CMSI NEWS

CMSI Welcomes It's New Institutional Member!!!

- Simhadri Thermal Power Project, NTPC Ltd., Visakhapatnam
- College of Engineering (Autonomous) Andhra University, Visakhapatnam

CMSI Welcomes It's New Members!!

LIFE MEMBERS:

Sri JANGA REDDY METTU	Prof. BEELA SATYANARAYANA	Prof. MOHAMMED M.M. SARCAR
Sri PRAVEEN KUMAR PATNAIK	Prof. DHULIPALA RADHAKRISHNA	Prof. B.S.K. SUNDARA SIVA RAO
Prof. RAMAKRISHNA AVASARALA	Sri P. SRINIVASA RAO	Sri SUROJIT GHOSH
Dr. ASHESH TIWARI	Sri S. CHINAMANIKYAM	Sri N.S.NAIDU
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Cdr. SYED SHAHID RAZA	Smt. R. RAJASREE	Sri P. JANARDHANA RAO

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Ms. PADMINI RAPETI	Sri D. VARADA RAJU	Sri B. ANANT RANGANATH
Sri B.S. PRASAD	Sri K. SAGAR SURESH	Sri ONI LOKHANDWALA
Sri ARUNJIT SHEKHAR PAL	Sri PAILA APPALA NAIDU	

REFERENCE BOOKS

MAINTENANCE PLANNING & SCHEDULING HANDBOOK 2nd edition by Richard D Palmer 2005, 544 pp

This handbook provides proven planning and scheduling strategies and techniques that will take any maintenance organization to the next level of performance. The Maintenance Planning and Scheduling Handbook is regarded as the chief authority for establishing effective maintenance planning and scheduling in the real world. The second edition has important new sections

PLANT AND MACHINERY FAILURE PREVENTION by A A Hattangadi 2005, 458 pp

Plant and Machinery Failure Prevention is based on the premise of ìZero-Failure Performanceî. The book introduces the general features and investigative methods at the design phase for determining failures in mechanical components such as: Flat Belt Failures, Vee-belt Failures, Pulley Failures, Gear Failures, Steel Wire Rope Failures, Spring Failures, and Gasket Failures. Includes numerous case studies.

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,

CMSI MONITOR

Regd. No. 45061/2003 Volume 5, No. 1 January 2008

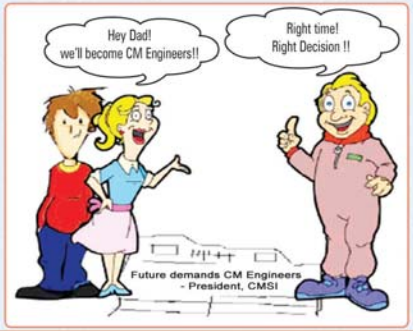
From President's Desk

Airline industry and aircraft maintenance is one area where the scope for CBM exists in plenty. As the cost of running an airline in the sky increases, in the backdrop of intense competition, as is happening today, airlines need efficient and effective maintenance so that such program will provide optimal utilization of resources, improved performance and decreased costs. The ability to minimize inventory holding of parts while maintaining acceptable parts availability levels is also important in an airline operation. All the CBM specialists are to think of this new emerging area for utilization of CBM expertise…

CMSI WISHES YOU ALL A HAPPY & PROSPEROUS NEW YEAR 2008

MACHINERY KNOWLEDGE

The design and operating characteristics of a machine determine both the type of defects that are possible, and the vibration response to those defects. Vibration analysis is difficult without a working knowledge of these characteristics. Another important consideration is the effect of changes in operating condition on measured vibration. By understanding how vibration changes with such variables as load and temperature, you will be better able to determine whether an increased level of vibration is due to a defect, or to a change in operating conditions. The best sources of information on these characteristics are the manufacturer of the machine, and historical records on the same or similar machines. In applications such as machinery maintenance, courses from manufacturers can provide insight into both the possible defects, and the mechanisms of vibration response for specific machines. Several baseline spectra taken under different operating conditions are useful for documenting the effects of changing operating parameters.



24/ 7 ONLINE CBM ON OFF-SHORE DRILL SHIP

The drill ship "West Navigator" operating off the Norwegian coast became in April 2007 the first vessel to be connected 24/7 on-line to Wärtsilä's CBM (Condition-Based Maintenance) on-line service based in Vaasa, Finland.

