



An Intensive 5 - Day Training Course On

COMMISSIONING & START UP OF PROCESS PLANT

Principal Course Leaders:



Fred Geitner, PE
Mechanical & Process Machinery
Specialist

Chris Dannenmair, PE
Process Specialist



John C. Hollemans, PE
E&I Specialist

Kish Island-Iran
July, 2018

INTRODUCTION:

The purpose of this course is to provide the attendees with a comprehensive knowledge on how to receive, store, prepare and commission equipment in the petrochemical industry. The intent is to learn how to minimize start-up issues using a structured approach leading to a successful plant start up. This course is designed for all disciplines that are involved in plant commissioning. It is ideal for Operations, Maintenance and Engineering personnel.

PROGRAMME OBJECTIVES:

The objectives of this program are to provide participants with an awareness of the unique challenges associated with plant start-up and commissioning situations, an understanding of the key concepts, tools and techniques that can be used to facilitate the effective planning, execution, control and management of these situations. Participants completing this program should be able to contribute confidently to the planning and execution of effective strategies for plant commissioning and start-up in their own specific work and process plant situations. Objectives include building knowledge and understanding of :

- The six key stages of the commissioning process
- How to develop and overall commissioning and plant start-up strategy
- How to deal with machinery and equipment specific commissioning issues
- How to manage issues dealing with the commissioning of Electrical, Instrumentation and Utilities Systems
- How to develop an overall commissioning management plan, resource plan and budget
- How to apply troubleshooting and problem solving strategies to address issues commonly arising during start up and commissioning
- How to manage risks associated with commissioning

WHO SHOULD ATTEND?

This intensive course addresses the needs of a diverse audience with an interest in Plant Start-up and Commissioning, including:

- General Managers who have oversight responsibility for Plant Start-up and Commissioning
- Operations and Maintenance Managers with direct line responsibility as well as staff support responsibility for delivering on effective Plant Start-up and Commissioning
- Plant Start-up and Commissioning Managers and Engineers
- Technical personnel involved in supporting Plant Start-up and Commissioning activities
- Supervisors and Engineers, both operations and maintenance who are involved or likely to be involved in Plant Start-up and Commissioning situations

TRAINING METHODOLOGY:

Process Plant Start-up and Commissioning is a hands-on, stimulating learning experience. The program will be highly interactive, with opportunities to advance your opinions and ideas. Participation is encouraged in a supportive environment.

To ensure the concepts introduced during the program are understood, they will be reinforced through a mix of learning methods, including lecture style presentation, open discussion, case studies, simulations and group work.

WHAT YOU WILL LEARN:

Develop a thorough understanding of specific instructions needed from equipment suppliers. Understand the structure, procedures and checks required so that all systems and associated equipment are stored, inspected and maintained in a desired state leading to commissioning.

Attendees will learn how to create procedures and check lists reflecting the steps required to ready and monitor static and rotating equipment through all stages of a safe and efficient commissioning and start-up process.

COURSE OUTLINE:

Day 1:

The Commissioning Process

Key Stages:

1. Preparation and Planning
2. Mechanical completion and integrity checking
3. Pre-Commissioning and Operational Testing
4. Start-up and initial operation
5. Performance and Acceptance Testing
6. Post Commissioning

Preparation and Planning

- ❖ Building the Organizational Structure
 - ✓ Commissioning Manager
 - ✓ Commissioning Lead Discipline Engineer
 - ✓ Commissioning Teams
- ❖ Training
- ❖ Information Gathering
 - Collect Vendor (OEM¹) Information
 - Establish Owner's Records (CMMS²)
 - Startup, Shutdown and Emergency Procedures
- ❖ Safety and Risk Assessment
- ❖ Developing a Commissioning Strategy
 - Facility/Plant Level Activities (Commissioning Master Plan)
 - System Level Activities
 - Equipment Level Activities
- ❖ Developing Procedures and Checklists
 - Procedures defined
 - Guidelines for Writing Effective Procedures and Checklists
 - Critical Path and Network Plan
 - Issues to be resolved (Hot fluids, Explosive Gases, Safety)
- ❖ Detailed Plan and Budget Preparation

Day 2:

Mechanical Completion and Integrity Checking

- ❖ Inspection
 - Categories of Process Equipment
 - Methodology
- ❖ Mechanical and Functional Completion and Integrity Checking explained

