Advanced Lubrication Engineering 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 Lubrication Engineering in Manufacturing Training Course is designed to enhance expertise in tribology, industrial lubrication systems, predictive maintenance, and machinery reliability optimization. In modern manufacturing environments, equipment efficiency, downtime reduction, and asset longevity are directly influenced by advanced lubrication practices. This course integrates condition-based maintenance (CBM), reliability-centered maintenance (RCM), and smart lubrication technologies to equip professionals with cutting-edge skills required in high-performance production systems.

With increasing adoption of Industry 4.0, IoT-based predictive maintenance, and AI-driven condition monitoring, lubrication engineering has evolved into a critical discipline for operational excellence. This training emphasizes real-world applications across manufacturing sectors such as automotive, steel production, food processing, pharmaceuticals, and heavy machinery. Participants will gain hands-on knowledge in lubricant selection, contamination control, failure analysis, and lubrication system design, ensuring improved equipment uptime, reduced operational costs, and enhanced production efficiency.

Programme Curriculum

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10 days

Course Objectives

1. Master advanced tribology and surface interaction engineering
2. Optimize industrial lubrication system design and performance
3. Implement predictive maintenance strategies using lubrication analytics
4. Reduce downtime through condition-based lubrication monitoring (CBM)
5. Enhance equipment life using friction and wear control technologies
6. Apply AI-driven predictive lubrication management systems
7. Develop expertise in synthetic and bio-based lubricants selection
8. Improve reliability using RCM (Reliability Centered Maintenance) frameworks
9. Detect failures through oil analysis and contamination diagnostics
10. Integrate IoT-enabled smart lubrication systems in manufacturing
11. Reduce energy losses via friction optimization techniques
12. Ensure compliance with ISO lubrication and maintenance standards
13. Build capability in industrial asset performance optimization (APM)

Target Audience

1. Maintenance Engineers and Technicians
2. Mechanical Engineers in Manufacturing Plants
3. Reliability and Asset Managers
4. Production Supervisors and Plant Managers
5. Industrial Lubrication Specialists
6. Condition Monitoring Analysts
7. Energy Efficiency Engineers
8. Technical Consultants in Manufacturing Operations

Course Modules

Module 1: Fundamentals of Tribology in Manufacturing

- Friction, wear, and lubrication principles
- Surface interaction mechanisms
- Industrial applications of tribology
- Lubrication regimes (boundary, mixed, hydrodynamic)
- Material compatibility analysis
- **Case Study:** Reducing wear failure in CNC machining tools through optimized tribology

Module 2: Industrial Lubricants and Their Properties

- Mineral vs synthetic lubricants

- Viscosity and thermal stability
- Additive chemistry
- Lubricant degradation factors
- Selection criteria for machinery
- **Case Study:** Improving gearbox efficiency in automotive assembly plants

Module 3: Lubrication System Design Engineering

- Centralized lubrication systems
- Manual vs automated systems
- Pump and distribution design
- Flow rate optimization
- System safety considerations
- **Case Study:** Retrofitting lubrication systems in steel rolling mills

Module 4: Predictive Maintenance and Lubrication Analytics

- Condition-based monitoring tools
- Oil condition sensors
- Data-driven maintenance scheduling
- Failure prediction models
- Digital twin integration
- **Case Study:** Predicting bearing failure in turbine systems

Module 5: Contamination Control & Filtration Technology

- Types of contaminants
- Filtration mechanisms
- Cleanliness standards (ISO 4406)
- Breather systems
- Particle monitoring techniques
- **Case Study:** Extending hydraulic system life in injection molding machines

Module 6: Lubrication Failure Analysis Techniques

- Wear particle analysis
- Root cause failure analysis (RCFA)
- Oil degradation diagnostics
- Thermal breakdown identification
- Reporting methodologies
- **Case Study:** Gearbox failure investigation in mining equipment

Module 7: Energy Efficiency Through Lubrication Optimization

- Friction reduction strategies
- Energy loss mechanisms
- Lubricant film strength optimization
- Efficiency benchmarking
- Green lubrication practices
- **Case Study:** Energy savings in conveyor systems

Module 8: Industrial Gearbox Lubrication Systems

- Gear types and lubrication needs
- EP lubricants
- Load distribution factors
- Thermal management
- Maintenance scheduling
- **Case Study:** High-load gearbox optimization in cement industry

Module 9: Hydraulic Systems Lubrication Engineering

- Hydraulic fluid selection
- Pressure control systems
- Leak prevention strategies
- Seal compatibility
- System efficiency enhancement
- **Case Study:** Hydraulic press performance improvement in automotive stamping

Module 10: Bearing Lubrication Technologies

- Rolling vs plain bearings
- Grease vs oil lubrication
- Speed-load considerations
- Temperature control
- Bearing life extension strategies
- **Case Study:** Extending bearing life in textile manufacturing machinery

Module 11: Smart Lubrication Systems (Industry 4.0)

- IoT-enabled lubrication systems
- Smart sensors and automation
- Real-time monitoring dashboards
- AI-based lubrication optimization
- Predictive alerts
- **Case Study:** Smart factory lubrication integration in electronics manufacturing

Module 12: Lubrication Standards and Compliance (ISO & ASTM)

- ISO lubrication standards
- ASTM testing methods
- Environmental compliance
- Safety regulations
- Audit preparation
- **Case Study:** ISO compliance upgrade in pharmaceutical manufacturing plant

Module 13: Lubricant Storage and Handling Best Practices

- Storage contamination prevention
- Dispensing systems
- Color coding and labeling systems
- Shelf life management
- Safety protocols
- **Case Study:** Reduction of lubricant contamination in food processing plant

Module 14: Condition Monitoring Technologies

- Vibration analysis integration
- Thermography in lubrication
- Acoustic emission monitoring
- Oil debris sensors
- Multi-parameter diagnostics
- **Case Study:** Early fault detection in wind turbine bearings

Module 15: Maintenance Strategy Development & Optimization

- RCM strategy design
- Lubrication scheduling optimization
- Cost-benefit analysis
- Downtime reduction strategies
- Continuous improvement systems
- **Case Study:** Plant-wide lubrication strategy transformation in automotive manufacturing

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

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