



## Lucas-Nülle at a glance



EXCELLENCE IN  
TECHNOLOGY &  
TRAINING SOLUTIONS

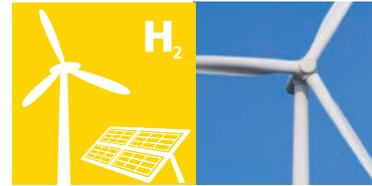
  
MADE IN GERMANY



**Building Management**  
Electrical Wiring, Smart Home



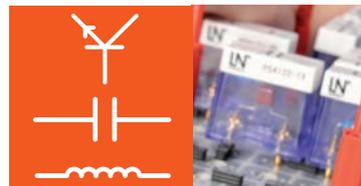
**Electrical Power Engineering**  
Smart Grids



**Renewable Energies**



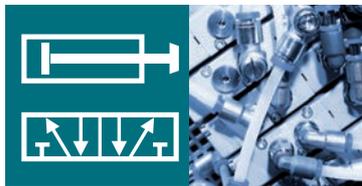
**Drive Technology**  
Electric Machines & Power Electronics



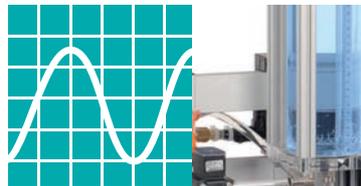
**Basics of Electrical Engineering**  
EloTrain Plug-In System



**Communication Technology**  
Cyber Security



**Fluid Power**  
Pneumatics / Hydraulics



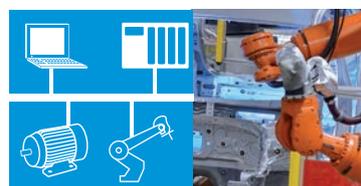
**Process Control**



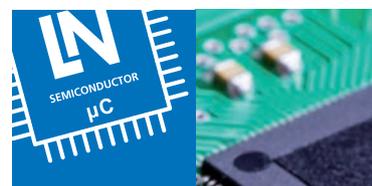
**Instrumentation**



**HVAC**



**Automation Technology**  
Smart Factory, Robotics, Industry 4.0



**Microcomputers**  
Microcontrollers, IoT



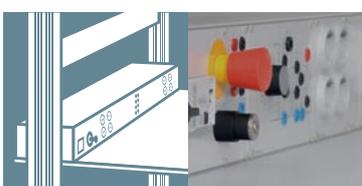
**Automotive Technology**  
Diagnosis, Hybrid and Electric Vehicles



**Machinery and Systems Engineering**



**Process and Chemical Engineering**



**Laboratory Infrastructure**  
SybaLab



**Vocanto**  
E-Learning



**UniTrain**



## Working closely with industry and educational experts,

we have developed training systems that keep pace with modern technology. Our strengths are skilled training methods combined with technical implementation for the instructor and learner. This strategy has proven to produce successful learning outcomes.

Lucas-Nuelle is the worldwide market leader in the field of technical training systems as demonstrated by our decades of experience and successfully completed projects in more than 100 countries.



