Industrial Surface Engineering: Fundamentals, Practice and Applications

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Course Objectives
Surface Engineering is a multidisciplinary design and manufacturing process that integrates the surface and the substrate in one functionally graded system. The designed surface generates significant performance enhancement of the product and consequently Surface Engineering has become a critical component of industrial research and manufacturing. The course will discuss industrial aspects of surface engineering.
• Learn the principles and methodology of Industrial Surface Engineering
• Learn the rules of product-design and of the relevant surface engineering techniques
• Learn how they are applied in three major industrial sectors: machining, automotive and aerospace.

Course Description
Many modern manufacturers rely on surface engineering and on surface engineered products to ensure competitive advantage in the fast changing global markets. We will learn the principles of coating-substrate systems and key industrial surface engineering techniques. We will present and discuss, in depth, the applications of surface engineering in the metal cutting, the automotive and the aerospace industries. The course will conclude with a discussion of new trends in surface engineering and in the design of multi-functional coating-substrate systems.

Course Content
• Fundamental aspects of industrial surface engineering: Engineering of the substrate; Design of the coating-substrate interface; building the required coating.
• Key Industrial Surface Engineering Technologies:
  Managing the substrate for corrosion and wear protection; Ion bombardment and laser treatment for surface modification; Vacuum technologies for PVD and CVD coatings for wear and corrosion resistant coatings; and Thermal spray, thermal barrier coatings;
• We will examine some of the developed coatings and systems:
  Hard tribological coatings on cutting tools and wear parts; Wear and corrosion resistant coatings for landing gear applications, Thermal barrier coatings on nickel alloy turbine blades for aircraft and power generation; diamond like coatings and wear protective coatings in machining, aerospace and automotive industries.
• Topical discussion of key industrial challenges, new trends and future applications.

Who Should Attend?
Students and scientist who are interested in a comprehensive review of surface engineering. Managers and engineers will find useful perspective on industrial applications and potentially new research directions.

Course Materials: Detailed course notes will be provided.