

# Introduction to rotating machines (PC-1)

#### Objective:

- Acquire the general principles of machine operation: centrifugal pumps, centrifugal and reciprocating compressors, steam turbines.
- Identify the operating limits specific to each type of machine.
- Define the main cases of major disorders.

#### Target group:

- This course is aimed at operators, foremen, technicians or engineers from operations, maintenance or process departments with at least 1 month's professional experience.
- Maximum 8 to 10 people per session.

## **Contents:**

#### Day 1

Centrifugal pumps

09:00 - 10:30

- Pump types: Technology: casings, impellers, bearings, seals
- Characteristics: Flow rate / Head
- Centrifugal pump performance curves

10:30 - 10:45 Break

10:45 - 12:15

- Power and efficiency
- Influence of parameters: rotation speed, impeller diameter, density, viscosity
- Operating limits: cavitation and NPSH

12:15 - 13:15 Lunch

Centrifugal compressors

13:15 - 14:45

- Different technologies: housings, impellers, diffusers, bearings
- Gas compression: centrifugal effect, role of impellers and diffusers, return channels.

14:45 - 15:00 Break

15:00 - 16:30

- Characteristic curves of a centrifugal compressor:
  - o Compression ratio, volume flow, mass flow
  - o Influence of speed, efficiency, power
  - o Operating limits
- Protection and monitoring devices: anti-pumping, vibration and axial displacement sensors.
- Major incidents

#### Dav 2

Reciprocating compressors

09:00 - 10:30

- Technology:
- o Components of a reciprocating compressor: frame, cylinders, pistons, sealing valves, Direct drive or geared motor

- o Anti-pulsation devices
- Compression cycle: flow, power, efficiency

10:30 - 10:45 Break

10:45 - 12:15

- Adaptation to operating conditions: influence of parameters P, T, mw
- Multi-stage compressor operation
- Protective devices and major incidents: effects and prevention

12:15 - 13:15 Lunch

Steam turbines

13:15 - 14:45

- Turbine classification: action or reaction, counterpressure or condensation
- Technology: rotor, blades, diaphragms, thrust bearing, bearings

14:45 - 15:00 Break

15:00 - 16:30

- Steam turbine principle :
  - o Steam expansion: Mollier cycle, enthalpy variation
  - o Steam turbine performance: steam flow, power, efficiency
- Operating limits: inlet and outlet steam pressure and temperature
- Protective devices
- Major incidents

## Implementation / working method:

2-day interactive face-to-face course, powerpoint support will be shared at the beginning of the course in paper and digital formats.

## Course language and materials

French

## **Event Properties**

**Event Date** Wednesday, 24 September 2025 - Thursday, 25

September 2025

**Registration Start Date** Monday, 30 November -0001 **Cut off date** Monday, 30 November -0001

Individual Price Membre CHF 1'130.00, non-membre CHF 1'350.00,

étudiants/doctorants/AVS CHF 600.00 (incl. Lunch)

Lecturer Michel Huet, PRIMCO

Course language French

Location PRIMCO Thônex, Thônex