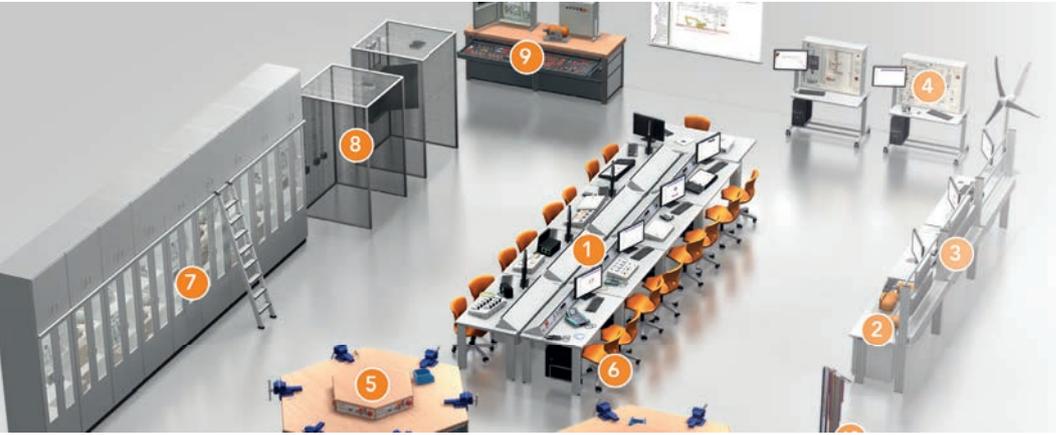
## High Quality



  
MADE IN GERMANY

# 1 Individual Consulting

Project Planning  
Curriculum Strategy



## 2 Facility Planning

3D Model

## 3 Installation



## 4 Training

Train the Trainer  
Advanced Training  
Technical Instruction

## 5 After-Sales Service





# Complete laboratories for a range of technical areas

## Interactive learning software

Labsoft: the learning environment  
VOCANTO: Cloud learning

## Workshop equipment

Custom-designed equipment and infrastructure

## Learning factory 4.0

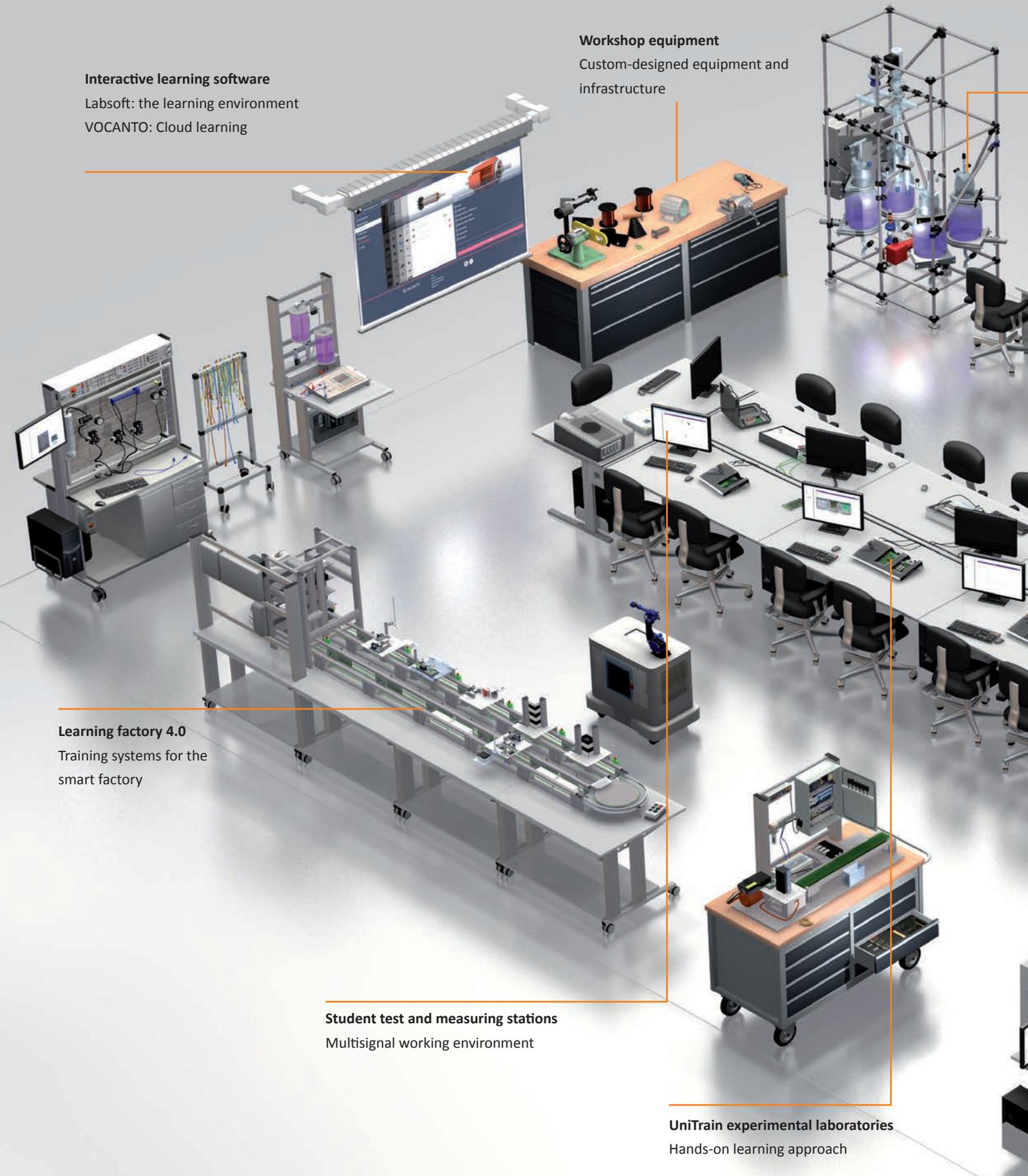
Training systems for the smart factory

## Student test and measuring stations

Multisignal working environment

## UniTrain experimental laboratories

Hands-on learning approach



# More than just a training system

## Modular training systems

Individual test set-ups for a range  
of technical areas



## Real-life application

Authentic training in a safe  
environment

# Let's get practical

**EXPERIMENT. LEARN. UNDERSTAND.**

Theory is only properly understood when applied in practice. This is why we take a hands-on learning approach. The degree of practical implementation increases depending on the system. This creates a positive teaching experience and allows students to engage in the learning process.

UniTrain



Modular training systems





# Interactive software

**ALL DIGITAL LEARNING CONTENT IS BASED ON OUR WELL-PLANNED TEACHING METHOD.**

More than just hardware: interactive software is an essential part of all our systems. The digital courses contain animation, virtual instruments and experiments – which motivate learning with hands-on activities and procedures.



