

ICIT - 99

Tribology in 2000 and Beyond

Second International Conference On Industrial Tribology

December 1-4, 1999, Hyderabad, India

*PROGRAM
GUIDE*

*CALL FOR
REGISTRATION*



Organized By

BHEL
Corporate R&D Division
Hyderabad



Under the aegis of
Tribology Society of India



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Head, Thermal Engg.,
Larsen & Toubro Ltd.

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Fidelity Industries Ltd, Chennai

Dr.Har Prashad

Jt.Secretary, TSI Convener & Organizing,
Secretary, BHEL, Corp R&D, Hyderabad

ICIT '99 – TECHNICAL COMMITTEE

Chairman: Dr.Har Prashad, BHEL, Corporate R&D, Hyderabad

1.Lubrication Basics :

Prof. D.V.Singh

All India Council for Technical Education
Indira Gandhi Sports Complex, I.P.Estate
New Delhi-110002

2.Lubricants

Dr.J.Bhatia

Balmer Lawrie-Fuchs Ltd, 5, J.N.Herdia Marg
Ballard Estate Mumbai-400038

3.Lubricants :

Sudhir Singhal

Indian Institute of Petroleum
P.O.Mohkampur, Dehradun-248005

4.Surface Engineering :

Dr.A.Sethuramiah

ITMMEC, IIT, Hauz Khas, New Delhi-110016

5.Tribology of Materials :

Dr.A.K.Jha

Regional Research Laboratory
Near Habibganj Naka, Bhopal-462026

6.Condition Monitoring :

Dr.B.S.Prabhu

Professor, Mechanical Engg., IIT, Chennai

7.Tribotesting and Analytical Techniques.

Mr.A.K.Mehta

IOC, R&D Centre, Sector 13, Faridabad-121007

8. Dynamic Fluid Sealing, Seals and Rotodynamic Coefficients.

Prof.M.K.Ghosh

Banaras Hindu University
Institute of Technology, Department of Mech Engg
Varanasi-221005

9.Tribology in Power Sector and Allied Industries.

Dr.Har Prashad

BHEL, Corp R&D,
Vikashnagar, Hyderabad-500093

10.Special Topics in Tribology:

Prof.M.C.Dwivedi

IIT,Dept of Chemical Engg, Mumbai-400076

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Dr.Har Prashad

Convenor

MESSAGES

From

The Chairman, Organizing Committee and the President TSI



M.K.Mittal

BHEL, Corporate R&D Division has the privilege to organize the Second International Conference on Industrial Tribology – 1999 (ICIT-99) under the aegis of Tribology Society of India at Hyderabad. ICIT-99 would be a unique forum for Scientists, Engineers and Practitioners of Tribology from all over India as well as from abroad to deliberate on the achievements of Tribology, its future trends and their applications in industry.

Over the years, Tribology has played a major role in evolving optimum maintenance strategies and industry has realised that it is a potent technoeconomical tool for maintainability, reliability, energy saving and safety.

The theme of the conference “**Tribology in 2000 and Beyond**” is very pertinent, particularly with increasing awareness towards the use of synthetic, environment friendly lubricants; use of magnetic bearings; increased wear resistant surface treatment to enhance the performance of the equipments. I am confident that ICIT-99 would address various facets of its theme and bring out the strategy providing direction to the practicing tribologists.

On behalf of the organisers of the conference and the Steering Committee, I extend a hearty welcome to delegates of ICIT-99 & wish the conference a great success.

M.K.Mittal

Chairman, Steering Committee, ICIT-99



D.V.Singh

The first major initiative for promotion of Tribology in India, which resulted in a conceptual consciousness of the importance of the unified area of Tribology at a national level, was taken when the World Conference of Industrial Tribology was organized in New Delhi in 1972, barely five years after the word Tribology as a discipline was coined to represent the unity and interlinkage of friction, lubrication and wear.

We have been regularly organising Conferences biennially which have attracted enthusiastic participation from academic institutions, research laboratories and industries in India and abroad. Taking 1972 as the landmark year, the Tribology Society of India celebrated the Silver Jubilee of Tribology movement in India by organising an International Conference of Industrial Tribology in 1997 (ICIT-97) in Calcutta. The biennial Conferences of the Tribology Society of India have made significant contributions in the growth of education, research and application of the discipline of Tribology in the country.

Conservation of resources, material and energy will dominate the technology developments in the Twenty-first Century. The discipline of Tribology will be one of the core disciplines influencing the growth of technology and will require innovative and multidisciplinary research, both basic and applied.

