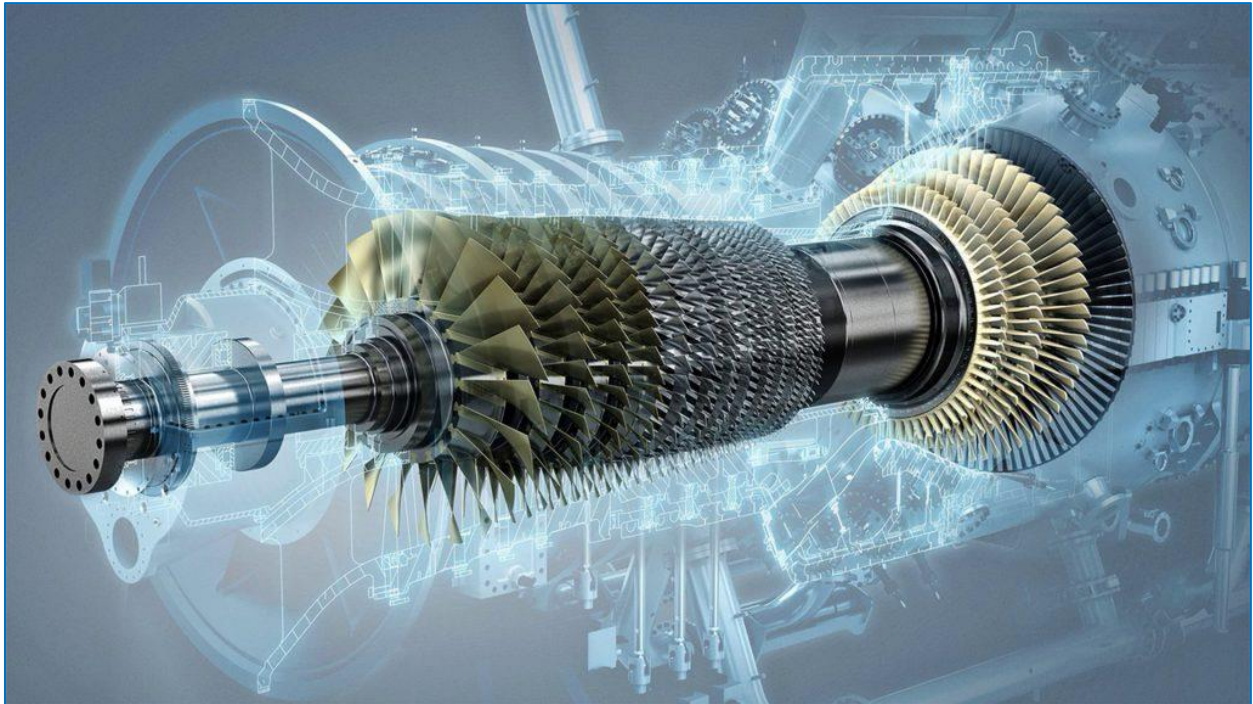




MU214: Pumps, Compressors, Turbines and Troubleshooting

Training Description:

The Pumps, Compressors, Turbines and Troubleshooting training course is designed to provide participants with a comprehensive understanding of rotating and positive displacement equipment used in industrial energy and process systems. Pumps, compressors and turbines are critical assets in power generation, oil & gas, petrochemical, manufacturing and water treatment facilities, where operational reliability and performance efficiency directly impact safety, production continuity and operating cost. This course provides a structured technical approach to understanding machine principles, system integration and failure prevention.

This intensive training course focuses on fluid dynamics fundamentals, thermodynamics of compression and expansion, equipment construction, performance characteristics, installation practices and systematic troubleshooting methodologies. Participants will examine how hydraulic machines convert mechanical energy into fluid movement, how compressors increase gas pressure and how turbines convert fluid energy into mechanical power

By the end of the training course, participants will be able to analyze performance deviations, diagnose mechanical and operational issues and implement corrective and preventive measures that enhance reliability and efficiency. The training course strengthens technical knowledge, analytical capability and decision-making confidence in managing industrial rotating equipment throughout its lifecycle.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Understand the operating principles of pumps, compressors and turbines
- ✓ Differentiate between positive displacement and dynamic machines
- ✓ Interpret performance curves and manufacturer technical data
- ✓ Perform basic hydraulic and thermodynamic calculations
- ✓ Identify common causes of cavitation, surge, vibration and overheating
- ✓ Apply correct installation, alignment and commissioning practices
- ✓ Utilize systematic troubleshooting techniques
- ✓ Implement preventive and predictive maintenance strategies
- ✓ Conduct basic root cause failure analysis
- ✓ Improve operational safety, efficiency and equipment reliability

Training Designed for:

This training course is designed for mechanical engineers, maintenance engineers, reliability engineers, plant operators and technical supervisors responsible for rotating equipment in industrial facilities. It is also suitable for project engineers, commissioning personnel and field service technicians working in power generation, oil & gas, petrochemical, manufacturing and heavy industrial sectors who require a deeper understanding of machine performance and troubleshooting practices.

Training Requirement:

"Hands on practical sessions, equipment and software will be applied during the course if required and as per the client's request."

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

FLUID MACHINES

❖ Understanding Energy Transfer and Machine Classification

- Review of fluid mechanics and thermodynamics basics
- Energy conversion principles in pumps, compressors and turbines
- Positive displacement vs dynamic machines
- Performance parameters: flow, head, pressure, power and efficiency
- Introduction to performance curves
- Basic calculation workshop

DAY TWO:

PUMPS – TYPES, OPERATION AND PERFORMANCE

❖ Hydraulic Machines in Industrial Systems

- Centrifugal pump working principles
- Reciprocating and rotary pump overview
- Pump components and internal clearances
- Cavitation causes and prevention
- NPSH concepts and system design considerations
- Pump selection criteria
- Practical exercise: Pump performance evaluation

DAY THREE:

COMPRESSORS – DESIGN AND CONTROL

❖ Gas Compression Systems and Stability

- Reciprocating and rotary compressor principles
- Single-stage and multi-stage compression
- Thermodynamic compression cycles
- Intercooling and aftercooling
- Surge and stall phenomena
- Capacity control methods
- Case study: Compressor operational analysis

DAY FOUR:

TURBINES – ENERGY CONVERSION AND RELIABILITY

❖ Power Generation and Mechanical Drive Applications

- Steam turbine fundamentals
- Gas turbine fundamentals
- Hydraulic turbine overview
- Impulse vs reaction turbines
- Performance monitoring parameters

- Lubrication and sealing systems
- Common turbine failure modes
- Workshop: Turbine performance diagnostics

DAY FIVE:

TROUBLESHOOTING AND RELIABILITY IMPROVEMENT

- ❖ **Systematic Fault Diagnosis and Maintenance Strategy**
 - Structured troubleshooting methodology
 - Vibration basics and condition monitoring
 - Alignment and balancing principles
 - Bearing and seal failures
 - Root cause failure analysis (RCFA)
 - Preventive and predictive maintenance planning
 - Final exercise: Integrated rotating equipment case study
- ❖ Course Conclusion
- ❖ POST-ASSESSMENT and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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