# Building Systems Management



## Installation technology, smart home

Modern installation technology demands modern training systems. Smart home and energy efficiency are just two areas where professionals are facing ongoing and rapid change. Developments that tomorrow's technicians will be facing.

### Topics:

- Industrial installation technology
- Safety measures
- Building communications
- Hazard alarm and access control
- Building automation: smart home





# HVAC

## From basic to complex applications

Improved energy efficiency, new plant designs and refrigerants, complex regulations or customer-specific solutions: refrigeration and air-conditioning technology face many challenges.

Our systems explain the whole specialist area from basic thermodynamics to complex refrigeration applications in order to equip engineers and technicians with the knowledge they need.

### Topics:

- Thermodynamics
- Refrigeration processes
- Industrial refrigeration technology
- Split-climate systems with heat pump function
- Assembly of refrigeration technology modules





# Electrical Power Engineering

## Smart grids and microgrids

Energy is one of the most important topics of our time and electrical energy is growing in importance. Qualified technicians and engineers are in high demand worldwide to implement the necessary developments. Our systems cover the whole topic, right through to controls for smart grids and microgrids.

### Topics:

- Energy generators and consumption
- Energy transmission and distribution
- Protection for energy equipment and plants
- Energy management in smart grids and microgrids (SCADA)
- Cyber security





# Renewable Energies

## Wind, photovoltaics, fuel cells

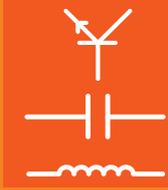
The transition to renewable energies is underway. Wind and photovoltaics now make a significant contribution to covering energy demand.

The technologies behind these developments are innovative. Our systems provide the means to meet the new expectations placed on energy engineers and technicians.

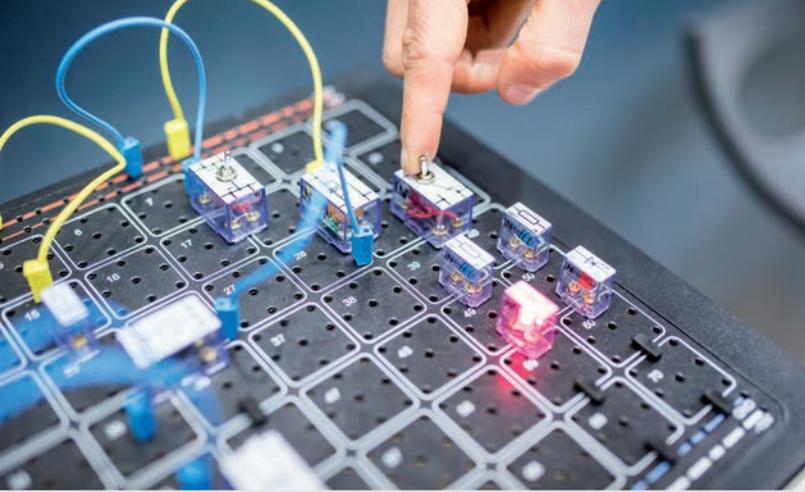
### Topics:

- Renewable energy generation
- Wind, photovoltaic and fuel cell technology
- Energy storage
- Single-phase and three-phase systems
- Integration of smart grids and microgrids





# The Basics of Electrical Engineering



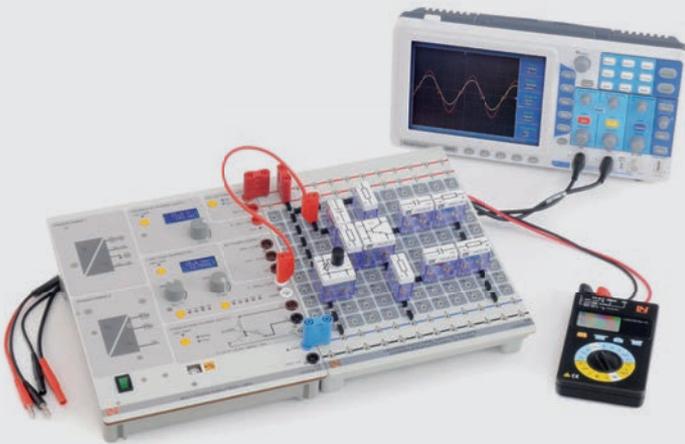
## The EloTrain Plug-In System

EloTrain provides a learning environment for students to safely experiment with the basic elements of electric circuit design. This covers fundamental topics of electrical engineering as well as theory.

The system uses extra-low voltage, making it safe and suitable for complete beginners. Experimental learning makes the connection between theory and practice. The user takes the first step towards acquiring competence.

