openings for radial, nonradial, and multiple nozzle arrangements are covered, as is designing their thermal sleeves which are vital to vessel thermal-shock protection. Stresses in bolts and the design of bolted and nonbolted closures receive extensive treatment as do the use of crack arrest features to negate brittle fracture potential. Vessel support skirts, saddles, and attachments impose both structural and thermal loadings that must be reconciled with the vessel pressure stresses. Gaskets are essential to removable closures and their type, design, and control parameters are presented. Thin claddings are widely used to prevent corrosion of the base metal or contamination of the media, and their life is appraised.

Chapter 7 introduces fabrication-construction methods and their economic potential. This includes novel innovations to satisfy a unique requirement, such as filament-wound, multilayer, wire-wrapped, link-belt, coiled, prestressed steel and concrete, and other vessels. Material selection is by basic cost per unit of stress and optimum safety factors utilizing advanced composites, high strength materials, or those with enhanced properties such as that obtained from directional solidification for use in a creep rupture environment. Fabrication methods like modular construction, cryogenic and high energy forming, adhesive joints, metallurgical bonding and healing of internal defects by hot isostatic pressing, etc. – all to achieve the economic goal of low cost and long service life – are presented.

Chapter 8 introduces the stability theory of plain and stiffened vessels, and its application to the design of thin, intermediate and thick walled ones. The overall stabilizing effect of structural stiffeners, as well as their effect in regions of high local compressive stress, is covered from initial design, failure analysis, and repair viewpoints. This forms the basis for the development of regulatory codes and compliance standards. The fabrication tolerances and construction details of noncircularity, local thinning, unreinforced openings, and stress concentrators are not self-limiting or self-compensating in a buckling phenomenon, and these critical effects are evaluated."

J. H. Harvey
(*from* Preface)

Pressure Vessel Design Handbook, Second Edition, 1985, by Henry H. Bednar, Van Nostrand Reinhold Company, New York, $46.50.

"This handbook has been prepared as a practical aid for engineers who are engaged in the design of pressure vessels. Design of pressure vessels has to be done in accord with specific codes which give the formulas and rules for satisfactory and safe construction of the main vessel components. However, the codes leave it up to the designer to choose what methods he will use to solve many design problems; in this way, he is not prevented from using the latest accepted engineering analytical procedures.

Efficiency in design work is based on many factors, including scientific training, sound engineering judgment, familiarity with empirical data, knowledge of design codes and standards, experience gained over the years, and available technical information. Much of the technical information currently used in the design of pressure vessels is scattered among many publications and is not available in the standard textbooks on the strength of materials.

In revising the first edition the intent has been to improve the handbook as a reference book by enlarging its scope. The stress analysis of pressure vessels has been greatly enhanced in accuracy by numerical methods. These methods represent a great addition to the analytical techniques available to a stress analyst. Therefore, chapter 12 describing the most important numerical methods with illustrative examples has been added. Throughout the text new material and new illustrative examples have also been added. The writer believes that any technical book in which the theory is not clarified by illustrative examples, can be of little use to a practicing designer engineer. Also some typographical errors have been corrected.

It is assumed that the reader has a working knowledge of the ASME Boiler and Pressure Vessel Code, Section VIII, Pressure Vessels, Division 1."

H. H. Bednar
(*from* Preface)

The Engineer Is Human, 1985, by Henry Petroski, St. Martin's Press, New York, $16.95.

"Though ours is an age of high technology, the essence of what engineering is and what engineers do is not common knowledge. Even the most elementary of principles upon which great bridges, jumbo jets, or super computers are built are alien concepts to many. This is so in part because engineering as a human endeavor is not yet integrated into our culture and intellectual tradition. And while educators are currently wrestling with the problem of introducing technology into conventional academic curricula, thus better preparing today's students for life in a world increasingly technological, there is as yet no consensus as to how technological literacy can best be achieved.

I believe, and I argue in this essay, that the ideas of engineering are in fact in our bones and part of our human nature and experience. Furthermore, I believe that an understanding and an appreciation of engineers and engineering can be gotten without an engineering or technical education. Thus I hope that the technologically uninitiated will come to read what I have written as an introduction to technology. Indeed, this book is my answer to the questions "What is engineering?" and "What do engineers do?"

The idea of design – of making something that has not existed before – is central to engineering, and I take design and engineering to be virtually synonymous for the purposes of my development. Examples from structural designs commonly associated with mechanical and civil engineers are most prominent in this book because it is from those fields that I draw my own experiences, but the underlying principles are no less applicable to other branches of engineering.

I believe that the concept of failure – mechanical and structural failure in the context of this discussion – is central to understanding engineering, for engineering design has as its first and foremost objective the obviation of failure. Thus the colossal disasters that do occur are ultimately failures of design, but the lessons learned from those disasters can do more to advance engineering knowledge than all the successful machines and structures in the world. Indeed, failures appear to be inevitable in the wake of prolonged success, which encourages lower margins of safety. Failures in turn lead to greater safety margins and, hence, new periods of success. To understand what engineering is and what engineers do is to understand how failures can happen and how they can contribute more than successes to advance technology."

