MONITOR

A Publication of Condition Monitoring Society of India

Regd. No. 45061/2003 | Volume 5, No. 2 | June 2008

From President's Desk

It is always exciting to see new developments in CBM field. Today new wireless products for reading and processing of signals from vibration sensors are available (http://www.machinetalker.com). This product facilitates CBM by monitoring upto 6 sensors at a remote location and linking results into a wireless mesh network for access by plant maintenance personnel. For example, acquiring vibration data from inside a cooling tower is a perfect application! It is extremely cost effective because no wiring is required. Studies indicate that wiring alone can be 50% of the cost of sensor installation with long runs of conduits required in industrial applications. We can think of measurements at sites previously considered as not possible. Another interesting development is the Republic of Singapore Air Force (RSAF), SRTC (Singapore Research & Technology Centre) and Eurocopter (EC) jointly announced a 3 year collaborative research programme addressing CBM. A state of the art diagnostic and prognostic maintenance system is the goal of this programme. They expect more aircraft availability, less maintenance cost and more cost savings.

TOO MUCH VIBRATION !!

Modern machines, machine trains and drive systems are becoming ever more compact and efficient while at the same time experiencing a reduction in their operating weight. Production gains are often achieved by raising rotating speeds and increasing rotating speed variability. The associated rise in dynamic load leads to higher vibrations and material strain, resulting in premature wear. Increased vibration can also have an impact on operating reliability, equipment life and the quality of the manufactured and processed products. Suitable testing technology can be used to identify the dominant sources of vibration, correct imbalances and reduce unallowably high vibration levels by precisely aligning and adjusting drive and machine components.

Design and construction alone will not necessarily protect the machine against faults and damage from external sources.

Damage in electromechanical drive components can be differentiated into damage from wear, from product flaws, from operating errors and from human error. It has become apparent that machine components, especially rotating machine parts, must be manufactured to high degree of accuracy as the impact of additional dynamic strains and vibration continues to increase.

High-speed high power machines, for example, tend to be subject to more vibration.

By employing innovative testing technology, the causes for increased vibration can be analyzed on-site and eliminated systematically. For example, if a misalignment is identified as the dominant cause of vibration, vibrations can be reduced to an acceptable level through the precise alignment of the machine. A high degree of alignment accuracy also ensures that roller bearings, which are subject to complex loads during their rolling, rub and shock processes, run more smoothly and attain a longer service life.

Source: www.pruftechnik.com

Wear: The Reason Why Machines don't last forever?!

Wear is the phenomena of rubbing two parts of machinery each other. There are seven important types of wear that occur in all machinery. Wear is one of the most costly factors in operating machinery, causing direct cost, inconvenience and lost production. By understanding the following types of wear, one can increase the life of machinery:

• **Adhesive wear** occurs when similar materials in sliding contact weld together, because of the frictional heat generated. This type of wear follows a "weld and tear" pattern and can produce wear debris.

• **Abrasive wear** is due to gouging by debris trapped between two rubbing surfaces, or by microscopic protrusions on one surface gouging into the other. It is a ploughing action. Debris may be wear metal fragments, dirt, or even combustion bi-products .. especially soot in diesel engines.

• **Fretting wear** often occurs during transport of equipment. Small oscillating movements, due to vibration, can cause wear due to a combination of abrasive and adhesive wear.

• **Fatigue wear.** Repeated load cycles placed on a part will eventually cause small cracks and eventual failure of that part. For example, rollers in a bearing concentrate stresses in front of the contact zone and slightly beneath the surface. After a number of cycles, failure occurs and is evident as pitting.

• **Corrosive wear.** Any chemical reaction that removes material from the surface (eg rusting) is a form of corrosive wear. Sulphur in diesel fuel forms a corrosive acid during combustion and this can damage engine parts. Lubricating oils contain additives that combat this effect.

• **Erosive wear.** This is due to the impact of particles that strike a surface at speed, cutting into that surface. Carbon deposits formed in exhaust parts from inefficient combustion tend to break away and this is an example of erosive wear as they strike turbocharger blades.

• **Cavitation wear.** This occurs when bubbles in a liquid collapse against a surface, eg in water pumps. The sudden change in pressure causes pitting on the component surface.

Do U Know ?! It's Very Interesting !!

