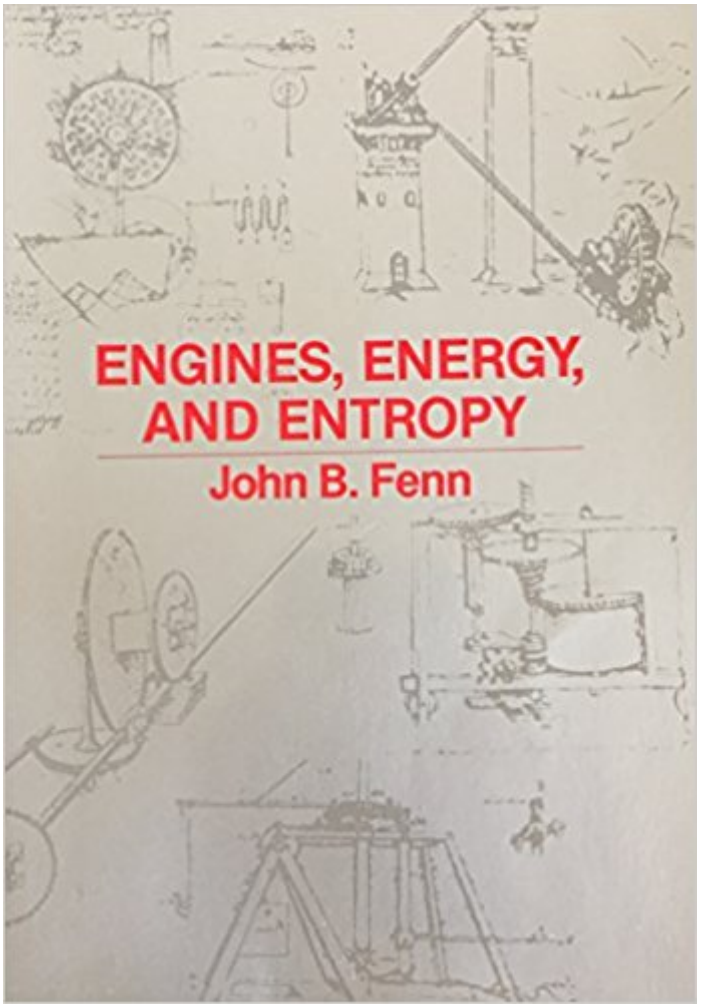
Engines, Energy And Entropy: A Thermodynamics Primer



Synopsis

In Engines, Energy, and Entropy, John Fenn engagingly explores the subject of thermodynamics by drawing on the reader s everyday experience. He lucidly explains the laws of thermodynamics, examines their origins, their meaning, and their application to familiar situations. His wry presentation includes frequent insights into the history of the subject, and a whimsical character named Charlie the Caveman as an early Everyman, highlighting the applications of the laws. End-of-chapter exercises permit readers to test their comprehension of the material. --This text refers to an alternate Paperback edition.

Book Information

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Customer Reviews

Having made several attempts to understand thermo, ever since first struggling to grasp its concepts in college as an engineering student, and later returning to re-read the college texts as well as Zemansky’s Heat and Thermodynamics and Enrico Fermi’s remarkable monograph on the subject, I can write that John Fenn has indeed, for me, composed a lucid and fundamental exposition of the subject. I only regret that he continues the tradition of discussing the Carnot cycle in its historical and conventional (and wholly impractical) abstraction, composed of two isothermal and two adiabatic transformations when a truly practical example is available in the Stirling cycle, which, along with the Ericsson cycle, being completely reversible, is also a Carnot cycle. Moreover, contemporary machinery operating on the Stirling cycle can (and has) been built and remains available as commercial working models. Engines based both on the Stirling and Ericsson cycle

