

**For the chemical, pharmaceutical, and food process industries**

# **Pilot Plant Design, Construction, and Operation**

**October 10–12, 2012  
Houston, Texas**

**A course designed specifically for engineers, scientists, contractors, supervisors, and operators who build, design, operate, or support pilot plant and laboratory units**

**“EVERY SECTION GAVE ME NEW IDEAS AND USEFUL INFORMATION.”**

Pilot Plant Engineer

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# **Pilot Plant Design, Construction, and Operation**

**October 10–12, 2012  
Houston, Texas**

- Learn how properly defining a pilot plant program can save time and money
- Learn how to estimate costs accurately and quickly
- Understand the impact different types of space have on a unit's design and operation
- Explore options for designing and constructing a pilot plant
- Learn how to select the right control system
- Understand the different types of instrumentation of special interest to pilot plant operations
- Discover how to optimize pilot plant start-up
- Learn how to minimize pilot plant maintenance costs and maximize its effectiveness



# Pilot Plant Design, Construction, and Operation

October 10–12, 2012 in Houston, Texas

## Examine Practical Concepts

This detailed course is designed for engineers, scientists, contractors, supervisors, and operators who build, design, operate, or support pilot plant and laboratory units. You will gain a comprehensive overview of all aspects involved in bringing a pilot plant to life, including:

- Defining the function of the pilot plant
- Cost factors
- Design
- Space requirements
- Control systems
- Safety and start-up
- Maintenance

## Learn How To

- Identify the key issues and requirements for a new pilot plant
- Develop a comprehensive design basis
- Estimate the costs involved in pilot plants, including:
  - design and construction costs
  - start-up costs
  - operating costs
  - the frequently overlooked cost factors
- Reduce pilot plant costs
- Estimate space requirements

The course will also explore the critical differences between pilot plant design and process plant design.

### Course Text

The text for this course is *Pilot Plant Design, Operation and Construction*, by Richard P. Palluzi, McGraw-Hill Publishing Co., 1992. The text is included in the course fee.

## Explore Critical Issues

This course provides information that you can put to work immediately, including how to:

- Examine different design approaches
- Determine control systems requirements
- Select and install the proper instrumentation, including:
  - gas and liquid flow sensors
  - liquid level sensors
  - temperature and pressure sensors
- Optimize your start-up efforts
- Determine appropriate start-up sequences for safe and efficient start-up
- Minimize maintenance costs and yet provide good maintenance

## Attend and Benefit

Engineers and scientists who are involved in pilot plant design, development, and operation will learn the essentials and critically examine alternatives to traditional approaches. The course will be especially valuable to those involved in designing, building, and operating pilot plants in the following industries:

- Chemical, petrochemical, agrichemical, and specialty chemical
- Biotechnology, biochemical, and fermentation
- Pharmaceuticals and cosmetics
- Food processing

This course will be especially valuable to those who are:

- New to the pilot plant
- Designing pilot plants
- Managing pilot plants
- Operating pilot plants

The novice will be brought up to speed quickly and will benefit from the breadth and detail of the course. More experienced personnel will find the overall approach and breadth will help them better understand the complex interrelations between all of the different areas.

## Your Instructor

**Richard P. Palluzi** is a Distinguished Engineering Associate at ExxonMobil Research and Engineering where he is responsible for the design, construction, and support of pilot plants and laboratories for ExxonMobil's research site in Clinton, New Jersey. He also is a consultant on issues related to pilot plants throughout ExxonMobil worldwide. He has a bachelor of engineering degree and a master of engineering degree in chemical engineering from Stevens Institute of Technology. He is the author of two books, 30 articles, and 40 presentations on all phases of pilot plant and laboratory safety and operations. He is a past chair of the AIChE Pilot Plant Committee and the Clinton site's Safe Operations Team and was responsible for reviewing and approving all pilot plant and laboratory installations and operations. He currently chairs ExxonMobil's Pilot Plant and Laboratory Safety Standards Committee and is responsible for the development and dissemination of more than 100 internal company standards on pilot plant design and construction. He has consulted for the Department of Energy and the Department of Defense on research-related issues. Rich is a member of the American Institute of Chemical Engineers, the International Society of Automation, the American Society of Safety Engineers, and the National Fire Protection Association where he serves on the committees on NFPA-45 Fire Protection for Laboratories Using Chemicals and NFPA-55 Industrial and Medical Gases.

