



MESSAGE FROM PRESIDENT



One of the most remarkable features of today's technologies is the increasing frequency with which they acquire new dimensions as a result of innovations. These new dimensions are essentially designed for higher productivity through increased efficiency, safety, speed, lower energy consumption and longer service life of plant and machinery. Tribology plays a major part in guaranteeing these benefits and, therefore, this relatively new discipline science has become a major area of research all over the world within a short span.

In India, many industrial R&D units, national research laboratories and academic institutions are engaged in research programmes related to tribology. The Tribology Society of India (TSI) was formed to act as a bridge between those organizations engaged in research and facilitate their interaction on a common platform for a better understanding of the subject. It now has 20 institutional and 500 individual members. The Society has also recently launched its own web-site to provide members easy access to information related to its programmes and activities. Simultaneously, the TSI Newsletter, which could not be published for some time due to unavoidable reasons, is being revived with this issue. I am sure its continued future publication will further improve the flow of useful information to the members. There are also definite plans to bring out booklets on topics of relevance to industry.

I am happy to inform members that the groundwork for the International Conference on Industrial Tribology - ICIT-2001, being organised at Jamshedpur during November 27-30, 2001 is gaining momentum. A special feature of this conference will be dovetailing of three educational courses on '**Advances in Lubricating Greases**', '**Basics of Tribology**' and '**Cement Plant/Steel Plant Lubrication**' which are aimed to enrich the knowledge base of the participants. It is also proposed to launch the Journal of Tribology Society of India for which Indian Institute of Petroleum, Dehradun has taken the responsibility.

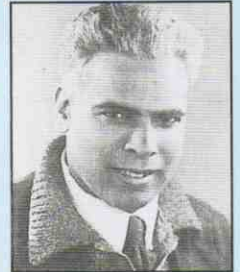
With greetings and good wishes to all members,

(Dr. A.K. Bhatnagar)

EMINENT TRIBOLOGISTS

Dr. Kolachala Seeta Ramayya

A luminary in the field of Tribology (also known as Chemotology in earlier days), Kolachala Seeta Ramayya was born on July 15, 1899 at Vuyyur in Andhra Pradesh, India. After graduation in Chemistry, he went to the United States where he joined the University of Chicago and obtained an MS in Chemistry, in June 1924, with "Paths of Atoms" as the subject of his thesis. He enrolled for Ph.D. programme of the Cornell University in 1925-26. He left Cornell without completing the programme. Two years later he joined L.Sonneborn Sons Inc., a petrochemical company, which built a laboratory for him in New York City. Here he formulated additives for lubricants which extended the life of engines and secured three US patents.



Dr. Ramayya responded in 1930 to the call of the erstwhile Soviet Union to build its fledgeling petrochemical industry. He was offered the top position at the lubricants research division of the Petrochemical Institute in Moscow. He introduced new procedures and methods for testing and evaluation, and was asked within years to head the department of Fuels and Oils at the Institution of the Automobile Motors Research. Here he developed a kerosene fuel for the battle tanks to operate in the sub-zero temperatures. This proved to be a big factor in the Soviet tank battle against the Germans in World War II.

Dr. Ramayya helped develop DK-NAMI an equipment for determining the characteristics of oil. His book "Viscosity Anomaly in Oil and its Effects on Friction in Machines" earned him a doctorate. His last scientific work "Induction Period of Precipitation-a New Index of Motor Oil Quality and Effectiveness of Additives" was published posthumously. The 70 scientific papers he published constitute the foundation of a new science Chemotology (chemistry of motors) better known as Tribology.

Ramayya made a sentimental journey to his motherland, India in 1963.

He passed away in Moscow on September 29, 1977, a legend in his own lifetime.

TECHNOLOGY IS THE KEY TO SUCCESS IN CHANGING TIMES

In times of the global opportunities, the organizations which do not anticipate customer needs and change with time face difficulty in sustaining their growth. The balance between cost containment and new technology that delights customers is the key which propels an organization to newer heights. As the new technology is well directed to markets, it also creates new challenges and opportunities in the allied sectors. This issue of TSI newsletter features an article on the lubrication requirement of CNG engines as these engines get into city bus service in our capital city of Delhi. While it is a viable technology for emission reduction, it will need development of a new class of lubricants for optimum performance.

Researches have to be ahead of their times and there is no better way than sessions of brain storming which was the hallmark of Sikkim International Nanotribology Symposium. I hope the readers will get some idea about what Nanotribology is and what it can do to understand the myths of lubrication and design the tribological systems of future.

