From President's Desk..

Greetings! Maintenance, fault diagnosis, signal processing, vibration, thermography, oil analysis... Don't they all look so familiar to us! Day in and day out condition monitoring practioners spend time in using these techniques/tools for predicting the condition of engines, vehicles or structures so as to provide early warning of impending failures and suggest corrective action in advance. My question here is, same time, are we keeping track of several new sweeping developments in this field.

The subject is becoming more and more multi-disciplinary day by day. Time has come to establish Centres of Condition Monitoring in our reputed Universities/Institutions. Experts are talking about CM of factories instead of single machines, automatic correction and healing of machinery faults through IoT, neural nets and net work management. Lot of research is needed in fault management models, causal models, uncertainty models, multiple fault filtering, variable-oriented diagnosis etc. Internet of Things (IoT) and data-driven techniques are changing manufacturing scenario by collecting the huge amount of data through computer networks from several machines and use this big data into actionable information. Deep Learning based health monitoring systems are providing a new paradigm for detection of faults and understanding of certain failures (diagnosis) and predictions of left over useful life (prognosis) based on the operating conditions. This is how in future we can think of effective and efficient diagnosis, prognosis and smart decision making in today'ssmart industry. Good Luck ! Let us catch up fast!!

---- Dr. V. Bhujanga Rao

Main Features of this Issue…

Announcement: NCCM-2018

National Conference on Condition Monitoring (NCCM-2018) is being Conducted at **K. L. University (Deemed), Vijayawada** under the aegis of **Condition Monitoring Society of India (CMSI)** during **23-24 Nov 2018**.
For Further information please see: *Website*: www.comsoi.org

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COMADEM - 2019 is being hosted by **University of Huddersfield, UK,** during **03- 05 Sep 2019**. For Further information please see:
Website: *http://www.comadem2019.com/*

7th International Conference on **Through-life Engineering Services** at **Cranfield University, UK,** during **06 – 07 Nov 2018.**
For Further information please see:
Website: http://www.through-life-engineering-services.org/index.php/home

Enroll as a member of our society & advertise your products in News Letter 'MONITOR' and Website:www.comsoi.org Check Website for details..

Indian Railways to Acquire onboard Monitoring System

The Indian Railways plan to acquire from the international market advanced train wheel sensors to monitor maintenance needs of coaches, tracks and locomotives. The sensor-based on board condition monitoring system for timely detection of defects related to passenger coaches, wagons, locomotives and tracks, operational in Western countries, would enable predictive maintenance and reduction in sudden catastrophic failures in coach suspension, roller bearings and track condition. The most effective enabler for the system would be monitoring of critical components that have been identified as major causes for derailments and delays, and for causing deterioration in rail infrastructure. The condition monitoring system aims to strengthen the security and safety in train operation as it will have integrated CCTV and information system which will constantly update the health of the coach -- from oscillatory behaviour, coach diagnostics and heating, ventilation and air conditioning and water management, among others. According to the system, the on-board sensors constantly record vibrations and temperatures. Anomalies in vibration are the earliest indicator that something may be wrong with the bearings in the wheels of a coach. This allows for operators to mark those bearings out for careful observation, thus preventing any further damage. Detection of bearing fault at this early stage will help prevent incidents and maintenance schedules can be planned accordingly. To this end, the mainstay of the smart coach would be the wireless sensor modes that, once fitted on every wheel, help monitor the health of the wheel and its bearings. "Once deployed in volume, these sensors would also be able to monitor track health on a real-time basis, resulting in improved safety, higher utilization and reduced operation costs by enabling predictive maintenance and reduction in sudden catastrophic failures of the Railway's assets," the official told IANS.

The technology has found great acceptance and traction in other parts of the world.

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Remote Condition Monitoring of Railway Signalling

Indian Railways are also introducing Remote condition monitoring using non-intrusive sensors for continuous online monitoring of signals, track circuits, axle counters and their sub-systems of interlocking, power supply systems including the voltage and current levels, relays, timers. This will enable prediction of signalling asset failures, automated self-correction and informed decisions on intervention strategies.

Currently remote monitoring of signalling is operational in advanced countries like Britain.

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Some Latest Trends in CM Technology

From Predictive Maintenance to Optimized Service Schedules
(Drive Train Analytics)

To help its customers avoid major damage and production shutdowns, Siemens Process Industries and Drives (PD) offers condition monitoring, a service that is otherwise known as drive train analytics. Condition monitoring is also used to monitor other equipment such as machine tools. The technology is based on the use of drive train-based sensors that perceive oscillations and other conditions. Oscillation behavior will usually change in the event of minor damage, such as a crack or chipping. Inbuilt Sensors record such changes during an early phase of damage. Specialized algorithms analyze the oscillation signal and then characterize the damage Sensor data indicated that repairing the system could wait until the next scheduled service, thereby avoiding unscheduled, cost-intensive production interruptions.

