Preface

The dynamic development of mechanical engineering and the construction industry relies on a deep understanding of the properties and behaviour of structural materials, as well as the advancement of their processing methods, taking into account the environmental load factor at all stages. This special edition features an overview of studies that span the analysis properties of structural materials and innovative technologies of their synthesis, processing and methods of effective application in machinery and construction.

Chapter 1: Properties and Treatment of Steel and Alloys examines the physical and mechanical properties of structural metallic materials, as well as various technological processes involved in their treatment. The research presented here highlights advances in steel and alloy design, processing optimisation, and the control of microstructural evolution to achieve superior strength and durability.

Chapter 2: Friction Stir Processing focuses on a solid-state modification technique that enhances the microstructure and properties of aluminium-based alloys and metal matrix composites without melting. The chapter discusses the fundamental mechanisms of aluminium alloy friction stir processing and its growing importance in the production of high-performance components.

Chapter 3: Building Materials examines the traditional and modern materials used in construction, with a focus on their mechanical and environmental performance, which are crucial in achieving sustainability in construction.

The special edition provides valuable insights for researchers, engineers, and practitioners involved in developing stronger and more efficient structural materials and sustainable technologies for treatment.

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