# COURSE OVERVIEW IE0566
# Instrumentation and Control Engineering, Control Theory, Rotating Equipment Controls and Operation Certification

**Course Title**
Instrumentation and Control Engineering, Control Theory, Rotating Equipment Controls and Operation Certification


**Course Date/Venue**
November 23-27, 2025/Tamra Meeting Room, Al Bandar Rotana, Dubai Creek, Dubai, UAE

**Course Reference**
IE0566

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

**Course Description**

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

This course is designed to provide participants with a detailed and up-to-date overview of Rotating Equipment Controls and Operation. It covers the principles of operation of gas turbine, steam turbine and compressor; the surge phenomenon and protection methods; the control system of pump, compressor and turbine; the process control loop operations, PID and control loop interactions; the trip logic of pump, compressor and turbine; the instrumentation in pump, compressor and turbine, anti-surge principle and control system; and the antisurge controllers, surge prediction and tailored control response.

During this interactive course, participants will learn the compression ratio and pressure drop across a flow meter and; the suction temperature and pressure of pump, compressor and turbine; the rotational speed, guide vane angle and over speed trip system; the vibration and speed probe principle of operation and maintenance; the proportional-integral control for preventing reset windup; the performance and antisurge controllers tuning and open and closed-loop control responses; the automatic start-up and shut-down logic, transfer between manual and automatic operating modes; the operator error protection, Modbus interface, operator interface module and speed and acceleration limiting; inspecting and diagnosing the root cause of problems; and the best practices for maintenance strategies and repair.

## Course Objectives

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

- Apply and gain an in-depth knowledge on rotating equipment controls and operation
- Discuss the principles of operation of gas turbine, steam turbine and compressor
- Carryout surge phenomenon and protection methods and recognize the control system of pump, compressor and turbine
- Apply process control loop operations, PID and handling control loop interactions
- Describe the trip logic of pump, compressor and turbine
- Recognize instrumentation in pump, compressor and turbine, anti-surge principle and control system
- Employ antisurge controllers and surge prediction and tailored control response
- Evaluate the compression ratio and pressure drop across a flow meter and identify suction temperature and pressure of pump, compressor and turbine
- Analyze rotational speed, guide vane angle, over speed trip system
- Discuss vibration and speed probe principle of operation and maintenance
- Design proportional-integral control for preventing reset windup
- Recognize performance and antisurge controllers tuning as well as open and closed-loop control responses
- Illustrate automatic start-up and shut-down logic including transfer between manual and automatic operating modes
- Identify operator error protection, Modbus interface, operator interface module and speed and acceleration limiting
- Inspect and diagnose the root cause of problems and employ best practices for maintenance strategies and repair

## 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 rotating equipment controls and operation for instrument engineers, supervisors and technicians.

## Course Certificate(s)

(1) Internationally recognized Competency Certificates and Plastic Wallet Cards will be issued to participants who completed a minimum of 80% of the total tuition hours and successfully passed the exam at the end of the course. Certificates are valid for 5 years.

**Recertification is FOC for a Lifetime.**

## Sample Certificates

The following are samples of the certificates that will be awarded to course participants: -



(2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course

**Haward Technology Middle East**

Continuing Professional Development (HTME-CPD)

## CEU Official Transcript of Records

**TOR Issuance Date:** 15-Nov-23

**HTME No.** 74851

**Participant Name:** Waleed Al Habeeb

| Program Ref. | Program Title | Program Date | No. of Contact Hours | CEU's |
|---|---|---|---|---|
| IE0566 | Instrumentation and Control Engineering, Control Theory, Rotating Equipment Controls and Operation Certification | November 11-15, 2023 | 30 | 3.0 |

Total No. of CEU's Earned as of TOR Issuance Date **3.0**

TRUE COPY

Jaryl Castillo
Academic Director

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

P.O. Box 26070, Abu Dhabi, United Arab Emirates | Tel.: +971 2 3091 714 | E-mail: info@haward.org | Website: www.haward.org

## Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

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.

- 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.

