

TECHNICAL TRAINING COURSES

GROWTH THROUGH KNOWLEDGE

111





OUR OFFER

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WELCOME TO TVH ACADEMY

TVH Academy offers practice-oriented training courses. Our "hands-on" training starts with a theoretical introduction. After that, the knowledge gained is immediately put into practice and we exercise on test stands and machines.

The variation between theory and practice contributes to the development of knowledge and skills.

Choose from our standard offer or opt for a customised training course.

WHAT CAN YOU EXPECT?

	More than 10 years of experience	\bigcirc	Easily accessible with plenty of parking space
	Highly qualified trainers with years of practical experience		Customer-focused and interactive training courses tailored to your needs
<u>f</u>	Practice-oriented training courses with concrete test setups from the field		Personal coaching
	1500 m ² of classrooms with teaching facilities		Training certificate after each successful module

TVH ACADEMY IN COLLABORATION WITH IPAF



CAP points can be obtained for all IPAF-accredited courses.

In order to demonstrate that someone is capable of performing thorough inspections on MEWPs, that person can qualify as a CAP (Competent Assessed Person). Before enrolling for the CAP assessment course, the candidate must meet certain requirements, including obtaining sufficient points to be admitted to the course.

For each training day, you will receive 0,5 CAP point when you pass the theoretical test.

WHERE DO THE TRAINING COURSES TAKE PLACE?

These can take place in our training centres in Waregem, Apeldoorn - the Netherlands or in Swindon - United Kingdom.

TAILOR-MADE TRAINING COURSES

In need of a specific training tailored to your company? Even for that, TVH Academy offers a suitable solution. We offer bespoke training courses both in our training centre and at a location of your choice.

Thanks to our extensive knowledge and experience, we are able to develop these customer-oriented training courses quickly and in mutual consultation.

In case of questions or if you're interested, please contact us: tta.be@tvh.com T +32 56 43 44 88

TRAINING TRAJECTORY

	FOUNDATION LEVEL	ADVANCED LEVEL	EXPERT LEVEL		
INTERNAL COMBUSTION ENGINES	 Intro common rail and CAN bus 	 New diesel technologies New gasoline / LPG technology 	 Diesel exhaust gas after-treatment + TEXA 		
Q Electrics		 Aimed fault-finding on internal combustion lift trucks and mobile elevating work platforms Aimed fault-finding on electric lift trucks and mobile elevating work platforms 	 Diagnostics and analysis of electrical signals 		
↔> HYDRAULICS	 Preliminary stage hydraulics Hydraulic attachments for lift trucks 	 Introduction to mobile hydraulics Hydraulic diagram reading - measurements and adjustments 	 LS-pump regulation - proportional hydraulics Hydrostatic drives 		
POWER ELECTRONICS	 Batteries and chargers Batteries: analysis and regeneration AC/DC motors 	 Aimed fault-finding on electric lift trucks and mobile elevating work platforms 	 Diagnostics and analysis of electrical signals Drive controllers - evolution and diagnostics AC/DC controllers ZAPI controller CURTIS controller SEVCON controller GENERAL ELECTRIC controller 		
TECHNICAL- COMMERCIAL	LIFT TRUCK - Lift truck technology for non-engineers MOBILE ELEVATING WORK PLATFORM - Scissor lift and mobile elevating work platform technology for non-engineers TELEHANDLER - Telehandler technology for non-engineers TRACTOR - Tractor technology for non-engineers SEM - Small earth-moving (SEM) technology for non-engineers LIFT TRUCK - Hydraulic attachments for lift trucks for non-engineers				

INTERESTED OR LOOKING FOR MORE INFO?





Please contact us: tta.be@tvh.com T +32 56 43 44 38





TESTIMONIAL



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The trainers show a great passion to develop training solutions that meet the needs of technical target groups.

Liselot 🎵



TECHNICAL TRAINING COURSES

で INTERNAL COMBUSTION ENGINES

Mastering the knowledge about the consequences of maintenance and diagnostics Learning the specific points of attention with regard to fuel supply Caining an insight into the new engine management and after-treatment systems

INTRO COMMON RAIL AND CAN BUS

TARGET GROUP

Engineers who work with internal combustion diesel lift trucks and who want to learn new diagnostics techniques.

PRIOR KNOWLEDGE

Familiarity with the operating principles of combustion engines and engine management systems. Basic skills and insight in electrical signals.

GOAL

- To gain an insight into the new diesel injection technology.
- Mastering the knowledge about the consequences of maintenance and diagnostics.
- Understanding the communications technology between the control units and assessing the impact of this on the diagnostics.
- To know the impact of a CAN bus system in relation to the fault-finding.

CONTENT

Common rail

- Combustion process of a diesel engine
- Mechanical diesel injection
- Why common rail?
- Fuel circuit
- Spare parts
- High-pressure pump
- Injectors
- Management system
- · Advantages and disadvantages
- Points of attention

DURATION + COST PRICE

1 day - 350 EUR

TO BRING

- Working clothes
- Safety shoes

IPAF-APPROVED

CAN bus

- \cdot Introduction
- $\cdot\,$ Goal of data communication systems
- Differences between networks
- Protocol
- Topology
- Structure of a data frame
- \cdot Controls
- · Impact on fault-finding



NEW DIESEL TECHNOLOGIES

ADVANCED LEVEL

TARGET GROUP

Engineers involved in the repair and diagnostic checks of internal combustion machines (diesel).

