

COURSE DESCRIPTION

# CHP400 - Power Plant Fundamentals

## Layout and Components

### Course goal

The course goal is to give students fundamental knowledge of Power Generation Technology and an overview of functionality and operation of the main components.

### Main learning objectives

The participants will be able to:

- Describe the layout of a specific power plant
- Identify the main components and describe their characteristics
- Outline operation and installation of components
- Describe main plant operation steps and maintenance measures
- Describe function of related Power Generation System

### Participant profile

Supervisors, design and planning personnel, engineering and application personnel, maintenance and operating personnel and consultants from the Electricity Supply Industry. Sales and technical personnel from ABB companies.

### Prerequisites

Electrical or mechanical engineering degree, technical college qualifications or equivalent. Basic knowledge of power generation and process control is recommended.

### Topics

#### POWER PLANT TURBOMACHINES

- Fundamentals: Design, classification, physical concepts and basic laws.
- Hydraulic machines: Application, function and operation of turbines and pumps.
- Turbocompressors: Construction, principles, operation range and protection.

- Gas- and steamturbines: Function and classification, principles, starting steps and operation modes.
- CCGP: Basic process and comparative cycles for gas- and steamturbines. Thermodynamic principles. Main parameters.

#### TURBOGROUP DESIGN AND INSTALLATION

- Turbomachines installation: General projects, classification. Identification of main components.
- Generator and exciter machines: Basic performance of a turbogenerator. Static and brushless excitation.
- Fixed components: Casing, assembling and fixation. Fixed points and expansion control.
- Rotating components: Design, adjustments and basic measurements. Sealing, axial and radial bearings.
- Alignment: Different couplings and shaft line in operation. Machine and rotor alignment

#### PROCESS SYSTEM DESCRIPTION

- Power plant visit: Visit of a selected Power plant. Identification components, reviewing design aspects.
- Process systems: Documentation (P & ID's, SLD's, Instructions), classification.
- Primary systems: Flow path, start-up and operation modes of oil systems.
- Secondary systems: Cooling, sealing & blow off systems, function and operation modes.

- Steam water cycle: Design of Boilers and HRSG's, steam process systems, flow path and basic function
- BOP systems: Selection of BOP systems e.g. closed cooling water, etc.
- CCGP process cycle

#### START-UP AND OPERATION MODES OF A CCGP, CONTROL SYSTEM

- Gasturbine process: Design of open and closed loop controllers. Actual regulators, speed and load control, function diagrams.
- Startup sequence: Preparation, standstill checks, start-up, and ignition. Check points. Synchronizing & loading characteristics.
- Typical starting failures: Problems during start-up. Trouble-shooting sequence and solutions.
- Operation modes: CCGP, including HRSG and steamturboset, considering power output and network condition.
- Gasturbine protection: Drive and group control, hardwired units for supervision and protections.
- Shutdown sequence: Normal shutdown with deloading gradient, idling and rundown. Emergency shutdown.
- Control System: Introduction to Automation Platform and philosophy. Design example

#### MAINTENANCE AND TROUBLE-SHOOTING (optional)

- Operation maintenance: Concepts, analysis, organization and checks. Data collection and evaluation.
- Output and efficiency: Calculation of power output and efficiency of a CCGP, influence factors.
- Important contaminants: Possibilities of fouling of compressors and turbines, Blade Corrosion.
- Operation problems & Trouble-shooting: Typical failures and their prevention. Alarms in operation. Actions and procedures.
- Standstill maintenance: Planning, manufacturers recommendations, procedures of an overhaul, checklist. Important measurements

#### Course type

This is a face to face class room training with maximum 8 participants.

#### Learning methods and tools

Lectures, demonstrations, applied exercises, discussions and a plant visit. **Laptop** or tablet is required to have access to the e-documentation.

#### Duration

4 days (5 days incl. chapter "Maintenance and - Troubleshooting")

#### To Register:

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