

8th International Conference on Industrial Tribology

Theme : Tribology for Sustainable Development

7 – 9 December, 2012

The Westin Pune Koregaon Park, India

SOUVENIR



Under the Aegis of



ICIT 2012

Tribology Society of India



8th International Conference on Industrial Tribology

Technical Programme at a Glance

7 th December, 2012		8 th December, 2012				9 th December, 2012					
Inauguration (Inspire Hall) (9.00 Hrs. to 11.00 Hrs.)		Plenary Session II (Inspire Hall) (9.00 Hrs. to 11.00 Hrs.)				Plenary Session III (Inspire Hall) (9.00 Hrs. to 10.30 Hrs.)					
Inauguration of Exhibition /Poster Session followed by Tea Break (11.00 Hrs. to 11.30 Hrs.)		Tea Break (11.00 Hrs. to 11.15 Hrs.)				Tea Break (10.30 Hrs. to 11.00 Hrs.)					
Plenary Session I (Inspire Hall) (11.30 Hrs. to 13.00 Hrs.)		Business Meet-II (Inspire Hall) (11.15 Hrs. to 12.45 Hrs.)				Technical Session-IV (11.00 Hrs. to 13.00 Hrs.)					
Lunch (13.00 Hrs. to 14.00 Hrs.)		Lunch (12.45 Hrs. to 13.30 Hrs.)				IV-A IV-B IV-C IV-D					
Business Meet-I (Inspire Hall) (14.00 Hrs. to 15.30 Hrs.)		Technical Session-II (13.30 Hrs. to 15.30 Hrs.)				Valedictory Session (Inspire Hall) (13.00 Hrs. to 14.00 Hrs.)					
Tea Break (15.30 Hrs. to 15.45 Hrs.)		Tea Break (15.30 Hrs. to 15.45 Hrs.)				Lunch (14.00 Hrs. Onwards)					
Technical Session-I (15.45 Hrs. to 17.45 Hrs.)		Technical Session-III (15.45 Hrs. to 17.45 Hrs.)									
I-A	I-B	I-C	I-D	II-A	II-B	II-C	II-D	III-A	III-B	III-C	III-D
Cultural Program & Dinner (19.00 Hrs. Onwards)		GBM of TSI (18.00 Hrs. Onwards)									

(The details of programme are on the back pages 168-170)

Posters sessions : Venue: Near Exhibition area

Poster session I : 7th December 2012, 1000-1330 hrs

Poster Session II : 7th December 2012, 1400-1730 Hrs

Poster Session III : 8th December 2012, 0900 -1300 Hrs

Poster Session IV : 8th December 2012 1400-1730 Hrs

I-A	Bearing & Gear Tribology-I
I-B	Automotive Tribology
I-C	Condition Based Maintenance System
I-D	Contact Mechanics & Friction
II-A	Bearing & Gear Tribology-II
II-B	Lubricants & additives-I
II-C	Wear Mechanisms-I
II-D	Tribotesting-I
III-A	Bearing & Gear Tribology-III
III-B	Surface Treatment & Coatings
III-C	Tribology in Manufacturing
III-D	Wear Mechanisms-II
IV-A	Lubricants & additives-II
IV-B	Tribotesting-II
IV-C	Wear Mechanisms-III
IV-D	Special topics in Tribology

Message from President, TSI

Dear TSI Members,

Greetings to you all and welcome to ICIT-2012.

I am sure the organizing committee of ICIT-2012 will spare no efforts to live up to your expectations and ensure this event, both scientifically and professionally, is rewarding to each one of you.

On behalf of current TSI Executive Committee, I would like to take this opportunity to express my sincere thanks for your support and cooperation during the tenure of the outgoing executive committee, as our term ends with conclusion of ICIT-2012. The present Executive Committee assumed the office of TSI with an ambitious work plan in extending and expanding the reach of Tribology society of India in terms of its activities and dissemination of knowledge of this inter disciplinary science for the benefit of industry at large. We have kept you informed of various TSI initiatives and events over the past two years through our various communications, the TSI Website and these Newsletters. I am also happy that over past few years TSI has achieved a global orientation. Our collaborative linkages with STLE – USA are growing stronger while we are also emerging as a key player within the Asian Tribology community. I see great potential for TSI in the coming years.

We were successful in bidding and winning of the AsiaTrib-2014 conference for India amidst stiff international competition. This bears testimony of the faith reposed by Asian Tribology community in the technical and organizational prowess of TSI. Amidst this euphoria, it is imperative that each one of us at TSI had the onus of living up to the expectations of entire Asian tribology community in organizing the Asian Tribology Conference which is scheduled to be held in New Delhi during January 2014.

As we go forward, we need to involve the academia in our programs more closely and play a proactive role in promoting Tribology education at Undergraduate levels. I strongly believe that TSI can be a very important player in aligning the academic research efforts in Tribology with viable industrial solutions, for the betterment of our economy.

I would like to convey my best wishes to all of you for continued success in your professional and personal life.



Dr. R K Malhotra

President

Tribology Society of India

From the Desk of Secretary, TSI

Dear Colleagues,

As you read this, you would probably be in the midst of our biennial event ICIT-2012 at Pune. I hope all of you will find this Conference professionally enriching and very enjoyable. This is the last Newsletter to be brought out during the tenure of our current Executive Committee, which comes to an end after the Conference. It has been an exciting period of two years since the present EC took charge after ICIT-2010 at RDCIS – Ranchi. Overall this has been a mixed bag of experience for us at TSI. We achieved significant success in some of our endeavors, while more could have been done in some other areas. On the organizational front, activities at our Headquarters at IndianOil (R&D) – Faridabad have been streamlined thanks to the untiring efforts of our TSI Headquarters Team of Mr. A. K. Mehta, Mr. Ajay Kumar and Dr. Pankaj Bhatnagar. We have significantly enhanced the number of members enrolled in last two years. We have successfully obtained the registration under Sec. 12AA of the Income Tax Act in October 2011 and under Sec. 80G of the Income Tax Act in January 2012. These registrations will enable us to obtain significant benefits in the long run. The TSI website has been revamped with many new features and useful information. It is heartening to see that this Newsletter has also become a regular channel of our communication, thanks to the hard work by Dr. Har Prashad and Mr. Mehta.



