



## 12<sup>th</sup> TSI SUMMER SCHOOL IN TRIBOLOGY, 21 - 25 JULY 2020 (Webinar mode)

### *TSI embraces Technology to overcome COVID-19 Challenge*

The 12<sup>th</sup> Summer School in Tribology (SST), the annual flagship educational event of TSI, was planned to be organized at Indian Oil Institute of Petroleum Management (IIPM), Gurugram during 12 - 16 May 2020. However, after the program was announced and enrolment process started, the COVID-19 pandemic struck and the whole country went into lockdown. It appeared that TSI might have to cancel the event, thus disrupting the continuity of SST over past eleven years. Fortunately, the undaunted TSI spirit successfully overcame this unprecedented challenge and TSI Leadership took the momentous decision to conduct the 12<sup>th</sup> SST through webinar mode. Under the guidance of Dr SSV Ramakumar, President (TSI) and ably led by Mr Ajay Kumar, Secretary (TSI) the dynamic team at TSI Headquarters conceptualized and implemented the whole 5-day event flawlessly in less than two months.

The 12<sup>th</sup> SST took place during 21 - 25 July 2020, through Webinar mode over a digital collaboration platform. TSI partnered with M/s Rosefield Energy Tech Pvt. Ltd for organizational support. The program included a series of technical sessions, guest lectures and an on-line examination on the last day. The detailed program brochure can be viewed at the following link on TSI website:

<https://www.tribologyindia.org/pdf/12th-SST-Webinar-Brochure.pdf>

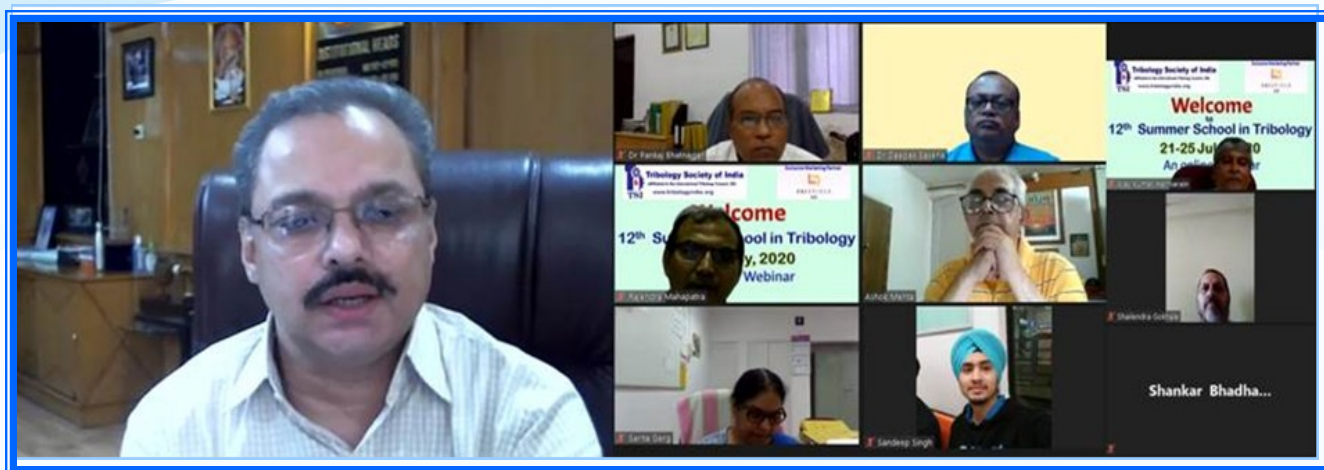
Key highlights of the program are briefly mentioned here.

#### **Inaugural Function**

Dr SSV Ramakumar, Director (R&D), IndianOil and President (TSI) inaugurated the 12<sup>th</sup> Summer School in Tribology in webinar format on 21<sup>st</sup> July 2020. Speaking on the occasion, he emphasized the importance of energy saving potential of Tribology in different industries. He spoke about the famous Jost Report, published in 1966, which highlighted the huge cost incurred in the UK economy due to friction, wear and corrosion, because of inadequate knowledge about Tribology and its applications. He expressed satisfaction that such an assessment on role of Tribology in quantifying energy saving potential in the Indian Mining sector was being coordinated by TSI with the support of Petroleum Conservation Research Association (PCRA). Application of Tribological principles could yield enhanced productivity, higher efficiency and increased profitability through significant reduction in material and energy losses, he added.

Dr Ramakumar lauded the efforts to conduct the 12<sup>th</sup> SST through on-line mode and mentioned that the event had been designed after careful consideration of suggestions from eminent members of Academia and Industry, so that the participants could derive maximum benefit. Further, introduction of lectures on emerging topics such as e-Mobility and its associated complexities, such as optimizing energy efficiency and NVH issues, will be very useful for participants to pursue further work. He hoped that, with such events, Tribology could become a mainstream subject of teaching and research. Dr Ramakumar advised the TSI organizing team to plan and conduct more such events at regular interval, to derive maximum benefits from the use of on-line platform.

