

**CUSTOMER TRAINING COURSE PROGRAMME**

**TECHNICAL TRAINING**



**PREFACE****PLEASE CONTACT US.**

In this brochure, you will find details of the courses available within the Konecranes Port Solutions customer training course programme.

Should you have any further questions about this customer training course programme or if you want to order one of our training courses, please do not hesitate to contact us.

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## PREFACE

### MAKING SKILLS WORK –

#### DEVELOP YOUR STAFF THROUGH OUR TRAINING COURSES

**Making skills work** – true to this motto we support you with high quality training course programme to exploit the full potential of your Konecranes Port Solutions products and to boost your productivity.

We offer you a comprehensive range of training courses that qualify your staff in the safe and efficient operation and maintenance of Konecranes Port Solutions products and their components. You benefit from our many years of experience. We continuously develop our training courses on the basis of intensive customer interaction and local expertise. With practical work carried out on the products, we ensure that your staff acquires the relevant know-how. We document the trainee's successful completion of the course with our training course certificates, which are recognised by the industry.

#### The most important highlights

- Modular, practice-oriented training course programme
- German-educated technical training instructors
- Operator training instructors with more than 20 years experience
- State-of-the-art equipment used in our training courses
- Comprehensive training course documentation for each course
- Training courses held at our training centres in
  - Düsseldorf (Germany)
  - Würzburg/Hamburg (Germany)
  - Montceau-les-Mines (France)
- Training courses held on site at your port
- Recognised Konecranes Port Solutions training course certificate



## PREFACE

### TRAINING CENTRE IN DÜSSELDORF, GERMANY



#### Highlights:

- Highly qualified, experienced training instructors
- State-of-the-art training workplaces equipped with Notebook and PLC controlled belt model
- Technology simulator to represent the overall crane control system
- Comprehensive training course documentation for each course
- Recognised Konecranes Port Solutions training course certificate

### SIMULATOR TRAINING COURSE IN DÜSSELDORF, GERMANY



#### Highlights:

- Highly qualified, experienced training instructors
- State-of-the-art simulator featuring many operating scenarios that are adapted to Konecranes® Gottwald mobile harbour cranes and excellent physics simulation
- Recognised Konecranes Port Solutions crane operator licence in EC card format and official training course certificate

## PREFACE

### TRAINING CENTRE IN MONTCEAU-LES-MINES, FRANCE



#### Highlights:

- Konecranes Port Solutions certified training instructors
- State-of-the-art Konecranes Port Solutions training facility
- Konecranes reach stacker for hands-on training course
- Technical documentation for training course
- Recognised Konecranes Port Solutions training course certificate



### TRAINING CENTRE IN WÜRZBURG/HAMBURG, GERMANY

#### Highlights:

- Highly qualified, experienced training instructors
- Konecranes straddle carriers for hands-on training course
- Detailed training course documentation
- Recognised Konecranes Port Solutions training course certificate

## PREFACE

### ON-SITE TRAINING COURSE AT CUSTOMER'S SITE



#### Highlights:

- Highly qualified, experienced training instructors
- Training course in customer's own environment with realistic conditions and following the relevant on-site procedures
- Training directly with customer's product
- Flexible training course structure switching between theory and practice
- Recognised Konecranes Port Solutions training course certificate



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**MOBILE HARBOUR CRANE****1 MOBILE HARBOUR CRANE****Targets**

- Acquiring and improving the necessary skills
- Practical implementation of skills gained in classroom training
- Improved productivity through minimum downtimes and well-trained staff

**Concept:****Technical Training 1 & 2**

**SIMATIC S7  
basic training  
Hydraulics training**

**Troubleshooting training  
(on-site)**

**Safe handling and improved  
container performance**

**Target groups**

- Maintenance staff and service technicians
- Maintenance staff and service technicians
- Experienced service technicians



making  
skills  
work

## MOBILE HARBOUR CRANE

### 1.1 TECHNICAL TRAINING 1

**Number of participants:**

- Min. 3 and max. 8 participants

**Duration:**

- 5 days

**Location:**

- Training Center Düsseldorf, Germany
- On site

In this course, fundamental knowledge about Konecranes® Gottwald cranes is conveyed to the trainees. Trainees will first learn about the general set-up of their crane and become familiar with the product documentation. To be able to perform the maintenance work and fault diagnosis, trainees are introduced to the fundamentals of the electrics and hydraulics of their Konecranes® Gottwald products. The training also includes learning to read the circuit diagrams and hydraulic drawings. Trainees also receive instruction on the functions and settings of drive units and assemblies such as the hoists, slewing and luffing gear units as well as the brakes, steering and stabilisers.

“Technical training 1” is designed for electricians and mechanics involved in work or maintenance work on mechanical, hydraulic or electrical components of a Konecranes® Gottwald product.

