

**COURSE OVERVIEW RE0096**  
**Advanced Inspection & Performance Evaluation of Rotating Equipment including Turbine Maintenance**

**Course Title**

Advanced Inspection & Performance Evaluation of Rotating Equipment including Turbine Maintenance

**Course Reference**  
RE0096

**Course Duration/Credits**  
Five days/3.0 CEUs/30 PDHs



**Course Date/Venue**

Session(s)	Date	Venue
1	May 19-23, 2024	Oryx Meeting Room, Doubletree By Hilton Doha-Al Sadd, Doha, Qatar
2	August 25-29, 2024	Kizkulesi, Crown Plaza Istanbul Asia Hotels & Convention Center, Istanbul, Turkey
3	November 04-08, 2024	Hampstead Meeting Room, London Marriott Hotel Regents Park, London, United Kingdom
4	January 05-09, 2025	The Kooh Al Noor Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE

**Course Objectives**



***This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.***



This course is designed to provide participants with a detailed and up-to-date overview of Advanced Inspection & Performance Evaluation of Rotating Equipment including Turbine Maintenance. It covers the types, applications and significance of rotating equipment in industrial settings; the basic mechanical principles behind turbines; the importance of safety in maintenance practices; the inspection techniques for rotating equipment and the role of lubricants in equipment performance; the techniques and tools for vibration analysis and thermal imaging to identify potential issues; the ultrasonic testing methods for detecting internal flaws; the tools used for precise measurement in maintenance; and the patterns of wear and how to address them.



During this interactive course, participants will learn the key performance metrics and indicators for rotating equipment and data-driven maintenance strategies; the equipment efficiency and the principles and implementation of RCM; the strategies to determine the underlying causes of failures; the components, functions, parts and roles of turbines; the standard practices for maintaining turbines and troubleshooting common turbine issues; the techniques for complex repairs and component replacements and condition monitoring systems (CMS) for turbine maintenance; the maintenance challenges and solutions for wind and hydro turbines; the regulatory compliance and standards as well as the technologies and methodologies in equipment maintenance; and the skills to lead maintenance teams effectively.

### Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an advanced knowledge on inspection and performance evaluation of rotating equipment including turbine maintenance
- Discuss the types, applications and significance of rotating equipment in industrial settings
- Identify the basic mechanical principles behind turbines and emphasize the importance of safety in maintenance practices
- Carryout inspection techniques for rotating equipment and explain the role of lubricants in equipment performance
- Apply the techniques and tools for vibration analysis and thermal imaging to identify potential issues
- Recognize ultrasonic testing methods for detecting internal flaws
- Determine the tools used for precise measurement in maintenance and describe the patterns of wear and how to address them
- Identify the key performance metrics and indicators for rotating equipment and apply data-driven maintenance strategies
- Evaluate and enhance equipment efficiency and discuss the principles and implementation of RCM
- Carryout the strategies to determine the underlying causes of failures
- Discuss the components, functions, parts and roles of turbines as well as apply standard practices for maintaining turbines and troubleshooting common turbine issues
- Demonstrate techniques for complex repairs and component replacements as well as apply condition monitoring systems (CMS) for turbine maintenance
- Define the maintenance challenges and solutions for wind and hydro turbines
- Implement regulatory compliance and standards as well as recognize emerging technologies and methodologies in equipment maintenance
- Carryout the skills to lead maintenance teams effectively

### Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.

### Who Should Attend


This course provides an overview of all significant aspects and considerations of advanced inspection and performance evaluation of rotating equipment including turbine maintenance for mechanical engineers, maintenance engineers, plant managers and supervisors, reliability engineers, process engineers, maintenance planners, maintenance and reliability managers, field service engineers, energy industry professionals, pump and compressor specialists and those who are involved in the operation, maintenance, and inspection of rotating machinery, especially turbines.

### Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

### Certificate Accreditations


Certificates are accredited by the following international accreditation organizations:

- 
The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

### Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

### Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



**Mr. Manuel Dalas, MSc, BSc, is a Senior Mechanical & Maintenance Engineer with over 25 years of industrial experience in Oil, Gas, Refinery, Petrochemical, Power and Nuclear industries. His wide expertise includes Root Cause Failure Analysis, Rotating Equipment Maintenance & Failure Analysis, Failure Analysis Methodologies for Mechanical Engineers, Reliability Centered Maintenance & Root Cause Failure Analysis, Machinery Failure Analysis, Prevention & Troubleshooting, Machinery Failure Analysis, Machinery Root Cause Failure Analysis (RCFA), Machinery Diagnostics & Root Cause Failure Analysis, Water Well, Transfer & Network Systems Operation, Water Network Systems & Pumping Stations, Instrument, Control & Protection Systems, Plumbing Network Systems & Building, Water Distribution & Pump Station, Boiler Operation & Water Treatment, Pipe Stress Analysis using CAESAR II, CAESAR II Application, Piping Dynamic, Static & Other Special Analysis using CAESAR II, Expansion Joints Design & Analysis, Impact Load Analysis, Piping Systems, Piping Codes Used in CAESAR II, RFP Pipe Maintenance & Repair, Relief Valve Analysis, Safety Relief Valve, Tanks & Tank Farms, Seismic Loads, Tank Shell, Tank Failure, Vacuum Tanks, Tank Design & Engineering, Tank Contractions, Material Cataloguing, Maintenance Planning & Scheduling, Reliability Centered Maintenance (RCM), Reliability Maintenance, Condition Based Maintenance & Condition Monitoring, Asset & Risk Management, Vibration Condition Monitoring & Diagnostics of Machines, Vibration & Predictive Maintenance, Reliability Improvement & Vibration Analysis for Rotating Machinery, Effective Maintenance Shutdown & Turnaround Management, Engineering Codes & Standards, Rotating Equipment Maintenance, Mechanical Troubleshooting, Static Mechanical Equipment Maintenance, Plant Reliability & Maintenance Strategies, Pumps Maintenance & Troubleshooting, Fans, Blowers & Compressors, Process Control Valves, Piping Systems & Process Equipment, Gas Turbines & Compressors Troubleshooting, Advanced Valve Technology, Pressure Vessel Design & Analysis, Steam & Gas Turbine, High Pressure Boiler Operation, FRP Pipe Maintenance & Repair, Centrifugal & Positive Displacement Pump Technology Troubleshooting & Maintenance, Rotating Machinery Best Practices, PD Compressor & Gas Engine Operation & Troubleshooting, Hydraulic Tools & Fitting, Mass & Material Balance Tank Farm & Tank Terminal Safety & Integrity Management, Process Piping Design, Construction & Mechanical Integrity, Stack & Noise Monitoring, HVAC & Refrigeration Systems, BPV Code, Section VIII, Division 2, Facility Planning & Energy Management, Hoist - Remote & Basic Rigging & Slings, Mobile Equipment Operation & Inspection, Heat Exchanger, Safety Relief Valve, PRV & POPRV/PORV, Bearing & Lubrication, Voith Coupling Overhaul, Pump & Valve Technology, Lubrication Inspection, Process Plant Optimization, Rehabilitation, Revamping & Debottlenecking, Engineering Problem Solving and Process Plant Performance & Efficiency. Currently, he is the Technical Consultant of the Association of Local Authorities of Greater Thessaloniki where he is in charge of the mechanical engineering services for piping, pressure vessels fabrications and ironwork.**

During his career life, Mr. Dalas has gained his practical and field experience through his various significant positions and dedication as the **Technical Manager, Project Engineer, Safety Engineer, Deputy Officer, Instructor, Construction Manager, Construction Engineer, Consultant Engineer, Water Network Systems Engineer, Maintenance Engineer and Mechanical Engineer and CAESAR II Application Consultant** for numerous multi-billion companies including the **Biological Recycling Unit** and the **Department of Supplies of Greece, Alpha Bank Group, EMKE S.A, ASTE LLC and Polytechnic College of Evosmos.**

Mr. Dalas has a **Master's degree in Energy System** from the **International Hellenic University, School of Science & Technology** and a **Bachelor's degree in Mechanical Engineering** from the **Mechanical Engineering Technical University of Greece** along with a **Diploma in Management & Production Engineering** from the **Technical University of Crete**. Further, he is a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management (ILM)**, a **Certified Project Manager Professional (PMI-PMP)**, a **Certified Instructor/Trainer**, a **Certified Energy Auditor for Buildings, Heating & Climate Systems**, a **Member of the Hellenic Valuation Institute** and the **Association of Greek Valuers** and a **Licensed Expert Valuer Consultant** of the **Ministry of Development and Competitiveness**. He has further delivered numerous trainings, courses, seminars, conferences and workshops internationally.

### Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures

20% Practical Workshops & Work Presentations

30% Hands-on Practical Exercises & Case Studies

20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

### Course Fee

Doha	<b>US\$ 6,000</b> per Delegate. This rate includes H-STK® (Howard Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Istanbul	<b>US\$ 6,000</b> per Delegate + <b>VAT</b> . This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
London	<b>US\$ 8,800</b> per Delegate + <b>VAT</b> . This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day
Dubai	<b>US\$ 5,500</b> per Delegate + <b>VAT</b> . This rate includes H-STK® (Howard Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

### Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

#### **Day 1: Introduction and Basic Concepts**

0730 - 0800	<i>Registration &amp; Coffee</i>
0800 - 0815	<i>Welcome &amp; Introduction</i>
0815 - 0830	<b>PRE-TEST</b>
0830 - 0930	<b>Overview of Rotating Equipment: Types, Applications &amp; Significance in Industrial Settings</b>
0930 - 0945	<i>Break</i>
0945 - 1030	<b>Fundamentals of Turbine Mechanics: Understanding the Basic Mechanical Principles Behind Turbines</b>
1030 - 1130	<b>Safety Protocols in Equipment Inspection: Emphasizing the Importance of Safety in Maintenance Practices</b>
1130 - 1230	<b>Inspection Techniques for Rotating Equipment: Introduction to Various Inspection Methods &amp; Tools</b>
1230 - 1245	<i>Break</i>
1245 - 1320	<b>Lubrication &amp; Maintenance Basics: Understanding the Role of Lubricants in Equipment Performance</b>
1350 - 1420	<b>Case Studies: Review of Real-life Incidents to Understand Common Failures &amp; Solutions</b>
1420 - 1430	<b>Recap</b>
1430	<i>Lunch &amp; End of Day One</i>



**Day 2: Advanced Inspection Techniques**

0730 - 0830	<b>Vibration Analysis in Equipment Inspection: Techniques &amp; Tools for Vibration Analysis</b>
0830 - 0930	<b>Thermal Imaging for Fault Detection: Utilizing Thermal Imaging to Identify Potential Issues</b>
0930 - 0945	Break
0945 - 1130	<b>Ultrasonic Testing Methods: Advanced Ultrasonic Methods for Detecting Internal Flaws</b>
1130 - 1230	<b>Precision Measurement Tools: Introduction to Tools Used for Precise Measurement in Maintenance</b>
1230 - 1245	Break
1245 - 1345	<b>Wear &amp; Tear Analysis: Understanding Patterns of Wear and How to Address them</b>
1345 - 1420	<b>Interactive Workshop: Hands-on Session with Equipment to Practice Inspection Techniques</b>
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day Two

**Day 3: Performance Evaluation**

0730 - 0830	<b>Performance Metrics for Rotating Equipment: Identifying Key Performance Indicators</b>
0830 - 0930	<b>Data-Driven Maintenance Strategies: Utilizing Data for Predictive Maintenance</b>
0930 - 0945	Break
0945 - 1130	<b>Efficiency Analysis Techniques: Methods to Evaluate &amp; Enhance Equipment Efficiency</b>
1130 - 1230	<b>Reliability-Centered Maintenance: Principles &amp; Implementation of RCM</b>
1230 - 1245	Break
1245 - 1345	<b>Root Cause Analysis of Failures: Techniques to Determine the Underlying Causes of Failures</b>
1345 - 1420	<b>Group Discussion: Analyzing Different Scenarios &amp; Decision-Making Processes</b>
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day Three

**Day 4: Turbine Maintenance and Troubleshooting**

0730 - 0830	<b>Turbine Components &amp; Functions: Detailed Overview of Turbine Parts &amp; their Roles</b>
0830 - 0930	<b>Routine Maintenance Procedures for Turbines: Standard Practices for Maintaining Turbines</b>
0930 - 0945	Break
0945 - 1130	<b>Troubleshooting Common Turbine Issues: Identifying &amp; Resolving Frequent Problems</b>
1130 - 1230	<b>Advanced Repair Techniques: Techniques for Complex Repairs &amp; Component Replacements</b>
1230 - 1245	Break
1245 - 1345	<b>Condition Monitoring Systems: Understanding &amp; Using CMS for Turbine Maintenance</b>
1345 - 1420	<b>Simulation Exercise: Simulated Troubleshooting Scenarios</b>
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day Four