On this occasion, Dr Deepak Saxena, Executive Director (Lube Technology), IndianOil R&D and EC Member of TSI, delivered the welcome address, followed by a brief on the program format by Mr Ajay Kumar Harinarain, GM (Grease & Tribology), IndianOil R&D and Secretary (TSI).



**Dr SSV Ramakumar, Director (R&D), Indian Oil and President (TSI), inaugurating the 12<sup>th</sup> SST on 21 July 2020 in webinar mode**

### Salient Features of the Event

- 114 participants from Academia and 71 delegates from industry across multiple locations registered for the 12<sup>th</sup> SST .
- The program covered 20 technical lectures and 7 guest lectures from eminent faculty from industry and reputed academic institutions. The guest lectures included 2 following lectures organised with the help of M/s Rosefield Energy Tech Pvt. Ltd.
  1. Lubrication Requirements for Electric Vehicles, by Mr Philip Reeve, ADLU Consultancy, UK,
  2. Overview of the Base Oil Industry and the challenges and choices it brings for lubricant formulators, by Mr Gerard Heaton, Saudi Aramco Luberef.

Details of the technical program of 12<sup>th</sup> SST can be seen at the following link of TSI website:

<https://www.tribologyindia.org/pdf/12th-sst-webinar-mode-tech-program.pdf>

- On the 5<sup>th</sup> day, an on-line test of 1-hour duration, with 50 multiple-choice questions, was organized. About 120 participants took the test and submitted their answers on line. This was a unique experience for TSI as well as for the participants.
- One the last day of the event a Concluding Session, chaired by Dr Barun Chakrabarti, General Manager & SME (Asset Integrity Management), L&T Hydrocarbon Engineering and Vice President (TSI), was organised. As part of feedback interaction, the participants expressed their satisfaction and reiterated the usefulness of this virtual event, since a large number of participants from academia and industry were able to join. Several suggestions were received for incorporation in future such events.
- Some of the academia participants requested TSI to organize more virtual programs for their students at under-graduate / post graduate level. Team TSI will get in touch with concerned institution to discuss further on such initiatives.

The great success of this very first on-line event of TSI underlines the power of technology and opens up exciting possibilities for future TSI programs and brand building.



**IndiaTrib - 2019 : 1 - 4 DECEMBER 2019**  
**(HOSTED BY MECHANICAL ENGINEERING DEPARTMENT,**  
**INDIAN INSTITUTE OF SCIENCE, BENGALURU)**

IndiaTrib - 2019, The 10<sup>th</sup> International Conference on Industrial Tribology, was organized by the Department of Mechanical Engineering of Indian Institute of Science, (IISc), Bengaluru during 1-4 December 2019 with the Theme: *Tribology for Society*, under the Aegis of Tribology Society of India.

It is noteworthy that the Mechanical Engineering Department of IISc also completed 75 years in 2019.

Following are some of the highlights of the conference\*\*:

- A Pre-Conference Education Course was organized on 1<sup>st</sup> December 2019. There were 5 technical lectures and over 20 paid participants who attended the program along with few students / other associates from IISc.
- The IndiaTrib 2019 was inaugurated by Prof\_Jayant Modak, Deputy Director, IISc. Other dignitaries present included Prof. Raghuraman Goverdan, Acting Chairman, Department of Mechanical Engineering, Mr Ajay Kumar Harinarain, Dr Barun Chakrabarti, Prof. Nicholas D Spencer and Prof M.S. Bobji .



**Group photo of the participants during the Pre-conference Education Course**





The conference was inaugurated by Prof. Jayant Modak, Dy Director, IISc



A cultural program on Classical Chou Dance by Geetanjali Hembrom and her team was organized on the evening of 1<sup>st</sup> December, 2019



A group photo of all participants of IndiaTrib 2019 taken immediately after the inaugural function on 2<sup>nd</sup> Day of the event.



- A large group of students of the Surface Interaction & Manufacturing Laboratory and Force Microscopy Laboratory, Department of Mechanical Engineering, worked day and night tirelessly to make the conference a successful one. The picture below shows the enthusiastic team of students at the registration desk during day 2 of the conference.



- The Technical Exhibition organized during the conference was inaugurated by Prof. Luo Jianbin of Tsinghua University, China



The Technical Exhibition being inaugurated by Prof. Luo Jianbin

- A cultural evening on Classical Vocal by Shri Maruthi Prasad and team was organized on the second day evening.
- A good number of female participants added colour to the conference. Some of the those present on the Day 3 of the conference during the dinner function posed for a group photo shown below.
- On the fourth and last day of the conference, Prof M\_S Bobji presented the highlights of the conference in his inimitable humorous style, which was appreciated by all.