The TSI Summer Schools in Tribology have now truly become National events. We have successfully organized the Summer Schools in June – 2011 and June -2012 and also succeeded in getting sponsorship support from the Department of Science & Technology, Government of India. The first National Tribology Conference (NTC-2011) of TSI was successfully organized at IIT Roorkee in December 2011. We have also made continued progress in our on-going collaboration with STLE – USA. The collaboration agreement has been renewed till 2016, which presents a great opportunity for enhanced interactions between the two Societies. The first TSI – STLE Certification Training and Examination was conducted at IIPM, Gurgaon in April, 2012. Though there were logistic problems faced with shipping of the examination papers to the US leading to a re-examination, the response to this event has been very encouraging and we hope to make this an annual event. The TSI Team actively participated in the 67th STLE Annual Meeting at St. Luis, Missouri in May 2012.

Let us also focus on some areas that need our urgent attention. We are making serious efforts in regularizing the publication of our Indian Journal of Tribology, and hopefully it will soon evolve into a publication of international standards. Our Local Chapters need to enhance their levels of activity in respective locations. We also need to boost our Industry interactions, so that the Indian Industry can reap full benefits from sound Tribological practices. Establishing Tribology curricula in engineering colleges and bringing out affordable Tribology text books for Indian students should also be our priority in coming years.

I would like to remind you of one more mega event of TSI, the prestigious ASIATRIB-2014 at New Delhi, which is being planned during early 2014. This will be a landmark event in the history of TSI and will make our Society a truly global player. I invite all of you to come forward and join hands with other TSI Members to realize our dreams about TSI.

I take this opportunity to convey my greetings to you and your family for a very enjoyable winter vacation and an exciting New Year 2013.

With best wishes,

Dr. Barun Chakrabarti
Secretary
Tribology Society of India

"Welcome to ICIT 2012"

TSI has been conducting biennial international conferences on Industrial Tribology for the past decade and half and the 8th edition of this conference is going to unfold in Hotel Westin, Pune from Dec.7th-9th, 2012. The theme of this conference is "Tribology for Sustainable Development".



Over the years, this international conference has gained popularity as an important scientific event in the area of Tribology, which is very relevant for all automotive and industrial segments. Practicing engineers, lubrication specialists, end users, researchers from all over the world from these industrial segments, academia and research institutes will participate in this conference to exchange knowledge about new developments in this area of science and technology. Prior to the conference (on Dec.6th) we have two education courses on "Basics of Tribology" and "Automotive Tribology", where eminent faculty drawn from industry and academia will give presentations. These courses are especially helpful to students, researchers and young and budding engineers/lubrication executives from various industrial segments to get requisite understanding about the principles of tribology and lubrication.

8th ICIT has attracted an overwhelming response of more than 200 technical paper proposals from all over the World. Eminent specialist Tribologists from General Motors, STLE, USA and SWRI, USA, Esslingen, Germany etc. are going to present their research findings in this conference. Apart from these, there is an overwhelming response from academia of India and abroad. This conference will also comprise of a concurrent exposition of various instrument manufacturers in the field of Tribology and lubrication, showcasing their latest instruments.

Pune city in December offers very pleasant weather and right kind of historic backdrop for the conference.

As Organizing Secretary of this conference, I would like to invite industrial and academic community from India and abroad and especially the TSI member community for having a technically enriching conference, which is intended to keep you abreast of the latest developments in the field of Tribology.

Dr.SSV Ramakumar
*EC Member, TSI &
Organizing Secretary ICIT-12*

Tribology Society of India - Initiatives & Activities

Tribology is a multi-disciplinary subject dealing with the study of interacting surfaces in relative motion. The term, derived from the Greek word "Tribos" (meaning "Rubbing"), in general denotes the subject of Friction, Lubrication & Wear technology. Over the years, the subject of Tribology came to be recognized as a very important aspect in all industrial operations. The application of correct Tribological practices can protect and enhance the life of plants and machinery, improves efficiency of operations, reduce energy consumption and prevent expensive breakdowns. Major organizations and academic institutions in the country have realized the importance of Industrial Tribology and its relevance to modern design and efficient plant maintenance.



The activities related to Tribology in the country started way back in 1972, when First International Conference on Tribology was organized by Indian Institute of Technology at New Delhi. Continuing with this, a series of National and International Conferences had been organized in the last 29 years. Besides there are a number of academic and industrial centers in India actively pursuing research activities in this area.

To provide a common umbrella to work further in this area, Tribology Society of India (TSI) was set up as a professional, non-profit body bringing together academicians, industry as well as research organizations as its members. The Society is affiliated to the International Tribology Council (ITC) based in London, UK along with 36 other National Tribology Societies spread all over the world. Currently the Society operates from its registered office at IndianOil R&D Centre, Faridabad.

TSI is committed to provide a common forum for technologists, scientists and industrialists to meet and to foster the advancement of Tribo-science through its various activities. Though it organizes conferences, seminars and workshops at various locations on a periodic basis, a need was felt for further fostering of such activities on a more active and regular basis through the formation of the local chapters of the society. As India is a large country, and the local needs vary from region to region, it was perceived that local chapters can effectively address their requirements and further strengthen the national level efforts of the society. To meet these need local chapters were created at seven locations in India.

Since its inception, the TSI has emerged as the premier professional body in India in the field of Tribology. Over the past two decades, TSI has provided the right platform to engineers, scientists, academicians and students for promoting Tribology awareness, education, training and research.

In keeping with its mandate of promoting Tribology awareness and practice in India, TSI has been organizing conferences and education courses. So far 11 National Conferences (NCIT) and 7 International Conferences (ICIT) have been organized across India, on relevant themes. The ICITs are organized once every two years. Starting with 2011, TSI is also launching an annual National Tribology Conference (NTC). The first such event (NTC-2011) was organized at the Indian Institute of Technology, Roorkee during 8 - 10 December 2011. TSI has been constantly striving to make these Conferences professionally beneficial for the participants. The ever increasing number of participants, sizeable number of foreign delegates,

exhibition stalls and new initiatives such as Business Meets bear testimony to the fact that the TSI Conferences are now recognized as important events for the international Tribology community.

