



# TSI NEWS LETTER

TSI Newsletter

January 2017

From the desk of President – TSI



Dear Colleagues

I am pleased to convey my greetings to fellow Tribologists on behalf of new TSI Executive Committee (2017-2018). As you may be aware, TSI has been making steadfast efforts for promoting the awareness, knowledge and practice of Tribology in India over past two decades. The Society has made significant progress during the tenure of the previous Executive Committees, with its regular conference/educational activities. It will be a privilege as well as a challenge for the current Executive Committee to continue the excellent work and take TSI to greater heights.



The Society had participated in the 50th anniversary of Tribology functions at London last year and has come to be recognized as one of the active Tribology Societies of the world. The Society, on the back of its organizational skills for Tribology conferences, has put its bid to host the next World Tribology Congress in 2021 in India. To highlight the importance of Tribology to industrial practices across the country, it will be shortly embarking upon a task of quantifying the saving potential by application of proper Tribological practices across sectors of industry in India, similar to the surveys done across the world.

While we may be justifiably proud of our achievements, we have several tasks on hand, such as strengthening of academia - industry interactions and involving the engineering student community in our Society activities in a significant way, among others. Our efforts can only be described as successful if we get the ultimate end users, i.e. some of the key industry sectors, to get involved in the TSI initiatives in a big way.

I call upon all of you to come forward and actively participate in these Society initiatives.

With kind regards

**Dr SSV Ramakumar**

President - Tribology Society of India

## Countdown has started for ICIT – 2017

The preparations have started in full swing for the flagship event of TSI, The 9th International Conference on Industrial Tribology - 2017 (ICIT-2017). The Conference, having the theme "Tribology - A Key Enabler for Industrial Growth", is scheduled to be held during 6 - 9 December 2017 at The Vedic Village SPA Resorts, Kolkata. The event is being organized by Balmer Lawrie & Co. Ltd., under the aegis of TSI. The First Announcement & Call for Papers will be released shortly. Watch out for more on the TSI website [www.tribologyindia.org](http://www.tribologyindia.org).

We look forward to seeing all of you at ICIT-2017!



बामर लॉरी एण्ड कं० लिमिटेड  
(भारत सरकार का एक उद्यम)  
**Balmer Lawrie & Co. Ltd.**  
(A Government of India Enterprise)

## From the desk of Secretary - TSI

Dear Colleagues

It is a pleasure communicating with you through this latest issue of our Newsletter. We are constantly trying to enhance the quality and contents of this Newsletter, introducing new features and topics. I request you to let us know about any ideas and suggestions for this newsletter and also regarding the activities of the Society in general.



As you may be aware, NTC-2016, the third in a series of National Tribology Conferences, was successfully organized at IIT BHU Varanasi in December 2016.

We appreciate the efforts of the organizing team at IIT BHU as also of all the participants, authors, sponsors and advertisers for their involvement and support in making this event a grand success. An Annual General Meeting of TSI was also held on the sidelines of this Conference during which a new Executive Committee was elected.

We will shortly be releasing the first announcement of ICIT -2017 event at Kolkata, scheduled during 6-9 December 2017. This event will be organized by Balmer Lawrie & Co, and will be held after a lull of 5 years, owing to ASIATRIB 2014. We look forward to your wholehearted participation in this conference.

Please feel free to contact us on [info@tribologyindia.org](mailto:info@tribologyindia.org) with your ideas and suggestions to make the Society a vibrant forum for Tribologists to interact.

With best wishes

Ajay Kumar Harinarain  
Secretary - TSI

## National Tribology Conference (NTC-2016): 8 – 10 December 2016 Department of Mechanical Engineering, IIT BHU - Varanasi

National Tribology Conference “NTC2016” was organized by Department of Mechanical Engineering, IIT (BHU) Varanasi under the aegis of Tribology Society of India (TSI) during December 8-10, 2016 at IIT (BHU) Varanasi. It started with a great note with the turn up of a good number of participants who came from almost all parts of the country, by beating the winter chill at Varanasi at the inaugural function held in Swatantrata Bhawan BHU on Dec 8, 2016. Inaugural function was graced by the presence of Prof. S V Kailas, who was the guest of honour as well as the keynote speaker. The inaugural session started with garlanding the bust of the founder of Banaras Hindu University and a great visionary Mahamana Pt. Madan Mohan Malviya, This was followed by kulgeet of IIT BHU. After welcome addresses by the Convener, Organizing Secretary and Head, Department of Mechanical Engineering, IIT BHU, the keynote lecture was delivered by Prof. Kailas on “Closing the Loop and Sustainable Tribological Products”, where he highlighted the importance of tribology for a sustainable development and betterment of society.

