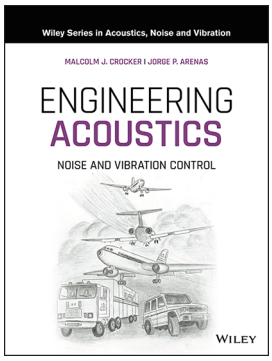
Acta Acustica 2024, **8**, 31
© The Author(s), Published by EDP Sciences, 2024
https://doi.org/10.1051/aacus/2024033

Available online at:
https://acta-acustica.edpsciences.org

BOOK REVIEW OPEN ACCESS

Book review on "Engineering acoustics: noise and vibration control" by Malcolm J. Crocker and Jorge P. Arenas



Engineering Acoustics: Noise and Vibration Control
Malcolm J. Crocker, Jorge P. Arenas
ISBN: 978-1-118-49642-8
8 January 2021
784 Pages

'Engineering Acoustics: Noise and Vibration Control' aims to provide the reader with background theory and understanding that can be applied to solve engineering problems concerning sound and vibration. On this topic, the authors, Malcolm Crocker and Jorge Arenas, have considerable experience in academic research, industrial applications, teaching and consultancy.

The style of writing is clear, accessible, and straightforward, making it suitable to students that are relatively new to the field of sound and vibration with a thorough glossary of acoustic terminology included at the back of the book. Whilst the focus is clearly on engineering, where appropriate, the text refers to the historical origins of the physics and its terminology to help the reader delve deeper into the literature. Short, worked examples are embedded within the text of each chapter. These have been designed to test the application of theory, check understanding and to introduce real-world applications of noise and vibration control. Engineers will appreciate the fact that most theory is not introduced in a dry manner; next to the equations the reader will find many useful comments that give insights into the solutions to engineering problems. As a reference work, the navigation of this large textbook (approximately 760 pages) is made easier by the headers on open pages indicating the section heading as well as the chapter heading.

The first two chapters guide the reader through the fundamental physics relating to sound and vibration followed by chapter three that describes sources of sound and their propagation in interior and exterior spaces. Chapters four and five concern human response to sound and vibration in terms of perception and adverse effects with chapter six describing the parameters and criteria that are used to evaluate and assess human response. Chapter seven then describes commonly used measurement equipment and signal analysis. Having covered the fundamentals, the later chapters focus on specific aspects of noise and vibration control with more detailed and complex theory alongside reviews of research developments over time. The authors note that chapters eight, ten, twelve and thirteen have been expanded because of their importance and the authors' expertise in these areas. Chapter eight is devoted to the measurement of sound intensity and its use to quantify sound power. For some practitioners, sound intensity is less well-known and whilst the technique offers significant insights into the ranking of different sources and quantifying transmission loss, the interpretation requires additional knowledge. Due to its relatively complex nature, this chapter starts with historical developments on intensity probes used for research, then discusses the commercial probes that are available and moves on to focus on applications in machinery, buildings, and transportation. Chapter nine introduces overarching principles of noise and vibration control which provides the background information referred to in later chapters on specific applications relating to buildings, machinery, and transportation. An introduction is given to vibration isolators, inertia blocks, damping materials and acoustic enclosures for machinery, sound absorption for interior spaces, noise barriers for interior and exterior noise control, as well as active noise and vibration control for industrial and transportation applications. Chapter ten gives an in-depth review of developments in the modelling of the acoustic performance of reactive and dissipative mufflers (silencers) over several decades that are relevant to automotive exhausts, ducts, and other industrial applications. Many figures are included to illustrate key aspects that are critical in their design and to highlight differences between different approaches to modelling. Chapter eleven concerns noise and vibration control of machinery and for those working on industrial acoustics gives an overview of the underlying

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

physics alongside the equations that describe common noise sources such as gears, bearings, fans, industrial processes (such as metal cutting and woodworking), internal combustion engines, electrical motors, compressors, pumps and noise due to fluid flow. Chapter twelve concerns building acoustics. This introduces Statistical Energy Analysis (SEA) theory as applied to the prediction of sound transmission across single and double walls as well as enclosures. Airborne and impact sound insulation are then discussed in more general terms suited to consultancy with reference to both ASTM and ISO standards. A novel addition at the end of the chapter is a brief overview on the vibration of buildings due to wind. Chapter thirteen describes HVAC systems and provides an excellent primer for those entering acoustic consultancy in its coverage of fan noise, vibration isolation and most aspects of ventilation and duct systems. Chapter fourteen discusses interior and exterior noise from surface transportation (automotive, trains/trams and ships) indicating sources of noise and vibration and their control. This also makes brief reference to noise from electric cars. Chapter fifteen briefly covers interior and exterior noise from aircraft as well as noise from airports. Rather than include detailed theory, the latter two chapters provide an overview of noise sources and their control that would serve as introductory modules to noise and vibration in mechanical engineering undergraduate courses. The book concludes with chapter sixteen on community noise that discusses other aspects of road, rail, and airport noise.

Many references are given to further information in the Handbook of Acoustics, the Encyclopedia of Acoustics and the Handbook of Noise and Vibration Control that are edited by the first author along with authored chapters. Considering that these reference books are at least twice as long as this book, many undergraduate students in engineering are likely to find that this book satisfies their needs as a general reference, whereas postgraduate students are likely to follow the links to the more detailed texts. Whilst much of the fundamental theory in early chapters can be found in a variety of other textbooks, its inclusion has allowed the authors to make clear links from theory into industrial practice within a single volume. This book will be a valuable addition to the shelves of undergraduate and postgraduate students that will serve them well as a primer for a range of applications in mechanical and acoustic engineering if they choose a career involving noise and vibration control.

Prof. Carl Hopkins

Cite this article as: Hopkins C. 2024. Engineering Acoustics: Noise and Vibration Control. Acta Acustica, **8**, 31.