A very appropriate theme, **Tribology in 2000 and Beyond** has been selected for ICIT-99. Whereas it is generally difficult to make technological projections or predictions for the future since technology is growing at a very fast pace, it is nonetheless important that we look ahead and develop a perception of future objectively while keeping our feet firmly on the ground, in order to be able to meet the challenges of tomorrow.

I hope that ICIT-99 would provide an opportunity to Tribology scientists, technologists and professionals to share ideas with peers and strengthen international linkages which will have increasingly important role in the emerging global knowledge societies. Ideas lead to innovations; shared ideas proliferate and result in new knowledge. ICIT-99 is expected to make an important, even if small in the global context, contribution to dissemination and application of science and technology of Tribology.

Prof.D.V.Singh

President, Tribology Society of India

GENERAL INFORMATION

BHEL, Corporate R&D Division, under the aegis of Tribology Society of India is proud to announce the **Second International Conference on Industrial Tribology** to be held at Hyderabad, India from 1st to 4th of December, 1999.

In December 1997, an International Conference was organized at Calcutta with the theme **War against Wear** to commemorate 25 years of the Indian contributions in advancement of the science of Tribology after the 1972 event which sensitized the scientists and engineers in India to the importance and interdisciplinary sweep of Tribology. The Second International Conference is being organized with the theme of **Tribology in 2000 and Beyond** to bring to focus the achievements of Tribology by 2000 and the future advancement of this discipline in the 21st Century.

VENUE

HOLIDAY INN KRISHNA
ROAD NO.1, BANJARA HILLS, HYDERABAD-500034, INDIA
Telephone: (+91 40) 3393939, Fax: (+91 40) 3392684

THEME

ICIT-99 will have "Tribology in 2000 and Beyond" as its theme, which will be addressed through a number of Technical Sessions as enumerated in the programme.

REGISTRATION

Registration Fee

The registration fee for the Conference will cover :

- | | |
|--|---|
| ■ Participation in Technical Sessions. | ■ Copy of the Conference Proceedings. |
| ■ Conference Kit. | ■ Lunch and Tea during the Conference. |
| ■ Conference Banquet. | ■ Local transport arrangements for arranged visits. |

Registration fee structure

	TSI	Others
Life-members		
Industry Delegates	Rs.4000/-	Rs.5000/-*
Delegates from R&D and Academic Institutions	Rs.2000/-	Rs.3000/-*
Bonafide full time Students		Rs. 750/-
Overseas Delegates	US \$ 400*	

**The participants, subject to eligibility, will be entitled to free life-membership of Tribology Society of India*

Technical Courses

On December 1st, 1999, four parallel one day courses on the following themes will be organized at the Conference Venue:

1. **Automotive Lubricants** : Course Designer & Main Faculty:
Sudhir Singhal, IIP, Dehra Dun
2. **Metal working Lubricants-
Health and Safety** : Course Designer & Main Faculty:
G.S.Ravi, Standard Oil Additives Pvt Ltd,
Bangalore.
3. **Maintenance of Rotating
Machines** : Course Designer & Main Faculty:
J.S.Rao, IIT, New Delhi
4. **Steel Mill Lubrication** : Course Designer & Main Faculty:
C. Misra, Tata Iron & Steel Co Ltd,
Jamshedpur

One Day Course Registration Fee

The registration fee for each course will cover :

- Participation in one of the parallel courses. ■ Course material
- Lunch and Tea during the course
- Fee Structure

Rs.2500 (TSI members), Rs.3000 (Others)

Advance Registration

It is desirable that delegates register in advance. Advance registration will facilitate quick servicing at the registration counter at the Conference Venue. This will also help us in planning the arrangements and serving you better.

Spot Registration

Delegates may also register at the Conference Venue on December 1, 1999 from 1300 hours to 1730 hours and on subsequent days from 0800 hours onwards.

Hyderabad Weather

In early December, day temperatures are normally in the range of 20°C to 25°C and around 15°C during the night with a relative humidity of about 45%. Light woollen clothes are recommended.

Accommodation

Hyderabad offers a range of accommodation to suit every budget (between Rs.2400 to Rs.700 [\$100 to \$36] for single occupancy and Rs.2600 to Rs.700 [\$120 to \$45] for double occupancy). If desired by the participant, hotel accommodation and travel arrangements will be made by the organizers. A number of hotels have agreed to offer accommodation at special rates.

Last date for accepting request for advance hotel reservation: November 15, 1999

Exhibition

An exhibition is being organized at the Venue of the Conference which will remain open during the conference days. A few stalls are still available. Conference Secretariat may be contacted to avail the facility.

