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8th International Conference on Industrial Tribology

Under the Aegis of



Tribology Society of India

Theme : Tribology for Sustainable Development

7 - 9 December, 2012

The Westin Pune Koregaon Park, India



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7-9

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Barun Chakrabarti



Jerry P Byers



Arun Jaura



SSV Ramakumar



A K













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Three men are engaged in a conversation. One man is wearing a backpack. In the background, another man is sitting at a desk working on a laptop.

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8th International Conference on Industrial Tribology

Technical Programme at a Glance

7th December 2012
Inauguration (Inspire Hall)
 (9.30 Hrs. to 11.00 Hrs.)

Inauguration of Exhibition - Plenary Session followed by Tea

Tea Break
 (11.30 Hrs. to 11.35 Hrs.)

Plenary Session I (Inspire Hall)
 (11.35 Hrs. to 13.00 Hrs.)

Prof. Sahin Kalkan, Professor
 Senior Member of Science, Bangalore
 "Sustainable Closing the Cycle and Tribology"

D-B Basu, Executive Director
 Indian Oil Corporation Ltd. IOC/Centre, Fertiliser
 "Formulating Lubricants Using Artificial Neural Networks (ANN)"

Lunch
 (13.30 Hrs. to 14.30 Hrs.)

Business Meet - I (Inspire Hall)
 (14.30 Hrs. to 15.30 Hrs.)

STUE, HBS, TIS
 (15.30 Hrs. to 15.45 Hrs.)

Technical Session - I
 (15.45 Hrs. to 17.45 Hrs.)

Session	Topic	Speaker
TS1	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS2	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS3	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS4	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS5	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan

Cultural Program & Dinner
 (19.30 Hrs. onwards)

8th December 2012
Plenary Session II (Inspire Hall)
 (9.30 Hrs. to 11.00 Hrs.)

Mr. Jerry Byers, Manager
 Product Research & Development Convoco Fluid Technologies LLC
 "Evaluation of Microwearing Fluids and Trends in the Industry"

Prof. Wilhelm J. Bartz
 Technische Akademie Esslingen V, Germany
 "Future Energy Sources for Mobility - Contribution of the Green Automobile"

Mr. George Pilot
 Phoenix Tribology Ltd, UK
 "The Effects of Test Machine Dynamics on Tribological Response"

Tea Break
 (11.30 Hrs. to 11.35 Hrs.)

Business Meet - II (Inspire Hall)
 (11.35 Hrs. to 12.45 Hrs.)

SKF, BASF, MECPL
 (12.45 Hrs. to 13.30 Hrs.)

Lunch
 (13.30 Hrs. to 14.30 Hrs.)

Technical Session - II
 (14.30 Hrs. to 15.30 Hrs.)

Session	Topic	Speaker
TS6	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS7	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS8	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS9	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS10	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan

Tea Break
 (15.30 Hrs. to 15.45 Hrs.)

Technical Session - III
 (15.45 Hrs. to 17.45 Hrs.)

Session	Topic	Speaker
TS11	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS12	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS13	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS14	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS15	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan

GBM of TSI
 (18.00 Hrs. onwards)

9th December 2012
Plenary Session III (Inspire Hall)
 (9.00 Hrs. to 11.00 Hrs.)

Prof. Koshi Adachi
 Head of Laboratory of Nanointerface Engineering, Tohoku University, Japan
 "Creation of Nanointerface for Super-low Friction"

Dr. Georges Limbert
 CEng MIMechE National Centre for Advanced Tribology
 at Southampton (nCATS), UK
 "When Tribology Meets Biology"

Tea Break
 (10.30 Hrs. to 11.00 Hrs.)

Technical Session - IV
 (11.00 Hrs. to 13.00 Hrs.)

