

COURSE OVERVIEW PE0230K1
Safe Process Units Start-Up/Shutdown and Development of
Equipment Handling Over/Commissioning Procedures

Course Title

Safe Process Units Start-Up/Shutdown and Development of Equipment Handling Over/Commissioning Procedures

Course Date/Venue

October 06-10, 2024/TBA Meeting Room, The H Dubai Hotel, Sheikh Zayed Road, Dubai, UAE

Course Reference

PE0230K1

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.



Plant modifications are an ongoing process throughout the life of any process plant. Reasons for modification include efforts to improve reliability, production capacity, quality, or productivity. Seamless incorporation is the key concern associated with the installation of any new equipment in an operating plant due to the high cost of process downtime. Several steps shall be taken to minimise the risk associated with the installation of new equipment such as hazard and operability studies, project management, development of redundancy plans, and commissioning of the new equipment.



Start-up and commissioning are essential activities in all process plant-modification projects and have significant implications for project success. Yet paradoxically they tend to be approached in an ad hoc manner. Commissioning is often included in project plans, so it is not that people are ignorant. However, there is usually a lack of systematic approaches to commissioning, so it is frequently left to tradespeople and plant operators to manage in whatever way they see fit. This is an undesirable situation since it results in unpredictable outcomes. In some cases it can even cause serious problems. Lack of experience in dealing with these problems has frequently resulted in prolonged and costly start-ups, caused by inadequate preparation for the events of start-up.

This course is designed to provide participants with an up-to-date overview of the start-up and commissioning of Process plants including troubleshooting of the start-up process. It includes the methodology for start-up and commissioning of process plants, which can be used when commissioning a new plant, or for modified equipment in an existing facility, or in a turnaround, shutdown or overhaul scenario. It takes the approach that commissioning is a series of checks and counter-checks to confirm every unit in the process plant is fit for purpose and suitable for operation.

During the course, each participant will gain enough skills to anticipate and avoid problems associated with start-up processes. Participants will gain a satisfactory understanding of the commissioning strategy, organizational issues, estimation of required resources, CPM planning, mechanical integrity, troubleshooting, start-up operations, technical inspection, instrumentation/control systems, HSE and other necessary knowledge associated with the process plant start-up and commissioning. Actual case studies from around the world will be demonstrated to highlight the topics discussed.

Course Objectives

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

- Apply systematic techniques in process plant start-up, commissioning and troubleshooting
- Carryout planning and preparation as well as cost estimation
- Discuss health, safety and environment, process plant start-up management and develop process plant commissioning strategy
- Conduct mechanical integrity testing and pre-commissioning, technical inspection and dynamic hydraulic testing
- Explain construction completion and the importance of machinery commissioning
- Apply start-up operations, start-up progress monitoring and control as well as determine instrumentation and control systems in commissioning process
- Demonstrate performance trials, troubleshooting and problem solving
- Implement change management including operational techniques and post commissioning audit in process plants

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, sample video clips of the instructor’s actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.

Who Should Attend

This course provides a complete and up-to-date overview of the process plant start-up and commissioning for those involved in the start-up operations of a process plant. This includes process engineers, team leaders, project managers, refinery managers, plant managers, section heads, plant supervisors, process engineers, maintenance staff, technical staff and contractor personnel involved in project execution and plant start-up in process industry. Mechanical, electrical, instrumentation and control engineers who are involved in process plant start-up and commissioning will also benefit from this course.

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

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.

Accommodation


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

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:-

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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.

