



FUNDAMENTALS OF SURFACE ENGINEERING: MECHANISMS, PROCESSES AND CHARACTERIZATIONS

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IIT Roorkee

TYPE OF COURSE : Rerun | Elective | PG
COURSE DURATION : 12 weeks (24 Jan' 22 - 15 Apr' 22)
EXAM DATE : 24 Apr 2022

INTENDED AUDIENCE : UG and PG Student, Research Scholar & Practicing Engineers

INDUSTRIES APPLICABLE TO : Mining, Hydropower, Cement and Manufacturing

COURSE OUTLINE :

The course content is designed to have systematic and comprehensive understanding on various aspects related with surface engineering of metallic components for enhanced tribological life. It is proposed to include fundamental mechanisms of wear such as adhesive, abrasive, erosive, cavitation, corrosion etc., governing laws, materials properties importance for improved wear resistance under different wear conditions, materials increased tribological life, processes for engineering surfaces of three broad categories a) regulating the micro-structure without changing chemical composition b) modification of chemical composition of near surface layers and c) developing of films, coating, and cladding on the. Methods of characterization needed for evaluating the metallurgical and mechanical and tribological properties and performance of engineered surfaces shall also be presented. Presentations will be supported with case studies for effective communication of concepts and procedures. Case studies will be taken up regarding surface engineering of various metal systems like ferrous and non-ferrous metals using different approaches discussed.

ABOUT INSTRUCTOR :

Prof. D.K. Dwivedi obtained BE (Mechanical Engineering) , in 1993 from GEC Rewa, ME (welding engineering) from Univ. of Roorkee in 1997 and PhD in Met. Engineering from MNIT, Jaipur in 2003. He has about 9 years teaching experience at NIT Hamirpur and 12 years at IIT Roorkee of subjects related with manufacturing at UG level and welding engineering related subjects at PG level including failure analysis of welded joints. He has undertaken work of failure investigation valves, penstocks, bridges for many private and public sector industries especially in hydropower sector.

COURSE PLAN :

Week 01 : Introduction

Week 02 : Introduction - contd.

Week 03 : Surface damage

Week 04 : Surface damage - contd.

Week 05 : Materials for wear resistant applications

Week 06 : Processes for Controlling Wear: Structural Modification

Week 07 : Processes for Controlling Wear: Composition Modification

Week 08 : Processes for Controlling Wear: Composition Modification - contd.

Week 09 : Processes for Controlling Wear: Composition Modification & Weld Surfacing

Week 10 : Processes for Controlling Wear: Coatings & Cladding

Week 11 : Processes for Controlling Wear: Coatings & Overlays

Week 12 : Processes for Controlling Wear: Coatings & Characterization