- Definition and Scope
- Mechanical Completion and Integrity Checking Procedures
- Progress List
- Line Walking
- Managing the Punch List
- Hints and Tips
- Pipe Stressing
- Piping and Equipment Supports
- Machinery
- Columns and Vessels
- Electrical Supply and Distribution Systems
- Instrument and Control Systems
- Control Room(s)
- Safety Valves
- ❖ Pressure Testing
 - Objectives
 - Responsibilities
 - Procedures
 - Vacuum and Instrument Air Systems
- ❖ Cleaning and Flushing
 - Objectives
 - Procedures
- ❖ Machinery Checkout
 - General Purpose Machinery (Spared Machinery)
 - Special Purpose Machinery (Unspared Machinery)
 - Analog, Distributed Control Systems and Programmable Logic Control Systems
 - Instrument Air System
 - Control Room(s)

Day 3:

Pre-Commissioning and Operational Testing

- ❖ Pre-Commissioning Audit
 - Objectives
 - Procedures
- ❖ Final Installation Checks
 - Static Equipment
 - Rotating Equipment
 - Instrument Air System
 - Instrumentation, Analog and Distributed Control Systems, Programmable Logic Controller Systems
- ❖ Steam and other Utilities commissioned and introduced
 - Provides Planning Practice for Plant Commissioning
 - Guidelines
 - Introducing Steam
 - Electrical System
 - Instrument Air System
- ❖ Operational Testing Progresses through Several Stages
 - General Principles of Testing

¹Original Equipment Manufacturer

²Computerized Maintenance Management System

COURSE OUTLINE(Continued):

- Dry Runs and Hot Tests
- Hot running trials
- Safe-fluid dynamic testing
- Solvent dynamic testing
- Process fluid tests

Day 4:

Start-up and Initial Operation

- ❖ General Assumptions about the Plant Process
 - Feed Preparation
 - Reaction
 - Recovery
 - Product Refining
 - Start-up Logic
- ❖ Coordination and Supervision during Start-up
- ❖ Introduction of Process Fluid
- ❖ Start-up and Initial Operation
- ❖ Bringing up the Plant
- ❖ Troubleshooting and Problem Correction
- ❖ Plant Taken to Full Operation

Day 5:

Performance and Acceptance Testing and Post Commissioning

- ❖ Performance Tracking
- ❖ What needs to be Verified
- ❖ Formal Acceptance Tests
 - Objectives
 - Designed by Commissioning Team
 - Manage outstanding Punch List Items

Post Commissioning

- ❖ Definitions and Activities
- ❖ From Plant On-Stream to Regular Production
- ❖ Adjustments, Modifications and Fault Correction
- ❖ Completion of Outstanding Punch List Items
- ❖ As-Built Process and Instrument Diagrams (P&IDs)
- ❖ Specification Books
- ❖ Construction Drawings
- ❖ Vendor Drawings/Specification Books
- ❖ Updated Shutdown, Startup and Emergency Procedures

About Your Principal Course Leaders:



Mr. Fred K. Geitner P.Eng. M.S.M.E. is the Principal Engineer of PMES (Process Machinery Engineering Services). He has **over 50 years experience** in rotating/process machinery engineering for the petrochemical and related process industries. He is presently working as an

expert witness for rotating machinery and is advising on subjects related to process machinery (e.g. air compressors, steam turbines, etc.), reliability improvement and maintenance such as machinery failure analysis, specifications, technical bid analysis and machinery design audits. From 1993 to 2000, Mr. Fred K. Geitner worked for a major natural gas transmission company in Germany where he was in charge of machinery technology liaison between the German firm and pipeline companies in the newly independent states of the former Soviet Union. Before retiring from Exxon in 1992, after twenty years of service, Mr. Geitner's professional career included positions as Engineering Associate with Esso Chemical Canada and a three-year assignment as a lead machinery specialist with Exxon Chemical France. Prior to joining Exxon, Mr. Geitner worked for ten years for Cooper Industries, a major manufacturer of process machinery. There he held positions in field service engineering, design and manufacturing at various locations in Canada and the U.S. Mr. Geitner graduated from the Technical University of Berlin/Germany with an M.S. (Dipl. Eng.) degree in Engineering and did post-graduate studies at the University of Cincinnati, USA. Mr. Geitner has presented courses and seminars on design, operation and maintenance of process machinery and related equipment in Canada, the US, Europe, South America and the Middle East.