During alignment too many shims are used to make vertical corrections, as many as 10. When as many shims are used, a squishy foot or spring condition occurs. Rule of thumb is ***no more than four (4) shims to be used*** *under any foot. Replace multiple thin shims with single-thickness plates. Imperfections in the too many shims can cause the spring or squishy foot at the rate of approximately three mils per shim.*

- by Carol Pettit, PdM Engineer, TVA, Madison, Alabama

Oil analysis - a tool to help health of the refuse vehicles

When you visit the doctor's office for a checkup, one of the first things the nurse does is draw blood from your arm, because blood tests are an easy and fast way to isolate problems such as high cholesterol or increased insulin levels. In effect, blood tests allow the doctor to look inside your body without actually cutting you open. That same philosophy is at work when it comes to oil analysis for trucks.

Taking regular samples of truck engine oil - and of other on-board liquids, such as engine coolant and hydraulic fluid - for testing allows fleet personnel to look inside vehicles to pinpoint a potential problem before a truck breaks down, thus reducing a truck's downtime. Regular sampling also helps a refuse fleet see if the engine oil is wearing out under a vehicle's day-to-day strain or if the drain interval can be extended - which saves the fleet money on oil purchasing costs.

Trucks operate in a very dirty environment, and the severe nature of the operation can generate fuel or soot contamination in the engine oil. Without oil analysis, you would not be able to know if you are having any contamination issues, or if the wear trends are indicating the need to schedule the truck for servicing. That's why it's a critical preventative maintenance tool.

By using oil analysis, a fleet manager always knows what's going on inside the engine. Oil analysis program tests for different metals and chemicals that may indicate a problem and that information becomes part of a historical database that fleets can use to take better care of their vehicles during their ownership period.

- Sean Kilcarr

PROPER SHAFT KEY LENGTH

Proper shaft key length is often overlooked when performing repairs or troubleshooting higher than normal vibration. An improperly sized key will cause an unbalance condition and increase the vibration levels at 1x rotational speed.

To ensure you have the proper key length use the following formula.

Proper key length = Total shaft key slot length + coupling key slot length DIVIDED BY 2

This will produce a key that will fill the entire coupling slot, to provide proper power transmission, and provide enough exposed key to compensate for the removed shaft material of the unused slot length.

A properly sized key should fill approximately half of the exposed shaft key slot.

PRODUCT NEWS

HS-BE Series Sensor Connection Boxes

The HS-BE Series offers a low-cost option for Sensor Connection Boxes. They are available in a choice of number of channels and thei robust construction gives protection to the sensor cabling against industrial environments.

Simple-to-use, the HS-BE boxes are ideal for connecting, via the BNC, with a portable data collector to take vibration readings.
Typical applications include air handling units, pumps, motors, etc.

A NEW range of Vibration Sensors

Just released is the NEW HS-130 Series of Vibration Sensors.
This general purpose industrial accelerometer is a very compact device, weighing just 30 grams. Its robust stainless steel construction is sealed to IP65 allowing it to be used in difficult industrial conditions. The sensors are fitted with non-over braided, fire retardant, twin core screened cable. Just released is the NEW HS-130 Series of Vibration Sensors.This general purpose industrial accelerometer is a very compact device, weighing just 30 grams. Its robust stainless steel construction is sealed to IP65 allowing it to be used in difficult industrial conditions. The sensors are fitted with non-over braided, fire retardant, twin core screened cable.

The sensors provide a 100mV/g signal using a top-entry cable arrangement. Ideal in predictive maintenance roles when monitoring vibration levels on important plant such as fans, motors, gearboxes, etc., the HS-130 Series is just one of many vibration sensors.
Source: ***www.hansfordsensors.com***

CM – Around the Globe
Courses, Conferences & Workshops

Condition Monitoring & Vibration Control of Machines and Plant

This course covers a range of topics for condition monitoring of machines and plants, e.g. basic visual techniques, oil debris analysis, and advanced vibration monitoring and control techniques.
Course Duration: 5 Days,
UK Course Dates: 10 - 14 Nov 2008
Dubai Course Dates: 2 - 6 Nov 2008

For more information: ***www.osbornetrainingservices.com***

Reciprocating Compressor Condition Monitoring and Diagnostics

In this instructor-led course, students will learn how to properly instrument a reciprocating compressor, interpret data plots and identify reciprocating compressor malfunctions. The course includes hands-on workshops with actual case histories.
Course Duration: 3 Days,
Course Dates: 17 - 19 Sep 2008, Minden, NV
For more information: ***www.gepower.com***

* * *

TERMINOLOGY

• **Fluid Film Lubrication:** It means when contacting parts are separated by a film of lubricating fluid (grease, oil or even air). As the relative speed between the parts increases, the motion of the lubricant provides an increased film thickness. This is termed hydrodynamic lubrication. A higher lubricant viscosity will also increases the film thickness, but heavy loads and higher temperatures decrease it. Higher speeds also create greater fluid friction (internally) within the lubricant. It becomes obvious that correct viscosity selection requires a consideration of operating speed, amount of stop/start operation, duty cycle, component loading, operating temperature, variation in ambient temperature and more.

