT AMOUNT OF GREASE EVERY TIME

Instead, these professionals should leverage a reliability centered lubrication process that revolves around several best practices:

Using the correct lubrication type for the specific application

Filtering lubricant as necessary and in the correct way

Storing lubricant in a way that keeps it cool, dry and clean

Incorporating predictive maintenance tools like ultrasound to assist in the timing and amount of lubrication application

Simply eyeballing the right amount – even for seasoned maintenance veterans – isn't the best strategy

THE BEST LUBRICATION METHOD CONTAINS EACH OF THESE FACETS WITHOUT LEAVING ANYTHING OUT

3

MANY FACILITY MAINTENANCE TEAMS RELY ON TIME-BASED LUBRICATION –

A TRADITIONAL METHOD THAT ESTABLISHES INTERVALS FOR LUBRICATION AND A SET AMOUNT OF GREASE

> This technique may seem like a solid approach, but there are a few gaps that could result in early bearing failure even if the schedule is followed to perfection

CONSIDER!

- What if the bearing already has enough grease?
- What if the scheduled lubrication is too frequent or not frequent enough?
- What if the amount of grease applied is too much or too little?
- What if the bearing has issues beyond lubrication?

OF THESE, THE CHIEF CONCERN FOR THE TIME-BASED APPROACH IS OVER-LUBRICATION

Often, the bearing will end up with far more lubricant than necessary, which hastens the onset of failure mode

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CONDITION-BASED LUBRICATION IS A BETTER STRATEGY

Rather than establishing a rigid structure for lubrication based on time intervals, **maintenance teams can use a combination of equipment run time, historical data and condition monitoring tools to detect mechanical failures**

To help establish a condition-based lubrication protocol, maintenance professionals use the I-P-F model to analyze a piece of equipment's life, from installation to point-of-failure

THIS IS FUNDAMENTALLY A DIFFERENT WAY TO LUBRICATE – *USING ASSET HEALTH AND ALARM INDICATORS AS THE DETERMINING FACTOR FOR WHEN TO APPLY LUBRICATION AND IN WHAT PORTION*

WITH THAT SAID,

CONDITION-BASED MONITORING WORKS BEST IF

MAINTENANCE PROFESSIONALS HAVE THE RIGHT TOOLS AT THEIR DISPOSAL

To that end, ultrasound is an excellent way to find early stage bearing failures.

IN FACT, ULTRASOUND CAN GO EVEN FURTHER – THE TECHNOLOGY DETECTS SLIGHT CHANGES IN AMPLITUDE OR DECIBEL LEVELS DUE TO INCREASED FRICTION, EITHER FROM TOO MUCH OR TOO LITTLE LUBRICATION.

BY INCORPORATING ULTRASOUND INTO BEST LUBRICATION PRACTICES, THE RESULTS CAN INCLUDE:

- Fewer lubrication-based failures
- More accurate and efficient lubricant usage
- Longer motor and bearing life
- Lower rebuild or repurchasing costs
- The discovery of otherwise undetectable problems
- Better overall reliability

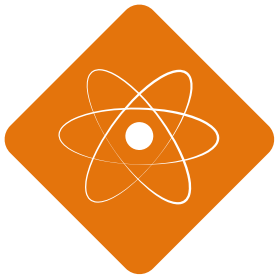
*In many cases, ultrasound can reduce grease consumption by **30%***

WITH THE RIGHT TRAINING AND TOOLS OF THE HIGHEST QUALITY, ULTRASOUND OPERATORS CAN

IDENTIFY THE SOURCE OF A SOUND AND LEARN TO IDENTIFY THE TYPE OF ISSUE THAT MAY BE CAUSING IT

Generally, there are THREE SOURCES OF ULTRASOUND:

TURBULENCE



IONIZATION

FRICTION AND IMPACTS

These are defects that create sound, but at a frequency outside what the human ear can perceive