H. Petroski
(*from* Preface)

Process Plant Layout, 1985, ed. by J. C. Mecklenburgh, Halsted Press/John Wiley and Sons, Inc., New York.

"Layout is concerned with the spatial arrangement of process plant and its interconnections, such as piping. Good layout practice achieves a balance between the requirements for safety, economics, the protection of the public and the environment, construction, maintenance, operation, space for future expansion and process needs.

It is necessary to distinguish between the layout of the various plants in a *site*, the arrangement of process vessels, piping, etc. in a plant on a *plot* and finally the detailed arrangements of both *equipment* and *piping*. Thus, in this book the term *plant layout* has been given a generic meaning covering all aspects of layout. In the earlier Institution of Chemical Engineers publication[1] the term *plant* was also used synonymously for *plot* reflecting the common occurrence where a plant occupies one plot. However, it has been found helpful to define the terminology more precisely.

Since the first book the principal addition to the subject has been hazard assessment. Also there has been an increase (though not as much as expected) in the use of computer-aided design in layout. With the growth of project size it has become recognized that layout execution must be formally organized along with other design activities. The amount of detailed layout information available has also grown (see, for example, Kern[2]). Consequently, the size of this book is much larger than the first book and it was thought desirable to provide introductory Chapters 1-4 giving general principles before going into detail from Chapter 5 onwards.

Chapter 2 is concerned with the general discipline of layout and details on the various approaches are presented in Chapters 5-8, which encompass planning, layout conception, aids to layout and hazard assessment of layouts.

Chapter 3 provides the principles of site layout whilst Chapter 9 discusses the transportation requirements of a site, and Chapters 10, 11 and 12 look at storage and warehousing. The layout features of effluent facilities, utilities and central services are examined in Chapters 13, 14 and 15.

The basic principles of plot layout are outlined in Chapter 4 and further details are given in Chapter 17. The special features of plant layout within enclosed buildings are listed in Chapter 18. Chapter 16 discusses construction, including the recent development of modular construction.

The layout of individual items of equipment is covered in Chapters 19-30 with piping layout occupying Chapter 31.

This book is intended to be a guide to good practice and although the contents give spacings and arrangements, it must be remembered that these are only typical and not mandatory. They may have to be altered to suit local conditions, plant owners' requirements and established safe practices. In particular the guide has to be largely phrased in terms of a new or 'greenfield' site, whereas most projects are involved with modifications and extensions where existing site constraints inevitably make observance of good practice more difficult."

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J. C. Mecklenburgh
(*from* Introduction)

Pressure Gauge Handbook, *1985*, ed. by P. W. Harland, Marcel Dekker, Inc., New York, Basel.

"This handbook presents a detailed discussion of pressure gauges of the type which contains various types of elastic measuring elements (principally bourdons) wherein the power necessary to provide an analog indication of the magnitude of the applied pressure is supplied by the applied pressure. Pressure gauges requiring an external source of energy (e.g., strain gauges, and piezoresistive, capacitive, and variable reluctance transducers) are considered only briefly.

Over the 100 years or so that pressure gauges have been mass produced, a sometimes bewildering array of construction variations, nomenclature, and accessories has evolved. Chapters 2, 3 and 4 are intended to clear up at least some of the confusion by discussing and illustrating the more common variations and defining the nomenclature. Chapter 5 continues this objective by discussing a variety of accessories available for use with pressure gauges which can improve their performance and expand their usefulness. Pressure gauge selection, installation, and maintenance are covered in Chapters 6 and 7, including detailed information on how to use the various built-in adjustments for recalibration of a pressure gauge to restore its accuracy. Chapter 8 discusses the several ways that pressure gauges may be used to measure temperature. Chapter 9 gives a general review of externally powered pressure transducers and is included in order to give the reader some direction in the event self-powered gauges, which are the subject of this book, will not provide the desired performance characteristics.

Throughout this handbook references are made to various safety considerations involved in the use of pressure gauges. Chapter 10 is devoted to this topic. Its importance will become apparent to anyone who works with pressurized liquids and gasses. A discussion of the more recent ISO units of pressure and how they relate to previously established metric and English units is contained in Chapter 11."

P. W. Harland
(*from* Preface)

Directory of Microcomputer Software for Mechanical Engineering Design, 1985 Edition, ed. by C. O'Connell, J. K. Shevick, A. R. Browne, S. V. Johnson, Marcel Dekker, Inc., New York, Basel.

"*The Directory of Microcomputer Software for Mechanical Engineering Design* was prepared for practicing engineers who are looking for mechanical design programs that will run on microcomputers. The directory provides information on a wide variety of programs from many sources and thus is an excellent tool for mechanical engineers, architects, computer scientists, educators and students. The book is appropriate for both new and experienced microcomputer users. With new software appearing at a phenomenal rate, a major problem for engineers is to find appropriate programs. This directory will aid in selecting microcomputer programs for mechanical design projects.

Descriptions of each software package include information such as: hardware and software requirements, available documentation and training, price, and ordering instructions. Entries are organized by application and indexing by machine, subject keywords, producer and program name."

(*from* Preface)