During the three-day span of the conference there were two plenary sessions having two expert lectures each, apart from 13 technical sessions for oral presentations and one poster presentation session. There were about 60 oral presentations and 15 poster presentations during the conference.



**Inaugural Function of NTC 2016:**  
(L to R) Prof. AP Harsha, Prof. A K Jha, Prof. SV Kailas and Prof. Rajnesh Tyagi



**Prof. Satish V Kailas delivering Key Note Lecture during the Inaugural Function**

Mr. Rajeshwar Verma of IIT Delhi and Mr. Deepak Kumar Prajapati were conferred with best paper awards in oral and poster presentation categories, respectively, with a cash prize of Rs. 5000 each.

The valedictory session was graced by the presence of Mr. A K Mehta, ED (TSI), who was the guest of honor for the ceremony. The conference ended with the vote of thanks given by the Treasurer - NTC 2016, followed by the national anthem.



## National Tribology Conference

NTC-2016, 8-10 December 2016 at IIT BHU Varanasi





Seated (Left to Right)

Standing I Row

Standing II & III Row

: Ram Turaga, Ajay K. Harinarain, SR Durugkar, AP Harsha, SK Mzumdar, AK Mehta, AK Jha, Wasche Rolf, SV Kailas, Subrate Ray, Sunil Mohan, Rajnesh Tyagi, Rajesh Kumar, R K Gautam, PC Mani, JV Tirkey

: M Vashishtha, MZ Khan, Mallikarjun SD, US Rao, Deepak Kumar, Sushil Chikane, Hiren Vador, Sangita, Dr. P. Ramkumar, Kailash Nath Yadav, Dr T. Singh, Dr. JN Pandey, Dr Ravi Kumar L, Basavraj, P Rajesh, Raghu Yograj, Mukesh, Abhijit H Patil, Navnath R Kalel, Gaurav Gautam, Rahul Vaish, Manish Kumar, Harsh Kumar

: SP Tiwari, Amit Tyagi, Channabasappa B., Deepak K Prajapati., Dr P B Khushare, Suresh Jadhav, Brij Kumar, Ajay Chauhan, Jayant Singh, Shankar Bhadhavath, Arun Kumar Sharma, T Pramod, Raghvendra Naik, Eknath Aitavade, Maruti Patil, Shakti Rajan Naik, Prasad Duddumpudi, Gnann Saurya, SK Shah, Kaushik N CH, Manik S Nathe, Sandip Panda, Ramesh Bhandari, Mayank Tiwari, Dharmendra Jain, Vivek Kumar, Chippa Srinivas, Chandra Bahadur Khatri, Om Prakash Sharma, SK Sharma, Inder Singh, Chacko Preno Koshy, PS Suvin, SK Senapati, R Mahapatra, Virender Kumar, Dr Mukesh Kumar Vyas, Ms. Simmi Datta, Jyotiranjana Oja, R. Choudhary, Mrs. Pooja Aitavade, Sourabh Aitavade, Shubham R Suryawanshi

**Group Photo of NTC - 2016 Participants**





**Prof. Subrata Ray, distinguished Visiting Professor  
IIT Mandi, delivering a Plenary Lecture**



**Mr. Rolf Wasche, BAM Germany, Delivering  
his Plenary Lecture**



**Concluding Session of NTC - 2016:(L to R) Prof. Rajnesh Tyagi, Mr Ajay K Harinarain,  
Mr A K Mehta, Prof. Rajesh Kumar and Prof. R K Gautam**

### **New President and Executive Committee Take Charge in TSI**

A new Executive Committee (EC) headed by the new President, Dr. SSV Ramakumar, Director (Research & Development), Indian Oil Corporation Ltd., has taken charge at TSI following the elections held for the term (2017-2018) during NTC-2016 event at IIT-BHU, Varanasi.

With a doctorate in Chemistry from IIT-Roorkee (erstwhile University of Roorkee), Dr. Ramakumar has almost three decades of R&D experience in downstream hydrocarbons sector, notably in the areas of refinery process research streams, including catalyst development; simulation & modelling; and development, quality upgradation and marketing coordination of automotive lubricants. He was instrumental in development of India's home-grown, OEM-approved marine lubricant technology, which catapulted IndianOil's SERVO lubes into the select league of five MNC oil companies. As head of Nanotechnology research in IndianOil, he spearheaded the fastest ever development and commercial deployment of Indane Nanocut high-therm metal-cutting gas.



Along with the new President, 20 other Members of the Executive Committee were elected, representing a wide cross-section of industry and academia. The new Executive Committee can include additional co-opted Members, as per provisions of TSI Constitution.

