COURSE OVERVIEW RE0984
Refinery Shutdown, Turnaround & Troubleshooting

Course Title
Refinery Shutdown, Turnaround & Troubleshooting

Course Date/Venue
September 22-26, 2025/Vasco da Game Room, Holiday Inn Lisbon – Continental, an IHG Hotel, Lisbon, Portugal

Course Reference
RE0984

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 our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Refinery Shutdown, Turnaround and Troubleshooting. It covers the various reasons for shutdowns in refinery operations, regulatory and statutory requirements and financial and operational implications; the shutdown and turnaround lifecycle phases covering initiation and planning, preparation and execution, commissioning and startup and post-analysis and lessons learned; the roles and responsibilities of turnaround manager, project engineer and contractor; the scope definition and work list development; the risk assessment and management in turnarounds, turnaround KPIs and performance metrics; and the detailed planning techniques.

Further, the course will also discuss the shutdown scheduling essentials, logistics and materials management; the contractor management and safety management during turnaround; the quality assurance and control, shutdown of heat exchangers and boilers and column and reactor shutdown procedures; the pumps, compressors and turbomachinery, alignment and vibration diagnostics, bearing inspection and replacement; the mechanical seal maintenance and performance verification; the piping and valves maintenance, isolation techniques and hydrotesting; the gasket replacement, flange integrity and valve overhauling procedures; and the stress analysis and support adjustments.

During this interactive course, participants will learn the instrumentation and control systems, utility systems and ancillary equipment; the common problems during shutdown and startup challenges and troubleshooting; the root cause analysis (RCA), fault tree analysis (FTA), "5 whys" and cause mapping and documentation and reporting; the troubleshooting of rotating equipment, process troubleshooting in major units and communication and decision-making in crisis; the commissioning and performance testing, punch list management, post-shutdown review and documentation and cost control and financial closure; the turnaround improvement initiatives covering benchmarking against industry best practices, the performance gaps, future turnaround strategies and organizational turnaround capability; the digital tools for planning and tracking, remote monitoring and IoT in turnarounds; the digital twins and predictive analytics; and enhancing safety and efficiency with automation.

Course Objectives

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

- Apply and gain an in-depth knowledge on refinery shutdown, turnaround and troubleshooting
- Discuss various reasons for shutdowns in refinery operations, regulatory and statutory requirements and financial and operational implications
- Illustrate shutdown and turnaround lifecycle phases covering initiation and planning, preparation and execution, commissioning and startup and post-analysis and lessons learned
- Define the roles and responsibilities of turnaround manager, project engineer and contractor and discuss scope definition and work list development
- Apply risk assessment and management in turnarounds, turnaround KPIs and performance metrics and detailed planning techniques
- Employ shutdown scheduling essentials, logistics and materials management, contractor management and safety management during turnaround
- Carryout quality assurance and control, shutdown of heat exchangers and boilers and column and reactor shutdown procedures
- Identify pumps, compressors and turbomachinery and apply alignment and vibration diagnostics, bearing inspection and replacement, mechanical seal maintenance and performance verification
- Employ piping and valves maintenance comprising of isolation techniques and hydrotesting, gasket replacement and flange integrity, valve overhaul procedures and stress analysis and support adjustments
- Recognize instrumentation and control systems, utility systems and ancillary equipment, common problems during shutdown and startup challenges and troubleshooting
- Illustrate root cause analysis (RCA), fault tree analysis (FTA), "5 whys" and cause mapping and documentation and reporting
- Implement proper troubleshooting of rotating equipment, process troubleshooting in major units and communication and decision-making in crisis

- Carryout commissioning and performance testing, punch list management, post-shutdown review and documentation and cost control and financial closure
- Apply turnaround improvement initiatives covering benchmarking against industry best practices, identifying performance gaps, developing future turnaround strategies and building organizational turnaround capability
- Use digital tools for planning and tracking and apply remote monitoring and IoT in turnarounds, digital twins and predictive analytics and enhancing safety and efficiency with automation

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 refinery shutdown, turnaround and troubleshooting for maintenance engineers, operations personnel, maintenance and inspection teams, shutdown and turnaround planners, process and technical staff, health, safety, and environment (HSE) personnel, inspection and integrity professionals, project and asset managers and other technical staff.

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.

