Does the Squeaky Wheel Get the Grease?

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Many incorrect assumptions exist with regards to greasing of bearings. It wasn't until the Ultra-Lube concept that a whole new approach emerged to the age-old problem of over and under-greasing. The Ultra-Lube takes the guesswork out of greasing. By incorporating this new technology and following a few important guidelines, equipment breakdowns can be significantly reduced or eliminated. Heightened awareness on the importance of proper greasing procedures could be the simplest vehicle for creating a positive impact on your company's bottom line! To maximize it's effectiveness; consistent maintenance methods should be implemented as detailed below.

TRAINING

This is essential!! In many instances greasing is given a low priority to breakdowns and often performed by improperly trained or inexperienced technicians. To assume that anyone can instinctively grease equipment is a recipe for disaster. The primary concern of every supervisor should be to ensure that greasing is given **top priority** and carried out at the first indication of a problem. Greasing can be simple, but consistency can only be achieved through proper training. The introduction of the Ultra-Lube creates the opportunity to even "teach the old dogs new tricks". With this new tool, it is possible to catch every technician's attention and not insult them when they are taught the basics required.

SPECIFICATIONS

Prior to any greasing application, analyze the requirements:

1. Viscosity – Know the viscosity of each grease and the machine requirements
2. Grease base – Which greases are compatible with bearing requirements
3. Is heat a problem – Grease life is halved for every 15 degrees C over 70 deg. C
4. Question the grease supplied in new equipment – Standardize with existing equipment
5. Location of fittings – Center of pillow block for a W33 style bearing
6. Grease path – Does the housing design allow grease to even get to the bearing

IDENTIFICATION

To avoid unnecessary errors, all grease guns should be clearly marked as to the grease it contains – and personnel trained as to the proper use of each one. Likewise, all bearings should be tagged with the type of grease required.

DETECTION

How can lubrication deficiencies be detected? Lubrication charts and predictive maintenance programs provide only ballpark figures because they assume every bearing of the same size, running for an equal amount of time will use the same amount of grease. With testing it has been determined that this is not the case. All bearings are not created equal. Each one requires individual attention, with regard to lubrication, due to varying conditions of its use. Depending on its placement a bearing will be subject to different levels of stress, such as: varying weight loads, different levels of contamination, condition of bearing when installed, and temperature – to name a few. Therefore, every bearing needs to be analyzed separately to determine the amount of grease required. To date, determining when a bearing needed grease and if, in fact, the grease reached it when applied, has been mostly guesswork correlated with the temperature rise of the bearing. Now with the diagnostic capabilities of the Ultra-Lube unit, improved ways to interpret the current condition of a bearing and what it requires to remain "healthy" are readily available.

SYNERGY

As our plant started along the path of improved greasing with the Ultra-Lube unit, a startling discovery was made with our vibration analysis equipment. The "acceleration envelope" reading for early bearing detection, taken on the vibration monitoring data collector, displayed the increase in bearing noise level and thus signaled the need for grease. We could then see in detail what the Ultra-Lube was hearing. So then, why did we still require the Ultra Lube? The original vision saw every area of the plant using the Ultra-Lube unit in both mechanical and electrical maintenance. That vision still holds true, but the CM group (condition-monitoring group) became an integral part of the equation by identifying lubrication issues and reporting them to the area. It is then up to the maintenance technicians to carry out the greasing using Ultra–Lube. The CM group supplies training by working with technicians on specific problems in their area as well as seminars. Once the technicians have a solid grasp of the basic concepts, they are on their own to grease those bearings reported with high noise levels, as well as other problem bearings they find on equipment not regularly monitored. To ensure success, occasional follow-up is important to keep the program on track and allow for exchange of new ideas

CULTURE CHANGE

Since adopting this technology, a new view of machines has emerged. The CM group used to lump all machine issues such as balance, alignment, coupling and bearings together as one issue. Now it is possible to view bearings as a separate entity. For example, at start up of a new or existing machine, that machine can be said to run smoothly from the stand point of balance, alignment and coupling issues, but may not be smooth due to noise levels in a bearing. The next step is to determine the solution to the separate bearing issue, which many times is as simple as a few shots of grease. This was a great step toward preventing "infant mortality" at start up and continued smooth operation.