Awards

Best Paper awards for Basic and Applied Research fields will be given to the papers presented in the conference.

Cultural Programme and Conference Banquet

A cultural programme reflecting Indian cultural heritage is being organized on December 3, 1999 at Pingle Venkata Ram Reddy Hall, near Indira Park (Besides Ramakrishna Math) in the City Centre followed by the Conference Banquet in the same premises.

Local Sight Seeing

Hyderabad, the capital city of Andhra Pradesh State, has a rich heritage of Nizam culture. Major attractions include – Salar Jung Museum, Charminar, Golkonda Fort, etc besides other attractions with a relish of modern India. A full day sight seeing trip covering these places will be arranged on December 5, 1999 if encouraging response prevails.

During the conference days, local sight seeing and shopping trips are planned for accompanying spouses. Also, a trip to the Birla Temple, a major attraction of Hyderabad is planned for all delegates on December 2, 1999 between 1830 hours to 2000 hours.

Mode of Payment

Registration fee and other payments should be made by a Demand Draft / Pay Order / Cheque drawn in favour of TSI - ICIT '99, payable at Hyderabad, India. In case of outstation cheques, please add Rs.35/- towards bank charges.

For further Information Please Contact

Dr. Har Prashad

Organizing Secretary, INTERNATIONAL CONFERENCE ON INDUSTRIAL TRIBOLOGY - 1999, C/O BHEL, CORPORATE R&D DIVISION, VIKASNAGAR, HYDERABAD-500093, INDIA.

FAX : (+91 40) 3078320 / (+91 40) 3079073, PHONE : (+91 40) 3079494, EXT : 242)

: (+91 40) 3079073), e-mail : harprashad@rnd.bhel.co.in

DETAILED PROGRAMME OF CONFERENCE SESSIONS (December 1, 1999)

TECHNICAL COURSES : (0900 HRS TO 1600 hrs)

1. AUTOMOTIVE LUBRICANTS
2. METAL WORKING LUBRICANTS
3. MAINTENANCE OF ROTATING MACHINES
4. STEEL MILL LUBRICATION

REGISTRATION	: 1300 hrs to 1730 hrs
INAUGURATION	: 1800 hrs
HIGH TEA	: 1930 hrs
EXECUTIVE COMMITTEE MEETING OF TSI	: 2000 hrs

DETAILED PROGRAMME OF CONFERENCE SESSIONS**Authors' Meet** : 0800 hrs to 0830 hrs, **Registration** : 0830 hrs to 1600 hrs**PLENARY SESSION 1** : (0830 hrs to 1030hrs)

- Tribology in the Twenty First Century**
Professor Bo Jacobson, Lund Institute of Technology, Lund University, Sweden
- Synthetic Lubricants Scenario in 21st Century**
Dr.S.P.Srivastava, Indian Oil Corporation R& D Centre, Faridabad, India
- Aluminium Machining – A New Challenge**
Dr.D.Homer, Fuchs Petrolub A.G., Germany

Tea : 1030 hrs - 1050 hrs**SESSION A-1** : (1050 hrs to 1255 hrs)**LUBRICATION BASICS**

- Transient Response of Capillary Compensated Hybrid Journal Bearing System During Starting and Stopping Operation**

Theme Paper

Vijay Kumar, Satish C.Sharma and S.C.Jain

University of Roorkee, Roorkee

- Engine Journal Bearing: Design and Case Study Analyses**

H.Hirani, K.Athre and S.Biswas

Indian Institute of Technology, New Delhi

- Some Experiments on Magnetically Suspended Test Rotor**

V.Kamala, P.Muthu, U.K.Choudhary and A.Rajamani

Bharat Heavy Electricals Limited, Corporate R & D Division, Hyderabad

- Effect of Load Direction on the Hydrostatic/Hybrid Performance of a Multirecess Orifice Compensated Flexible Journal Bearing**

Satish C.Sharma, S.C.Jain and B.V.N.Surendra Kumar

University of Roorkee, Roorkee

- Transient Orbit Analysis for Acceleration and Deceleration of Rotors using Finite Element Method**

R.K.Purohit and O.P.Singhal

J.N.V.University, Jodhpur

SESSION A-2 : (1050 hrs to 1255 hrs)**Lubricants (1) :- Industrial and Solid Lubricants, Greases, Additives, Speciality lubricants including lubricants at Extreme Temperatures and conditions**