Forecasting Lifespan

Here, instead of using conventional oscillation sensors, the idea is to use sensors that measure drive train rotation speed and torque – characteristics that change depending on levels of stress. Such stress may manifest itself, for example, in a wind turbine when a severe storm puts extreme loads on a rotor or in a mill when grinding of a particularly coarse product is required. In such cases, the aim is to quantify how intense the load on a system can be during the system's useful lifespanThe advantages of load monitoring are definitely convincing – not just because it opens the door to early identification of high stress levels, but because it also makes it possible to determine whether a drive train is being operated at its load limits. If it turns out that systems are being subjected to lower loads than assumed, they can be designed to be leaner in the future. And that could save materials and money.

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Smart manufacturing can be considered the pursuit of data-driven manufacturing, where real-time data from sensors in the factory can be analysed to inform decision-making particularly real-times tracking of resources, waste and emissions in a factory is possible with smart manufacturing, said **Prof. Amaresh Chakrabarti**, Sr. Professor & Chairman, Centre for Product Design and Manufacturing, IISc, Bengalore here at GITAM Deemed University on Monday.

He participated as Chief Guest to deliver **Dr. V. Bhujanga Rao Seventh Endowment Lecture** on **"Industry 4.0: Smart Monitoring of Manufacturing and Beyond"** jointly organised by **GITAM Mechanical Engineering Department** and **Condition Monitoring Society of India (CMSI)** at GITAM Campus. Prof. Amaresh Chakrabarthi mentioned that under smart monitoring of manufacturing asset tracking is possible like where a tool is, or combining information on the tool, its proximity to the specific worker, or the information on the manufacturing step, worker assigned and required tool which tell whether the tool being picked up is the right one for the job: thereby tracking productivity. Smart Manufacturing is a intensified application of networked information technologies through out manufacturing plants and their supply chain enterprises, he added. He emphasized that smart manufacturing can be multi-layer in smart industry where machines are self-aware and full automatic material handling systems.

ISRO Chair Professor, former Director General (NS & M), DRDO, New Delhi and President CMSI **Dr. V. Bhujanga Rao** spoke about various advances in Condition Monitoring and how the diagnosis is done through latest systems and how it benefits our country in better asset management. NSTL Associate Director, Scientist "G" and Senior Vice President-Condition Monitoring Society of India, **Er. P.V.S. Ganesh Kumar** briefed about the CMSI activities and informed about the importance of health monitoring of machinery in real time and emphasized how the Society is supportive of present scenario to handle challenges and support research developments in condition monitoring.

GITAM Vice-Chancellor **Prof. M.S. Prasada Rao** said that the employability ratio would improve only through the expansion of Manufacturing Sector. Core branches like mechanical engineering have good number of opportunities in Manufacturing sector and employability will be sustainable. GITAM Institute of Technology Principal **Prof. K. Lakshmi Prasad**, Mechanical Engineering Department Head **Prof. M.R.S. Satyanarayana** and others participated in the program.

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*Dr. Amaresh Chakrabarti is Professor of Engineering Design and Chairman of the Centre for Product Design & Manufacturing, **Indian Institute of Science (IISc), Bangalore.** He has BE degree in Mechanical Engineering from IIEST Shibpur, India, ME in Mechanical Design from IISc, and PhD in Engineering Design from University of Cambridge, UK. After PhD, he led for ten years the Design Synthesis team at the EPSRC Centre for ExcellenceinEngineering Design Centre at University of Cambridge, before joining IISc as an Associate Professor.*

Prof. Amaresh Chakrabarti has research interests in design synthesis, creativity, biomimetics, eco-design, sustainability, product informatics, virtual reality, ergonomic assembly, smart manufacturing, and design research methodology. He authored/edited 13 books, over 290 peer-reviewed articles, and has 10 patents granted/pending. He co-authored DRM, a methodology used widely as a framework for doing engineering design research. He is the current Editor-in-chief, AI EDAM and Design Science Journals (CUP), Area Editor, Research in Engg Design (Springer), Regional Editor, Journal of Remanufacturing (Springer), and Advisory Editor for 7 International Journals incl. Journal of Engg Design (T&F), Clean Technologies and Environmental Policy (Springer), and Int Journal of Design Creativity and Innovation (T&F). Professor Chakrabarti has been elected twice to the Advisory Board of Design Society, UK, where he is currently an elected member of its Board of Management. He is a member of the CII National Committee on Design, India, member of the Jury for India Design Mark and India Design Excellence Awards of India Design Council. He founded IDeASLab – the first design observatory in India for research into design creativity, sustainability and innovation. He is Programme chair for International Conferences on Research into Design (ICoRD) and 22nd CIRP Design Conference (CIRP Design 2012), Conference Chair for 3rd International Conference on Design Creativity (ICDC 2015) and vice-Chair for AI in Design (AID) and Design Computing and Cognition (DCC) Conferences.