PRIOR KNOWLEDGE

Insight in the operating principles of diesel combustion engines.

GOAL

- Recognising the different injection systems of diesel engines and gaining an insight in their working principles.
- Acquiring knowledge of the different components and being able to recognise and locate these on a machine.
- Learning the specific points of attention during maintenance and diagnostic checks of the new generation of electronic control systems.
- · Acquiring knowledge about the different exhaust gas after-treatment systems.

CONTENT

Diesel

- Functioning of the diesel engine
- Mixture composition
- Combustion cycle
- Combustion chamber
- Checking and repairing a diesel engine
- Combustion process
- \cdot Fuel pumps
- Fuel circuit
- Functioning of the line pump
- Functioning of the rotary pump
- Functioning of the electronic
- rotary pump
- Pre-heating

DURATION + COST PRICE

3 days - 995 EUR

TO BRING

- Working clothes
- Safety shoes

IPAF-APPROVED

Common rail

- · Presentation of the engine
- Mechanics
- \cdot Injection
- Servicing guidelines
- · Components
- Operating principle electronic control system
- Sensors
- Actuators
- Diagnostics
- Diagnostics equipment TEXA

Exhaust gas after-treatment

- Emission standards Tier 4/ stage Ill B
- Use of EGR Exhaust Gas Recirculation
- DOC-filter Diesel Oxidation Catalyst
- DPF Diesel Particulate Filter
- SCR Selective Catalytic Reduction
- DEF Diesel Emission Fluid (AdBlue)



ADVANCED LEVEL

new Gasoline / LPG **TECHNOLOGY**

TARGET GROUP

Engineers who service and repair internal combustion machines (gasoline and LPG engines), as well as engineers who want to keep up with and gain an insight in the new LPG injection techniques.

PRIOR KNOWLEDGE

Insight in the functioning of gasoline/LPG combustion engines.

GOAL

- To get a clear insight in the functioning of the injection systems of gasoline/LPG engines.
- · Recognising and locating different components on a machine.
- Making a correct diagnosis by means of measuring tools and software.

CONTENT

Gasoline/LPG engines

- Combustion process of an Otto engine
- Gasoline
- Combustion process
- Exhaust gas after-treatment
- · Catalyst systems
- · Lambda control cycle

LPG

- Characteristics of the fuel
- Mixture formation

Types of ignition systems

- Functioning of the conventional What is LPI? ignition
- Hall ignition
- Inductive ignition
- High-tension distribution
- Spark plugs

LPI injection

- · Components
- Build-up of the system
- Operating principle
- Points of attention
- Programming
- Reading the parameters
- Diagnostics

DURATION + COST PRICE

3 days - 995 EUR

TO BRING

- Working clothes
- Safety shoes



EXPERT LEVEL

DIESEL EXHAUST GAS AFTER-TREATMENT + TEXA

TARGET GROUP

Engineers who maintain and repair the new generation of (common rail) diesel engines. Engineers who want to evolve with and gain an insight in the exhaust gas after-treatment of the new diesel engines.

PRIOR KNOWLEDGE

Some prior knowledge of diesel engines is required.

GOAL

- To gain an insight in the new systems that reduce the emission of toxic exhaust fumes.
- To recognise and locate parts on the machine.
- To be aware of the functioning, points of special attention and safety of these systems and parts.

CONTENT

Euro – Tier standards

- Different exhaust fumes and solutions
- Short recapitulation common rail
- Short recapitulation EGR (Exhaust Gas Recirculation)

DOC (Diesel Oxidation Catalyst)

DPF (Diesel Particulate Filter)

- Functioning
- Regeneration
 - Passive
 - \cdot Active
 - \cdot Parked
 - Service
- Stages of soot filter clogging + indicator lights on dashboard
- · Replacing cleaning: when, points of attention

- · Kubota (Doosan)
- Deutz 3B (JLG, Manitou)
- Perkins (Manitou)
- · Short: DPF fitted afterwards
- SCR (AdBlue)

Points of attention with regard to safety and maintenance

Importance of diesel fuel for new systems

TEXA

- Start-up screen
- Selection machine / engine
- Reading errors
- Parameters
- \cdot Activations
- Info ECU
- \cdot Dashboard

Different systems

DURATION + COST PRICE

3 days - 995 EUR

TO BRING

- Working clothes
- Safety shoes



TEST CONFIGURATION COMMON RAIL ENGINE WITH DPF FILTER





TECHNICAL TRAINING COURSES

ELECTRICS

To be capable of recognising different components and locate them on a diagram.

ADVANCED LEVEL

Q AIMED FAULT-FINDING ON INTERNAL COMBUSTION LIFT TRUCKS AND MOBILE ELEVATING WORK PLATFORMS

TARGET GROUP

Engineers who perform maintenance and repairs on internal combustion lift trucks and mobile elevating work platforms.

