

WP 2 Inventory of Courses for Innovative Maintenance Techniques

Principles of hydraulics

Description

Basic knowledge of hydraulics from the perspective of the maintenance technician.

- Basic principles of hydraulics
- Components
- Basic schemes: reading and interpretation
- Troubleshooting for installations
- Basic maintenance
- Search of spare parts

Technologies

Hydraulics & electro-hydraulics

Target group

Maintenance technicians and their superiors

Modalities

- 4 days
- Practical course

Name of certification

Type of certification

Level of certification

European levels 2 to 3

Sources

Festo/Rexroth

Hydraulics for the advanced maintenance technician

Description

- Proportional valves
- Mounting control loops
- Open and closed systems
- Adjustment of installations
- Component knowledge
- Complex electro-hydraulic systems
- Troubleshooting
- Wear-out

Technologies

- Hydraulic & electro-hydraulic applications

Target group

Experienced technicians with notion of electric and hydraulic control systems.

Modalities

- Plenary and practice
- Timing: 4 days

Name of certification

Type of certification

Level of certification

Level 3 to 4

Sources

Festo/Rexroth/Sauer

Mobile hydraulics

Description of content

- Proportional valves
- Mounting control loops
- Open and closed systems
- Adjustment of installations
- Component knowledge
- Complex electro-hydraulic systems

Technologies

- Electro-hydraulic applications
- Proportional technique

Target group

- Technicians responsible for the maintenance of fork trucks, farming equipment, ...

Modalities

- Theoretical with attention for practical support
- Timing: 8 days

Name of certification

Type of certification

Level of certification

- Levels 3 to 4

Sources

Initiation in the technique

Description

- Basic explanation
- What is a motor/reduction
- Types and function of sensors
- Basic explanation of pneumatics
- Principles of chains, bearings and belts

Technologies

Basic knowledge

Target group

Operators

Modalities

- Practice
- Timing: 2 days (4x ½ day)

Name of certification

Type of certification

Level of certification

- Level 1

Sources

Ventilators

Description of content

- Types of ventilators
- Types of screws
- Principal functions of ventilators
- Air systems
- Wear-out: recognition and problem solving
- Graphics analysis

Technologies

- Air systems
- Air purifiers for fixed substances such as fibres, dust, ...

Target group

- Technicians levels 2 to 4

Modalities

- Practice
- Timing: 2 to 4 days

Name of certification

Type of certification

- Level 3

Level of certification

Sources

Vandommele, Lysair, Siempelkamp, Almeco, personal experience, ...

Chains

Description of content

- Types of chains (new generation chains)
- Mounting
- Maintenance of chains
- Adjustment (tuning) using
 - ruler
 - measuring rod
 - laser (new)
- Wear-out

Technologies

- Measuring techniques for wear-outs
- Mechanical maintenance, practice included

Target group

- Technicians
- Operators

Modalities

- Practice
- Timing: 1 day

Name of certification

Type of certification

Level of certification

- Level 2

Sources

Clutches

Description of content

- Types of clutches
 - Fixed clutches
 - Flexible clutches
 - Cardan joints / universal joints
- Mounting clutches
- Adjustment (tuning)
 - Basic method
 - Modern techniques
- Newest types of clutches

Technologies

- Traditional method of adjusting
- Adjustment by laser

Target group

- Technicians

Modalities

- Practice
- Timing: 1 day

Name of certification

Type of certification

Level of certification

- Level 2

Sources

Bearings (basics)

Description

- Types of frequently used bearings
- Bushings
- Needle bearings
- Comprehension of numbers & suffixes
- (de-)Mounting techniques
- Detection of wear-outs
- Measurement of vibration
- Finding alternatives for bearing problems

Technologies

- Basic knowledge
- Basic measuring of vibration

Target group

Operators

Modalities

- Practice
- Timing: 2 days

Name of certification

Type of certification

Level of certification

- Level 2

Sources

Bearings (advanced)

Description of content

- Hydraulic (de-)mounting
- Calculation of product life cycle
- Frequency and amount of greasing
- Alternatives
- Error analysis
- Troubleshooting

Technologies

- Hydraulic (de-)mounting
- Using software for calculating greasing and product life cycle
- Measurement of vibration

Target group

Operators

Modalities

- Practice
- Timing: 2 days

Name of certification

Type of certification

Level of certification

- Level 3

Sources

Flanges

Description

- Types of flanges
- Types of seals
- Tools
- Procedures
- (de-)Mounting techniques