- Mo-S Complexes as Multifunctional Lubricant Additives**

Theme Paper

V.K.Verma, R.Singh, A.Bhattacharya A.K.Tripathi, P.K. Singh and Vandana Srivastava

Banaras Hindu University, Varanasi

- Synthetic Aluminium Complex Grease: A Tribological Evaluation Using a Four-ball Test**

Tarunendr Singh and M.F.Sait

Hindustan Petroleum Corporation Limited, Mumbai

- Effects of Average Molecular Weight and Concentration of Styrene-Isoprene co-polymer on Tribological Characteristics,**

Mahendra Pal

Indian Institute of Petroleum, Dehra Dun

- Degradation Kinetics of Hydrogenerated Poly (Styrene-Co-Isoprene)**

N.M.Desai and N.C.Joshi

Lubrizol India Limited, Mumbai

- Effect of Emulsifier Chemistry on Wear Behaviour of Invert Emulsion Fire Resistant Hydraulic Fluid**

A.K.Jain, B.S.Nagarkoti, D.V.Prasad,

M.P.Bangwal, A.B.Shah and M.F.Sait

HPCL, Mumbai

LUNCH : 1255 hrs to 1335 hrs

PROGRAMME

SECOND INTERNATIONAL CONFERENCE ON

VENUE : HOLIDAY INN

DECEMBER 1, 1999 :

FOUR TECHNICAL COURSES : 0900 hrs to 1600 hrs;

INAUGURATION

: 1800 hrs;

EXECUTIVE COMMITTEE MEETING OF TSI

REGIST

HIGH T

TIME DAY	0800 hrs to 1030 hrs	0830 hrs to 1050 hrs	1030 hrs to 1255 hrs	1050 hrs to 1335 hrs	1255 hrs to 1540 hrs	
DEC 2, 99	AUTHORS' MEET	PLENARY SESSION-1	TEA	SESSION A-1 LUBRICATION BASICS A-2 LUBRICANTS (1)	LUNCH	B-1 CO TIC MO TO (1)
DEC 3, 99	AUTHORS' MEET	PLENARY SESSION-2	TEA	SESSION E-1 DYNAMIC FLUID SEALINGS, SEALS AND ROTO-DYNAMIC COEFFICIENTS E-2 TRIBOLOGY OF MATERIALS(1)	LUNCH	F-1 TRI LOC POW SEC ANI ALL IND TRI
DEC 4, 99	AUTHORS' MEET	PLENARY SESSION-3	TEA	SYMPOSIUM : ENERGY EFFICIENT BEARINGS AND TRIBOLOGY IN 2000 AND BEYOND	LUNCH	PA DE C TR IN 20 BE

AT A GLANCE

N INDUSTRIAL TRIBOLOGY - 1999 (ICIT-99)
KRISHNA, HYDERABAD

RATION : 1300 hrs to 1730 hrs;
EA : 1930 hrs;
: 2000 hrs

✓ GB Agenda

17.40

18.40

GB

1335 hrs to 1600 hrs	1540 hrs to 1740 hrs	1600 hrs to 1830 hrs	1740 hrs TO 2000 hrs	1830 hrs TO
SESSION B-2 SUR- FACE ENGG (1)	TEA	SESSION C-1 CONDI- TION MONI- TORING (2)	SESSION D-1 SPECIAL TOPICS IN TRIBO- LOGY	SESSION D-2 PANEL DISCUS- SION ON : AUTOMO- TIVE POLLUTION- ROLE OF LUBRICANTS
SESSION F-2 TRIBO- LOGY OF MATE- RIALS (2)	TEA	SESSION G-1 TRIBO- TESTING AND ANA- LYTICAL TECHNI- QUES	SESSION G-2 SURFACE ENGI- NEERING (2)	CULTURAL PROGRAMME FOLLOWED BY CONFERENCE BANQUET (1900 hrs to 2200 hrs)
SESSION VALEDICTORY SESSION : -GENERAL BODY MEETING -PRIZE DISTRIBUTION -VOTE OF THANKS				

SESSION B-1 : (1335 hrs to 1540 hrs)

CONDITION MONITORING (1) :
VIBRATION DIAGNOSTICS,
FAILURE ANALYSIS AND
PREDICTIVE MAINTENANCE

1. Designing Large Motor Bearings for a Reliable Operating Life of 40 years in CANDU Reactors

Theme Paper

Ashok N. Kumar

Atomic Energy of Canada Limited (AECL), Canada

2. Condition Monitoring of Extrusion Operation Using Load Cells Interfaced with Computer

G.Chandra Mohan Reddy*, M.Komaraiah, V.Kamala, A.K.Dhar and N.V. Srinivasulu

*Chaitanya Bharati Institute of Technology, Hyderabad

3. Cutting Tool Wear Monitoring

A.Ramachandra, K.Chandrashekhara, P.Prasad and Srinivasa Pai. P.

