

## PD679

### Selection of Pumps and Valves for Optimum System Performance

#### Day 1 – Review of Preliminary Topics

- Introduction
  - Examples of installations
  - Description of unit systems: SI and Engineering units
  - Review of fluid mechanics
  - Derivation of friction factor equations
  - Flow in circular pipes
  - Flow in noncircular ducts
  - Calculation of pressure loss a pipeline due to friction
  - Calculation of pressure loss due to minor losses
  - Minor Loss tables and calculations
  - Equivalent length
  - Moody diagram
  - Curve fit equations for the Moody diagram
- Centrifugal Pumps
  - Testing of centrifugal pumps
  - Performance curves for centrifugal pumps
  - Derivation of dimensionless groups for centrifugal pumps
  - Affinity Laws for pumps
  - Specific speed and how it is used to correlate data
  - Pump efficiency
  - System curve for a piping system
  - Pump selection using the system curve
  - Effect of pipeline diameter on pressure losses

#### Day 2 – Pumps

- Centrifugal Pumps (cont'd)
  - Net Positive Suction Head
  - Suction lift and suction head configurations
  - Avoiding cavitation
  - Example problems to demonstrate pump selection procedure
  - Series and parallel pump configurations
  - Evaluating system performance
- Centrifugal Pumps
  - Derivation of Euler's equation for turbomachines
  - Application of Euler's equation to predict pumping power
  - Designing a centrifugal pump impeller
  - Designing a centrifugal pump volute
  - Extension to positive displacement pumps

### **Day 3 – Meters in Pipelines**

- Turbine type meter
- Rotameter
- Venturi Meter
- Orifice Meter
- ASME standards & recommended practices
- Calibration methods

### **Day 4 – Positive Displacement Pumps**

- Reciprocating diaphragm pumps
- Reciprocating piston pumps
- Gear pumps
- Lobe pumps
- Screw pumps
- Gear Pumps
- Lobe Pumps
- Testing procedures
- When to use a PD pump

### **Day 4 – Valves**

- Basics of Valves
  - Types of Valves
  - Flow
  - Pressure Temperature Rating
  - End Connections of Valves
  - Types of Connections
  - Valve Categories
  - Advantages and Disadvantages of Types of Valves
- Materials Used in Valve Construction
  - Stainless Steels
  - Coatings
- Selection of Valves
  - Selection Parameters
  - Procurement Specifications
- Flow Characteristics of Valves
  - Flow Coefficient
  - Pressure Drop



- Valve Operation
  - Manual
  - Gear Unit
  - Actuator
- Best Practices