During the First Meeting of the new Executive Committee held on 10 February 2017 at IOCL R&D Centre - Faridabad, Dr. SSV Ramakumar was formally felicitated by the EC Members. Dr Barun Chakrabarti, Vice President - TSI, welcomed Dr Ramakumar with a bouquet.



Felicitation of Dr. SSV Ramakumar during the 1st Meeting of New Executive Committee

### New Members of Tribology Society of India (August 2016 to January 2017)

Sl. No.	Life Mem. #	NAME	ORGANIZATION
1.	5813	Mr Bikash Routh	VIT University, Vellore
2.	5814	Mr Niranjan Singh	Model Institute of Engineering & Technology, Jammu
3.	5815	Dr Mukesh Kumar	MNIT, Jaipur
4.	5816	Prof. E N Aitavade	Ashokrao Mane Group of Institutions, Kolhapur (Maharashtra)
5.	S-5817	Ms Kinjal Trivedi	Charotar University of Science & Technology, Anand (Gujarat)
6.	5818	Mr Jagan Venkatesan	S. V. A. Rikkon Lubes Pvt. Ltd., Chennai
7.	5819	Dr BV Manoj Kumar	IIT Rorkee, Uttarakhand

**We extend our hearty welcome to the new Members and look forward to their active contribution in TSI activities**

## **AICTE Sponsored Short Term Course on “Tribology in Design” Department of Mechanical Engineering, IIT Madras (7- 12 November 2016)**

Dr. P. Ramkumar and Dr. A. S. Sekhar from the Department of Mechanical Engineering at IIT Madras have successfully conducted the AICTE sponsored program on “Tribology in Design” during 7-12 November 2016. A total of 30 faculty members from 6 different states participated in the course. Head - Department of Mechanical Engineering presided over the inaugural function. The inaugural talk on “Friction Reduction on Pistons” was delivered by the Chief Guest, Dr. R. Mahadevan, Director, India Pistons Ltd., Chennai. The course had 26 sessions, covering topics from the basics to advance such as engine tribology, space tribology and bio tribology, including Lab session.

The lectures were delivered by the distinguish experts from IIT Madras, IISc, CECRI and GE Bengaluru. A special banquet dinner was arranged for the participants and the faculties from the department for interaction. In valedictory function, Prof BVSSS Prasad, HOD, distributed the course materials and certificates to the participants and a group photo was taken.



**Inaugural Function: (L to R) Dr. P. Ramkumar, Prof. A. S. Sekhar,  
Dr. R. Mahadevan and Prof. N. Ramesh Babu**



**A Group Photo of the Participants**



## **QIP Course on "Tribology of Soft Matters: Bio-tribology, Microsystems and Automotive Applications": IIT Delhi (7-11 November 2017)**

A QIP short-course was organized by the Indian Institute of Technology - Delhi from 7-11 November 2016. It was well attended by about 30 participants, all faculties at various engineering colleges in India. The title of the course was "Tribology of Soft Matters: Bio-tribology, Microsystems and Automotive Applications". An important feature of this short-course was that it included both oral presentations and lab work.

The area of the talks covered fundamentals of tribology, polymer tribology, polymer composites, bio-materials, lubricants, Nano lubricants and biological materials. Various applications were explained which included brakes, hip joint, microsystems etc. Experts from India and abroad gave talks in this event. The lab work included, basic tribological tests, surface analysis tools, surface energy measurement, lubricant thickness measurement etc. It was decided to conduct this type of course once every year at IIT Delhi. The course coordinators were, Dr. Deepak Kumar and Prof. Sujeet K. Sinha of IIT Delhi.



Participants of QIP Short Term Course, 7-11 November 2016 at IIT Delhi

## **A One-Week Workshop on “Industrial Tribology” under GIAN, MHRD Department of Mechanical Engineering, VJTI – Mumbai (4-8 July 2016)**

A one-week course on “Industrial Tribology” under Global Initiative of Academic Networks (GIAN) was organized by Department Mechanical Engineering, VJTI - Mumbai during 4 - 8 July, 2016. GIAN is an initiative of Ministry of Human Resource Development, Government of India, to garner the best international experience into our systems of education, enable interaction of students and faculty with the best academic and industry experts from all over the world and also to share their experiences and expertise to motivate people to work on Indian problems.

Foreign expert Dr. Michel from Prime Institute, France and Indian expert Dr. R. K. Pandey from IIT Delhi delivered lectures in this course. Total 50 participants, including faculties from various academic institutes, research scholars and industry professionals attended this course.

