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Nota di contenuto	Plasma- Spray Coating; Contents; List of Symbols and Abbreviations; 1 Introduction; 1.1 Coatings in the Industrial Environment; 1.2 Surface Coating Techniques; 1.3 Brief History of Thermal Spraying; 1.4 Synergistic Nature of Coatings; 1.5 Applications of Thermally Sprayed Coatings; References; 2 Principles of Thermal Spraying; 2.1 Characterization of Flame versus Plasma Spraying; 2.2 Concept of Energy Transfer Processes; 2.3 Unique Features of the Plasma Spray Process; References; 3 The First Energy Transfer Process: Electron-Gas Interactions; 3.1 The Plasma State 3.1.1 Characteristic Plasma Parameters 3.1.1.1 Langmuir Plasma Frequency; 3.1.1.2 Debye Screening Length; 3.1.1.3 Landau Length; 3.1.1.4 Collision Path Length; 3.1.1.5 Collision Frequency; 3.1.2 Classification of Plasmas; 3.1.2.1 Low Density Plasmas; 3.1.2.2 Medium Density Plasmas; 3.1.2.3 High Density Plasmas; 3.1.3 Equilibrium and Nonequilibrium Plasmas; 3.1.4 Maxwellian Distribution of Plasma Energies; 3.1.5 Equilibrium Compositions of Plasma Gases (Phase Diagrams); 3.2 Plasma Generation; 3.2.1 Plasma Generation through Application of Heat; 3.2.2 Plasma Generation through Compression

3.2.3 Plasma Generation by Radiation; 3.2.4 Plasma Generation by Electric Currents (Gas Discharges); 3.2.4.1 Glow Discharges; 3.2.4.2 Arc Discharges; 3.2.4.3 Modeling of the Arc Column; 3.2.4.4 Structure of the Arc Column; 3.3 Design of Plasmatrons; 3.3.1 Arc Discharge Generators and their Applications; 3.3.1.1 Electrode-supported Plasmas; 3.3.1.2 Electrodeless Plasmas; 3.3.1.3 Hybrid Devices; 3.3.2 Stabilization of Plasma Arcs; 3.3.2.1 Wall-stabilized Arcs; 3.3.2.2 Convection-stabilized Arcs; 3.3.2.3 Electrode-stabilized Arcs; 3.3.2.4 Other Stabilization Methods; 3.3.3 Temperature and Velocity Distribution in a Plasma Jet; 3.3.3.1 Turbulent Jets; 3.3.3.2 Quasi-laminar Jets; 3.4 Plasma Diagnostics: Temperature, Enthalpy, and Velocity Measurements; 3.4.1 Temperature Measurements; 3.4.1.1 Spectroscopic Methods; 3.4.1.2 Two-wavelength Pyrometry; 3.4.2 Velocity Measurements; 3.4.2.1 Enthalpy Probe and Pitot Tube Techniques; 3.4.2.2 Laser Doppler Anemometry (LDA); 3.4.2.3 Other Methods; References; 4 The Second Energy Transfer Process: Plasma-Particle Interactions; 4.1 Injection of Powders; 4.2 Feed Material Characteristics; 4.2.1 Solid Wires, Rods and Filled Wires; 4.2.2 Powders; 4.2.2.1 Atomization; 4.2.2.2 Fusion and Crushing; 4.2.2.3 Compositing; 4.2.2.4 Agglomeration; 4.3 Momentum Transfer; 4.3.1 Connected Energy Transmission; 4.3.2 Modeling of Momentum Transfer; 4.3.3 Estimation of the Drag Coefficient; 4.3.4 Surface Ablation of Particles; 4.4 Heat Transfer; 4.4.1 Heat Transfer under Low Loading Conditions; 4.4.2 Exact Solution of Heat Transfer Equations; 4.4.2.1 Particle Heating without Evaporation; 4.4.2.2 Particle Heating with Evaporation; 4.4.2.3 Evaporation Time of a Particle; 4.4.3 Heat Transfer under Dense Loading Conditions

Sommario/riassunto

Over the past two decades, thermal spraying of metallic, ceramic and composite coatings has emerged as a powerful tool for surface engineering, with many new applications and markets continually being developed. This book will help materials scientists and engineers to choose the most appropriate combination of materials, equipment, and operation parameters for the design of high-performance coatings with new functional properties and improved service life. Includes: \* a thorough treatment of the fundamental physical processes governing plasma spray technology; \* a critica