were in common use at one time pumping well water. Now, while an enduring subject of interest to technologists despite its poor power to weight ratio compared to the (irreversible and non-Carnot) internal combustion engines, Stirling cycle machines can be operated both as an engine and as a refrigerator and therefore serve as a truly realistic embodiment of the heat transfer-to-work/work-to-heat transfer machine upon which a large part of thermodynamics is predicated. An example of a heat reversible machine that can actually be built and run lends much credence to a presentation for those readers, such as this one, always seeking an eminently practical example of an otherwise hypothetical concept. Fenn does discuss heat pumps, a subject not commonly treated in introductory texts and provides a simple analysis that uncovers, even better than the discussion of engines, the magic of combining work with thermal transfer.Very much to his credit, Professor Fenn does mention in his historical asides that the development of engines (and, for that matter, machinery in general) proceeded without the benefit of much or any theoretical understanding of physics and that the theory of thermodynamics congealed well after inventors Newcomen, Watt, Carnot, Stirling, Ericsson, Otto and Diesel had all left their considerable marks on the material world - an unusual and welcome perspective for engineering readers from an exceptional educator. The discussion also includes the global implications of energy consumption, its actual (1981) values and comparisons with that provided by the Sun. The treatment of entropy, probably the most difficult concept to understand for many students, is the best this reader has encountered.A general caution here, however. Despite the jacket disclaimers, this book is not for the technically uneducated reader. Its understanding requires a knowledge of algebra and at least a pretty good grasp of high school physics. The author, himself, states that the book can be used as one semester college engineering course in thermo, a recommendation with which this reader enthusiastically agrees. Some knowledge of chemistry and appreciation of technology in general is also helpful. And although Professor Fenn makes gallant and successful attempts to pilot through mathematical obstacles in some computations using only algebra, knowledge of college level calculus is of substantial assistance to the reader at many salient points.

This book combines an historic view of the development of thermodynamics along with its mathematical derivation from first principles; it is quite good. I have returned to the subject many years after my undergraduate course in the subject; this course was an abysmal failure on the part of the professor - whose form of instruction consisted of talking and the occasional scribble (literally) on the board during an hour long lecture. What was clearly absent from the course was a description of the concepts from first principles along with an attempt to impart intuition of the

subject (a common failing in courses taught by engineers). This book largely achieves these results.I can easily recommend it to someone who has a good grasp of basic mechanics, chemistry and calculus. As some of the other reviewers have indicated, it is not a book that will impart a deep understanding to a social-science or arts major. This class of student may, however, find some insight into the subject so long as he or she is willing to take large sections of the book (i.e. the derivations) for granted. I found myself occasionally forced to do this through some of the derivations which became very mathematically abstract at times (especially with respect to entropy). I am willing to assume that this is a necessary evil. Fortunately these more abstract derivations are ultimately solidified with deep intuition (e.g. entropy is the "depreciation" of work).This is a good book - well worth the modest price.

Renewing old friends from college.These old truisms are still true:You get nothing for nothing, and thewhole damn world wants to fall apart,except for those forces keeping it together.IT'S CALLED GOD.

Thermodynamics is generally perceived as a nightmare by most technical students. Yet, the importance of this discipline cannot be underestimated as it provides a solid foundation upon which the concept of energy can be clearly understood, explained, and put into practicalities.Since I haven't previously had a formal training in mechanical engineering or related fields, I had to teach myself thermodynamics in order to be able to model dynamic of complex systems which constitutes part of my PhD work and this makes me struggling for some years.I firstly started with the work of Dr. Morton Mott-Smith (1964) titled "The Concept of Energy Simply Explained" in which, I think, is an excellent primer! I bought Prof. Fenn's book later when I have already had an adequate proficiency in this field. Yet, I still find this work enjoyable to read.This book is specifically tailored for non-technical readers with minimal skills in Mathematics. Hence, most key concepts are presented descriptively rather than quantitatively. This makes this volume highly readable especially for non-technical readers.Another point that worths mentioning is Prof. Fenn's creative use of 'Charlie' as a charactor to represent the basic human's experiences in every day life on heat and energy in relation with thermodynamics which can generate sufficient humour to overcome technicality and boost understanding on serious topics.Whoever you are, and regardless of your academic backgrounds, if you want to explore thermodynamics in a friendly fashion, this is an ideal book to start!Doy Sundarasaradula, PhDMay 8, 2009

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