



TSI NEWSLETTER

A Quarterly Newsletter from Tribology Society of India

ACTIVITIES OF RANCHI REGIONAL CHAPTER, RANCHI

Ranchi Regional Chapter of the Tribology Society of India (TSI) organized a technical talk on **Recent Trends in Environment Friendly Lubricants** at RDCIS, SAIL, Ranchi, on February 19, 1999. The talk was delivered by **Dr.J.Bhatia, Managing Director of Balmer Lawrie Fuchs Ltd. And Vice-President of TSI**, and was attended by over 50 engineers, scientists and academicians of Ranchi. It was the first programme of the Ranchi Chapter after its inauguration in December 1998.

At the outset, Shri Basundeo Roy, AGM (RDCIS) and General Secretary of the Ranchi Chapter, welcomed Dr.Bhatia and other participants of the talk. Subsequently, Shri Sudhaker Jha, Executive Director (RDCIS) and Vice President of the Chapter, introduced Dr.Bhatia to the audience. Shri Jha also expressed that topic of the talk was highly relevant looking at the present environmental abuses.

In his talk, Dr.Bhatia explained about various issues related to **pollution created by present day lubricants**. It included different channels for lubricant related pollution, environmentally critical lubricant application areas, criteria for environment friendliness, myth and reality about environment friendly products, scope for biodegradable lubes, main environment friendly product groups, future trends and Indian scenario. His presentation has been summarized below.

**Summary of Talk of Dr. J. Bhatia, Managing Director,
Balmer Lawrie Fuchs Ltd**

Compiled by: P. Pathak, Regional Secretary, TSI - Ranchi Chapter

Industries are identified as one of the prime sources of environmental abuse. About 32% of total lubes are consumed in different industries, 40% of which goes as environmental losses. **Growing concern for protection of environment has led to the development of environment friendly lubricants.**

The lubricants can pollute our land, water and air through spillage/leakage, disposal, exhaust and/or particulate emission. The lubricants can

also be harmful to the operating personnel through their contact with skin, consumption and inhalation.

The environmentally critical lubricant application areas are total loss systems, water miscible lubricant systems, mist / splash / spray / open systems, applications prone to incidental contact with human skin / eyes / foodstuff, and high temperature / chemically active systems. Environment friendliness of the lubricants being used in these areas may be evaluated on the basis of their biodegradability, non-toxicity / skin neutrality, low evaporation or misting, non-hazardous / non-carcinogenicity, fire resistance and safety in disposal.

Myth about environment friendly products is that they are compromise products that sacrifice performance and have poor cost performance ratio. It is also believed that this type of products is usually incompatible with manufacturing systems and require considerable new investment for use. In reality, however, they offer high performance as well as environment friendliness. They are in fact offering highly favourable cost performance ratio and complete system compatibility. These factors create good scope for the use of biodegradable lubricants world wide, in general, and in India, in particular. Good volume of this type of products is in use in the developed countries. The biggest reasons for this type of products not being popular in India are lack of awareness as well as of legislation.

The main environment friendly product groups are metalworking oils, greases, hydraulic fluids, 2-stroke engine oils, refrigeration oils, and corrosion preventives. Shift towards complete environment friendliness and rapid biodegradability has already started for these products in India. **Need is there for technical innovations with the objective of minimizing lubricant usage and maximizing environmental safety. Vast and varied vegetable oil based resources in our country offer several opportunities for this type of research.** For increasing the usage of this type of lubricants, it also requires to have more stringent legislative norms.



Shri Sudhaker Jha, Executive Director (RDCIS), introducing Dr.J. Bhatia to the audience



Dr.J.Bhatia, Managing Director (Fuchs Ltd), presenting his technical talk



ELSEVIER SCIENCE!

Tribology International Vol. 31, No. 12, p. 787, 1998 © 1999 Published by Elsevier Science Ltd. All rights reserved Printed in Great Britain
0301-679X/98/\$19.00 +0.00
PII: S0301-679X(98)00098-X

ICIT'97—International Conference on Advances in Industrial Tribology Calcutta, December 1997

