

Gas Turbines

General Objectives:

To deepen knowledge about gas turbine technology and enhance competency in the selection, operation and maintenance of gas turbines.

Specific Objectives:

At the end of training the trainees will be able:

- ✓ To understand gas turbine operation;
- ✓ To understand selection criteria based on process and on-site conditions;
- ✓ To participate in gas turbine troubleshooting;
- ✓ To know how to create a gas turbine maintenance schedule.

Audience:

Engineers and managers involved in gas turbines operation, maintenance, engineering and purchase, as also, as operators who want to improve the knowledge.

Workload: 40 hours

CONTENTS:

Module I – Gas turbine equipment

- ✓ Classification: typical cycles, heavy duty and aerodrivative designs, applications;
- ✓ Presentation: main components. Typical machines available on the market;
- ✓ Construction and design: compression, combustion, expansion. Rotor dynamics, coupling;
- ✓ Auxiliary equipment;
- ✓ Internal cooling, lubrication, control system, safety devices.

Module II – Performance

- ✓ Thermodynamics: ideal and actual gas, behavior during compression and expansion, isentropic and polytropic processes;
- ✓ Centrifugal and axial compression. Performance, stability and other limits;

- ✓ Combustion: types of combustors, combustion operation. Influence of fuel type. Afterburning for cogeneration purposes. Low NOx designs;
- ✓ Expansion: single ou double shaft design operation;
- ✓ Performance influence of atmospheric conditions, fuel selection. API charts;
- ✓ Available load characteristics: rotation speed, T3 firing temperature, IGV influences. Open cycle, combined cycle examples;
- ✓ Case studies: actual performance vs basic design; troubleshooting.

Module III – Selection

- ✓ Selection criteria according to availability, operational and maintenance requirements;
- ✓ Bidding: significant information for data sheet definition.

Module IV – Operation

- ✓ Start-up and shutdown operation: sequences and trips;
- ✓ Air filtering, lubrication and fuel systems operation;
- ✓ Performance monitoring and mechanical operation;
- ✓ Maintenance during operation: compressor cleaning devices;
- ✓ Maintenance objectives and scheduling: operation, load, fuel influences; inspection schedules;
- ✓ Factors related to available load: rotation speed, T3, IGV. Typical approaches related to Brayton cycle, cogeneration (combined cycle).