TSI has also been active in providing excellent networking opportunities for its members, through its local chapters spread across the country. TSI members can have access to the collective expertise and experience of other members, domain specialists and Tribologists of global repute. The Society publishes the Indian Journal of Tribology (IJT) and also brings out TSI Newsletters for its member community. The TSI Journal not only serves as a useful source of current technical knowledge, but also provides a forum to Tribology professionals for sharing their own work and learning. Starting in 2010, TSI has instituted the "TSI Lifetime Achievement Award" to honour distinguished Indian Tribologists. Plans are being finalized to introduce "TSI Tribologist of the Year" award soon.

In keeping with its focus on Tribology education, TSI has been successfully organizing TSI Summers Schools for past four years, for participants from academia and industry. This has become a very popular annual event in the country, which has also received support from Department of Science & Technology (DST), Government of India.

As part of its focus on international collaboration, TSI entered into a collaboration agreement with the Society of Tribology and Lubrication Engineers (STLE) in 2009. Two highly successful TSI - STLE Tribology Education Courses have been conducted in India in 2010 and 2011, with the help of distinguished faculty from STLE - USA. This is also going to be an annual Tribology event in India. TSI Members are also eligible to receive several benefits that are available to the STLE Members in the USA.

TSI has been playing an important role in the Asian Tribology Council (ATC) formed by the National Tribology Societies of key Asia-Pacific countries. TSI was also instrumental in developing the draft Constitution for the ATC. TSI has been participating in the ASIATRIB Conferences of ATC, which is organized once in four years. It is a matter of pride for India that TSI has been entrusted with the responsibility of organizing the ASIATRIB-2014 event in India in 2014. This will become a landmark event in the history of Tribology in India.

TSI is now poised for an impressive growth, with a series of new initiatives that have been launched during past few years and several others that are being planned. These include:

- Professional training and certification courses in collaboration with STLE, USA
- Establishment of domain-specific Technical Committees and Industry Councils
- Launching of TSI consulting services
- Industry-focused Tribology surveys and performance-improvement programs
- Collaborative research programs
- Formulation of UG and PG curricula in Tribology for engineering colleges

All these initiatives will enable TSI to achieve its Aims and Objectives and to offer its members long-term professional benefits.

Please visit www.tribologyindia.org for more information.

A. K. Mehta
Executive Director
Tribology Society of India



Tribology Society of India

Headquartered at Indian Oil Corporation Limited

Research & Development Centre

Sector-13, Faridabad-121007, Haryana, India.

Email : info@tribologyindia.org

Website : www.tribologyindia.org

**Glimpses of Past
Tribology Conferences in
India**

Tribology Conferences in India

S. No.	Dates	Title	Organised by
1	11-18 Dec., 1972	First WCIT, New Delhi	Indian Inst of Tech., Delhi
2	18-21 Dec., 1974	First National Conference	Indian Inst of Tech., Madras
3	6-8 Dec., 1976	2nd National Ind Trib Conf 1976	Indian Inst of Tech., Bombay
4	Oct-79	Proceedings NCIT 1979	Ind Inst of Pet. Dehra Dun
5	7-8 Sep., 1981	NCIT, 7-8 Sep., 1981, Proceedings	IOC R&D Faridabad
6	19-20 Jul., 1984	NCIT, 19-20 July 1984	BHEL, Corp R&D Hydrabad
7	11-12 Dec., 1986	NCIT 1986	IOC (M) & Lubrizol
8	Dec., 1989	VIII NCIT-1989	VSSC, Trivendram
9	7-8 Feb., 1991	IX NCIT, 1991	CMTI, Bangalore
10	24-26 Mar., 1993	X NCIT, 1993 (Recent Adv in Trib Vol I & II)	Ind Inst of Pet. Dehra Dun
11	22-25 Jan. 1995	XI NCIT, 1995	IOC R&D Faridabad
12	2-5 Dec., 1997	Proceedings of ICIT, 2-5 Dec, 1997, Calcutta	Balmer Lawrie & BL-Fuchs
13	1-4 Dec., 1999	II ICIT-1999 (Trib in 2000 and Beyond)	BHEL, Corp R&D hydrabad
14	8-11 Apr, 2012	ICIT-01 (Emerging Trends in Tribology)	Tata Steel, Jamshedpur
15	15-18, Dec., 2004	ICIT-2004 (Trib for Equpt Reliability)	IOC,BPC,HPC and L&T, Mumbai
16	Nov 30-Dec 02, 2006	ICIT-2006	IISc., Bangalore
17	6-8, Nov., 2008	6th ICIT-08, Trib for Energy Eff & Env Protection	IOC R&D Faridabad
18	2-4 Dec, 2010	7th ICIT 2010	RDCIS, Ranchi

**PROCEEDINGS
OF THE
FIRST WORLD CONFERENCE
IN
INDUSTRIAL TRIBOLOGY
NEW DELHI : 1972**

Dedicated to all those, both in India and abroad, who directly and indirectly rendered their support in the noble cause in successfully organising the First World Conference in Industrial Tribology, 1972 in New Delhi

Acc. No. 805

LIBRARY,

Industrial Research And Development Centre

Edited by

Dr R. C. MALHOTRA
Head & Professor of Applied Mechanics Department
Indian Institute of Technology,
New Delhi-110029, India

and

Dr. J. P. SHARMA
Head of Tribology Laboratory & Asst. Professor
Mechanical Engineering Department
Indian Institute of Technology,
New Delhi-110029, India

World International Conference on Industrial Tribology, New Delhi 1972



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**FIRST
NATIONAL CONFERENCE**