## For Related Course Descriptions

[epd.engr.wisc.edu/chemicaleng](http://epd.engr.wisc.edu/chemicaleng)

# Pilot Plant Design, Construction, and Operation

October 10–12, 2012, in Houston, Texas

## Important Course Topics

### Welcome and Introduction

*Elaine M. Bower*

Program Director

Department of Engineering

Professional Development

University of Wisconsin–Madison

### Defining a Pilot Plant Program

- What is a pilot plant?
- Defining the goals of the pilot plant
- Identifying key issues
- Selecting the appropriate strategy
- Developing a design basis
- Prototype concerns and implications
- P&IDs

### Pilot Plant Cost Factors

- Practical effects of budget constraints
- Estimating pilot plant design and construction costs
- Estimating start-up costs
- Estimating operating costs
- Frequently overlooked cost factors
- Reducing pilot plant costs

### Types of Space Suitable for Pilot Plant Operations

- Separate buildings
- Containment cells
- Open bays
- Hoods and laboratory areas
- Estimating pilot plant space requirements

### Pilot Plant Design

- Design approaches
- Differences from process plant design
- Developing a pilot plant design specification
- Options for designing and constructing a pilot plant

### Pilot Plant Control Systems

- Determining system requirements
- Selecting the right control system
- Types of computer control systems

### Instrumentation of Special Interest to Pilot Plant Operations

- Gas and liquid flow measurement
- Liquid level measurement
- Temperature measurement
- Pressure measurement

### Pilot Plant Start-up

- Differences from major process unit start-up
- Optimizing start-up efforts
- Start-up resources
- Start-up sequences
- Equipment
- Calibration
- Turn-key vs. in-house start-up
- Flushing
- Leak testing

### Pilot Plant Maintenance

- Advantages of good maintenance
- Types of maintenance
- How to minimize maintenance costs
- Typical maintenance costs
- In-house or contracted maintenance

### Summary

## Schedule Note

Registration will begin at 8:00 a.m. on Wednesday, October 10, 2012 at the Hilton-NASA/Clear Lake, Houston, TX. The course will meet from 8:15 a.m. to 4:30 p.m. on Wednesday, from 8:00 a.m. to 4:30 p.m. on Thursday and from 8:00 a.m. to noon on Friday. The daily schedule will include midmorning and midafternoon refreshment breaks and lunch at noon, Wednesday and Thursday.

## What Past Participants Say About This Course

**"I WAS LOOKING FOR A GOOD OVERVIEW AND THIS COURSE DELIVERED."**

Pilot Plant Operations Superintendent

**"THE THREE DAYS IN CLASS PROVIDED MORE INFORMATION THAN WORKING ON THE JOB FOR THE PAST YEAR!"**

Research Engineer

**"THIS COURSE GAVE ME AN EXCELLENT BASE TO WORK FROM. THE NOTES ARE A VALUABLE RESOURCE AND REFERENCE."**

Research Scientist

**"RICH IS A PASSIONATE INSTRUCTOR, WHO PROVIDED A VERY PRACTICAL COURSE, PACKED WITH REAL-WORLD EXAMPLES."**

Senior Research Technician

## Past Participating Companies

Air Products and Chemicals, Inc.

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## Four Easy Ways to Enroll



### Internet:

<http://epd.engr.wisc.edu/webN510>



### Phone:

800-462-0876 or  
608-262-1299 (TDD 265-2370)



### Mail to:

Engineering Registration  
The Pyle Center, Dept. 107  
702 Langdon Street  
Madison, Wisconsin 53706



### Fax:

800-442-4214 or  
608-265-3448

**ENROLL ONLINE  
TODAY!**

### Course Information

- Please enroll me in **Pilot Plant Design, Construction, and Operation**  
**Course #N510** October 10–12, 2012 in Houston, Texas Fee: \$1795  
Team Discount: \$1650 per person when two or more enroll from the same organization.
- I cannot attend at this time. Please send me brochures on future courses.

