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Nota di contenuto	Oxide Scale Behaviour in High Temperature Metal Processing; Contents; Preface; 1: Introduction; 2: A Pivotal Role of Secondary Oxide Scale During Hot Rolling and for Subsequent Product Quality; 2.1 Friction; 2.2 Heat Transfer; 2.3 Thermal Evolution in Hot Rolling; 2.4 Secondary Scale-Related Defects; References; 3: Scale Growth and Formation of Subsurface Layers; 3.1 High-Temperature Oxidation of Steel; 3.2 Short-Time Oxidation of Steel; 3.3 Scale Growth at Continuous Cooling; 3.4 Plastic Deformation of Oxide Scales; 3.5 Formation and Structure of the Subsurface Layer in Aluminum Rolling References4: Methodology Applied for Numerical Characterization of Oxide Scale in Thermomechanical Processing; 4.1 Combination of Experiments and Computer Modeling: A Key for Scale Characterization; 4.2 Prediction of Mild Steel Oxide Failure at Entry Into the Roll Gap as an Example of the Numerical Characterization of the Secondary Scale Behavior; 4.2.1 Evaluation of Strains Ahead of Entry into the Roll Gap; 4.2.2 The Tensile Failure of Oxide Scale Under Hot Rolling Conditions;

4.2.3 Prediction of Steel Oxide Failure During Tensile Testing
4.2.4 Prediction of Scale Failure at Entry into the Roll Gap4.2.5 Verification Using Stalled Hot Rolling Testing; References; 5: Making Measurements of Oxide Scale Behavior Under Hot Working Conditions; 5.1 Laboratory Rolling Experiments; 5.2 Multipass Laboratory Rolling Testing; 5.3 Hot Tensile Testing; 5.4 Hot Plane Strain Compression Testing; 5.5 Hot Four-Point Bend Testing; 5.6 Hot Tension Compression Testing; 5.7 Bend Testing at the Room Temperature; References; 6: Numerical Interpretation of Test Results: A Way Toward Determining the Most Critical Parameters of Oxide Scale Behavior
6.1 Numerical Interpretation of Modified Hot Tensile Testing6.2 Numerical Interpretation of Plane Strain Compression Testing; 6.3 Numerical Interpretation of Hot Four-Point Bend Testing; 6.4 Numerical Interpretation of Hot Tension-Compression Testing; 6.5 Numerical Interpretation of Bend Testing at Room Temperature; References; 7: Physically Based Finite Element Model of the Oxide Scale: Assumptions, Numerical Techniques, Examples of Prediction; 7.1 Multilevel Analysis; 7.2 Fracture, Ductile Behavior, and Sliding; 7.3 Delamination, Multilayer Scale, Scale on Roll, and Multipass Rolling
7.4 Combined Discrete/Finite Element ApproachReferences; 8: Understanding and Predicting Microevents Related to Scale Behavior and Formation of Subsurface Layers; 8.1 Surface Scale Evolution in the Hot Rolling of Steel; 8.2 Crack Development in Steel Oxide Scale Under Hot Compression; 8.3 Oxide Scale Behavior and Composition Effects; 8.4 Surface Finish in the Hot Rolling of Low-Carbon Steel; 8.5 Analysis of Mechanical Descaling: Low-Carbon and Stainless Steel; 8.6 Evaluation of Interfacial Heat Transfer During Hot Steel Rolling Assuming Scale Failure Effects
8.7 Scale Surface Roughness in Hot Rolling

Sommario/riassunto

The result of a fruitful, on-going collaboration between academia and industry, this book reviews recent advances in research on oxide scale behavior in high-temperature forming processes. Presenting novel, previously neglected approaches, the authors emphasize the pivotal role of reproducible experiments to elucidate the oxide scale properties and develop quantitative models with predictive accuracy. Each chapter consists of a detailed, systematic examination of different aspects of oxide scale formation with immediate impact for researchers and developers in industry. The clear and strin