Internet continues to enrich our knowledge base and your society has recently launched a Website which will carry updates on TSI

activities. We shall also try to make available the news letter on line in future.

The theme of ICIT-2001 being organized in Jamshedpur during 27-30 November is, "**Emerging Trends in Tribology**". I am personally excited about this conference and believe, together we will gain valuable insight as we go through the technical sessions. Ideas generated must be put to practice to generate wealth in the industry. It is for the appreciation of this approach of putting scientific knowledge for the benefit of industry that we feature in this newsletter the profile of a tribologist. He is Dr. Kolachalar Seeta Ramayya - a role model of many tribologists in the country.

Let me admit this is a re-launch of TSI newsletter after some discontinuity (Did you notice it?). How can we avoid it in future? To my mind, there is only one way to continue and that is the involvement of everyone. If there are no active readers (passives are many!) it will die again. Can you and I make an attempt in all earnest to avoid this?

Dr. G. K. Sharma

Technical Update

DO CNG ENGINES HAVE DIFFERENT LUBE REQUIREMENTS?

(Dr. G.K. Sharma, IOC, R & D, Faridabad)

Compressed natural gas (CNG) engines have been used for decades in stationary applications such as power generation, pipeline gas transportation etc. More recently, the environmental and economics considerations in certain regions have made CNG as an attractive alternative fuel for transport applications. The conversion of compression-ignited diesel engines to CNG is now an established technology. The urban transit bus population is practically well suited to CNG where buses return to a refueling station on a daily basis.

Lubricant requirements of CNG engine in transport sector are different from diesel engines or from stationary CNG engines. The experience of stationary CNG engine lubrication can not be directly translated to CNG engines in urban transport sector due to differences in operation conditions and maintenance practices, besides the basic design differences which may exist e.g. valve train mechanisms - roller follower (stationary engines) v/s slider follower (automotive engines mostly). CNG engines are generally high viscosity, mono grade formulation Lubricants for stationary with low ash content. On the contrary, lubricants for conventional diesel engines tend to be multigrade with considerably higher ash levels.

The lubrication needs of CNG engines in transport application may not be adequately met with the lubricants widely used in the industry for stationary CNG engines or conventionally fuelled engines.

Basic difference arises from the fact than CNG engines in transport usage run much hotter than diesel engines which call for better oxidation and nitration control. As the soot is practically absent in a CNG engine, the soot dispersancy and soot-related wear - a formidably concern of diesel engine, is not an issue with CNG engine. Spark plug fouling, valve train wear are areas of concern.

As a large number of CNG engines in transport application employ after - treatment catalyst, the lubricant compatiably with catalyst systems is required. Generally low Zn/P (<300ppm) and low ash (<0.5%) products are preferred.

With the increased use of CNG as a fuel for transportation, it is necessary to have a procedure to evaluate lubricants for this application. Currently, there are no standard specifications and test methods in the industry to evaluate such lubricants. As a matter of fact the industry is currently experimenting with products and also evaluation of engine test methods as specific to needs of individual OEMs and localized requirements. The lubricants in market for CNG engines in transport sector are yet to mature to provide long drain capabilities and other benefits which are generally seen with lubricants for conventionally fuelled engines.

CNG Engines in transport application, generally speaking, is an industry in its infancy. While most of the CNG engines today are Lambda 1 (Stoichiometric air to fuel ratio), we are yet to see the larger growth of lean burn CNG engines to achieve better fuel economy and emission performance. Diesel - like efficiency is yet a very difficult target for the CNG engines and many new concepts involving advanced combustion systems for CI mode operation are being researched, both for passenger car and heavy commercial vehicle applications. These new developments in engines design are likely to focus new challenges for lubricants industry.

In Indian context, we anticipate a phenomenal growth of CNG engines in city transport in our metros and therefore there is a need for collaborative work among oil companies additive suppliers and OEMs to understand and then address the lubrication needs of CNG engines through systematic development of lubricant formulations and their evaluation tools including the engine test methods.