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Welcome to the Wireless World

We have gone past the days of maintenance professionals climbing ladders or placing their hands on equipment or machines to collect information. This usually took trained professionals days, weeks and sometimes even months to manually collect and analyze. This led to maintenance professionals only fixing the equipment that needed immediate attention. At times sudden faults would usually come up leading to more delay in production time under

certain amount of load conditions and if these load conditions occurred outside the times when personnel come for inspection or regular checks they would obviously miss some of this vital information and the consequences of these excess loads could be harmful to those carrying out the inspection causing some form of disaster or harm. Valuable monitoring information can also be lost between data collection trips through the plant. These and many more are the primary reasons for introducing a wireless monitoring system.
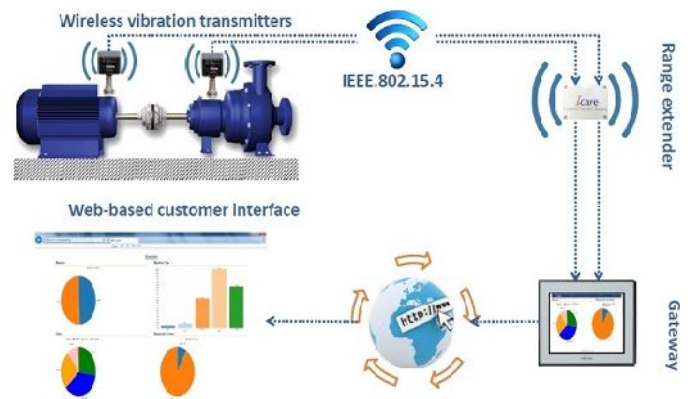
The aim of Wireless Asset Condition Monitoring is to use technology to monitor the asset's condition, or at least a specific number of key physical parameters relating to the condition of the asset then take this acquired data and build a database of the true condition and operation of individual assets. It is possible to compute data accurately from many recording systems, collected at different times, to produce a single overall view of the whole network and this can aid maintainers in assessing developing issues or faults within their area of responsibility. This allows the maintainer to plan where and when to schedule maintenance. With the advent of cloud technologies, the Internet of Things and advanced software forecasting wireless ACM just got started.

How Wireless Asset Condition Monitoring Works

It consists of wireless sensors that send periodic measurements of vibration and temperature through multiple relays to the gateway. All this information is recorded on the server and can be displayed and analyzed on the system's website. Factors like acceleration, velocity and temporal signal could be inbuilt in other to further facilitate the analysis.

written by David Jonathan CMRP, CRL March 1, 2018 and reproduced from the blog of The Maintenance Institute of Africa. Mr. David is a Certified Reliability Leader (CRL), Certified Maintenance Reliability Professional (CMRP), Six Sigma Certified, and Field bus Certified Professional. Currently he serves as an active M & R practitioner in the oil and gas sector where is application of best practices has seen savings in excess of 11 Million dollars and plant reliability improved by over 95%. He is the founder of The Maintenance Institute Africa (TMI AFRICA).

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NEWS ABOUT CMSI ACTIVITIES

CMSI – Jamshedpur Chapter Activity – One Day Workshop

A Workshop on Condition Monitoring was jointly organized by CMSI Jamshedpur Chapter & Timken on 19th January 2018 at United Club, Jamshedpur.

Mr. Probal Ghosh, Chief of Mechanical Maintenance, Tata steel and Chairman, CMSI Jamshedpur Chapter spoke on the importance of condition monitoring and how Tata steel is planning to set up a central/nodal point of access to centrally monitor all assets across the works at a location so that their health can be recorded, tracked, analysed and intervened in case it is needed. He also talked about large scale launch of predictive maintenance management system on various critical assets across Tata Steel.

Mr. Sanjay Koul, MD Timken India Limited, talked about the Timken strength in supporting customers to handle problems and come out with the solution which can help customer improve their productivity. He also appreciated the CMSI Jamshedpur Chapter and the leading role played by Tata Steel in this regard. As per Mr. Koul any exemplary work done by Tata Steel is keenly noticed by other industry leaders and they also try to learn from the experience of Tata Steel, which is beneficial for all the members of CMSI group.