### Advantages:

- Competence gained through self-paced experimentation
- Student protection using extra-low voltage
- Proven plug-in systems for 2mm (UniTrain) and 4mm (multi-power supply)
- Basic experiments
- Reconfigurable system





## Electric Machines and Power Electronics

Many machines involve drive systems. Therefore, Drive Technology is closely interconnected with other specialist fields and is continually involved with technical innovation. This also means ever new demands on technicians and engineers. Our training equipment tackles this topic from the basics through to modern application scenarios.

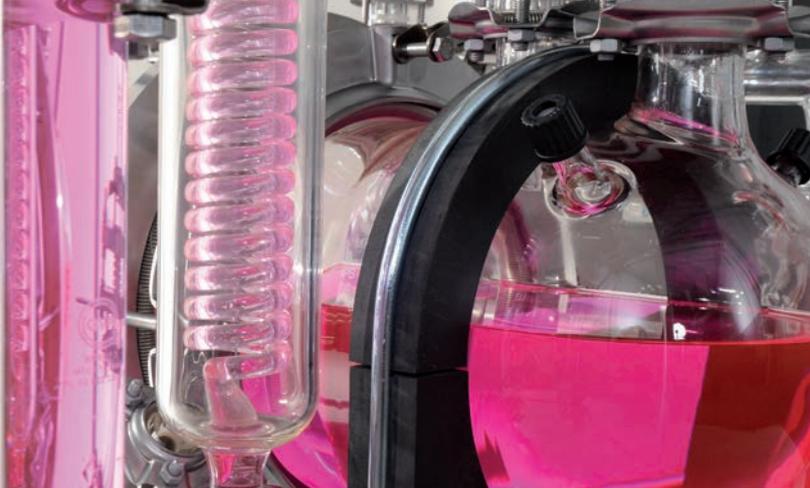
### Topics:

- Frequency controllers
- Single-phase and three-phase transformers
- Active load for machine testing
- Matlab Simulink: design a drive controller
- Complete laboratory solution for electrical machines





# Process and Chemical Engineering



## Plants in the process industry

Our LN Process trainers are designed to be compact and hands-on. They impress with their easy-to-understand presentation and explanation of the complex technical issues in the process industry. Setup of experiments can be performed quickly and effectively. The systems are almost completely made of glass, meaning the processes can be clearly observed. The result is a better understanding of the experiment.

### Topics:

- Distillation, extraction, reaction, gas processes
- Industrial process design
- Batch and continuous processes
- Application of an industrial process control system
- Influence of process parameters on process efficiency





## Measure, compare and control

In Industry 4.0 (smart factory), production is closely connected with the most up-to-date communications technology. It is based on monitoring the process status using sensors and the automatic control of process variables. Knowledge of sensor technology is important for all who come into contact with automation systems – including mechatronics technicians and engineers.

### Topics:

- Sensor technology: measuring electrical and non-electrical parameters
- Modern servo technology
- Applied control technology
- Controller types (such as three-point or PID)
- Matlab Simulink: design and program control systems