Shri Maruthi Prasad and team enthralled the audience with their classical vocal repertory on the evening of second day



A group of female delegates added colour to the dinner program on the third day



Prof M S Bobji presenting the conference highlights in the concluding session of IndiaTrib 2019

**Award Ceremony:** All Technical Papers including Oral (Short / Poster), Oral (Academia) and Oral (Industry) categories were evaluated by a team of experts for the TSI awards. Awards were presented during the concluding session. Following the winning entries:

- **TSI 1<sup>st</sup> Best Paper in Oral (Academia) Category:** Tribological Behavior of Polymer Brushes: Effect of crosslinking (Paper ID # TSI19183), by Mr Manjesh Kumar Singh from Max Planck Institute for Polymer Research, Mainz.
- **TSI 2<sup>nd</sup> Best Paper in Oral (Academia) Category:** Determination of static and dynamic friction in force controlled sliding conditions (Paper ID # TSI19385), by Mr Pranay Likhar from IISc Bengaluru.
- **TSI 1<sup>st</sup> Best Paper in Oral (Industry) Category:** High temperature erosion performance evaluation of advanced materials (Paper ID # TSI19361), by Mr Debdutt Patro from DUCOM Instruments Pvt. Ltd. Bengaluru.
- **TSI 2<sup>nd</sup> Best Paper in Oral (Industry) Category:** Tribological approach to enhance performance and durability of off-highway power train aggregates (Paper ID # TSI19352), by Mr Raghu Vamsi Patnala from R&D Division, BEML Ltd, KGF - Bengaluru.
- **TSI 1<sup>st</sup> Best Paper in Oral (Short) Academia Category:** Gum acacia as filler for SU-8 composites for superior mechanical and tribological performance (Paper ID # TSI19257), by Ms Shanmukhi Sripada from IIT Delhi.



- **TSI 2<sup>nd</sup> Best Paper in Oral (Short) Academic Category:** Elasto-hydrostatic Lubrication of Control Flow Valve Compensated Thrust Bearing (Paper ID # TSI19256), by **Mr Vivek Kumar** from IIT Roorkee.
- **TSI 3<sup>rd</sup> Best Paper in Oral (Short) Academia Category:** Investigation on Dynamic Characteristics of Meso Scale Air Journal Bearing with Texture (Paper ID # TSI19117), by **Mr Vyshakh V** from MNNIT Allahabad, Prayagraj.
- The awards as detailed above were presented to the winners by Prof Nicholas D. Spencer. The picture below shows Prof Satish V Kailas accepting the award on behalf of his student Mr **Pranay Likhar** from Prof Nicholas D Spencer.



**Prof Satish V Kailas accepting the award on behalf of his student  
Mr Pranay Likhar from Prof Nicholas D Spencer**

- Prof B V A Rao, a distinguished Tribologist and academician and Past President of TSI, delivered the valedictory address during the Concluding Session of the conference.



**Prof B. V. A. Rao, Past President TSI, delivering the valedictory address  
at the concluding session.**

- As decided in the TSI Executive Committee Meeting during the conference, it was announced that the next **TribolIndia 2020** would be organized by SRM University, Chennai. Prof. TVVLN Rao and Prof Shubrajit Bhaumik from SRM University formally accepted the invitation to conduct TribolIndia 2020 .



**Prof TVVLN Rao and Prof Shubrajit Bhaumik of SRM University affirming the acceptance for conducting TRIBOINDIA 2020**

- A vote of thanks at the conclusion of the event was offered by Prof Satish V Kailas, the Organizing Secretary of IndiaTrib 2019. First and foremost, he thanked late Prof. Sanjay Biswas for his lifetime contribution to the field of Tribology and bringing IISc and India on the world map of Tribology. He thanked the Management of IISc for providing the venue and other infrastructure of IISc for conducting IndiaTrib 2019. He also thanked all speakers and authors from across the world for their contributions and all participants for making the conference a great success. He acknowledged the support received from all sponsor, exhibitors and advertisers. Last but not the least, Prof Kailas praised the dedicated group of student volunteers and IISc staff whose tireless efforts made the conference a truly learning opportunity and a memorable event for everybody.