Session	Topic	Speaker
TS16	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS17	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS18	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS19	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan
TS20	Effect of Surface Roughness on Friction and Wear	Prof. Sahin Kalkan

Valedictory Session (Inspire Hall)
 (13.00 Hrs. to 14.00 Hrs.)
Lunch
 (14.00 Hrs. onwards)

Steady State Non-Newtonian THD Analysis of Journal Bearing Considering 3D Surface Roughness and Fluid Inertia Effects

E. Sujin Prasad*, T. Nagaraju¹, K. M. Jagadeesh² and A. Shrinani Basavaraj³

ABSTRACT: The combined influence of 3D surface roughness and fluid inertia effects is considered in the steady state non-Newtonian THD analysis of a journal bearing. Based on the Patil and Cheng's procedure, an average Reynolds equation is derived to include the surface roughness, fluid inertia and viscous resistance due to the non-Newtonian behavior of lubricant. The effects of surface roughness parameter, roughness preparation, and roughness characteristics of bearing surface, on circumferential fluid film pressure distribution, load carrying capacity and stability threshold speed of the bearing are studied by considering thermal, non-Newtonian behavior of lubricant and fluid inertia effects.

Introduction

In the classical non-Newtonian thermo-hydrodynamic (THD) analysis of a journal bearing the surface roughness and fluid inertia effects are generally neglected due to the complexity in the development of mathematical models and their solution process. However, in actual practice the bearing surface, even after the most careful polishing, will still be rough to a microscopic scale. In such cases, the fluid assumption of a smooth surface can no longer be employed to accurately predict the performance of a journal bearing. Further, unless the bearing operating under high speed and reduced lubricant viscosity, the film of lubricant can be considered as laminar but the fluid inertia forces cannot be neglected.

Mathematical Formulations

RESULTS AND DISCUSSION

The results are compared to the Newtonian case to study the combined influence of thermal, non-Newtonian behavior of lubricant and fluid inertia effects on journal bearing performance.

CONCLUSIONS

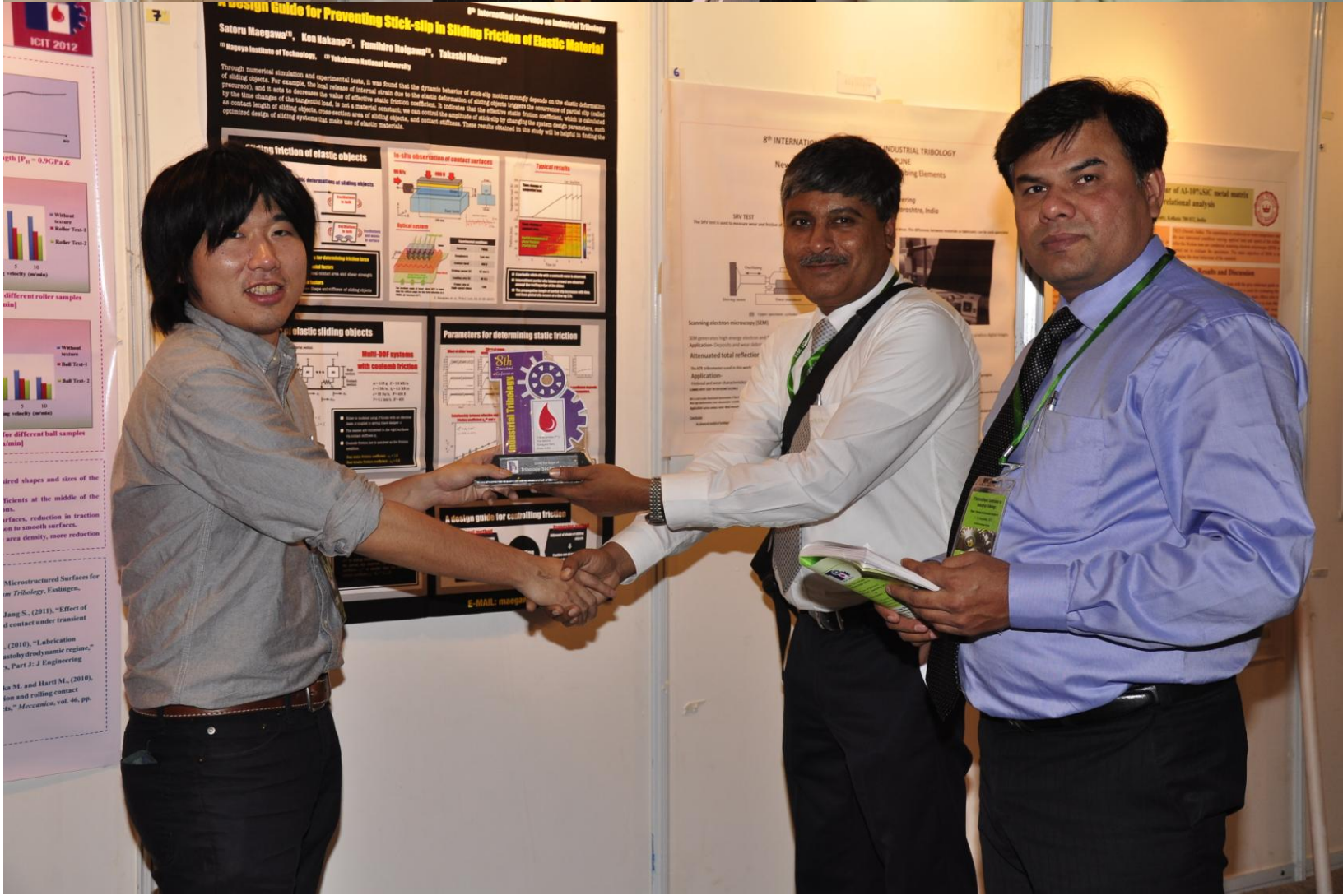
1. Circumferential pressure distribution and rough bearing response are highly affected by the non-Newtonian behavior of lubricant.
2. Increased surface roughness significantly affects the load carrying capacity and stability threshold speed of the bearing.
3. Fluid inertia effects are significant at high speeds and low viscosities.

