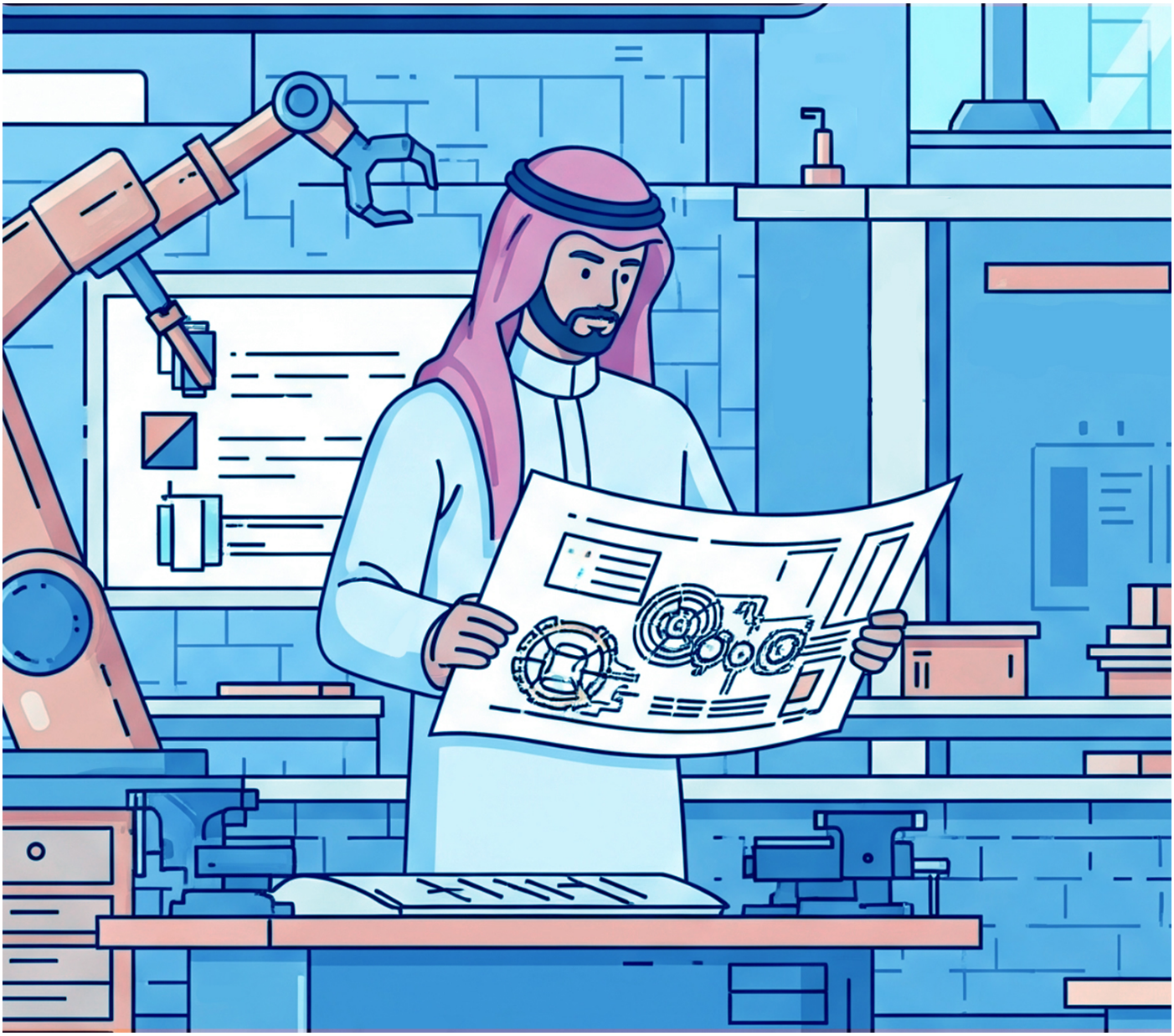
BOOST
THE LEADING TRAINING PROVIDER



Mechanical Engineering

Siemens (NBE) 4000 F Class GT Machines Operation and Maintenance

Course Introduction

This training course is designed to equip TAPCO participants with in-depth knowledge and practical skills necessary for efficient turbine management. The course covers fundamental principles of gas turbine operation, detailed procedures for startup, shutdown, and normal operations, as well as advanced maintenance strategies. Trainees will engage in hands-on workshops and simulations to practice routine inspections, major overhauls, and troubleshooting techniques. The program also includes advanced topics on monitoring technologies and integration with plant systems, ensuring participants are well-versed in the latest industry trends and innovations.

Target Audience

1. Maintenance Management – Overseeing turbine maintenance strategies.
2. Mechanical Engineers – Ensuring reliability and efficiency of GT components.
3. Asset & Reliability Managers – Optimizing turbine lifecycle and performance.
4. Field Service Supervisors – Managing on-site maintenance and troubleshooting.

