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# Technical training

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Hydraulic Excavators  
and Off-Highway Trucks

**LIEBHERR**

Mining







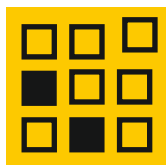


# Introduction

Liebherr understands the importance of keeping the customer's equipments running smoothly and efficiently. That's why we offer comprehensive technical training for all Liebherr machines, specifically tailored for all technical teams handling Liebherr machines. Our training ensures that the team will be equipped with the knowledge and skills necessary to perform repairs and maintenance tasks according to Liebherr's high standards.

With our technical training, the participants will gain hands-on experience and in-depth understanding of Liebherr equipment, allowing them to effectively diagnose issues, perform repairs, and carry out preventive maintenance procedures. Our expert trainers will guide the participants through the intricacies of Liebherr machines, covering everything from basic maintenance to advanced troubleshooting techniques.

## Training highlights



Structured, multi-level training courses that evolve with participants' skill levels.



Professional training conducted at our factory, utilising state-of-the-art training media and simulators.



On-demand training available directly at the customer's site, for convenience and relevance.

## Training journey of the participant

**Product familiarisation**



**Fundamentals of electrical and hydraulics**



**Principles of operation and maintenance**



**Advanced technical training**

# Training chapters description



All basic courses are online and designed to familiarise participants with Liebherr Mining machines and safety procedures. These courses equip participants with the fundamental skills needed to progress to advanced training.

## Product familiarisation

This chapter serves as an introduction to Liebherr Mining machines, offering trainees a comprehensive understanding and facilitating their familiarity with Liebherr's range of offerings.

### Safety familiarisation

This course ensures that participants are well-versed in crucial safety protocols for operating, maintaining, or accessing Liebherr machines. It encompasses a thorough overview of security procedures, including proper lockout-tagout techniques and safe parking practices (for overhaul trucks). Additionally, participants will receive comprehensive guidance on general safety rules, including the identification of emergency stops and egress points. Furthermore, this segment provides trainees with access to essential technical documentation necessary for understanding and adhering to safety standards while engaging with the Liebherr equipment.

### Walk around and general inspection

This section comprises several modules intended to acquaint training participants with the overall layout and functions of components on Liebherr machines.

The module for Liebherr Off-Highway Trucks specifically delves into the superstructure power module, axle box, frame, and external components. Each module will also include essential safety precautions for independent operation of all Liebherr machines. Additionally, the module for Liebherr Hydraulic Excavators covers the undercarriage, upper carriage, and attachment inspection techniques.

## Fundamentals of electrical and hydraulic components

This chapter is designed to equip training participants with a foundational understanding of electrical and hydraulic systems. Through hands-on exercises and theoretical explanations, participants will develop the skills to read and interpret schematics, empowering them to effectively diagnose and troubleshoot equipment issues.

## Content of the modules

- Energy transfer system, potential energy and pressure energy, pressure loss
- Hydraulic symbols
- Pressure relief valves, linear motors
- Hydraulic pumps and motors
- The hydraulic circuit
  - Types of regulations and comparison of systems of mobile hydraulics
  - Open and closed circuit
  - Basics on regulation systems
  - Restrictor control and load sensing
- Adjustments on the example of a hydraulic excavator
- Electrical symbols and units
- Comparison hydraulics / electrics (voltage / current / resistance)
- Ohmic law, electrical power, wiring types
- Different measuring tools and their use
- Magnetism and induction with practical examples
- Components of electrics and electronics
- Basics of digital technology
- Measurements, explained with virtual workshops

