



PE034: Process Plant Troubleshooting & Engineering Problem Solving

Training Description:

Modern industrial processes are large, complex and have a high degree of interaction between both dependent and independent variables. This makes problem solving difficult and leads to the “disappearing problem” syndrome. Problems often disappear without being solved only to reappear again. This course deals with a unique approach of combining cause and effect problem solving thinking with formulation of theoretically correct working hypotheses to provide rapid and effective problem-solving techniques for the process industry.

Problem Solving in the process industry is often characterized by either inference based on cause and effect relationships or highly involved theoretical approaches. Neither of these approaches is satisfactory in a modern manufacturing environment. The cause/effect inference approach while being expedient often results in solutions that do not eliminate the problem, but in fact make the problem worse. The more sophisticated highly theoretical approach is rarely expedient enough to satisfy time constraints in a production facility. Thus, one of the most frequent industry requests to the academic world is “give us people that can solve problems”.

This course presents an approach that emphasizes the classical problem-solving approach (defining the sequence of events) with the addition of the steps of formulating a theoretically correct working hypothesis, providing a means to test the hypothesis, and providing a foolproof means to eliminate the problem. The initial part of the course focuses on defining the problem that must be solved and obtaining the location, time and quantity-based specifications of the problem. The initial part of the course is suitable for all engineering disciplines as well as non-engineers.

The second part of the course deals with the utilization of chemical engineering fundamentals to develop a technically correct working hypothesis that is the key to successful problem solving. The primary emphasis is on pragmatic calculation techniques that are theoretically correct. These techniques have been developed by the course Instructor who has over 30+ years of industrial experience. Using these techniques, theoretically correct working hypotheses can be developed in an expedient fashion. The course includes both sample problems as well as problem working sessions to allow the participants to develop confidence with the approach.

The participants are encouraged to bring real problems that they are working to use in discussions on the last day of the course. These problems should be of a non-confidential nature that can be discussed without violation of any confidentiality restrictions.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Apply and gain an in-depth knowledge on process plant troubleshooting and engineering problem solving
- ✓ Enumerate the components of plant problem solving as well as the various troubleshooting techniques on engineering problem solving by familiarizing the potential sources
- ✓ Specify the limitations to plant problem solving through sources of historical data and explain the daily monitoring system guidelines by setting trigger points

- ✓ Apply the methods of risk analysis particularly HAZOP and MSDS in process plant troubleshooting and practice the process of engineering problem solving through sample problems in troubleshooting
- ✓ Discuss the scope of applied economics including other valuation forms & methods, and review the guidelines for problem solving temperature, pressure, and level
- ✓ Employ the simplified approach in solving compressor problems, distillation, plates & tray stability, discuss clearly the elements of measurements & verifications and carryout sample exercise on kinetics, flow, mechanical and designs
- ✓ Recognize the attributes of equivalent piping lengths, commercial correlations and fluids by means of practical exercises
- ✓ Discuss the importance of two-phase flow including its attributes and applications and analyze the characteristics of controllers, feedback, feedforward and cascade controls used in process control
- ✓ Recognize process control and optimization, process analyzers, distillation multiple control, volume control, condenser control and control project drawback
- ✓ Employ heat transfer and various troubleshooting techniques and applications used in process plant
- ✓ Implement the procedures on distillation column packing and identify the different forms of hazards to equip them with the QRA procedures and demonstration
- ✓ Carryout proper methodology of MSDS and discuss if the needed information is good enough or incomplete

Training Designed for:

This course is intended for process engineers, plant managers, team leaders, section heads, plant supervisors and other technical staff will definitely benefit from the engineering problem solving approach of the course. This course provides a complete and up-to-date overview of the process plant troubleshooting techniques and procedures used to solve engineering problems.

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.”

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course 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
- ❖ Troubleshooting
- ❖ Definition, Potential Sources
- ❖ Engineering Problem Solving
- ❖ Course Approach
- ❖ Components of Plant Problem Solving

- ❖ Limitations to Plant Problem Solving
- ❖ Sources of Historical Data
- ❖ Daily Monitoring System Guidelines
- ❖ Setting Trigger Points
- ❖ Disciplined Learned Problem-Solving Approach
- ❖ Step 1 to Step 6 – Considerations
- ❖ Risk Analysis – HAZOP – MSDS
- ❖ Troubleshooting Manual: Sample Problems

DAY TWO:

- ❖ Applied Economics
- ❖ Valuation Principles and Methods
- ❖ Other Valuation Principle and Methods
- ❖ Compressor – Compressor Problems – Simplified Approach
- ❖ Distillation, Plates, Tray Stability
- ❖ Guidelines for Problem Solving Temperature, Pressure, Level
- ❖ Measurements, Verification
- ❖ Sample Exercise Kinetics, Flow, Mechanical, Design

DAY THREE:

- ❖ Fluid Overview – Basic Principles
- ❖ Fluid Overview – Head Definition
- ❖ Equivalent Piping Lengths
- ❖ Commercial Correlations
 - Practical Exercises
- ❖ Two Phase Flow/Theory and Applications
 - Practical Exercises
- ❖ Process Control – Introduction; PID
- ❖ Controllers, Feedback, Feedforward and Cascade Controls
- ❖ Advanced Control; Multi-loop
- ❖ Controllers; Process Control & Optimization
- ❖ On Line Optimization; Process Analyzers
- ❖ Distillation Multiple Control; Volume Control
- ❖ Condenser Control, Practical Considerations, Advanced
- ❖ Control Project Drawback

DAY FOUR:

- ❖ Heat Transfer Overview
- ❖ Troubleshooting Techniques/Applications
 - Practical Exercises
- ❖ Distillation Column Packing
 - Practical Exercises

DAY FIVE:

- ❖ Hazards
 - Demonstration

- ❖ QRA “Ishikawa” Diagrams
 - Exercises
- ❖ MSDS
 - Needed Information, Is it Good Enough?
 - Incomplete?
 - Accidents
 - Flixborough Accident
- ❖ Course Conclusion
- ❖ POST-ASSESSMENT 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, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

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

Training Fees:

TBA 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 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

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

Aisha Relative - Training & Career Development Manager

aisha@cmc-me.com / training@cmc-me.com

Tel.: +971 2 665 3945 or +971 2 643 6653 | Mob.: +971 52 2954615