• **Boundary Lubrication:** It means when the lubricant film no longer separates the moving parts. For example, the oil film may have ruptured due to a high loading, or the oil viscosity may be too light for the application. Some oil types provide inherently better boundary lubrication, but most commonly, the additive package contains some form of boundary lubricant. Anti-wear oil additives, EP (extreme pressure) additives for gear oils, molybdenum disulfide, PTFE (teflon) and graphite are some of the more common additives providing boundary lubrication.

GLIMPSES OF NEW LOCAL CHAPTER AT HYDERABAD

Condition Monitoring Society of India (CMSI) started its third local chapter at Hyderabad, Andhra Pradesh on 5th June 2008. CMSI President Dr. V. Bhujanga Rao and General Secretary Dr. M. Ananda Rao inaugurated the Hyderabad Local Chapter at MLR Institute of Technology, Dundigal, Hyderabad premises during One-day Workshop on Condition Monitoring. The executive committee of Hyderabad local chapter was constituted with the following office bearers.

Chairman : Dr. P. Narasimha Reddy
Secretary : Dr. P. Ravindra Reddy
Treasurer : Dr. G. Manikanthan

Dr. B.Satyanarayana

Dr B.Satyanarayana, Former Rector of AU and CMSI Member has been appointed as Vice - Chancellor,Andhra University, Visakhapatnam.
CMSI Congratulates and wishes him all the best in new assignment.

Confederation of Indian Industry (CII) and CMSI as its Institutional partner organising a Conference on "Condition Monitoring"

Venue: Hotel Express Residency, Vadodara
Date : 27 Jun 2008.

REFERENCE BOOKS

CONDITION MONITORING STANDARDS VOLUME I, II, III
– By Torbjorn Idhammar 2001 [Colour] $330 per Each Volume

VOL I: Motor AC; Coupling Tire; Coupling Sure flex; Coupling Grid; Coupling Thomas; Coupling Wrap flex/Atra flex; Coupling Gear; Coupling Jar; Coupling Magnetic; Coupling Torus; Pump Vacuum Nash; Pump - Vertical - Multistage; Tank ; Conveyor Screw; Valve solenoid; Air Breather – Des Case; Flinger; Gear Reducer; Conveyor Belt; Conveyor Drag; Fan Axial; Agitator/Mixer; Compressor Rotary Screw - Quincy; Dryer System - Air desiccant; Steam Joint – Valmet.

VOL II: Motion Detector; Backstop; Pump, Centrifugal; Heat Exchanger; Bearing, Pillow Block; Chain Drive; Hydraulic Unit; Feeder; Mech. Seal; Packing; Check Valves; Screen Reciprocating; V Belt Drive; Screen – Vibrating; Screen - Disc; Screen - Centrifugal; Lubrication Reservoir; Fan Radial; Pump Vane; Pump Gear; Pump Piston; Steam Trap Mechanical; Steam Trap Thermostatic; Steam Trap Thermodynamic; Valve with Actuator.

VOL III: Universal Joint; Rope Sheaves; Regulator - Air; Pump - Progressive Cavity; Blower - Rotary Lobe; Belt - Cog; Brake Disc; Bolts and Nuts; Cylinder - Air; Pump - Diaphragm; Motor DC; Valve; Clutch Centrifugal; Expansion Joint; Coupling - Fluid; Cylinder Hydraulic Motors; Pump - Multistage; Governor; Pneumatic Filter; Piping and Pipe Hangers; Steam Turbine [Small].

CMSI Welcomes It's New Members!!

LIFE MEMBERS:

CDR J. VINODH
SRI C P SINGH
SRI K. SAGAR
SRI N. R. NALAWADE

ANNUAL MEMBER:

SRI DEEPAK KAPOOR

All feed back, comments and contribution to the news letter are most Welcome.
- Editor

If undelivered please return to:
Dr. V. Bhujanga Rao,
President, Condition Monitoring Society of India,
Naval Science & Technological Laboratory,
Visakhapatnam – 530 027, INDIA
Phone: 0891-2586100

To,