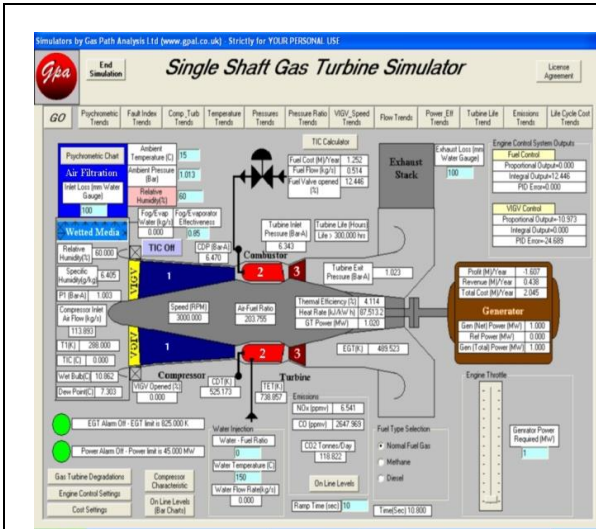


**Day 5: Advanced Topics and Emerging Trends**

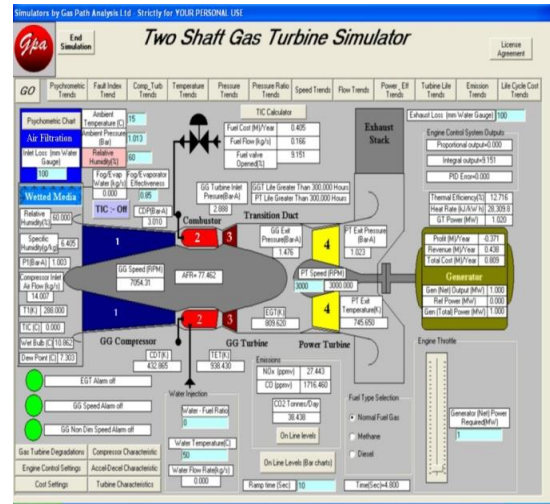
0730 - 0930	<i>Renewable Energy Turbines: Maintenance Challenges &amp; Solutions for Wind and Hydro Turbines</i>
0930 - 0945	<i>Break</i>
0945 - 1030	<i>Regulatory Compliance &amp; Standards: Understanding Relevant Industry Regulations</i>
1030 - 1130	<i>Future Trends in Equipment Maintenance: Emerging Technologies &amp; Methodologies</i>
1130 - 1230	<i>Leadership &amp; Management in Maintenance: Skills for Leading Maintenance Teams Effectively</i>
1230 - 1245	<i>Break</i>
1245 - 1345	<i>Final Workshop: Practical Assessment</i>
1345 - 1400	<i>Course Conclusion</i>
1400 - 1415	<i>POST TEST</i>
1415 - 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch &amp; End of Course</i>

### Simulator (Hands-on Practical Sessions)

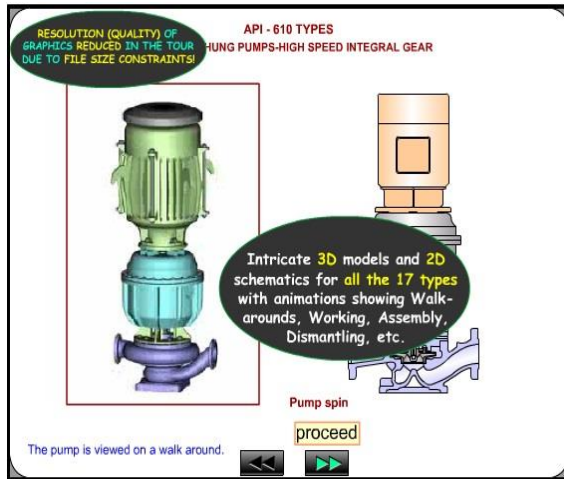
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art “Single Shaft Gas Turbine Simulator” and “Two Shaft Gas Turbine Simulator”, “Steam Turbine & Governing System”, “Centrifugal Pumps and Troubleshooting Guide 3.0”, “SIM 3300 Centrifugal Compressor Simulator” & “CBT on Compressors” Simulators.



