



TSI Newsletter

A Quarterly Newsletter from Tribology Society of India

ACTIVITY OF TRIBOLOGY SOCIETY OF INDIA

A. K. MEHTA

SECRETARY, TRIBOLOGY SOCIETY OF INDIA.

The activity of Tribology in the country started way back in 1972 when first International Conference was organized in New Delhi. Continuing with that a series of biennial National Conferences had been organized in the last 25 years and the Tribology activities have entered into its **Silver Jubilee this year** and befitting with this an **International Conference on Industrial Tribology** with 'War against Wear' as its theme is being organized under the aegis of Tribology Society of India at Calcutta (December 2-5, 1997).

Although, in addition to the organization of biennial conferences, a number of workshops under the aegis of Tribology Society of India had been organized, the activities in the area of Tribology seeing the size and stature of the country need to be much more. The

issue which has been catching the attention of the current Executive Committee of Tribology Society of India was to make the activities of Tribology broad based and **creation of local chapters of Tribology Society of India** in the country at different centres of Tribology. We are happy to say that the TSI Executive Committee during its 22nd meeting held on 7th July, 1997 finalised the guidelines for local chapters for TSI and the same will be appearing in this forthcoming issue of TSI News Letter.

The publication of **Journal of Tribology Society of India (J-TSI)** on regular basis is being discussed in the TSI Executive Committee for quite some time and efforts are being made to bring-out the J-TSI.

Another issue which has been deliberated and is being pursued

is the **publication of a series of technical book-lets** on Products and Processes related to Tribology. These publications to be brought-out by TSI, will go a long way in fulfilling gap of non-availability of this information to various industrial units especially Small Scale Units engaged in the activities and processes related to Tribology. Three publications in the areas of Cutting Oils, Greases and Automotive lubricants have been planned.

The activities of Society depend upon the interest and requirements of its members and their interaction with one another. M/s. BHEL R&D has kindly agreed to bring-out this **TSI News Letter** for next 2 years. I would like to sincerely appeal to all members of the Society to send their contribution in terms of information and news items for publication in TSI news letter, so



that the information could be shared with all members.

Another important issue which TSI news letter can address is the **Tribology related areas of concern** of its members. I would like to appeal all TSI members to send such problems from the field and bring it to the notice of all members through TSI News Letter. We are sure some solutions to the existing problems will come from the members and TSI-News Letter can bridge this useful gap among the members.

HIGHLIGHTS OF 22nd EXECUTIVE COMMITTEE MEETING OF TSI

The 22nd Executive Committee Meeting of TSI was held on 7th July, 1997 at AICTE, New Delhi. The meeting was presided by Shri S.Singhal, President, TSI. The followings were discussed and decided:

TSI AWARDS

The committee in principle agreed a proposal sent by Dr Har Prashad of BHEL, Corporate R&D Division, that the Tribology Society of India should recognise the contribution of some of the leading experts in

the country in the field of the science of Tribology. It was decided to constitute the following awards:

(i) Awards for life time achievement and contribution in field of Tribology.

(ii) A young scientist award.

In addition the founder president of TSI should be facilitated during the ICIT-97. TSI award committee was constituted for working out the modalities of the TSI- Awards. The committee will submit modalities for award by

September 97. The committee consists of

Dr D V Singh, Vice Chairman AICTE - Convenor

Dr A K Bhatnagar, E.D. IOC (R&D) - Member

Dr A Sethuramiah, Prof. ITMMEC, IIT Delhi - Member

The award committee may also like to purpose a third award if considered appropriate. These awards will be given during all the future Tribology Conferences. The first in the series will commence during ICIT-97.

Guidelines for TSI local chapters.

The draft guidelines, prepared by Dr J. Bhatia, Vice President TSI regarding the local chapters of the TSI were discussed. Number of suggestions given by the E.C. members to modify the guidelines. Dr Bhatia has agreed to revise the guidelines for TSI local chapters.

Besides above, various views concerning publication of TSI journal, financial status of society, and NCIT -1999/2000 were discussed.