S.J.College of Engineering, Mysore

4. Failure Analysis of Bearings, Gear and Hydraulic Systems of Heavy Earth Moving Machines (HEMM) – Case Studies at Opencast Coal Mines of C.C.L.

Kamal Mukherjee

Central Coal Fields Ltd, Hazaribag

5. Engine Oil Ageing in HEMM (Mining Equipment) – A Case Study

P.S.Mukherjee, A.N.Sinha and A.De

Indian School of Mines, Dhanbad

6. Improvement in Blast Furnace Availability through Condition Monitoring of Bell Less Top System in Bhilai Steel Plant

P.K. Bandyopadhyay*, A.K. Mishra*, A. Ghosh Harza*, P.C. Basak*, T.D. Chatterjee*, S.Jha*, A. Mohammad, K.U. Rao and N. Ahmad

*RDCIS, SAIL, Ranchi

SESSION B-2 : (1335 hrs to 1540 hrs)
SURFACE ENGG (1) : COATING AND
RHEALOGY OF SURFACE FILMS,
WEAR MECHANISM, MODELLING,
EROSION AND WEAR OF
MACHINE COMPONENTS

1. HVOF Deposited WC-12% Co Coating on Ti-alloy for Improved Erosion Resistance

Theme Paper

Manish Roy*, B.E.Narkhede and S.N.Paul

*Defence Metallurgical Lab, Hyderabad

2. Abrasive Wear of Al Alloy-Al₂O₃ Particle Composite: A Study on the Combined Effect of Load and Size of Abrasive

D.P.Mondal, S.Das, S.Gupta, A.K.Jha and B.K.Prasad

Regional Research Lab, Bhopal

3. Response of Plasma Sprayed Alumina – Titania System to Three – Body Abrasion

S.L.Ajit Prasad, M.M.Mayuram and R.Krishnamurthy

Indian Institute of Technology, Chennai

4. Effect of Experimental Factors on the Slurry Erosive Wear Behaviour of a Few Hardfacing Alloys with Varying Chromium Content

R.Dasgupta, A.K.Jha, B.K.Prasad, O.P.Modi, S.Das and A.H.Yegneswaran

Regional Research Lab, Bhopal

5. Erosive-Corrosive Wear Characteristics of a Zinc-Based Alloy and Composite Under the Conditions of Varying Slurry Composition and Distance

B.K.Prasad, O.P.Modi, S.Das, R.Dasgupta and D.P.Mondal

Regional Research Lab, Bhopal

TEA : 1540 hrs to 1600 hrs

<p>SESSION C-1 : (1600 hrs to 1740 hrs)</p> <p>CONDITION MONITORING (2) : VIBRATION DIAGNOSTICS, FAILURE ANALYSIS AND PREDICTIVE MAINTENANCE</p>	<p>SESSION C-2 : (1600 hrs to 1740 hrs)</p> <p>LUBRICANTS (2) : AUTOMOTIVE, METAL WORKING AND POWER TRANSMISSION</p>
<ol style="list-style-type: none"> Vibration Diagnostics of Rotating Machinery Through Expert System <i>Theme Paper</i> M.Sarath Kumar and B.S.Prabhu Indian Institute of Technology, Chennai Expert System and Condition Monitoring of Machinery A.Ramachandra, K.Chandrashekar, Kala Shirish, R. and N.J.Krishna Prasad S.J.College of Engineering, Mysore Condition Monitoring of Rolling Element Bearing, Vis-à-vis its Life Prediction R.Sen, S.Islam and S.C.Nidhi Central Mechanical Engg Research Institute, Durgapur Factors Influencing the Performance of Fluid Film Bearings of Vertical Machines N.Santhanam Bharat Heavy Electricals Limited, Corporate R&D Division, Hyderabad Ferrographic Wear Particle Analysis Prateek Mehta SPM Instruments India (P) Ltd, Hyderabad Statistical Wear Debris Analysis in Lubricants and Hydraulic Fluids for Machine Condition Monitoring A.K.Mishra*, P.K.Bandyopadhyay*, A.Ghosh Hazra*, P.C.Basak*, T.D.Chatterjee*, S.Jha*, A. Mohammad, and A.M. Patel *RDCIS, SAIL, Ranchi 	<ol style="list-style-type: none"> Effect of Water Soluble Metal working coolants on Surface State of High Hardness Steel at Finishing Treatment <i>Theme Paper</i> Mishchuk O.A., Protsishin V.T. and Rizhov Yu.E. UkrNDINP, "MASMA", Ukraine Metal working Fluid Formulation : An Environmental View Mahendra Pal Indian Institute of Petroleum, Dehra Dun A Laboratory Technique for Evaluation of API GL-5 Level Auto Gear Oils R.P.Bisht and V.K.Jain Indian Institute of Petroleum, Dehra Dun <p>SESSION D-1 : (1740 hrs to 1830 hrs)</p> <p>SPECIAL TOPICS IN TRIBOLOGY</p> <ol style="list-style-type: none"> Tribology in Wire Drawing <i>Theme Paper</i> S.Srivastava, N.R.Bhoopalkar Apar Industries Ltd, Mumbai Computer Aided Analysis and Monitoring of Sheet Metal Forming Operations with Force Transients G.Chandra Mohan Reddy*, V.Kamala, M.Komaraiah and C.S. Krishna Prasad Rao *Chaitanya Bharati Institute of Technology, Hyderabad <p>SESSION D-2: (1740 hrs to 1830 hrs)</p> <p>PANEL DISCUSSION ON AUTOMOTIVE POLLUTION - ROLE OF LUBRICANTS</p> <p>VISIT TO BIRLA TEMPLE : 1830 hrs to 2000 hrs</p>