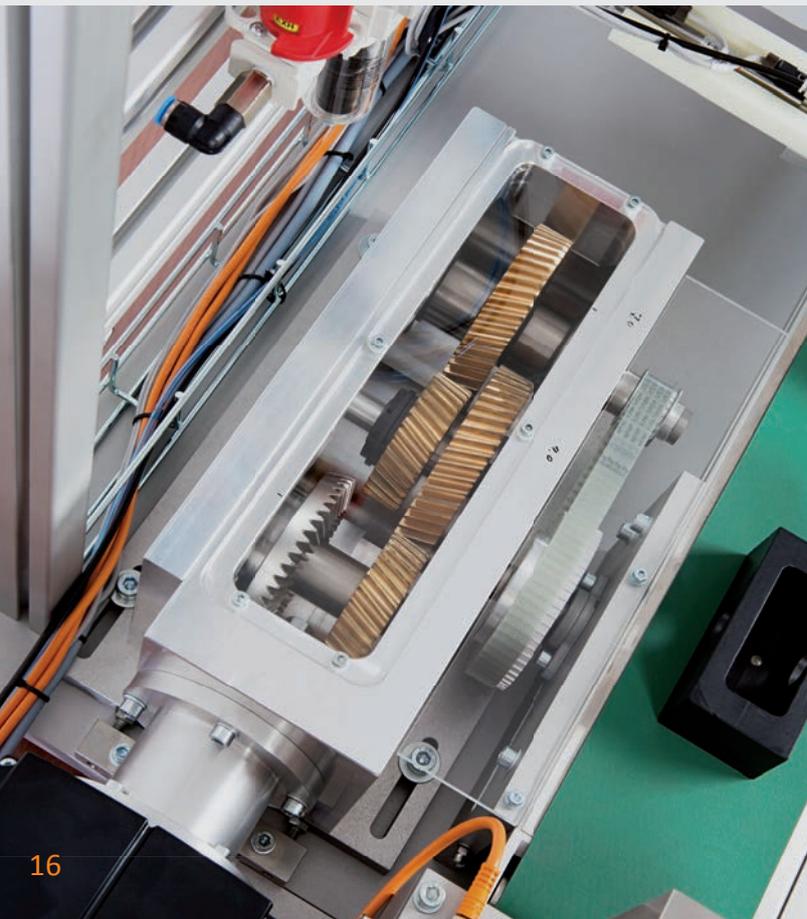
# Machinery and Systems Engineering

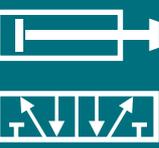
## Mechatronics technology

In modern industry, all machines are digitally networked. Electrical engineering is becoming increasingly significant in traditional metalworking professions. Our training systems address traditional gearing, controls and production engineering. They explain the subject area, also within the context of smart factories.

### Topics:

- Basics of gearing engineering
- Modular conveyor belt technology
- Projects out of the industrial practice
- CNC Trainer: programming and operation
- Computer-integrated manufacturing (CIM)





# Fluid Power

## Pneumatics / Hydraulics

Engineers and technicians who have experience with real pneumatic and hydraulic components are in high demand for installation and maintenance of industrial manufacturing plants. Our training systems were jointly developed with Bosch Rexroth and Aventics and provide a real-life working environment.

### Topics:

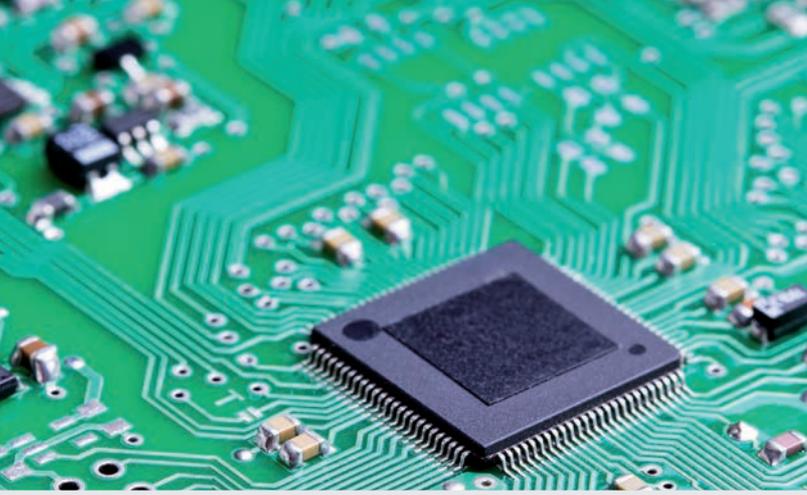
- Pneumatics and electropneumatics
- Hydraulics and electrohydraulics
- Interactive electrical circuit diagrams
- Industrial applications
- Automation studio: professional software



Strong Partners



# Microcomputers

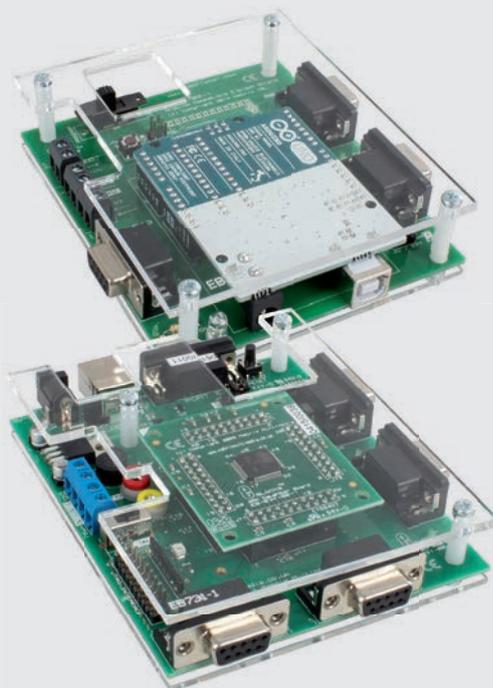
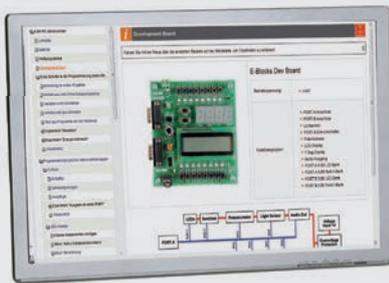


## Microcontrollers. FPGA. Microprocessors.

Intelligent systems need microcomputers. Nowadays, they are no longer exclusively operated by programmers. Using UniTrain, our complete package solution can teach various programming languages and hardware architectures in a common and easy-to-understand format.

