

CENTRIFUGAL PUMPS AND POSITIVE DISPLACEMENT PUMPS

OBJECTIVES

To enable the participants to understand performance, technology, and operation of centrifugal and positive displacement pumps.

On completion of the course, the participants are able to:

- understand the working and the operation of the pumps
- analyze the technical solutions applied in their units
- establish a diagnosis of the incidents, and participate in the troubleshooting meetings
- bring essential elements for choosing a pump

▲ Who should attend?

Engineers and technical staff involved in centrifugal and positive displacement pump operation, maintenance or engineering.

COURSE CONTENT

HYDRODYNAMICS APPLIED TO A PUMPING SYSTEM 2 days

Pump performance

Flow in a pump, velocities triangle, internal flow and energy losses. Theoretical and practical head: characteristic curve. Other characteristics: efficiency, power. Internal heating: minimal thermal flow. NPSH required: cavitation. Changes in characteristics vs rotation, viscosity, impeller shape, cavitation.

Pipe system

Liquid flows in pipes: friction losses. System curve, resistance of flow and throttling control. Operating point: normal and maximum capacities, change in fluid characteristics and incidence on operating conditions.

Case study: study of a reflux line and its pump.

CENTRIFUGAL PUMP TECHNOLOGY AND SELECTION 2 days

Centrifugal pump selection criteria

Construction and technology: API and ISO specifications. Internal forces and mechanical criteria: shaft sag, balancing, ring clearances. Specific numbers, impeller and pump shape, suction conditions.

Mechanical seal selection criteria

Selection according API or ISO standards, materials, type. Stability, friction face heating. Safety and environment: typical arrangements (single, double, dry seal).

Installation selection criteria

Suction and discharge pipe design. NPSH available; base plate and grouting. Auxiliary pipes and devices.

Others selection criteria

Coupling and driven machines. Safety and environment: ATEX instructions. Specific solutions: canned motor pump, magnetic drive pump.

POSITIVE DISPLACEMENT PUMP TECHNOLOGY AND PERFORMANCE 0.5 day

Technology

Different types of pumps: rotary and reciprocating pumps
Operating principle and utilization of the different types of pumps.

Performance

Influence of clearance, internal leaks, nature of product on flow rate and pressure
Flow rate regulation
Installation guidelines: position of tanks, line diameters, metering drums, pulsation dampeners, pressure valves.

PUMP OPERATION 0.5 day

Preparation: filling, draining; spare pumps: heating, auxiliaries.

Start-up / Shut down: priming, remote/local controls, hammer shock, risks for process and pump.

Survey: parameters (vibration levels, noises, bearing housing temperature, motor intensity, pressures); process incidences (discharge pressure, viscosity, specific gravity, intensity); hazards.

Parallel and series operations: risks, dysfunction.

Reliability: types and origins of damages (wear, ruptures, cavitation, leakages); ways of improvement.

Safety conditions.

▲ Duration

5 days

▲ Dates & Location

Non-scheduled

May only be organized for a single company

▲ Tuition Fees

To be agreed upon

▲ Course Coordinator

Christian Castelnaud

Ref. **MTE / PC-E**