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Practical Process Control: Tuning and Troubleshooting

By Cecil L. Smith



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Practical Process Control: Tuning and Troubleshooting By Cecil L. Smith

Practical Process Control (loop tuning and troubleshooting). This book differs from others on the market in several respects. First, the presentation is totally in the time domain (the word "LaPlace" is nowhere to be found). The focus of the book is actually troubleshooting, not tuning. If a controller is "tunable", the tuning procedure will be straightforward and uneventful. But if a loop is "untunable", difficulties will be experienced, usually early in the tuning effort. The nature of any difficulty provides valuable clues to what is rendering the loop "untunable". For example, if reducing the controller gain leads to increased oscillations, one should look for possible interaction with one or more other loops. Tuning difficulties are always symptoms of other problems; effective troubleshooting involves recognizing the clues, identifying the root cause of the problem, and making corrections.

Furthermore, most loops are rendered "untunable" due to some aspect of the steady-state behavior of the process. Consequently, the book focuses more on the relationship of process control to steady-state process characteristics than to dynamic process characteristics. One prerequisite to effective troubleshooting is to "demystify" some of the characteristics of the PID control equations. One unique aspect of this book is that it explains in the time domain all aspects of the PID control equation (including as the difference between the parallel and series forms of the PID, the reset feedback form of the PID equation, reset windup protection, etc.) The book stresses an appropriate P&I (process and instrumentation) diagram as critical to successful tuning. If the P&I is not right, tuning difficulties are inevitable. Developing and analyzing P&I diagrams is a critical aspect of troubleshooting.



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Editorial Review

From the Back Cover

Practical troubleshooting advice that's easy to understand and easy to implement

Practical Process Control shows you how to analyze and troubleshoot process control systems in process manufacturing plants. Easy to read and understand, the book stresses practical solutions that don't require complex mathematics.

This book offers several advantages that you won't find in comparable texts. For example, the presentation is totally in the time domain—the word "Laplace" is nowhere to be found. In addition, the focus of the book is troubleshooting, not tuning. The author effectively demonstrates why tuning difficulties are almost always symptoms of other problems. By showing you how to recognize the clues, identify the root causes of the problem, and make needed corrections, you'll learn how to effectively troubleshoot problems before they mushroom into disasters.

Practical Process Control gives you even more support in troubleshooting process control systems by...

- Focusing on the relationship of process control to steady-state process characteristics rather than to dynamic process characteristics
- Demystifying PID control equations by explaining them in the time domain
- Helping you develop and analyze process and instrument (P&I) diagrams and demonstrating why they are critical to troubleshooting

Filled with real-world examples, the book enables engineers to easily implement the author's troubleshooting guidelines in order to ensure that their plants operate safely, efficiently, and economically.

About the Author

CECIL L. SMITH, PHD, has over thirty-five years' experience in process control, his expertise encompassing every control technology being applied in industrial production facilities. In continuous processes, he has worked with oil refining, pulp/paper, power generation, and ore processing. In batch processes, he has experience with both single-product processes (such as PVC reactors and pulp digesters) and the multiproduct (flexible batch) processes that are the norm in specialty chemicals. His primary focus is on designing a control strategy for a process and then commissioning the controls; that is, the process aspects as opposed to systems aspects. He also develops and teaches continuing education courses for practicing engineers on various aspects of process control and instrumentation.

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