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. Mervyn Frampton is a **Senior Process Engineer** with over **30 years** of industrial experience within the **Oil & Gas, Refinery, Petrochemical** and **Utilities** industries. His expertise lies extensively in the areas of **Process Troubleshooting, Distillation Towers, Fundamentals of Distillation** for Engineers, **Distillation Operation and Troubleshooting, Advanced Distillation Troubleshooting, Distillation Technology, Vacuum Distillation, Distillation Column Operation & Control, Oil Movement Storage & Troubleshooting, Process Equipment Design, Applied Process Engineering Elements, Process Plant Optimization, Revamping & Debottlenecking, Process Plant Troubleshooting & Engineering Problem Solving, Process Plant Monitoring, Catalyst Selection & Production Optimization, Operations Abnormalities & Plant Upset, Process Plant Start-up & Commissioning, Clean Fuel Technology & Standards, Flare, Blowdown & Pressure Relief Systems, Oil & Gas Field Commissioning Techniques, Pressure Vessel Operation, Gas Processing, Chemical Engineering, Process Reactors Start-Up & Shutdown, Gasoline Blending for Refineries, Urea Manufacturing Process Technology, Continuous Catalytic Reformer (CCR), De-Sulfurization Technology, Advanced Operational & Troubleshooting Skills, Principles of Operations Planning, Rotating Equipment Maintenance & Troubleshooting, Hazardous Waste Management & Pollution Prevention, Heat Exchangers & Fired Heaters Operation & Troubleshooting, Energy Conservation Skills, Catalyst Technology, Refinery & Process Industry, Chemical Analysis, Process Plant, Commissioning & Start-Up, Alkylation, Hydrogenation, Dehydrogenation, Isomerization, Hydrocracking & De-Alkylation, Fluidized Catalytic Cracking, Catalytic Hydrodesulphuriser, Kerosene Hydrotreater, Thermal Cracker, Catalytic Reforming, Polymerization, Polyethylene, Polypropylene, Pilot Water Treatment Plant, Gas Cooling, Cooling Water Systems, Effluent Systems, Material Handling Systems, Gasifier, Gasification, Coal Feeder System, Sulphur Extraction Plant, Crude Distillation Unit, Acid Plant Revamp and Crude Pumping. Further, he is also well-versed in HSE Leadership, Project and Programme Management, Project Coordination, Project Cost & Schedule Monitoring, Control & Analysis, Team Building, Relationship Management, Quality Management, Performance Reporting, Project Change Control, Commercial Awareness and Risk Management.**

During his career life, Mr. Frampton held significant positions as the **Site Engineering Manager, Senior Project Manager, Process Engineering Manager, Project Engineering Manager, Construction Manager, Site Manager, Area Manager, Procurement Manager, Factory Manager, Technical Services Manager, Senior Project Engineer, Process Engineer, Project Engineer, Assistant Project Manager, Handover Coordinator and Engineering Coordinator** from various international companies such as the **Fluor Daniel, KBR South Africa, ESKOM, MEGAWATT PARK, CHEMEPIC, PDPS, CAKASA, Worley Parsons, Lurgi South Africa, Sasol, Foster Wheeler, Bosch & Associates, BCG Engineering Contractors, Fina Refinery, Sapref Refinery, Secunda Engine Refinery** just to name a few.

Mr. Frampton has a **Bachelor's degree in Industrial Chemistry** from **The City University in London**. Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management (ILM)** and has delivered numerous trainings, courses, workshops, conferences and seminars internationally.

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, 06th of October 2024**

0730 – 0800	Registration & Coffee
0800 – 0815	Introduction & Welcome
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Process Plant Commissioning Terminology • Requirements • Project Details • Contracting Strategy • Organizational Structure & Responsibilities • Success Measures and Problem Avoidance
0930 – 0945	Break
0945 – 1100	Planning & Preparation Project Planning, Critical Path (CPM/PERT) • Gantt Chart • Logic Diagrams • Planning Methods • Preparation of Checklists and Spare Parts Planning
1100 – 1230	Cost Estimation Budget Components • Estimation Sheets • Resource Prediction • Extra Costs & Change Orders
1230 – 1245	Break
1245 – 1420	Cost Estimation (cont'd) Spare parts • Inventory • Material ordering • MIS and Cost control
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: **Monday, 07th of October 2024**

0730 – 0930	Health, Safety & Environment Hazard & Operability Analysis (HAZOP) • Hazard Analysis (HAZAN) • Process Safety Management (PSM) • Root Cause Analysis and Why Trees • Risk Assessment
0930 – 0945	Break
0945 – 1100	Health, Safety & Environment (cont'd) Hazard Identification • Safety Training • HSE Problems and contingency plans • Safety Procedures and Implementation • Safety Manual
1100 – 1230	Process Plant Start-Up Management Responsibilities & Authorities • Organizational Structure • Manpower & Staffing • Coordination Procedures • Leadership
1230 – 1245	Break
1245 – 1420	Process Plant Commissioning Strategy The Commissioning Team • Training • Commissioning Strategy • Start-Up Procedures & Logic
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: Tuesday, 08th of October 2024

