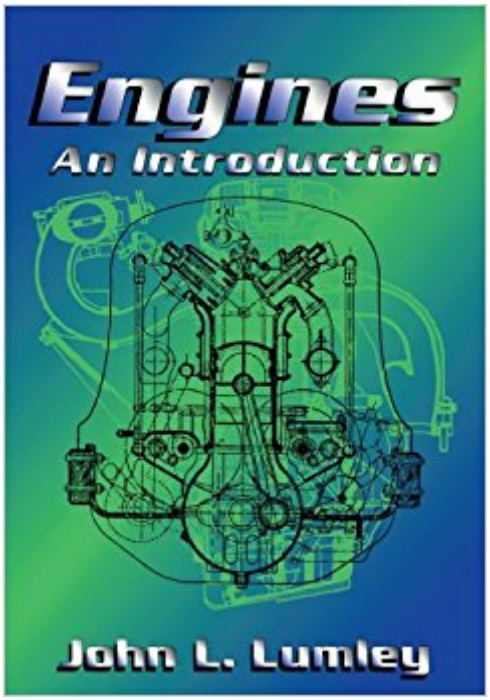
Engines: An Introduction



Synopsis

The internal combustion engine that powers the modern automobile has changed very little from its initial design of some eighty years ago. Unlike many high tech advances, engine design still depends on an understanding of basic fluid mechanics and thermodynamics. This text offers a fresh approach to the study of engines, with an emphasis on design and on fluid dynamics. Professor Lumley, a renowned fluid dynamicist, provides a lucid explanation of how air and fuel are mixed, how they get into the engine, what happens to them there, and how they get out again. Particular attention is given to the complex issue of pollution. Every chapter includes numerous illustrations and examples and concludes with homework problems. Examples are taken from the early days of engine design, as well as the latest designs, such as stratified charge gasoline direct injection engines. It is intended that the text be used in conjunction with the Stanford Engine Simulation Program (ESP). This user-friendly, interactive software tool answers a significant need not addressed by other texts on engines. Aimed at undergraduate and first-year graduate students, the book will also appeal to hobbyists and car buffs who will appreciate the wealth of illustrations of classic, racing, and modern engines.

Book Information

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Customer Reviews

This book makes me wish there were a six star or that I'd never given a 5 star to any other product. Lumley goes into very good detail about how to calculate various aspects of engine performance. Then he gives simpler rules of thumb one can use instead. He'll commonly show how those rules of

thumb compare to that empirical data both noting how well they compare but then show where they fall short.This book seems as if it might belong in a sophmore class for engineers pursuing a degree related to automobile engine design or in an upper division class for engineers pursuing other lines of work. Just a superb book. I've flags marking equations on about every other page. His writing is clear, concise and simple. An example of the simple language which does not become simplistic is:"When the flow velocity through an orifice reaches the local speed of sound, a change in the pressure downstream of the orifice can no longer be communicated to the flow upstream of the orifice."I suspect that even graduate engine designers could use the equations in Lumley's book for estimation of performance. A designer of intake ports, for example, might use such empirical rules of an engine's "breathing" in order to sketch characteristics only turning to more detailed calculations and simulations when certain that a design fell within realistic bounds.As a software engineer I find this book invaluable in creating the sort of basic simulation which is close enough without cutting corners too much. A simple example is the fact that the speed of sound only rises 1 meter/second from 0% to 100% humidity while a change in temperature has a broader range of change. To reduce the complexity of the calculations, he removes the consideration of of humidity.

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