

# Discover the Fascinating World of Mechanical Properties and Working of Metals and Alloys with Springer in Materials

Metals and alloys have been integral to human civilization for centuries. From the Bronze Age to the space age, these materials have played a crucial role in shaping our society and advancing technology. Understanding the mechanical properties and working of metals and alloys is essential for engineers, scientists, and researchers in various fields. Springer in Materials offers a treasure trove of knowledge on this subject, providing a wealth of valuable insights.

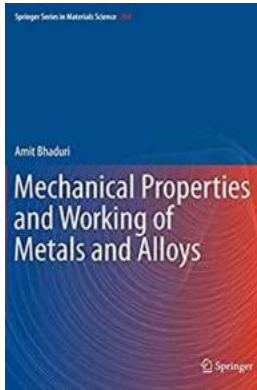
## What are Mechanical Properties?

Before diving into the applications of metals and alloys, it's important to grasp the concept of mechanical properties. Essentially, these properties define how materials respond to external forces, such as tension, compression, or bending. The study of mechanical properties focuses on characteristics like strength, toughness, ductility, hardness, and elasticity.

## The Significance of Mechanical Properties in Metals and Alloys

Mechanical properties play a pivotal role in determining the suitability of metals and alloys for specific applications. For example, high-strength metals are preferred in aerospace engineering to withstand extreme conditions, while ductile metals find use in forming processes. By studying and manipulating these properties, researchers can optimize materials for desired applications.

**Mechanical Properties and Working of Metals and Alloys (Springer Series in Materials Science Book 264)** by Amit Bhaduri (1st ed. 2018 Edition, Kindle Edition)



★★★★★ 5 out of 5

Language : English  
File size : 193130 KB  
Text-to-Speech : Enabled  
Screen Reader : Supported  
Enhanced typesetting : Enabled  
Word Wise : Enabled  
Print length : 759 pages  
Hardcover : 232 pages  
Reading age : 22 years and up  
Item Weight : 1.11 pounds  
Dimensions : 6.14 x 0.56 x 9.21 inches  
X-Ray for textbooks : Enabled



## Diving Deeper into Mechanical Properties

To gain a comprehensive understanding of the mechanical properties of metals and alloys, it's important to explore various aspects. Springer in Materials offers a range of resources covering topics like tensile strength, yield strength, hardness measurements, impact resistance, corrosion resistance, fatigue properties, and creep behavior. By delving into these subjects, professionals can make informed decisions regarding material selection and design.

## Working of Metals and Alloys

Metals and alloys undergo various processes to transform them into usable forms. These processes include casting, forming, machining, joining, and heat treatment. Each technique has its own complexities and considerations, depending on the material's mechanical properties and desired final product. Springer in Materials provides invaluable resources on these processes, discussing the principles, techniques, and challenges associated with them.

## **Real-World Applications**

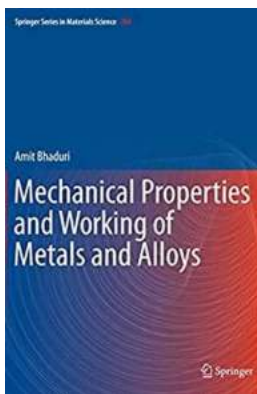
Metals and alloys find applications in diverse industries, from construction and automotive to aerospace and medical. Springer in Materials showcases real-world case studies and research papers, highlighting the practical applications of these materials. Whether you're interested in the development of lightweight alloys for vehicles or the impact of corrosion on structural materials, you'll find an abundance of insightful content.

## **Why Choose Springer in Materials?**

Springer in Materials stands out as a comprehensive and trusted resource for professionals delving into the world of mechanical properties and working of metals and alloys. Here's why it's a top choice:

1. **Expert Authors:** The publications offered by Springer in Materials are authored by renowned experts in the field, ensuring the accuracy and reliability of the content.
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5. **Constantly Updated:** Springer in Materials regularly publishes new research and insights, keeping professionals abreast of the latest developments in this field.

