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Precipitation; 3.4 Hot and Cold Rolling; 3.4.1 Flow Stress Modeling
3.4.2 Texture Simulation3.4.3 Recrystallization; 3.5 Cup Drawing; 3.5.1 Anisotropy Update; 3.5.2 Results; 3.6 Conclusions and Outlook; References; 4 From Casting to Product Properties: Modeling the Process Chain of Steels (TP C7); Abstract; 4.1 Introduction; 4.2 Continuous Casting Simulation; 4.3 Hot Rolling Simulation; 4.4 Simulation of Phase Transformation; 4.4.1 Physical Modeling of Isothermal Proeutectoid Ferrite Transformation; 4.4.2 Semiempirical Modeling of Phase Transformation; 4.5 Simulation of Mechanical Properties; 4.6 Welding Simulation; 4.7 Application; 4.8 Summary; References
5 Status of Through-Process Simulation for Coated Gas Turbine Components (TP C8)Abstract; 5.1 Introduction; 5.2 Solidification and Heat Treatment of the Nickel-Based Superalloy; 5.3 CVD Processing of an Alumina Interdiffusion Barrier; 5.4 Magnetron Sputter Process of NiCoCrAlY Corrosion-Protective Coating; 5.5 Atmospheric Plasma Spraying of Ceramic TBC; 5.6 Stress Response and Crack Formation at the Bond Coat/TBC Interface During Cyclic Thermal Loading; 5.7 Conclusions; References; 6 Deformation Behavior of a Plastics Pipe Fitting (TP C9); Abstract; 6.1 Introduction; 6.2 Aims and Procedure
6.3 Calculation of Local Inner Part Properties Using Extended Process Simulation6.3.1 Developed Software; 6.3.2 Temperature Field Calculation; 6.3.3 Calculation of Inner Properties; 6.3.4 Procedure of Simulating Inner Properties; 6.4 Integration of Inner Properties into Structural Analysis; 6.5 Conclusions and Perspectives; References; 7 Modeling of Flow Processes During Solidification (TP A1); Abstract; 7.1 Introduction; 7.1.1 Aluminum Cup; 7.1.2 Plastics Pipe Fitting; 7.1.3 Steel Profile; 7.2 Software Development; 7.2.1 Aluminum Cup; 7.2.2 Plastics Pipe Fitting; 7.2.3 Steel Profile
7.3 Experiments and Results

Sommario/riassunto

Adopting a holistic approach to materials simulation, this monograph covers four very important structural materials: aluminum, carbon steels, superalloys, and plastics. Following an introduction to the concept of integral modeling, the book goes on to cover a wide range of production steps and usage, including melt flow and solidification behavior, coating, shaping, thermal treatment, deep drawing, hardness and ductility, damage initiation, and deformation behavior.