## Accommodation

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

## Course Fee

**US$ 5,500** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

**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. Barry Pretorius** is a **Senior Electrical & Instrumentation Engineer** with almost **30** years of extensive experience within the **Oil**, **Gas**, **Petrochemical**, **Refinery** & **Power** industries. His expertise widely covers in the areas of Distributed Control System (**DCS**), **DCS** Operations & Techniques, **Plant Control** and Protection Systems, **Process Control & Instrumentation**, **Liquid & Gas Flowmetering**, **Custody Measurement**, **Ultrasonic Flowmetering**, **Loss Control**, **Loss Control** & **Multiphase Flowmetering**, **Custody Measurement** & **Loss Control**, **Gas Measurement**, **Cascade Control Loops**, **Split-Range Control Loops**, **Capacity Control** & Other Advanced Control Schemes, **Safety Instrumented Systems**, **Plant Automation** Operations & Maintenance, Programmable Logic Controller (**PLC**), **Siemens PLC** Simatic S7-400/S7-300/S7-200, **PLC & SCADA** for Automation & Process Control, **Artificial Intelligence**, **Allen Bradley PLC** Programing and Hardware Trouble Shooting, Schneider **SCADA System**, **Wonder Ware**, **Emerson**, **Honeywell**, **Honeywell** Safety Manager PLC, **Yokogawa**, Advanced **DCS Yokogawa**, **Endress & Hauser**, Field Commissioning and Start up Testing Pre Operations, **Fire & Gas Detection** System, System Factory Acceptance Test (**FAT**), FactoryLink ECS, Modicon 484, Rockwell Automation, System Site Acceptance Test (**SAT**), **SCADA HMI & PLC** Control Logic, **Cyber Security** Practitioner, **Cyber Security** of Industrial Control System, **IT Cyber Security** Best Practices, **Cybersecurity** Fundamentals, **Ethical Hacking & Penetration Testing**, **Cybersecurity** Risk Management, **Cybersecurity** Threat Intelligence, **OT Whitelisting** for Better Industrial Control System Defense, **NESA** Standard and Compliance Workshop, **OT**, **Cyber Attacks** Awareness - Malware/Ransom Ware / Virus /Trojan/ Philsing, **Information Security Manager**, **Security System** Installation and Maintenance, Implementation, Systems Testing, Commissioning and Startup, **Foxboro DCS & Triconics**, **SIS** Systems, Advanced **DC Drives**, Motion Control, **Hydraulics**, **Pneumatics and Control Systems** Engineering, **Electrical & Automation Control Systems**, **HV/MV Switchgear**, **LV & MV** Switchgears & Circuit Breakers, **High Voltage Electrical Safety**, **LV & HV Electrical System**, **HV Equipment** Inspection & Maintenance, **LV Distribution Switchgear & Equipment**, **Electrical Safety**, **Electrical** Maintenance, **Transformers**, **Medium & High Voltage Equipment**, **Circuit Breakers**, **Cable & Overhead Line** Troubleshooting & Maintenance, **Electrical Drawing & Schematics**, **Voltage Distribution**, **Power Distribution**, **Filters**, **Automation System**, **Electrical Variable Speed Drives**, **Power** Systems, **Power Generation**, **Diesel Generators**, **Power Stations**, Uninterruptible Power Systems (**UPS**), **Battery Chargers**, **AC & DC Transmission**, **CCTV** Installation, **Data & Fire Alarm** System, **Evacuation** Systems and **Electrical Motors & Variable Speed Drives**, & Control of Electrical and Electronic devices.

During Mr. Pretorius's career life, he has gained his practical experience through several significant positions and dedication as the **Technical Director**, **Automation System's Software Manager**, **Site Manager**, **Senior Lead Technical Analyst**, **Project Team Leader**, **Automation Team Leader**, **Automation System's Senior Project Engineer**, **Senior Project & Commissioning Engineer**, **Senior Instrumentation & Control Engineer**, **Electrical Engineer**, **Project Engineer**, **Pre-Operations Startup Engineer**, **PLC Specialist**, **Radio Technician**, **A.T.E Technician** and **Senior Instructor/Trainer** from various companies like the ADNOC Sour Gas, Ras Al Khair Aluminum Smelter, Johnson Matthey Pty. Ltd, Craigcor Engineering, Unitronics South Africa Pty (Ltd), Bridgestone/Firestone South Africa Pty (Ltd) and South African Defense Force.

Mr. Pretorius's has a **Bachelor** of **Technology** in **Electrical Engineering** (**Heavy Current**). Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), received numerous awards from various institutions and delivered numerous trainings, courses, workshops, seminars and conferences 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 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: Sunday, 23rd of November 2025***

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|---|---|
| *0730 – 0800* | *Registration & Coffee* |
| *0800 – 0815* | *Welcome & Introduction* |
| *0815 – 0830* | ***PRE-TEST*** |
| *0830 – 0900* | ***Introduction to Rotating Equipment Controls & Operation*** |
| *0900 – 0930* | ***Pumps Types & Principles of Operation*** |
| *0930 – 0945* | *Break* |
| *0945 – 1100* | ***Gas Turbine Principle of Operation*** |
| *1100 - 1230* | ***Steam Turbine Principle of Operation*** |
| *1230 – 1245* | *Break* |
| *1245 – 1345* | ***Compressor Principles of Operation*** |
| *1345 - 1420* | ***Surge Phenomenon & Protection Methods*** |
| *1420 – 1430* | ***Recap*** |
| *1430* | *Lunch & End of Day One* |