Metals and alloys have revolutionized countless industries, and understanding their mechanical properties and working is crucial for professionals in the field. Springer in Materials offers a vast collection of resources, covering a wide range of topics related to this subject. From learning about mechanical properties to exploring the real-world applications, Springer in Materials provides an invaluable platform to enhance knowledge and stay updated with the latest developments. Embrace the opportunity to delve into this fascinating world and unlock new possibilities in materials engineering.



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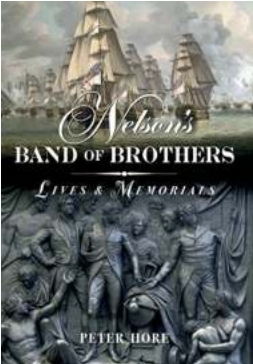
This book is intended to serve as core text or handy reference on two key areas of metallic materials: (i) mechanical behavior and properties evaluated by mechanical testing; and (ii) different types of metal working or forming operations to produce useful shapes. The book consists of 16 chapters which are divided

into two parts. The first part contains nine chapters which describe tension (including elastic stress – strain relation, relevant theory of plasticity, and strengthening methods), compression, hardness, bending, torsion – pure shear, impact loading, creep and stress rupture, fatigue, and fracture. The second part is composed of seven chapters and covers fundamentals of mechanical working, forging, rolling, extrusion, drawing of flat strip, round bar, and tube, deep drawing, and high-energy rate forming. The book comprises an exhaustive description of mechanical properties evaluated by testing of metals and metal working in sufficient depth and with reasonably wide coverage. The book is written in an easy-to-understand manner and includes many solved problems. More than 150 numerical problems and many multiple choice questions as exercise along with their answers have also been provided. The mathematical analyses are well elaborated without skipping any intermediate steps. Slab method of analysis or free-body equilibrium approach is used for the analytical treatment of mechanical working processes. For hot working processes, different frictional conditions (sliding, sticking and mixed sticking–sliding) have been considered to estimate the deformation loads. In addition to the slab method of analysis, this book also contains slip-line field theory, its application to the static system, and the steady state motion. Further, this book includes upper-bound theorem, and upper-bound solutions for indentation, compression, extrusion and strip drawing. The book can be used to teach graduate and undergraduate courses offered to students of mechanical, aerospace, production, manufacturing and metallurgical engineering disciplines. The book can also be used for metallurgists and practicing engineers in industry and development courses in the metallurgy and metallic manufacturing industries.



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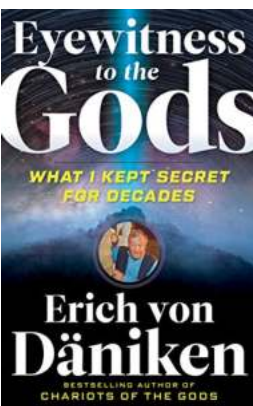
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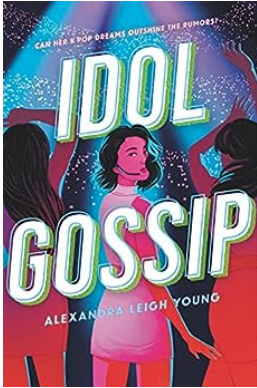
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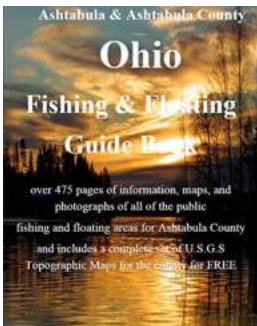
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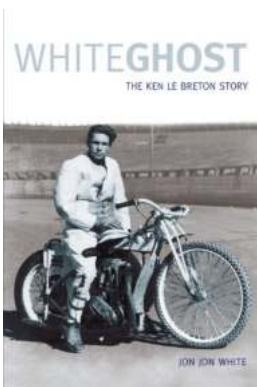
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