**Seminar contents:**

- Mobile harbour cranes
  - G HxK/HxK general diagrams
  - G HxK/HxK superstructure/chassis/etc.
- Documentation
  - Training manual
  - Operating and maintenance manuals
  - Spare parts catalogue (CD ROM)
- Electrics
  - Designation systems for control systems and auxiliary units
  - Function modules, function designations etc.
  - Circuit diagrams
- Hydraulics
  - Introduction to hydraulics
  - Illustration of hydraulic symbols
  - Hydraulic circuit diagrams

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## MOBILE HARBOUR CRANE

*Continued from "Technical training 1" course programme*

- Crane components
    - Superstructure and tower set-up
    - Hoist function and set-up
    - Slewing gear function and set-up
    - Luffing gear function and set-up
  
    - Chassis set-up
    - Travel gear function and set-up
    - Steering function and set-up
    - Brake function and set-up
    - Stabiliser function and set-up
- } for G HMK/HMK



## MOBILE HARBOUR CRANE

### 1.2 TECHNICAL TRAINING 2

**Number of participants:**

- Min. 3 and max. 8 participants

**Duration:**

- 5 days

**Location:**

- Training Center Düsseldorf, Germany
- On site

The trainees are taught knowledge relevant to the correction of faults on Konecranes® Gottwald cranes. After fundamental explanations of the way the control system, consisting of hardware and software components, is made up, key aspects of the bus systems are examined in detail. Additional insights into programming and the programming language used make subsequent troubleshooting that much easier. Participants will become familiar with one of the tried and tested aids for diagnosing faults – the Visumatic® control and visualisation system. Hands-on training enables the trainees to learn practical fault diagnosis skills and remedies.

Technical Training 2 is designed for electricians involved in more complex maintenance work or tougher troubleshooting.

**Seminar contents:**

- Programmable logic controller (PLC)
- PLC on mobile harbour cranes
  - Industrial PC/hardware/software/ethernet
  - Controller S7 300/S7 400 set-up/displays
- PROFIBUS DP
  - PROFIBUS DP components and interface
  - S7 hardware configuration
- ET 200S
  - IM 151 interface module set-up and displays
  - ET 200S input and output modules
- ASI bus
  - Set-up/function
  - Master and slave module set-up/function
- CAN bus (G HxK only)
  - Set-up/function
  - Master and slave module set-up/function

*Continued on next page*

**MOBILE HARBOUR CRANE**

*Continued from "Technical training 2" course programme*

- STEP 7 programming environment
  - Organisation blocks (OB)
  - Function blocks (FB)
  - Function (FC)
  - Data blocks (DB)
- Programming languages
  - Statement list (STL)
  - Function block diagram (FBD)
  - Ladder diagram (LAD)
- Online functions
  - Main window
  - Menu and toolbar
  - Object organiser
  - Variable table (VAT)
- User program
  - Set-up and structure
  - Signal tracking
  - Functions



## MOBILE HARBOUR CRANE

### 1.3 HYDRAULICS TRAINING

**Number of participants:**

- Min. 3 and max. 6 participants

**Duration:**

- 5 days

**Location:**

- Training Center Düsseldorf, Germany

In this course, fundamental knowledge about Konecranes® Gottwald cranes is conveyed to the trainees. Trainees will first learn about the general set-up of their crane and become familiar with the product documentation. To be able to perform the maintenance work and fault diagnosis, trainees are introduced to the fundamentals of the hydraulics of their Konecranes® Gottwald products. The training also includes learning to read the hydraulic drawings. Trainees also receive instruction on the functions and settings of hydraulic units and assemblies such as the travel and luffing gear units as well as on the brakes, steering and stabilisers.

The hydraulics training is designed for electricians and mechanics involved in work or maintenance work on hydraulic components.

**Seminar contents:**

- What is hydraulic fluid technology?
  - Generation of force using hydraulics
  - Illustration of hydraulic symbols
  - Layout of hydraulic drawings
- Hydraulic systems in the 4th or 5th generation of mobile harbour cranes
  - HxK/G HxK hydraulic system
  - Four-rope grab crane superstructure hydraulic system
- Hydraulic power generation and distribution
  - HxK/G HxK pump system
  - A11VO hydraulic pump
  - Control block
  - Distributor block
  - Pressure stages
- Set-up and function of hydraulic drives in the superstructure
  - Luffing gear hydraulic system
  - Set-up of hydraulic control blocks
  - Luffing-in or raising the boom
  - Luffing-out or setting down the boom
  - Description of the hoist and slewing gear brakes

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## MOBILE HARBOUR CRANE

*Continued from “Hydraulics training“ course programme*

- Set-up and function of the hydraulic drives in the chassis
  - HMK/G HMK chassis hydraulic system
  - Description of travel gear, steering, travel gear brake, stabiliser system
- Valve lists
  - HMK or G HMK valve blocks



## MOBILE HARBOUR CRANE

### 1.4 TROUBLESHOOTING TRAINING (ON SITE & HANDS-ON)

**Number of participants:**

- Min. 3 and max. 4 participants

**Duration:**

- 5 days

**Location:**

- On site

**Requirements:**

- Mobile harbour crane must be available

The trainees are taught knowledge relevant to the correction of faults on Konecranes® Gottwald cranes. After fundamental explanations of the way the control system, consisting of hardware and software components, is made up, key aspects of the bus systems are examined in detail. Additional insights into programming and the programming language used make subsequent troubleshooting that much easier. Participants will become familiar with one of the tried and tested aids for diagnosing faults – the Visumatic® control and visualisation system. Hands-on training enables the trainees to learn practical fault diagnosis skills and remedies.