Operated by a Norwegian offshore drilling contractor, Seadrill Management AS, the "West Navigator" was built in Korea in 2000. It is a dynamically-positioned drill ship able to drill down to 9000 m in water of 2500 m depth. It is powered by seven Wärtsilä diesel generating sets, comprising four 6-cylinder in-line Wärtsilä 46-engined sets, two 16-cylinder Wärtsilä 32-engined sets in V-configuration and one 9-cylinder in-line Wärtsilä 20 engine set, having a combined output of 37.53 MWe. It is currently operating on the Ormen Lange gas field which is about 100 km north-west of Molde, Norway.

The CBM on-line service uses a combination of on-line monitoring of mechanical and thermal condition (with in-built sensors, for example), system efficiency data and many other indicators to assess the condition of an engine. All this information in the shipboard system in real time transmitted 24/7 to Wärtsilä service engineers at the CBM Centre in Vaasa, Finland, Wärtsilä Norway and the Seadrill office in Stavanger Norway. The service team then accurately assess the overall status and condition of the plant – and ultimately the maintenance it needs, and make regular reports to the engine users based on established guidelines and specific operating conditions.

Marine installations use satellite communication to connect to the CBM Centre. An engine installation can be connected to the CBM Centre through the Internet using a VPN (Virtual Private Network) connection or through the e-mail server onboard the ship. There is also a manual alternative for data collection and e-mail sending which uses Wärtsilä's special software.

Once connected, the CBM Centre receives operation data information about the specific engines including load and ambient conditions. The received data are automatically analyzed by the special Wärtsilä developed analyzing software. The most common for marine installations is still to send a batch of operating data once a day to assess engine condition. In the future the 24/7 online connections will be more and more common because of the increasing satellite connection capacity and reduced data transfer costs.

The on-line service is a valuable development of Wärtsilä's range of CBM services to the marine industry. Wärtsilä has existing CBM contracts on more than 130 ships and power plants including almost 500 engines with an output of more than 4.500 MW globally. The major marine segments for CBM services have so far been cruise, offshore and general cargo vessels. Wärtsilä is the first engine manufacturer to sign CBM contracts within the cruise and offshore drilling industry.

Source : www.wartsila.com

EXTENSION OF MAINTENANCE PERIODS SAVE 1.5M EUROS TERMINOLOGY

Machinery Health Management technologies from Emerson Process Management have enabled the Belgian Navy to make significant savings in maintenance costs. By applying vibration and oil analysis technologies to the gas turbines on its mine hunter vessels, the Mean Time Between Maintenance (MTBM) has been extended from 2500 hours to 4000 hours, representing a saving of 71,000 Euros for each cycle.

In addition, the introduction of a predictive maintenance programme of shipboard equipment including motors, pumps, and fans have provided further savings.

DO U KNOW ?! IT'S VERY INTERESTING !!

Fast transient temperature changes may cause spurious signals on the sensor output due to thermal expansions of the metal parts. When using poorly designed sensors, these spurious outputs can trigger false alarms. *Low frequency accelerometers and sensors with poor strain sensitivity are much more susceptible to transient temperature effects.*

HOT STOVE EFFECT !!

BY JIM FITCH, "THE HOT STOVE EFFECT". PRACTICING OIL ANALYSIS MAGAZINE. NOVEMBER 2006

The hot stove effect was first given to learning and management science by Mark Twain. He observed that if a cat happens to jump on a hot stove, he will never jump on a hot stove again. This of course is a good thing. However, not so good is the fact that he will not jump on a cold stove either, or perhaps anything the bears the slightest resemblance to a stove.

Many of us still harbor frightful childhood memories of attempts to ride a bicycle or learning to swim. Yet despite our scrapes, bruises and fear, most of us prevailed in mastering these simple skills. It is sometimes stated that perfection begins with imperfection and we've all heard that practice makes perfect. Imagine the number of dropped baseballs needed for the average child to learn how to play catch. But suppose, if after just one missed swing of a bat a young little leaguer tells his coach, "I'm not very good at baseball so I'm not going to play it any more."

From my experience, the quality and value of one's experience is directly proportional to the risks taken in gaining that experience. Just as in baseball, lubrication is a "practice sport". It requires a certain amount of trial and error, a process known in management science as experiential learning. There will still be those traumatizing moments resulting from "sudden death" machine failures. But each one should be viewed as a learning experience, especially if we make the added effort to explore the root causes and then transform the new knowledge to enhance reliability.