Accommodation

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

Course Fee

US$ 12,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course 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

Haward's 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**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

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. Karl Thanasis, PEng, MSc, MBA, BSc, is **Senior Mechanical & Maintenance Engineer** with over **30 years** of extensive industrial experience. His wide expertise includes **Piping & Pipeline**, Maintenance, Repair, **Shutdown**, **Turnaround & Outages**, **Maintenance & Reliability** Management, **Mechanical Maintenance** Planning, Scheduling & Work Control, Advanced Techniques in **Maintenance** Management, **Predictive & Preventive** Maintenance, **Maintenance & Operation Cost Reduction** Techniques, Reliability Centered Maintenance (**RCM**), **Machinery Failure** Analysis, **Rotating Equipment Reliability** Optimization & Continuous Improvement, **Material Cataloguing**, **Mechanical & Rotating Equipment** Troubleshooting & Maintenance, **Root Cause Analysis & Reliability** Improvement, **Condition** Monitoring, **Root Cause Failure Analysis** (RCFA), **Steam Generation**, **Steam Turbines**, **Power Generator Plants**, **Gas Turbines**, **Combined Cycle Plants**, **Boilers**, **Process Fired Heaters**, Air Preheaters, Induced Draft Fans, All Heaters Piping Work, Refractory Casting, Heater Fabrication, Thermal & Fired Heater Design, **Heat Exchangers**, Heat Transfer, Coolers, **Power Plant** Performance, Efficiency & Optimization, **Storage Tank** Design & Fabrication, **Thermal Power Plant** Management, **Boiler & Steam** System Management, **Pump** Operation & Maintenance, **Chiller & Chiller Plant** Design & Installation, **Pressure Vessel**, **Safety Relief Valve** Sizing & Selection, **Valve** Disassembling & Repair, Pressure Relief Devices (**PSV**), **Hydraulic & Pneumatic** Maintenance, Advanced **Valve** Technology, **Pressure Vessel** Design & Fabrication, **Pumps**, Turbo-Generator, Turbine **Shaft Alignment**, **Lubrication**, Mechanical **Seals**, Packing, **Blowers**, **Bearing** Installation, **Couplings**, **Clutches** and **Gears**. Further, he is also versed in **Wastewater Treatment** Technology, **Networking** System, **Water Network Design**, Industrial **Water Treatment** in Refineries & Petrochemical Plants, **Piping** System, Water Movement, Water Filtering, Mud Pumping, **Sludge Treatment** and **Drying**, **Aerobic Process** of **Water Treatment** that includes **Aeration**, **Sedimentation** and **Chlorination Tanks**. His strong background also includes **Design** and **Sizing** of all **Waste Water Treatment Plant Associated Equipment** such as **Sludge Pumps**, **Filters**, **Metering Pumps**, **Aerators** and **Sludge Decanters**.

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager**, **Plant Manager**, **Area Manager - Equipment Construction**, **Construction Superintendent**, **Project Engineer** and **Design Engineer**. His duties covered **Plant Preliminary Design**, **Plant Operation**, **Write-up** of **Capital Proposal**, **Investment Approval**, **Bid Evaluation**, **Technical Contract Write-up**, **Construction** and **Sub-contractor Follow up**, **Lab Analysis**, **Sludge Drying** and **Management** of **Sludge Odor** and **Removal**. He has worked in various companies worldwide in the **USA**, **Germany**, **England** and **Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA** and **Greece** and has a **Master's** and **Bachelor's** degree in **Mechanical Engineering** with **Honours** from the **Purdue University** and **SIU** in **USA** respectively as well as an **MBA** from the **University of Phoenix** in **USA**. Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management** (**ILM**) a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, seminars, workshops and conferences worldwide.

Course Program

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

Day 1: ***Monday, 22nd of September 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Refinery Shutdowns & Turnarounds*** *Definition & Key Terminology (Shutdown, Turnaround, Outage) • Reasons for Shutdowns in Refinery Operations • Regulatory and Statutory Requirements • Financial and Operational Implications*
0930 – 0945	*Break*
0945 – 1030	***Shutdown & Turnaround Lifecycle Phases*** *Initiation & Planning • Preparation & Execution • Commissioning & Startup • Post-Analysis & Lessons Learned*
1030 – 1130	***Roles & Responsibilities*** *Turnaround Manager versus Project Engineer versus Operations • Contractor versus Internal Staff Coordination • HSE Responsibilities during Turnarounds • Communication Flow and Authority Hierarchy*
1130 – 1215	***Scope Definition & Work List Development*** *Identifying Critical versus Non-Critical Tasks • Scope Freeze Strategies and Change Control • Asset Integrity Assessments • Historical Data Usage for Scope Building*
1215 – 1230	*Break*
1230 – 1330	***Risk Assessment & Management in Turnarounds*** *Identifying Potential Shutdown Hazards • Risk Matrix Development • Integration of Safety Studies (HAZOP, LOPA) • Mitigation Plans & Contingency Strategies*
1330 – 1420	***Turnaround KPIs & Performance Metrics*** *Schedule Adherence • Budget Compliance • Safety Performance (TRIR, LTI) • Equipment Reliability Post-Turnaround*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2: ***Tuesday, 23rd of September 2025***

