

CHEMICAL ENGINEERING

PROCESS DESIGN AND ECONOMICS
A PRACTICAL GUIDE



SECOND EDITION

Gael D. Ulrich

| Palligarnai T. Vasudevan

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To friends of this book, past and future

CHEMICAL ENGINEERING PROCESS DESIGN AND ECONOMICS: A Practical Guide
Second Edition

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Front Cover Description:

View of Holcim [US] portland cement plant, Devil's Slide, Utah. The rotary kiln in the foreground is 50 meters in length and 4 meters in diameter. The large cylindrical duct running parallel to it carries hot gases to the preheater that towers behind it. Raw feed is heated to 1000°C in its 20-second drop through the tower and converted to cement clinker during 30-minute residence (reaching temperatures up to 1500°C) in the rotary kiln.

Built in 1997, the kiln and preheater replaced two rotary kilns that were each 50% larger than the one shown. The module pictured here was constructed at half the cost of duplicating the 50-year-old twin-kiln arrangement (a savings of about \$10 million). This 1997 plant expansion included a major design change from wet-to dry-processing. Preheating and the shift to dry processing allowed plant capacity to double with no increase in fuel consumption. Further savings and environmental/conservation gains were made by including shredded, scrap tires and trimming waste from a disposable diaper factory as supplementary fuels in the kiln.¹



¹Coauthor Ulrich was born and reared in a house located within one mile of this site.

CONTENTS

SECTION 1

Process Design	1
TECHNICAL NOMENCLATURE	6
CHAPTER 1 Process Design and Why it is Important	11
Levels of Design Accuracy, 11	
Steps in Process Design, 14	
Social Considerations, 16	
Process Simulation/Optimization/Modeling, 17	
The Project, 18	
CHAPTER 2 How to Define and Begin a Project	21
Step 1 Understand the Process, 21	
Step 2 Narrow the Possibilities, 23	
Step 3 Define Conditions and Capacities, 26	
CHAPTER 3 Flow Sheet Preparation	29
Sketching Techniques, 29	
Equipment Numbering, 32	
Stream Designation, 33	
Material and Energy Balances, 38	
Batch Processes, 50	
Computer Simulation, 60	
Flow Sheet Checks and Pitfalls, 60	
Flow Sheet Strategy, 63	
CHAPTER 4 Short-Cut Equipment Design	89
Categories of Process Equipment, 89	
Materials of Construction, 94	
Parameters for Equipment Specification, 100	
Specific Equipment Design Methods, 102	
Auxiliary or "Offsite" Facilities, 103	
Conveyors (Feeders), 103	
Crushers, Mills, Grinders, 108	
Drives and Power Recovery Machines, 120	
Evaporators and Vaporizers, 132	
Furnaces, 148	
Gas Movers and Compressors, 154	
Gas-Solid Contacting Equipment, 168	
Heat Exchangers, 187	
Mixers, 211	
Process Vessels, 225	

Pumps, 247
 Reactors, 258
 Separators, 276
 Size-Enlargement Equipment, 304
 Storage Vessels, 309
 Equipment List, 313

SECTION 2

Economic Analysis 325

ECONOMIC NOMENCLATURE, 328

CHAPTER 5 Capital Cost Estimation 331

Variation of Equipment Cost with Size, 331
 Adjusting Equipment Costs for Inflation, 335
 Installation Costs, 337
 Installation Factors, 339
 Unusual Construction Materials, Extreme Conditions,
 and Technical Uncertainty, 342
 Piping Cost Chart: An Example, 346
 Summary and Review, 359
 Capital Cost Summary Sheet, 360
 Cost Data, 362
 Capital Cost Charts, 364

CHAPTER 6 Manufacturing Cost Estimation 409

Fixed Capital, Working Capital, and Total Capital, 409
 Manufacturing Expenses, 410
 Utility Cost Coefficients, 415
 General Expenses, 424
 Sales Revenue, Profit, and Taxes, 426
 Contingency Factors for Untested Processes, 434

CHAPTER 7 Economic Optimization 439

Conventional Optimization, 439
 Functions of Multiple Variables, 447
 Incremental Return on Incremental investment, 456
 Optimum Scheduling of Batch Processes, 459

CHAPTER 8 Profitability (Cash Flow) Analysis 467

Time Value of Money, 467
 Cash Flow Analysis, 470
 Net Return Rate, 472
 Cash Flow Applied to Incremental Investments, 476
 Inflation, 480
 Sensitivity Analysis, 481

SECTION 3

Process Design and Society **485**

CHAPTER 9	Ethics and Professionalism	487
CHAPTER 10	Safety	495
	Who Really is Responsible? 495	
	Hazard versus Risk, 496	
	Plant Risk Hot Spots, 498	
	Steps for Inherently Safer Predesign, 503	
	Identify, 503	
	Eradicate, 507	
	Minimize, 508	
	Isolate, 508	
	Application of ISPD to Flow Sheet Development, 511	
CHAPTER 11	Pollution Control and Prevention	521
	Step for Predesign Pollution Prevention/Control, 524	
	Identify, 524	
	Eradicate, 526	
	Minimize, 530	
	Isolate, 532	

SECTION 4

Packaging the Result **539**

CHAPTER 12	Report Preparation	541
	Philosophy of Technical Reporting, 541	
	Mechanics of Report Writing, 541	
	Style and Technique, 547	

Appendixes **555**

Appendix A	Units and Conversion Factors	557
Appendix B	Flow Chart Symbols and Icons	563
Appendix C	Rules of Thumb	573
Appendix D	JANAF Thermochemical Data	585
Appendix E	Rate of Return/Net Return Rate Definitions	603
Appendix F	Detailed Decision Chart for LNG Refrigerant	
	Energy Recovery	605
	Spreadsheets; Fluid Bed Illustration 4-6	608
Appendix G-1	Alkylate Splitter Supporting Calculations	615
Appendix G-2	Beta-Galactosidase Supporting Calculations	647
Index		671

WEB PAGE CONTENTS

Web Data Base Subject (Reference pages in this book)

Supporting Material for Chapter 2

Trash to Energy University/Community Scenario (25)

Supporting Material for Chapters 3, 4, and 5

Simulation Calculations for Alkylate Splitter Module
and Beta-Galactosidase Case Studies (50, 60, 317, 399)

Supporting Material for Chapter 10

Hazards and Risks (497)

Friction as a Cause of Fire (507)

Danger all around Us

Supporting Material for Chapter 12

Revising, Cutting, and Polishing (547)

Criticism of Student Project Reports (554)

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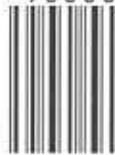
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