Engineers who want to gain an insight into performing diagnostics by means of electrical diagrams.

PRIOR KNOWLEDGE

Prior knowledge of electrics on/in internal combustion machines is an asset, not a requirement.

GOAL

- To gain an insight into electrical diagrams of internal combustion lift trucks.
- To be able to recognise and locate different components on a diagram.
- To perform a diagnosis of an error by means of the electrical diagram and a multimeter.

CONTENT

Theory:

- Electrical diagrams
 - Lighting
 - Ignition system
 - Common sensors on internal combustion engines
 - Charging system
 - Valve control
 - Diagram analysis

Practice:

- · Using an electrical diagram and multimeter to locate faults:
 - Lighting on internal combustion machine doesn't work
 - Engine doesn't start
 - Alternator doesn't work
 - Short circuit
 - · Leakage currents
 - Machine doesn't lift/drive

DURATION + COST PRICE

2 days - 670 EUR

TO BRING

- Working clothes
- Safety shoes
- Test lamp
- Multimeter



AIMED FAULT-FINDING ON ELECTRIC LIFT TRUCKS AND MOBILE ELEVATING WORK PLATFORMS

TARGET GROUP

Engineers who perform maintenance and repairs on electric pallet trucks, lift trucks and mobile elevating work platforms.

Engineers who want to gain an insight into performing diagnostics by means of electrical diagrams. Engineers who want to retrain into becoming a repairer of electric machines.

PRIOR KNOWLEDGE

Prior knowledge of electrics and some prior knowledge of electric machines (notes of batteries, electric motors ...) is required.

GOAL

- To gain an insight into electrical diagrams of electric pallet trucks, lift trucks and mobile elevating work platforms.
- To be able to locate, recognise and check power components.
- · To perform a diagnosis of an error by means of the electrical diagram and a multimeter.

CONTENT

Theory:

- Electronic components and connections (diode, capacitor, thyristor ...)
- Structure of the electric lift truck / mobile elevating work platform
- Leakage currents and short circuits
- Electrical diagrams
- Power supply shared components
- Drive section
- Lift section
- Steering section
- Options

DURATION + COST PRICE

2 days - 670 EUR

TO BRING

- Working clothes
- \cdot Safety shoes
- Multimeter
- Handy-man (optional)

IPAF-APPROVED

Practice:

- Measuring electronic components by means of the handy-man and multimeter
- Using didactic panels to check the functioning of components
- Using an electrical diagram and multimeter to locate faults:
 - $\cdot\,$ Line contactor doesn't rise
 - $\cdot\,$ Drive controller doesn't work
 - No hydraulic movements
 - Short circuit



DIAGNOSTICS AND ANALYSIS OF ELECTRICAL SIGNALS

TARGET GROUP

Engineers working with electrics and electronics, who want to improve their fault-finding skills.

PRIOR KNOWLEDGE

Some prior knowledge in performing measurements and fault-finding is required.

GOAL

This hands-on training familiarises the engineer with common sensor and actuator signals, gives a clear insight into the operating principle of processing units and teaches the engineer how to look for faults in a targeted way.

CONTENT

- Electrical diagram
- Properties of the electric circuit
- Basic principles
- $\cdot \,$ Current and resistors
- Magnetism and electric interference
- How and when to use an oscilloscope
- Analogue versus digital signals

- Details of an oscillogram
- Pulse width modulation, duty cycle, frequency ...
- Proportional control
- Temperature sensor, pressure sensor, position sensor and speed sensor
- Communication signals (e.g. CAN bus)

DURATION + COST PRICE

3 days - 995 EUR

TO BRING

- Working clothes
- Safety shoes
- Multimeter / oscilloscope (if available)
- \cdot Safety shoes
- Test lamp
- Multimeter





TECHNICAL TRAINING COURSES

HYDRAULICS



⊶ PRELIMINARY STAGE HYDRAULICS

TARGET GROUP

Engineers with little or no prior knowledge, as an introduction to the training course 'Introduction to mobile hydraulics'.

Anyone who is active in a technical-commercial environment, but doesn't carry out repairs. People who work in a sales environment, in the warehouse, in the administrative department ...

PRIOR KNOWLEDGE

No prior knowledge of hydraulics is required.

GOAL

- To gain an insight into hydraulic operating principles, applied to lift trucks and mobile elevating work platforms.
- Recognising parts on a machine and on a diagram.
- Getting to know the function of common components.

CONTENT

Important hydraulic concepts, laws and formulas

- \cdot Pressure, flow rate
- Pascal's Law

Structure of an installation

Common components and their function

- · Pump
- Filter
- Cylinder
- Pressure relief valve, hose break valve ...
- Orbitrol

Basic symbols and diagram reading

DURATION + COST PRICE

1 day - 350 EUR

TO BRING

- Working clothes
- Safety shoes
- Adequate gloves (optional)

IPAF-APPROVED

Introduction to proportional hydraulics

Introduction to hydrostatic drive

Practical exercises

- Demonstrating hydraulic laws
- Understanding the functioning of the components
- Introduction to measuring pressure and flow rate

Safety



← HYDRAULIC ATTACHMENTS FOR LIFT TRUCKS

TARGET GROUP

Engineers who want to keep up with and gain a clear insight in hydraulic attachments of the brand CAM attachments[®].