**Prof. Satish Kailas, Organizing Secretary and Mr A K Mehta, ED (TSI) with the group of IISc students and staff who made the Conference grand success**



- IndiaTrib 2019 was supported by several Sponsors, Exhibitors and Advertisers. We are thankful to all of them:

- Sponsors :** M/s Indian Oil Corporation Limited (Diamond Sponsor), BPCL, TATA Steel, Magnum Engineers, Lubrizol India Private Limited, Indian Additives Limited, Balmer Lawrie & Co. Ltd.
- Exhibitors :** M/s Bruker India Scientific Pvt. Ltd., DUCOM Instruments Pvt. Ltd., RTec Instruments, Optimol Instruments, ITW India Private Limited, Anton Paar India Pvt. Ltd., Industron Nanotechnology Pvt Ltd, Ace Instruments Delhi, RCG Instruments (India) Pvt Ltd, Entuple Technologies Pvt Ltd., Mahr Metrology India Private Ltd.
- Advertisements for Souvenir and contribution for the Conference :** M/s Jeol Pvt Ltd, Gulf Oil Lubricants India Ltd, Siddharth Grease and Lubes Pvt Limited, KIPRO Technologies Private Limited, VAS Tribology Solutions Pvt Ltd, Triveni Turbine Limited, Standard Greases & Specialties Pvt Ltd, REVA University, ANSYS Software Pvt. Ltd, BEML Ltd.

\*\* A copy of the Conference Souvenir is available at the following link:  
<https://www.tribologyindia.org/pdf/souvenir-for-indiatrib-2019.pdf>

### ALL INDIA SEMINAR ON “TRIBOLOGY AS ENERGY SAVER FOR MINING, STEEL & OTHER HEAVY INDUSTRIES”, 28-29 SEPTEMBER 2019 AT IEI, JSC, RANCHI

An All India Seminar on “Tribology as Energy Saver for Mining, Steel & Other Heavy Industries” was organized during 28 - 29 September 2019 by The Institution of Engineers, JSC - Ranchi under the aegis of Mechanical Engineering Division Board of IEI, Kolkata, in association with Tribology Society of India, Ranchi Chapter.

The Seminar was inaugurated on 28th September 2019 by Dr S. S. V. Ramakumar, Director (R&D), IOCL and President, Tribology Society of India. Following distinguished Industry professionals deliberated on the application of Tribology in energy conservation in their respective industries:

- Mr R. N. Jha, Director Technical, (CRD), CMPDIL, Ranchi from **Mining Industry**
- Mr. Ajay Arora, Executive Director, (R&D), RDCIS-SAIL, Ranchi from **Steel Industry**
- Mr. Rana S Chakravorty, Director, (Marketing & Production), HEC, Ranchi from **Heavy Industry**



Dr S. S. V. Ramakumar being felicitated during the event



Dr S. S. V. Ramakumar and other dignitaries releasing the souvenir of the event.

The seminar was attended by 69 registered delegates.

The broad recommendations summarized during the seminar were as below: -

- Energy efficient hydraulic oil should be widely used in excavators in mining industry for its better efficiency, performance and energy conservation .
- By adopting better Tribological approach, e.g. surface treatment, thermal coating, wear plates/bars etc., energy savings can be achieved in a variety of ways (primary saving through lowering of frictional losses, secondary saving due to reduction in wear and tertiary saving by reducing the consumption of spares). On the other hand, it also reduces the CO<sub>2</sub> emission.
- By modifying the design of lubrication system and employing additional cooling, the wear of rollers for steel plants could be reduced.
- By replacing the present lubricants with nano-lubricants, the engine efficiency could be increased and thus fuel can be conserved.
- By removal of contaminants in fuel and regular condition monitoring of different type of lubricants used in mining, steel and heavy industries, impending failures can be detected early. This will allow timely remedial actions to avoid major breakdowns and their cascading effects.
- The performance of gear pump can be improved by adopting metal polymers in various applications of steel, mining, cement, agriculture and other industries.

### STTP ON “ADVANCES IN TRIBOLOGY” ORGANIZED DURING 4 - 9 NOVEMBER 2019 AT PUNE

A Short-Term Technical Program (STTP) on “Advances in Tribology” took place during 4-9 November 2019 at the Department of Mechanical Engineering, All India Shri Shivaji Memorial Society’s College of Engineering, Kennedy Road, Pune 411 001. The event was sponsored by AICTE New Delhi. A total of 61 participants attended this STTP.

The workshop was designed to cater to the needs of faculty members in Mechanical and Production Engineering, Post-graduate Students, Research Scholars pursuing or aspiring to do research in the area of Tribology, practicing engineers from Industry and lubricant manufacturer.

The course content included Tribological studies in Automobiles, Bearings Tribology, Engines, Bio-Tribology, Tribo-tests, Recent Surface Treatment and Coatings, Lubricants, MR Fluid and their applications, Tribological Aspects in Metal Working, Nano Tribology, Tribological Characterization and Industrial Case Studies.

Expert lectures of following faculty members from academia, industry and research institutes were organized. Participants got ample opportunity to interact with the speakers.