December 1974

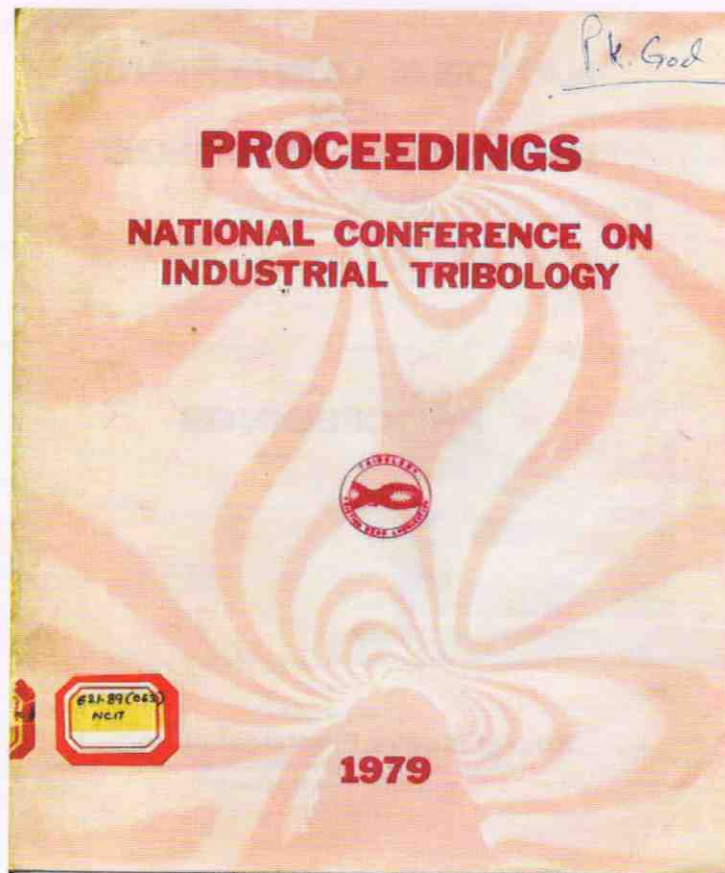
MADRAS

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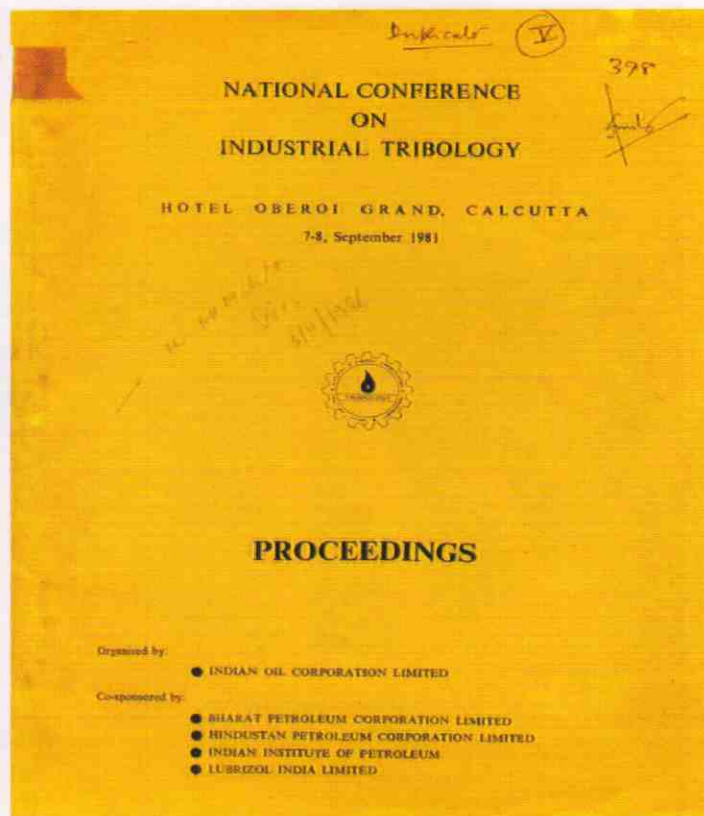
1st National Conference on Industrial Tribology 1974, IIT Madras



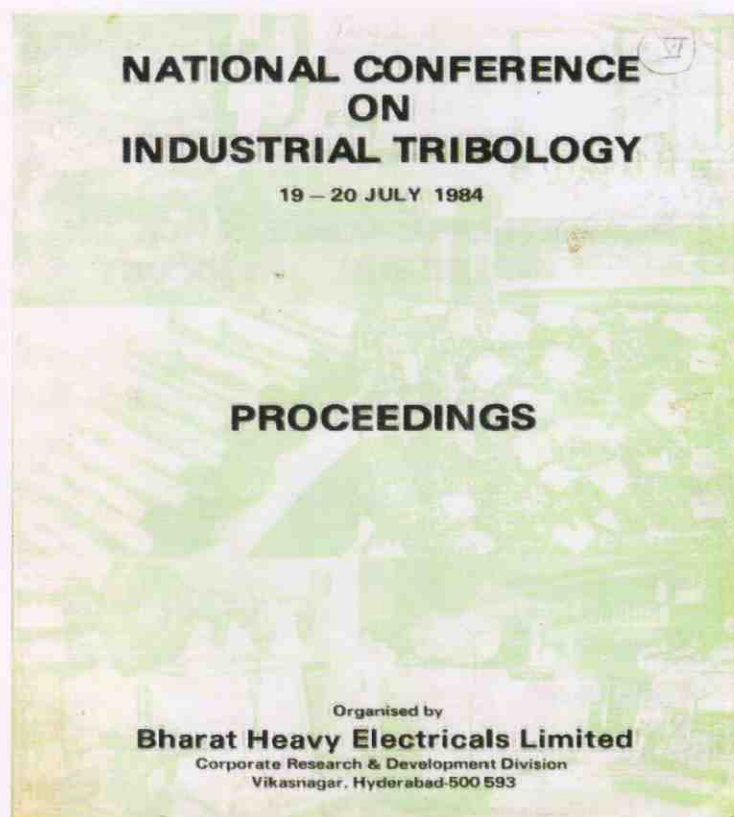
2nd National Industrial Tribology Conference, IIT Bombay 1976



