Surface Engineering & Coatings in Manufacturing Training Course

Professional Development Training Course Outline

Category	Manufacturing	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Surface Engineering & Coatings in Manufacturing is a critical advanced training program designed to equip engineers, technicians, and manufacturing professionals with cutting-edge knowledge in surface modification, wear resistance technologies, corrosion protection systems, and high-performance coating applications. In today's highly competitive industrial landscape, product durability, energy efficiency, and lifecycle optimization are driven by innovations in surface engineering. Surface Engineering & Coatings in Manufacturing Training Course provides a deep understanding of modern coating techniques such as PVD, CVD, thermal spraying, electroplating, anodizing, and nano-coatings that significantly enhance material performance in aerospace, automotive, oil & gas, medical devices, and heavy machinery industries.

With increasing demand for sustainable manufacturing, smart materials, and Industry 4.0-driven production systems, surface engineering has become a strategic enabler of product innovation. This training emphasizes real-world industrial applications, failure analysis, tribology fundamentals, and advanced surface characterization techniques. Participants will gain hands-on insights into coating selection, process optimization, defect analysis, and quality control systems aligned with international standards. The program bridges the gap between theoretical material science and practical manufacturing excellence, ensuring participants are industry-ready for next-generation engineering challenges.

Programme Curriculum

Surface Engineering & Coatings in Manufacturing Training Course

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Course Objectives

1. Master advanced surface engineering technologies for industrial applications
2. Understand tribology, friction, wear, and lubrication mechanisms
3. Analyze corrosion prevention and anti-wear coating systems
4. Apply PVD, CVD, thermal spray, and electroplating techniques
5. Develop expertise in nano-coatings and smart surface technologies
6. Evaluate coating adhesion, hardness, and surface integrity
7. Implement failure analysis and root cause investigation in coatings
8. Optimize manufacturing efficiency using surface treatment processes
9. Integrate Industry 4.0 and smart manufacturing in coating systems
10. Enhance material performance through advanced surface modification
11. Ensure compliance with ISO coating and quality standards
12. Improve sustainability and eco-friendly coating solutions
13. Strengthen R&D capabilities in advanced manufacturing materials

Target Audience

- Manufacturing Engineers & Process Engineers
- Mechanical & Materials Engineers
- Quality Assurance & Quality Control Professionals
- Maintenance & Reliability Engineers
- Aerospace & Automotive Industry Specialists
- Oil & Gas and Heavy Equipment Engineers
- R&D Scientists & Metallurgists
- Technical Managers & Production Supervisors

Course Modules

Module 1: Fundamentals of Surface Engineering

- Surface energy, roughness, and morphology
- Material surface interaction principles

- Introduction to coating systems
- Surface modification techniques overview
- Industrial applications overview
- **Case Study:** Failure of turbine blades due to poor surface finish and corrective engineering solutions

Module 2: Tribology and Wear Mechanisms

- Friction, wear, and lubrication principles
- Adhesive, abrasive, and corrosive wear
- Lubrication regimes in machinery
- Wear testing methods
- Performance optimization strategies
- **Case Study:** Wear failure in automotive engine components and tribological improvement

Module 3: Corrosion Engineering & Protection

- Electrochemical corrosion mechanisms
- Corrosion-resistant coatings
- Cathodic protection systems
- Environmental degradation factors
- Testing and evaluation methods
- **Case Study:** Pipeline corrosion failure in oil & gas sector and mitigation strategy

Module 4: Physical Vapor Deposition (PVD) & Chemical Vapor Deposition (CVD)

- PVD and CVD principles
- Thin film deposition techniques
- Vacuum systems and process control
- Coating adhesion mechanisms
- Industrial applications
- **Case Study:** Cutting tool performance enhancement using TiN coating

Module 5: Thermal Spray Coating Technologies

- Flame spraying, plasma spraying, HVOF
- Coating materials and selection
- Surface preparation techniques
- Bond strength optimization
- Industrial repair applications
- **Case Study:** Restoration of worn turbine components using thermal spray coating

Module 6: Electroplating & Anodizing Processes

- Electrochemical deposition principles
- Hard chrome and nickel plating
- Aluminum anodizing techniques
- Bath chemistry control
- Defect analysis and troubleshooting
- **Case Study:** Corrosion failure in marine components and electroplating solution

Module 7: Nano-Coatings & Smart Surfaces

- Nanotechnology in surface engineering
- Self-healing coatings
- Hydrophobic and anti-fouling surfaces
- Functional smart coatings
- Emerging material innovations
- **Case Study:** Self-cleaning glass technology in architectural applications

Module 8: Surface Characterization & Quality Control

- SEM, TEM, XRD analysis techniques
- Surface hardness and roughness testing
- Adhesion and durability testing
- Standards (ASTM, ISO) compliance
- Quality assurance systems
- **Case Study:** Defect analysis in aerospace coating failure using SEM diagnostics

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com