DETAILED PROGRAMME OF CONFERENCE SESSIONS**Authors' Meet** : 0800 hrs to 0830 hrs, **Registration** : 0830 hrs to 1600 hrs**PLENARY SESSION 2** : (0830 hrs to 1030hrs)

- 1. Energy Efficient Journal Bearings Through Lubrication**
Emeritus Professor Jack Schofield
Liverpool John Moores University, U.K.
- 2. Complexity of Future Lubricant Development – Illustrated by Machine Tool Lubrication**
Professor Theo Mang
Fuchs Petrolub A.G., Germany
- 3. Tribology Under Electrical Environment**
Dr. Har Prashad
Bharat Heavy Electricals Ltd, Corporate R&D Division, Hyderabad, India

TEA : 1030 hrs - 1050 hrs
SESSION E-1 : (1050 hrs TO 1255 hrs)
DYNAMIC FLUID SEALINGS, SEALS
AND ROTODYNAMIC COEFFICIENTS

- 1. Effect of Fluid Inertia on Stability of Oil Journal Bearings considering Time History of Film Shape**
Theme Paper
S.K.Kakoty and B.C.Majumdar
Indian Institute of Technology, Kharagpur
- 2. Unbalance Vibration Control of Flexible Rotors Employing Radial and Angular Damping of Active Magnetic Bearings**
S.Jana*, R.Bhattacharyya and B.Samanta
*National Aerospace Laboratories, Bangalore
- 3. Life Prediction Model of Treated Surfaces under Rolling Contact Accounting for Tractional Effect**
D.Dinakar and M.M.Mayuram
Indian Institute of Technology, Chennai
- 4. Rotodynamic Coefficients and Stability of Multilobe Hybrid bearings**
M.K.Ghosh and M.R.Satish
Institute of Technology, Banaras Hindu University, Varanasi
- 5. Estimation of Leakage and Dynamic Characteristics of Labrinth Seal using Finite Element Method**
Y.Rame Gowda, P.Chandrasekhar and B.S.Prabhu
Indian Institute of Technology, Chennai
- 6. A Methodology to Evaluate Non-linear Dynamic Coefficients in a Hydrodynamic Journal Bearing**
T.V.V.L.N.Rao, S.Biswas and K.Atre
Indian Institute of Technology, New Delhi

SESSION E-2 : (1050 hrs TO 1255 hrs)
TRIBOLOGY OF MATERIALS (1)

- 1. Antifrictional Coatings with Organomineral Fillers for Heavy - Duty Friction Joints**
Theme Paper
L.I.Zlotnikov, V.A.Smurugov and S.V.Piskunov
V.I.Belyi Metal Polymer Research Institute of National Academy of Sciences of Belarus, Belarus
- 2. Erosive Wear Studies of Unidirectionally Carbon Fibre Reinforced Epoxy Components.**
U.S.Tewari and A.P.Harsha
Indian Institute of Technology, New Delhi
- 3. Comparative Study of Wear on the Rollers During Flow Forming of Different Materials**
C.S.Krishna Prasada Rao*, M.Komaraiah and G.Chandra Mohan Reddy
*Bharat Dynamics Ltd, Hyderabad
- 4. Factorial Designing of High Stress Abrasive Wear Response of Steels**
R.Dasgupta and A.Roy
Regional Research Laboratory, Bhopal
- 5. Wear Characteristics of H.S.S.Cutting Tool during Turning Operation of Cast Aluminium Alloy-SiC/Gr Composites**
M.S. Bhagyashekar, C.S. Ramesh, A. Ramachandra, and K.Chandrashekara
S.J.College of Engineering, Mysore