For many in the lubrication field, unexpected failure makes them progressively more adverse to risk, just like the cat and the stove. A maintenance manager recently told me that they no longer relubricate their electric motor bearings, regardless of size. When I asked him why, he explained "The last time we tried, some of the motors failed within a couple hours." If you attend any of the lubrication seminars, they talk about the several ways this can occur. Experiential learning has taught us that it is not the lubricant that causes these failures but rather "lubrication". How you do something is sometimes more important than what you do.

Other examples of lubrication hot stove effects including:

- The refinery that outlawed the use of synthetic lubricants because it claimed synthetics always cause leaks.
- Or the company that switched to six-micron filtration for critical machines but switched back to 25-micron filters after it noticed the new filters lasted only a couple of hours.

Many organizations are too quick to abandon a novel fix or the deployment of promising new maintenance technology. I once heard a budding entrepreneur say, "we can make three mistakes and fix them before our competition has the courage to make one."

* * *

TERMINOLOGY

Fluid-Film Bearing: A bearing which supports the shaft on a thin film of oil. The fluid-film layer may be generated by journal rotation (hydrodynamic bearing), or by externally applied pressure (hydrostatic bearing).

Preload, Bearing: The dimensionless quantity that is typically expressed as a number from zero to one where a preload of zero indicates no bearing load upon the shaft, and one indicates the maximum preload (i.e., line contact between shaft and bearing).

Preload, External: Any of several mechanisms that can externally load a bearing. This includes "soft" preloads such as process fluids or gravitational forces as well as "hard" preloads from gear contact forces, misalignment, rubs, etc.

Cavitation: A condition which can occur in liquid-handling machinery (e.g. centrifugal pumps) where a system pressure decrease in the suction line and pump inlet lowers fluid pressure and vaporization occurs. The result is mixed flow which may produce vibration.

* * *

THE HUMAN BODY PARALLEL TO MACHINE MAINTENANCE

The human body represents an excellent parallel to mechanical machinery to better understand the opportunity which lies in PROACTIVE maintenance. A breakdown, or run-to-failure approach to maintenance is analogous to a heart attack or stroke. Waiting until this dire indication of troble in a human body or a machine results in the need to perform a quick diagnosis and act immediately. There is scarcely enough time to carefully acquire and analyse condition information and make a thorough diagnosis of the situation. This leads to prescribed actions which have a higher than normal probability of failure. It is a situation which all physicians and maintenance managers prefer to avoid.

Maintenance Strategy	Technique Needed	Human Body Parallel
Proactive Maintenance	Monitoring and correction of failing root causes, e.g., contamination	Cholesterol and blood pressure monitoring with diet control
Predictive Maintenance	Monitoring of vibration, heat, alignment, wear debris	Detection of heart disease using EKG or ultrasonic's
Preventive Maintenance	Periodic component replacement	By-pass or transplant surgery
Breakdown Maintenance	Large maintenance budget	Heart attack or stroke

In reviewing the human body parallel to machine maintenance program becomes clear. No physician would suggest that critical body components be replaced or rebuild just because a certain age is reached. It seems equally illogical to prescribe an overhaul or rebuild of a mechanical system based solely on a schedule, without the assistance of machine condition data. Most surgical activities, such as heart surgery, are scheduled when non-destructive testing information, such as EKG, suggests that a problem is present. This information allows the physician to acquire corroborating test information and diagnosis, and to schedule and plan surgical activities under non-emergency circumstances, greatly enhancing the probality of a successful outcome. This is exactly the objective of predictive maintenance.

By gathering machine condition information, an effective diagnosis can be made, and activities scheduled logically and with sufficient time to plan.

Most physicians today recommend a PROACTIVE approach to human body maintenance. It is widely published that cholesterol and high blood pressure are precursors to heart failure and other human ailments. While the presence of either, or both, does not in itself represent heart disease, they represent the underlying root causes of heart failure, strokes, etc. By making an investment in controlling these root causes today, an individual can reduce his risk of a failure later. Physicians recommend regular checks to quantify the presence of these contaminants which are harmful to the human body. When acceptable levels are exceeded, prescriptive actions are taken to remedy the root cause condition, not the component itself. This is PROACTIVE health care. Machines can be maintained in the very same way. By regularly monitoring particle and moisture contamination (cholesterol to a mechanical system), corrective action can be take to remedy the presence of the contamination, eliminating the risk to machine reliability which they represent.

