

PD763
Centrifugal Pumps: Testing, Design and Analysis

Day One

- Introduction
 - Examples of Pump Installations
 - SI and Engineering unit systems
 - Review of fluid mechanics
 - Derivation of friction factor equations
 - Flow in Circular Pipes
 - Flow in Annular Ducts
 - Calculation of pressure loss in 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
- Types of Valves
 - Flow through a valve
 - Valve categories
 - Advantages and disadvantages of types of valves
- Description of Types of Pumps
 - Reciprocating diaphragm pumps
 - Reciprocating piston pumps
 - Gear pumps
 - Lobe pumps
 - Screw pumps

Day Two

- 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
 - Best practices

- Analysis of centrifugal pumps
 - Velocity Diagrams for flow through a centrifugal pumps
 - Derivation of Euler's equation for turbomachines
 - Application of Euler's equation to predict pumping power

Day Three

- Designing a centrifugal pump impeller
 - Selecting inlet and outlet vane angles
 - Vane layout drawings using Kaplan triangles
 - Vane layout drawings using tangent circular arcs
- Designing a centrifugal pump volute
- Effect of pipeline diameter on pressure losses
- Series and parallel pumps
- Critical speed of a rotating shaft
 - Vibrational effects
- Shaft stresses
 - Bending stresses
 - Axial stresses
 - Torsional stresses
- Disk stresses
- Economic factors