Advanced Process Optimization Tools in Manufacturing Training Course

Professional Development Training Course Outline

Category	Manufacturing	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Advanced Process Optimization Tools in Manufacturing Training Course is designed to equip professionals with the expertise to drive operational excellence, smart manufacturing transformation, AI-powered optimization, and data-driven production efficiency. In today's rapidly evolving industrial landscape shaped by Industry 4.0, Industrial IoT (IIoT), digital twins, machine learning analytics, and smart factories, manufacturers must continuously optimize processes to reduce waste, improve throughput, enhance quality, and achieve sustainable productivity gains. This course provides a comprehensive understanding of advanced optimization frameworks, real-time production monitoring systems, predictive analytics, and simulation-based decision-making tools that empower organizations to stay competitive in a globalized market.

The training emphasizes hands-on exposure to Lean Six Sigma integration, Advanced Planning & Scheduling (APS), Manufacturing Execution Systems (MES), constraint-based optimization, and AI-driven process control systems. Participants will learn how to leverage modern tools such as predictive maintenance systems, digital simulation models, and process mining technologies to identify bottlenecks, streamline workflows, and maximize asset utilization. By combining theoretical insights with real-world case studies, this program ensures learners gain practical mastery in transforming traditional manufacturing systems into agile, intelligent, and highly optimized production ecosystems.

Programme Curriculum

Advanced Process Optimization Tools in Manufacturing Training Course

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Course Duration

10 days

Course Objectives

1. Master Industry 4.0-enabled process optimization strategies
2. Implement AI-powered manufacturing analytics and decision systems
3. Apply Lean Six Sigma methodologies for waste reduction
4. Utilize Digital Twin technology for process simulation
5. Optimize workflows using Advanced Planning & Scheduling (APS) tools
6. Improve productivity through Industrial IoT (IIoT) data integration
7. Develop expertise in predictive maintenance and asset optimization
8. Enhance production efficiency using real-time MES systems
9. Identify bottlenecks using process mining and workflow analytics
10. Integrate machine learning models for predictive production control
11. Achieve cost reduction through smart factory optimization techniques
12. Strengthen quality systems using statistical process control (SPC)
13. Enable sustainable manufacturing via green and lean optimization strategies

Target Audience

- Manufacturing engineers and process engineers
- Operations and production managers
- Industrial automation specialists
- Supply chain and logistics professionals
- Quality assurance and Six Sigma practitioners
- Plant supervisors and factory floor managers
- Data analysts in manufacturing environments
- Industrial engineering students and researchers

Course Modules

Module 1: Fundamentals of Process Optimization in Manufacturing

- Introduction to optimization principles

- Key performance indicators (KPIs) in manufacturing
- Process mapping techniques
- Waste identification methods
- Optimization lifecycle overview
- **Case Study:** Automotive assembly line efficiency improvement

Module 2: Industry 4.0 and Smart Manufacturing Systems

- Smart factory architecture
- Cyber-physical systems integration
- Real-time data exchange
- Automation frameworks
- Digital transformation roadmap
- **Case Study:** Smart factory deployment in electronics manufacturing

Module 3: Lean Manufacturing and Six Sigma Integration

- Lean principles and value stream mapping
- DMAIC methodology
- Waste elimination strategies
- Continuous improvement systems
- Process capability enhancement
- **Case Study:** Lean transformation in FMCG production

Module 4: Advanced Planning and Scheduling (APS)

- Production scheduling optimization
- Constraint-based planning
- Resource allocation models
- Demand forecasting integration
- Bottleneck analysis
- **Case Study:** APS implementation in textile manufacturing

Module 5: Manufacturing Execution Systems (MES)

- MES architecture and functions
- Shop floor control systems
- Real-time production tracking
- Quality data integration
- Performance monitoring dashboards
- **Case Study:** MES deployment in semiconductor plant

Module 6: Industrial IoT (IIoT) in Manufacturing Optimization

- Sensor-based data acquisition
- Machine connectivity frameworks
- Edge computing applications
- IoT-enabled monitoring systems
- Data-driven optimization
- **Case Study:** IIoT in predictive maintenance for heavy machinery

Module 7: Digital Twin Technology for Process Simulation

- Virtual manufacturing models
- Simulation of production systems
- Scenario testing and optimization
- Real-time synchronization
- Risk-free process experimentation
- **Case Study:** Digital twin in automotive design optimization

Module 8: Predictive Maintenance and Asset Optimization

- Condition monitoring systems
- Failure prediction models
- Maintenance scheduling optimization
- AI-based diagnostics
- Equipment lifecycle management
- **Case Study:** Predictive maintenance in oil & gas manufacturing

Module 9: Machine Learning for Manufacturing Optimization

- Data preprocessing techniques
- Predictive analytics models
- Classification and regression in production
- AI-driven decision systems
- Model training and validation
- **Case Study:** ML-based defect detection in production lines

Module 10: Process Mining and Workflow Analytics

- Event log analysis
- Bottleneck detection
- Workflow visualization tools
- Performance gap identification
- Process redesign strategies
- **Case Study:** Process mining in pharmaceutical manufacturing

Module 11: Statistical Process Control (SPC)

- Control charts and variation analysis
- Process stability monitoring
- Quality deviation detection
- Root cause analysis
- Continuous quality improvement
- **Case Study:** SPC in food processing industry

Module 12: Supply Chain Optimization in Manufacturing

- Demand-supply balancing
- Inventory optimization models
- Logistics efficiency improvement
- Supplier integration systems
- End-to-end visibility
- **Case Study:** Supply chain optimization in retail manufacturing

Module 13: Energy Efficiency and Sustainable Manufacturing

- Green manufacturing principles
- Energy consumption analytics
- Carbon footprint reduction
- Resource optimization techniques
- Sustainability KPIs
- **Case Study:** Energy optimization in steel production

Module 14: Real-Time Data Analytics and Dashboards

- Manufacturing analytics platforms
- KPI dashboards design
- Real-time visualization tools
- Data-driven decision-making
- Performance tracking systems
- **Case Study:** Real-time analytics in beverage production plant

Module 15: Capstone Project – End-to-End Process Optimization

- Industry problem identification
- Data collection and analysis
- Optimization model development
- Implementation strategy
- Final presentation and evaluation
- **Case Study:** Full-scale optimization of an FMCG production facility

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
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

Ready to enroll or request a customized program? Book online or contact us:

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