The following topics were covered in this course:

- Thermo-elasto-hydrodynamics of tilting-pad journal bearings
- The effect of wear in hydrodynamic journal bearings
- Influence of scratches on the behavior of a partial journal bearing
- Effect of misalignment in plain journal bearings under THD regime
- Thermo-elasto-hydrodynamic analysis of PTFE-faced and babbitted tilting pad thrust bearings
- Validation of the Reynolds Equation in lubricated contact - Application to analysis of the mixed lubrication regime in heavily loaded bearings
- Analysis of textured surface effects in hydrodynamic bearings-Application to slider, thrust and journal



**Group photo of the Participants during one week workshop on “Industrial Tribology”  
4-8 July 2016, VJTI-Mumbai**





Dr. Michel Fillon from Prime Institute, France, speaking during the program.

## Young Research Scholars in Tribology



**Name of Research Scholar :** Ashokraj Jayachandran

**Title of Ph.D. Thesis :** “Study of synergy between Plastic Deformation Mechanisms, Tribo-Oxidation and Mechanically Mixed Layers in Tribology of Ti-6Al-4V slid against SS316L and Alumina” (2016)

**Supervisors :** Prof. Satish Vasu Kailas and Prof. Anindya Deb (CPDM)

Surface Interaction and Manufacturing Lab (Tribology Lab), Department of Mechanical Engineering, Indian Institute of Science (IISc), Bangalore-560012.

### **Brief Abstract of Thesis:**

Titanium alloys are widely used in aerospace and automobile applications because of their high specific strength, high specific modulus, creep resistance and corrosion resistance. Amongst the Ti-alloy systems, the Ti-6Al-4V (Ti64)

alloy is the widely used alloy which covers about 50% of the total production of titanium alloys. In spite of its high strength and corrosion resistance, the application of Ti64 alloy is limited because of its poor wear resistance. It is well established that metallic wear is governed by 3 dominant mechanisms, which include: (i) Plastic deformation at the near surface region, (ii) Tribo Chemical Reactions (TCR) and (iii) Formation of Mechanically Mixed Layer (MML). This work aims at understanding and controlling the intensity of these three mechanisms by controlling the experimental conditions. Experiments are conducted in a vacuum based high temperature pin-on-disc (P-O-D) tribometer at various loads and speeds. Ti64 pins are slid against Alumina (Al<sub>2</sub>O<sub>3</sub>) and SS316L discs under ambient and vacuum conditions. At low load/speed, under different environmental conditions and against both the counterface materials (alumina and SS316L), the Ti64 undergoes plastic deformation at the near surface region because of the imposed high strain rate and low temperature. The wear rate and friction is also higher at low load/speed. While increasing the load/speed against alumina and under ambient conditions, wear rate decreases as the effect of TCR is increasing with speed/load. The increase in the availability of thermal energy (high temperature), created by friction, promotes the formation of oxide films on the sliding surface, which act as lubricant by preventing the metal to ceramic wear. However, against SS316L the agglomerated debris is

incorporated with the intermetallics, and the oxides of Ti/Al are mixed as a result of mechanical alloying. Oxidation is also caused by the large amount of plastic deformation occurring during the sliding process in association with frictional heating. The pin surface is also getting protected by the formed MML. Such kind of mixing is not possible against alumina, due to the much lower solubility of alumina in Ti64 for the conditions encountered during sliding. When increasing the load/speed against alumina and SS316L and under vacuum conditions, the wear rate is high due to the adhesion wear, which occurs because of the high plastic deformation and metal to metal/ceramic contact. Hence, it can be concluded that the response of a material, as a function of plastic deformation at the near surface region (ASB), TCR, and MML play a synergistic role in deciding the wear behavior. These mechanisms are mainly dependent on the materials, environmental and operating conditions and the kinetics of the tribological processes at the surface regions.

### **In Focus : Advanced Tribology Research Centre CSIR-Indian Institute of Petroleum, Dehradun**

CSIR-Indian Institute of Petroleum is one of the 37 constituent laboratories of Council of Scientific & Industrial Research. Advanced Tribology Research Centre is focused on petroleum product application area of this premier institute. Advanced Tribology Research Centre is devoted to Research, Development and Consultancy activities in multidisciplinary areas of Tribology.