PRIOR KNOWLEDGE

Prior knowledge of hydraulics is required. Participants must have taken at least the training course 'Preliminary stage hydraulics' or have an equal level of experience.

GOAL

- To gain a clear insight in the different types of hydraulic attachments.
- Points of interest when installing a hydraulic attachment.
- Tracking and solving common errors and faults.

CONTENT

General information

- Fork (carriage) types
- FEM or IS02328
- · Separate/integrated sideshifter
- Residual capacity calculation

Overview hydraulic attachments

- Sideshifters
- Fork positioners
- Rotators
- Bale clamps
- Paper roll clamps
- Multi-fork positioners
- \cdot Push pull
- Carton and appliance clamps

DURATION + COST PRICE

1 day - 350 EUR

TO BRING

- Working clothes
- Safety shoes

Hydraulics

- Pressure flow rate
- Maintenance
- Diagrams of the attachments

Remarks and exercises with regard to hydraulic attachments

- · Relief valve
- · Piloted one-way valve
- Restriction

Setting the pressure and flow rate of the attachment



ADVANCED LEVEL

TARGET GROUP

Engineers who want to keep up with and have a clear insight in the latest complex hydraulic controllers and drives.

PRIOR KNOWLEDGE

Familiarity with the maintenance of machines as an engineer.

GOAL

- To gain an insight in the functioning of hydraulic components.
- To learn the diagnostics methods and to underline the specific points of attention when running a diagnostics check on a hydraulic circuit.
- To read and understand the operation of a hydraulic circuit by means of a hydraulic diagram.

CONTENT

Formulas and reading diagrams

Hydraulic components

- · Pumps
- Motors
- \cdot Safety valves
- Priority valve
- Orbitrol
- Special valves

DURATION + COST PRICE

3 days - 1135 EUR

TO BRING

- Working clothes
- Safety shoes
- Adequate gloves (optional)

IPAF-APPROVED



Speed controllers

Hydraulic diagrams

Fault analysis

- Causes
- Locating faults
- · Using measuring equipment

Safety

ADVANCED LEVEL

← HYDRAULIC DIAGRAM READING - MEASUREMENTS AND ADJUSTMENTS

TARGET GROUP

Engineers who work with mobile hydraulics. If the participants want to discuss a specific diagram, please pass this on to TVH Academy in advance.

PRIOR KNOWLEDGE

Must have taken the 'Introduction to mobile hydraulics' training course. Sufficient prior knowledge as a result of preliminary training or experience.

GOAL

- Follow-up to the hydraulics training course.
- To apply the acquired knowledge on diagrams of various machines and to learn how to interpret the diagrams.

• Doosan

Safety

machines

• Analysis of the sample diagrams

Practical training and measurements on various

CONTENT

- Recapitulation of the basic components in a hydraulic circuit
- Reading a diagram by means of sample diagrams
- JLG
- Manitou

DURATION + COST PRICE

2 days - 670 EUR

TO BRING

- Working clothes
- Safety shoes
- Adequate gloves (optional)



EXPERT LEVEL

⊶---> LS-PUMP REGULATION -PROPORTIONAL HYDRAULICS

TARGET GROUP

Engineers who want to keep up with and explore the modern complex systems of hydraulic controllers and drives.

PRIOR KNOWLEDGE

Familiarity with the maintenance of machines as an engineer. Participants must have taken and successfully completed the training courses 'Introduction to mobile hydraulics' and 'Hydraulic diagram reading'.

GOAL

- To get to know and understand the functioning of the different hydraulic components in the mobile hydraulics, such as proportional valves and load-sensing pumps.
- To be able to perform adjustments on machines with proportional valves and load-sensing pumps.
- To be able to perform a diagnostic test on machines equipped with these new technologies.

CONTENT

Hydraulic diagrams - symbols

Proportional hydraulics

- What are proportional hydraulics?
 - Possible proportional systems
 - Symbols of proportional valves
 - Description and operating principles
- Concepts with regard to the adjustment of the system ramp - offset - minimum - maximum PWM frequency
- The proportional valve as pressurecompensated flow control valve

Valves in mobile hydraulics

· Common mobile valve blocks

PVG Sauer-Danfoss

- SX14 Bosch Rexroth
- The counterbalance valve

DURATION + COST PRICE

3 days - 1135 EUR

TO BRING

- Working clothes
- Safety shoes
- Safety glasses
- Adequate gloves (optional)

IPAF-APPROVED

Pump regulation

- Constant pressure regulation
- Load-sensing regulation (LS)

Discussing a complete diagram with proportional valves with and without LS pump

Practice on test configurations

- Following hydraulic diagrams
- Adjusting proportional valves by means of software

Practice exercise on a machine (JLG - Genie - Manitou)

Safety



⊶ HYDROSTATIC DRIVES

EXPERT LEVEL

TARGET GROUP

Engineers who are involved in the maintenance, adjustment and detection of faults in hydrostatic drive systems.