### Topics:

- Programming languages (including UML and VHDL)
- Hardware architecture from 8 bit to 32 bit
- Controlling cyber-physical systems (CPS)
- Programming the Internet of Things (IoT)
- Basics of computer technology





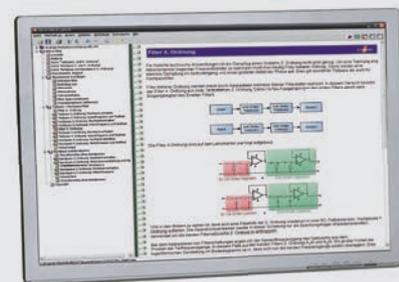
# Communication Technology

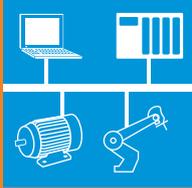
## With cyber security

The modern world of telecommunication is the foundation for networks and therefore also digitalization. Topics like cyber security and digital signal processing are growing in significance. Our built-in virtual instruments, exceeding 120 in number, offer both wired and wireless solutions.

### Topics:

- Transmission and receiver technology
- Modulation and multiplexing
- Digital signal processing
- Network technology and cyber security
- Radar technology





# Automation Technology



## Industrial bus systems and robotics

Automation technology is becoming more important due to rapid changes in industrial process automation. Developments are closely linked with those in the drive technology and computer technology sectors. Keeping up to date with these developments is a key challenge in education.

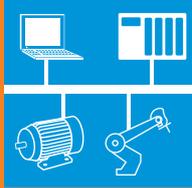
### Topics:

- Programmable logic devices
- System models & process simulators
- Safety engineering in automation technology
- Robotics / collaborative robots
- Industrial process automation (IPA)





# Smart Factory



## Industry 4.0

Industry 4.0 stands out for its adaptability and resource efficiency. That includes versatile production, the use of networked systems and the bundling of all information in one CPS. Smart Factories are based on an ERP system that works in the Cloud. Our training systems cover all these topics and offer a complete “Learning Factory 4.0” from a single source.

### Topics:

- Customer-specific production
- Production via the Internet (CPS)
- Unique ERP training software
- Cyber security
- Web shop: from order entry to shipping



Components from strong partners

**KUKA**

**Lenze**

**MIR**  
MIRA 2 INDUSTRIAL ROBOT

**PHOENIX CONTACT**

**Rexroth**  
Bosch Group

**SICK**  
Sensor Intelligence.

**SIEMENS**

**SMC**

**TURCK**

**UNIVERSAL ROBOTS**



# Automotive Technology



## Extensive diagnostics capabilities

Vehicles are becoming increasingly complex. Diagnosis is becoming increasingly challenging to automotive technicians, especially in the field of electronics. We are countering this development using training method concepts that combine interactive theory with diagnostics based on real-life practice. Our systems assist in providing full and comprehensive training in automotive technology.

### Topics:

- Petrol and diesel engines
- Engine management
- Networked systems (CAN, LIN, MOST)
- Safety and comfort
- Diagnostics and maintenance





# Hybrid and Electric Vehicles

## High-voltage technology

Electric vehicles are becoming increasingly popular and bring about innovation in automotive technology. The next generation of qualified vehicle technicians must be trained in safety when working with HV systems. Our newly developed training systems for hybrid and electric vehicles set new standards in terms of safety, functionality and usability.

### Topics:

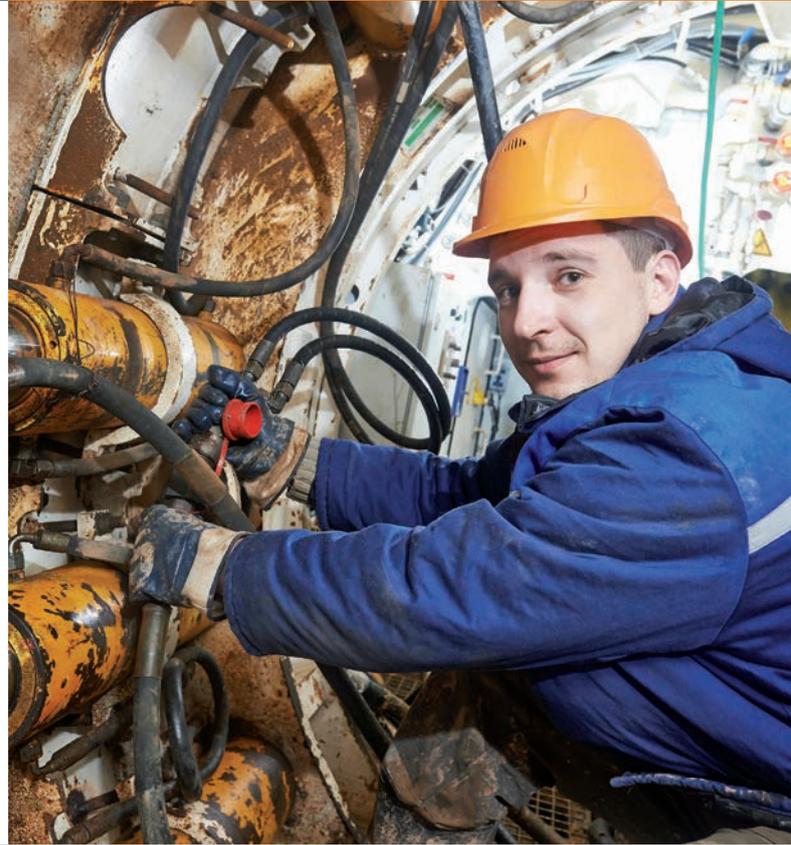
- Basics of hybrid and electric vehicles
- Hybrid drive and fuel cells
- Work safely with high-voltage batteries
- HV system diagnostics training
- Handling damaged HV vehicles





