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TSI NEWS LETTER

A Quarterly Newsletter from Tribology Society of India

November 2008

Dr G K Sharma's Driving Pleasure With Hydrogen Engine

Received on 21/2/08



During my recent visit of BMW Head Quarters in Munich, Germany, I had the privilege to be driven around in a BMW Hydrogen 7 car powered by Hydrogen combustion engine. This luxury vehicle is capable of running on hydrogen as well as petrol with the same engine output in either operating mode. As a matter of fact, we started our journey from the garage on petrol mode and were driving at a speed of around 140 km/h on highway and then the operation was switched over to hydrogen. There was no power loss or loss of acceleration while running on hydrogen.

BMW prefers the use of liquid hydrogen for the simple reason that for the same construction volume as for a conventional storage tank, the amount of energy contained in liquid hydrogen (at about -250°C) is 75% higher as compared with gaseous hydrogen, stored at 700 bar.

As the hydrogen, availability at filling stations is in early stages of development the bivalent system of engine operation adopted by BMW addresses the unlimited freedom of mobility. BMW 7 has a comfortable range of more than 700 km - 200km in hydrogen mode and 500 km in petrol mode.

The 12 cylinder engine of BMW Hydrogen 7 has an output of 260 bhp and achieves maximum torque of 390 Newton metres at 4300 rpm. Its top speed is limited to 230 km/h and can accelerate to 100 km/h in 9.5 sec. BMW Hydrogen 7 is a direct injection petrol engine but in hydrogen mode, it is port injection. Due to physical characteristics of hydrogen, petrol injection system are unsuitable. This necessitated the development of injection and metering valves suitable of operation in various system pressures as well as for injection durations.

It is not fair to state that all exhaust is pure water vapour as is generally believed because lubrication system is still conventional in Hydrogen based IC engines. Only a minuscule amount of lubricant burns in the cylinder alongwith hydrogen and thus it is very safe within EU4 standard.

Mr N M Dube reports on STLE/ASME INTERNATIONAL JOINT TRIBOLOGY CONFERENCE IJTC-2007, OCTOBER 22 - 24, SAN DIEGO, USA.



The international Joint Tribology Conference (IJTC)-2007 was organized by the Tribology Division of American Society of Mechanical Engineers (ASME) and Society of Tribology and Lubrication Engineers (STLE) on October 22 - 24, 2007 at San Diego. These were the days, you may recall, San Diego suffered severe wildfire. Though more than 50 thousand people were evacuated to safety and as many as 12 thousand were sheltered in Qualcomm stadium which was a short distance away from the conference venue, there was barely any noticeable impact on civic amenities!

There were over 300 technical presentations made in the following 14 technical tracks: Tribomaterials, Lubricants and Additives, Elastohydrodynamic Lubrication, Hydrodynamic Lubrication and Fluid Film Bearings, Rolling Element Bearings, Engine Tribology, Machine Components Tribology, Contact Mechanics, Magnetic Storage Tribology, Manufacturing/Metalworking Tribology, Nanotribology, Engineered Surfaces, Biotribology & Emerging Technologies

In addition, there were 30 student posters, panel discussions and an exhibition with 9 booths. It was attended by around 400 delegates from 36 countries. They also enjoyed a special symposium in honor of esteemed tribologist Dr. Ward O. Winer, of Georgia Tech who delivered an interesting address titled, "I Was in Tribology Before Tribology was Cool." Various awards for the year 2007 were conferred. Recipient of the Captain Alfred E. Hunt award was Dr. Scott Bair of the Georgia Institute of Technology in recognition of his paper: "A More Complete Description of the Shear Rheology of High-Temperature, High-Shear Journal Bearing Lubrication" published in January 2006, Tribology Transactions. The other notable honor, the 2007 International award went to Dr. Ted Harris, retired professor, Pennsylvania State University. Dr. Harris' work on rolling element bearing fatigue has led to a new theory that included the effect of multiple variable interactions in predicting fatigue damage. This method has been widely used by the industry, and will be adopted in ISO standard for rating of rolling element bearings. For the first time there was an online poster presentation contest with 17 contestants around the world. In addition to the technical program, the meeting provided a forum for networking and informal exchange of ideas among participants from academia, research labs, industry, and government agencies.