Sr No	Name of Resource Person	Designation	Affiliation
1	Mr A K Mehta	Executive Director	TSI Faridabad
2	Dr H Bagchi	Professor Emeritus, Dept. of Production & Industrial Engg.	COEP, Pune
3	Mr M Jamadar	Manager, Engine Design and Development	ARAI Pune
4	Mr Ravindra Birajdar	Vice President, R & D	Kirloskar Brothers Limited Pune
5	Dr S T Chavan	Professor & Head	MIT Kothrud
6	Mr Ram Deshpande	International Consultant, KSPG Automotive India Pvt Ltd	Automotive India Pvt Ltd



7	Dr Nagesh Kini	Divisional Manager	Materials Group Thermax Limited, Pune
8	Dr V M Phalle	Associate Professor	VJTI, Mumbai
9	Mr P K Limaye	Scientist Officer	BARC Mumbai
10	Dr D G Thakur	Professor	DIAT, Pune
11	Mr S R Durugkar	Jt. General Manager & Vice Chairman TSI- Mumbai Pune Chapter.	L&T Hydrocarbon, Mumbai
12	Dr Satish Chinchankar	Professor	VIIT Pune
13	Dr B D Bachchhav	Professor and Head	AISSMSCOE, Pune
14	Dr Sanjay Shah	Chief Medical Officer	SVNIT, Surat
15	Mr Sujit Kumar	Consultant and Marketing Executive	Industron Nanotechnology



Inauguration of STTP on “Advances in Tribology” by Dr D N Malkhede, Adviser IRIFD AICTE New Delhi and Mr A K Mehta, Executive Director TSI Faridabad on 4<sup>th</sup> Nov 2019. Dr (Mrs) Priya Gajjal, coordinated the program

### INAUGURATION OF UNIVERSITY MEMBERSHIP ACTIVITIES OF TRIBOLOGY SOCIETY OF INDIA AT REVA UNIVERSITY, BENGALURU (31 OCTOBER 2019)

School of Mechanical Engineering of Reva University, Bengaluru, India, organized the inauguration of “University Membership Activities of Tribology Society of India” on 31st October 2019. Around 75 students attended the function. Among them 25 students have taken up the membership. The chief guest was Dr. Satish V Kailas, Vice President of TSI and Professor of Mechanical Engineering, IISc, Bengaluru.

REVA University has taken up Institutional Membership of TSI and also launched a membership campaign to enable students to become members of Tribology Society of India, the premier professional society in India in the field of Tribology, with affiliation to the International Tribology Council (ITC), UK. The ITC has 33 other national societies spread all over the world as its members, including Japan, Germany, Italy, China, Czech

Republic, Brazil, Korea, Malaysia, Poland, Russia, South Africa, Sweden, USA, Switzerland etc.

Over the years, the subject of Tribology has been recognized as a very important multi-disciplinary scientific domain for conservation of material and energy, improvement in efficiency and productivity - leading to significant benefits in economic performance, environmental protection and sustainability.



Prof Satish V Kailas handing over TSI's "Certificate of Institutional Membership" to Dr. S Y Kulkarni, Vice Chancellor, Reva University



Dr. K.S. Narayanaswamy, Director, School of Mechanical Engineering, presenting a memento to Prof Satish V Kailas, in presence of Dr. Niranjana H, the event coordinator

During the event, Professor Kailas delivered a brief talk explaining the multi-faceted nature of Tribology and the effect of more than one parameter on the study of Tribo systems. He dealt with non-linearity of Tribology processes. He also advised students about their study. Prof. Kailas emphasized that students of Engineering would need to assimilate knowledge, analyze the knowledge and create new knowledge (Invention). He gave guidance on how to improve attention level of individuals and reminded the participating students that the core activity of student life was to "study".

### YOUNG RESEARCH SCHOLARS IN TRIBOLOGY



**Name of Research Scholar:** Satish R More

**Title of Ph.D. Thesis:** *Experimental Performance Evaluation of Slurry Erosion Wear Behaviour on SS304, A-356, M.S. and WCCoCrNi Laser Clad Surfaces Using Upgraded Slurry Pot Test Rig and Validation.*

**Year of Completion:** 2019

**Supervisor:** Dr. D. V. Bhatt, SVNIT - Surat.

**Co- Supervisor:** Dr. J. V. Menghani, SVNIT - Surat.



**Name of Research Scholar:** Shubrajit Bhaumik

**Title of the thesis:** *Tribological Performance of Micro and Nano Friction Modifiers in Mineral Oil and Castor Oil.*

**Year of Completion:** 2019

**Supervisors:** Dr. S.D. Pathak, Visiting Professor (SRM IST)/ Retd. Professor (IIT-Madras) and Dr. Shubhabrata Datta, Research Professor, Department of Mechanical Engineering, SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu, 603203.