The International Conference on Industrial Tribology, ICIT'97 was held in Calcutta, India, on 2-5 December 1997. The conference, organised by the Tribology Society of India (TSI) and Balmer Lawrie Fuchs Ltd., was sponsored by many oil and power equipment companies. While some leading tribologists from the US, UK, Germany and other European countries as well as India, participated in this conference, this meeting is in general an annual meeting of the TSI. It is gratifying to note that the organisation, participation (300 delegates) and quality of these conferences have improved steadily over the years. This conference had a judicious mixture of academic and industrial papers and provided an important forum for the members of both these communities to meet and exchange views. **The broad theme of the conference was 'War on Wear'.**

Each session of the conference was initiated by some authoritative 'special topic' presentation. **In tune with the total ambience of this meeting these plenaries had an industrial and academic as well as foreign and Indian mixes. While a leading lubricant manufacturer from Germany provided a world view, his Indian counterpart provided the successes and problems of the Indian lubricant industry. Both highlighted the role of R&D in developing base oil and additives to meet the stiff demands of wear minimisation being made on lubricants.** The other industrial contributions to these plenaries focused on the tribology of power equipment and gear trains as well as on lubricant

development for environmental and work safety. The academic contributions highlighted some of the major challenges faced in understanding the phenomenon of wear in bulk and coated systems. While a war on wear is to be waged and solutions found, in terms of basics we still have a long way to go in our understanding.

The regular session on war mechanism traversed a wide spectrum of theory and practice. On the theory side mechanics of fractal and non-Gaussian engineering surfaces were presented. **Experimental work focused on coatings, films and implants for a whole range of materials from DLC to MoS₂ and exhibited a rich variety of work on substrates, spanning polymers to ceramics. The session on bearings brought out the ongoing work on design using a variety of techniques: FEM, FDM, electrical analogy, and more classical approaches, for journal, thrust pad and rolling element bearings.**

In the area of automotive and metal working lubricants, authors presented their work on viscosity modifying and anti-wear performances of a range of polymers (viz., hydrogenated styrene-isoprene copolymer) and organic sulphur and phosphorous EP additives. There was also a series of presentations on evaluation methods and condition monitoring in cutting as well as metal working operations. There is a keen interest in condition monitoring in the Indian mining industry; a range (viz., off-line expert system in an object Oriented Programming

Framework) of methodological as well as system-based studies of coal bunkers and pulverisers are being undertaken and the benefits of monitoring assessed. **With a strong participation from industry there was much discussion on grease and other industrial lubricants. A highlight was the presentation of work on titanium complex greases developed indigenously by a major Indian oil company.**

The global concern for environment and safety has caught up with tribology in the last few years, and there has been much discussion in journals such as *Tribology International* and many international forums. The Indian forum (ICIT97) was no exception to this. Issues related to eco-toxicity, biodegradability and bio-accumulation of lubricants, their evaluation methods and appropriate legal structures were discussed in the conference. **Finally, the role of tribology in agriculture and the vast rural sector of India was given due consideration by the delegates.**

The conference was held in one of the oldest hostels in India in a very pleasant and comfortable environment. The agenda included a hot discussion with cool refreshment while sailing down the river Ganges.

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Har Prashad

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India*

MEET OUR EMINENT TRIBOLOGIST



Mr. Sudhir Singhal did his B.Tech (Hons) in Mechanical Engineering from IIT, Kharagpur in 1965 and his M.Sc. in Applied Physical Sciences (Tribology) from University of Reading and University of Wales at Swansea, UK in 1969. He joined Indian Institute of Petroleum, Dehradun as Senior Research Fellow in 1965. He has been Heading the Engine Laboratory of IIP since 1973, & is also the Area Leader for the Tribology Laboratory. He heads the Petroleum Products Application Division of IIP since 1983. He has also headed the Analysis & Analytical Spectroscopy Division from 1992 to 1998.

He has represented India at Brazil in 1979 as part of a Ministry of Petroleum delegation on use of Alcohol fuels in I C Engines; to Netherlands in 1989 for the 1st meeting of ISOTC 193 on Natural Gas; in 1994 to USA as a part of Ministry of Non-Conventional Energy delegation on Energy issues; in 1997 to Sweden to participate in European Commission COST-516 Action Tribology working group meeting; to Singapore in 1998 as a member of the government / Industry delegation on Harmonisation of Technical Regulations, etc. He is the Project Coordinator of the lone project of European Commission from India in COST-516 Action Tribology. He has earlier been National Project Coordinator of UNDP projects for application Division (1972-77) and

again for Alternate fuels (1982-1987).

