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This book presents a newly developed general conceptual and basic quantitative analysis of the mechanical efficiency of heat engines. The book works out the theory at a level of ideality and generality compatible with the treatment given to thermal efficiency by classical thermodynamics. This yields results of broad bearing concerning the overall cyclic conversion of heat into usable mechanical energy. Most notably, the work reveals intrinsic limits on the overall performance of reciprocating heat engines. The ideal Stirling engine is shown to have the best overall performance potential of all possible engines under ideal comparable assumptions. The work provides mathematically explicit upper bounds on the mechanical efficiency and cyclic work output of engines having like characteristics. The theory describes the general effects of parameters such as compression ratio and external or buffer pressure on engine output. It also provides rational explanations of certain operational characteristics such as how engines generally behave when supercharged or pressurized.