6

Technical posters displayed on a wall, including graphs and text.







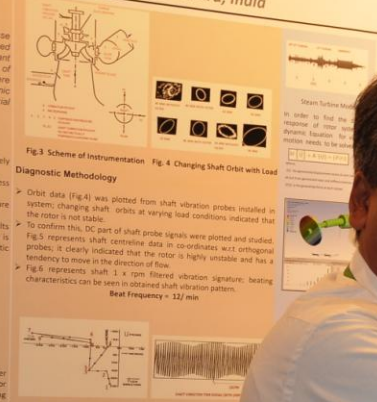
Friction Based Comparison of Mechanical Shaft Seal and Dynamic O' Ring Seal Module Developed for Rudders and Fins of Autonomous Underwater Vehicle (AUV)

A. K. Singh, D. N. Baidya and Deep Singh
 Director of Research Handling & Robotics (DRHR)
 Bhabha Atomic Research Centre, Mumbai (INDIA)
 Email: canan@barc.gov.in

ABSTRACT
 This paper describes design of mechanical shaft seal & dynamic O' ring seal module for AUV. The also give comparison of seal used for pressure hulling of shaft seal. The results obtained by give a new friction based comparison of the two seal modules. Results show that mechanical seal was best for pressure hulling for higher duration. From the type of seal used have been successfully for water and pressure hulling of shaft seal.

INTRODUCTION
 Autonomous Underwater Vehicle (AUV) is used for sea defense of underwater vessels. AUV is a free swimming marine vehicle capable of autonomous operation. AUVs are used for military and civilian purposes. AUVs are used for sea defense of underwater vessels. AUVs are used for sea defense of underwater vessels. AUVs are used for sea defense of underwater vessels.

CONCLUSIONS
 The paper describes design of mechanical shaft seal & dynamic O' ring seal module for AUV. The also give comparison of seal used for pressure hulling of shaft seal. The results obtained by give a new friction based comparison of the two seal modules. Results show that mechanical seal was best for pressure hulling for higher duration.