**Name of Research Scholar:** Vikram Kumar S. Jain

**Title of Ph.D. Thesis:** *Fabrication and Characterization of AA5083 Surface Composites by Friction Stir Processing.*

**Year of Completion:** 2019

**Supervisor:** Dr. S. Muthukumaran, Associate Professor, National Institute of Technology, Tiruchirappalli, Tamilnadu, India.



**Name of Research Scholar:** Harshal P. Mungse

**Title of Ph.D. Thesis:** *Development of Graphene Oxide Based Materials for Tribology Applications.*

**Year of Completion:** 2019

**Supervisor:** Dr. Om P. Khatri, Principal Scientist, CSIR-Indian Institute of Petroleum, Dehradun - 248005



**Name of Research Scholar:** Dr. Vivek Bhardwaj

**Title of Ph.D. Thesis:** *Influence of Surface Textures, Micro/Nano Materials, and Starvation on the Performance Behaviour of Ball Bearings.*

**Year of Completion:** 2019

**Supervisor:** Prof. V. K. Agarwal, Prof. R. K. Pandey, Indian Institute of Technology, Delhi



**Name of Research Scholar:** Dr. Sabrinath S.

**Title of Ph.D Thesis:** *Development of an eco-friendly lubricant from sesame oil and evaluation of its various properties.*

**Year of Completion :** 2019

**Supervisor:** Dr. P.K Rajendrakumar (Professor NIT Calicut), Dr. K Prabhakaran Nair (Professor (Retd.) NIT Calicut)



**Name of the Research Scholar:** Dr (Mrs) Tanusree Bera

**Title of the Ph.D Thesis:** *Development and characterization of metal matrix composite using cenosphere for wear resistant applications.*

**Year of Completion :** 2019

**Supervisor:** Dr Samir Kumar Acharya, Professor - Department of Mechanical Engineering, NIT Rourkela - 769008

**Co-supervisor:** Dr Gautam Sutradhar, Director - NIT Manipur

## TRIBOLOGY LABORATORY AT NIT - ROURKELA, ODISHA

National Institute of Technology - Rourkela, Odisha is an Institute of National Importance for technical education, established by the Government of India. The Department of Mechanical Engineering here is one of the premier departments engaged in active research in the field of Tribology, leading to development of a series of wear resistance coatings and composites (natural fiber, synthetic fiber, hybrid composites and nano composites) in addition to research in the field of rotor dynamics and engine tribology for B.Tech., M.Tech. and Ph.D students. The department is well equipped with facility like Pin-on-Disc Friction and Wear Test Rig, Dry Sand Abrasion Test Rig, Air Jet Erosion Test Rig, Journal Bearing Test Rig, Slurry Abrasion Test Rig and Two-Body Abrasion Test Rig.

The department is offering two full-time Tribology courses, one on Introduction to Tribology and other on Materials for Tribological Applications for M.Tech and PhD students. The Tribology Laboratory is now headed by Professor Samir Kumar Acharya. For any query he can be contacted through mail ([skacharya@nitrkl.ac.in](mailto:skacharya@nitrkl.ac.in)) and by mobile (+91 9437248460). The names of department faculty engaged in Tribology research can be viewed from the NIT - Rourkela website ([www.nitrkl.ac.in](http://www.nitrkl.ac.in)).



