

Volume 5
Surface Engineering

1. Surface Cleaning

Classification and Selection of Cleaning Processes

Alkaline Cleaning

Solvent Cold Cleaning and Vapor Degreasing

Emulsion Cleaning

Molten Salt Bath Cleaning

Ultrasonic Cleaning

Acid Cleaning

Mechanical Cleaning Systems

Pickling and Descaling

2. Finishing Methods

Classification and Selection of Finishing Processes

Finishing Methods Using Defined Cutting Edges

Finishing Methods Using Multipoint or Random Cutting Edges

Nonabrasive Finishing Methods

Mass Finishing

Shot Peening

Topography of Surfaces

Microstructural Analysis of Finished Surfaces

Residual Effects of Finishing Methods

Thermal Aspects of Surface Finishing Processes

Selection, Application, and Disposal of Finishing Fluids

Influence of Work Material Properties on Finishing Methods

3. Plating and Electroplating

Copper Plating

Industrial (Hard) Chromium Plating

Decorative Chromium Plating

Nickel Plating

Iron Plating

Cadmium Plating

Zinc Plating

Indium Plating

Tin Plating

Lead Plating

- Silver Plating
- Gold Plating
- Platinum-Group Metals Plating
- Copper Alloy Plating
- Tin Alloy Plating
- Zinc Alloy Plating
- Nickel Alloy Plating
- Chromium Alloy Plating
- Multiple-Layer Alloy Plating
- Selective (Brush) Plating
- Pulsed-Current Plating
- Electroforming
- Electroless Nickel Plating
- Electroless Copper Plating
- Electroless Gold Plating
- Electroless Alloy Deposition
- Mechanical Plating

4. Dip, Barrier, and Chemical Conversion Coatings

- Surface Preparation for Continuously Applied Coatings
- Continuous Hot Dip Coatings
- Continuous Electrodeposited Coatings for Steel Strip
- Batch Hot Dip Galvanized Coatings
- Babbitting
- Phosphate Coatings
- Chromate Conversion Coatings
- Rust-Preventive Compounds
- Painting
- Elastomeric Coatings for Automotive Plastics
- Porcelain Enameling
- Ceramic Coatings and Linings
- Anodizing

5. Vacuum and Controlled-Atmosphere Coating and Surface Modification Processes

- Thermal Spray Coatings
- Chemical Vapor Deposition of Non semiconductor Materials
- Chemical Vapor Deposition of Semiconductor Materials
- Plasma-Enhanced Chemical Vapor Deposition

Growth and Growth-Related Properties of Films Formed by Physical Vapor Deposition
Vacuum Deposition, Reactive Evaporation, and Gas Evaporation
Sputter Deposition
Ion Plating
Ion-Beam-Assisted Deposition
Arc Deposition
Ion Implantation
Diffusion Coatings
Pulsed-Laser Deposition

6. Testing and Characterization of Coatings and Thin Films

Film Thickness Measurements Using Optical Techniques
Corrosion Testing of Coatings
Evaluation of Mechanical Properties of Thin Films
Stress Determination for Coatings
Testing of Stability and Thermal Properties of Thermal Barrier Coatings
Microstructural Characterization of Coatings and Thin Films
Surface and Interface Analysis of Coatings and Thin Films
Overview of Wear and Erosion Testing of Coatings

7. Surface Engineering of Irons and Steels

Surface Engineering of Cast Irons
Surface Engineering of Carbon and Alloy Steels
Surface Engineering of Stainless Steels
Surface Engineering of Specialty Steels

8. Surface Engineering of Nonferrous Metals

Surface Engineering of Heat-Resistant Alloys
Surface Engineering of Aluminum and Aluminum Alloys
Surface Engineering of Copper and Copper Alloys
Surface Engineering of Magnesium Alloys
Surface Engineering of Titanium and Titanium Alloys
Surface Engineering of Zirconium and Hafnium
Surface Engineering of Refractory Metals and Alloys
Surface Engineering of Nickel and Nickel Alloys
Surface Engineering of Zinc Alloys

9. Surface Engineering of Selected Nonmetallic Materials

Glazes and Enamel Coatings for Ceramics and Glasses

Surface Engineering for Chemical Activity

Protective Coatings for Carbon-Carbon Composites

Plasma Surface Engineering of Plastics

Surface Engineering of Carbide, Cermet, and Ceramic Cutting Tools

10. Environmental Protection Issues

Environmental Regulation of Surface Engineering

Cadmium Elimination in Surface Engineering

Chromium Elimination in Surface Engineering

Vapor Degreasing Alternatives

Compliant Organic Coatings

Compliant Wipe Solvent Cleaners