Results & Discussion

- Shaft centreline plot indicated highly unstable rotor, which to move in direction of flow. The movement of plot in frequency of bursts (12 per minute) in tail pool exit of the beat pattern obtained in time waveform data has frequency of bursts (12 per minute) in tail pool exit of the beat pattern obtained in time waveform data has frequency of bursts (12 per minute) in tail pool exit of the beat pattern obtained in time waveform data.
- To confirm this, DC part of shaft probe signals were plotted and studied. Fig. 5 represents shaft centreline data in co-ordinates w.r.t orthogonal probes. It clearly indicates that the rotor is highly unstable and has a tendency to move in the direction of flow.
- Fig. 6 represents shaft 1 x rpm filtered vibration signature. Beating characteristics can be seen in obtained shaft vibration pattern. Beat Frequency = 12/min.



Optimization of Tribological behaviour of Al-10%SiC metal matrix composite using Taguchi based grey relational analysis

Shankh Ghosh, Prasanta Sahoo, Goutam Satpathy
 Department of Mechanical Engineering, Jadavpur University, Kolkata 700 032, India

Introduction
 Metal Matrix Composites (MMC) have gained tremendous interest in industrial applications in the past years. The composite materials show improved toughness, strength, and stiffness than the base metal. There are different types of MMCs based on the base metal, reinforcement type and volume fraction of reinforcement. The composite gain mixed properties of the base metal and reinforcement. Some of the friction behaviour studies conducted by researchers are cited here. Akhater et al [1] carried out observation of Al-SiC MMC by abrasive wear test. Sahoo et al [2] performed tribological wear test of Al-10%SiC at different loads, sliding distances and reinforcement particles size. They observed that reinforcement particle size has the greatest effect on wear. Ma et al [3] conducted wear test with block-on-ring configuration for Al₂O₃/SiC and Al₂O₃/SiC. From the tests they reported that wear increases with increase in load and sliding speed, while wear decreases with increase in SiC incorporation. It was also observed that at loads above 100 N and at sliding speed of 6 m/s, severe wear took place.



Experimental Details

Run	Factor 1	Factor 2	Factor 3	Response
1	1	1	1	116051
2	1	2	1	8139743
3	1	3	1	81000716
4	2	1	1	81006831
5	2	2	1	81022772
6	2	3	1	81022772
Total				818224

Conclusions
 The present work deals with the study of tribological behaviour of MMC. From the analysis of test data it is concluded that the tribological behaviour of MMC is highly dependent on the load and sliding speed. The ANOVA analysis reveals load and time as the most significant factors. The tribological behaviour of MMC is highly dependent on the load and sliding speed. The ANOVA analysis reveals load and time as the most significant factors. The tribological behaviour of MMC is highly dependent on the load and sliding speed.

Optimization of Tribological behaviour of Al-10%SiC metal matrix composite using Taguchi based grey relational analysis

INTERNATIONAL CONFERENCE ON INDUSTRIAL TRIBOLOGY
 (07-08 DECEMBER, 2012), PUNE
 Challenges in Nanotribology for Rubbing Elements
 Prof. Sonawane Vishnu Y
 Department of Production Engineering
 Axioms College of Engineering Pune, Maharashtra, India



Taguchi Method
 Taguchi technique is a powerful tool for design of high quality systems. Dr. Genichi Taguchi's method or Taguchi approach. This optimization technique is carried out in a three stage approach such as system design, parameter design and tolerance design. System design reveals the usage of scientific and engineering information required for producing a particular design. Parameter design is used to determine optimum levels of process parameters. Tolerance design is used to determine the product performance and to determine the process parameters. Taguchi method is used to determine the optimum levels of process parameters. Taguchi method is used to determine the optimum levels of process parameters.

Experimental Details
 The composite Al-10%SiC MMC is used as the sliding partner in tribological studies. The base metal (Aluminum) is polished at 900°C and the composite is polished at 1000°C and the specimen is ground. The tribological performance of Al-10%SiC MMC is studied in terms of wear volume, friction coefficient and torque. The tribological performance of Al-10%SiC MMC is studied in terms of wear volume, friction coefficient and torque.

