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Mechanism; 2.5.2.1 Gibbsian Segregation; 2.5.2.2 Grain Boundary Sweeping; 2.5.2.3 Pipeline Diffusion; 2.5.2.4 Grain Boundary Wetting 2.5.3 Examples of PMZ formation 2.6 Heat Affected Zone (HAZ); 2.6.1 Recrystallization and Grain Growth; 2.6.2 Allotropic Phase Transformations; 2.6.3 Precipitation Reactions; 2.6.4 Examples of HAZ Microstructure; 2.7 Solid-State Welding; 2.7.1 Friction Stir Welding; 2.7.2 Diffusion Welding; 2.7.3 Explosion Welding; 2.7.4 Ultrasonic Welding; References; Chapter 3 Hot Cracking; 3.1 Introduction; 3.2 Weld Solidification Cracking; 3.2.1 Theories of Weld Solidification Cracking; 3.2.1.1 Shrinkage-Brittleness Theory; 3.2.1.2 Strain Theory; 3.2.1.3 Generalized Theory 3.2.1.4 Modified Generalized Theory 3.2.1.5 Technological Strength Theory; 3.2.1.6 Commentary on Solidification Cracking Theories; 3.2.2 Predictions of Elemental Effects; 3.2.3 The BTR and Solidification Cracking Temperature Range; 3.2.4 Factors that Influence Weld Solidification Cracking; 3.2.4.1 Composition Control; 3.2.4.2 Grain Boundary Liquid Films; 3.2.4.3 Effect of Restraint; 3.2.5 Identifying Weld Solidification Cracking; 3.2.6 Preventing Weld Solidification Cracking; 3.3 Liquefaction Cracking; 3.3.1 HAZ Liquefaction Cracking; 3.3.2 Weld Metal Liquefaction Cracking 3.3.3 Variables that Influence Susceptibility to Liquefaction Cracking 3.3.1 Composition; 3.3.3.2 Grain Size; 3.3.3.3 Base Metal Heat Treatment; 3.3.3.4 Weld Heat Input and Filler Metal Selection; 3.3.4 Identifying HAZ and Weld Metal Liquefaction Cracks; 3.3.5 Preventing Liquefaction Cracking; References; Chapter 4 Solid-State Cracking; 4.1 Introduction; 4.2 Ductility-Dip Cracking; 4.2.1 Proposed Mechanisms; 4.2.2 Summary of Factors That Influence DDC; 4.2.3 Quantifying Ductility-Dip Cracking; 4.2.4 Identifying Ductility-Dip Cracks; 4.2.5 Preventing DDC; 4.3 Reheat Cracking 4.3.1 Reheat Cracking in Low-Alloy Steels

Sommario/riassunto

"This book describes the weldability aspects of many structural materials used in a wide variety of engineering structures, including steels, stainless steels, Ni-base alloys, and Al-base alloys. The basic mechanisms of weldability are described and methods to improve weldability are described. Specific topics include solidification and liquation cracking, solid-state cracking, hydrogen cracking, fracture and fatigue, and corrosion. Methods for interpretation of weld failures using computational and characterization techniques are described"--
"Book deals with a wide range of materials and weldability issues"--