The Centre has state-of-the-art facilities to study various Tribo contacts; testing and evaluation facility for lubricants and greases and equipment for advanced analysis. Major Facilities available are:

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| <ul style="list-style-type: none"> <li>• FZG Gear Test Rig</li> <li>• IAE Gear Test Rig</li> <li>• Timken Lubricant Test Rig (EP)</li> <li>• Four Ball Wear Test Rig</li> <li>• Four Ball EP Test Rig</li> <li>• Four Ball Rolling Contact Fatigue Tester</li> <li>• Amsler Disc-on-Disc Tester</li> <li>• Multi-specimen Tribo-contact Simulators (Four Ball, Pin on Disk, Ball on Disk, Sector Bearing on Roller, Roller on Roller, Pin on Roller, Ball on Roller, Block on Roller etc.)</li> <li>• Universal Micro Tribo Tester (Pin/Ball-on disk with rotary and reciprocating drive)</li> <li>• Journal Bearing Test Rig (full/partial bearing, cylindrical/lobed bearing)</li> <li>• Lubricity Tester for Turbine Fuels and Additives</li> <li>• Air Release Property of Petroleum Oils</li> <li>• Hydrolytic Stability of Lubricating Oil</li> <li>• Oxidation Stability of Lubricating Oil</li> <li>• Elastomer Compatibility of Lubricating Oil</li> <li>• Fire Resistance Properties of Hydraulic Fluids</li> </ul> | <ul style="list-style-type: none"> <li>• Shear Stability of Hydraulic Oils</li> <li>• Apparent Viscosity of Greases</li> <li>• Drop Point of Greases</li> <li>• Grease Worker and Cone Penetrometer</li> <li>• Roll Stability of Greases</li> <li>• Water Wash Out of Grease</li> <li>• Rust Preventive of Greases</li> <li>• EMCOR test rig for Grease</li> <li>• Low Temperature Torque of Greases</li> <li>• Grease Stability in Hot Water</li> <li>• Oxidation Stability of Greases</li> <li>• Evaporation Loss of Greases</li> <li>• Leakage Tendency of Greases</li> <li>• Oil Separation from Lubricating Grease (Thermal Stability)</li> <li>• Gear Wear Tester for Greases</li> <li>• IP Rolling Bearing Test Rig</li> <li>• Grease Kettle (5 kg)</li> <li>• Scratch Tester</li> <li>• 3D Optical Surface Profilometer</li> </ul> |
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Journal Bearing Test Rig



Universal Micro Tribo-tester



Advanced Tribology Research Centre team at CSIR, Indian Institute of Petroleum Dehradun



Lubricant performance evaluation laboratory



Tribo contact simulators

## Elected Members of TSI Executive Committee (2017-2018)

Sl. No.	Name	Role	Affiliation
1.	Dr. S S V Ramakumar	President	IOCL R&D Centre, Faridabad
2.	Prof. Satish V. Kailas	Vice President	IISc - Bangalore
3.	Dr. Barun Chakrabarti	Vice President	L&T Hydrocarbon Engineering, Mumbai
4.	Mr. Ajay Kumar Harinarain	Secretary	IOCL R&D Centre, Faridabad
5.	Dr. T. Singh	Joint Secretary	BPCL - Mumbai
6.	Dr. Pankaj Bhatnagar	Joint Secretary	IOCL R&D Centre, Faridabad
7.	Mr. Rajendra Mahapatra	Treasurer	IOCL R&D Centre, Faridabad
8.	Mr. Kamal Mukherjee	EC Member	Formerly of SECL
9.	Prof. Satish C. Sharma	EC Member	IIT Roorkee
10.	Prof. C. S. Ramesh	EC Member	Dayanand Sagar University, Bangalore
11.	Prof. Ram Turaga	EC Member	IISc - Bangalore
12.	Prof. Mayank Tiwari	EC Member	IIT - Patna
13.	Dr. S K Mazumdar	EC Member	IOCL R&D Centre, Faridabad
14.	Dr. Sudhir Rashingkar	EC Member	RCG Instruments, Pune
15.	Mr. Sothi Selvam	EC Member	Balmer Lawrie & Co., Kolkata
16.	Mr. N. M. Dube	EC Member	DUCOM, Bangalore
17.	Mr. S. R. Durugkar	EC Member	L&T Hydrocarbon Engineering, Mumbai
18.	Mr. TL Sethuram	EC Member	Lubrizol India, Mumbai
19.	Prof. A P Harsha	EC Member	IIT BHU, Varanasi
20.	Mr. R Suresh	Ex. Officio	IOCL R&D Centre, Faridabad
21.	Dr. R K Malhotra	Ex. Officio	Formerly of IOCL R&D Centre, Faridabad

- ❖ All Members are invited to send their publication materials, suggestions and feedback to the email ID [info@tribologyindia.org](mailto:info@tribologyindia.org)
- ❖ Compiled by Mr. A. K. Mehta, ED (TSI) and Edited by Dr. Barun Chakrabarti, Vice President (TSI), on behalf of Tribology Society of India. This publication is for free circulation among TSI Members.