0730 – 0900	Mechanical Integrity Testing & Pre-commissioning Hydraulic Testing • Flushing • Breaking-in Pumps • Drying Heaters
0900 – 0915	Break
0915 – 1100	Technical Inspection & Dynamic Hydraulic Testing Vessel & Column Internals • Dynamic Loop Testing • Tightness Testing
1100 – 1230	Construction Completion (The Beginning of Start-Up) Construction Schedules vs. Start-Up Needs • Start-Up by Systems • Systems Definition • Punch Listing • Handover
1230 – 1245	Break
1245 - 1420	Machinery Commissioning Types of Process Equipment Plant Machinery • Preparation of Machines • Compressor Commissioning • Compressor Surge
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: Wednesday, 09th of October 2024

0730 – 0930	Start-Up Operations Isolation of Vessels and Pipes • Types of Isolation • Initial Start-Up Activities • Steaming • Fuel Gas or Nitrogen Purge • Feed-in
0930 – 0945	Break
0945 – 1100	Start-Up Progress Monitoring and Control Planning for Success • Sequence by Units • Sequence by Systems • Recovery from False Starts
1100 – 1230	Instrumentation & Control Systems Instrument Commissioning • Start-up Problems and Causes
1230 – 1245	Break
1245 - 1420	Performance Trials Performance and Acceptance Testing, Preliminary Tests • Performance Test runs
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: Thursday, 10th of October 2024

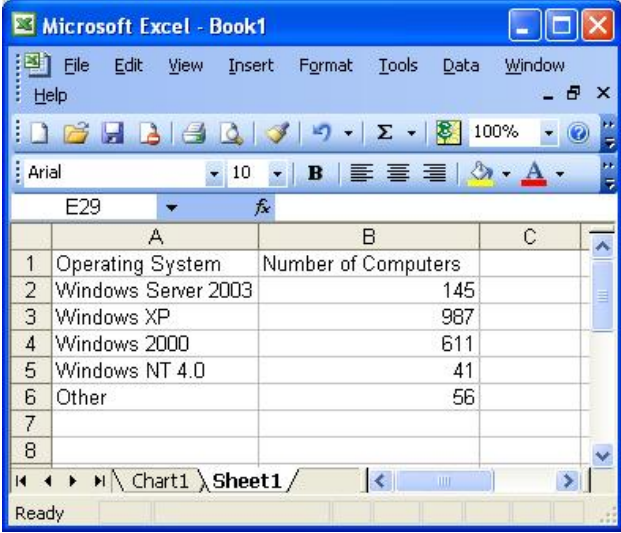
0730 – 0930	Troubleshooting & Problem Solving Identification of Problems & Priorities • Resource Allocation & Teamwork • Data Collection & Solution Selection
0930 – 0945	Break
0945 – 1100	Troubleshooting & Problem Solving (cont'd) Troubleshooting Techniques • RCFA & RCM • Murphy's law
1100 – 1215	Change Management Implementation of Change • Success Measures • Operational Techniques • Post Commissioning Audit • Close-out Certificates

1215 – 1230	Break
1230 – 1345	Case Studies
1345 – 1400	Course Conclusion Using this Course Overview, the Instructor(s) will Brief Participants about the Course 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)

