

Pumps & Piping

Duration: 16 Hour Program

PIPING DESIGN SYSTEMS

Flow Rate Determination
Piping Layout, Pipe Size, and System Syzer
Open & Closed Systems
Valve Installation Type & Effect
Balancing Valves, Manual, Automatic Flow
Branch to Riser Pressure Drop Ratio

CENTRIFUGUL PUMPS

Impeller
Pump Volutes
Mechanical Seals, Seal Materials, Ratings

PUMP CURVES

Pump Curve Selection
Head vs. Capacity
Pump Efficiency
Non Overloading
Pump Cavitations
NPSHR, NPSHA, NPSH Margin
Gauges & Pump Curves in Trouble Shooting

REDUCING OPERATION COSTS

Affinity Rules
Cost and Issues
Variable Speed Pumping
Automatic Control Systems Sensor Location
Automatic Drive Bypass Systems

GLYCOL SYSTEMS

Historical Issues
Glycol Inhibitors, Dilution Water
System Filling & Avoiding Damage to Thermal
Storage Units

PROTECTING THE PUMP

Adverse Minimum Flows
Controlling Minimum Flow
Building Loads
Three Way Valve Systems
Two Way Valve Systems
Constant Speed, Variable Speed
Effects of Excessive Flow

PUMP INSTALLATION

Bases & Suction Piping
In-Line Pump Installations
Pipe Supports & Pump Alignment
Triple Duty Valves
Pressure Gauges & Corrosion Protection

TOWER SYSTEMS

Suction Piping
Historical Issues in Tower Systems
NPSH and Cavitations

FILLING, VENTING, & PRESSURIZING SYSTEMS

Cleaning & Flushing
Water Conditions Effect on Seals, Valves
Air Separators, Strainers
Setting PRV or Fill Pump
Compression or Pre Charged Tanks
PNPC & Relief Valves

PRESSURE BOOSTER SYSTEMS

Typical Booster Package
Components of Booster Package & Setting
the PRV