Pune Koregaon Park, India



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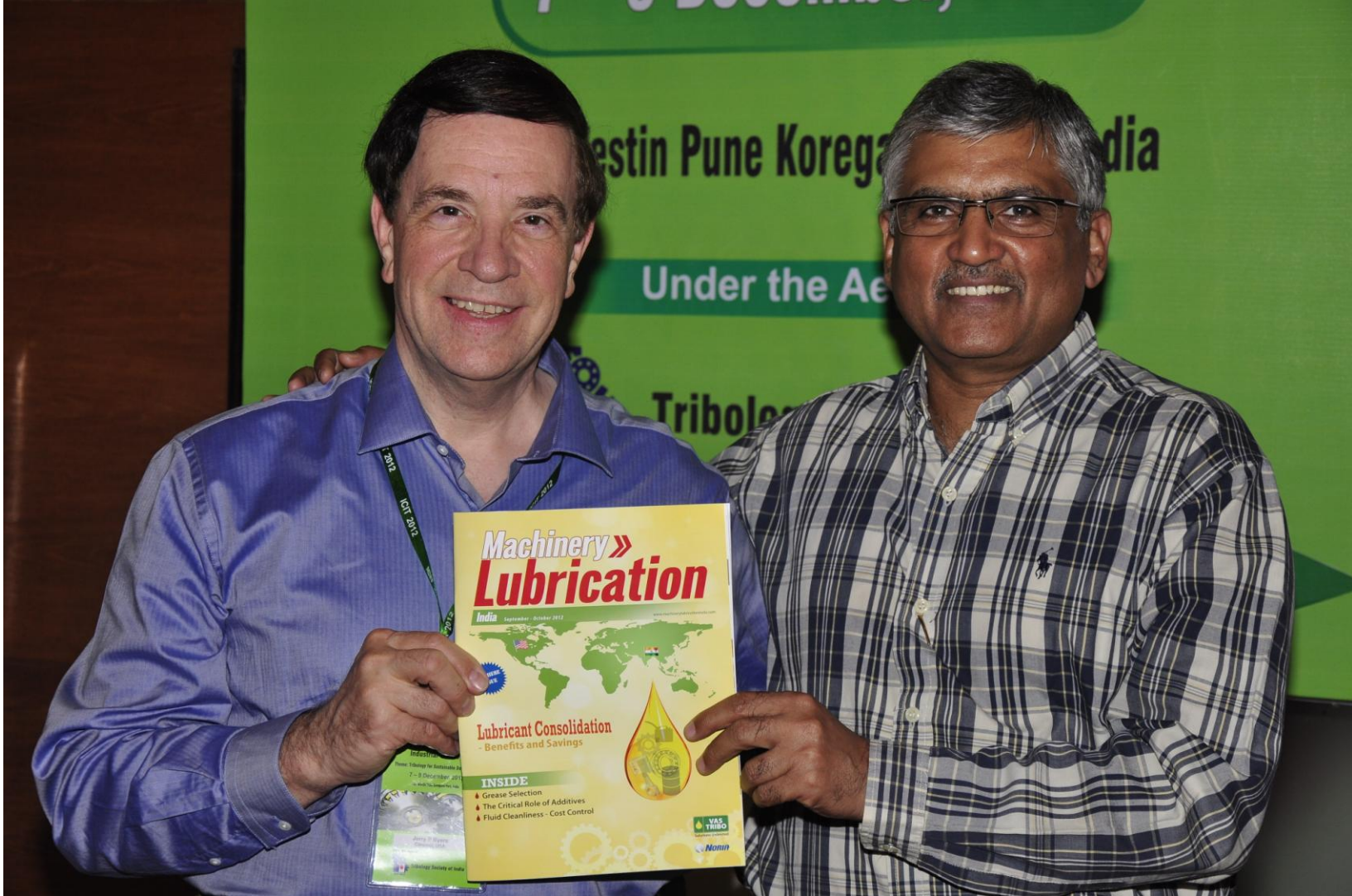
