## Principles of operation and maintenance

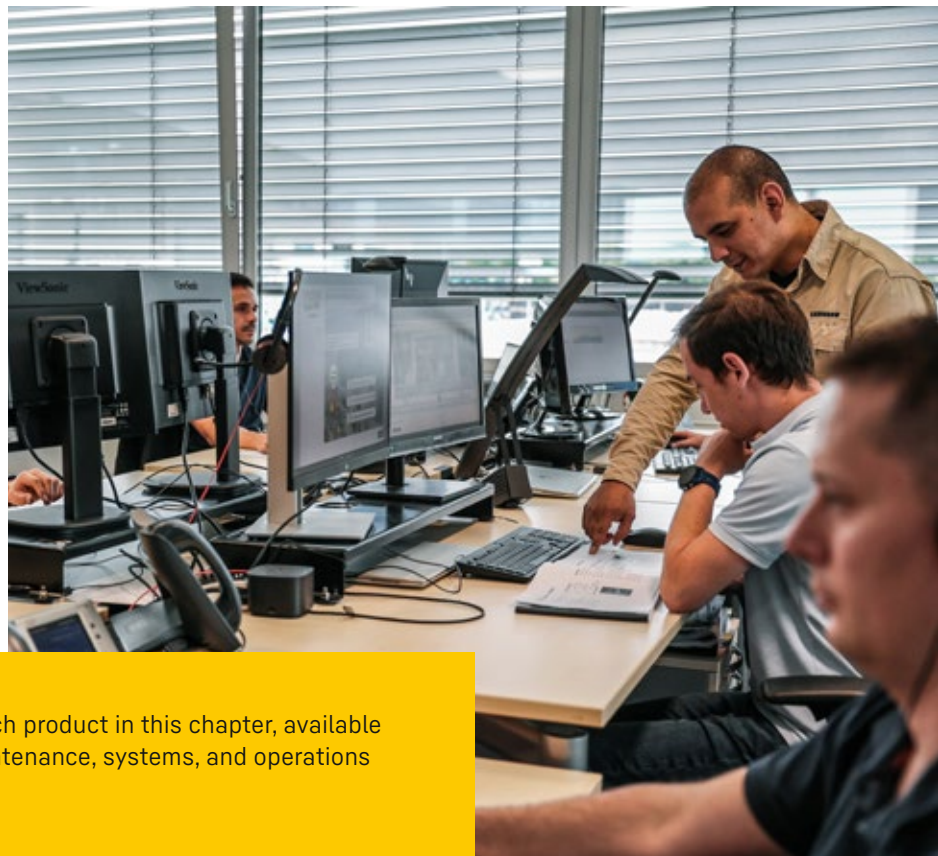
This chapter equips training participants with a foundational knowledge of Liebherr Mining machines, covering maintenance procedures, system functionalities, and basic operation. This understanding allows them to effectively support customers at an introductory level.

### Systems

General explanation and principle of operation of the systems.

### Maintenance

- Level Checks:  
inspection of the oil, coolant, grease.
- Daily Checks:  
learn how to perform a visual inspection of all the machines for every product type and report any failure.
- Preventive Maintenance:  
learn how to perform Preventive Maintenance procedures.



We offer comprehensive packages for each product in this chapter, available either virtually or in person, covering maintenance, systems, and operations of Liebherr machines.

