Pump Characteristics Applications, Third Edition
Michael Volk
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This beautiful third edition book on pumps by Michael Volk (www.volkassociates.com) is a comprehensive practical sourcebook intended for a broad audience, from the casual reader to those in need of immediate diagnostic resources and everyone in between including facility managers and pump system designers.

From the preface to the first edition: "The purpose of this book is to give engineers and technicians a general understanding of pumps and to provide the tools to allow them to properly select, size, operate and maintain pumps. . .without getting so immersed in design details as to overwhelm the reader".

The author also provides training at: http://www.volkassociates.com/seminars.html.

There are nine chapters:

1. Introduction
2. Hydraulics, selection and curves
3. Special hydraulic considerations
4. Centrifugal pump types and applications
5. Sealing systems and sealless pumps
6. Energy conservation and life-cycle costs
7. Special pump-related topics
8. Installation, operation, maintenance, and repair
9. Case studies,

with two appendices, one on major suppliers of pumps in the United States and one with conversion formulae, followed by references and a thorough index.

So the book covers every aspect of pumps: basics of pump and pumping system design, special applications, extensive example problems with solved solutions throughout the book, discussion of downloadable software design tools (PIPE FLO), topics in energy conservation, industry contacts, key industry standards and document references, conversion formulae and an entire chapter devoted to pump system troubleshooting based on actual consulting case studies the author has encountered.

Particular topics of interest include: a ten step process to determine total head; a detailed overview of all types of pumps including centrifugal and positive displacement, commercial and industrial applications; detailed discussion of NPSH with examples and remedies; vibration issues including overcoming variable frequency drive vibration problems by avoiding system natural frequencies; energy efficiency considerations and life-cycle cost analysis.

Additionally, the book covers a wide range of practical concerns such as variance in performance over the life of the pump, multiple pumps (parallel and series), motors including variable frequency drives and an explanation of power factor, control systems, different working fluids, design drivers including user priorities for each application and implications of overdesign factors. In the author's words, from the preface to the first edition, a key point he wishes to convey is that all aspects of pump systems from "system design, to pump selection, to piping design, to installation, to operation are interrelated".

New in this third edition are color coding of photographs and graphics which are very effective in quickly communicating key points. The case studies in Chapter 9 are particularly helpful, structured to provide background, analysis of the problem, and solutions and lessons learned. In general, the structure of the book allows the reader to obtain valuable insights with minimum time investment, as well as providing adequate information for a deep dive into topics of particular interest to the reader. The author provides guidance on how to think about common problems and provides useful design values in tables and graphs.

The author makes the equations quickly accessible by explaining the variables and providing example values such that the reader can understand and use the equations quickly without being familiar with the conventions of the book. The reader who is looking for additional mathematical detail and formulations can reference the footnotes and other references provided.

The entire chapter on energy savings, including detailed life cycle cost analysis, makes this book immediately relevant with respect to current industry concerns such as sustainable design, energy efficiency and demand side management. For example, sections on variable frequency drives include coverage of limitations on energy savings for pumping systems with static head—a point which is frequently overlooked in energy savings calculations even among experts in the energy field. The graphical presentation of energy savings for VFDs visually conveys the energy and cost savings potential for VFDs compared with a variety of flow reduction options.

The book does not explicitly address the so-called "intelligent" pumps more recently available on the market which utilize integral electrically commutated mode (ECM) motors in small circulator pumps; however contact information for all major pump suppliers is

provided in Appendix A. Additionally, the book does not explicitly discuss implications of energy standards such as ASHRAE E90.1 on pump system design and control best practices, although the book itself addresses and promotes the best practices encoded in such standards.

This book is highly recommended for anyone who works with and designs pump systems on a daily basis, as well as anyone learning about pumps for the first time.

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