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

Learn how properly defining a pilot plant program can save time and money
Learn how to estimate costs accurately
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
Learn how to optimize pilot plant maintenance costs and maximize its effectiveness
Learn how to minimize pilot plant start-up costs
Learn how to estimate costs accurately and quickly
Learn how properly defining a pilot plant program can save time and money

Save time and money!
Inquire about on-site and online courses.
Call 800-462-0876 today!

Please route this brochure to colleagues who would also benefit by attending.
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.

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.

Course Text

For Related Course Descriptions
[epd.engr.wisc.edu/chemicaleng](epd.engr.wisc.edu/chemicaleng)
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.
Amgen Inc.
Archer Daniels Midland Company
BOC Gases
BP
Bristol Myers Squibb Company
Celanese Ltd.
Chevron Corporation
DuPont Pharmaceuticals Company
ExxonMobil Corporation
FMC Corporation
Halliburton
Hexion Specialty Chemicals
JH Research USA LLC
Mead Johnson Nutritionals
Peninsula Copper Industries, Inc.
Pepperidge Farm, Inc.
Shell Canada Ltd.
Shell Global Solutions
SK Energy
University of Calgary
W.R. Grace & Company
Zeton Inc.

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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.

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.
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. SGS’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.