The troubleshooting training is designed for electricians involved in more complex maintenance work or tougher troubleshooting.

**Seminar contents:**

- Electrics
  - Fault finding with Visumatic®
  - Fault finding with electrical booklet and multimeter
- Hydraulics
  - Fault finding with Visumatic® and hydraulic diagram
- Programmable logic controller (PLC)
  - Introduction into the user program
  - Fault finding with SIMATIC Manager
  - Error logging
  - Error recovery
- PROFIBUS DP
  - Reviewing connections at components and interfaces
- ET 200S
  - Evaluating status LEDs
  - Checking input and output modules

*Continued on next page*

## MOBILE HARBOUR CRANE

*Continued from “Troubleshooting training (on site & hands-on)” course programme*

- ASI bus
  - Evaluating status LEDs
  - Replacing faulty components
  - Readdressing connected slaves
  - Displaying digital and analogue values
- Online functions
  - Diagnosing online status of the crane
  - Displaying variables in VAT
  - Comparing online/offline user program
  - Downloading user program
  - Signal tracking



**AUTOMATED GUIDED VEHICLE****2 AUTOMATED GUIDED VEHICLE****2.1 TECHNICAL TRAINING 1****Number of participants:**

- Min. 3 and max. 6 participants

**Duration:**

- 2.5 days

**Location:**

- On site

**Requirements:**

- AGV must be available

In this course, fundamental knowledge about Konecranes® Gottwald cranes is conveyed to the trainees. Trainees will first learn about the general set-up of their crane and become familiar with the product documentation. To be able to perform the maintenance work and fault diagnosis, trainees are introduced to the fundamentals of the electrics and hydraulics of their Konecranes® Gottwald products. The training also includes learning to read the circuit diagrams and hydraulic drawings.

Technical training 1 is designed for electricians and mechanics involved in work or maintenance work on mechanical, hydraulic or electric components of an AGV.

**Seminar contents:**

- Automated guided vehicle (AGV)
  - General view of the components
  - Technical data
  - Safety instructions
- Documentation
  - Training manual
  - Operating and maintenance manuals
  - Spare parts catalogue (CD ROM)
- Electrics
  - Designation systems for control systems and auxiliary units
  - Function modules, function designations etc.
  - Circuit diagrams
- Hydraulics
  - Introduction to hydraulics
  - Illustration of hydraulic symbols
  - Hydraulic circuit diagrams

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## AUTOMATED GUIDED VEHICLE

*Continued from "Technical Training 1" course programme*

- Vehicle components
  - Control system
  - Sensors
  - Chassis set-up
  - Travel gear function and set-up
  - Steering function and set-up
  - Brake function and set-up



## AUTOMATED GUIDED VEHICLE

### 2.2 TECHNICAL TRAINING 2

**Number of participants:**

- Min. 3 and max. 6 participants

**Duration:**

- 2 days

**Location:**

- On site

**Requirements:**

- AGV must be available

The trainees are taught knowledge relevant to the diagnosis and correction of faults on Konecranes® Gottwald cranes. After fundamental explanations of the way the control system, consisting of hardware and software components, is made up, key aspects of the bus systems are examined in detail. Additional insights into programming and the programming language used make subsequent troubleshooting that much easier. Hands-on training enables the trainees to learn practical fault diagnosis skills and remedies.

Technical Training 2 is designed for electricians involved in more complex maintenance work or tougher troubleshooting.

**Seminar contents:**

- Fundamentals of programmable logic controller (PLC)
- PLC on automated guided vehicles (AGV)
  - User program
  - Software update
  - Troubleshooting
- CAN bus
  - CAN bus components and interface
- Signal routes
- Introductions to TEAMS, FMDS, BMS, FCS
- Inverters
  - Basics
  - Manufacturer's documentation
  - Parameter update
  - Firmware update

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## AUTOMATED GUIDED VEHICLE

*Continued from "Technical Training 2" course programme*

- IO Box
- Lütze LOCC Box Net
- Service display
  - Troubleshooting
  - Advanced user
  - Software update
- Sensors used on the AGV
- WLAN access point



## AUTOMATED GUIDED VEHICLE

### 2.3 BATTERY TRAINING (BT)

**Number of participants:**

- Min. 3 and max. 6 participants

**Duration:**

- 0.5 days

**Location:**

- On site

**Requirements:**

- Battery exchange station and maintenance point must be available



In this course, fundamental knowledge about the AGV battery is conveyed to the trainees. Trainees will first learn about the general set-up of the battery and become familiar with the product documentation, so that they are able to perform maintenance work. Hands-on training enables the trainees to experience important maintenance steps on the product.

The battery training is designed for electricians involved in work or maintenance work on electric components or involved in troubleshooting.