**Limited Enrollment**

### Personal Information (Please print clearly.)

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### Additional Enrollees

Name \_\_\_\_\_

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## Related Courses

### *Pilot Plant Equipment*

September 5–7, 2012

Course #N508

During this course, you will focus on common pilot plant equipment, including piping; reactors; seals; controls for reactors; valves; pumps; sampling systems; heat tracing; and drivers. You will discuss the issues involved in correctly designing and installing this equipment and explore troubleshooting methods and options.

### *Pilot Plant and Laboratory Safety*

Spring 2013

During this course, you will learn how to develop and implement an effective safety program for your labs and pilot plants. You will gain a comprehensive overview of applicable safety codes, including OSHA, NFPA, and ASME; flammability basics and how they influence safety and safety programs; safety systems and interlocks; and gas monitoring systems.

### *Laboratory Design for Owners, Designers, and Engineers*

Fall 2013

During this course, you will gain a working knowledge of laboratory design for functionality; laboratory use requirements; codes and regulations that impact laboratory design; renovation as an alternative to new construction; and general laboratory safety issues.

For details see [epd.engr.wisc.edu/chemicaleng](http://epd.engr.wisc.edu/chemicaleng).

## Future Courses

For information about the following courses, contact Elaine Bower, Program Director, at 800-462-0876, or e-mail her at [bower@engr.wisc.edu](mailto:bower@engr.wisc.edu).

### *Pilot Plant Equipment*

September 5–7, 2012

Course #N508

### *Powder and Bulk Mixing: Processes, Applications, and Equipment*

September 25–27, 2012

Course #N509

### *Chemical Engineering for Non-Chemical Engineers*

October 1–3, 2012

Course #N425

### *Pilot Plant Design, Construction, and Operation*

October 10–12, 2012

Course #N510

### *Dryer Technology*

October 15–16, 2012

Course #N382

### *Atomization and Spray Technology*

October 17, 2012

Course #N383

### *Solids Handling: Bins, Feeders, and Pneumatic Conveying Systems*

October 22–25, 2012

Course #N384

## Need to Know More?

Call toll free **800-462-0876** and ask for

**Program Director:** Elaine M. Bower

[bower@engr.wisc.edu](mailto:bower@engr.wisc.edu)

**Program Associate:** Theresa Rodger

[rodger@epd.engr.wisc.edu](mailto:rodger@epd.engr.wisc.edu)

Or e-mail [custserv@epd.engr.wisc.edu](mailto:custserv@epd.engr.wisc.edu)

## General Information

**Fee of \$1795 Covers** Notebook, course materials, break refreshments, lunches on Wednesday and Thursday, and certificate. We do not publish proceedings. Course materials are distributed only to participants.

**Cancellation** If you cannot attend, please notify us by October 3, 2012, and we will refund your fee. Because this course has limited enrollment, cancellations received after this date and no-shows are subject to the full course fee of \$1795. You may enroll a substitute at any time before the course starts.

**Location and Accommodations** This course will be held at the Hilton-NASA/Clear Lake, 3000 NASA Parkway, Houston, TX. We have reserved a block of guest rooms (rates starting at \$109) for course participants at the Hilton-NASA/Clear Lake. To reserve a room, call 281-333-9300 by September 10, and request Group Code UNI.

**Earn Continuing Education Credits** By participating in this course, you will earn 2.0 Continuing Education Units (CEU) or 20 Professional Development Hours (PDH).

**ENROLL ONLINE TODAY! Or visit our Web site**

A well-designed pilot plant allows for operational flexibility. This flexibility is the strength of pilot operations. Your program will include allowances for. Sample variability testing. Adjustment of certain parameters within pre-planned limits.Â SGSâ€™s operational piloting experience is second to none. We provide all the pilot plant operation procedures and philosophy as well as all a definitive set of protocols in confidentiality, health, safety and environment. Confidentiality. SGS has longstanding experience in bench scale testing and full scale pilot plants where confidential client intellectual property is an issue. Confidentiality is guaranteed, as integrity is a cornerstone of SGS operation. Health and Safety. Health and Safety is of paramount importance for SGS. The maritime pilot does not have the luxury like an airline pilot to board the vessel at ease. Mostly the embarking and disembarking is done in open sea with rolling pitching, so there needs to be an arrangement to ensure safety of the pilot. This is done using a pilot ladder and you can learn about its construction and arrangement in this article.