Pin-on-Disc Friction and Wear Test Rig



Dry Sand Abrasion Test Rig



Air Jet Erosion Test Rig



Slurry Abrasion Test Rig



Journal Bearing Test Rig



Two-Body Abrasion Test Rig



## LIST OF NEW TSI MEMBERS (JULY-2019 to JULY-2020)

Sr No	LM #	Name	Affiliation
1	5906	Prof. Dr. A Elayaperumal	Anna University, Chennai
2	5907	Mr. Harpreet Singh	John Deere Technology Center, Pune
3	5908	Ms. Jyoti Srivastava	DRDO, Kanpur
4	5909	Ms. E. Sneha	College of Engineering, Trivandrum, Kerala
5	5910	Mr Ananthan D Thampi	College of Engineering, Trivandrum, Kerala
6	5911	Mr Anoop Kumar S	Sri Chitra Thirumal College of Engineering, Kerala
7	5912	Dr Sanjay Sharma	Shri Mata Vaishno Devi University, Katra (J&K)
8	5913	Mr Sunil Kumar Srivastava	IndianOil Corp.Ltd., Faridabad
9	5914	Mr S Arokya Agustin	SRM Institute of Science and Technology,
10	5915	Mr Biswajit Chattopadhyay	IndianOil Corp.Ltd. Faridabad
11	5916	Mr Ashish Omprakash Jain	GIDC Degree Engineering College, Navsari, Gujarat
12	S-5917	Mr Abishek S	REVA University , Karnataka
13	S-5918	Mr Saurabh Shukla	REVA University , Karnataka
14	S-5919	Mr Sachit Poovanna	REVA University , Karnataka
15	S-5920	Mr Rohit Kumar Singh	REVA University , Karnataka
16	S-5921	Mr Akshit Dabash	REVA University , Karnataka
17	S-5922	Mr Thirthan K	REVA University , Karnataka
18	S-5923	Mr Shaik Mansoor Ali	REVA University , Karnataka
19	S-5924	Mr G. Sarath Chandra Reddy	REVA University , Karnataka
20	S-5925	Ms Shikha N Singh	REVA University , Karnataka
21	S-5926	Ms Pooja G V	REVA University , Karnataka
22	S-5927	Mr Siva S	REVA University , Karnataka
23	S-5928	Ms R. Prathiksha	REVA University , Karnataka
24	S-5929	Mr Rahul Sahani B	REVA University , Karnataka

25	5930	Dr. Vikas Kukshal	NIT Uttarakhand
26	S-5931	Ms Shraddha S Magaji	REVA University , Karnataka
27	S-5932	Mr Nishanth M	REVA University , Karnataka
28	S-5933	Mr Raja P	IIT, Madras
29	S-5934	Mr Sri Jubin Das	REVA University , Karnataka
30	S-5935	Mr G V Venkata Sandarsh	REVA University , Karnataka
31	S-5936	Mr Majesty Vineeth	REVA University , Karnataka
32	S-5937	Mr Kunal K C	REVA University , Karnataka
33	S-5938	Ms Pavithra T R	REVA University , Karnataka
34	S-5939	Mr Jai Singh	IIT Roorkee
35	5940	Prof. Dipak S.Bajaj	Amrutvahini College of Engineering, Ahmadnagar,
36	5941	Mr Sandeep C. Fargade	Amrutvahini College of Engineering, Ahmadnagar
37	5942	Mr Prem Kumar J	SCT College, Thiruvananthapuram, Kerala
38	5943	Mr Prakash Chandra Mani	IIT BHU Varanasi
39	5944	Mr Gautam Revankar A	Indian Institute of Science, Bengaluru
40	5945	Mr Avinash Tiwari	(PGI-1) - Forschungszentrum Jülich, Germany
41	5946	Mr Channabasappa H.	Klueber Lubrication India Pvt Ltd, Bengaluru
42	5947	Mr K S Tarun	REVA University , Karnataka
43	5948	Dr. Shivasharanayya Swamy	REVA University , Karnataka
44	5949	Dr. K. S. Narayanaswamy	REVA University , Karnataka
45	5950	Dr. Manjunatha L H	REVA University , Karnataka
46	5951	Mr Sandeep Singh	IOCL R&D Centre, Faridabad
47	5952	Mr Sonam Gupta	RDSO, Lucknow UP
48	S-5953	Vinay Siani	IIT Delhi
49	5955	Mr Sulthan Mohiddin Shariff	ARCI (ARC-International), Hyderabad



50	5956	Dr. Basil Kuriachen	NIT Mizoram
51	5957	Mr. Nitish Prasad K.	IIT Madras
52	5958	Mr. Alok Kumar Singh	IIT BHU, Varanasi
53	5959	Ms. Nivedita Shukla	IIT BHU, Varanasi
54	S-5960	Mr. Nilesh D Hingawe	MNNIT Allahabad
55	5961	Dr. Raghu Yogaraju	BMS College of Engineering, Bengaluru
56	5962	Mr. C. S. Prakasarao	IIT Roorkee
57	5963	Mr. Hemanth G	Robert Bosch Engineering and Business Solutions Pvt Ltd, Bengaluru
58	5964	Dr. Sunil Thakur	AP Goyal Shimla University, Shimla
59	5965	Mr. Geeteshwar Sharan Varshney	Technical Education Department, Rajasthan
60	S-5966	Mr. Vishal Singh	IIT Jammu
61	5967	Mr. Madhan K	Fluidtec Controls, Chennai
62	5968	Mr. Dineshkumar L	IIT Jammu
63	5969	Mr. Santhosh Kumar Kamarapu	PDPM IIIT Jabalpur
64	5970	Mr. R. Bakul	Suzlon Energy Ltd , Hadapsar, Pune

1	Institutional Member FY 2019-20	School of Mechanical Engineering, REVA University Bengaluru	Supported by Dr KS Narayanaswamy, Director & Professor
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*We welcome all new TSI Members and look forward to their active participation and contribution in TSI events and initiatives*

## OBITUARY : SHRI ANAND KUMAR

*Past President (TSI) and Former Director (R&D), IndianOil*

(28th June 1950 - 30th August 2020)



Na jayete mriyate va kudachit  
nayam bhutva bhavita va na bhuyah;  
Ajo nityah shasvato' yam purano  
na hanyate hanyamane sharire

He is never born, nor does he die at any time, nor having (once) come to be will he again cease to be. He is unborn, eternal, permanent and primeval. He is not slain when the body is slain.

