Process Debottlenecking Techniques Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Process debottlenecking is a critical engineering discipline focused on identifying, analyzing, and eliminating constraints that limit production capacity, efficiency, and operational performance in industrial systems. In today’s competitive landscape driven by Operational Excellence, Industry 4.0, Lean Manufacturing, and Process Optimization, organizations must continuously improve throughput without significant capital expenditure. Process Debottlenecking Techniques Training Course equips participants with advanced tools and methodologies to systematically detect bottlenecks, evaluate process inefficiencies, and implement sustainable capacity enhancement strategies across oil & gas, petrochemical, manufacturing, and energy sectors.

The course integrates advanced process simulation, throughput analysis, constraint management theory, and data-driven decision-making techniques to enable engineers and managers to unlock hidden plant capacity. Participants will gain hands-on exposure to real-world industrial challenges involving equipment limitations, flow restrictions, energy inefficiencies, and control system constraints. By mastering debottlenecking strategies, process intensification, root cause analysis, and performance optimization frameworks, learners will be able to significantly improve plant reliability, reduce operational costs, and maximize asset utilization.

Programme Curriculum

Process Debottlenecking Techniques Training Course

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Course Duration

5 days

Course Objectives

1. Master Process Debottlenecking Techniques for industrial systems
2. Identify production constraints and bottleneck analysis methods
3. Apply Lean Manufacturing and Six Sigma optimization tools
4. Conduct process capacity utilization and throughput analysis
5. Use simulation-based process optimization techniques
6. Improve plant efficiency and operational performance metrics
7. Apply Theory of Constraints (TOC) in process industries
8. Perform root cause failure analysis for process limitations
9. Optimize energy consumption and utility systems performance
10. Enhance equipment reliability and maintenance efficiency
11. Implement process intensification strategies for capacity expansion
12. Develop data-driven decision-making in process engineering
13. Achieve cost reduction and productivity improvement targets

Target Audience

1. Process Engineers
2. Chemical Engineers
3. Production & Operations Managers
4. Plant Managers & Supervisors
5. Industrial Engineers
6. Maintenance Engineers
7. Reliability Engineers
8. Energy & Utilities Engineers

Course Modules

Module 1: Fundamentals of Process Debottlenecking

- Understanding bottlenecks in industrial systems
- Types of constraints: physical, operational, and procedural
- Capacity vs demand imbalance analysis
- Introduction to throughput optimization

- KPI identification for performance tracking
- **Case Study:** Oil refinery crude distillation unit capacity limitation analysis

Module 2: Theory of Constraints (TOC) in Process Systems

- TOC principles and system thinking approach
- Identifying system bottlenecks
- Drum-buffer-rope methodology
- Constraint prioritization techniques
- Continuous improvement cycle
- **Case Study:** Bottleneck identification in petrochemical production line

Module 3: Process Flow Analysis & Mapping

- Value stream mapping techniques
- Material and energy flow analysis
- Process interdependency mapping
- Cycle time and waiting time analysis
- Waste identification in production systems
- **Case Study:** Manufacturing assembly line throughput delay analysis

Module 4: Simulation & Modeling for Debottlenecking

- Process simulation software applications
- What-if scenario analysis
- Digital twin technology in process optimization
- Capacity modeling techniques
- Sensitivity analysis of process variables
- **Case Study:** Gas processing plant simulation for capacity expansion

Module 5: Equipment & Utility Bottleneck Optimization

- Heat exchanger and pump limitations
- Compressor and pipeline constraints
- Utility system optimization
- Equipment sizing and redesign strategies
- Reliability-centered improvements
- **Case Study:** Steam network bottleneck in chemical plant utilities

Module 6: Data Analytics & Performance Monitoring

- Industrial data acquisition systems
- Real-time monitoring and dashboards
- Predictive analytics for bottleneck detection
- Statistical process control (SPC)
- KPI-driven optimization strategies
- **Case Study:** Predictive bottleneck detection in cement manufacturing plant

Module 7: Lean & Six Sigma Integration for Debottlenecking

- Lean manufacturing principles
- DMAIC methodology for process improvement

- Waste reduction techniques
- Process variation reduction strategies
- Continuous improvement culture
- **Case Study:** Six Sigma-based throughput improvement in bottling plant

Module 8: Process Intensification & Capacity Expansion

- Advanced process intensification techniques
- Retrofit vs expansion decision-making
- Cost-benefit analysis for upgrades
- Energy-efficient redesign strategies
- Sustainability-driven optimization
- **Case Study:** Refinery capacity expansion without major capital investment

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
07 Sep 2026	11 Sep 2026	Online	$1,000
07 Sep 2026	11 Sep 2026	Physical	$1,500
14 Sep 2026	18 Sep 2026	Online	$1,000
14 Sep 2026	18 Sep 2026	Physical	$1,500
21 Sep 2026	25 Sep 2026	Online	$1,000
21 Sep 2026	25 Sep 2026	Physical	$1,500
28 Sep 2026	02 Oct 2026	Online	$1,000
28 Sep 2026	02 Oct 2026	Physical	$1,500

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