CHALLENGES IN TRIBOLOGY

The genesis of intermolecular forces involves electrostatic attraction or repulsion during tribological interaction and thus it creates electrodynamic, magnetic and exchange forces between atoms. Thus, nearly, all tribological phenomenon occurring in any interacting system, metal-lubricant-metal or metal to metal is electrical in nature. This originates the science of Tribology in electrical environment. If the precise nature between microscopic contacts could be determined, then better understanding of friction could lead to industrial innovations for development of improved lubricants, and wear resistant components. From this, there is every reason to contemplate the existence of law of variation of coefficient of friction versus contact potential between interacting surfaces in presence of different lubricants. The phenomenon, in general, may exist for different interacting materials, both lubricants and materials, forming the frictional couples.

The classic laws of friction which stipulates that the frictional force resists sliding at an interface is proportional to the "normal load". This perhaps counter the other existing statement that the amount of friction force does not depend on the apparent area of contact. The latest investigation shows the evidence of wear-free friction. Also, investigations indicate that

the friction arising from atomic-lattice vibration may occur when atom close to the surface are set into motion by the sliding action of atoms in the opposing surfaces.

The study of electrical phenomenon in the tribology covering friction and wear in presence of lubricant play a very significant role. The importance of electrical phenomenon has been realised but has not been understood in totality in any depth.

In any tribological interaction thermoelectric component, capacitance component, acoustoelectric component, galvanic component, inductive component of the oil film thickness play a very significant role besides the conventional knowledge to understand friction and wear in presence of lubricants having different properties.

Furthermore, it is very important to understand the electrical properties of hydrocarbon chain molecules for the mechanism of boundary layer formation. Unless the state of various thin lubricant film and the effect of electrical forces on the film separating metallic surfaces are not understood, the basics of tribology can not be refined/understood to a greater depth.

Among the factors defining the frictional interaction between different metals in presence of various type of lubricants, the following may be of basic interest;

i) the structure and properties of the lubricant molecules;

ii) the way in which lubricant molecules adopt to a bearing surface;

iii) special measures/conditions for the long existence of a boundary layer between the interacting surfaces.

It is clear from the above broad spectrum analysis that the current interest in electrical phenomenon arises two fundamental questions; Firstly the ability to control phenomenon which provides basis for developing new methods for increasing wear resistance. This is an engineering problem. At the same time, Secondly, the discovery of the mechanism of electro-physical and electro-chemical processes taking place in the contact interaction opens a wide scope to understand the behaviour of lubricants and wear phenomenon is a basic scientific issue.

It is well known that the large number of components found in the degraded oils cannot be thermodynamically formed by normal chemical transformations, which are expected to be taking place at the tribological systems. The subject has been nicely developed by Prof. C. Kajdas, who attributes that due to oil metal friction the metal surface acquires electrostatic charges at the random spots. These charged spots then emit low charge particles called "Exoelectrons". The number and

frequency of emission depends on speed, load, and nature of metal and lubricant.

The important aspect is that the exoelectrons provide required energy to make some of the chemical oxidation and degradation reactions, thermodynamically possible. Which are otherwise impossible at the temperature of bearing.

The fundamental research on the atomic scale may give way to direct application in future. For instance, presently it is known, why substances made of branched chain molecules make better lubricants than straight chain molecules, even though the branched chain ones are, in bulk form, are more viscous. They remained as a liquid under great forces than do the straight chained molecules, and thus are able to keep two interacting surfaces from touching each other. **Tribologists working in the fundamental mechanism may help chemists to understand friction induced reaction taking place on surfaces or aid material scientists in developing material that resist wear.** As the need to conserve both energy and raw material is becoming very significant, the understanding of basic tribological phenomenon concerning frictional process has to be accelerated in the engineering and scientific organisations.