The 2008 International Joint Tribology Conference is scheduled on Oct. 20-22 at the Hyatt Regency Miami hotel in Miami, Florida (USA). Deadline for abstracts is March 14, 2008.

Local Chapter Activities

National Workshop On Rolling Element Bearings ORGANIZED BY CMERI DURGAPUR



Mr. G. S. Rattan, Chief Guest, NWREB-06 and Chief Executive Tata Bearing Delivering Guest Lecture



Cultural Programme

A two days workshop on Rolling Element Bearings during 24th and 25th July 2006 with specific theme: Future Directions in Research on Rolling Element Bearings in India was organized by Central Mechanical Engineering Research Institute, Durgapur. This workshop was sponsored by Department of Science & Technology (DST), New Delhi Council of Scientific and Industrial Research (CSIR), New Delhi and Co-sponsored by Tribology Society of India (TSI). The broad objective of this workshop was to provide an opportunity and platform for the scientists, manufacturers, maintenance engineers, academicians to interact and understand the complex & diverse problem of rolling Element Bearings in Indian's future perspective. Rolling Element bearings are very critical components of all machines and equipment as their malfunctioning costs heavily to the performance of the system. Understanding and evaluation of the life of rolling element bearing is, therefore, of great concern. This programme was a step taken in the direction of exploring the untouched domains of rolling element bearings technology and also to seek guidance for the future research to be carried out in this aspect by building a strong and unique partnership between the industry, academia and the research laboratories.

Dr. Gopal P.Sniha, Chairman NWREB-2006 & Director, CMERI welcomed the guests, participants and the staff members of CMERI. The workshop was inaugurated by Prof. D.V.Singh, Patron NWREB-2006 & Former Director, IIT-Roorkee who delivered the inaugural lecture on importance of bearings to the august gathering. Sh. G.S. Rattan, Executive-In-Charge, TATA Bearings, a division of TATA Steel was the Chief Guest on the occasion and emphasized the importance of Industry, R & D Laboratory and Academic institution's interaction and collaboration for quality augmentation of bearings by indigenous bearing manufactures. Inaugural session was concluded by the vote of thanks by Organizing Secretary, Sh. N. C. Murmu, Scientist, CMERI.

Delhi Chapter

Delhi Chapter Organises ONE DAY WORKSHOP ON POWER PLANT LUBRICATION



Mr. AK Mehta, Dr GK Sharma and Dr RK Malhotra inaugurate the Workshop by lighting the Ceremonial Lamp



Mr. TL Nanda and Dr KP Naithani speak during Concluding Session

A workshop on the theme of power plant lubrication was held at Indian Habitat Center, New Delhi on May 12, 2007. Tribology Society of India-Delhi Chapter and CIMAC INDIA jointly organized the workshop. The lead sponsor of this workshop is Indian Oil Corporation Limited (Marketing Division). Lubrizol India Pvt. Limited also supported this workshop.

Recognizing the growing importance of power generation segment and need for good maintenance practices for power plant sector, organizers of the workshop have designed the technical programme of this workshop in such a way that every aspect of power plant lubrication-be it turbine based, diesel generating sets or transformers- ranging from equipment design trends to new developments in lubrication and lubricating oils had been included.

The workshop was inaugurated by Dr.R.K.Malhotra, Executive Director, IOC R&D and President, CIMAC India who underlined the need for technological innovations in this critical inter-disciplinary area of science and technology-Power plant maintenance and lubrication. Dr.G.K.Sharma, Technical Director, NATRiP, New Delhi and President, Tribology Society of India also addressed the gathering outlining the future activities of Tribology society of India. All the technical presentations of the workshop were compiled in the form of a CDROM and the same was formally released by Dr.K.P.Naithani, General Manager, IOC R&D and EC member, TSI-DC chapter.

