

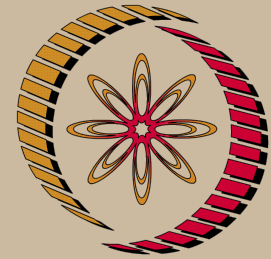
Tribology - Web course

COURSE OUTLINE

Tribology deals with design of fluid containment systems like seals and gasket, Lubrication of surfaces in relative motion to achieve reduced friction and wear. The structure of the bearing and the nature of fluid flow determine the loads that can be supported. Modeling systems as hydrostatic squeeze film and Elasto-hydrodynamic lubrication will be studied as infinite and later finite structures. Gas (air) lubricated and rolling contact type motions with deformation at contact will be studied as special systems.

COURSE DETAIL

Sl. No	Topic
1	Introduction <ol style="list-style-type: none"> 1. Introduction to tribology 2. History of tribology 3. Interdisciplinary Approach 4. Economic Benefits.
2	Friction <ol style="list-style-type: none"> 1. Causes of Friction. 2. Adhesion Theory. 3. Abrasive Theory. 4. Junction Growth Theory. 5. Laws of Rolling Friction. 6. Friction Instability.
3	Wear <ol style="list-style-type: none"> 1. Wear Mechanisms. 2. Adhesive Wear. 3. Abrasive Wear. 4. Corrosive Wear. 5. Fretting Wear.



NP-TEL

NPTEL

<http://nptel.iitm.ac.in>

Mechanical Engineering

Pre-requisites:

- Fluid mechanics

Coordinators:

Dr. Harish Hirani

Department of Mechanical Engineering IIT Delhi

	6. Wear Analysis
4	Lubrication and Lubricants <ol style="list-style-type: none"> 1. Importance of Lubrication. 2. Boundary Lubrication. 3. Mixed Lubrication. 4. Full Fluid Film Lubrication ; Hydrodynamic 5. Elastohydrodynamic lubrication. 6. Types & Properties of Lubricants. 7. Lubricants Additives.
5	Fluid film lubrication <ol style="list-style-type: none"> 1. Fluid mechanics concepts. 2. Equation of Continuity & Motion. 3. Generalised Reynolds Equation with Compressible & Incompressible Lubricants.
6	Application of Tribology <ol style="list-style-type: none"> 1. Introduction 2. Rolling Contact Bearings. 3. Gears 4. Journal Bearings - Finite Bearings.

References:

1. Dowson D, History of Tribology, Longman London, 1979.
2. Stachowiak G N, Batchelor A W and Stachowick G B "Experimental methods in Tribology", Tribology Series 44, Editor D Dowson, 2004.
3. Michael M Khonsari, Applied Tribology (Bearing Design and Lubrication), John Wiley & Sons, 2001.
4. Jost H P, Lubrication (Tribology) : A Report on the present position and industry`s needs, Her Majesty`s Stationary Office, London, 1966.
5. J Halling, Principles of Tribology, The Macmillan Press Ltd, London, 1975.
6. Archard J F and Hirst W, The Wear of Metals under Unlubricated Conditions, Proc. R. Soc., London, A 236, 397-410, 1956.
7. Ludema K C, Friction, Wear, Lubrication: A textbook in Tribology, CRC Press, 2010.
8. Lim S C and Ashby M F, Wear Mechanism Maps, Acta Metall., Vol. 35 (1), 1-24, 1987.
9. Waterhouse R B, Fretting Wear, Wear Vol. 100(1-3), 107-118, 1984.
10. Norton R L, Cam Design and Manufacturing Handbook, Industrial Press Inc., 2009.
11. <http://auto.howstuffworks.com/power-window1.htm> Accessed on 19th February 2013.
12. Stachowiak G W & Batchelor A W, Engineering Tribology,

Third Edition, Elsevier Inc., 2005.

13. Peterson M B and Winer W O, Wear control handbook, ASME, 413-473, 1980.
14. Hamrock B J, Jacobson B O & Schmid S R, Fundamentals of Machine Elements, McGraw-Hill Inc., 1998.
15. Edwards K S & McKee R B, Fundamentals of Mechanical Component Design, McGraw-Hill Inc., 1991.
16. <http://www.skf.com/group/products/bearings-units-housings/index.html> accessed on 20th February 2013.
17. <http://www.maxxtorque.com/dieselcommunity/winter-2008/intro-to-lubrication?start=2> accesses on 20th February 2013.
18. Shigley J E, Mischke C R, Mechanical Engineering Design, Tata McGraw-Hill Publishing Company Limited, 2003.
19. Martin F A and Lee C S, "Feed pressure flow in plain journal bearings" ASLE Transactions, 26 (3), 381-392, 1983.