-Dr. Har Prashad

ICIT'97 - TECHNICAL COMMITTEE

CHAIRMAN: Dr J Bhatia, BALMER LAWRIE -FUCHS LTD., MUMBAI

SESSION ORGANISERS:

1. Science of Lubrication

Dr A Sethuramaiah

Indian Institute of Technology
ITMMEC

Hauz Khas, New Delhi - 110 016

Tel: 011-6857658/666979;

Fax: 011-6862037

2. Bearings - I.

Dr. D. V. Singh

All India Council for Technical
Education

Indira Gandhi Sports Complex, I.P.
Estate,

New Delhi - 110 002.

Tel: 011-3378491;

Fax: 011-3379002/3379044

3. Bearings - 2

Dr Har Prashad

Dy General Manager, BHEL
Corporate R&D

Vikasnagar, Hyderabad - 500 093

Tel: 040 - 279494 Extn.242;

Fax: 040-278320

4. Surface Engineering

Mr. K. Balasubramaniam

Fidelity Industries Ltd.,

Arphi Chambers, 3rd Floor,

189, Mount Road, Madras - 600 006.

Tel: 044-8522389/8526225/

4991162(R);

Fax: 044-8550731/4995210

5. Automotive Lubricants

Mr. Sudhir Singhal

Indian Institute of Petroleum

Dehradun - 248 005.

Fax: 0135 621986/621858

6. Industrial Lubricants & Greases

Dr. J. Bhatia

Managing Director

BALMER LAWRIE - FUCHS LTD.

5, J.N. Heredia Marge,

Ballard Estate, Mumbai - 400 038.

Tel: 022 - 2618106/2612106;

Fax: 022-2615781

7. Mechanical Operations & Lubricants

Mr. Sudhaker Jha

General Manager (Product)

SAIL R&D Centre for Iron & Steel

P.O. Doranda, Ranchi - 834 002,

Bihar.

Tel: 0651-501144;

Fax: 0651 - 501327

8. Lubricants Additives

Dr. S.P. Srivastava

General Manager

M/s. Indian Oil Corporation Ltd.,

R&D Centre,

Sector - 13, Faridabad - 121 007.

Tel: 0129-287263(Direct), 285611;

Fax: 0129-286221

9. Testing & Analytical Techniques in Tribology

Mr. A.K. Mehta

M/s. Indian Oil Corporation Ltd.,

R&D Centre,

Sector - 13, Faridabad - 121 007.

Tel: 0129-286216;

Fax: 0129-286221

10. Condition Monitoring & Simulation

Mr. C. Mishra (Sr. Divisional Manager)

Engineering Services

The TATA Iron & Steel Company

Ltd.,

Jamshedpur - 831 001; Bihar, India.

Tel: 0657-424266;

Fax: 0657 - 310140

11. Environmental & Rural Engineering

Dr. S. Chattopadhyay

Balmer Lawrie & Co. Ltd.,

Application Research Laboratory

P-43, Hide Road Extension,

Calcutta - 700 088.

Tel: 033-49-2222/2253/344;

Fax: 033-4792277

INVESTIGATION OF SIGNIFICANT TRIBOLOGICAL PROBLEMS BY BHEL, CORPORATE R&D, HYDERABAD.

WORKS CARRIED OUT

Investigation of failure of Alternator Bearings.
Investigation of Synchronous Condenser Bearings.
Failure of 10 MW Motor Bearings
Problems of additive disintegration and mal-functioning of Electro-Hydraulic Governor of Turbogenerator set.
Wear of coupling of Industrial Turbine at Nawgaon (Assam)
Thermo Hydrodynamic Analysis of Thrust Bearings of Hydrogenerators of Bhumibol, Dehar, Bhaba etc.,
Failure Analysis of Greases used in Traction Motors and Performance
Evaluation of Indigenous greases.
Journal Bearing failure analysis at Vijjeswaram Site.
Journal Bearing failure analysis
Sealing retrofit 210 MW 843 Bowl Mills
High Vibration/Oil spilling problem of Kalinadi Hydro
Kudremukh vertical pump motor problem regarding aeration/high vibration.

