P. K. Goel

PROCEEDINGS

NATIONAL CONFERENCE ON INDUSTRIAL TRIBOLOGY

1979

Presented by Shri P K. Goel

PROCEEDINGS

NATIONAL CONFERENCE ON INDUSTRIAL TRIBOLOGY

VOLUME - 1 PAPERS

OCTOBER 1979

ORGANISED BY:

INDIAN INSTITUTE OF PETROLEUM, DEHRA DUN (INDIA)

CO-SPONSORED BY:

BHARAT PETROLEUM CORPORATION LIMITED
HINDUSTAN PETROLEUM CORPORATION LIMITED
INDIAN OIL CORPORATION LIMITED
LUBRIZOL INDIA LIMITED

FOREWORD

The theoretical and applied aspects of tribology have assumed significant importance from the point of energy and material conservation. Two National Conferences held earlier have developed a keen awareness of tribology in the country.

Indian Institute of petroleum has an active tribology group and is organising the present National Conference. It is gratifying to receive the quick and enthusiastic support of our Co-sponsors:

Bharat Petroleum Corporation Ltd.,
Hindustan Petr leum Corporation Ltd.,
Indian Oil Corporation Ltd.,
Lubrizol India Ltd.,

A National organising Committee has been formed with Dr. A. Ramachandran, former Secretary DST as the President. The National Committee has made very valuable suggestions regarding the technical and organisational aspects of the conference. The members of this Committee are:

Shri C.R. Das Gupta, Chairman,
Indian Oil Corporation Ltd.,
New Delhi.

Shri R.M. Bhandari, Chairman and MD,
Hindustan Petroleum Corporation Ltd., Bombay.

Shri R.N. Bhatnagar, Chairman and MD,
Bharat Refineries Ltd., Bombay.

Dr. J.P. Dalal, Lubrizol India Ltd., Bombay.

Prof. A.K. De, Director, IIT, Bombay.

Dr. J.S. Ahluwalia, Head, IOC (R&D) Centre, Faridabad.

Prof. S.P. Luthra, Educational Adviser,
National Council of Educational Research and Training,
New Delhi.

Dr. H.N. Sharan, Director Engineering,
BHEL, New Delhi.

Lt. Gen. M.M. Chabra, M.M. Chabra and Associates,
New Delhi.

Dr. I.B. Gulati, Director, Indian Institute of Petroleum,
Dehradun.

The technical aspects of the Conference were co-ordinated by the technical Committee chaired by Prof. J.S. Rao of IIT, New Delhi. The Committee has put in a lot of effort to carefully screen the papers and to advise on the technical content of the conference. The members of the Committee are:

Shri R.A. Rao, Project Manager, BCT, Yellamanchili.

Dr. R.K. Gupta, Head Mechanical Testing & Tribology Division,
IOC (R & D) Centre, Faridabad.

Prof. J.B. Shukla, Department of Mathematics, IIT, Kanpur.

Dr. A. Sethuramiah, Project Coordinator, Tribology Laboratory,
IIP, Dehradun.

Shri S. Singhal, Project Coordinator, Engines Laboratory,
IIP, Dehradun.

The present volume Consists of papers being presented in the following sessions:

Fluid Film Lubrication
Boundary Lubrication
Friction and Wear
Metal Working Lubricants/Lubrication
Gear Lubrication

In addition to the above sessions there shall be sessions on Case Study, Training and Standardisation and a panel discussion with the theme "National R & D priorities in Industrial Tribology - Have they been identified?" The papers for these sessions shall be supplied to the delegates during registration.

The fluid film lubrication shall cover the present state of the art by B.C. Majumdar. Advanced work being done in the country shall be presented by the various authors and deals with the problems related to hybrid bearings, gas journal bearings and porous bearings.

The importance of chemical reactions in boundary lubrication shall be reviewed by T. Sakurai. The other papers in boundary lubrication deal

with role of base fluids on anti-wear additive performance, a boundary lubrication model for engine wear, lubricity evaluation of watch oils and quantitative relationships between metal contact and wear volume.

The importance of ferrography shall be dealt by D. Scott. The other papers in the friction and wear session deal with wear behaviour of sintered iron based materials, wear resistance of burnished parts. strain rate dependence of PTFE, material selection under hostile environments, and abrasive wear of graphitic aluminium. A fundamental paper considers an electronic approach to wear.

Lubrication problems in steel industry shall be highlighted by J.S. Ahluwalia. The other papers in metal working session deal with interfacial friction in metal deformation, effect of cutting fluids in helical slab mill operation, performance evaluation of wire drawing lubricants and numerical methods for predicting extrusion flow-field.

Influence of lubricant additives on gear fatigue is not well understood. This aspect shall be discussed in detail by W.J. Bartz. The surface deterioration of gears shall be dealt by R. Krishnamurthy. The other paper in the gear lubrication session deals with performance evaluation of hypoid gear oils on a disc machine. There shall also be an invited talk on gear lubrication by J.G. Larcombe.

The Part II of the proceedings shall consist of the discussions at the conference.

We take this opportunity to thank all those who have worked for the conference thus far and to those who will make this Conference a success.

A. Sethuramiah
Conference Convener

TABLE OF CONTENTS

PART III: FRICTION AND WEAR

PART IV: METAL WORKING LUBRICANTS/LUBRICATION

PART V: GEAR LUBRICATION