PRIOR KNOWLEDGE

A thorough knowledge of hydraulic operating principles is required (components, reading diagrams ...). Participants must have taken and successfully completed the training courses 'Introduction to mobile hydraulics' and 'LS pump regulation - Proportional hydraulics' or have an equivalent level of experience.

• High-pressure circuit

System with flow divider

different drive curves

• Fully hydraulically controlled system

Electroproportionally controlled system with

Cooling circuit

GOAL

- To gain an insight in the functioning of hydrostatic drives.
- Knowledge of the different components of the closed circuit.
- Analysis of the schematics of different systems.

CONTENT

- Functioning of the pump in hydrostatic drives
- Functioning of the fixed and variable plunger motors
- Functioning and goal of the used valves in the system
- Hydraulic supply circuit

DURATION + COST PRICE

3 days - 1135 EUR

TO BRING

- Working clothes
- Safety shoes
- Adequate gloves (optional)



TEST CONFIGURATION HYDRAULIC PROPORTIONAL CONTROLLERS





TECHNICAL TRAINING COURSES



POWER ELECTRONICS

Preparing a battery report to ← detect faulty cells

Configuring and cotting

Setting a charger in accordance with the battery

Solving problems with AC/DC motors

Configuring and setting parameters and calibrating controllers





TARGET GROUP

Engineers who work with electric machines. Engineers who want to acquire a decent knowledge of the functioning and maintenance of lead-acid traction batteries and their chargers.

PRIOR KNOWLEDGE

No prior knowledge is required.

GOAL

- To be able to understand the operating principle of batteries and chargers.
- To be able to check and run a diagnostic test of batteries and chargers by means of a hydrometer and multimeter.
- $\cdot\,$ To match the correct charger to a battery and set them up correctly.
- To install and calibrate a conventional charger (Energic Plus).

CONTENT

Batteries

- What are voltage and current?
- Types of batteries and their application
- Traction cell
 - · Composition
 - Functioning
 - Maintenance
 - Control procedure with a multimeter and hydrometer
 - Result analysis

Battery chargers

- · Compatibility and settings
- Conventional versus high-frequency
- $\cdot\,$ Charging curves
- Options
 - Battery maintenance equipment

Safety and risks

DURATION + COST PRICE

1 day - 350 EUR

TO BRING

- Working clothes
- Safety shoes
- Safety glasses
- Acid-resistant gloves



BATTERIES: [ANALYSIS AND REGENERATION

TARGET GROUP

Engineers who perform repairs on electric machines. Engineers who wish to gain an insight in the functioning of lead-acid traction batteries, checking batteries and the operating principle of the battery regenerator.

PRIOR KNOWLEDGE

Prior knowledge about batteries is required. This training course can be taken as a refresher and follow-up course to the training 'Batteries and chargers'.

GOAL

To be able to check traction batteries in a correct way and make a correct diagnosis. To recognise a sulphated battery. To understand the functioning of the battery regenerator and use it efficiently.

CONTENT

Traction batteries

- · Composition
- Functioning
- \cdot Maintenance
- \cdot Gel batteries

Sulphation

Analysis of batteries

- Control procedure
 - By means of voltmeter and hydrometer
 - By means of specific equipment
- Result analysis

DURATION + COST PRICE

1 day - 350 EUR

TO BRING

- Working clothes
- \cdot Safety shoes
- Safety glasses
- Acid-resistant gloves



Regeneration

- Principle and methods
- Battery regenerator
- Operating principle
 - Settings
- Result analysis

Safety and risks





TARGET GROUP

Engineers who work with electric machines.

PRIOR KNOWLEDGE

No prior knowledge is required.

GOAL

- To become familiar with the use and functioning of large electric motors (pump motor and drive motor).
- After the training course, the participant is able to check electric motors and recognise certain typical damage patterns.

CONTENT

- \cdot Introduction
- The permanent magnet motor
- Variants of the PM motor
- \cdot The series motor
- $\cdot\,$ Variants of the series motor
- $\cdot\,$ The shunt field motor

DURATION + COST PRICE

1 day - 350 EUR

TO BRING

- \cdot Working clothes
- Safety shoes
- Multimeter



- $\cdot\,$ Service and repair of DC motors
- Collector wear (wear patterns)
- Detecting faults in motors
- \cdot AC motors: introduction



AIMED FAULT-FINDING ON ELECTRIC LIFT TRUCKS AND MOBILE ELEVATING WORK PLATFORMS

TARGET GROUP

Engineers who perform maintenance and repairs on electric pallet trucks, lift trucks and mobile elevating work platforms.

Engineers who want to gain an insight into performing diagnostics by means of electrical diagrams. Engineers who want to retrain into becoming a repairer of electric machines.

PRIOR KNOWLEDGE

Prior knowledge of electrics and some prior knowledge of electric machines (notes of batteries, electric motors ...) is required.

GOAL

- To gain an insight into electrical diagrams of electric pallet trucks, lift trucks and mobile elevating work platforms.
- To be able to locate, recognise and check power components.
- \cdot To perform a diagnosis of an error by means of the electrical diagram and a multimeter.