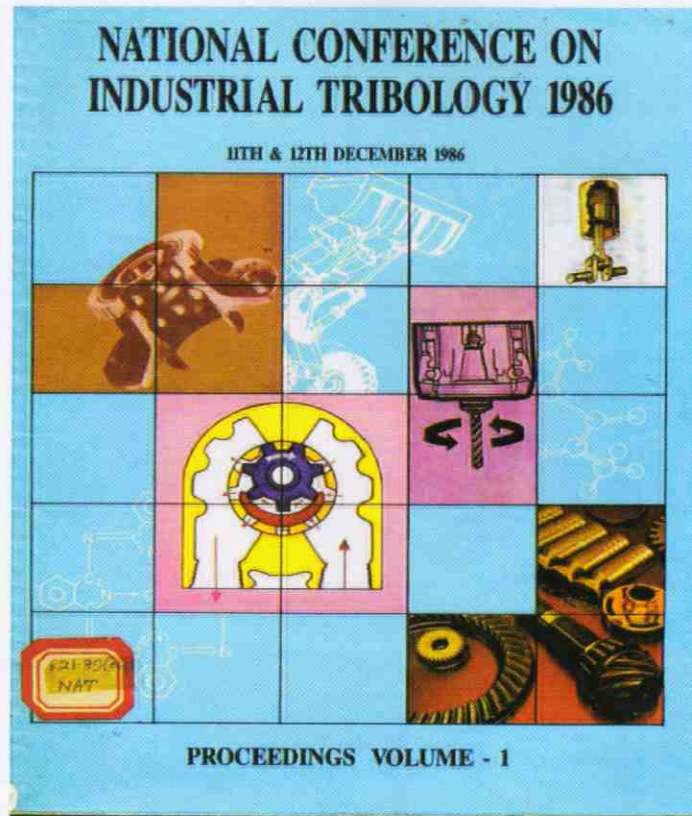
3rd National Conference on Industrial Tribology, IIP Dehradun, 1979



4th National Conference on Industrial Tribology, Calcutta, 1981



5th National Conference on Industrial Tribology, Hyderabad 1984



6th National Conference on Industrial Tribology, Mumbai, 1986



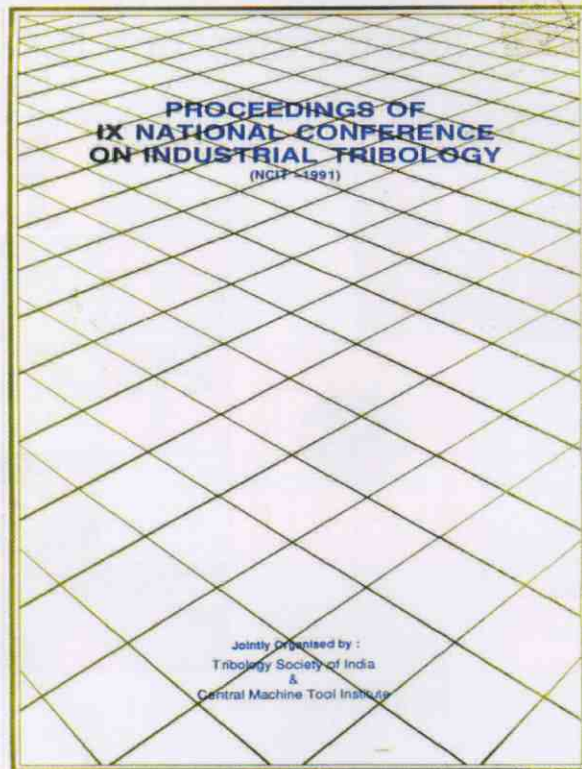
7th National Conference on Industrial Tribology, 1989, Trivandrum

Organised by
 Vikram Sarabhai Space Centre,
 Indian Space Research Organisation,
 Trivandrum, India

