MERCURY

Rotary Machinery Course

7 – 11 March 2027
Cairo (Egypt)



Dubai - UAE: +971 4 450 5697
Istanbul - Türkiye: +90 539 599 1206
Amman - Jordan: +962 79 712 3347

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Rotary Machinery Course

Ref: 16389_1018649 **Date:** 7 – 11 March 2027 **Location:** Cairo (Egypt) **Fees:** 4000 Euro

Introduction:

The Rotary Machinery course equips professionals with a comprehensive understanding of the principles, operations, and maintenance of rotating equipment. This course explores the intricacies of machinery, including pumps, compressors, turbines, and motors, highlighting their crucial role in various industrial applications. Participants will explore the fundamental concepts of mechanical dynamics, vibration analysis, and fault diagnosis.

Through a blend of theoretical knowledge and practical insights, the Rotary Machinery program aims to enhance the efficiency and reliability of rotating machinery systems. The curriculum is structured to cater to both novice and experienced professionals, ensuring a progressive learning experience. Attendees will possess the skills to optimize machine performance and effectively troubleshoot common issues.

Targeted Groups:

The Rotary Machinery training targets professionals seeking specialized knowledge and skills:

- Mechanical engineers aiming to deepen their expertise in rotating equipment.
- Maintenance technicians are responsible for the upkeep of industrial machinery.
- Operations managers oversee the performance and efficiency of machinery and equipment.
- Design engineers are involved in the development of rotating machinery systems.
- Quality assurance professionals ensure equipment reliability and standards.
- Project managers coordinating machinery installation and commissioning.
- Safety officers focused on preventing hazards related to machinery.
- Consultants advising on machinery optimization and troubleshooting.

Course Objectives:

Participants will achieve the following objectives by completing the Rotary Machinery course:

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- Identify various types of rotating machinery and their applications across industries.
- Explain the fundamental principles governing the operation of pumps, compressors, turbines, and motors.
- Analyze the dynamic behavior of rotating systems, including vibration characteristics.
- Apply diagnostic techniques to detect and rectify common faults in rotating machinery.
- Implement effective maintenance strategies to enhance equipment longevity and performance.
- Utilize advanced tools and methodologies for monitoring and analyzing machinery health.
- Design and execute alignment procedures to ensure optimal operation of machinery.
- Evaluate the impact of operational conditions on machinery efficiency and reliability.
- Develop skills to interpret technical documentation and machinery specifications.
- Foster a proactive approach to machinery management, emphasizing preventive measures.

Targeted Competencies:

Participants will gain the following competencies during the Rotary Machinery program:

- Proficiency in identifying and categorizing different types of rotating machinery.
- In-depth understanding of mechanical principles related to rotating systems.
- Ability to assess and interpret vibration data for machinery diagnostics.
- Skill in troubleshooting and resolving common machinery faults.
- Expertise in implementing maintenance schedules and strategies.
- Competence in using diagnostic tools and software for machinery analysis.
- Capability to perform precise alignment and balancing procedures.
- Knowledge of safety standards and practices related to rotating equipment.
- Aptitude for interpreting and applying technical manuals and specifications.
- Capacity to contribute to continuous improvement initiatives in machinery management.

Studying Scenarios:

In this Rotary Machinery training, participants will develop their skills through the analysis of the following scenarios:

- Diagnosing and rectifying misalignment issues in centrifugal pumps.
- Troubleshooting vibration anomalies in reciprocating compressors.
- Evaluating the performance degradation of steam turbines due to bearing wear.
- Implementing predictive maintenance techniques for electric motors.
- Assessing the impact of thermal expansion on pump shaft alignment.
- Analyzing the causes and solutions for cavitation in centrifugal pumps.
- Addressing seal failures in high-speed rotating machinery.
- Optimizing operational parameters to enhance compressor efficiency.

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Course Content:

Unit 1: Introduction to Rotary Machinery:

- Overview of rotating machinery types and their industrial applications.
- Fundamental mechanical principles governing rotating systems.
- Key components and their functions in machinery operation.
- Understanding the significance of rotational speed and torque.
- Introduction to mechanical vibrations and their impact on machinery.
- Basic terminology and units of measurement in rotating equipment.
- Safety Considerations and Best Practices in Machinery Handling.

Unit 2: Dynamics of Rotating Systems:

- Analysis of forces acting on rotating bodies.
- Study of angular momentum and its conservation.
- Examination of gyroscopic effects in rotating machinery.
- Understanding Resonance and Its Implications for Machinery.
- Vibration Modes and Their Influence on System Stability
- Damping mechanisms and their role in vibration control.
- Application of dynamic balancing techniques.
- Use of simulation tools for dynamic analysis.

Unit 3: Operation and Performance:

- Operational characteristics of pumps, compressors, turbines, and motors.
- Performance curves and their interpretation.
- Efficiency calculations and optimization strategies.
- Impact of load variations on machinery performance.
- Thermal effects and their management in rotating systems.
- Power Transmission and Losses in Mechanical Systems.
- Startup and shutdown procedures for rotating machinery.
- Case studies on operational challenges and solutions.

Unit 4: Maintenance and Troubleshooting:

- Preventive and predictive maintenance strategies.
- Condition monitoring techniques and tools.
- Common faults and their diagnostic methods.
- Repair and replacement protocols for critical components.
- Lubrication systems and their maintenance.
- Alignment and balancing procedures.
- Record-keeping and documentation practices.
- Root cause analysis and corrective actions.

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Unit 5: Advanced Topics and Emerging Trends:

- Integration of IoT in machinery monitoring.
- Use of artificial intelligence in predictive maintenance.
- Advancements in materials for rotating equipment.
- Energy efficiency and sustainability considerations.
- Additive manufacturing applications in machinery components.
- Cybersecurity concerns in industrial machinery systems.
- Regulatory standards and compliance requirements.
- Future Trends and Innovations in Rotating Machinery.

Final Insights & Key Takeaways:

This course provides a comprehensive foundation in the principles and practices of rotating machinery. Participants will enhance the performance and reliability of machinery in their respective industries.