Now that it's possible to measure the noise level in a bearing, a new approach to PM's can emerge. Along the lines of the old adage " If it ain't broke, don't fix it", I say "If it's running smoothly, don't disturb it". Most companies clean and repack split pillow block bearings on a 6-month basis. For bearings that are now determined to be running smoothly, an inspection can take place to check for the correct amount and condition of the grease. If that is good then replace the cap and run it. A few shots of grease can be added using the Ultra-Lube after the machine is running. Re-packing the bearing can introduce contaminants into the rolling elements that will shorten bearing life. High heat resulting from re-packing can also increase the potential for failure.

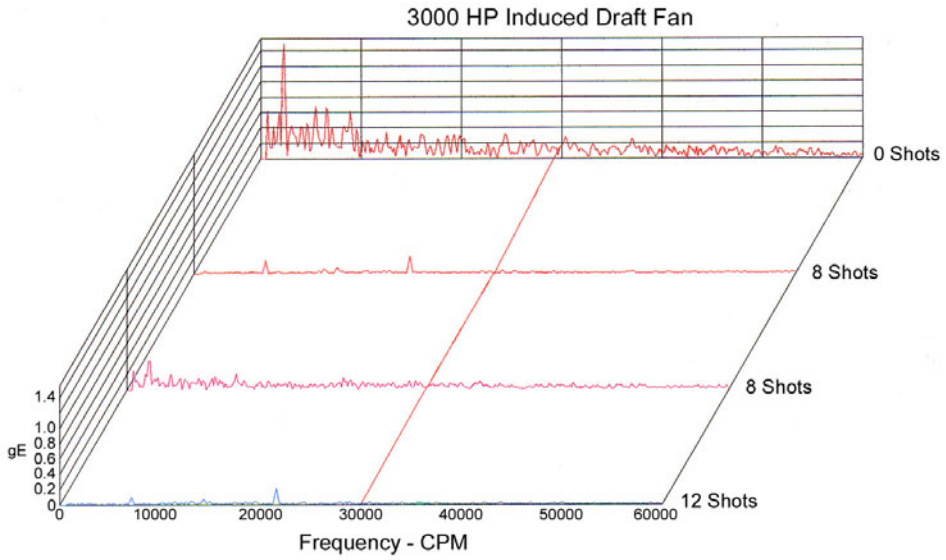
Following are some case studies to illustrate the value of improved greasing techniques using the Ultra-Lube:

CASE STUDY 1

<u>3000 HP Induced Draft Fan</u>

The non-drive end bearing of the motor was found, through vibration monitoring, to have an elevated noise floor. Dryness in the bearing was suspected so the Ultra-Lube unit was used to grease the bearing. As an experiment, envelope acceleration readings were taken before and during the greasing process. The technician, using the grease gun, was amazed at what he heard. The bearing noise dropped dramatically after adding a small amount of grease. This is demonstrated in Exhibit 1 through the arrangement of progressive signatures in a waterfall display.

Exhibit 1



Before greasing, there was a high noise level at 10 g's (0 shots of grease). After only 8 shots of grease the noise level dropped dramatically to 1.5 g's (8 shots). After a few minutes the noise increased slightly to 2.5 g's (8 shots). Only 4 more shots of grease were added and the noise was reduced and remained low (12 shots).

The noise level in this bearing rose again every 3 to 4 weeks and the technician could grease it, using the Ultra-Lube, with 4-6 shots of grease and know when it was quiet again. This bearing could have failed due to a lack of grease which would have resulted in the shut down of primary steel production at a cost of $1,000,000 every 8 hours. This motor was eventually removed on a scheduled shutdown for repairs.

It is a fact that bearings can fail at very low levels of vibration, as the only initial sign of failure is internal noise. Detecting and lowering the noise level of bearings is therefore a crucial proactive step in preventing failures.

Did you notice that I didn't mention greasing the bearing on the other end of this motor? That bearing continued to run smoothly and did not require attention. Under the old PM method of greasing, both bearings would receive 20 shots of grease every 6 months. In this case, one bearing would have been under-lubricated and the other bearing would have been over-lubricated.

This motor issue then triggered the question of consistency in greasing. Due to a resistance to a change in culture one supervisor felt that the mill should return to a "consistent" method of greasing on a PM schedule every 6 months. It was then explained that the new system of greasing on an "as needed" basis rather then by a schedule creates true consistency and longer bearing life. He could not disagree.

CASE STUDY 2

Greasing of Pillow Block Bearings on an Overhung Fan

The progression of 2 different bearings on the same fan was studied over an 18-month period. The fan side bearing was a 2 row spherical with a grease grove in the center while the drive side bearing was a 2-row ball bearing with no center grease groove. Both bearings began with the same low noise levels as seen in Exhibits 2 and 3.