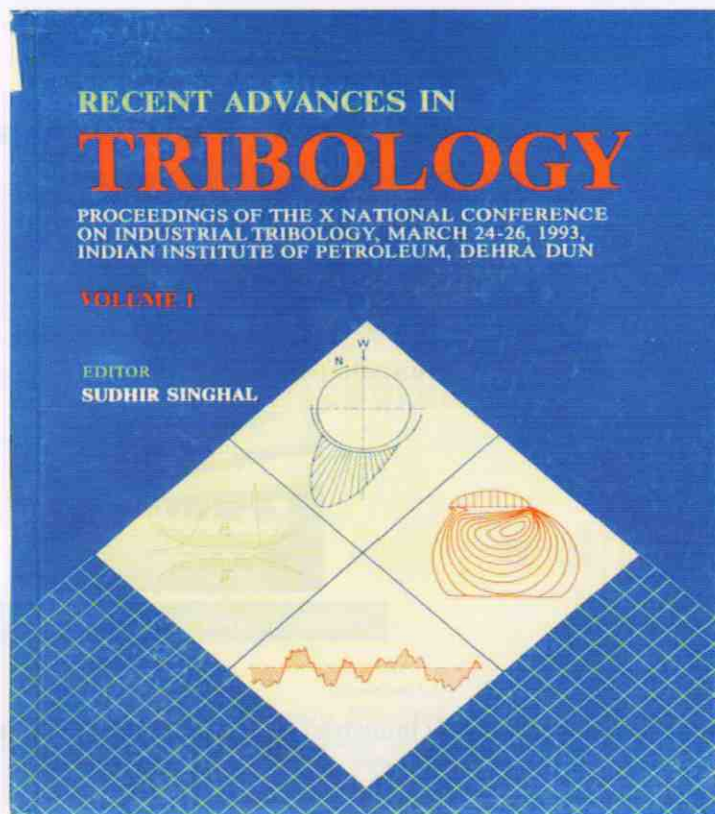


VIKRAM SARABHAI SPACE CENTRE, TRIVANDRUM

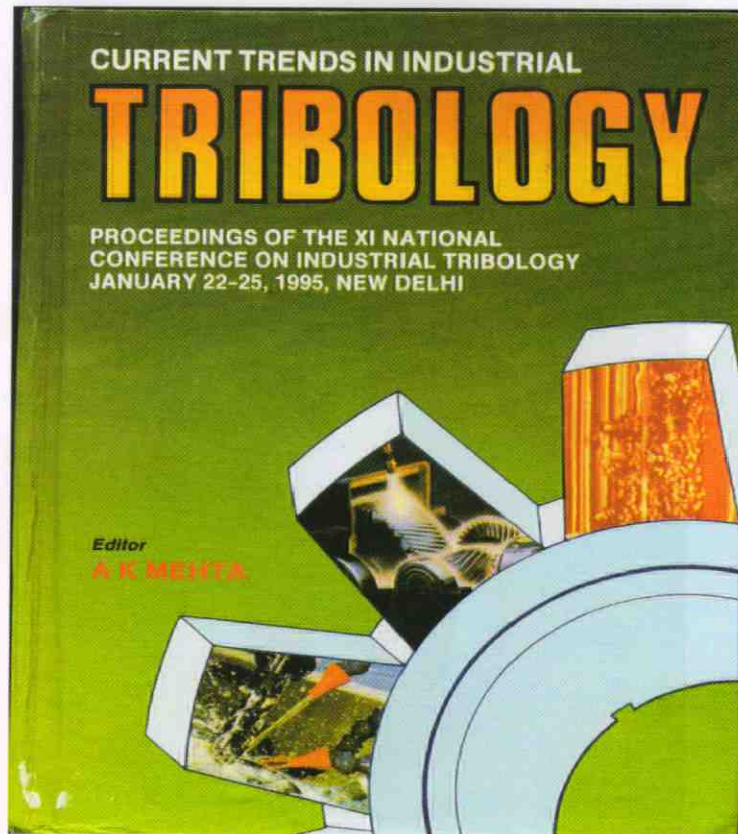
7th National Conference on Industrial Tribology, 1989, Trivandrum



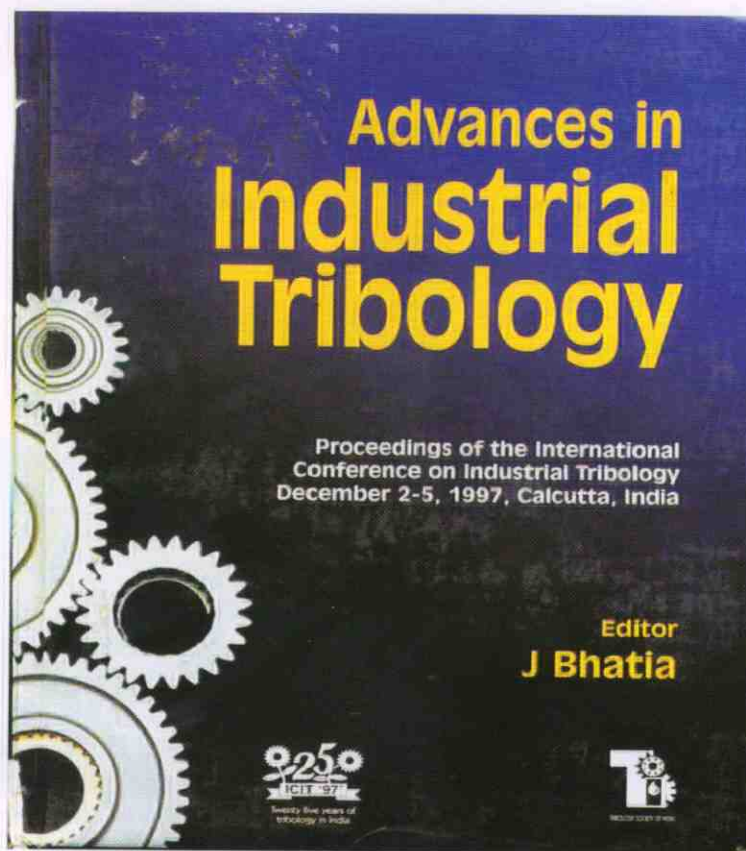
IX National Conference on Industrial Tribology, Bangalore, 1991



