



Piping System Assessment & Optimization

2010 Class Registration

TRAINING OUTLINE

The course length is three days. Class starts at 8:00 AM each day and ends at 5:00 PM with a break for lunch. Example problems are provided so bring a calculator if you want to test out your new skills. Laptops are also recommended for using the provided electronic worksheets.

Introduction

- Energy flow in piping systems
- Why optimize a piping system?
- Energy losses in a piping system
- Industry and government resources
- Developing an optimization method
- DOE case studies of successful optimization

Energy Assessments

- ASME Energy Assessment for Pumping Systems standard
- Assessment levels
- How to organize a plant assessment
- Prescreening your systems
- System walk-through
- Data collection
- Analyzing plant data
- Solutions to excessive energy use
- Reporting and documenting

Motors and Drives

- Motors as an energy conversion device
- Energy loss in a motor
- Motor efficiency standards
- Motor power equations
- Motor and drive calculation worksheet
- Variable speed drives
- VFD efficiency

Centrifugal Pumps

- Theory of operation
- NPSH and cavitation
- Pump performance curve
- Pump power equations
- Energy loss in a pump and pump efficiency
- Calculating pump operating cost
- Pump affinity rules
- Options for optimizing pump operation
- Cross-validating pump and motor data
- Pump calculation worksheet

Energy Losses in Pipelines

- Forms of hydraulic energy and energy loss
- Bernoulli Equation
- Converting pressure to head
- Calculating fluid velocity
- Head loss calculations for pipes, valves, and fittings
- Cost of head loss
- Options for reducing head loss
- Pipeline calculation worksheet

Control Valves

- Types of control valves
- Energy profile through a valve
- Flow coefficient equation
- Control valve characteristics
- Calculating the cost of throttling
- Control valve calculation worksheet

The Piping System

- Types of piping systems
- Hydraulic performance of piping system devices
- Component calculation worksheet
- Use and limitations of the system resistance curve
- System static and dynamic head
- Understanding system process requirements
- Effect of over-sizing equipment in a system
- Methods of controlling a system
- Cost comparison of control methods

Solutions for Excessive Energy Use

- Reducing system static and dynamic head
- Reducing system flow rates
- Reducing system run times
- Modifying system equipment and configuration
- Replacing inefficient equipment

Developing an Assessment & Optimization Method

- Prioritizing systems by prescreening
- Conducting a system walk through
- Data collection and analysis
- Identifying inefficient operation
- Developing options for system optimization
- Economically justifying optimization projects
- Implementing system optimization
- Monitoring and reporting results

Case Studies

- Reviewing the system description
- Understanding the design case
- Detailed equipment descriptions
- Maintenance and operational histories
- Load profiles
- Current operating conditions
- Analyzing system operation
- Operating cost calculation
- Identifying options for optimization
- Evaluating options for economic feasibility.



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Class Registration

To register: Fax (360) 412-0672, call (888) 206-2779, or email register@flowoffluids.com This registration form does not guarantee that a seat is held for the registrant(s). Call to confirm seating availability.

Course fee: The registration fee of \$1295 includes the three-day seminar, course workbook and copy of the ASME standard EA-2-2009, Energy Assessment for Pumping Systems.

Cancellation Policy: If notification is received at least two weeks prior to the start of the course, credit may be granted to a later seminar date. No refunds are available for cancellations made less than 30 days prior to the start of the scheduled course. If for any reason we are required to cancel a class, our liability is limited to the return of the registration fee.

Guarantee: Engineered Software offers the highest quality training available. If you are dissatisfied for any reason, notify the instructor prior to the end of the first day and you may withdraw and receive a 100% tuition refund.

Class size: Limited to 40.

Continuing Education Unit (CEU): Completion of the Piping System Assessment & Optimization Training is credited as 2.4 CEU's (24 Professional Development Hours).

Courses are offered on the following 2010 schedule:

Boston, MA - September 21-23, 2010

Houston, TX - November 9-11

Method of Payment (Check one):

Visa MC Amex Purchase Order* Check (Payable to Engineered Software)

Card Number:

Exp. Date:

Security Code:

Name On Card:

Signature:

Attendee Information ** Requested Class Date:

Boston, MA - September 21-23, 2010

Houston, TX - November 9-11

*In order to notify you of class changes or cancellations, contact information **MUST** be completely filled out.*

Name:

Email:

Company:

Title:

Address:

City:

State:

Zip:

Phone:

Fax:

Please **Mail** this form to:

Engineered Software, Inc. c/o Flow of Fluids
4529 Intelco Loop SE
Lacey, WA 98503-5941

For your convenience you may also:

Fax to: (360) 412-0672

E-mail to: register@flowoffluids.com

Phone Registration is available from 7am to 3:30pm PDT: (888) 206-2779

* Invoice to be paid prior to beginning of class.

** For additional attendees, a second sheet has been provided. If you need more spaces to register additional people please make a copy of the following attendee registration sheet and use it to include all attendee registrations and return with the Payment Method form.

Additional Attendee(s) Form

Attendee Information

Name: _____ Email: _____
Company: _____ Title: _____
Address: _____
City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____

Attendee Information

Name: _____ Email: _____
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