Exhibit 2 (Fan side bearing)

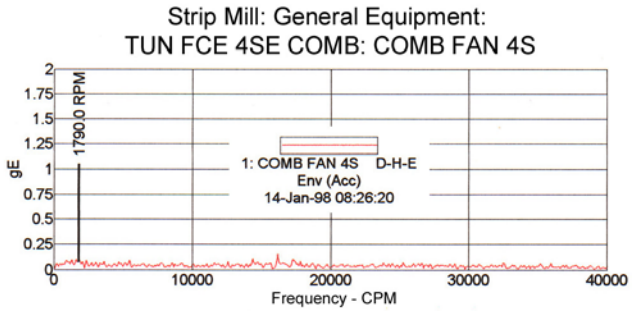
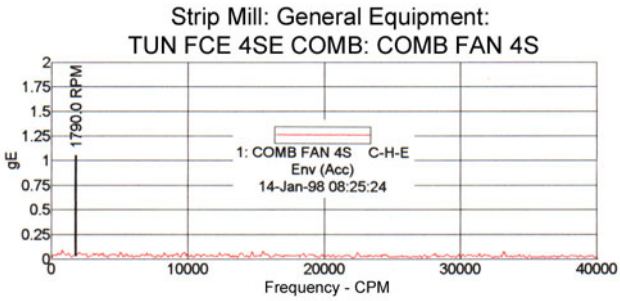


Exhibit 3 (Drive side bearing)



It was possible to grease the 2 row spherical (fan side) bearing through the center but not the 2-row ball (drive side) bearing. This meant that the new grease for the ball bearing had to be injected into the cavity of the pillow block. As the technician monitored the bearings using the Ultra-Lube and greased as required, the noise levels in the ball bearing did not subside while the noise in the spherical bearing was controllable. Over time, there were indications of looseness in the ball bearing, as a lack of direct lubrication resulted in dryness causing it to spin in the fit of the pillow block. (Exhibits 4 & 5 compare readings on the 2 bearings after 18 months).

Exhibit 4 (Fan side bearing)

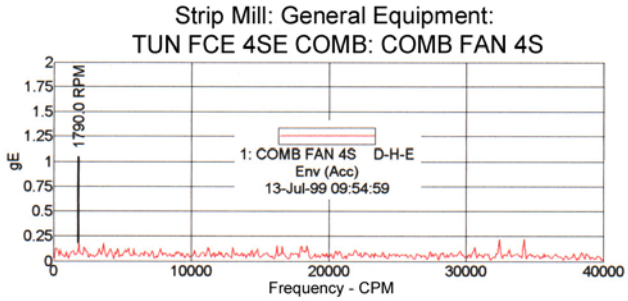
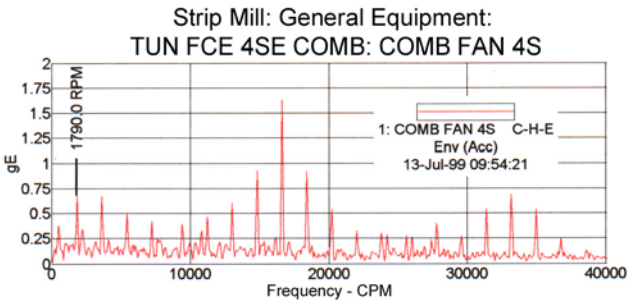


Exhibit 5 (Drive side bearing)



The only way the ball bearing could be greased properly was to re-pack it on a scheduled shutdown. Historically, failures such as this have occurred without any indication of the route cause. This is just one example of the importance grease path has on successful lubrication.

CASE STUDY 3

Greasing of Conveyors

The CM group cannot monitor all of the conveyor bearings in the plant, so it is the function of the technician to grease the conveyors on a preventative basis. Before the existence of the Ultra-Lube, the technician had to carry a packsack full of extra grease for all of the many head pulleys and guide rollers. Now that he can listen to each bearing, and only grease those that require it, he carries only one extra tube of grease to cover the entire conveyor system. Using the Ultra–Lube unit to detect failed bearings on the conveyor system, has averted breakdowns.

To find those squeaky wheels in your plant, the Ultra-Lube unit will stand alone or work in perfect harmony with an existing Condition Monitoring system to ensure enhanced machine reliability!