***Day 2: Monday, 24th of November 2025***

| | |
|---|---|
| *0730 – 0830* | ***Control System of Pump, Compressor & Turbine*** |
| *0830 - 0930* | ***Process Control Loop Operations*** |
| *0930 – 0945* | *Break* |
| *0945 – 1100* | ***PID & Handling Control Loop Interactions*** |
| *1100 – 1230* | ***Trip Logic of Pump, Compressor & Turbine*** |
| *1230 – 1245* | *Break* |
| *1245 – 1345* | ***Instrumentation in Pump, Compressor & Turbine*** |
| *1345 - 1420* | ***Anti-Surge Principle & Control System*** |
| *1420 – 1430* | ***Recap*** |
| *1430* | *Lunch & End of Day Two* |

**Day 3: Tuesday, 25th of November 2025**

| | |
|---|---|
| 0730 – 0830 | ***Antisurge Controllers*** |
| 0830 - 0930 | ***Surge Prediction & Tailored Control Response*** |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Compression Ratio & Pressure Drop Across a Flow Meter*** |
| 1100 – 1230 | ***Suction Temperature & Pressure of Pump, Compressor & Turbine*** |
| 1230 – 1245 | *Break* |
| 1245 – 1345 | ***Rotational Speed & Guide Vane Angle*** |
| 1345 - 1420 | ***Over Speed Trip System*** |
| 1420 – 1430 | ***Recap*** |
| 1430 | *Lunch & End of Day Three* |

**Day 4: Wednesday, 26th of November 2025**

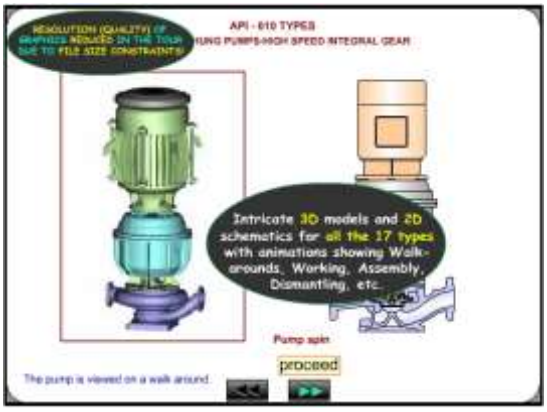
| | |
|---|---|
| 0730 – 0830 | ***Vibration & Speed Probe Principle of Operation & Maintenance*** |
| 0830 - 0930 | ***Proportional-Integral Control for Preventing Reset Windup*** |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Performance & Antisurge Controllers Tuning*** |
| 1100 – 1230 | ***Open & Closed-Loop Control Responses*** |
| 1230 – 1245 | *Break* |
| 1245 – 1345 | ***Automatic Start-Up & Shut-Down Logic*** |
| 1345 - 1420 | ***Transfer Between Manual & Automatic Operating Modes*** |
| 1420 – 1430 | ***Recap*** |
| 1430 | *Lunch & End of Day Four* |

**Day 5: Thursday, 27th of November 2025**

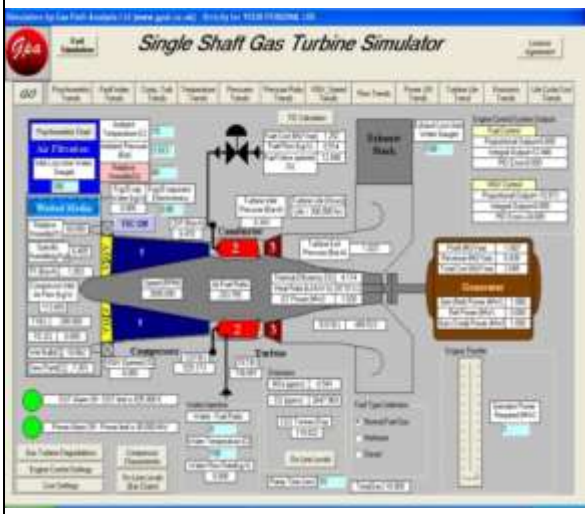
| | |
|---|---|
| 0730 – 0830 | ***Operator Error Protection & Modbus Interface*** |
| 0830 – 0930 | ***Operator Interface Module (OIM)*** |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Speed & Acceleration Limiting*** |
| 1100 - 1230 | ***Inspection & Diagnosing the Root Cause of Problems*** |
| 1230 – 1245 | *Break* |
| 1245 - 1300 | ***Best Practices for Maintenance Strategies & Repair*** |
| 1300 – 1315 | ***Course Conclusion*** |
| 1315– 1415 | ***COMPETENCY EXAM*** |
| 1415 – 1430 | *Presentation of Course Certificates* |
| 1430 | *Lunch & End of Course* |

