# Laser Manufacturing Technologies Training Course

Professional Development Training Course Outline

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

## Course Introduction

Laser Manufacturing Technologies represent a transformative leap in modern industrial production, enabling ultra-precise, high-speed, and highly efficient material processing across multiple sectors. Laser Manufacturing Technologies Training Course is designed to equip learners with advanced competencies in laser-based manufacturing systems, including laser cutting, welding, engraving, marking, additive manufacturing, and micro-machining. With industries rapidly shifting toward automation, Industry 4.0 integration, and smart manufacturing ecosystems, mastery of laser technologies has become a critical skill for engineers, technicians, and production specialists.

This comprehensive program provides a deep understanding of laser physics, system components, process optimization, safety protocols, and real-world industrial applications. Learners will gain hands-on exposure to cutting-edge laser equipment used in automotive, aerospace, medical device fabrication, electronics, and precision tooling industries. The course bridges theoretical foundations with practical implementation, empowering participants to optimize production efficiency, reduce material waste, and enhance product quality using advanced laser manufacturing systems.

## Programme Curriculum

**Laser Manufacturing Technologies Training Course**

**Introduction**

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**Course Duration**

5 days

**Course Objectives**

1. Understand laser physics fundamentals for industrial manufacturing applications
2. Master fiber laser, CO? laser, and solid-state laser systems operation
3. Apply precision laser cutting and micro-machining techniques
4. Develop skills in laser welding automation and robotic integration
5. Implement additive manufacturing using laser powder bed fusion (LPBF)
6. Optimize laser engraving and marking for industrial traceability systems
7. Enhance process control in smart manufacturing and Industry 4.0 environments
8. Ensure laser safety compliance and hazard risk management protocols
9. Analyze material interaction with high-energy laser beams
10. Improve production efficiency through laser parameter optimization
11. Integrate CAD/CAM software with laser manufacturing systems
12. Troubleshoot laser system faults and maintenance issues
13. Evaluate industrial case-based laser manufacturing performance metrics

**Target Audience**

1. Mechanical Engineers
2. Manufacturing Engineers
3. Industrial Technicians
4. Production Supervisors
5. Automation Engineers
6. CNC Machine Operators
7. R&D Specialists in Materials Engineering
8. Technical Students in Engineering & Applied Sciences

**Course Modules**

**Module 1: Introduction to Laser Manufacturing Systems**

- Laser types and classifications
- Industrial applications overview
- Beam generation principles
- System architecture breakdown
- Energy efficiency fundamentals
- **Case Study:** Adoption of laser cutting in automotive body panel production reducing waste by 35%

**Module 2: Laser Physics & Material Interaction**

- Photon energy principles
- Absorption and reflection in materials
- Thermal effects on metals and polymers
- Pulse vs continuous wave lasers
- Beam focusing techniques
- **Case Study:** Precision micro-drilling in aerospace turbine blades

**Module 3: Laser Cutting Technologies**

- CO? vs fiber laser cutting systems
- CNC integration in cutting operations
- Edge quality optimization
- Kerf width control
- High-speed cutting strategies
- **Case Study:** Sheet metal fabrication optimization in HVAC manufacturing

**Module 4: Laser Welding Techniques**

- Keyhole welding mechanism
- Seam tracking systems
- Robotic welding automation
- Weld strength analysis
- Defect reduction techniques
- **Case Study:** Battery welding systems in electric vehicle production

**Module 5: Laser Marking & Engraving Systems**

- Surface marking technologies
- Serialization and traceability systems
- High-speed engraving processes
- Material compatibility
- Software-driven marking control
- **Case Study:** Medical device serialization compliance in pharmaceutical manufacturing

**Module 6: Additive Manufacturing with Lasers (3D Printing)**

- Laser Powder Bed Fusion (LPBF)
- Selective laser sintering (SLS)
- Layer-by-layer fabrication
- Material powder handling
- Post-processing techniques
- **Case Study:** Custom orthopedic implant production using titanium alloys

**Module 7: Industrial Automation & Industry 4.0 Integration**

- IoT-enabled laser systems
- Real-time monitoring dashboards
- Predictive maintenance systems
- AI-driven process optimization
- Smart factory connectivity
- **Case Study:** Smart factory laser integration in semiconductor manufacturing

**Module 8: Laser Safety, Maintenance & Troubleshooting**

- Laser hazard classification
- Personal protective equipment (PPE) standards
- Alignment and calibration procedures
- Fault detection and repair
- Regulatory compliance frameworks
- **Case Study:** Workplace safety enhancement in high-power laser fabrication plant

### 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:

**Register Online Now**

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com