THESE SOUNDS ARE LOW-ENERGY, WHICH MAKES IT EASY TO TRACE THE EXACT SOURCE OF THE SOUND

< 20 khz

Human hearing ends at about 20 khz and that's right where ultrasound begins

> 20 khz

In this way, ultrasound can help pinpoint any number of early failure defects – not only those related to lubrication

For lubrication specifically, though, ***ULTRASOUND IS IDEAL***

ULTRASOUND ASSISTED LUBRICATION

IS A PROCESS BY WHICH MAINTENANCE PROFESSIONALS MONITOR AND TREND DECIBEL LEVELS IN A BEARING WHILE GREASING

That gives them the necessary data points to determine exactly how much grease is required at any given time. these professionals will know what they need to do by simply listening and reading the feedback.

AS THE OPERATOR ADDS GREASE, HE OR SHE WILL NOTICE A GRADUAL DROP IN DECIBELS. **ONCE THE LEVEL FALLS BACK TO THE BASELINE, THE BEARING IS SUFFICIENTLY LUBRICATED**

If the decibels increase, that means there is already enough lubricant. Even if ultrasound finds no change in decibels after adding grease, that is still actionable information.

The inspector can follow up with a spectrum analysis of the recorded ultrasound sound file, vibration analysis or some other technique to determine why there was no change in the decibel level.

8dB above baseline indicates a **lack of lubrication**

16dB above baseline indicates damage to the bearing – **a failure mode beyond lubrication alone**

35dB above baseline means the asset is critical – **it is close to failure**

ANY LUBRICATION METHOD IS BETTER THAN NONE WHATSOEVER,

BUT SOME TECHNIQUES ARE BETTER THAN OTHERS

At the very least, maintenance professionals should:

- Lubricate to the manufacturer's specifications
- Ensure the correct grease is being used
- Calculate the amount of grease based on bearing type and size
- Determine lubrication frequency by equipment run time and operating conditions

TO TAKE IT A STEP FURTHER, THESE INDIVIDUALS CAN ALSO:

Implement a basic ultrasound device to listen to the bearing while greasing

Track the changes in decibel level with added grease

Make note of any other issues that may be unrelated to lubrication

Monitor bearing condition and perform lubrication tasks remotely

Implement a machine learning application to help automate remote lubrication

IN A MORE ADVANCED SCENARIO

IN A MORE ADVANCED SCENARIO THE LUBRICATION METHOD FEATURES REMOTE ENABLEMENT AND AUTOMATION

WITH THIS STRATEGY, OPERATORS WILL FIND MORE PROBLEMS.
And resolve them before they become debilitating.

- Embracing a business-case that goes further to reduce the costs associated with premature bearing failure
- Sourcing and implementing technology that allows for the enablement of remote, predictive bearing monitoring and lubrication
- Providing staff and management with access to cloud-based software for real-time notifications, data analysis and task execution
- Build a process that can be learned and automated through machine-learning enabled technology (automated, hands-off lubrication)

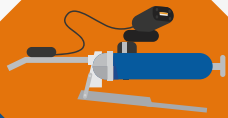
UE SYSTEMS PROVIDES ULTRASOUND INSTRUMENTS CAPABLE OF ALL LUBRICATION NEEDS

ALL BEARINGS FAIL EVENTUALLY – THAT'S A FACT OF FACILITY MAINTENANCE

But they don't need to fail as often as many do. Proper lubrication is key to healthy, long, productive bearing lives and the right ultrasound tools play a major part in that process.

The OnTrak Wireless gives lubrication experts a powerful, accurate and easy-to-use software application to monitor bearing friction and automate "remote" lubrication from anywhere, anytime on any supported device

The Ultraprobe 401 grease Caddy can store data, trend decibel levels and grease amount, store a before and after decibel level, record the number of grease pumps and can be used with remote access sensors if equipment access is restricted



The Ultraprobe 201 grease Caddy is simple to use, cost effective and will let the operator know when he or she has applied enough or too much grease

UE SYSTEMS INC

STAY CONNECTED FOR ALL OF THEIR LUBRICATION NEEDS

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