ENGINEERING TRAINER

# Steam Turbines: Operation and Maintenance

This steam-turbine course explains turbine operation and maintenance from the casing, turbine sections, seals, couplings and valves through auxiliary oil systems, controls and protection. It also covers inspection, clearances, alignment, balancing, vibration and performance monitoring. This self-paced online course includes video lectures and a completion certificate with PDH credits.

Buy This Course

Request a Quote or Invoice

| | | |
|---|---|---|
| ONLINE | SELF-PACED | 1-YEAR ACCESS |
| 11 MODULES | 10.5 PDH | 10.5 HOURS |

## TRUSTED BY ENGINEERING TEAMS WORLDWIDE

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## What you'll learn

This self paced learning path explains Steam Turbines from an operation and maintenance perspective. First the working of a Steam Turbine is explained and the components, ranging from the casing and the HP turbine, to the seals and the coupling are detailed. The auxiliary oil systems, the sealing, the supervisory control systems and the steam regulation valves are then explained.

The participants will be shown the control options for a Steam Turbine. What is the function of the Governor? What is the architecture of the trip system? What automatic protections are built into a steam turbine? Common maintenance procedures, such as opening the casing and removing the rotor, and adjustment or removal of the journal bearing are then explained The training course concludes with performance monitoring and troubleshooting. Participants are shown how vibration analysis can be used to identify problems in the steam turbine such as rotor rub or an unbalance, and how the performance of the steam turbine can be monitored using which measurement points.

This learning path is formed of 11 courses split across 10 hours 30mins of video recording based content.

## Skills you'll gain

- ✓ have a comprehensive knowledge of the main components in a steam turbine, including lubricating oil systems, steam and water seal systems, and hydraulic power units,
- ✓ are able to identify the locations of the turbine supervisory instrumentation and describe their functions,
- ✓ understand the different control concepts for a steam turbine,
- ✓ know how to perform thorough examinations of the cause and effects of thermal stress on normal turbine operations,
- ✓ are able to disassemble and assemble major turbine components safely, and can play an active role in improving inspection/repair techniques,
- ✓ are able to identify irregular operating conditions based on the vibration measurements for different components,
- ✓ understand how to detect abnormal conditions, and can propose potential solutions and loss prevention methods.

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# Steam Turbines: Operation and Maintenance

## About the instructor

**Dimitris Antoniadis**

Power Plant Maintenance Manager

## Who this course is for

- ✓ Steam-turbine operations engineers
- ✓ Steam-turbine maintenance engineers
- ✓ Rotating-equipment engineers responsible for steam turbines
- ✓ Power-plant technicians working with steam-turbine systems
- ✓ Oil and gas production technicians supporting steam turbines
- ✓ Process-plant technicians supporting steam turbines

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# Steam Turbines: Operation and Maintenance

## Course content

### Introduction to Steam Turbines

- Course Introduction
- What is a Steam Turbine?
- Thermodynamics
- According to Flow Directions
- According to Blade Type
- Classification
- Summary

### Steam Turbine Components

- Course Overview
- Outline of Components
- HP-IP Turbine
- LP Turbine
- HP Pedestal
- Steam Turbine Rotor
- Turbine Casing
- Turbine Blades
- Balancing Piston and Wheel Chamber
- Bearings
- Seals
- Coupling
- Condenser
- Vacuum System
- Summary

### Steam Valves

- Course Overview
- Why are Steam Valves needed?
- Valves for Controlling Steam Flow
- Turbine Stop and Control Valves
- Valve Seat Replacement
- Control Valve Hydraulics
- Stop/Control Valve Upgrades
- Bypass Valves
- Drain Valves
- Turbine Safety Valves
- Summary

### Turbine Generator Aux. Systems

- Course Overview
- Control Oil
- Turbine Lube/Lift Oil System
- Lifting Oil
- Hydraulic Turning Gear Unit
- Gland Seal System
- Drain System
- Generator
- Generator Cooling
- Generator Seal Oil System
- Generator Gas System
- Summary

### Steam Turbine Thermal Monitoring

- Course Overview
- Thermocouple Placement
- Thermal Stress Evaluation
- Temperature Measurements
- Temperature Control
- Casing Deformation
- Turbine Accelerated Cooling System
- Differential Thermal Expansion
- Fixed Point and Sliding Feet
- Nozzle Loads
- Summary

### Steam Turbine Control Concepts

- Course Overview
- Introduction to Control Concepts
- Methods of Governing
- Turbine Control
- Steam Turbine Controller
- Summary

### Turbine Protections

- Course Overview
- Introduction to Protections
- Architecture
- Lube Oil System
- Shaft
- Bearing Metal Temp.
- Seal Oil System
- High and Low Pressure Turbines
- Condenser
- Boiler or Generator Trip
- Push Button and Over Speed
- Turbine Protection System Extra Notes
- Summary

### Turbine Maintenance

- Course Overview
- Journal and Thrust Bearings
- Magnetic Bearings
- Thermal Bow Repair
- Routine Maintenance
- Overhaul Maintenance
- Inspection Intervals
- Start-up Operating Modes
- Inspections
- Preservation
- Summary

### Clearance, Alignment and Balancing

- Course Overview
- Turbine - Shell Clearances
- Turbine Alignment
- Balancing and Unbalance
- Static Unbalance
- Couple Unbalance
- Quasi-Static Unbalance
- Dynamic Unbalance
- Balancing Procedure
- Design Standards
- Closure

### Vibration Analysis

- Course Overview
- Vibration Signature
- Signature Analysis
- Monitoring and Measuring

### Performance & Monitoring

- Operational Issues to Monitor and Solve
- Turbine Supervisory Instrumentation
- Simple Performance Analysis and Contractual
- Test Cycle Calculation
- Contract Cycle Calculation