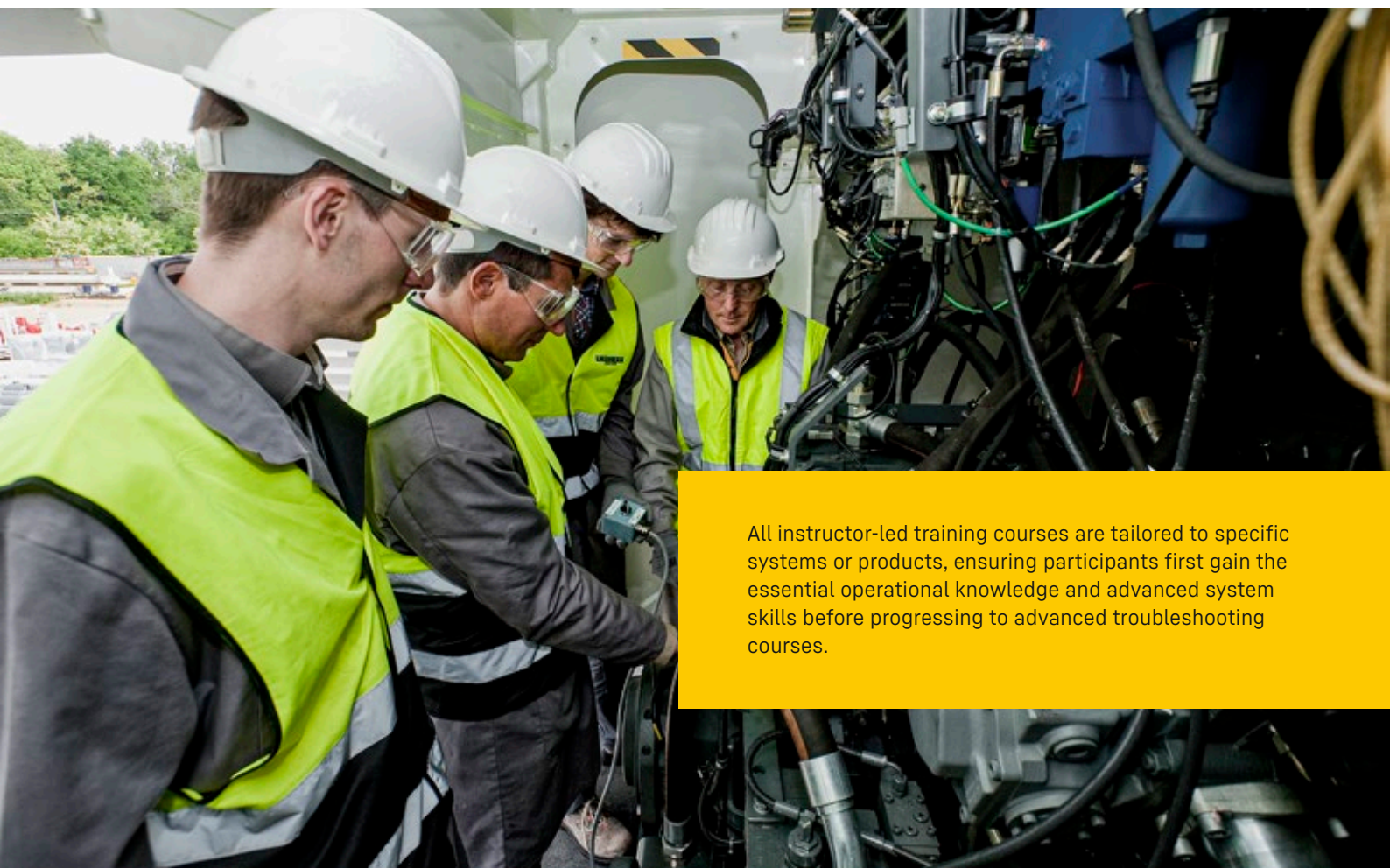


# Advanced technical training

The chapter provides comprehensive insights into the various sub-systems of Liebherr equipment, supplemented by hands-on experience using simulators. It emphasises the guidance and interpretation of fault data analysis for effective troubleshooting, as well as instructions on utilising Liebherr Mining Service diagnostic tools and hydraulic setup procedures.

Liebherr offers four days Instructor led training per product and focuses on different modules – electrical system, hydraulic system, work pumps adjustment, cooling system, swing system, and greasing system.

The course further advances understanding of Off - Highway Trucks' operations and maintenance, covering topics such as interpreting fault data analysis for effective troubleshooting, hydraulic system setup procedures, and guidance on utilising Liebherr Mining Service diagnostic tools.



All instructor-led training courses are tailored to specific systems or products, ensuring participants first gain the essential operational knowledge and advanced system skills before progressing to advanced troubleshooting courses.





## On the job training

The On-the-Job Training program is a highly effective approach where experienced employees mentor new recruits, providing guidance and coaching on essential job skills. This program allows newcomers to tap into the extensive expertise of their mentors, built over years of experience.

During the program, technicians work alongside qualified servicemen on-site, where they observe, perform, and are evaluated on specific tasks based on Liebherr's best practices. Each technician gains firsthand knowledge of procedures directly from service and maintenance manuals.