LUNCH : 1255 hrs to 1335 hrs

SESSION F-1 : (1335 hrs to 1540 hrs)	SESSION F-2 : (1335 hrs to 1540 hrs)
TRIBOLOGY IN POWER SECTOR AND ALLIED INDUSTRIES	TRIBOLOGY OF MATERIALS (2)
<p>1. Recent Trend in "Predictive Maintenance" and Significance of Transient Data Analysis and its Applications in Turbine Generator <i>Theme Paper</i> Chandra Gupta Porwal National Thermal Power Corporation, Noida</p> <p>2. Application of Machine Dynamics and Vibration Analysis in Problem Diagnostics of High Capacity Turbo Generator M.G.Poduval Vibration Engineers & Consultants, Chennai</p> <p>3. Role of Lubricants in Diagnostic Studies of Power Plant Equipment-Some Case Studies Zafar Mehdi, D.K.Singh and J.K.Quddusi Bharat Heavy Electricals Limited, Bhopal</p> <p>4. Measurement of Load on Pads of Large Thrust Bearings with Pad Support Pivots as Load Cells U.M.Chaudhari, M.Mohan Prabhu, B. Rama Rao, A.D.Baone and S.K.Goyal Bharat Heavy Electricals Limited, Corporate R&D Division, Hyderabad</p> <p>5. Some Operational and Trouble Shooting Experiences with Thrust and Guide Bearings of Hydrogenerators. Sukul Lomash and A.M.Gupta B.H.E.L., Hydrogenerator Engg Division, Bhopal, India</p>	<p>1. A New Three Stage Mechanism for Low Stress Abrasion in Glass Fibre Composites <i>Theme Paper</i> Navin Chand and Somit Neogi Regional Research Laboratory, Bhopal</p> <p>2. Investigations into Tribological Aspects during Forming of Sintered Preforms S.Kumar, Rajiv Ranjan and S.C.Prasad Birla Institute of Technology, Mesra, Ranchi</p> <p>3. A Study on Sliding Wear Behaviour of Phosphor-Bronze Alloy Composite Materials S.C.Sharma and B.M.Satish, B.M.Girish, Rathnakar Kamat and R.Venkatesan R.V.College of Engineering, Bangalore</p> <p>4. Role of Adhesion on Normal Impact of Rough Surfaces P.Sahoo*, M.V.R.Kishore* and S.K. Roy Chowdhury *Jadavpur University, Calcutta</p> <p>5. Effect of Addition of Flyash in PP/PC Blend on Abrasive Wear Navin Chand and Anuradha Pandey Regional Research Laboratory, Bhopal</p>
TEA : 1540 hrs to 1600 hrs	

