



# Principles and Case Studies of Simultaneous Design

By William L. Luyben

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There are many comprehensive design books, but none of them provide a significant number of detailed economic design examples of typically complex industrial processes. Most of the current design books cover a wide variety of topics associated with process design. In addition to discussing flowsheet development and equipment design, these textbooks go into a lot of detail on engineering economics and other many peripheral subjects such as written and oral skills, ethics, "green" engineering and product design. This book presents general process design principles in a concise readable form that can be easily comprehended by students and engineers when developing effective flow sheet and control structures.

Ten detailed case studies presented illustrate an in-depth and quantitative way the application of these general principles. Detailed economic steady-state designs are developed that satisfy economic criterion such as minimize total annual cost of both capital and energy or return on incremental capital investment. Complete detailed flow sheets and Aspen Plus files are provided. Then conventional PI control structures are be developed and tested for their ability to maintain product quality during disturbances. Complete Aspen Dynamics files are be provided of the dynamic simulations.

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### Editorial Review

#### Review

"I highly recommend the important and all encompassing book *Principles and Case Studies of Simultaneous Design* by William L. Luyben, to any chemistry or engineering students, practicing chemical engineers, product designers in industry, and business leaders looking for a fresh approach to simultaneous design issues. This book will transform your company's industrial processes and product design into one of a leader in process design." (Blog Business World, 26 November 2011)

#### From the Back Cover

#### **An in-depth look at the general principles of design—complete with a rich series of case studies**

Presenting general design principles in a concise format, *Principles and Case Studies of Simultaneous Design* guides readers in building an effective flowsheet and control structure when developing a chemical process. Aided by detailed economic design examples of typically complex industrial processes, this book encompasses all the methods and techniques essential to chemical process design in the creation of new facilities or the modifications of existing ones. In addition, it shows ways in which these methods can be applied to reactive distillation, reactor design, plant design, and various other chemical engineering processes. *Principles and Case Studies of Simultaneous Design*:

- Is presented in a well-illustrated, large-size format with detailed schematics
- Discusses conventional proportional—integral—derivative (PID) control structures to emphasize importance of maintaining product quality during disturbances
- Includes ten detailed case studies that illustrate the principles of process design
- Supplies case studies that contain rigorous steady-state economic evaluations and dynamic plant-wide control studies
- Provides completed detailed flowsheets with Aspen Plus files included, along with examples of dynamic simulations using Aspen Dynamics

*Principles and Case Studies of Simultaneous Design* offers students and engineers in the chemical, petroleum, and biochemical industries the essential principles of design and control in a manner that cuts directly to the core of the most important technical information. Written in style that is approachable and easy to comprehend, this invaluable reference is sure to become a treasured reference for any seasoned or aspiring engineer.

#### About the Author

**WILLIAM L. LUYBEN**, PhD, is a professor at Lehigh University, and the author/co-author of thirteen textbooks. He has published over 250 technical papers in the area of process control and design and has supervised thirty-five PhD dissertations. He has nine years of industrial experience with Exxon and DuPont.

## **Users Review**

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#### **Eunice Bourque:**

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