Mr. Singhal is member of several professional bodies such as Society of automotive engineers, USA; Tribology Society of India (President TSI from 1995-1997), Combustion Institute, USA; ASTM; the first President of National Raters Forum, and Chairman & member of several committees of the Bureau of Indian Standards.

Mr. Singhal has made significant contribution in the area of I C Engines and in Tribology. His work on transitions from hydrodynamic to boundary lubrication for piston-rings was well taken by British Petroleum Company. **He has contributed significantly in the area of Alternative Fuels, and on environmental issues.** His areas of current interest includes mechanism of boundary lubrication of nanofilms and the rheological behaviour of lubricants under such conditions.

He has over 100 publications, including presentations at National & International forums. In addition, he also has over 160 technical reports to his credit. The bulk of these are for sponsored work from industry. He has been the Organising Secretary for the NCIT in 1993, and in this capacity has edited the series in Advances of Tribology-1993 published by Tata Mc-Graw Hill, New Delhi.

TSI News Letter congratulates **Mr. Singhal** for his commendable contributions to the Tribology.

Dr. Har Prashad of BHEL, Corporate R&D Division, receiving *The Corps of Engineers Medal* award of the Institution of Engineers for his paper entitled **Assessment of Electrical Parameters of Three Lobe Journal Bearings-An Approach** from His Excellency Lt. Gen. B.K.N. Chhibber (Retd), Governor of Punjab and the Chief Guest of the 13th Indian Engineering Congress on April 25, 1999 during the inaugural ceremony of the congress at the Tagore Theatre Auditorium in Chandigarh.



ABSTRACTS OF LATEST PUBLICATION BY TSI MEMBERS IN THE REPUTED JOURNALS

Diagnosis and Cause Analysis of Rolling-Element Bearing Failure in Electrical Power Equipment Due to Current Passage

Published in Journal of Lubrication Engineering, Vol.55, Issue 5, May 1999 pp 30-35. Also, presented in ASME/STLE Tribology Conference in Toronto Ontario, Canada, October 26-28, 1998.

Authored by **Dr. Har Prashad**, (Member STLE), BHEL, corporate R&D, Hyderabad.

Abstract

This paper reports the diagnosis and cause analysis of rolling-elements bearings of electrical power equipments particularly

motors and alternators due to current passage. In general, the diagnosis of the failure of the bearings has been well established in literature. **The unforeseen causes by failure diagnosis leading to current passage were established as: the puncturing of bearings insulation, grease deterioration, grease pipe contacting the motor base frame, unshielded instrumentation cable, improper contact of grounding brush with shaft and the bearing operating under the influence of magnetic flux.** These causes allow passage of electric current through bearings of the motors and alternators, which lead to deteriorate and reduce the life of bearings in due course. The vibration and shaft voltage data, bearing location, characteristics of the grease used in various rolling-element bearings were analyzed and cause analysis of bearings failure of electric power equipments diagnosed.



Sections of Audience during the Technical Talk on Environment Friendly Lubricants at RDCIS, SAIL, Ranchi

ICIT-99 Steering Committee of ICIT-99

Shri M.K.Mittal
Director (E,R&D)
B.H.E.L.
(Chairman Steering Committee)

Dr.A.K.Bhatnagar
Director(R&D)
Indian Oil Corporation Ltd

Shri H.L.Zutshi
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Hindustan Petroleum Corporation Ltd

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Managing Director
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Standards Organisation (RDSO)

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General Manager(Mech)
B.H.E.L., Corporate R&D division
(Chairman, Organizing Committee)

Dr.Har Prashad
Sr.Dy.General Manager(Tribology)
B.H.E.L., Corporate R&D division
(Convenor and Organizing Secretary)

Let's Think It Over

- Knowledge is the accumulation of facts; Wisdom is the interpretation of facts. Knowledge is culled from textbooks; Wisdom comes out of life.
- Vision is the art of seeing invisible things.
- The trouble with the rat race is that even if you win, you are still a rat.
- God is a circle whose circumference is nowhere but whose centre is everywhere.

- Whisper from Eternity

INTERNATIONAL CONFERENCE ON INDUSTRIAL TRIBOLOGY (ICIT '99)



Registration for the conference has started. Delegates are requested to send registration form duly filled with registration fees to the Organising Secretary.
(Contact Phone : +91-40-3079494-242 or 3079073
e-mail : harprashad@rnd.bhel.co.in)

TO OUR READERS

TSI Members are requested to send short technical communications for Publication in TSI Newsletter to the Editor.