CONTENT

Theory:

- Electronic components and connections (diode, capacitor, thyristor ...)
- Structure of the electric lift truck / mobile elevating work platform
- Leakage currents and short circuits
- Electrical diagrams
- Power supply shared components
- Drive section
- Lift section
- Steering section
- Options

DURATION + COST PRICE

2 days - 670 EUR

TO BRING

- Working clothes
- \cdot Safety shoes
- Multimeter
- Handy-man (optional)

IPAF-APPROVED

Practice:

- Measuring electronic components by means of the handy-man and multimeter
- Using didactic panels to check the functioning of components
- Using an electrical diagram and multimeter to locate faults:
 - $\cdot\,$ Line contactor doesn't rise
 - $\cdot\,$ Drive controller doesn't work
 - No hydraulic movements
 - Short circuit



DIAGNOSTICS AND ANALYSIS OF ELECTRICAL SIGNALS

TARGET GROUP

Engineers working with electrics and electronics, who want to improve their fault-finding skills.

PRIOR KNOWLEDGE

Some prior knowledge in performing measurements and fault-finding is required.

GOAL

This hands-on training familiarises the engineer with common sensor and actuator signals, gives a clear insight into the operating principle of processing units and teaches the engineer how to look for faults in a targeted way.

CONTENT

- Electrical diagram
- Properties of the electric circuit
- Basic principles
- $\cdot\,$ Current and resistors
- Magnetism and electric interference
- How and when to use an oscilloscope
- $\cdot\,$ Analogue versus digital signals

- Details of an oscillogram
- Pulse width modulation, duty cycle, frequency ...
- Proportional control
- Temperature sensor, pressure sensor, position sensor and speed sensor
- Communication signals (e.g. CAN bus)

DURATION + COST PRICE

3 days - 995 EUR

TO BRING

- Working clothes
- \cdot Safety shoes
- Multimeter / oscilloscope (if available)
- $\cdot \,$ Safety shoes
- Test lamp
- Multimeter



EXPERT LEVEL

DRIVE CONTROLLERS: EVOLUTION AND DIAGNOSTICS AC/DC CONTROLLERS

TARGET GROUP

Electrical engineers who come into contact with the new generation of electric machines and have to perform diagnostics on these.

PRIOR KNOWLEDGE

Some insight in the functioning of electrical devices and familiarity with the electric quantities, measurements and fundamental knowledge of electronics and an oscilloscope.

GOAL

- To understand the operating principles of AC controllers is the first step towards an oriented diagnosis.
- To make an oriented diagnosis on common AC drive and pump controllers.
- To gain an insight in the functioning and controlling of AC motors.
- \cdot To be able to make an oriented diagnosis via measurements of the controllers of these motors.
- To be able to perform a quick check of the power stage (functioning of the FETs/transistors/IGBTs).

CONTENT

Drive controllers

- Main components in power controllers
- Handy-man
- PWM controller

Controlling of DC motors

- ON/OFF controller
- Proportional regulation
- Transistor control
- SEPEX controller

DURATION + COST PRICE

2 days - 670 EUR

TO BRING

- Working clothes
- Safety shoes
- Multimeter

IPAF-APPROVED

AC controllers

- Why AC technology?
- The three-phase asynchronous motor
- Structure of the motor
- (Regenerative) braking
- The inverter
- Functioning
- · Components
- · Adjusting the speed

The management system

- · Performing a diagnosis
- Measuring with the oscilloscope
- Digital signal
- Analogue signal
- Checking the circuit for voltage drops and wire breakage
- Capacitor bank





TARGET GROUP

Engineers who perform repairs on electric machines trucks equipped with Zapi motor controllers.

PRIOR KNOWLEDGE

Basic knowledge of the systems used in an electric machine.

GOAL

- To gain a better insight into the general functioning of Zapi motor controllers.
- To be able to recognise these controllers and determine what settings are needed.
- To be able to determine if a problem in the machine is caused by the controller or by other components.
- To be able to set parameters and perform calibrations.
- To be able to correctly set a new controller as a replacement for a faulty controller.

CONTENT

- Understanding the functioning of the common Zapi controllers H2, Combi Sem1, AC2, Dual-AC2.
- Fault diagnosis and setting of the common Zapi motor controllers H2, SEM2, AC1.

DURATION + COST PRICE

1 day - 350 EUR

TO BRING

- Working clothes
- Safety shoes
- Multimeter





TARGET GROUP

Engineers who perform repairs on electric machines equipped with Curtis motor controllers.

PRIOR KNOWLEDGE

Basic knowledge of the systems in an electric machine.

GOAL

- To gain a better insight into the general functioning of Curtis motor controllers.
- To be able to recognise these controllers and determine what settings are needed.
- To be able to determine if a problem in the machine is caused by the controller or by other components.
- To be able to set parameters and perform calibrations.
- To be able to correctly set a new controller as a replacement for a faulty controller.

CONTENT

• Fault diagnosis and setting of the Curtis motor controllers.

