

# Preface

This special edition focuses on materials engineering topics central to mechanical engineering and is dedicated to analysing the behaviour of structural materials, their processing methods, tribological properties, and the use of computational procedures for designing fluid systems.

Chapter 1: Properties and Processing Technologies of Steel and Alloys.

This chapter explores the applied aspects of steel and alloy development and processing, including microstructural and mechanical characteristics analysis. The part covers advanced high-performance processing techniques with wide applications in construction and machinery.

Chapter 2: Mechanics of Materials and Tribology.

The second chapter is devoted to the results of the investigation of the mechanical behaviour of materials under various loading conditions. In addition, the tribology section focuses on surface interactions - friction, wear, etc.- that are critical for component longevity in machine design. Integrating mechanics of materials and tribology gives insights into material selection and design optimisation in real-world engineering systems.

Chapter 3: Fluid Mechanics.

The final chapter presents examples of applications of fluid mechanics computational procedures in engineering analysis and design of fluid systems. Topics include fluid statics and dynamics, continuity and momentum equations, laminar and turbulent flow, and boundary layer theory. Practical examples are provided in the context of engineering systems such as pipelines, turbines, pumps, and aerodynamic structures.

This edition aims to equip readers with a well-rounded understanding of the nature of some key engineering solutions and principles driving innovation across multiple sectors of modern industry.