0730 – 0830	***Detailed Planning Techniques*** *Work Breakdown Structure (WBS) • Resource Planning (Manpower, Equipment, Materials) • Planning Tools (Primavera, MS Project) • Integration with Maintenance Management Systems (CMMS)*
0830 - 0930	***Shutdown Scheduling Essentials*** *Network Diagram & Critical Path Method (CPM) • Lag, Float and Slack Time Management • Sequencing and Logical Relationships • Managing Schedule Risks*
0930 – 0945	*Break*

0945 – 1100	***Logistics & Materials Management*** *Spare Parts Procurement and Control • Warehouse Planning and Staging Areas • Material Traceability and Availability • Equipment Mobilization & Demobilization*
1100 – 1215	***Contractor Management*** *Prequalification and Selection Process • Contract Types (Lump Sum, Time & Material, EPCM) • Interface Management Between Multiple Contractors • Daily Coordination and Progress Monitoring*
1215 – 1230	*Break*
1230 – 1330	***Safety Management During Turnaround*** *Permit to Work (PTW) Systems • Lock-Out Tag-Out (LOTO) • Confined Space and Hot Work Safety • Emergency Response Planning*
1330 – 1420	***Quality Assurance & Control*** *QA/QC Documentation for Shutdown Activities • Inspection & Testing Protocols • Non-Conformance Handling • Equipment Handover Process*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3: ***Wednesday, 24th of September 2025***

0730 – 0830	***Shutdown of Heat Exchangers & Boilers*** *Cleaning and Inspection Procedures • Bundle Pulling & Reinstallation • Tube Leak Testing and Plugging • Refractory and Insulation Checks*
0830 – 0930	***Column & Reactor Shutdown Procedures*** *Catalyst Unloading and Handling • Internal Inspections and Repair Work • Tray and Packing Maintenance • Blinding and Unblinding Practices*
0930 – 0945	*Break*
0945 – 1100	***Pumps, Compressors & Turbomachinery*** *Alignment and Vibration Diagnostics • Bearing Inspection and Replacement • Mechanical Seal Maintenance • Performance Verification*
1100 – 1215	***Piping & Valves Maintenance*** *Isolation Techniques and Hydrotesting • Gasket Replacement and Flange Integrity • Valve Overhaul Procedures • Stress Analysis and Support Adjustments*
1215 – 1230	*Break*
1230 – 1330	***Instrumentation & Control Systems*** *Loop Checking and Calibration • Shutdown of SIS and DCS Components • Field Device Inspection • Wiring, Terminations and Panel Testing*
1330 – 1420	***Utility Systems & Ancillary Equipment*** *Steam and Condensate Systems • Cooling Water Systems • Nitrogen & Compressed Air Systems • Electrical Systems and UPS Maintenance*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4: Thursday, 25th of September 2025

0730 – 0830	***Common Problems during Shutdown*** *Delays Due to Unforeseen Equipment Issues • Improper Isolation or Depressurization • Contractor Non-Performance • Material Delivery Failures*
0830 – 0930	***Startup Challenges & Troubleshooting*** *Equipment Not Reaching Design Performance • Leaks, Abnormal Noises or Overheating • Instrument Loop Failure • Control Logic Errors*
0930 – 0945	*Break*
0945 – 1100	***Systematic Troubleshooting Methodologies*** *Root Cause Analysis (RCA) • Fault Tree Analysis (FTA) • "5 Whys" and Cause Mapping • Documentation and Reporting*
1100 – 1215	***Troubleshooting Rotating Equipment*** *Vibration & Alignment Issues • Bearing and Seal Failure Symptoms • Suction & Discharge Anomalies • Motor Startup Issues*
1215 – 1230	*Break*
1230 – 1330	***Process Troubleshooting in Major Units*** *Crude Distillation Unit (CDU) Upsets • Hydrotreater Startup Failures • FCCU Common Faults • Delayed Coker Performance Issues*
1330 – 1420	***Communication & Decision-Making in Crisis*** *Real-Time Decision Frameworks • Command Structure and Escalation • Keeping Stakeholders Informed • Learning from Live Troubleshooting Events*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