DURATION + COST PRICE

1 day - 350 EUR

TO BRING

- Working clothes
- \cdot Safety shoes
- Multimeter



EXPERT LEVEL

SEVCON CONTROLLER

TARGET GROUP

Engineers who perform repairs on electric machines trucks equipped with Sevcon controllers.

PRIOR KNOWLEDGE

Basic knowledge of the systems in an electric machine.

GOAL

- To gain a better insight into the general functioning of the range of Sevcon controllers.
- To be able to recognise these controllers and determine what settings are needed.
- To be able to determine if a problem in the machine is caused by the controller or by other components.
- $\cdot\,$ To be able to set parameters and perform calibrations.
- To be able to correctly set a new controller as a replacement for a faulty controller.

CONTENT

- Understanding the functioning of the common Sevcon controllers MOS90, MilliPak, SC2000 and PowerPak.
- Fault diagnosis and setting of the common Sevcon controllers MOS90, MilliPak, SC2000 and PowerPak.

DURATION + COST PRICE

1 day - 350 EUR

TO BRING

- Working clothes
- Safety shoes
- Multimeter



EXPERT LEVEL

GENERAL ELECTRIC CONTROLLER

TARGET GROUP

Engineers who perform repairs on electric machines equipped with General Electric controllers.

PRIOR KNOWLEDGE

Basic knowledge of the systems used in an electric machine.

GOAL

- Understanding the different technologies that have been used over the years in the GE product range.
- Understanding the operating principle of common controllers.
- To be able to correctly identify the specific card types or controllers.
- To be able to set parameters and perform calibrations.
- To be able to correctly set a new controller as a replacement for a faulty controller.

CONTENT

- To be able to make a distinction between the different series of GE controllers (EV-1, EV-10, EV-100LX, EV-100ZX, EVT-100ZX & SX-series).
- Identifying cards, setting up test bench connections and learning to work with the handset by modifying parameters.
- To be able to analyse faults and abnormalities on different GE controllers in order to make a correct diagnosis.
- To be able to make test configurations operate by taking measurement and solving faults.
- Becoming familiar with the use of the LX-handset and being able to modify parameters.
- Learning to use a Handy-man to measure and check components.
- Correctly interpreting error codes from the troubleshooting guide.

DURATION + COST PRICE

1 day - 350 EUR

TO BRING

- Working clothes
- Safety shoes
- Multimeter





OUR TRAINING COURSES





TECHNICAL TRAINING COURSES



TECHNICAL-COMMERCIAL

To gain an insight ← into the functioning and fields of application of machines

To be capable of recognising different components and locate them on a machine

To be able to advise customers about parts and machines

🕸 LIFT TRUCK TECHNOLOGY FOR NON-ENGINEERS

TARGET GROUP

Anyone who is active in a technical-commercial environment, but doesn't carry out repairs. After the training, the participant has a better insight in the many technical aspects of a lift truck. Only the basic principles are addressed, detailed operating principles aren't treated. This training course is particularly suitable for people who work in the sales department, warehouse, administration or car mechanics who want to reorientate their career to the forklift business.

PRIOR KNOWLEDGE

No specific prior knowledge is required to take this training course.

GOAL

- To gain an insight into the functioning and fields of application of lift trucks.
- To be capable of recognising different components and locate them on a machine.
- To be capable of advising customers about lift trucks.

CONTENT

Machine types and functioning

Mast configurations

Electric machine parts and functioning

- Electric motor types and contactors
- Batteries
- Charger types

Hydraulic components and functioning

Lift chains and forks

Safety instructions

Maintenance

Internal combustion engines

- · Components
- Fuel system
- Ignition
- Lubrication
- Cooling
- Exhaust
- Gasoline
- · I PG
- Diesel
- Periodic maintenance
- Points of attention

Transmission

- Operating principle
- Torque converter
- Gears
- Forward reverse
- Maintenance

Practical exercises on electric and internal combustion lift trucks.

DURATION + COST PRICE

2 days - 670 EUR



MOBILE ELEVATING WORK PLATFORM AND SCISSOR LIFT TECHNOLOGY FOR NON-ENGINEERS

TARGET GROUP

Anyone who is active in a technical-commercial environment, but doesn't carry out repairs. After the training, the participant has a better insight in the many technical aspects of an aerial work platform and scissor lift. Only the basic principles are addressed, detailed operating principles aren't treated. This training course is particularly suitable for people who work in the sales department, warehouse, administration or car mechanics who want to reorientate their career to the mobile elevating work platform business.

PRIOR KNOWLEDGE

No prior knowledge is required.

GOAL

- To gain an insight into the functioning and fields of application of mobile elevating work platforms.
- To be capable of recognising different components and locate them on a machine.
- To be capable of advising customers about mobile elevating work platforms.

CONTENT

Introduction to the types of mobile elevating work platforms

- · Physical properties and interplay of forces
- Basic concepts and locating of basic components
- \cdot Points of attention

Scissor lifts

- Field of application types
- Lifting mechanism
- Steering mechanism
- Driving mechanism
- Outriggers
- Maintenance

Boom lift

- Field of application types
- Lifting mechanism
- Steering mechanism
- Driving mechanism
- \cdot Overload
- Maintenance

Spider aerial work platform

- Field of application types
- Lifting mechanism
- Steering mechanism
- Driving mechanism
- Positioning of the stabilisers
- Maintenance

Practical exercises with boom lift and scissor lift.

