



## BOOK REVIEW

**Fundamentals of Gas Turbines** 2nd Edn by Wm. W. Bathie, John Wiley and Sons, New York, 1996. 11 Chapters, 17 appendices, XIV + 453 pages. Cloth bound hard cover Price: US\$84.95.

The past five decades have witnessed a phenomenal progress in the industrial development and application of the gas turbine engine for power production. It has now evolved into a very reliable, highly fuel efficient and versatile power plant with high power-to-weight ratio.

On the application side, it has made a clean sweep of the aeroengine industry displacing the old piston-type engines altogether and is advancing rapidly in the areas of utility power-generation, rail locomotives, heavy trucks, army tanks and ships of all kinds and sizes. A part of the intrinsic technical merits of the gas turbines, the resource-crunch and environmental issues relating to oil and coal have also accelerated the transition to gas turbine technology.

In line with these developments, foundation courses on gas turbine technology have been introduced in most university engineering curricula, beginning with the undergraduate and extending to the advanced graduate programs, with the aim of preparing fresh entrants to the engineering profession for involvement with gas turbine plants.

The book under review is an excellent text book for such courses. The main emphasis of the book is very rightly on the fundamentals of design and functional mechanics of gas turbines.

The book begins with a development-history of gas turbine technology, with a decade-wise break-up of important milestones from 1791 on to the present day. This is followed in the next three chapters (2-4) by a detailed treatment of the fundamentals of the thermodynamics, fluid mechanics and combustion which are all essential for a basic understanding of the gas turbine

mechanism. The concepts are plentifully illustrated with examples and strengthened by problem-exercises. What is more, the reader is repeatedly reminded with flashbacks of these fundamentals in the subsequent chapters covering the design and engineering of the gas turbine for various types of application. A critical discussion of the various gas turbine cycles and of the factors that influence the performance is given in chapters 5 and 6. The next four chapters (7-10) deal mainly with the turbine hardware and elaborate on the fundamentals of component design and integrated component matching for different end-uses of turbine engines. The last chapter discusses pollutant and noise emissions and the modifications that can be tried to reduce them to acceptable levels.

Both the SI and the English systems of units are used in the examples provided in the book. Computer outputs are provided at various places to encourage the reader to try and develop computer programs for stage-wise analyses of turbine performance.

A welcome feature of the book is that it is essentially self-contained and comprehensive in regard to fundamentals, engineering principles and design methodology. Tables of properties of gases, dry air and atmospheric data are included in the appendices. The text is profusely illustrated with photographs and drawings showing the internal views of the machines as well as total assemblies to support the textual explanations.

In conclusion, the book will be very useful as a textbook not only for engineering students but also in refresher courses for engineers in industry who would have missed a course on gas turbines in their earlier education.

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