**Seminar contents:**

- Safety
  - Electrical hazards
  - Safe handling of batteries
- Documentation
  - Training manual
  - Operating and maintenance manuals
- Batteries
  - Set-up
  - Changing manually
  - Maintenance
    - Water refill
    - Measuring acid density
    - Measuring cell voltage
  - Function of Wire-IQ
- Battery charger
  - Functions
  - Status lamps
- Battery exchange station
  - Automatic mode for battery maintenance

## AUTOMATED GUIDED VEHICLE

### 2.4 BATTERY EXCHANGE STATION (BES)

**Number of participants:**

- Min. 3 and max. 6 participants

**Duration:**

- 1 day

**Location:**

- On site

**Requirements:**

- Battery AGV and battery exchange station must be available

In this course, fundamental knowledge about the AGV battery exchange station is conveyed to the trainees. Trainees will first learn about the general set-up of the battery exchange station and become familiar with the product documentation, so that they are able to perform maintenance work. Hands-on training enables the trainees to learn important fault diagnosis skills and remedies.

The battery exchange station training is designed for electricians involved in work or maintenance work on electric components or involved in troubleshooting.

**Seminar contents:**

- Safety
  - Electrical hazards
  - Safe handling of batteries
- Documentation
  - Training manual
  - Operating and maintenance manuals
- Batteries
  - Set-up and technical information
- Battery charger
  - Functions
  - Status lamps
  - Fault messages
- FMDS and BMS
  - Set-up
  - Operation
  - Fault messages
- BESC
  - Set-up
  - Troubleshooting

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## AUTOMATED GUIDED VEHICLE

*Continued from "Battery exchange station (BES)" course programme*

- Function and set-up of the Battery exchange station
  - Automatic mode
  - Manual operation
  - Maintenance calibration
  - Fault messages
  - Troubleshooting



**AUTOMATED STACKING CRANE (ASC)****3 AUTOMATED STACKING CRANE (ASC)****3.1 TECHNICAL TRAINING 1****Number of participants:**

- Min. 3 and max. 6 participants

**Duration:**

- 2.5 days

**Location:**

- On site

**Requirements:**

- ASC must be available

In this course, fundamental knowledge about ASCs is conveyed to the trainees. Trainees will first learn about the general set-up of the ASC and become familiar with the product documentation. To be able to perform the maintenance work and fault diagnosis, trainees are introduced to the fundamentals of the electrics and hydraulics of their Konecranes® Gottwald products. The training also includes learning to read the circuit diagrams and hydraulic drawings.

Technical Training 1 is designed for electricians and mechanics involved in work or maintenance work on mechanical, hydraulic or electric components of an ASC.

**Seminar contents:**

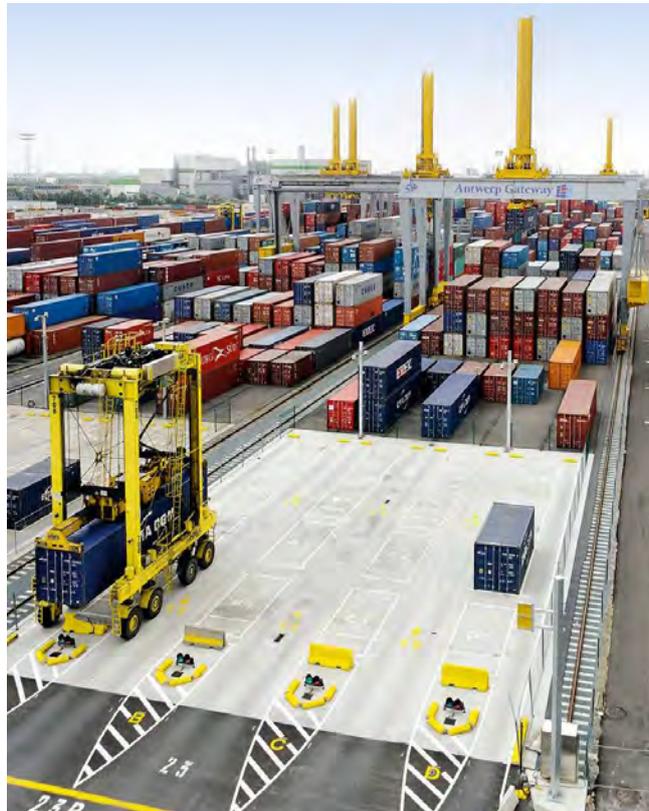
- Automated stacking crane
  - General view of the components
  - Technical data
  - Safety instructions
- Documentation
  - Training manual
  - Operating and maintenance manuals
  - Spare parts catalogue (CD ROM)
- Electrics
  - Designation systems for control systems and auxiliary units
  - Function modules, function designations etc.
  - Circuit diagrams

*Continued on next page*

## AUTOMATED STACKING CRANE (ASC)

*Continued from “Technical Training 1” course programme*

- Hydraulics
  - Introduction to hydraulics
  - Illustration to hydraulic symbols
  - Hydraulic circuit diagrams
- Manual operation
  - Safety instructions
  - Functions of the hand-held controller
- Hands-on training
- Functions and set-up
  - Control system
  - Sensors
  - Gantry
  - Trolley
  - Hoist
  - Cable reel



## AUTOMATED STACKING CRANE (ASC)

### 3.2 TECHNICAL TRAINING 2

**Number of participants:**

- Min. 3 and max. 6 participants

**Duration:**

- 2 days

**Location:**

- On site

**Requirements:**

- ASC must be available

The trainees are taught knowledge relevant to the diagnosis and correction of faults on the ASC. After fundamental explanations of the way the control system, consisting of hardware and software components, is made up, key aspects of the bus systems are examined in detail. Additional insights into programming and the programming language used make subsequent troubleshooting that much easier. Hands-on training enables the trainees to learn practical fault diagnosis skills and remedies.