## A range of cross-platform technology

A mining project requires extensive planning. The geology of the site and the safety of the workers are just two aspects to be considered. Prospective technicians and engineers must be trained in all the disciplines that are important for tomorrow's miners. A broad understanding of technology is vital in order to become familiar with both new and older systems and the more complex equipment. Our training systems are based on experience in many technical fields and provide the ideal basis for future miners.



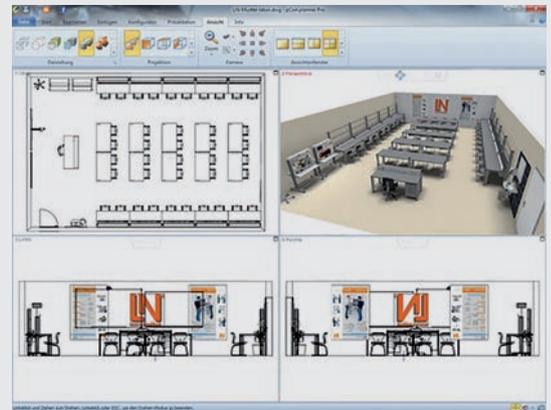


## Your customized laboratory solution

Innovative, easy-to-use and flexible laboratories for professional training – this is what SybaLab offers. Our modern equipment is resistant to chemicals and heavy loads. At the same time, our laboratory designs offer attractive and functional solutions for a broad range of applications.

### Advantages:

- Mobile workshop systems and laboratory furniture
- Storage and cabinet systems
- Safe power supply solutions
- Detailed 3D room planning
- Complete laboratories from a single provider





# UniTrain

## Multimedia desktop lab

Through continuous development, the UniTrain delivery system has become the most widely used and versatile teaching system for prospective electrical engineers and technicians. It offers a complete laboratory with more than 120 measuring devices and sources in one unit. Available in multiple languages.

### Advantages:

- Competence through experiment-based learning
- Flexible application in a wide range of technical areas
- Theoretical content with hands-on application
- Supports individual learning
- Safety through extra-low voltages





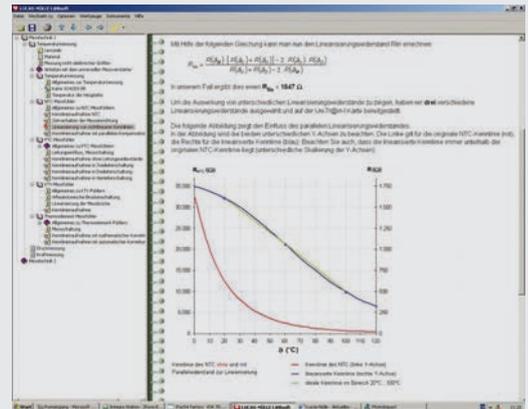
# LabSoft

## Learning environment and Classroom Manager

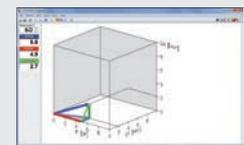
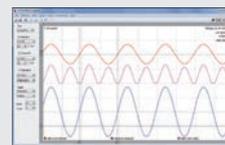
LabSoft is a comfortable learning environment with simple user-interface menu navigation. This allows quick access to all learning content. Control of Lucas-Nülle hardware is also supported by LabSoft with its integrated virtual instrumentation. Also available: the LabSoft Classroom Manager Suite, useful software set for lesson planning.

### Advantages:

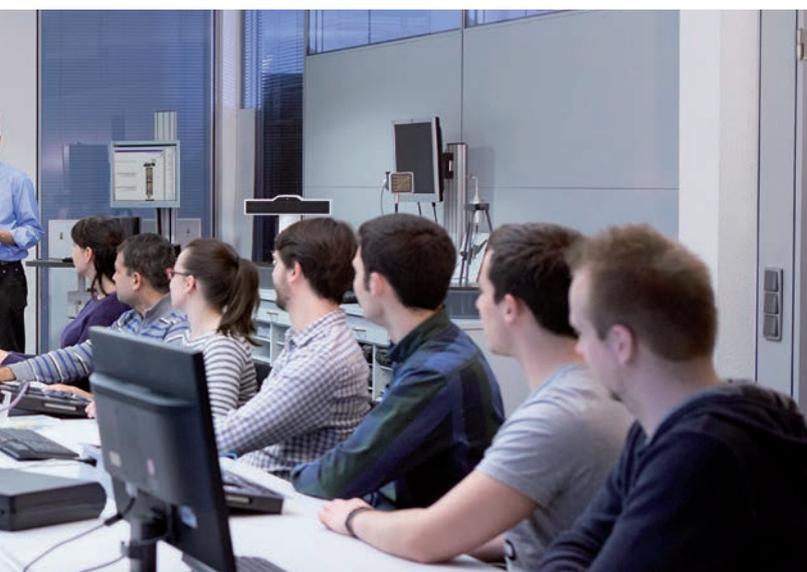
- Simple navigation to course content
- Over 100 different virtual instruments
- Results stored on user-by-user basis
- Installs locally, on a network or with an LMS
- Optional advanced Classroom Manager suite



