Micro-Manufacturing Technologies Training Course

Professional Development Training Course Outline

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

Course Introduction

Micro-Manufacturing Technologies represent the next frontier in precision engineering, enabling the production of ultra-small, high-accuracy components used in aerospace, biomedical devices, electronics, automotive systems, and advanced robotics. Micro-Manufacturing Technologies Training Course is designed to equip learners with cutting-edge knowledge and hands-on competencies in micro-scale fabrication processes, precision machining, MEMS (Micro-Electro-Mechanical Systems), and advanced additive manufacturing techniques. Participants will gain exposure to industry 4.0-enabled micro-production systems, smart materials integration, and nano-precision quality control methods.

As global industries shift toward miniaturization, efficiency, and high-performance micro-components, professionals skilled in micro-manufacturing technologies are in high demand. This course bridges the gap between theoretical micro-engineering principles and real-world industrial applications, focusing on high-precision tooling, micro-fabrication processes, digital manufacturing systems, and automated inspection technologies. Learners will be prepared to contribute to innovation-driven manufacturing ecosystems and advanced production environments.

Programme Curriculum

Micro-Manufacturing Technologies Training Course

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Course Duration

5 days

Course Objectives

1. Master Micro-Manufacturing Process Engineering and system design principles
2. Develop expertise in Precision CNC Micro-Machining Technologies
3. Understand MEMS Fabrication and Nano-Scale Engineering Applications
4. Apply Additive Manufacturing (3D Printing) for Micro Components
5. Implement Smart Factory & Industry 4.0 Micro-Production Systems
6. Gain proficiency in Laser Micro-Machining and Micro-Drilling Techniques
7. Analyze Material Behavior at Micro and Nano Scale Levels
8. Perform Ultra-Precision Metrology and Quality Assurance
9. Integrate Automation and Robotics in Micro-Manufacturing Lines
10. Understand Advanced Surface Engineering and Coating Technologies
11. Optimize Lean Micro-Manufacturing and Process Efficiency Systems
12. Apply AI-driven Predictive Maintenance in Micro-Production Equipment
13. Develop innovation skills in Sustainable and Green Micro-Manufacturing Systems

Target Audience

1. Mechanical and Manufacturing Engineers
2. Industrial Automation Specialists
3. Mechanical Engineering Students & Graduates
4. Aerospace and Automotive Technicians
5. Biomedical Device Designers
6. Research and Development Professionals
7. Production and Quality Control Managers
8. Entrepreneurs in Advanced Manufacturing Startups

Course Modules

Module 1: Fundamentals of Micro-Manufacturing

- Overview of micro-manufacturing systems
- Scaling laws in micro production
- Micro vs macro manufacturing differences
- Industry applications overview
- Equipment and tooling basics
- **Case Study:** Micro-gear fabrication for smartwatch mechanisms

Module 2: Precision CNC Micro-Machining

- High-speed micro CNC operations
- Tool selection and wear analysis
- Micro cutting dynamics
- Tolerance control techniques
- Surface finish optimization
- **Case Study:** Aerospace micro-nozzle component production

Module 3: MEMS and Nano Fabrication

- MEMS design principles
- Photolithography processes
- Etching and deposition methods
- Sensor and actuator fabrication
- Nano-scale integration
- **Case Study:** MEMS accelerometer used in smartphones

Module 4: Additive Manufacturing for Micro Components

- Micro 3D printing technologies
- Material selection for micro AM
- Layer resolution optimization
- Hybrid manufacturing approaches
- Post-processing techniques
- **Case Study:** Microfluidic chip for medical diagnostics

Module 5: Laser Micro-Machining Technologies

- Femtosecond laser systems
- Micro-drilling applications
- Thermal effects control
- Laser precision tuning
- Industrial laser safety
- **Case Study:** Micro-holes in fuel injection systems

Module 6: Metrology and Quality Assurance

- Nano-precision measurement tools
- Coordinate measuring machines (CMM)
- Optical inspection systems
- Surface roughness analysis
- Statistical process control
- **Case Study:** Quality control in semiconductor wafer inspection

Module 7: Automation and Smart Micro-Factories

- Robotics in micro-production
- IoT-enabled manufacturing systems
- Real-time monitoring systems
- Digital twin technology
- AI-based process control
- **Case Study:** Automated micro-electronics assembly line

Module 8: Sustainable Micro-Manufacturing

- Green manufacturing techniques
- Energy-efficient micro production
- Waste minimization strategies
- Eco-material integration
- Lifecycle assessment
- **Case Study:** Sustainable production of biodegradable micro-packaging components

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	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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

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