



## 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

#### Day 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**

<b>Event Date</b>	Wednesday, 21 May 2025 - Thursday, 22 May 2025
<b>Registration Start Date</b>	Monday, 30 November -0001
<b>Cut off date</b>	Monday, 30 November -0001
<b>Individual Price</b>	Membre CHF 1'130.00, non-membre CHF 1'350.00, étudiants/doctorants/AVS CHF 600.00 (incl. Lunch)
<b>Lecturer</b>	<a href="#">Michel Huet</a> , PRIMCO
<b>Course language</b>	French
<b>Location</b>	<a href="#">PRIMCO Thônex, Thônex</a>