CUSTOMER

RDSO, Lucknow
MPSEB, Ujjain
Vizag Steel Plant

Vizag TPS
Hindustan Paper Corporation

BHEL, HGE, Bhopal

TME, Bhopal and Avadi EMU Shed, Madras
ONGC, Andhra Pradesh
Kudremukh Site
BHEL
Karnataka State Electricity Board
Kudremukh

OFFICE BEARERS AND EXECUTIVE COMMITTEE MEMBERS OF TRIBOLOGY SOCIETY OF INDIA FOR THE YEARS 1995-97

1. Mr S Singhal
President

Dy Director
Indian Inst of Petroleum
P.O. Mohkampur
Dehradun - 248 005.

2. Dr J Bhatia
Vice-President

General Manager
Balmer Lawrie & Co Ltd.,
5, JN Heredia Marg
Ballard Estate
Bombay - 400 038.

3. Mr AK Mehta
Secretary

Dy General Manager
Indian Oil Corporation
R&D Centre,
Sector 13
Faridabad - 121 007.

4. Dr Braham Prakash
Joint Secretary

Sr Design Engineer
Indian Institute of Tech.
ITMMEC, P.O. Hauz Khas,
New Delhi - 110 016.

5. Dr KK Chaturvedi,
Treasurer

DGM, Tribology Lab.
BHEL - Corp. R&D Division
Hyderabad - 500 093.

6. Mr K Balasubramanian,
Executive Director,
Tribology India Ltd.,
1, Smith Road,
Madras - 600 002.

7. Mr R A Rao,
Consultant
Indian Additives Ltd.,
C-12, Kalayani Apartments,
2-17A-12, Dwaraka Gardens
Kakinada - 533 003. A.P.

8. Dr Har Prashad,
Dy General Manager (TBL)
BHEL - Corp. R&D Division,
Hyderabad - 500 093.

9. Dr D V Singh,
Vice-Chairman,
All India Council for
Technical Education,
Indira Gandhi
Sports Complex,
I.P. Estate,
New Delhi-110 002.

10. Dr. S K Biswas,
Professor
Indian Institute of Science
Dept. of Mechanical Engg.,
Bangalore - 560 012.

11. Dr S R Mediratta,
General Manager (IRON)
Steel Authority of India,
RDCIS, P.O. HINOO,
Doranda, Ranchi - 834 002.

12. Dr G Vasudeva
CTSM
Bharat Petroleum Corp. Ltd.,
'K' Installation,
Sewree Fort Road, Sewree
(East) Bombay - 400 015.

13. Dr VRK Sastry, Scientist
Indian Instt. of Petroleum
P.O. Mohkampur,
Dehradun - 248 005.

14. Mr M C Sachdeva
Asst. Chief Executive
Officer, Indo Mobil Limited,
405, Paharpur Business
Centre, 24, Nehru Place,
New Delhi - 110 019.

15. Mr Satvinder Singh
Director,
Tribotech Technologies,
A-2/43, Safdarjung Enclave
New Delhi - 110 029.

16. Dr A S Sarma
General Manager
Lubrizol India Ltd.,
Leo House, 4th Floor,
88-C, Old Prabhadevi Road,
Bombay - 400 025.

17. Dr M K Ghosh
Professor
Banaras Hindu University
Institute of Technology
Dept. of Mech. Engg.,
Varanasi - 221 005.

LET'S THINK IT OVER

Every thing in
future will improve
if spiritual efforts
are made now
Whisper from
Eternity.

PREVIOUS NATIONAL CONFERENCES OF INDUSTRIAL TRIBOLOGY (NCIT)