CM – AROUND THE GLOBE COURSES, CONFERENCES, WORKSHOPS

Predictive Maintenance Technology Conference & Expo (PdM-2008)

Date : September 15-17, 2008

Venue : Qwest Center, Omaha Nebraska, US

This Conference is designed for predictive maintenance beginners and seasoned condition monitoring professionals. Pdm-2008 provides leading techniques and technologies required for reliable machinery operation and case studies for Vibration Analysis, Airborne Ultrasound, Infrared Thermal Image, Motor Testing, Oil and Wear Particle Analysis, Other Condtion monitoring technologies.

Further details :

http://www.maintenanceconference.com/pdm/index.html

Operation, Maintenance and Inspection of Rotating Machinery

Date : August 18 to September 5, 2008

Venue : Solaize (Lyon)

The course outlines the technology of machines and their auxiliaries. It covers how machines work on process, the mechanical aspects, wear and tear, lubrication, and troubleshooting by vibration analysis and other techniques, thus providing participants with the necessary knowledge for inspecting machinery and making a diagnosis.

M/s. Mechanalysis (India) Limited (formally IRD Mechanalysis India Ltd.)

Regd. Office: 47 – 48, Tolly Marker Chamber II, Noriman Point, Mumbai – 400 021, India

Web site: www.mechanalysisindia.com

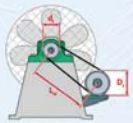
CALCULATING BELT FREQUENCIES

In small to medium power ranges, belt drives can be used to adapt drive speeds to machine speeds. Because belts only transfer a limited level of power, machines usually use several belts of the same length or timing belts. High vibration levels occur when individual belt strands are unequally loaded because the lengths are out of tolerance.

The unloaded strand of the belt should be slightly slack when under the largest load. If the slack strand remains too taught when under a large load, is will slip, causing high noise levels. If the belts flutter, the cause of the vibration can be found by means of frequency analysis, for example, Belt vibrations that are due solely to belt flaws occur at the belt frequency and have a large number of multiples, where the amplitudes are larger in the direction of the force transfer. Usually the calculated belt frequencies range up to 100 Hz.

The belt frequency can be calculated as follows :

$$f_B = \frac{D_r * n_D}{60\ L_w} = \frac{d_r * n_d}{60\ L_w}$$



D_r in mm = Effective pulley diameter

n_D in rpm = Pulley speed

L_w in mm = Effective belt length

In addition to the belt frequency, the rotational frequency of the drive pulley can appear up to the 5th harmonic. At times the vibration level may rise and fall periodically. Yet another special characteristic of belt drives is that you should avoid 1:1 translations. These will often result in unusual vibrations.

Source : www.telediagnose.com

STOP USING THE WRONG OIL !!

It is not uncommon for lube technicians and operators to fill the right oil in the wrong machine. While the mistake might be explained simply as operator error, management has a responsibility to create conditions that minimize (and eliminate, if possible) the problem.

New dispensing products remove much doubt and confusion. Color-coded dispensing flasks will help. Defined dispensing methods eliminate messy conditions that may be created by careless operators.

The importance of oil handling and dispensing is often overlooked by the most meticulous managers who supervise lube-oil programs. Only in the last five years has much attention been paid to the process.

Equipment and system reliability must be supported by handling procedures that promote lube-oil cleanliness. Housekeeping is essential to a comprehensive program.

PRODUCT NEWS

Two-in-one IR and contact thermometers with an innovative dot matrix display.

- Measures -40° C to 800° C /-40° F to 1472° F(568) or -40° C to 650° C/ -40° F to 1202° F(566)
- Easily access advanced features with the soft-key buttons and dot-matrix display
- Measures smaller objects from further away, with a distance-to-spot ratio of 50:1 (568) or 30:1 (566)
- Compatibility with all standard miniconnector Type K thermocouples allow you to preserve your thermocouple investments
- Confidently measures a wide variety of surfaces, with the adjustable emissivity feature, including a built-in material table

HS-660 Accelerometer Checker

The HS-660 is a NEW design portable tool designed with the Maintenance Engineer in mind.

The simple-to-use instrument performs the task of checking vibration sensors before and after installation. It confirms the bias level of the sensors and checks cable integrity, highlighting any electronic fault or cable damage.