DURATION + COST PRICE

2 days - 670 EUR



TELEHANDLER TECHNOLOGY FOR NON-ENGINEERS

TARGET GROUP

Anyone who is active in a technical-commercial environment, but doesn't carry out repairs. After the training, the participant has a better insight in the many technical aspects of a telehandler. Only the basic principles are addressed, detailed operating principles aren't treated. This training course is particularly suitable for people who work in the sales department, warehouse, administration or car mechanics who want to reorientate their career to the telehandler business.

PRIOR KNOWLEDGE

No prior knowledge is required.

GOAL

- To gain an insight into the functioning and fields of application of telehandlers.
- To be capable of recognising different components and locate them on a machine.
- To be capable of advising customers about telehandlers.

CONTENT

Introduction & definition

- Fields of application
- Segmentation & market players
- Top references

Physical characteristics

- Force & lever
- Stability triangle
- Use of stabilisers (influence on stability triangle)
- Load diagram (with and without stabilisers)
- Stabilisation indicator (LSI or Overload)
- Risks when driving/during use

Steering types

- · Conventional steering
- Crab steering
- Four-wheel steering
- $\cdot\,$ Hydraulic functions
- Driver's seat + display indication
- Cabin

Engines

- Emission standards (TIER 4)
- Oil and fuel standards
- Exhaust gas after-treatment (DOC + DPF + SCR)
- Regeneration
- Common abbreviations
- Mechanical hydraulic drive

Practical exercises with fixed and rotating telehandlers of the makes JLG and Manitou.

DURATION + COST PRICE

2 days - 670 EUR



TRACTOR TECHNOLOGY FOR NON-ENGINEERS

TARGET GROUP

This training is aimed at anyone who is active in a technical-commercial agricultural environment, but doesn't carry out repairs. After the training, the participant has a better insight in the many technical aspects of agricultural machinery. Only the basic principles are addressed, detailed operating principles aren't treated during this training. This training is particularly suitable for people who work in a sales environment, in the warehouse, in the administrative department ...

PRIOR KNOWLEDGE

No prior knowledge is required.

GOAL

- To gain an insight into the functioning and fields of application of agricultural machines.
- To be capable of recognising different components and locate them on a machine.
- To be capable of advising customers about agricultural machines.

CONTENT

Market overview

Types of tractors

Technical approach

- · Motor
- Transmission and drivetrain
- Braking
- · Front axle
- Suspension
- Hydraulics

DURATION + COST PRICE

2 days - 670 EUR

- \cdot Cab + electronics
- PT0
- Three-point lifting system

Machines - equipment

Combine harvesters

Future evolutions



SMALL EARTH-MOVING TECHNOLOGY (SEM) FOR NON-ENGINEERS

TARGET GROUP

This training is aimed at anyone who is active in a technical-commercial environment, but doesn't carry out repairs. After the training, the participant has a better insight in the many technical aspects of small earth-moving machinery. Only the basic principles are addressed, detailed operating principles aren't treated during this training.

This training is particularly suitable for people who work in the sales department, in the warehouse, in the administrative department ...

PRIOR KNOWLEDGE

No prior knowledge is required.

GOAL

- To gain an insight into the functioning and fields of application of SEM.
- To be capable of recognising different components and locate them on a machine.
- To be capable of advising customers about SEM.

CONTENT

History

Market overview

Types of vehicles within SEM

Technical approach

- Motor
- Hydraulic components
- Electronics

DURATION + COST PRICE

2 days - 670 EUR



- Tyres, wheels, tracks
- \cdot Cab accessories

Future evolutions



HYDRAULIC ATTACHMENTS FOR LIFT TRUCKS FOR NON-ENGINEERS

TARGET GROUP

Non-engineers who want to keep up with and gain a clear insight in hydraulic attachments of the brand CAM attachments[®].

PRIOR KNOWLEDGE

No specific prior knowledge is required to take this training course.

GOAL

- To gain a clear insight in the different types of hydraulic attachments.
- How to select the right attachment for your customer?
- Points of interest when choosing a hydraulic attachment.
- To gain a general insight in the structure and functioning of the hydraulic circuit of a lift truck.

CONTENT

General information

- Fork (carriage) types
- FEM or IS02328
- Separate/integrated sideshifter
- Residual capacity calculation

Overview hydraulic attachments

- Sideshifters
- Fork positioners
- Rotators
- Bale clamps
- Paper roll clamps
- Multi-fork positioners
- \cdot Push pull
- · Carton and appliance clamps

DURATION + COST PRICE

1 day - 350 EUR

Hydraulics

- Pressure flow rate
- \cdot Maintenance
- · Diagrams of the attachments

Remarks and exercises with regard to hydraulic attachments

- · Relief valve
- Piloted one-way valve
- Restriction
- FAQ



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