# Technical training programs for Hydraulic Excavators





Training program	Objectives	Training chapters	Expiration	Recertification path
HEX 1	Acquire a basic understanding of the Liebherr Hydraulic Excavators in terms of maintenance, system and / or operation.	<ul style="list-style-type: none"> <li>- Product familiarisation</li> <li>- Fundamentals of electric and hydraulics</li> <li>- Principles of operation and maintenance</li> </ul>	5 years	<ul style="list-style-type: none"> <li>- Retake safety module and principles of operation and maintenance courses</li> </ul>
HEX 2	Acquire the skills needed to do HEX 1 tasks + troubleshoot a type of family of Liebherr Hydraulic Excavator without assistance	<ul style="list-style-type: none"> <li>- Advanced technical training</li> </ul>	5 years	<ul style="list-style-type: none"> <li>- Retake advanced technical training course</li> </ul>

## HEX 1 Principles of operation and maintenance

## HEX 2 Advanced technical training

Product familiarisation	Fundamentals of electric and hydraulic components	Principles of operation and maintenance	Advanced technical training
<ul style="list-style-type: none"> <li>- Safety familiarisation</li> <li>- Components location - undercarriage, uppercarriage and attachment.</li> </ul>	Basic electric and hydraulic fundamental modules	<ul style="list-style-type: none"> <li>- Maintenance level and daily checks</li> <li>- Air conditioning system</li> <li>- Cooling system</li> <li>- Grease system</li> <li>- Access ladder and service station</li> <li>- Swing system</li> <li>- Lubricant training</li> <li>- Liebherr operational excellence</li> </ul>	Advanced training of the particular Liebherr Hydraulic Excavator model

HEX 1 - First level of Liebherr Hydraulic Excavators technical training program  
HEX 2 - Second level of Liebherr Hydraulic Excavators technical training program

# Technical training programs for Off-Highway Trucks





Training program	Objectives	Expiration	Recertification path
OHT 1	<ul style="list-style-type: none"> <li>- Product familiarisation</li> <li>- Fundamentals of electric and hydraulics</li> <li>- Principles of operations and maintenance</li> </ul>	5 years	Liebherr Off-Highway Truck maintenance and operational procedures
OHT 2	<ul style="list-style-type: none"> <li>- Advanced technical training</li> </ul>	5 years	Advanced system operations and troubleshooting procedures by the particular Liebherr Off-Highway Truck model

## OHT 1 Principles of operation and maintenance

## OHT 2 Advanced technical training

Product familiarisation	Fundamentals of electric and hydraulic components	Principles of operation and maintenance	Advanced technical training
<ul style="list-style-type: none"> <li>- Safety familiarisation</li> <li>- Walk around</li> <li>- Components location</li> <li>- Superstructure</li> <li>- Power module</li> <li>- Axle box</li> <li>- Frame and external components</li> </ul>	Basic electric and hydraulic fundamental modules	<ul style="list-style-type: none"> <li>- Liebherr Off-Highway Truck schematics</li> <li>- 24 VDC electrical controls</li> <li>- Power conversion</li> <li>- Fluid power distribution</li> <li>- Dynamic brake and steering system</li> <li>- Drive control</li> <li>- Hoist system</li> <li>- Trolley interface box</li> <li>- Gear oil cooling system</li> <li>- Anto lube</li> <li>- Maintenance checks</li> <li>- Operator training</li> </ul>	<ul style="list-style-type: none"> <li>- Litronic plus advance system operations and troubleshooting procedures (advanced)</li> <li>- Electro- mechanical fluid power advance system</li> <li>- Advanced operator training</li> </ul>

OHT 1 - First level of Off - Highway Trucks technical training program  
OHT 2 - Second level of Off - Highway Trucks technical training program

# Assessment and Certificates



## eLearning assessment

- Each eLearning module starts with a pre-test and is validated with a post test
- The passing score for the eLearning module is:
  - 100 % for Safety familiarisation
  - 80 % for the other modules
- The score is tracked using Liebherr's Learning Management System, and completing the course successfully is required to unlock the next module.



## Instructor-led assessment (face-to-face or virtual)

- Each instructor-led class begins with a pre-test and concludes with a post-test for validation
- The score is tracked using the Learning Management System developed by Liebherr



## Training certificates

A training certificate is issued to all participants after successfully completing the training modules.