So with a simple and quick test by connecting the probes to the sensors cable, the engineer can be sure of the correct operation of the complete sensor assembly.

Source : sales@hansfordsensors.com

GLIMPSES OF NEW LOCAL CHAPTER AT DURGAPUR

Condition Monitoring Society of India (CMSI) started its second local chapter at Durgapur, West Bengal on 19 May 2007. CMSI President Dr. V. Bhujanga Rao and Acting General Secretary Sri. KVVSS Murty (On behalf of General Secretary Dr. M. Ananda Rao) inaugurated the Durgapur Local Chapter at Central Mechanical Engineering Research Institute (CMERI), Durgapur premises during the Two-day National Workshop on Condition Monitoring (NWCM-2007). The executive committee of local chapter was constituted with the following office bearers.

Chairman: **Prof. S.C. Roy,**
Birla Institute of Technology, Sindri

Secretary: **Sri. P.K. Biswas,**
Scientist, CMERI, Durgapur

CONDITION BASED MAINTENANCE (CBM-2007)

A four-day short-term course on Condition Based Maintenance (CBM-2007) was organized by Condition Monitoring Society of India (CMSI) during 19-22 Nov 2007 at Hotel Dolphin, Visakhapatnam.

Dr. V.Bhujanga Rao, Director, NSTL and Founder president of CMSI was the chairman and Prof (Dr) M. Ananda Rao, General Secretary was the co-chairman with Sri. K.V.V.S.S. Murty, Additional Director, as the Convenor of the course CBM-07. The course was inaugurated by Dr. Ing. B.V.A. Rao, Director (Internatonal Relations), VIT, Vellore. Dr. B. Satyanarayana, Rector, Andhra University, Waltair was the Guest of Honour. The Course was planned with the objective of spreading and disseminating knowledge for effectively implementing condition based maintenance in industry. The chief guest of the short-term course Dr. Ing. B.V.A. Rao stressed the need for conducting such courses benefit to the participants to enrich their knowledge base. Dr. B. Satyanarayana, Rector, Andhra University, Waltair impressed the participants by proposing a Diploma/ PG Diploma course on Condition Monitoring of Machinery in the University Campus.

Invited talks were delivered by eminent faculty from various academic/ industrial organizations. Dr. V. Bhujanga Rao, Director, NSTL, delivered a talk on "Condition Based Maintenance - Technical & Economical Appraisal". Dr. V. Ramamurti, Former Professor, IIT, Madras presented industrial case studies for the benefit of participants.

Prof. A.R. Mohanty, IIT, Kharagpur delivered a lecture on condition based maintenance using Motor Current Analysis. Sri. B.K. Patnaik, Associate Director, IIPM, Kansbahal talked on Oil and Wear debris Analysis. He also presented several case studies related to the topic. Dr. K.V. Bhaskar Sharma and Sri P. Agashe, SRDC were deliverd talk on 'Condition Monitoring Standards & Practice' and 'Lub Oil Analysis' respectively. Sri S. Palanichamy, NTPC and Sri Edwin Vijaykumar, VSP were presented case studies on IR-Thermography. Sri S. Sadasivan, Scientist, ADE delivered a talk on 'Higher order spectra / Advanced Signal Processing'. Sri BVPS Rao and Sri YVN Chandrasekhar, Scientists from NSTL were also delivered talk on 'Vibratin Instrumentation' and 'Latest trends on Condition Monitoring'. Sri Kanakesh, GM, SPM also presented Ultrasonic Monitoring Techniques'. Sri. Edwin Vijay Kumar, DGM (Technical Services), Visakhapatnam steel plant organized an industrial visit to steel plant and demonstrated condition based maintenance practices using vibration monitoring, thermography and other techniques to the participants. Around 70 participants representing various sectors of the industry and Navy, academic institutions and students actively participated in the course. A cultural programme was organized to the appreciation of the participants. The course was well attended and widely appreciated, and helped in spreading the utility of condition based maintenance practices for better productivity in industry.

OVERALL FEED BACK FROM CBM-07 PARTICIPANTS : *It is an excellent Course organized by CMSI covering CBM practices useful for both academia and industry. Visit to Vizag Steel plant enriched the knowledge in practicing CBM in Plant*

Enroll as a member of our society & Advertise your products in News Magazine 'MONITOR' & Website www.comsoi.org. Check our website for details