SESSION G-1 : (1600 hrs to 1740 hrs)	SESSION G-2 : (1600 hrs to 1740 hrs)
TRIBOTESTING AND ANALYTICAL TECHNIQUES	SURFACE ENGINEERING (2)
<p>1. Tribo Testing and its Role in Establishing the Service Life of Lubricants <i>Theme Paper</i></p> <p>M.C.Jain, S.P.Shrivastava and A.K.Bhatnagar Indian Oil Corporation Ltd, R&D, Faridabad</p> <p>2. Artificial Digital Images in Tribotesting</p> <p>V.V.Konchits, L.V.Markova and N.K.Myshkin Metal-Polymer Research Institute of Belarus Academy of Sciences, Gomel, Belarus (Russia)</p> <p>3. Burnished Films of Molybdenum Disulphide and Graphite</p> <p>A.K.Kohli Bhaba Atomic Research Centre, Mumbai</p> <p>4. Studies on Rolling Contact Fatigue Lives of EN31 Steel Balls</p> <p>V.R.K.Sastry, B.M.Shukla and R.P.S.Bisht Indian Institute of Petroleum, Dehra Dun</p> <p>5. Performance Evaluation of Hydraulic Oil Filters Using Multipass Test</p> <p>M.I.Sakri B.L.D.E.A's V.P.Dr.P.G.Halkatti College of Engineering & Technology, Bijapur</p>	<p>1. Fractal Characterization of Running-in Behaviour of an IC Engine Piston Rings and Cylinder Liner Surface Combination <i>Theme Paper</i></p> <p>K.C.Joseph* and N.Raman *Vehs.Research and Development Estt, Ahmednagar</p> <p>2. Aluminium Matrix Composites: A Potential Material for Automobile and Engineering Applications</p> <p>S.Das, D.P.Mondal, O.P.Modi, and A.H.Yegneswaran Regional Research Laboratory, Bhopal</p> <p>3. Mechanism of Material Removal during Erosive-Corrosive of an Al-SiC Particle Composite</p> <p>S.Das, D.P.Mondal, R.Dasgupta and B.K.Prasad Regional Research Laboratory, Bhopal</p> <p>4. Improvement in Lubrication During Cold Rolling of Electrical Steel</p> <p>Madhu Ranjan, P.Pathak, A.K.Mar, P.P.Sengupta, R.C.Thakur and G.M.D.Murthy Steel Authority of India Ltd, RDCIS, Ranchi</p>
<p>CULTURAL PROGRAMME FOLLOWED BY CONFERENCE BANQUET : 1900 hrs Onwards (at Pingle Venkata Ram Reddy Hall, near Indira Park, Besides Ramakrishna Math)</p>	

DETAILED PROGRAMME OF CONFERENCE SESSIONS

Authors' Meet : 0800 hrs to 0830 hrs,

PLENARY SESSION 3 : (0830 hrs to 1030hrs)

1. **Gear Lubricants As Design Elements – A Tool for Gear Designers**
Professor.Dr.Ing.Wilfried J.Bartz
 Technische Akademie Esslingen and Klaus Michaelis, Germany
3. **Bearings in 2000 and Beyond**
Professor.B.C.Majumdar
 Indian Institute of Technology, Kharagpur, India
2. **Tribology Practices in Steel Industry**
C.Misra
 Tata Iron and Steel Company Limited, Jamshedpur, India

TEA : 1030 hrs - 1050 hrs

SYMPOSIUM : ENERGY EFFICIENT BEARINGS AND TRIBOLOGY BY 2000 AND BEYOND

(1050 hrs TO 1255 hrs)

1. **A Low Cost On-Site Oil Analysis Strategy**
Theme Paper
M.K. Williamson
 Entek IRD International, U.K.
2. **Role of Water Lubricated Bearings in CANDU Reactors**
Ashok N Kumar
 Atomic Energy of Canada Limited, Canada.
3. **Leaded Aluminium Alloys as Plain Bearing Materials of Twenty First Century**
J.P.Pathak
 Banaras Hindu University, Varanasi
4. **Tribology in 2000 and Beyond for Heavy Earth Moving Machines (HEMM)**
Kamal Mukherjee
 Central Coalfields Limited, Hazaribad
5. **Vibration Data Collectors meet Mobile Computers – Mobile Collectors**
Prateek Mehta
 SPM Instruments India Pvt Ltd, Hyderabad

LUNCH : 1255 hrs to 1335 hrs

- ♦ **Panel Discussions on Tribology in 2000 and Beyond**
 (1335 hrs TO 1540 hrs)

Valedictory Session (1540 hrs TO 1630 hrs)

- ♦ **General Body Meeting**
- ♦ **Prize Distribution**
- ♦ **Vote of Thanks**

TEA : 1630 hrs

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ABOUT TRIBOLOGY SOCIETY OF INDIA

Tribology Society of India (TSI) is a professional body registered under the "Societies Act". TSI comprises scientists, engineers and other professionals working in diverse disciplines which constitute the science of Tribology in Industry, R&D Institutions & Universities.

The Society, in its present name and form, was constituted in the year 1989. However, the tribologists of the country have been meeting and organizing seminars every alternate year in the field of Industrial Tribology since 1972.

TSI is affiliated to the International Tribology Council, U.K.

OBJECTIVES

- (a) To promote advancement of the science of Tribology
- (b) To provide a common forum for industrialists, technologists, scientists and others to meet and to foster the study and application of Tribology.
- (c) To organize and conduct activities of interest to the members, such as holding meetings, arranging lectures and organizing conferences, seminars and work-shops.
- (d) To disseminate scientific and technical information of interest to the members through publication of periodicals, reports, quarterly TSI Newsletters etc. and proceedings of conferences.
- (e) To collaborate with other such bodies in India and abroad pursuing similar aims and objectives in the area of Tribology.

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