TSI Local Chapter Activities



Inauguration of National Seminar on Tribology at Pune

- 1. Pune chapter :** In the year 2000, two major events were organized ;
 - A lecture by Mr. George Plint of M/s. Plint & Partners Limited, UK at Institution of Engineers, Pune on 2nd February 2000. The subject of the lecture was - "Tribology - Some Aspects." About 50 engineers participated.
 - National seminar on Tribology was organized in June 2000 for two days . More than 50 delegates from industry participated
 - The local chapter plans to organize a seminar on Tribology during September 2001 in Pune.
- 2. Ranchi chapter :** Following two lectures were arranged :
 - "Performance Improvement of Rolls through Surface Engineering," delivered by C. Bhavani Shankar, Ador Fontech Ltd , Bangalore on 26th July, 2000
 - "Surfacing/Hardening by Welding with Specific Reference to Steel Mill Rolls" delivered by K.K. Kashyap, Mailam, India Limited , Pondichery on 7th February 2001
- 3. Bhopal chapter :** A book entitled "An Introduction to Tribology of FRP Materials" , authored by M/s Navin Chand and M. Fatim , members of TSI, has been published by M/s Allied Publishers Limited ., priced at Rs 450/-. The book is particularly useful for higher studies in tribology Polymer , Composites , Materials Sciences etc.

TRIBOLOGY SOCIETY OF INDIA STALL AT PETROTECH 2001 (9-12 January, 2001 at Pragati Maidan, New Delhi)

Tribology Society of India along with two other societies viz. the National Lubricating Grease Institute (NLGI) -India Chapter and Indian Society for Analytical Scientists (ISAS) - Delhi Chapter had taken up a stall during the Petrotech 2001 Conference and Exhibition at Pragati Maidan, New Delhi during 9 to 12th January 2001. The activities of TSI, its aims and objectives, the list and some details of the past conferences and events, the list of EC members, the local chapters of the society as well as the details of the forthcoming International Conference on Industrial tribology being organized by Tata Steel at Jamshedpur in November 2001 were displayed on three poster panels in the stall. Some of the past Conference proceedings were on display and the handouts distributed included a brief about the society, membership form and details about ICIT-2001.

There were over 200 visitors to this stall during the exhibition. The stall had evinced good response from the visitors to the exhibition which included Hon'ble Minister for Petroleum and Natural Gas, Shri Ram Naik. The minister was happy to note the activities of societies like TSI working in the scientific field.



Minister for Petroleum and Natural Gas Shri Ram Naik at TSI Stall during Petrotech-2001. Shri M. A. Pathan, Chairman, IOCL is also seen in the picture.

Conference Review

SIKKIM INTERNATIONAL NANOTRIBOLOGY SYMPOSIUM (16th -25th May 2001), Pelling, Sikkim, India

The study of surface topography ,adhesion, friction, wear, lubrication and measurement of mechanical property on a micro to nanometer scale and to image lubricant molecules and use of supercomputers to conduct atomic scale simulation has led to development of a new field referred to as Nanotribology. This field concerns experimental and theoretical investigations of processes ranging from atomic and molecular scale to microscale , occurring during adhesion, friction, wear and thin film lubrication at sliding surfaces.

Indian Institute of Science, Bangalore had organized the first in a series of the Sikkim International Nanotribology Symposium during the 16th to 25th of May 2001 at Pelling in Sikkim. The theme of the symposium was Nanotribology : Mechanics, Physics and Chemistry of Contact at the Molecular Scale. Over 25 eminent speakers from nine countries delivered 33 lectures during the seven day symposium which was attended by about 45 delegates from academic, research institutions and industry. The symposium consisted of basic lectures of one hour duration and research oriented talks of half of an hour duration. It was truly an interdisciplinary symposium with delegates and speakers

specializing in Material Sciences, Chemistry, Physics, Mechanical Engineering and Chemical Engineering, getting together for deliberations, thereby increasing the knowledge base on Nanotribology that should unravel many of the mysteries of the surface science.

The eminent speakers included a who is who in the area of Tribology such as Prof. Jacob Israelchivili of University of Santa Barbara, California, Prof. John Pethica of University of Oxford, Prof. S. K. Biswas of Indian Institute of Science, Bangalore, Prof. Bharat Bhushan of Ohio State University, Prof. Nicholas Spencer of Swiss Federal Institute of Technology, Prof. Brian Lawn of NIST, USA etc. The topics included those on contact adhesion, chemistry of interfacial phenomena, intermolecular forces at molecularly smooth and rough surfaces, characterization and analysis of monolayers and interfaces using analytical techniques, study of surface layers thin films and coatings using SPM, AFM and nanoindentation techniques, rationale of additive selection for lubricants etc. There was a poster session with five papers on research oriented subjects related to Nanotribology.

