



# Piping System Fundamentals

## Spring 2010 Class Registration

The Piping System Fundamentals courses focus on the skills needed to fully understand fluid piping systems and successfully troubleshoot changes or additions to any piping system situation. Our emphasis is on understanding the relationship between the components that make up a piping system and what happens when changes are made to the piping system.

Each attendee is given a course handbook, the *Piping System Fundamentals* book, and a copy of the Crane Technical Paper No. 410 (TP410) in order to maximize the value of your learning experience.

### TRAINING OUTLINE

The course length is two 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.

#### **DAY 1 – BASIC TRAINING**

##### **INTRODUCTION**

- The Value of a Clear Picture
- Minimizing Capital Costs
- Minimizing Operational Costs
- Minimizing Maintenance Costs

##### **PIPING BASICS**

- Definitions
- Pipe Details
- Pressure Calculations
- Bernoulli Equations
- Pipeline Headloss Calculations

##### **PIPELINES**

- Pipe Material Variations
- Valves & Fittings
- Fluid Properties
- Connecting Pipelines
- Piping System Networks

##### **PUMPS**

- Overview
- How Centrifugal Pumps Operate
- Pump Types
- Understanding the Pump Curve
- Net Positive Suction Head
- Pump Affinity Laws
- Pump Power & Cost of Operation
- Operating Pumps Properly

#### **DAY 2 – SYSTEM EXAMPLES**

##### **CONTROL VALVES**

- Overview
- How Control Valves Operate
- Control Valve Description
- Selecting Control Valves
- Off Normal Control Valve Operation

##### **FLOW METERS**

- Types of Flow Meters
- Sizing Flow Meters
- Off Normal Flow Meter Operation

##### **COMPONENTS**

- Heat Exchangers
- Filters & Strainers

##### **SYSTEM OPERATION**

- Single Pipeline Controlled Flow
- Pipeline Between Two Pressure Sources
- Pipelines & Pumps
- Controlling Flow Rate with a Control Valve
- Controlling Flow Rate with a Pump
- Controlling Flow Rate with a VSD
- Balancing a System with Multiple Destinations
- Balancing a System with Multiple Loads
- Problems with Cavitating Pumps
- Problems with Cavitating Control Valves

##### **CONCLUSION**

- Review of First Day Examples
- Value of a Clear Understanding

## Class Registration

**To register:** Fax (360) 412-0672, call (800) 786-8545, or email [register@fluidfundamentals.com](mailto:register@fluidfundamentals.com) This registration form does not guarantee that a seat is held for the registrant(s). Call to confirm seating availability.

**Course fee:** The early registration fee of \$895 includes the two-day seminar, course workbook and Crane's TP410. The registration fee on the day of the class is \$995.

**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 Fundamentals Training is credited as 1.5 CEU's.

**Courses are offered on the following Spring 2010 schedule:**

Halifax, NS - May 25-26

Phoenix, AZ - June 2-3

Philadelphia, PA - Sept 15-16

Los Angeles, CA - October 6-7

Atlanta, GA - October 20-21

Las Vegas, NV - November 17-18

Houston, TX - December 8-9

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### 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:*

Halifax, NS - May 25-26

Phoenix, AZ - June 2-3

Philadelphia, PA - Sept 15-16

Los Angeles, CA - October 6-7

Atlanta, GA - October 20-21

Las Vegas, NV - November 17-18

Houston, TX - December 8-9

*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 select the version of the **CRANE TP410** you would prefer     US Edition     Metric Edition

Please select the version of **Piping System Fundamentals** you would prefer     US Edition     Metric Edition

Please **Mail** this form to:

Engineered Software, Inc.  
c/o Fluid Fundamentals Training  
4529 Intelco Loop SE  
Lacey, WA 98503-5941

For your convenience you may also:

**Fax** to: (360) 412-0672

**E-mail** to: [register@fluidfundamentals.com](mailto:register@fluidfundamentals.com)

**Phone Registration** is available from  
7am to 3:30pm PDT: (800) 786-8545

\* 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

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### Attendee Information

Name: \_\_\_\_\_ Email: \_\_\_\_\_

Company: \_\_\_\_\_ Title: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Plases select the version of the **CRANE TP410** you would prefer  US Edition  Metric Edition

Plases select the version of **Piping System Fundamentals** you would prefer  US Edition  Metric Edition

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