

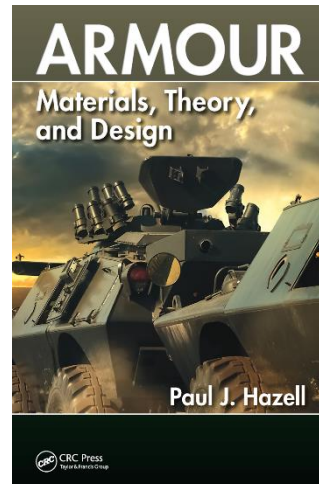
Armour: Materials, Theory, and Design

Paul J. Hazell

The book deals with several topics of armour protection. Author Paul J. Hazell is a Professor of Impact Dynamics at UNSW Australia. He has professional experience from Australian Defence Force Academy in Canberra. Prior to this, he had worked for Cranfield University at Shrivenham, UK. His main research interests are in the subjects of shock loading, penetration mechanics and lightweight armour optimisation.

Main topics of *Armour: Materials, Theory, and Design* are materials and structures for protection against blast and ballistic threat. This book explains the theory, applications, and material science aspects of modern armour design as they are used in relation to vehicles, ships, personnel, and buildings, and explores the science and technology used to provide protection against blasts and ballistic attacks. It covers materials technologies used in protection, addresses the system effects of adding blast-wave shaping to vehicles, as well as the effect on the human body, and outlines ballistic testing techniques.

This book examines different areas of the advanced threat and armour protection in the light of new development and gives a lot of examples of the increases in performance possible to expect.



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Subject:
Materials engineering
Armour systems

The book covers following fields:

Introduction. Survivability, Basic Concepts, the Disposition of Armour, Early Applications, Empirical Models of Penetration.

Materials. Structure of Materials, Stress and Strain, Elasticity, Strength, Hardness, Dynamic Behaviour of Materials, Material Testing.

Threat: Bullets, Blast, Jets and Fragments. Small-Arms Ammunition, Higher-Calibre KE Rounds, Explosive Materials, Shaped-Charge, Explosively Formed Projectiles, High-Explosive Squash Head, Fragments.

Penetration Mechanics. Failure Mechanisms, Penetration Analysis, Hydrodynamic Penetration, Computational Approaches.

Stress Waves. Elastic and Inelastic Waves, Shock Waves, Rankine-Hugoniot Equations.

Metallic Armour Materials and Structures. Properties and Processing, Materials, Sandwich Structures.

Ceramic Armour. Structure of Armour Ceramics, Processing of Ceramics, Properties of Ceramic, Early Studies on Ceramic Armour, Cone Formation, High-Velocity Impact, Dwell, Shock Studies in Ceramic Materials, Modelling Ceramic Impact, Current Application and Challenges, Comparing with Other Materials, Improving Performance, Transparent Armour Materials.

Woven Fabrics and Composite Laminates for Armour Applications. Manufacturing Processes of Composite Laminates, Fibrous Materials, Spall Shields, Sandwich Constructions.

Reactive Armour Systems. Explosive-Reactive Armour, Bulging Armour, Electric and Electromagnetic Developments.

Active Armour Systems. Hard-Kill DASs against SC Warheads and Long-Rod Penetrators.

Human Vulnerability. Human Response to Ballistic Loading, Human Response to Blast Loading, Limiting Blast Mine Injury to Vehicle Occupants.

Blast and Ballistic Testing Techniques. Ballistic Testing Techniques, Blast and Fragmentation Testing.

The book describes the existing and emerging protection technologies that are currently driving the latest advances in armour systems.

One of the most important aspects of current and future armour development is the improvement of the materials which are the basic constituents of armour system. Improved materials and their combination are indispensable to achieve armour systems which are affordable and resilient, besides being lightweight. The book gives an overview of materials relevant to armour.

This book contains information obtained from authentic and highly regarded sources. Reasonable efforts have been made to publish reliable data and information. In addition, the author lists more than 100 references for advanced study and further reading.

The unique book is a great contribution for the armour community, as well as for students and military public.

Stanislav Rolc