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Course Name

Operational Flexibility & Efficiency Enhancements of Gas Turbine

Sector Name

Mechanical Engineering

Document Type

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Operational Flexibility & Efficiency Enhancements of Gas Turbine

Course Introduction

Ensuring Gas turbines run at Maximum Efficiency is a primary Goal for Operators. In the current Economic Climate, anything that increases Productivity and hence profit is clearly welcome. From an Environmental point of view, it is also important that Turbines run as efficiently and produce as Few Emissions as possible. Fortunately, there are several ways to improve Gas Turbine Output. Controlling the Humidity and Temperature of Air entering the Combustion Inlet is one of the most important, as it has a direct effect on the turbine's Efficiency, Emissions, and Operational Reliability. The Simple Gas Turbine Configuration has Higher Power Output with effect on the compression ratio, while the Regenerative Gas Turbine Configuration has Higher Efficiency with effect Lower Compression Ratio, therefore the variation of Total Power Output is insignificant at the over Compression Ratio. The extensive modelling performed in this study reveals that the ambient temperature and compression ratios strongly influence the performance of the Combined Cycle. A Higher Overall Efficiency can be achieved for the combined cycle with an additional regenerative topping cycle.

The steam turbine

High Operational Flexibility - the Ability of a Power plant to fast-start and to adjust load output fast and predictably to changing market

requirements is an essential prerequisite to ensure economic success. Most factors limiting the load output of an existing combined cycle power plant are the allowed pressure and temperature transients of the steam turbine. The **five-day** course discusses the computation of the Performance of the Gas Turbine Power Plant. The Attendees will be explained the computations of the entire plant and the proper correction factors applicable in all the sections of the plant, which will be developed and discussed.

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Target Audience

- ✓ Automotive Engineer
- ✓ Boiler Engineer
- ✓ Ceramics Engineer
- ✓ Equipment Engineer
- ✓ High-Pressure Engineer
- ✓ Marine Engineer
- ✓ Mechanical Design Engineer
- ✓ Mechanical Engineer
- ✓ Naval Architect
- ✓ Pipeline Engineer
- ✓ Power Engineer
- ✓ Rotating Equipment Engineer
- ✓ Senior Mechanical Engineer
- ✓ Turbine Engineer
- ✓ Validation Engineer

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Learning Objectives

- ✓ Understanding Fundamentals of Gas Turbine Technology to Operational Aspects of Power Plants.
- ✓ Understanding all Operations Aspects and troubleshooting of all Systems and Equipment in the Field and control Room.
- ✓ Provide Operation Engineers and Operators with a broad Review and Systems of the key Factors driving the Operation of Gas turbines.
- ✓ Appreciation of the Operational Problems associated with Gas turbines used for Power Generation and their Auxiliaries.
- ✓ Understanding how the behavior of Operators will be during all the Operations Modes, such as during Normal Operation Condition, Startup, Shutdown, and Emergency Condition, to learn what the right action should be taken during each case?
- ✓ Investigation, Diagnose system versus component Problems, Causes, and Root Causes.

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Course Outline

✓ **01 DAY ONE**

Module (01) Optimizing Gas Turbine Unit

- ✓ Thermodynamics Parameters
- ✓ Modern Design Issues
- ✓ Utilization & Optimization
- ✓ Efficiency Parameters
- ✓ Simple and Combined Cycle
- ✓ Factors Affecting Performance
- ✓ Loss Prevention and Minimization
- ✓ Detection of Performance Deterioration
- ✓ Diagnostics and Trend Analysis

Module (02) Upgraded Gas Turbine Components

- ✓ Inlet Guide Vans
- ✓ Improved Seals, Tighter Clearances
- ✓ Combustion Liners
- ✓ Transition Pieces
- ✓ Turbine Blades & Vanes
- ✓ Hot Section Coatings
- ✓ Compressor Coatings
- ✓ Instrumentation & Condition Monitoring

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Course Outline

✓ 02 DAY TWO

Module (03) GT Availability & Reliability

- ✓ Operation Modes
- ✓ Availability Issues
- ✓ Utilization Factor
- ✓ Factors affecting GT Availability
- ✓ Starting Reliability
- ✓ Operation Reliability
- ✓ Tuning for Optimum Performance
- ✓ Update Operating Philosophies

Module (04) Major Factors Influencing GT Performance

- ✓ Operation and Services Factor
- ✓ Effects of the Type of Fuel Used
- ✓ Firing Temperature
- ✓ Duty Cycle and Effects
- ✓ Air Quality and Environment
- ✓ Exhaust Temperature
- ✓ Starting Frequency
- ✓ Selecting Maintenance Approaches

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✓ **03 DAY THREE**

Module (05) Gas Turbine Protection Devices

- ✓ Overview of GT Protection
- ✓ Over-Speed Protection Trip
- ✓ Trip Devices Testing
- ✓ Electronic Trip Systems
- ✓ Other Protection Trip

Module (06) Continue Safe Operating Units

- ✓ Take the Reading during Duty
- ✓ Analyzing the Operation Reading
- ✓ Report any diffraction in the Reading
- ✓ Dealing with every incident during the Operation

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Course Outline

✓ **04 DAY FOUR**

Module (07) Optimized Operational Flexibility

- ✓ Lifetime Extension
- ✓ Repair Components
- ✓ Replace Components
- ✓ Modify (If Needed)
- ✓ Future Operational Scenario
- ✓ Total Starts 9.2.2 Further Operating Time
- ✓ Base/Intermediate/Peak Load

Module (08) Lifetime Assessment

- ✓ Analysis of Operational Data
- ✓ Lifetime Analysis
- ✓ Remaining Lifetime
- ✓ Component Safety
- ✓ Integrity & Reliability
- ✓ Examination & Investigation

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Course Outline

✓ 05 DAY FIVE

Module (09) Gas Turbine Efficiency Updated

- ✓ GT Efficiency to Present Energy Industry Solutions
- ✓ GT Efficiency's Automated Tuning System
- ✓ GT Efficiency Corporate Updated for Future
- ✓ Innovative Technology for Reducing Emissions
- ✓ Optimizing GT Efficiency Parameters
- ✓ Effect of Fuel Type System

Module (10) Configuration for Improving Efficiency

- ✓ Integration of Gas Turbine Components
- ✓ Study the Effective Parameter of the GT Model

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Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
Aug. 2, 2027	Aug. 6, 2027	5 days	4250.00 \$	UAE , Dubai
Jan. 24, 2027	Jan. 28, 2027	5 days	4250.00 \$	KSA , Jeddah
May 24, 2027	May 28, 2027	5 days	4950.00 \$	England , London
Nov. 2, 2026	Nov. 6, 2026	5 days	4250.00 \$	UAE , Dubai

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