Technical Training 2 is designed for electricians involved in more complex maintenance work or tougher troubleshooting.

**Seminar contents:**

- Safety functions
- PLC on automated stacking cranes
  - User program and hardware configuration
  - Software update
- PROFIBUS
  - PROFIBUS components and interface
  - Hardware configuration
- Signal routes
- Introductions to TEAMS, FMDS, FCS, HC, RCC, ICZ
- Frequency inverters
  - Basics of SINAMICS drives
  - Manufacturer's documentation
  - User-specific parameters
  - Parameter update
  - Trace function
- Transponder antennas
- Multi-project server
- UPS - uninterruptible power supply

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## AUTOMATED STACKING CRANE (ASC)

*Continued from “Technical Training 2“ course programme*

- Sensors used on the ASC
- Industrial computers (Visu, Cam and Laser PC)
- Recovery of the crane Calibration of the different axles and the spreader
- Troubleshooting with the help of:
  - FMDS
  - PLC
  - Electrical circuit diagram booklet



**STRADDLE & SPRINTER CARRIERS****4 STRADDLE & SPRINTER CARRIERS****4.1 TECHNICAL TRAINING 1 FOR NOELL NSC E****Number of participants:**

- Min. 3 and max. 8 participants

**Duration:**

- 5 days

**Location:**

- Würzburg, Germany
- On site

**Requirements:**

- For on-site training a straddle carrier and/or a sprinter carrier must be available

In this course, fundamental knowledge about straddle carriers and sprinter carriers is conveyed to the trainees. Trainees will first learn about the general set-up of the straddle carrier and sprinter carrier and become familiar with the product documentation. To be able to perform the maintenance work and fault diagnosis, trainees are introduced to the fundamentals of the electrics and hydraulics. The training also includes learning to read the circuit diagrams and hydraulic drawings.

Technical Training 1 is designed for electricians and mechanics involved in work or maintenance work on mechanical, hydraulic or electric components of straddle carriers & sprinter carriers.

**Seminar contents:**

- Straddle carrier & sprinter carrier
  - Inspection of the main components
  - Explanation and location of the safety features
  - Introduction to the operational controls
- Documentation
  - Training manual
  - Operating and maintenance manual
  - Spare parts catalogue (CD ROM)
- Electrics
  - Designation systems for control systems and auxiliary units
  - Function modules, function designations etc.
  - Circuit diagrams
  - Basic description of individual electric systems (hoist, drive system)

*Continued on next page*

## STRADDLE & SPRINTER CARRIERS

*Continued from "Technical Training 1 for Noell NSC E" course programme*

- Hydraulics
  - Introduction to hydraulics
  - Illustration to hydraulic symbols
  - Hydraulic circuit diagrams
  - Basic description of individual hydraulic systems
    - Steering system
    - Brake system
    - Spreader
- PLC system
  - Description and function of the CAN bus
  - Basic description of the PLC system
  - PLC software update with a USB memory stick
- Generator
  - Basic description of the generator
- Generator/frequency inverters
  - Basic description of the inverters
  - Diagnostics using the frequency inverter/CAN fault list
  - Basic description of the emergency recovery procedure
- Diesel engine
  - Overview of the main diesel engine components
- Straddle carrier & sprinter carrier maintenance
  - Maintenance schedule



## STRADDLE & SPRINTER CARRIERS

### 4.2 TECHNICAL TRAINING 2 FOR NOELL NSC E

**Number of participants:**

- Min. 3 and max. 8 participants

**Duration:**

- 5 days

**Location:**

- Würzburg, Germany
- On site

**Requirements:**

- For on-site training a straddle carrier and/or a sprinter carrier must be available

The trainees are taught knowledge relevant to the diagnosis and correction of faults on the straddle carrier and sprinter carrier. After fundamental explanations of the way the control system, consisting of hardware and software components, is made up, key aspects of the bus systems are examined in detail. Additional insights into programming and the programming language used make subsequent troubleshooting that much easier. Hands-on training enables the trainees to learn practical fault diagnosis skills and remedies.

Technical Training 2 is designed for electricians involved in more complex maintenance work or tougher troubleshooting.

**Seminar contents:**

- Straddle carrier & sprinter carrier
  - Explanation and location of the safety features
- Electrics
  - Overview of the electrical system
  - Electrical components (e.g. absolute encoder, keyboard etc.)
  - Description and function of the individual electric systems
    - Hoist
    - Drive system
  - Troubleshooting the electrical system
- PLC system
  - Description and function of the CAN bus
  - Working with PCanView to diagnose the CAN bus
  - Working with CoDeSys (monitoring the program and creating HEX files)
  - Working with WinFlash (downloading HEX files to ESX controller)
  - Working with the Mvision software to set up and program the display
  - PLC software update with a USB memory stick
  - PLC data upload with a USB memory stick

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## STRADDLE & SPRINTER CARRIERS