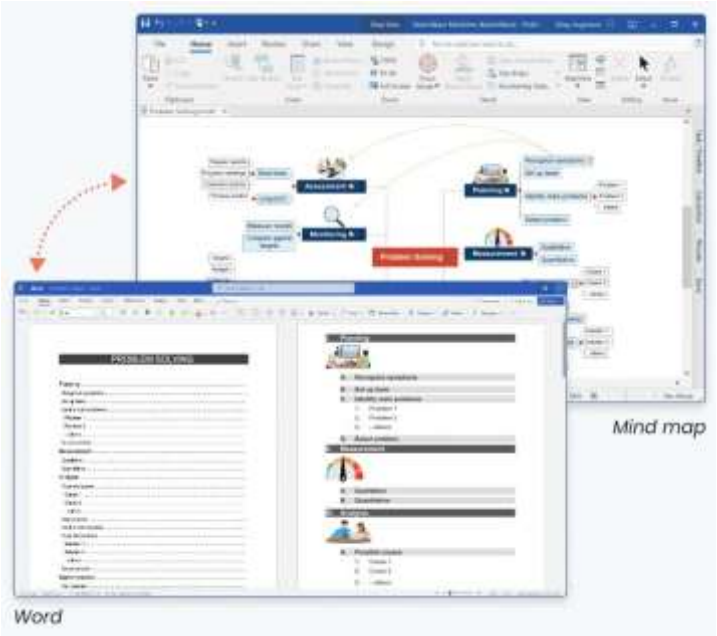
Day 5: Friday, 26th of September 2025

0730 – 0830	***Commissioning & Performance Testing*** *Key Commissioning Checklists • Leak, Pressure and Flow Testing • Functional & Interlock Testing • Baseline Performance Data Collection*
0830 – 0930	***Punch List Management*** *Generating and Closing Punch Items • Walkdown Protocols • Prioritization (A, B, C Items) • Final Handover Procedures*
0930 – 0945	*Break*
0945 – 1100	***Post-Shutdown Review & Documentation*** *Creating Shutdown Reports • Lessons Learned Sessions • Updating P&IDs and Equipment Files • As-Built Documentation and MOCs*
1100 – 1215	***Cost Control & Financial Closure*** *Final Cost Reporting and Variance Analysis • Claim Management and Contractor Payment • Budget versus Actual Comparison • Financial Risk & Recovery Strategies*
1215 – 1230	*Break*
1230 – 1300	***Turnaround Improvement Initiatives*** *Benchmarking Against Industry Best Practices • Identifying Performance Gaps • Developing Future Turnaround Strategies • Building Organizational Turnaround Capability*

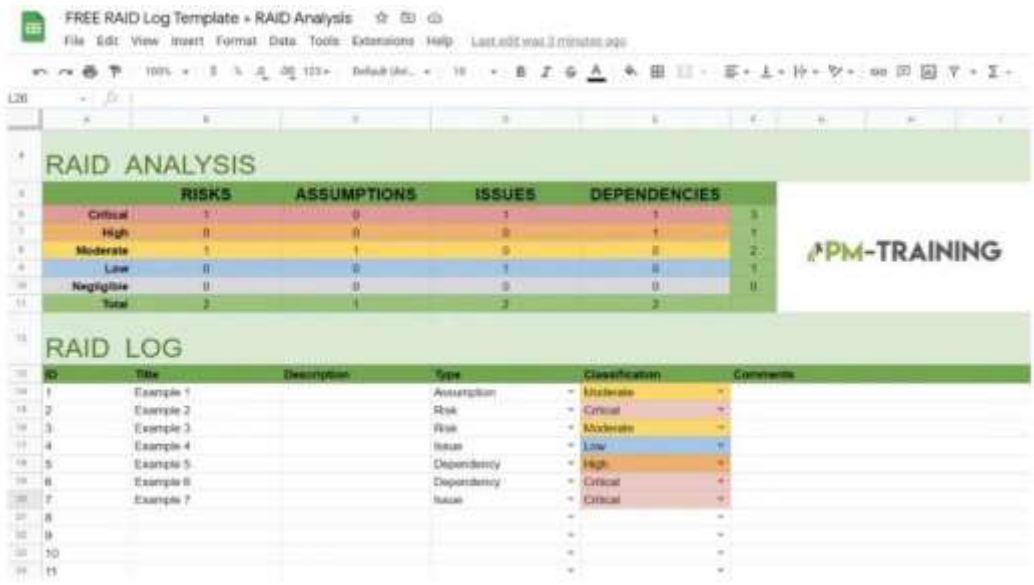
1300 – 1345	***Digitalization & Smart Shutdowns*** *Using Digital Tools for Planning and Tracking • Remote Monitoring and IoT in Turnarounds • Digital Twins and Predictive Analytics • Enhancing Safety and Efficiency with Automation*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

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 the "Mindview Software" and "Raidlog Simulator".



Mindview Software



Raidlog Simulator

Course Coordinator

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