Xth National Conference on Industrial Tribology, Dehradun 1993



XI National Conference on Industrial Tribology, New Delhi, 1995

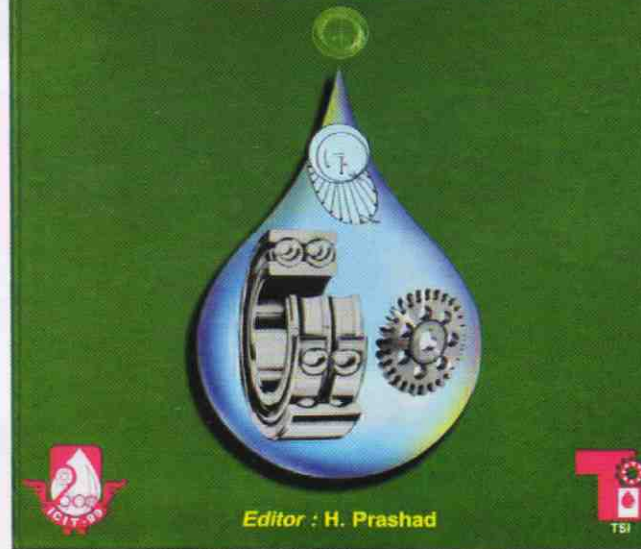


1st International Conference on Industrial Tribology, Calcutta, 1997

TRIBOLOGY IN 2000 AND BEYOND

Proceedings of the Second International
Conference on Industrial Tribology

December 1-4, 1999 Hyderabad, India



2nd International Conference on Industrial Tribology, Hyderabad 1999

EMERGING TRENDS IN TRIBOLOGY

ICIT '01

APRIL 8 - 11, 2002

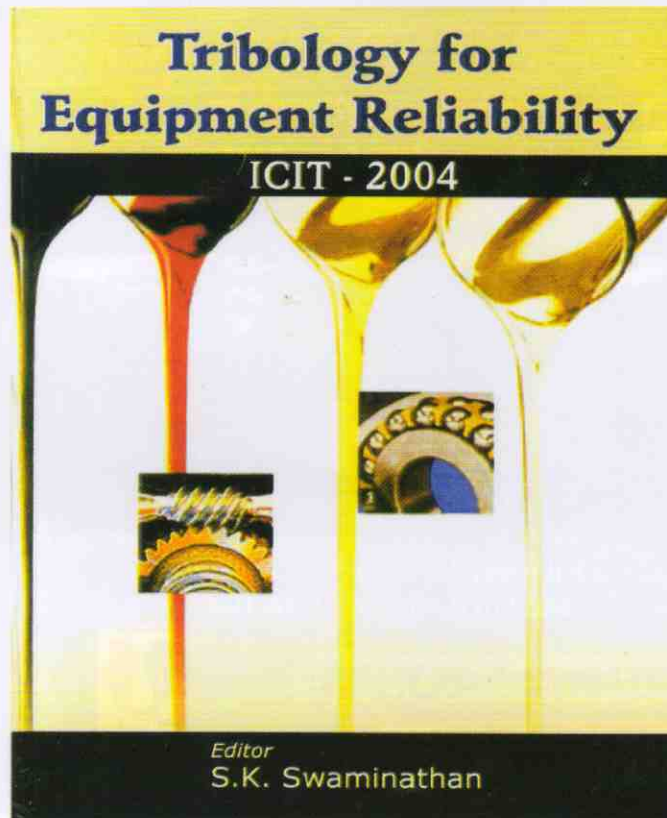
JAMSHEDPUR, INDIA

*Proceedings of the
Third International Conference
on Industrial Tribology*

Edited by C. Mishra



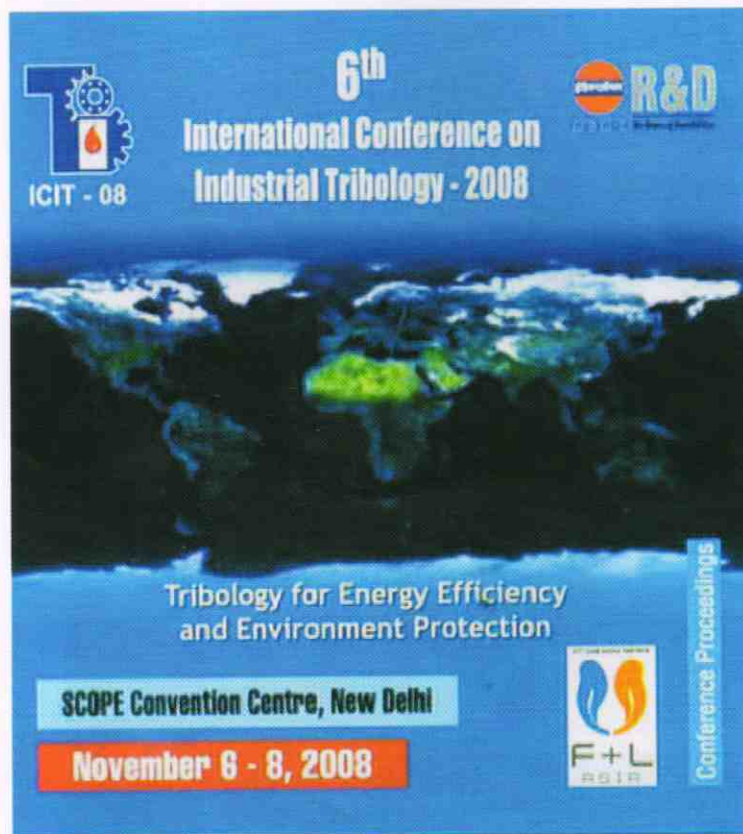
3rd International Conference on Industrial Tribology,
Jamshedpur, 2002



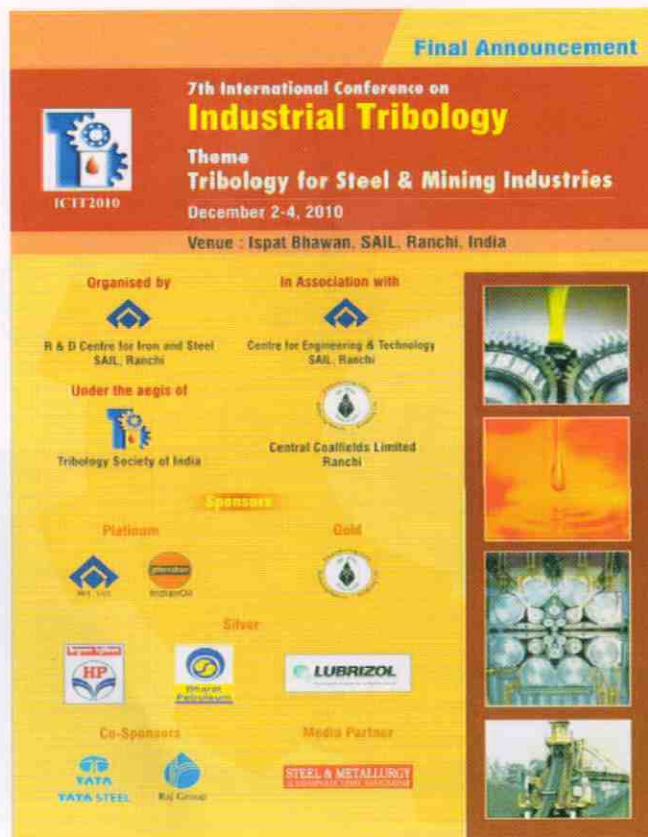
4th International Conference on Industrial Tribology, Mumbai, 2004



5th International Conference on Industrial Tribology, IISC, Bangalore, 2006



6th Industrial Conference on Industrial Tribology, New Delhi 2008



7th International Conference on Industrial Tribology, Ranchi 2010

8th International Conference on Industrial Tribology (ICIT - 2012)

