



A Toolkit for Process Control - BBBB (Bonus)

Process Control Systems Application, Design, and Tuning 4th Edition by F. G. Shinskey

Reviewed by Nick Sands

It has been over 10 years since the 4th edition of F. G. (Greg) Shinskey's classic *Process Control Systems: Applications, Design, and Tuning* was published and 40 years since the 1st edition. It is still a good practical guide to process control. Francis G. (Greg) Shinskey graduated from the University of Notre Dame and worked for DuPont, Olin Chemical, and most famously for The Foxboro Company. He is an ISA Fellow and was one of the initial inductees to Control Magazine's "Process Automation Hall of Fame" in the 2001. He has written 7 books, and contributed to many others including The Instrument Engineer's Handbook, The Control Handbook, and Perry's Chemical Engineer's Handbook. He has received many awards including The Foxboro Company's Bristol Fellowship, ISA's Education and Founder's awards, AIChE's Computing Practice award, the Institute of Measurement and Control's Hartley award, and the Nordic Process Control award.

Shinskey begins with a quick guide to feedback, deadtime, capacitance and first order models. He builds on those basics to cover the elements of the control loop, including transmitters and valves. The highlight of this section is the discussion of the five most common control loops; flow, pressure, level, temperature, and quality. The brief discussion provides practical guidance.

Performance criteria for controllers are introduced in order to evaluate which controllers are best for which processes. Integrated error, and when necessary, integrated absolute error, are Shinskey's criteria of choice. He demonstrates the difference in performance tuning for setpoint changes, servo control, vs load changes, regulatory control, as well as the benefits of wind-up protection. Advanced controllers such as internal model controllers, model predictive controllers, fuzzy logic and dead time compensated controllers are only briefly discussed. More time is spent evaluating filters, deadbands, velocity limits, and on-off control.

The section on multi-loop systems introduces cascade control and the value of external reset using the secondary process variable. This is another highlight of the book and a practical tip found in few text books. Other topics include valve-position control, which is not what a valve positioner does, override and selector control, feedforward and ratio control and types of adaptive control. The interaction analysis using relative gain arrays is an excellent chapter.

The applications section builds on the previous sections, and adds fundamentals about each process. The chapter on energy transfer covers pumps and compressors. The section on reactors starts with kinetics and ends with pH control. The mass transfer chapter provides an overview of distillation as well as dryers, kilns, and evaporators and techniques to determine the best control strategies. Ryskamp's decoupler is a very useful strategy. The final chapter on batch control is more focused on PID controllers in batch applications.

Process Control Systems is not an introductory book on process control. Many things are not explained to the reader, but assumed that the reader already understands. This is not only a must read and a must buy for a process control engineer, but likely one of the best references you can have in your library. It is a genuine bonus (BBBBB). While the book is out of print, it is still available on Amazon.com for about \$20.