*Continued from "Technical Training 2 for Noell NSC E" course programme*

- Describing and changing important PLC parameters
- Troubleshooting the PLC system
- Generator
  - Description and function of the generator
  - Troubleshooting the generator
- Frequency inverters
  - Description and function of the inverters
  - Diagnostics using the frequency inverter/CAN fault list
  - Downloading and changing parameters
  - Troubleshooting the frequency inverter
  - Description and function of the emergency recovery procedure
- Hydraulics
  - Steering system
    - Diagnostic software (only for electrical steering system)
  - Brake system
  - Spreader
  - Troubleshooting the hydraulic systems
- Diesel engine
  - Diagnostics for the diesel engine



## STRADDLE & SPRINTER CARRIERS

### 4.3 TECHNICAL TRAINING 1 FOR NOELL NSC H

**Number of participants:**

- Min. 3 and max. 8 participants

**Duration:**

- 5 days

**Location:**

- Würzburg, Germany
- On site

**Requirements:**

- For on-site training a straddle carrier and/or a sprinter carrier must be available

In this course, fundamental knowledge about straddle carriers and sprinter carriers is conveyed to the trainees. Trainees will first learn about the general set-up of the straddle carrier and sprinter carrier and become familiar with the product documentation. To be able to perform the maintenance work and fault diagnosis, trainees are introduced to the fundamentals of the electrics and hydraulics. The training also includes learning to read the circuit diagrams and hydraulic drawings.

Technical Training 1 is designed for electricians and mechanics involved in work or maintenance work on mechanical, hydraulic or electric components of straddle carriers & sprinter carriers.

**Seminar contents:**

- Straddle carrier & sprinter carrier
  - Inspection of the main components
  - Explanation and location of the safety features
  - Introduction to the operational controls
- Documentation
  - Training manual
  - Operating and maintenance manual
  - Spare parts catalogue (CD ROM)
- Electrics
  - Designation systems for control systems and auxiliary units
  - Function modules, function designations etc.
  - Circuit diagrams
- Hydraulics
  - Introduction to hydraulics
  - Hydraulic principles
  - Illustration of hydraulic symbols
  - Hydraulic circuit diagrams

*Continued on next page*

**STRADDLE & SPRINTER CARRIERS**

*Continued from "Technical Training 1 for Noell NSC H" course programme*

- Basic description of individual hydraulic systems
  - Steering system, brake system, spreader, hoist and drive system
- Basic description of the emergency recovery procedure
- PLC system
  - Description and function of the CAN bus
  - Basic description of the PLC system
  - PLC software update with a USB memory stick
- Diesel engine
  - Overview of the main diesel engine components
- Straddle carrier & sprinter carrier maintenance
  - Maintenance schedule

## STRADDLE & SPRINTER CARRIERS

### 4.4 TECHNICAL TRAINING 2 FOR NOELL NSC H

**Number of participants:**

- Min. 3 and max. 8 participants

**Duration:**

- 5 days

**Location:**

- Würzburg, Germany
- On site

**Requirements:**

- For on-site training a straddle carrier and/or a sprinter carrier must be available

The trainees are taught knowledge relevant to the diagnosis and correction of faults on the straddle carrier and sprinter carrier. After fundamental explanations of the way the control system, consisting of hardware and software components, is made up, key aspects of the bus systems are examined in detail. Additional insights into programming and the programming language used make subsequent troubleshooting that much easier. Hands-on training enables the trainees to learn practical fault diagnosis skills and remedies.

Technical Training 2 is designed for electricians involved in more complex maintenance work or tougher troubleshooting.

**Seminar contents:**

- Straddle carrier & sprinter carrier
  - Explanation and location of the safety features
- Electrics
  - Overview of the electrical system
  - Electrical components (e.g. absolute encoder, keyboard etc.)
  - Description and function of the individual electric systems
  - Troubleshooting the electrical system
- PLC system
  - Description and function of the CAN bus
  - Working with PCanView to diagnose the CAN bus
  - Working with CoDeSys (monitoring the program and creating HEX files)
  - Working with WinFlash (downloading HEX files to ESX controller)
  - Working with the Mvision software to set up and program the display
  - PLC software update with a USB memory stick
  - PLC data upload with a USB memory stick
  - Describing and changing important PLC parameters
  - Troubleshooting the PLC system

*Continued on next page*

## STRADDLE & SPRINTER CARRIERS

*Continued from "Technical Training 2 for Noell NSC H" course programme*

- Hydraulics
  - Description and function of the individual hydraulic systems
    - Steering system
    - Diagnostic software (only for electrical steering system)
    - Brake system
    - Spreader
    - Hoist
  - Drive system
  - Troubleshooting the hydraulic systems
  - Description and function of the emergency recovery procedure
- Diesel engine
  - Diagnostics for the diesel engine



**REACH STACKER****5 REACH STACKER****5.1 TECHNICAL TRAINING COURSE FOR KONECRANES TFC 45H/TFC 45HC****Number of trainees:**

- Min. 3 and max. 8 trainees

**Duration:**

- 5 days

**Location:**

- Montceau-les-Mines, France
- On site

**Requirements:**

- For on-site training course, a reach stacker must be available

This course will introduce the basics of TFC 45 reach stackers to the service technicians. It will deal with the main differences between the two versions TFC 45 H and TFC 45 HC.