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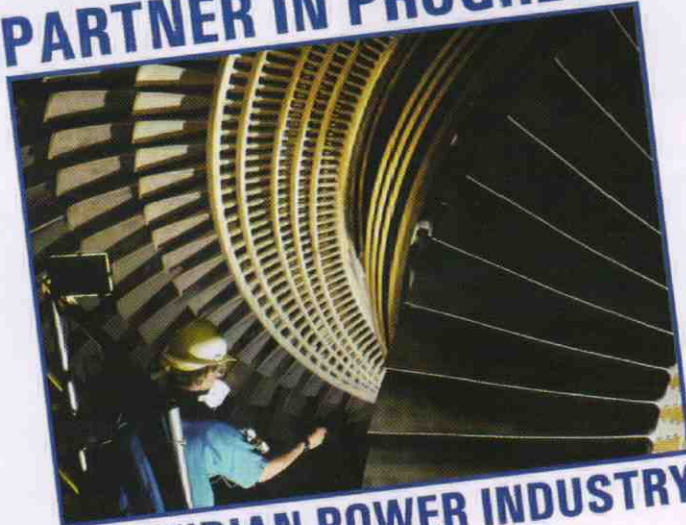
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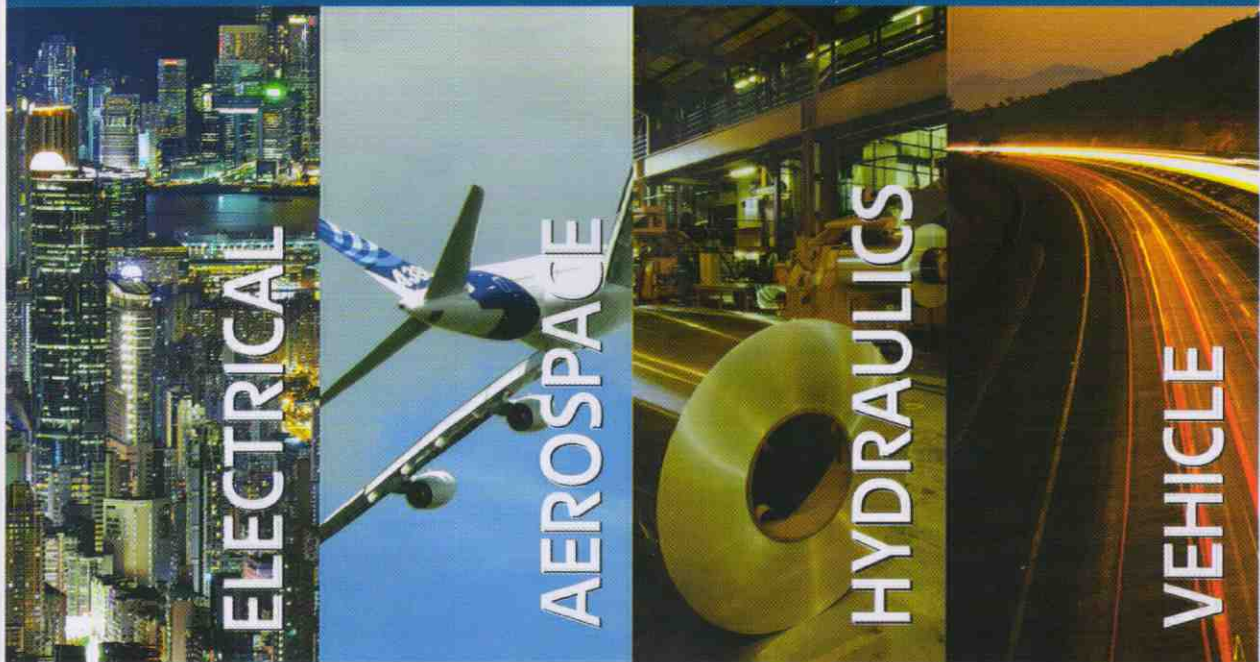
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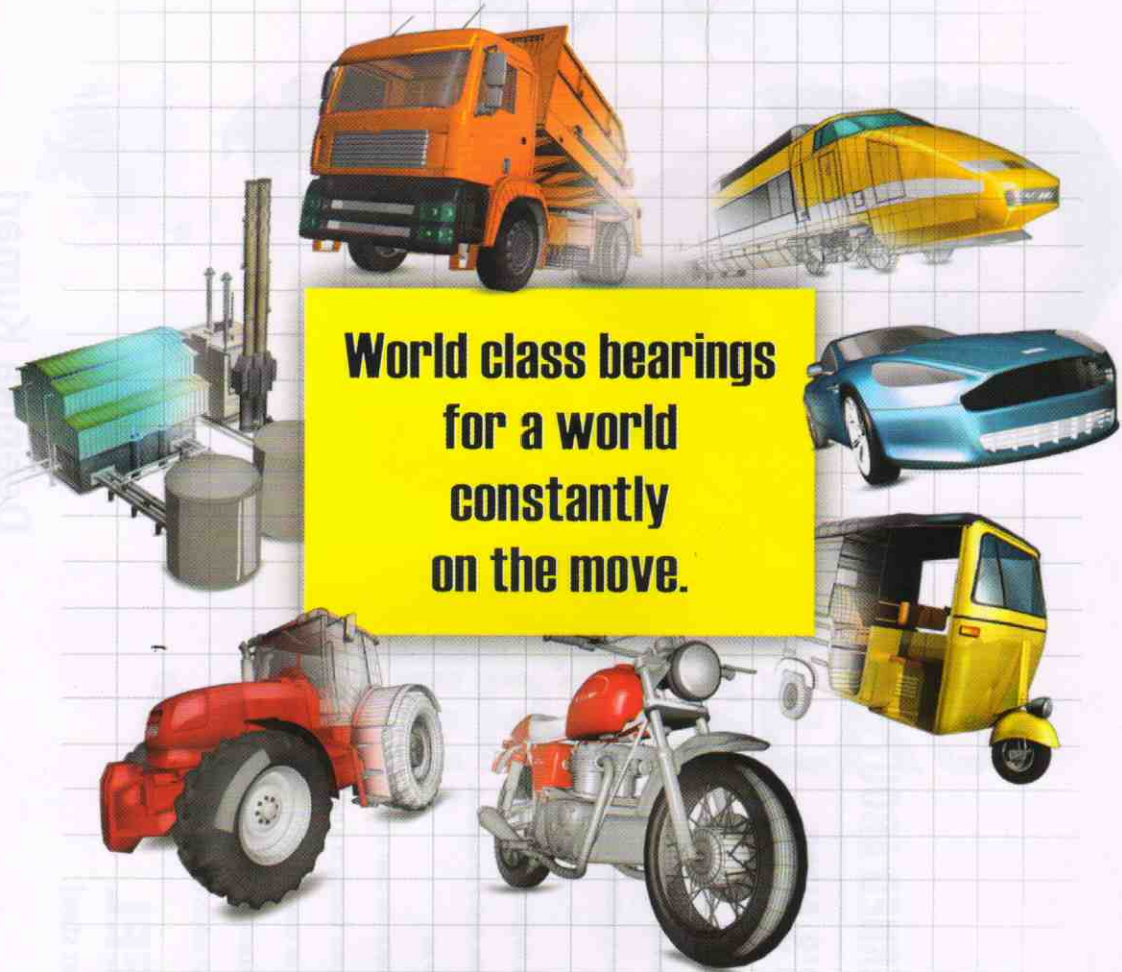


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