Learning Objectives

- Learn the fundamental principles of gas turbine operation, including thermodynamic cycles and component functions.
- Execute standard and emergency operating procedures, ensuring safe and efficient turbine operation.
- Develop skills in preventive, predictive, and condition-based maintenance to ensure the reliability and longevity of gas turbines.
- Acquire diagnostic techniques and problem-solving skills to address common mechanical, electrical, and control system faults.

- Explore advanced monitoring systems and data analytics to optimize performance and predict potential issues.

Course Outline

- **01 DAY ONE**

  Introduction and Overview of Siemens 4000 F Class Gas Turbines

  - Overview of Siemens 4000 F Class GT Machines
    - Historical development and evolution
    - Key features and specifications
    - Applications in the power industry
  - Basic Principles of Gas Turbine Operation
    - Thermodynamic cycles (Brayton cycle)
    - Components of a gas turbine (compressor, combustor, turbine)
    - Energy conversion process
  - Technical Specifications and Performance Parameters
    - Power output and efficiency
    - Emission standards and environmental impact
    - Fuel options and flexibility
  - System Components and Functions
    - Compressor section
    - Combustor section
    - Turbine section
  - Control Systems and Instrumentation
    - Overview of control systems
    - Key sensors and instrumentation
    - Data acquisition and monitoring
  - Industry Standards and Safety Regulations
    - ISO and ANSI standards
    - Safety protocols and best practices
    - Compliance requirements
- **02 DAY TWO**

Detailed Operation of Siemens 4000 F Class Gas Turbines

- Startup and Shutdown Procedures
    - Pre-startup checks and preparations
    - Normal startup sequence
    - Shutdown sequence and cooling down
- Normal and Emergency Operating Conditions
    - Load variations and operational adjustments
    - Handling transient conditions
    - Emergency shutdown procedures
- Performance Monitoring and Data Analysis
    - Key performance indicators (KPIs)
    - Analyzing operational data
    - Performance optimization techniques
- Fuel Management
    - Types of fuels used
    - Fuel handling and delivery systems
    - Fuel quality and conditioning
- Control System Operation
    - Human-Machine Interface (HMI)
    - Control logic and algorithms
    - Troubleshooting control issues
- Safety and Risk Management
    - Operational hazards and mitigation
    - Emergency response planning

Safety drills and training

• 03 DAY THREE

Maintenance Practices for Siemens 4000 F Class Gas Turbines

- Maintenance Philosophy and Strategies
    - Preventive maintenance
    - Predictive maintenance
    - Condition-based maintenance
- Routine Inspection and Maintenance Tasks
    - Daily and weekly checks
    - Monthly and annual inspections
    - Lubrication and filter replacement
- Major Overhaul Procedures
    - Planning and scheduling overhauls

        - Disassembly and inspection
        - Reassembly and testing
    - Component Maintenance and Replacement
        - Compressor maintenance
        - Combustor maintenance
        - Turbine blade inspection and replacement
    - Use of Diagnostic Tools and Techniques
        - Vibration analysis
        - Thermography
        - Ultrasonic testing
    - Documentation and Reporting
        - Maintenance logs
        - Inspection reports
        - Compliance documentation

- **04 DAY FOUR**

Troubleshooting and Problem Resolution

    - Common Operational Issues
        - Compressor surges and stalls
        - Combustion instability
        - Turbine blade failures
    - Diagnostic Approaches and Techniques
        - Root cause analysis
        - Fault tree analysis
        - Use of diagnostic software
    - Case Studies of Operational Problems
        - Real-world examples and solutions
        - Lessons learned from failures
        - Best practices in problem resolution
    - Control System Faults and Solutions
        - Sensor and actuator issues
        - Control logic problems
        - Software and firmware troubleshooting
    - Mechanical and Electrical Faults
        - Bearing and shaft issues
        - Electrical faults and insulation problems
        - Cooling and lubrication system failures
    - Developing a Troubleshooting Plan
        - Systematic approach to fault finding
        - Documentation of troubleshooting processes

- **05 DAY FIVE**

Advanced Topics and Practical Workshops

- Advanced Monitoring and Diagnostic Techniques
  - Online condition monitoring systems
  - Advanced data analytics
  - Prognostic health management
- Integration with Plant Systems
  - Grid synchronization and load management
  - Integration with SCADA systems
  - Data communication protocols
- Future Trends and Innovations
  - Emerging technologies in gas turbines
  - Digital twins and virtual simulations
  - Sustainability and environmental considerations

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
April 7, 2025	April 11, 2025	5 days	4250.00 $	UAE - Abu Dhabi
Sept. 1, 2025	Sept. 5, 2025	5 days	4250.00 $	UAE - Dubai
Dec. 1, 2025	Dec. 5, 2025	5 days	4950.00 $	Austria - Vienna