

Motor Driven Pumping Systems One Day Workshop

Purpose: Increasing energy demand requires increased overall plant efficiency, reliability and profitability. Improved systems design, installation and operation will assist in achieving these objectives. Motor driven systems comprise a large portion of a condensing steam power plant therefore providing the greatest opportunity for improving Uptime, availability and reliability.

Scope: Provide FOMIS members a one day workshop addressing motor and drive interaction as applied to large electric motor driven pumping (vertical and horizontal) systems. This in-depth workshop will provide a step-by-step process on selection, installation, operation, maintenance and performance testing of pumping system with a focus on motor reliability.

Agenda

8:00 a.m. – 12:00 p.m. Morning Session

- How a Roto-Dynamic (Centrifugal, Mixed Flow, and Axial Flow) Pump Works
 - Basic Pump Design
 - Boiler Feed
 - Condensate
 - Circulating Water
 - Heater Drain
- Calculating Horsepower
 - Water Horsepower
 - Brake Horsepower
 - Calculating Pump Efficiency
- Understanding the Pump Performance Curve (Impact on Motor)
 - Reading a Pump Curve
 - Plotting a Pump Curve
 - Types of Curves
 - Pump Efficiency
 - Shut-off Head
 - Allowable Operating Range (AOR)
 - Best Efficiency Point (BEP)
 - Preferred Operating Range (POR)
 - Minimum Flow
 - Thermal
 - Minimum Flow
 - Minimum Continuous Stable Flow
 - Maximum Flow Rate (Run Out)
 - Operating Point Vs. Design Point

- Pump Affinity Rules
 - Change of Rotational Speed
 - Change of Impeller Diameter

12:00 p.m. – 1:00 p.m. Lunch

1:00 p.m. – 4:30 p.m. Afternoon Session

- Pumping System Fundamentals; The Impact on Total System Efficiency
 - Pump
 - Motor
 - Coupling
 - Gearbox
 - Fluid Drive
 - Drive
 - Piping
 - Valves
 - End User Equipment (Boiler, Heat Exchanger, etc.)
- System Issues / Troubleshooting (Critical Systems)
 - Failure Modes / Cause and Effect
 - Boiler Feed
 - Condensate
 - Heater Drain
 - Circulating Water
 - Installation
 - Piping
 - Pump Performance
 - Cavitation
 - Coupling
 - Valve
 - Gearbox
- Assessing System (What to Look For)
 - Plotting a System Curve
 - Diagnostics and Data Collection
 - Using the Data to Identify Opportunity
 - Life Cycle Costing

Tools:

- PSIM (Pump System Improvement Modeling Tool) - Download from HI Web Site
- LCC Calculator (Excel Spread Sheet)
- System Efficiency Spread Sheet (Excel Spread Sheet)
- Valve Tool
- Speed Change Calculator (Excel Spread Sheet)
- Friction Loss Calculator (Excel Spread Sheet)

- QA / QC Check List (Excel Spread Sheet)
 - Boiler Feed Pump
 - Condensate Pump (Vertical)
 - Circulating Water Pump

Deliverables: Participants who attend the workshop will gain a better understanding of how pumping systems can affect the overall systems design and reliability of power plants as well as expertise on motor and pump interaction as applied to critical pumping applications within a typical condensing steam power plant. The workshop will also address the impact on motors driving the power plant pumps and how reliability and efficiency can be optimized by proper installation, operation and maintenance.