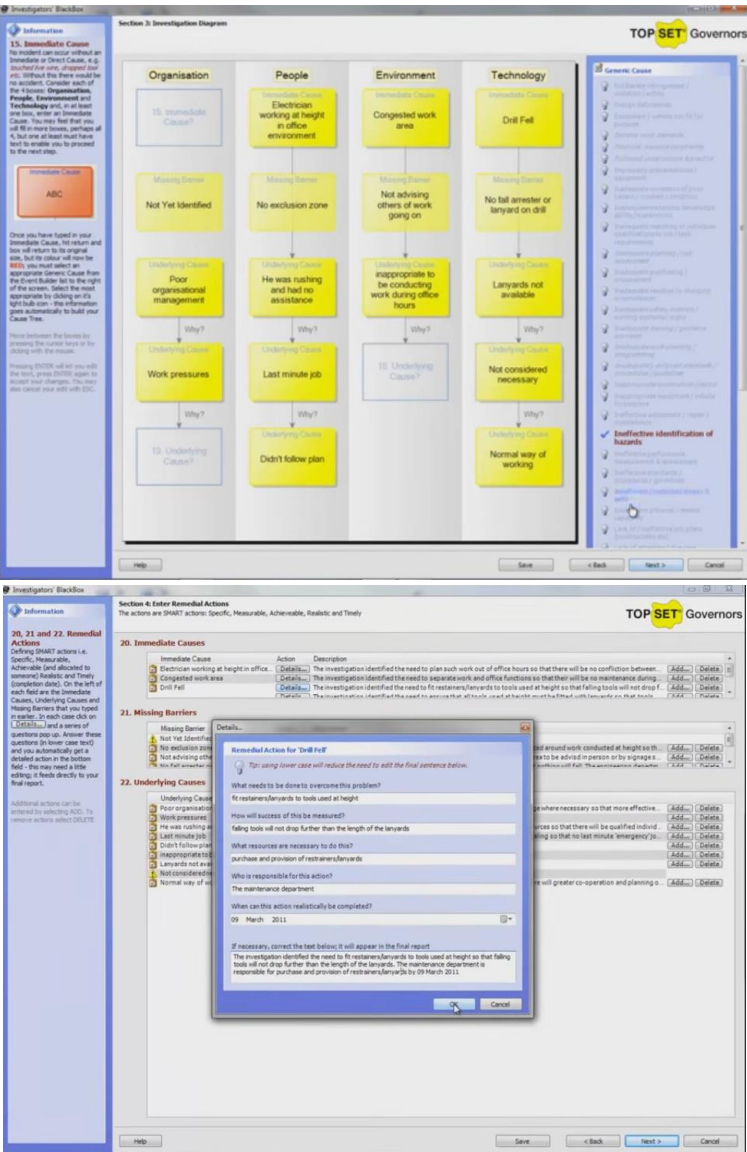
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art “MS -Project”, “MS-Excel”, “BlackBox Software Tool”, “Howard PHA/HAZOP Simulator”, “SIM 3300 Centrifugal Compressor Simulator”, “Centrifugal Pumps and Troubleshooting Guide 3.0” simulators and “ASPEN HYSYS” simulator.





	A	B	C
1	Operating System	Number of Computers	
2	Windows Server 2003	145	
3	Windows XP	987	
4	Windows 2000	611	
5	Windows NT 4.0	41	
6	Other	56	
7			
8			

Microsoft Excel



Section 3: Investigation Diagram

Organisation	People	Environment	Technology
Immediate Cause: Missing Barrier	Immediate Cause: Electrician working at height in office environment	Immediate Cause: Congested work area	Immediate Cause: Drill Fall
Underlying Cause: Poor organisational management	Underlying Cause: He was rushing and had no assistance	Underlying Cause: Inappropriate to be conducting work during office hours	Underlying Cause: Lanyards not available
Why? Work pressures	Why? Last minute job	Why? Underlying Cause?	Why? Not considered necessary
Why? Underlying Cause?	Why? Didn't follow plan	Why? Underlying Cause?	Why? Normal way of working

Section 4: Enter Remedial Actions

The actions are SMART actions: Specific, Measurable, Achievable, Realistic and Timely

Immediate Cause	Action	Description
Electrician working at height in office	Fit restainers/lanyards to tools used at height	The investigation identified the need to plan such work out of office hours so that there will be no conflict between...
Congested work area	Fit restainers/lanyards to tools used at height	The investigation identified the need to fit restainers/lanyards to tools used at height so that falling tools will not drop...
Drill fall	Fit restainers/lanyards to tools used at height	The investigation identified the need to ensure that all tools used at height must be fitted with lanyards on that tool...