Virtual instruments



Classroom Manager



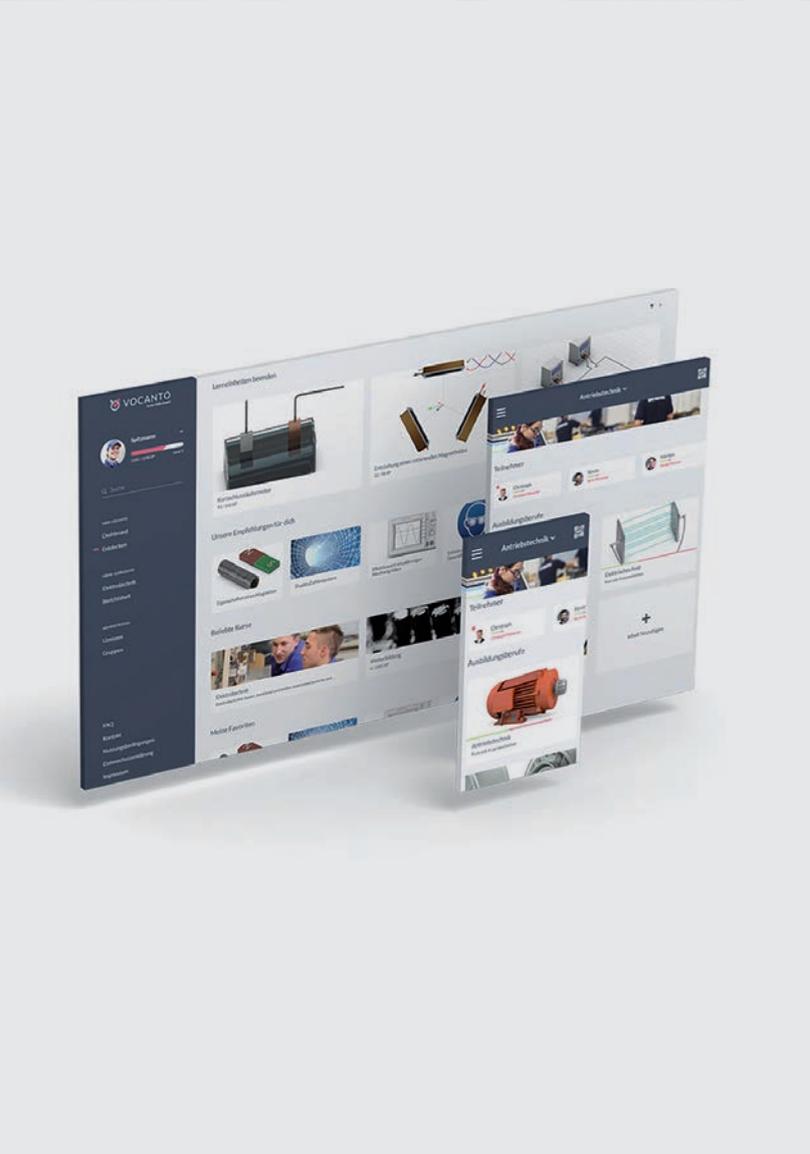


## Cloud-based learning

Learning has been made fun and exciting. VOCANTO is an online cloud-based e-Learning platform. Learning can now be anytime, anywhere and on any Internet-connected device. VOCANTO is more than just learning. VOCANTO is a learning management system for preparing students for examinations. The VOCANTO e-Learning platform incorporates the latest graphic standards and is pioneering in virtual reality learning.

### Advantages:

- Learning platform for vocational education
- Cloud-based, independent of end-device
- Effective learning wherever you are
- The perfect preparation for examinations
- New graphic standards in E-Learning



Finden und wählen Sie die einzelnen Bestandteile des Ständers nacheinander aus.

- 1 Gehäuse
- 2 Ständerwicklung
- 3 Ständerblechpaket
- 4 Klemmkasten





LEARN  
WHENEVER  
YOU  
WANT



LEARN  
WHEREVER  
YOU WANT

Experimenting. Learning. Understanding.

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