Technologies

- Determination of surface pressure
- Use of wrenches

Target group

- Technicians

Modalities

- Practice
- Timing: 2 days

Name of certification

Type of certification

Level of certification

- Level 2

Sources

Pneumatics

Description of content

- Introduction to air pressure
- Fundamental rules
- Types of cylinders and valves
- Speed control
- Interpretation and design of schemes
- Troubleshooting

Technologies

- Basic knowledge of electro-mechanics

Target group

- Technicians

Modalities

- Practice
- Timing: 4 days

Name of certification

Type of certification

Level of certification

- Level 3

Sources

Pumps (basics)

Description of content

- Types of pumps
- Types of fans
- Seals
- Cavitation
- Greasing
- Minor problems related to pumps

Technologies

- Basic knowledge of fluids
- Mounting/adjusting clutches

Target group

- Technicians

Modalities

- Practice: 8 testing pumps + disassembled units
- Timing: 4 days

Name of certification

Type of certification

Level of certification

- Levels 2 to 3

Sources

Pumps (advanced)

Description

- Pressure produced by a pump
- Dynamic/kinematic viscosity
- Turbulent and laminar flows + Reynolds number
- Principals of various pumps and areas of application
- Interpretation of graphics
- Characteristics of cabling
- Power and yield
- Parallel and serial circuits
- NPSH (Net Positive Suction Head) & cavitation
- Connection of wiring

Technologies

- Basic knowledge of pumps

Target group

- Technicians
- Designers

Modalities

- Practice
- Timing: 2 days

Name of certification

Type of certification

Level of certification

- Levels 3 to 4

Sources

Reductions

Description

- Types of cogs
- Measurement of modules
- Types of reductions
- Methods
- Measurement/calculation of gear ratio
- Profile shifting
- Wear-out

Technologies

- Vibration measurement

Target group

- Technicians

Modalities

- Practice
- Timing: 1 day

Name of certification

Type of certification

Level of certification

- Levels 2 to 3

Sources

Conveyor belts (basics)

Description

- Flat belts
 - Applications
 - Composition
 - Joints
 - Parts of a transmission belt
 - Transmission
 - How to install a belt correctly
 - Steering conveyor belts
 - Belt progress
 - Maintenance
- Toothed belts
 - Types and composition
 - Steering toothed belts
 - Installing toothed belts: adjustment and tightening
- V-belts
 - Types and composition
 - Installing V-belts: adjustment and tightening
 - Wear-out
 - Areas of application
 - Frequent problems with V-belts

Technologies

- Basic knowledge of forces, vectors
- Manual tightening methods
- Electronic tightening techniques
- Laser technique

Target group

- Technicians

Modalities

- Practice
- Timing: 2 days

Name of certification

Type of certification

Level of certification

- Level 2

Sources

Applied physics

Description of content

- Power, moment, leverage
- Characteristics bolts and nuts
- Types of threads
- Use of wrench
- Securing bolts and nuts
- Practical weight calculation + elementary lifting techniques

Technologies

- Basic knowledge of bolts
- Basic knowledge of weight calculation
- Bolt extension

Target group

- Operators
- Technicians

Modalities

- Practice
- Timing: 1 to 2 days

Name of certification

Type of certification

Level of certification

- Level 2

Sources

Maintenance mechanics (basics)

Description

- Bearings
- Applied physics
- Chains
- Clutches
- Reductions
- Reading drafts
- Conveyor belts

Technologies

- Cf. various modules

Target group

- Technicians
- Operators in training for 1°-line technicians

Modalities

- Practice
- Timing: 8 days

Name of certification

Type of certification

Level of certification

- Level 2

Sources

Maintenance mechanics (advanced)

Description of content

- Calculation of power of conveyor belts
- Product life cycle for bearings
- Establishing a greasing schedule
- Types of maintenance
- Vibrations

Technologies

- Calculation software
- Vibro-measurement

Target group

- Advanced technicians
- Chiefs
- Designers

Modalities

- Practice
- Timing: 2 days

Name of certification

Type of certification

Level of certification

- Level 1

Sources

Consortium

Description

- Mechanical:
 - Bearings
 - Applied physics
 - Chains
 - Clutches
 - Reductions
 - Reading drafts
 - Conveyor belts
- Electrical
 - Basics of electricity
 - Motors
 - Sensors
 - Circuits
- Pneumatic
 - Basic components + functions
 - Reading and establishing circuits
 - Detecting errors
- Safety

Technologies

- Basic knowledge

Target group

- Operators in training for technician

Modalities

- Practice
- Timing: 26 days

Name of certification

Type of certification

Level of certification

- level 2

Sources