



PE045: Process Plant Start-up, Commissioning & Troubleshooting



Training Description:

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 startups, caused by inadequate preparation for the events of start-up.

This intensive training is designed to provide participants with an up-to-date overview of the startup 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.

Training Objectives:

By the end of the training, participants 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





Training Designed for:

This course is intended for those involved in the start-up operations of a process plant ie; plant 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 Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request”.

Please note that the below topics can be amended as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

- ❖ Pre-Test
- ❖ Introduction to Process Plant Commissioning
 - Terminology
 - Requirements
 - Project Details
 - Contracting Strategy
 - Organizational Structure & Responsibilities
 - Success Measures and Problem Avoidance
- ❖ Planning & Preparation
 - Project Planning, Critical Path (CPM/PERT)
 - Gantt Chart
 - Logic Diagrams
 - Planning Methods
 - Preparation of Checklists and Spare Parts Planning
- ❖ Cost Estimation
 - Budget Components
 - Estimation Sheets
 - Resource Prediction
 - Extra Costs & Change Orders
 - Spare parts
 - Inventory
 - Material ordering
 - MIS and Cost control

DAY TWO:

- ❖ Health, Safety & Environment
 - Hazard Identification



- Safety Training
- HSE Problems and contingency plans
- Safety Procedures and Implementation
- Safety Manual
- ❖ **Process Plant Start-Up Management**
 - Responsibilities & Authorities
 - Organizational Structure
 - Manpower & Staffing
 - Coordination Procedures
 - Leadership
- ❖ **Process Plant Commissioning Strategy**
 - The Commissioning Team
 - Training
 - Commissioning Strategy
 - Start-Up Procedures & Logic

DAY THREE:

- ❖ **Mechanical Integrity Testing & Pre-commissioning**
 - Hydraulic Testing
 - Flushing
 - Breaking-in Pumps
 - Drying Heaters
- ❖ **Technical Inspection & Dynamic Hydraulic Testing**
 - Vessel & Column Internals
 - Dynamic Loop Testing
 - Tightness Testing
- ❖ **Construction Completion (The Beginning of Start-Up)**
 - Construction Schedules vs. Start-Up Needs
 - Start-Up by Systems
 - Systems Definition
 - Punch Listing
 - Handover
- ❖ **Machinery Commissioning**
 - Types of Process Equipment Plant Machinery
 - Preparation of Machines
 - Compressor Commissioning
 - Compressor Surge

DAY FOUR:

- ❖ **Start-Up Operations**
 - Isolation of Vessels and Pipes
 - Types of Isolation
 - Initial Start-Up Activities
 - Steaming
 - Fuel Gas or Nitrogen Purge



- Feed-in
- ❖ **Start-Up Progress Monitoring and Control**
 - Planning for Success
 - Sequence by Units
 - Sequence by Systems
 - Recovery from False Starts
- ❖ **Instrumentation & Control Systems**
 - Instrument Commissioning
 - Start-up Problems and Causes
- ❖ **Performance Trials**
 - Performance and Acceptance Testing, Preliminary Tests
 - Performance Test runs
- ❖ **Practical Sessions**
 - This hands-on, highly-interactive course includes real-life case studies and exercises

DAY FIVE:

- ❖ **Troubleshooting & Problem Solving**
 - Identification of Problems & Priorities
 - Resource Allocation & Teamwork
 - Data Collection & Solution Selection
 - Troubleshooting Techniques
 - RCFA & RCM
 - Murphy's law
- ❖ **Change Management**
 - Implementation of Change
 - Success Measures
 - Operational Techniques
 - Post Commissioning Audit
 - Close-out Certificates
- ❖ **Case Studies**
- ❖ **Course Conclusion**
- ❖ **Post-Test and Evaluation**

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

Internationally recognized certificate(s) will be issued to each participant who completed the course.





Training Fees:

As per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

For training registrations or in-house enquiries, please contact:

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Training & Career Development Department