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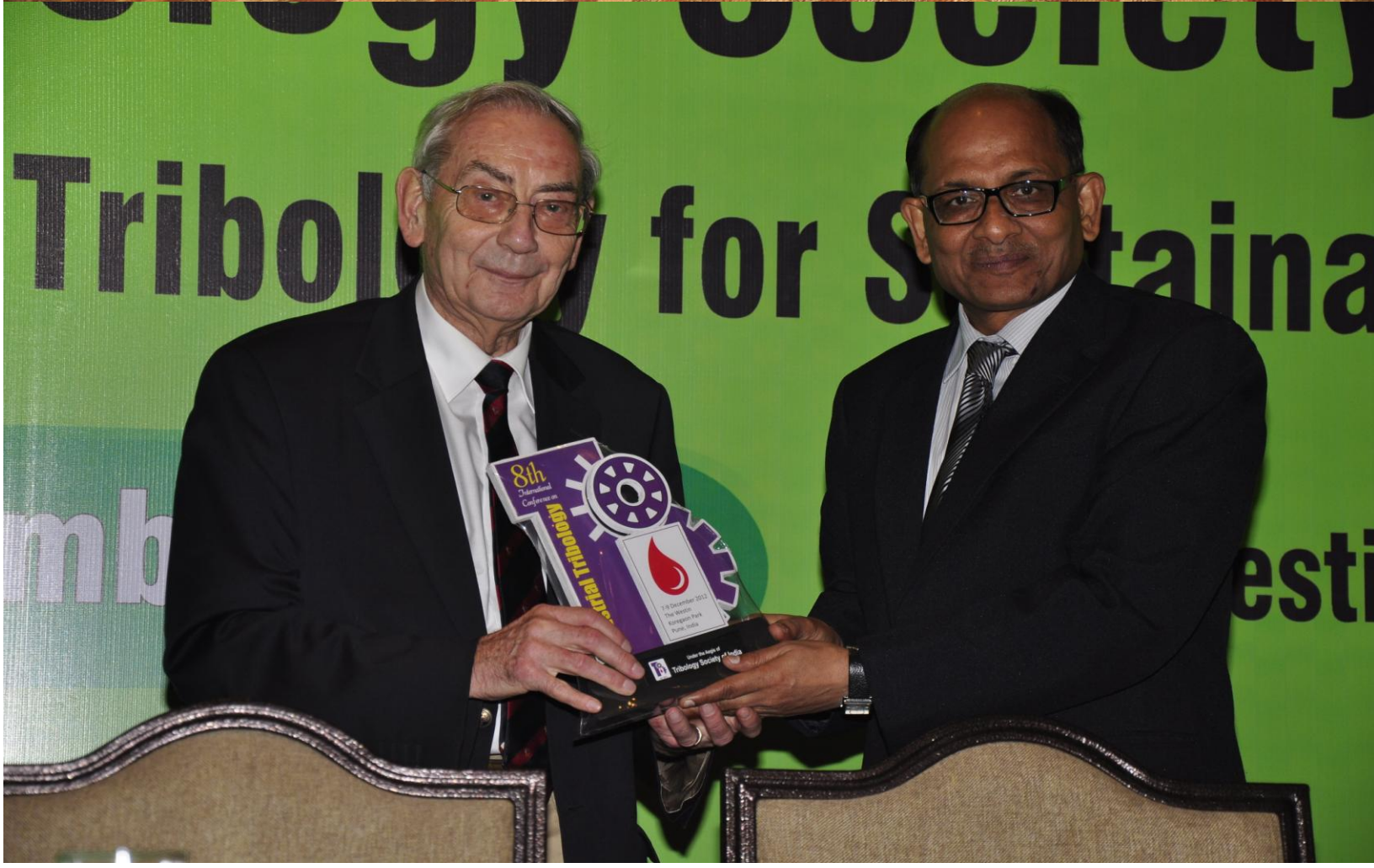
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Session IVC

Wear Mechanisms III



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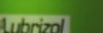
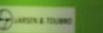
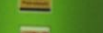
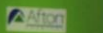


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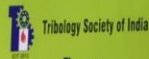
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