



PE249: Troubleshooting/ Performance Improvements

Training Description:

In a typical processing plant, such as a petrochemical plant or oil refinery, there are hundreds and even thousands of control loops. Each control loop is responsible for controlling one part of the process, such as maintaining a temperature, level or flow. If the control loop is not properly designed and tuned, the process runs below its optimum. The process will be more expensive to operate, and equipment will wear out prematurely. For each control loop to run optimally, identification of sensor, valve, and tuning problems is important. It has been well documented that over 35% of control loops typically have problems.

Process plant optimization is the set of adjustments of the various processes in order to optimize some specified set of parameters without violating some constraints. The most common goals are minimizing cost and maximizing throughput and efficiency. When optimizing a process, the goal is to maximize one or more of the process specifications, while keeping all others within their constraints. This can be done by using a process mining tool, discovering the critical activities and bottlenecks, and acting only on them.

Process plant optimization involves evaluating every process and interaction in order to determine the best possible outcome. It includes the optimization of process equipment, operating procedure and control systems. This can result in improved flexibility, modernization and the best use of equipment, improved automation, decreased production time, and increased innovation.

This intensive course covers a complete and up-to-date overview of process plant optimization. Upon the successful completion of this course, participant will gain a satisfactory understanding of the concepts of optimization fundamentals, process plant design optimization, process plant planning optimization, process plant operations optimization, process controls, optimizing reliability, optimizing offsite operations, continuous improvement and integrated supply chain optimization. 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 and gain an in-depth knowledge on process plant optimization technology and continuous improvement
- ✓ Define and identify the basic optimization fundamentals and tools
- ✓ Illustrate breakeven analysis, graphical methods, numerical methods, incremental methods, linear programming, quadratic programming and non-linear optimization techniques
- ✓ Describe global and local optima, design optimization, NP maximization and configuration optimization
- ✓ Discuss integer programming, capacity creep and plant debottlenecking as well as optimize operations planning, unit performance and process operations
- ✓ Explain linear programs and non-linear models, scheduling by parameters for optimization, crude unit cut points, reformer severity, FCC conversion and other key parameters
- ✓ Integrate unit performance, describe the utilities and process controls and differentiate analogue controls versus digital controls as well as feed-back versus feed-forward controls
- ✓ Determine DCS and advanced controls, process analyzers, off-line optimization, multivariable process control and inferential controls and differentiate dynamic versus steady-state

- ✓ Discuss statistical process control, optimizing reliability, RCFA logic diagrams and fault trees, turnaround planning, materials inventory management, management and information systems
- ✓ Employ risk management and optimization, offsite operations optimization, offsites design, storage facilities operation, utilities management, inventory management, blending optimization and continuous improvement
- ✓ Acquire knowledge on the elements in supply chain, lean manufacturing, kaisan and six sigma, benchmarking and best practices
- ✓ Distinguish the difference between plant optimization versus supply chain optimization and discuss the summary of refinery and process plant optimization

Training Designed for:

This course is intended for Managers, Leaders, Section Heads, Superintendents, Supervisors, Process Engineers, Production Engineers, Plant Engineers and Planning Engineers.

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.”

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for participants to practice the theory learnt. Participants will be provided with an opportunity to carryout various exercises using the “Simulis Thermodynamics”, ProPhyPlus”, “ProSim Ternary Diagram” and “Simulis Conversions” simulators.

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:

FIVE DAYS:

- ❖ PRE-TEST
- ❖ Optimization Fundamentals
- ❖ Definitions and Basic Optimization Tools
- ❖ Breakeven Analysis
- ❖ Graphical Solutions
- ❖ Numerical Methods
- ❖ Incremental Method
- ❖ Linear Programming (LP)
- ❖ Quadratic Programming (QP)
- ❖ Non-Linear Optimization Techniques
- ❖ Global & Local Optima
- ❖ Optimizing the Design
- ❖ Maximizing NP
- ❖ Configuration Optimization
- ❖ Integer Programming (IP)
- ❖ Capacity Creep

- ❖ Plant Debottlenecking
- ❖ Optimizing Operations Planning
- ❖ Linear Programs (LP) and Non-Linear Models
- ❖ Optimizing Unit Performance
- ❖ Scheduling
- ❖ Optimizing Process Operations
- ❖ Key Parameters for Optimization
- ❖ Crude Unit Cut Points
- ❖ Reformer Severity
- ❖ FCC Conversion
- ❖ Other Key Parameters
- ❖ Integrating Unit Performance
- ❖ Utilities
- ❖ Process Controls
- ❖ Analogue Controls versus Digital Controls
- ❖ Feed-back & Feed-forward Controls
- ❖ DCS (Distributed Control Systems) & Advanced Controls
- ❖ Process Analyzers
- ❖ Off-line Optimization
- ❖ Real Time Online Optimization
- ❖ Multivariable Process Control and Inferential Controls
- ❖ Dynamic versus Steady-State
- ❖ Statistical Process Control
- ❖ Optimizing Reliability
- ❖ Root Cause Failure Analysis
- ❖ Logic Diagrams & Fault Trees
- ❖ Turnaround Planning
- ❖ Materials Inventory Management
- ❖ Management & Enterprise Information Systems
- ❖ Risk Management & Optimization
- ❖ Optimizing Offsites Operations
- ❖ Offsites Design
- ❖ Storage Facilities Operation
- ❖ Utilities Management
- ❖ Inventory Management
- ❖ Blending Optimization
- ❖ Continuous Improvement
- ❖ Lean Manufacturing
- ❖ Kaisean and Six Sigma
- ❖ Benchmarking and Best Practices
- ❖ Plant Optimization versus Supply Chain Optimization
- ❖ Elements in Supply Chain
- ❖ Summary of Refinery and Process Plant Optimization Trends
- ❖ Crude Unit Optimization Case Study

❖ Simulator (Hands-on Practical Sessions)

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❖ 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, 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:

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