Year	Organised by	Convenor	Venue	Conference title
1972	IIT-Delhi	Prof. J P Sharma	Delhi	First international Conference on Industrial Tribology.
1974	IIT-Madras	Prof. BVA Rao	Madras	Second National Conference on Industrial Tribology, 7-8, December 1974.
1976	IIT-Bombay	Prof. RC Chaturvedi	Bombay	Third National Conference on Industrial Tribology, 6-8, December, 1976.
1979	I I P	Dr A Sethuramaiah	Delhi	Fourth National Conference on Industrial Tribology, 10-12 October, 1979.
1981	IOC(R&D)	Mr P K Goel	Calcutta	Fifth National Conference on Industrial Tribology, 7-8, September, 1981.
1984	BHEL	Mr TM Rao	Hyderabad	Sixth National Conference on Industrial Tribology, 19-20 July, 1984.
1986	IOC (M)	Mr NP Bakshi	Bombay	7th National Conference on Industrial Tribology, 11-12, December, 1986.
1989	VSSC	Dr B Kanaka Raju	Trivandrum	8th National Conference on Industrial Tribology, 19-20, January, 1989.
1991	TSI & CMTI	Mr VS Prabhakara	Bangalore	9th National Conference on Industrial Tribology, 7-8, February, 1991.
1993	TSI & IIP	Mr Sudhir Singhal	Dehradun	10th National Conference on Industrial Tribology, 24-26, March, 1993.
1995	IOC(R&D)	Shri AK Mehta	Delhi	11th National Conference on Industrial Tribology, 22-25, January, 1995.

CONFERENCE CALENDAR

1997

SEPTEMBER 4 - 6 : 24th Leeds - Lyon Symposium on Triobology (Tribology for Energy Conservation).

Organised by Tribology Section, Department of Mechanical Engineering, Imperial College of Science, Technology and Medicine, London U.K.

SEPTEMBER 8 - 12 : First World Tribology Congress Westminster Central Hall and I. Mech. E. HQ, London, U.K.

Organised by the Tribology Group of the Institution of Mechanical Engineers, U.K.

OCTOBER 1 - 3 : 7th European Space Mechanisms and Tribology Symposium, ESTEC, NOORDWIJK, The Netherlands.

Contact Address : ESTEC Conference Bureau, P.O. Box 299, 2200 AG NOORDIJ, N.L.

NOVEMBER 18 - 21 : International Conference on Surface Engineering ICSE, SHANGHAI '97, CHINA.

For Further Details contact : ICSE 97 Shanghai Secretariat, The Chinese Mechanical Engineering Society, 46 Sanlihe Road, Beijing 100823, The People's Republic of China.

DECEMBER 2 - 5 : International Conference on Industrial Tribology (ICIT - 97), Calcutta, India.

Organised by Balmer Lawrie and Co. Ltd., P-43, Hide Road Extn., Calcutta - 700 088, India.

DECEMBER 8 - 10 : International Symposium on Fuels and Lubricants (ISFL), New Delhi, India.

Organised by Indian Oil Corporation Limited, Research & Development Centre, Sector-13, Faridabad-121 007, India.

1998

MARCH 24 - 26 : Tribology '98, 6th International Tribology Conference (SAIT), Pretoria, South Africa.

Organised by the South Africa Institute of Tribology (SAIT), P.O. Box 1240, 2054 Kelvin South Africa.

MAY 17 - 21 : STLE Annual Meeting,

Westin Hotel, Renaissance Centre, Detroit, Michigan, U.S.A.,

ASME/STLE, Tribology Conference, Information not available at press time.

SEPTEMBER 16 - 18 : INSYCONT '98 Energy and Environmental Aspects of Tribology, KRAKOW, POLAND.

Contact Address : Chairman Organising Committee, INSYCONT '98, Akademia Gorniczko Hutnicza, A1, Michiewieza 30, 30-059, KRAKOW, POLAND.

1999

MAY 23 - 27 : STLE Annual Meeting, Ballys Las Vegas, Nevada, U.S.A.

OCTOBER : STLE/ASME Tribology Conference, Hinton Head, South Carolina, U.S.A.

THEME OF THE TRIBOLOGY CONFERENCE 1999/2000

Suggestions are invited from the members of Tribology Society of India (TSI) for proposing the theme of the conference to be organised in 1999/2000. Themes of the previous few conferences as envisaged were:

X NCIT 1993 "The Challenges in Tribology Indian Requirements."

XI NCIT 1995 "Energy and Material Conservation through Tribological Measures".

ICIT 1997 "War against Wear"

Please send your suggestions to Dr. Har Prashad, Dy General Manager, BHEL, Corporate R&D Division, Vikasnagar, Hyderabad - 500 093.