(Bhagvad Gita 2.20)

Tribology Society of India deeply mourns the untimely demise of **Shri Anand Kumar**, former Director (R&D), Indian Oil Corporation Ltd. and Past President of Tribology Society of India (2009-2010).

**Shri Anand Kumar** passed away for his heavenly abode on 30th August 2020 in New Delhi. He is survived by his wife and two sons.

**Shri Anand Kumar** was born on 28th June 1950. He obtained his basic degree in Chemical Engineering from BIT Sindri in the year 1972. He joined IndianOil as Graduate Engineer Trainee (GET) in 1974. He worked in Greenfield and Brownfield Refineries in India and abroad, leaving behind imprint of his inimitable leadership style. While defending and building the image of Mathura Refinery in the background of pollution monitoring in the Taj Trapezium by Supreme Court, he gave Mathura Refinery its tagline and identity as “*Green Refinery Clean Refinery*”. Later he gave the tagline “*In Harmony with Nature*” to Barauni Refinery, identifying its Core Values. His creative mind also coined the tagline “*Nurturing Leadership*” for IndianOil Institute of Petroleum (IIPM) along with its logo. He provided a lasting identity to the IndianOil R&D Centre through its tagline “*The Power of Possibilities*”, together with its logo.

**Shri Anand Kumar** in his humble way and with his unique people-centric leadership style, professional knowledge and diversity of experience, brought sea change to every institution and location he worked in. **Shri Anand Kumar** was responsible for turning around Barauni Refinery, taking it from the brink of closure to become the best performing refinery of Indian Oil (89% distillate yield) and transformed its township into the best place to live and work. Later he turned around IIPM and IndianOil R&D before his superannuation in 2010.

During a short tenure of 2 years (2009-2010), **Shri Anand Kumar** took charge of Tribology Society of India (TSI) as the President. Under his guidance and supervision, TSI got registered at Faridabad on 10th December 2010, with him as the Founder President of the new entity. He was kind enough to allot the permanent headquarters



of TSI within IOCL (R&D) premises. He also ensured that TSI received all necessary regulatory approvals and tax registration in compliance with Government guidelines.

As a visionary President of TSI, **Shri Anand Kumar** implemented a series of innovative programs. He conceptualized the “TSI Summer School in Tribology” to promote Tribology education and practice in India, while offering a platform for Industry-Academia collaboration. Starting with the 1st TSI Summer School in June 2009, the TSI SST has emerged as one of the most sought-after Tribology events that has continued uninterrupted till the recent 12th Edition conducted in July 2020 in webinar mode (due to COVID-19 pandemic). **Shri Anand Kumar** was passionate about environmental protection and sustainability and he identified the need to launch a study to quantify the energy and material saving potential of Tribology in the Indian context. He also conceptualized the idea of TSI Lifetime Achievement Award for eminent Tribologists. He was instrumental in promoting TSI collaboration with STLE and encouraged more International focus for TSI activities. Following his inspiration and guidance, TSI conferences have now achieved much larger scale, with significant International participation. During his tenure as the President of TSI, the 7th International Conference on Industrial Tribology was successfully organised at SAIL - RDCIS, Ranchi in December 2009. His ideas were often ahead of the time and we are now implementing many of the initiatives conceptualized by him.

An engineer by education, refiner by experience and academic by nature, Shri Anand Kumar worked tirelessly for bringing academia closer to industry. He has published over 50 papers and jointly holds over 25 patents. He remained professionally active till the end.



**Shri Anand Kumar graced the 11th TSI Summer School in Tribology as the Chief Guest at IIPM, Gurugram on 18th May 2011.**

As mentioned by Prof Satish V Kailas, Vice President (TSI), **Shri Anand Kumar** was himself a Karma Yogi and made others who worked with him also as Karma Yogi through his leadership and guidance. The void created by his absence will be difficult to fill for Indian Oil and Tribology Society of India. The best homage that we can pay him is by realizing his dreams about Tribology, the Nature and the Environment.

Om Shanti Shanti Shanti....

*All Members are invited to send their publication materials, suggestions and feedback to Mr. A. K. Mehta, ED (TSI) at the email ID: [ed.tsi@tribologyindia.org](mailto:ed.tsi@tribologyindia.org) / [office.tsi@tribologyindia.org](mailto:office.tsi@tribologyindia.org)*

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