Journal of Pressure Vessel Technology

Book Reviews

PRESSURE VESSEL AND PIPING TECHNOLOGY A DECADE OF PROGRESS—1985

Pressure Systems are defined as closed boundaries or enclosures containing pressurized or depressurized fluids; in other words, the pressure inside the system is different from the pressure outside the system. In addition, environmental conditions inside the system may be different from those outside the system; examples of such conditions include temperature, toxic or volatile chemicals radioactive materials, etc. Thus the pressure boundary, in addition to maintaining the pressure differential, may also protect the outside environment from being affected or polluted by the inside media.

Pressure systems are key elements in power, process, ordnance, aerospace and other industrial facilities. Pressure systems include pressure vessels, piping, and other pressure components and equipment. Consequences of a breach in the integrity of a pressure system depends on the pressure differential between the inside and outside environment, properties of the inside and outside media and the type of failure. Boiler failures that plagued the industry until the very early years of this century had caused property damage and even loss of life. The subsequent issuance and use of the ASME Boiler and Pressure Vessel Code and other advances in technology reduced such catastrophic failures, and the pressure vessel and piping industry has achieved an enviable safety record.

The stringent safety requirements of the nuclear power industry necessiated further advances in the analysis, design, manufacturing, operation and maintenance of pressure systems. Government and industry funded research programs brought forth significant advances in pressure vessel and piping technology. Current interest in alternate energy sources such as fusion, solar, coal gasification, liquid natural gas and synfuel bring with it new problems and new advances to the pressure vessel and piping industry. Also the emergence of new technological frontiers such as biotechnology creates new challenges and new opportunities in the pressure technology area.

In summary, pressure vessel and piping technology is still a dynamic field of engineering with considerable ongoing research and development activities. It is difficult for a practicing engineer, or even for a research engineer, to keep abreast with all new developments. The scope of the book is to present a set of comprehensive state-of-the-art review paper which provide up-to-data information on the subject areas. The papers highlight the recent developments and provide key references from which interested readers may obtain more detailed information. The seventy-two papers, written by ninty-nine experts on various fields of pressure technology, are organized into ten chapters. The Table of Contents of the book is given in the following.

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The book is available from the American Society of Mechanical Engineers. Price $150 (ASME Mem. $120). Book No. H00330.

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Deformation and Fracture Mechanics of Engineering Materials, R. W. Hertzberg, 2nd Edition, Wiley, New York, N.Y., 1983, 697 pp.

This is a very "meaty" book. It focuses upon a number of areas in structural design. Fracture mechanics can be applied to pressure vessel design, stationary power plants (boilers, gas and steam turbines), pertrochemical industry, air and ground transportation. Rupture of pressure vessel or failure of a rotor could be disasterous. How can one determine any failure without applying judgment or guess work? We now have a vivid and vital topic in understanding these predicaments. A better handle on how to design is at hand, as well as determining the possibility of a future failure. The answer stems from the homogeneous marriage of fracture mechanics, mechanics of materials and the use of better metallurgical principles. This book goes a long way in cementing these relationships. In the hands of the able designer, he can now design structures and pressue vessels with great assurance. A failure can now be greatly reduced with a resultant decrease in any possible pressure vessel mishaps as well as damage to the surrounding structures. As stated by the author, "The book will be useful to the working engineers who want to know more about mechanical metallurgy and, particularly, the fracture mechanics approach to the fracture of solids."