Remedial Action for 'Drill Fall'

What needs to be done to overcome this problem?
Fit restainers/lanyards to tools used at height

How will success of this be measured?
falling tools will not drop further than the length of the lanyards

What resources are necessary to do this?
purchase and provision of restainers/lanyards

Who is responsible for this action?
The maintenance department

When can this action realistically be completed?
09 March 2011

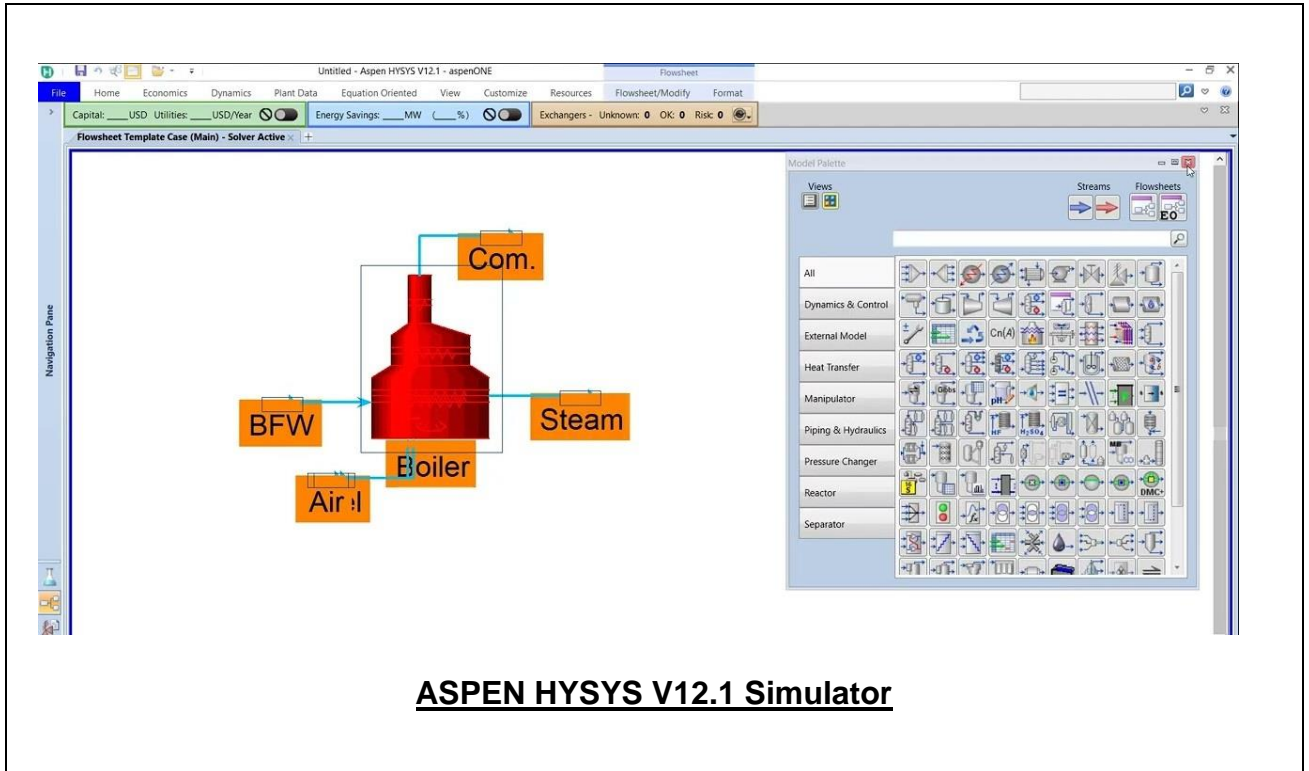
If necessary, insert the text below; it will appear in the final report
The investigation identified the need to fit restainers/lanyards to tools used at height so that falling tools will not drop further than the length of the lanyards. The maintenance department is responsible for purchase and provision of restainers/lanyards by 09 March 2011.

BlackBox Software Tool



Haward PHA/HAZOP Simulator

SIM 3300 Centrifugal Compressor Simulator



ASPEN HYSYS V12.1 Simulator

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org