After presentation of the control unit, we will analyse the two different forms of transmission by means of the hydraulic and electric system.

This will provide useful basic information on how to approach the different methods for troubleshooting and repair.

The training course comprises theoretical lessons in the classroom and practical lessons on the reach stacker.

During the training course, each trainee receives a training manual and the standard CD containing a manual with information on code of conduct, spare parts catalogue and diagrams.

The training courses start on Monday afternoon at 2.00 pm and finish on Friday at midday.

**Seminar contents:**

- History of the reach stacker
- Summary of control elements
- Control panel
- Maintenance schedule
- Understanding of systems and how the machines work
- Acquisition and improvement of hydraulic, electric and pneumatic knowledge for troubleshooting
- Knowledge of operation
- Knowledge of how to use LMI and adjustments procedure

*Continued on next page*

**REACH STACKER**

*Continued from "Technical Training course for Konecranes TFC 45H/TFC 45HC"  
course programme*

- Transmission analysis
  - Dana TE 27000 vfs-booster (APC 200)
  - Dana TE 27418 full flow (APC 216)
  - Gearbox calibration
- Load sensing pump
- Cooling circuit
- Parker control valve (M400LS-L90LS)
- Pressure regulation
- Steering function
- Brake system
- Spreader functions
- LOGO logic module reading (practice on millennium type)
- Boom telescoping and hoist functions
- MD3 display
  - Description of the menu
  - Diagnostic mode
  - Adjustments (angle, pressure, boom length)



## PRODUCT-INDEPENDENT TRAINING COURSES

# 6 PRODUCT-INDEPENDENT TRAINING COURSES

## 6.1 PRODUCT TRAINING

**Number of participants:**

- Min. 3 and max. 8 participants

**Duration:**

- 1 day

**Location:**

- Training Center Düsseldorf, Germany
- On site

In this training course, the entire Konecranes Port Solutions product range is presented to the training participants and they are taught basic technical knowledge. There is a particular focus on Konecranes® Gottwald products.

Besides a general overview, the main features and special technical characteristics of the respective products are described in this training course. The training includes a theoretical part in the classroom and concludes with a factory tour or a product inspection.

The target group is all team members who would like to improve their product knowledge. The training course is mainly suitable for employees without basic technical knowledge and for new team members who are coming into contact with our products for the first time.

We also gladly organize this course specifically for women only.

**Seminar contents:**

- Presentation of the company
- Konecranes Port Solutions product overview
- Product overview in detail
  - Mobile harbour crane (HxK)
  - Automated guided vehicle (AGV)
  - Automated stacking crane (ASC)
- Optional: factory tour

## PRODUCT-INDEPENDENT TRAINING COURSES

### 6.2 SIMATIC S7 BASIC TRAINING

**Number of participants:**

- Min. 3 and max. 6 participants

**Duration:**

- 5 days

**Location:**

- Training Center Düsseldorf, Germany

Trainees are taught the relevant knowledge about Siemens S7 PLC Systems, the hardware set-up and the programming languages. The participants work with the belt model and can start to develop their own programming solutions. Hands-on training enables the trainees to learn practical fault diagnosis skills and remedies.

**Seminar contents:**

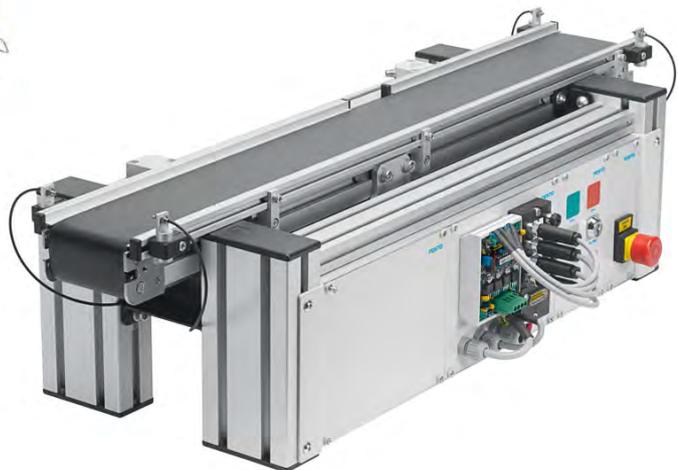
- Belt model
  - (hands-on)
- Programmable logic controller (PLC)
  - Fundamentals of programmable logic controller (PLC)
  - Memory areas
  - Program cycle
  - Block types
  - Data types
  - Addressing
- Programming the PLC
  - Programming languages
  - Statement list (STL)
  - Function block diagram (FBD)
  - Ladder diagram (LAD)
  - Digital and analogue instructions
- PLC hardware
  - Central device S7 300/S7 400 (CPU)
  - Decentralised periphery (ET 200 station)
  - Hardware configuration
  - PROFIBUS connection

*Continued on next page*

**PRODUCT-INDEPENDENT TRAINING COURSES**

*Continued from “SIMATIC S7 basic training“ course programme*

- SIMATIC manager
  - General set-up
  - User interface and operation
  - Applications
  - Creating logic blocks
  - Multiple instances in the variable declaration
  - Entering and editing addresses and parameters
  - Editing FBD and STL elements
  - Establishing online connections
  - Download/upload
  - Deleting on the programmable controller
  - Compressing the user memory
  - Managing multilingual texts
- Simulation tool
  - SIMATIC S/-PLCSIM



## PRODUCT-INDEPENDENT TRAINING COURSES

### 6.3 SIMOREG DRIVE TRAINING

**Requirements:**

- Qualification as an electrician

**Number of participants per course:**

- Min. 3 and max. 6 participants

**Duration:**

- 3 days

**Location:**

- Training Center Düsseldorf, Germany

In a combination of SIMOREG and SIMOVERT drive training, the training duration will be shortened from 6 to 5 days.

