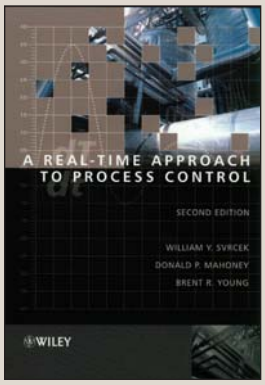
Books

A Real-Time Approach to Process Control, 2nd Ed.

W. Y. Svrcek, D. P. Mahoney, and B. R. Young; John Wiley & Sons Ltd., U.K.; Sept. 2006, 325 pages, $165; ISBN: 0470025344



For decades, the subject of process control theory has been taught using transfer functions, frequency-domain analysis, and Laplace transform mathematics. For linear systems this approach is well suited. As a methodology for the control of chemical processes, which are often characterized by nonlinearity and large doses of dead time, classical techniques have limitations. However, the era of realtime, simulation-based instruction of chemical process control has arrived.

Against this backdrop, *A Real-Time Approach to Process Control* provides a practical, hands-on introduction to the topic of process control by using only the more practical and applied time-domain techniques derived from modern process simulation. It is the first to treat the topic without relying at all upon Laplace transforms and the classical, frequency-domain techniques. It also enables the reader to understand and use a number of commercially available software packages and it provides specially designed workshops to facilitate the practice and application of the theory.

In order to gain an appreciation for process control and simulation it is important to have an understanding of the driving force behind their development. Chapter 1 provides a historical overview of the field. The rest of this book deals extensively with controller and process characteristic, including hardware fundamentals for the primary and final control elements . Chapter 2 introduces the very important and often overlooked topic of instrumentation. In Chapter 3, the authors explain the characterization of system responses and provides an introduction to modeling various processes. Feedback control, the elements of control loop s, system dynamics including capacitance and deadtime, and system modeling are introduced here. Chapter 4 describes the basic control modes or algorithms used in controllers in feedback control loops, and provides a framework for understanding control-loop design and tuning. Chapter 5 discusses control quality and optimization, including the performance criteria and methods that can be used to determine controller settings. It focuses specifically on tuning, armed with an understanding of feedback control, control loop structures, and tuning.

Up to this point the discussion has been restricted to feedback control loops, the most common control method used in process industries. Chapter 6 introduces some more advanced control configurations including feed-forward, cascade, and override control. These schemes are classified as advanced classical topics and are widely used in industry. Chapter 7 provides practical rules of thumb for designing and tuning the more common control loops found in industry. The loop characteristics, type of controller, response, tuning, and limitations are also be examined. In Chapter 8 the authors tackle the complex control issues associated with distillation columns. Chapter 9 explores different methods for designing multiple loop controllers — *e.g.*, multi-input-multi-output control schemes for processes using steady state methods. Chapter 10 covers the most common problem areas encountered when designing a plant-wide control scheme. Finally, up-to-date information on computer simulation for the workshops can be found on the book website.

A Real-Time Approach to Process Control would appeal to practicing engineers due to its "hands on" feel for the subject matter. But more importantly, the authors present these concepts as fundamentals of chemical engineering, in a way that is consistent with how professors teach at the universities.

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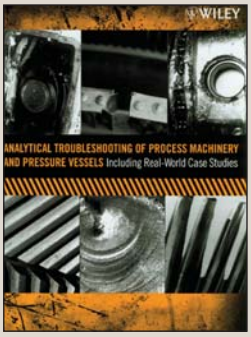
Analytical Troubleshooting of Process Machinery and Pressure Vessels: Including Real-World Case Studies

Anthony Sofronas; AIChE and John Wiley & Sons, Inc., (New York; Hoboken, NJ); Jan. 2006, 376 pages; $84.95; ISBN: 0-471-73211-7



This text provides both students and engineering professionals with the tools necessary for understanding and solving equipment problems in today's complex processing environment. Drawing on forty years of experience in the petrochemical, transportation, and component manufacturing industries, the author introduces analytical models that utilize simple mathematics to provide engineers with the information needed to understand equipment operation and failure modes. This will allow engineers to talk intelligibly with manufacturers, implement modifications required for continued operation, and ultimately help them save millions of dollars in lost production or warranty claims.

Readers will find in-depth coverage of factors that can cause equipment failure, including: component wear and fretting; vibration of machines and piping; instabilities and sizing of pumps and compressors; thermal loads and stresses; gear, bearing, shafting, and coupling loading; corrosion and materials of construction.

Equal consideration is given to both practical and analytical issues —each a potential problem area is illustrated with case studies taken from the author's own experience and accompanied by methods that can be used to address related challenges.