Timken Condition monitoring team presented the approach on CM services and explained as how it could be beneficial to customers. They also presented two case studies:

A) FAN application issue which was solved by the Timken CM services team.

B) Lowspeedwindgearbox problem analysis,detection of gear defect and the defect rectification.

Workshop/Lecture by CMSI member Er. HemantBari

Er. Hemant Bari delivered an Invited talk on **"Vibration Monitoring Techniques &Industrial Case studies"** at **IIT, Indore** on **11 Mar 2018.**

He conducted a Two Day Condition Monitoring workshop with Basics & Hands on Practice for Vibration Measurement at **University of Petroleum and Studies (UPES), Dehradun**,Uttarakhand during **15 - 16 Mar 2018.** During the workshop total 18Students enrolled for CMSI Student Annual Membership.

Healso conducted an Expert lecture on **"Condition Monitoring Techniques Used In Thermal Power Plant"** at Zeal College of Engineering & Research, Narhe, Pune on **27 Mar 2018.**

Some Highlights of the Events.
Congratulations to Mr. Hemant Bari for spreading Condition Monitoring among the Student Community.

CMSI Welcomes New Members!!

LIFE MEMBERS:
Dr. SIDRA KHANAM
Mr. NAVAL KISHOR PRASAD
Dr. SURESHBABU VALASINGAM
Mr.SHIEK SHAHED
Dr. NITESH PRAKASH YELVE

STUDENT MEMBERS:
- **50 Student Members from NIT, Agartala**
- **18 Student Members fromUniversity of Petroleum and Energy Studies, Dehradun.**

CMSI Members in News

DRDO Award for Sr. Vice President of CMSI

Er. PVS Ganesh Kumar, Scientist 'G' and Sr. Vice President, CMSI receiving Scientist of the Year-2016 award from Defence Minister Smt. Nirmala Sitaraman.

Er. PVS Ganesh Kumar, Senior Vice President of CMSI is awarded with **DRDO Scientist of the Year** in recognition of his significant contributions in the domain of **Naval Stealth Technologies.** He is currently working as **Scientist 'G'** at **NSTL, Visakhapatnam.** His efforts led to realization of several indigenous capabilities in prediction, measurement and mitigation of broad spectrum emissions of ships and submarines thereby enhancing self reliance in Naval Stealth Technologies. He is also guiding some of the complex and technologically challenging futuristic developments under various projects of NSTL.

CMSI congratulates him on his achievement and wish him many more laurels in all his future endeavours!!

Mr. T. Venkata Ratnam, Joint Secretary, CMSI has been Awarded **Ph.D.** degree in **Computer Science & System Engineering by Andhra University, Visakhapatnam.** He is currently working as Technical Officer 'D' at NSTL, Visakhapatnam.


CMSI Congratulates **Dr. T. Venkata Ratnam** for receiving Doctoral degree and wish him a great success in all his future endeavours !!

📖 Reference Book 📖

Vehicle Gearbox Noise and Vibration: Measurement, Signal Analysis, Signal Processing and Noise Reduction Measures **by Jiri Tuma (Author)**

This Book is a comprehensive reference for designers of gearing systems and test engineers in the automotive industry and is also a useful source of information for graduate students in automotive and noise engineering.
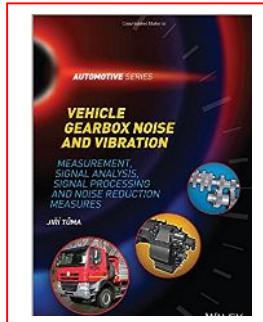
This book also covers methods of processing noise and vibration signals and takes a practical approach to the subject and includes a case study covering how to successfully reduce transmission noise. Describes the procedure for the measurement and calculation of the angular vibrations of gears during rotation. Considers various signal processing methods including order analysis, synchronous averaging, Vold–Kalman order tracking filtration and measuring the angular vibration.

Publisher : Wiley-Blackwell (2014), Hard Cover: 260 Pages
ISBN : 1118359410

Any information on Technical Articles, Latest CM Products/ Courses/ Conferences, significant Achievements/Awards/Honours by our CMSI members may please be intimated through our CMSI e-mail: cmsi.hq@gmail.com. **--Editor**

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Dr. V. Bhujanga Rao
Er. P.V.S. Ganesh Kumar
Dr. T. Venkata Ratnam
Er. Hemanth M. Bari

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All feedback, comments and contributions to the news letter are most welcome.

- Editor