He is also a present member of the Society of Tribologists and Lubrication Engineers and has, together with Heinz Bloch co-authored a series of books on process machinery management and reliability engineering. The current list of his books includes:

- (1) Machinery Failure Analysis and Troubleshooting (Third Edition), by Heinz P. Bloch and Fred K. Geitner (Houston, Texas: Gulf Publishing Company).
- (2) Practical Machinery Management for Process Plants, Volume 1, 3rd Edition.
- (3) Practical Machinery Management for Process Plants, Volume 2, 3rd Edition
- (4) Practical Machinery Management for Process Plants, Volume 3, 2nd Edition:
- (5) Practical Machinery Management for Process Plants, Volume 4, 2nd Edition.
- (6) Machinery Component Maintenance and Repair
- (7) Process Equipment Maintenance and Repair
- (8) Process Plant Machinery
- (9) Process Plant Reliability

About Your Principal Course Leaders(Continued):



Mr. Chris Dannenmaier, Principal Consultant and Chief Executive Officer of Plant Leadership Systems, LLC, is a Chemical Engineer with over 30 years of experience in leading and advising all phases of manufacturing operations in the process industries. As CEO of Plant Leadership Systems, LLC, he serves as lead consultant and oversees projects that assist clients in improvements to the organization and operation of

process manufacturing facilities around the globe. In addition, Chris conducts training and seminars aimed at extending the skill set of plant supervisors and managers. He has served in a variety of operating company positions in his career, including Process Engineer with GAF Chemicals, Production Superintendent with Syntex Chemicals, Engineering Manager, Production Manager, and Plant Manager with International Specialty Products and Director of Manufacturing with Roche Colorado Corporation. Chris is skilled at helping clients find creative, yet practical solutions to process plant problems.

Chris has conducted business across North America, Europe, the Middle East, and Asia. He holds an undergraduate degree in Chemical Engineering from the University of Texas at Austin and is a graduate of the University of Michigan Manufacturing Executive Program.

Example Projects include:

- Lead consultant on major refining company system-wide upgrade of operator learning and development program, including analysis of human performance practices throughout refining system.
- Lead consultant on evaluation of technical training college curricula, delivery, and efficacy.
- Lead consultant on refinery control room migration project including development of strategic business plan and operating philosophy, work process revision, upgrade of training systems.
- Training of process plant engineers, supervisors and managers, development of job performance standards (job competencies) for all staff positions, and performance management consulting.
- Analysis of pharmaceutical plant manufacturing performance, development of program for organizational performance improvement, consulting support of implementation.
- Delivery of training program for major Chinese energy company managers.
- Delivery of training program for major Saudi energy company supervisors and superintendents.
- Development and delivery of custom training for Oman process engineers.



John C. Hollemans is the Proprietor of Contrex Consulting and a Chemical Engineer. He has a post graduate degree in Control Engineering from the University of Manchester, UK. Mr Hollemans spent almost fifteen years with Imperial Oil Ltd. (Esso) in Sarnia, Ontario, Canada. He developed a number of Advanced Process Control applications using Esso's proprietary

Generalized Supervisory Programming System and taught process control at Exxon Research & Engineering in Florham Park, New Jersey, USA. A few years before leaving the company he was the leader of the Plant Computing System design team. These kinds of systems are now found in most modern refineries and chemical plants. After becoming an independent consultant in 1990 he held several long term advisory positions with Cegelec's COMSIP Division in Rueil-Malmaison, France and IBM Nederland in Utrecht, The Netherlands. He also worked as an Expert Witness for several US law firms dealing with product malfunction suits in the area of instrumentation and controls. Now he devotes most of his time teaching first class process control courses.



3 Easy Ways to register:

Online: www.matgroup.org

Email: training@matgroup.org

Fax: +9821-88552734

CONTACT US:

Unit#3, No.26, 3rd Alley, Vozara Ave, Tehran
1513634114 Iran

Tel/Fax: +9821-88552734

Tel.: +9821-88553230

E-mail: training@matgroup.org

www.matgroup.org