**Seminar contents:**

- Download & upload with the drive monitor software
  - User interface
  - Download
  - Upload
  - Compare
- Separately excited DC motor
  - Set-up
  - Function
  - Characteristics
  - Feedback control
  - Function diagrams
- Set-up of Siemens SIMOREG 6RA70
  - Function diagrams
  - Parameter types
  - Parameter management
  - Trace function

*Continued on next page*

## PRODUCT-INDEPENDENT TRAINING COURSES

*Continued from “SIMOREG Drive training“ course programme*

- Processing different tasks
  - In the SIMOREG workshop
- Commissioning instructions
- Troubleshooting
  - Fixing problems from the SIMOREG workshop
- Answering open questions
- Written check of learning targets to conclude the training course



## PRODUCT-INDEPENDENT TRAINING COURSES

### 6.4 SIMOVERT DRIVE TRAINING

**Requirements:**

- Qualification as an electrician

**Number of participants per course:**

- Min. 3 and max. 6 participants

**Duration:**

- 3 days

**Location:**

- Training Center Düsseldorf, Germany

In a combination of SIMOREG and SIMOVERT drive training, the training duration will be shortened from 6 to 5 days.

**Seminar contents:**

- Download & upload with the drive monitor software
  - User interface
  - Download
  - Upload
  - Compare
- Squirrel cage motor
  - Set-up
  - Function
  - Characteristics
  - Feedback control
  - Function diagrams
- Set-up of the Siemens SIMOVERT and the CUVC
  - Function diagrams
  - Parameter types
  - Parameter management
  - Trace function

*Continued on next page*

**PRODUCT-INDEPENDENT TRAINING COURSES**

*Continued from “SIMOVERT Drive training“ course programme*

- Processing different tasks
  - in the SIMOVERT workshop
- Commissioning instructions
- Troubleshooting
  - Fixing problems from the SIMOVERT workshop
- Answering open questions
- Written check of learning targets to conclude the training course



## PRODUCT-INDEPENDENT TRAINING COURSES

### 6.5 SINAMICS DRIVE TRAINING

**Requirements:**

- Qualification as an electrician

**Number of participants per course:**

- Min. 3 and max. 6 participants

**Duration:**

- 3 days

**Location:**

- Training Center Düsseldorf, Germany



In a combination of SINAMICS and SINAMICS DCM drive training, the training duration will be shortened from 6 to 5 days.

**Seminar contents:**

- Basics of drive technology
  - Squirrel cage motor
  - U/F control
  - Vector control
  - PROFIBUS/STARTER communication
- Set-up of Siemens SINAMICS system
  - Hardware components
  - Function diagrams
  - Parameter types
  - Parameter management
- Using the STARTER software
  - User interface
  - Online/offline
  - BICO links
  - Setting the value channel
  - Download/Upload
  - Compare
  - Faults and warnings
  - Trace function
- Processing different tasks
  - At the SINAMICS workshop
- Commissioning instructions
- Troubleshooting
  - Fixing problems from the SINAMICS workshop
- Answering open questions
- Written check of learning targets to conclude the training course

## PRODUCT-INDEPENDENT TRAINING COURSES

### 6.6 SINAMICS DCM DRIVE TRAINING

**Requirements:**

- Qualification as an electrician

**Number of participants per course:**

- Min. 3 and max. 6 participants

**Duration:**

- 3 days

**Location:**

- Training Center Düsseldorf, Germany



In a combination of SINAMICS and SINAMICS DCM drive training, the training duration will be shortened from 6 to 5 days.

**Seminar contents:**

- Separately excited DC motor
  - Function
  - Characteristics
  - Feedback control
  - Function diagrams
- Set-up of the Siemens SINAMICS DCM System
  - Hardware components
  - Function diagrams
  - Parameter types
  - Parameter management
- Using the STARTER software
  - User interface
  - Online/offline
  - BICO links
  - Setting the value channel
  - Download/Upload
  - Compare
  - Faults and warnings
  - Trace function
- Processing different tasks
  - At the SINAMICS DCM Workshop
- Commissioning instructions
- Troubleshooting
  - Fixing problems from the SINAMICS workshop
- Answering open questions
- Written check of learning targets to conclude the training course





Konecranes is a world-leading group of Lifting Businesses™, serving a broad range of customers, including manufacturing and process industries, shipyards, ports and terminals. Konecranes provides productivity enhancing lifting solutions as well as services for lifting equipment of all makes. The Group has 18,000 employees at 600 locations in 50 countries. Konecranes is listed on Nasdaq Helsinki (symbol: KCR).

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