## Simulators (Hands-on Practical Sessions)

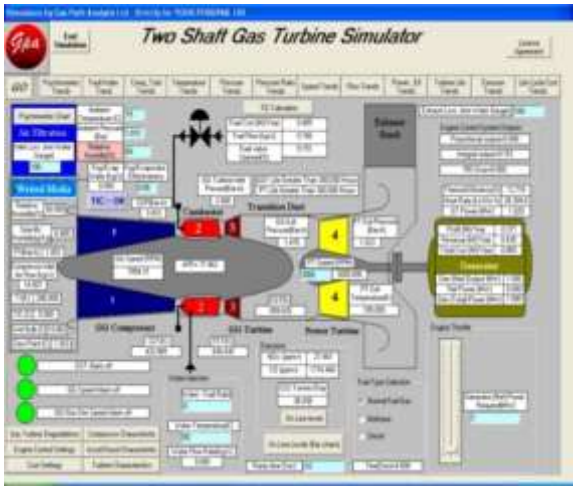
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art Simulator "Centrifugal Pumps and Troubleshooting Guide 3.0", Single Shaft Gas Turbine Simulator",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



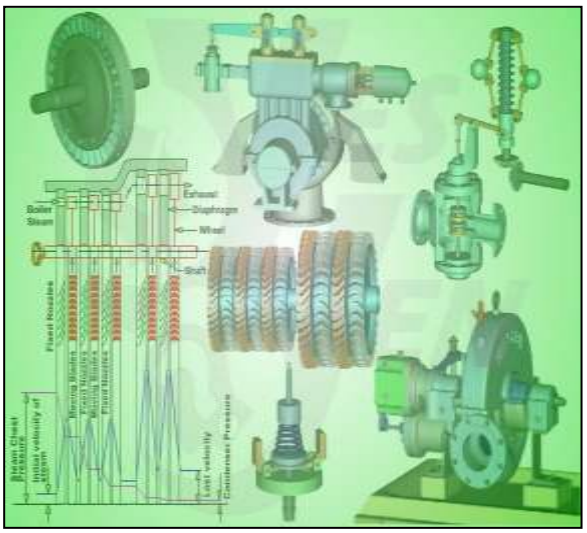

**Centrifugal Pumps and Troubleshooting Guide 3.0**



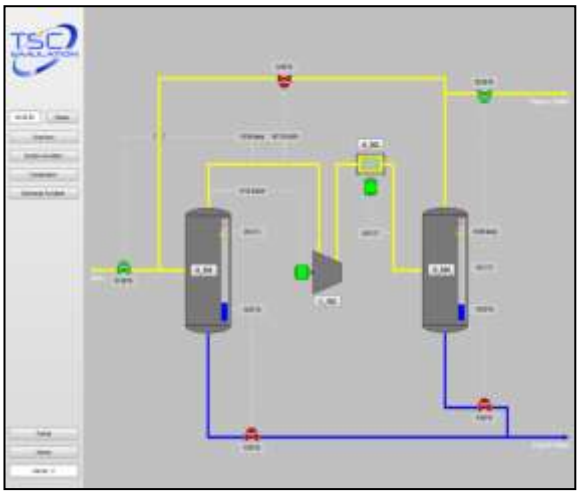

**Single Shaft Gas Turbine Simulator**



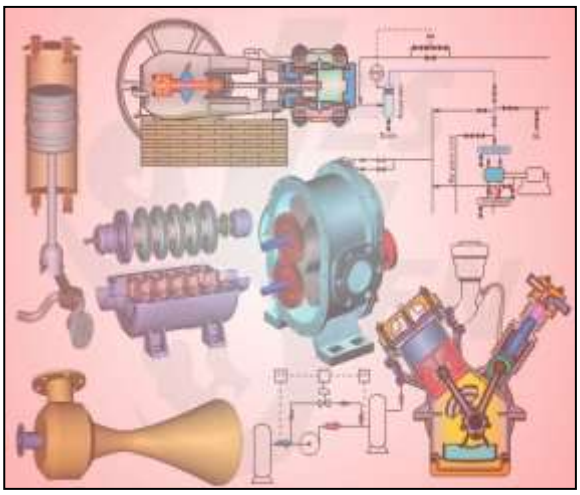

**Two Shaft Gas Turbine Simulator**



**Steam Turbine & Governing System CBT**



**SIM 3300 Centrifugal Compressor Simulator**



**CBT on Compressors**

## Course Coordinator

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