



# Piping System Fundamentals

## 2012 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**

What is a Piping System?  
Value of a Clear Picture of a Piping System  
Understanding the Total Piping System

##### **Terminology, Units, and Physical Laws**

Fluid Properties  
Flow Rate, Pressure, Head, and Head Loss  
Physical Laws that Govern Fluid Flow

##### **Tanks and Vessels**

Types of Tanks and Vessels  
Key Hydraulic Measurements  
Measuring & Controlling Tank Level, Pressure, & Temp.  
Common and Abnormal Tank Operations

##### **Centrifugal Pumps**

Major Pump Parts  
Theory of Operation  
Understanding the Pump Curve  
Pump Power & Cost of Operation  
Net Positive Suction Head and Cavitation  
Pump Affinity Laws  
Parallel and Series Pump Operation  
Fluid Considerations  
Pump Selection  
Operating Pumps Properly

##### **Pipelines**

Pipeline Terminology  
Head Loss Calculations  
Head Loss for Series and Parallel Piping  
Factors Affecting Head Loss  
Pipe Sizing and Selection

#### **DAY 2 – SYSTEM EXAMPLES**

##### **Valves and Fittings**

Purpose of Valves and Fittings  
Valve and Fitting Losses  
Hydraulic Performance of Valves and Fittings  
Valve Applications  
Cost of Valve Head Loss

##### **Control Valves**

Types of Control Valves  
Control Valve Operation  
Characteristic Curves  
Control Valve Applications  
ASME Ratings and ANSI Valve Classes  
Cavitation, Choking, and Flashing  
Sizing and Selecting Control Valves  
Control Valve Equations

##### **Process Measurement and Controls**

Instruments Used to Measure Processes  
The Typical Process Control Loop  
The PID Controller and Controller Tuning  
Control Schemes

##### **Piping System Processes and Process Equipment**

Types of Processes  
Process Equipment  
Hydraulic Performance of Equipment

##### **The Total System**

Types of Piping Systems  
Key Concepts to Understand the System  
Calculating Flow Between Two Pressure Sources  
Series Piping, Parallel Piping & Branching Piping  
The Siphon Effect  
System Static and Dynamic Head  
Visualizing Energy Addition and Losses  
Troubleshooting Piping Systems

## 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 2012 schedule:**

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Portland, OR - Mar 14-15, 2012  
Birmingham, AL - Apr 18-19, 2012  
Chicago, IL - Apr 24-25, 2012

### 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 (circle one):*

Portland, OR - Mar 14-15, 2012  
Birmingham, AL - Apr 18-19, 2012  
Chicago, IL - Apr 24-25, 2012

*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: \_\_\_\_\_ PE #: \_\_\_\_\_

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: \_\_\_\_\_ For your convenience you may also:

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

**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: \_\_\_\_\_ PE #: \_\_\_\_\_

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

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