Session on Turbine lubrication was addressed by Dr. .KK Chaturvedi, of BHEL R&D, Hyderabad and Mr.R.T.Mookken, DGM, IOC R&D. They covered about Turbine design trends and recent developments in the area of turbine lubricants respectively. This session was chaired by Sh.S.K.Rajya, AGM, NTPC, New Delhi. Session on DG set lubrication, which was chaired by Sh.A.K.Mehta, former GM, IOC R&D, was addressed by Sh.Prashant Makkar of Wartsila India and Dr.SSV Ramakumar, Chief Research Manager, IOC R&D who talked about DG lubrication and IOC's new range of DG set lubricants-Servo Marine K-Sereis- respectively. Session on Transformer lubrication, chaired by Dr.K.P.Naithani, GM, IOC R&D, was addressed by Mr.Sridhar of CPRI, Bangalore. Dr.Anoop Kumar of IOC R&D who talked about power plant greases. Sh.T.L.Nanda, DGM(TS), IOC, Mumbai enlightened the audience about condition monitoring techniques and their significance of various power plant lubricants.

The workshop was attended by more than 80 participants from various customer organizations engaged in power plant operation, NTPC units of Northern India and some of engineers of IOC Northern region. All the participants expressed their satisfaction about the technical proceedings of a focused theme in the concluding session which was chaired by Mr.T.L.Nanda and Dr.K.P.Naithani.

Mumbai Chapter

Mumbai Chapter organises a THEME MEETING ON NUCLEAR TRIBOLOGY



A theme meeting on " NUCLEAR TRIBOLOGY- (Understanding Friction, Wear and Lubrication)" at Multipurpose hall, Training school hostel, Anushaktinagar, Mumbai-400094 was organized by Refueling Technology Division, Bhabha Atomic Research Center in technical association with Tribology Society of India Mumbai Chapter and was sponsored by Board of Research in Nuclear Sciences, DAE.

It was inaugurated by Shri R.K.Sinha, Director Reactor Design & Development Group & Director, Design, Manufacturing & Automation Group, Bhabha Atomic Research Centre and inaugural Talk on " Tribology, its significance and Multi fold Applications" was delivered by Dr. Har Prasad, Consultant, Centre for Tribology incorporated & Ex. Sr. Deputy General Manager (Tribology), BHEL, Hyderabad which was concluded with a Vote of thanks by Shri. N.L.Soni, Head Fluid Power Tribology Section, Refueling technology Division, Bhabha Atomic Research Centre and Convener Theme Meeting.

There were three session, the first was presided by DR. K. RAVI, Chief Manager (R&D) , BPCL R&D , MUMBAI and covered a wide range of tribological subjects like polymer composites, water lubricated contacts, in sodium Tribology in PFBR, design challenges in precision mechanism in Indian PHWR type nuclear reactors and high temperature wear and friction monitor. In start of this session, Dr. Barun Chakraborti, L & T gave brief introduction about the Tribological Society of India.

The second session was presided by Prof. Dwivedi, IIT BOMBAY and covered a good mix of tribological subjects like Metallurgical Coatings, High flash point fluids for Nuclear Power Plant, High Temperature synthetic greases and Silicon Carbide Seals.

The second session was presided by Dr. A. K. Kohali, Cmd, Board Of Radiations And Isotopes Technology (BRIT), Mumbai and was brief presentation from various authors of Technical papers, which covered various tribological subjects from experimental to theoretical.

A good response was received though it was first of its kind. Total number of presentation made from various industries and research institutes are 18.

We have received the following form of technical presentation and papers:

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| □ No. of technical papers from BARC and DAE units | = | 5 |
| □ No. of technical papers from Industries and Research institutes | = | 6 |
| □ No. of participants BARC | = | 90 |
| □ No. of participants DAE units | = | 25 |
| □ No. of participants from Industries and Research institutes | = | 60 |