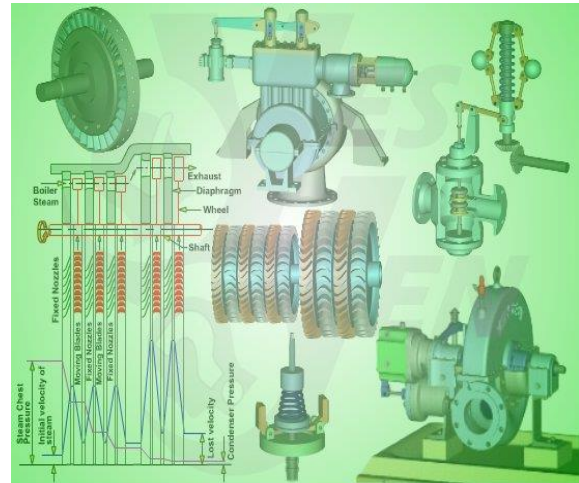
**Single Shaft Gas Turbine Simulator**



**Two Shaft Gas Turbine Simulator**

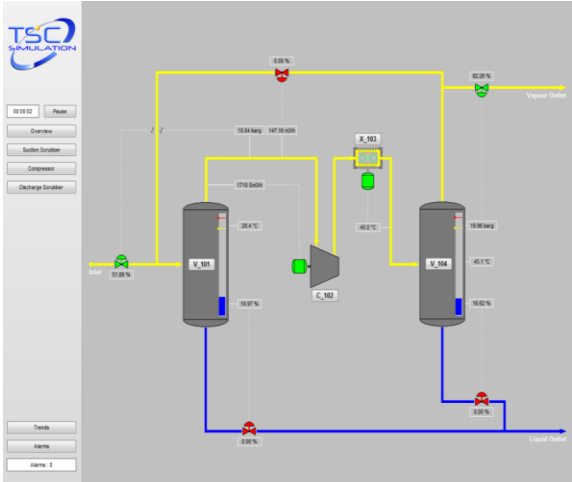


**Steam Turbine & Governing System**

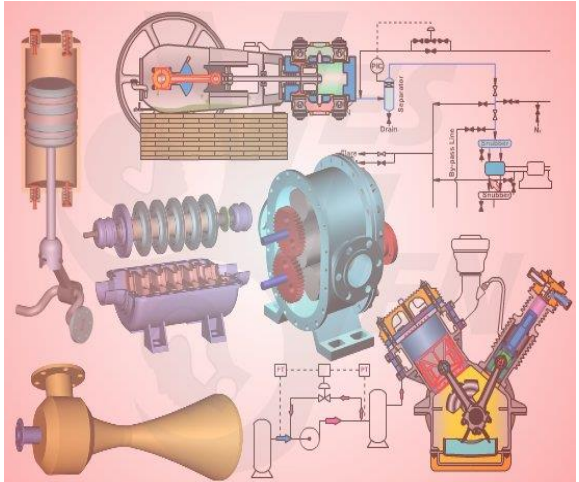


**Centrifugal Pumps and Troubleshooting Guide 3.0**





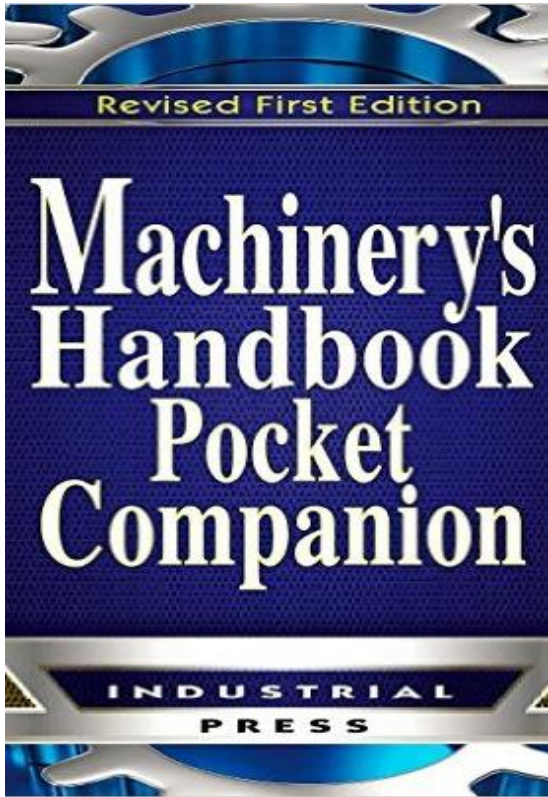
**SIM 3300 Centrifugal Compressor Simulator**



**CBT on Compressors**

**Book(s)**

As part of the course kit, the following e-book will be given to all participants:



**Title** : Machinery's Handbook Pocket Companion

**ISBN** : 9780831130954

**Author** : Christopher McCauley

**Publisher** : Industrial Press

**Course Coordinator**

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