Concepts and solutions for practically based technical education
On the following pages we will offer you a quick look at our product range.
For professional training in particular, the learning process needs to teach trainees actual practical skills. This works best when young people are having fun learning. Lucas-Nülle’s realistic training systems are making a major contribution to this educational revolution.

Now we are taking this another step further. With VOCANTO – the new, interactive learning platform – technical animations and simulations can even be loaded direct to your own smartphone. In a digitally interconnected world, the step towards mobile learning is one that seems natural and obvious.

Visit the Lucas-Nülle exhibition stand, put on a set of virtual reality goggles and find out about the future of learning.
Multimedia Courses for Education

Every Lucas-Nülle training system is accompanied by an educationally designed training course. The digital courses guide trainees through a subject step by step. They can learn the various skills at their own pace.

Already there are courses available in more than 40 languages. This wide range of languages helps, for example, to integrate refugees into lessons.

A host of 3D animations and graphics make even complex functions of a system understandable.
LEARN WHATEVER YOU WANT.

WINNER OF E-LEARNING AWARD 2017
The cloud-based implementation of professional knowledge in VOCANTO® is something entirely new. It allows trainees to learn far more easily. Short learning units can be loaded to a smartphone any time and anywhere. Moreover, teachers and instructors can have a summary of each trainee’s learning progress. Even learning theory can be fun.
The New Way to Learn

Technical training manuals are a thing of the past: In the form of VOCANTO, Lucas-Nülle now offers cloud-based learning software with which trainees can learn any time, anywhere on their own smartphones. Initial feedback indicates that VOCANTO is not simply learning, but also gaming for education, yet always within a framework curriculum.

VOCANTO is a software solution for learning for trainees, instructors and teachers who appreciate effective teaching methods. The platform is organised around a framework curriculum and offers learning units for all areas of study. As soon as you have registered, the VOCANTO library puts all the teaching content at your disposal, just like a reference manual. The learning units all include multiple-choice tests and are studded with high-quality 3D animations which vividly illustrate technical interactions – better than any textbook could.

Training instructors or teachers have the opportunity to set up their classes in working groups and allocate learning units to them as needed. This means they can always keep a check on the students’ learning progress. The class members’ results, any areas of difficulty and individual assessments for each student are displayed in real time. This ensures that time can be saved in the process of lesson preparation.
LEARN WHEREVER YOU WANT.

The facts:

- A learning platform with technical instruction, educational games and 3D animations
- Available on the web and as an app
- Direct from the cloud – server-independent
- Effective learning wherever you are
- Class tools for teachers
- Results and assessments from wherever students are learning
- No time limits
- For automotive technology and electrical engineering
Smart Factories
Smart Factories

Smart factories represent the thrust of digitalisation in industry. Future smart factories will be characterised by adaptability, resource-efficiency, ergonomic design and integration of customers and business partners into the company and value adding processes. The technical prerequisites for this will be intelligent, digitally interconnected systems helping to establish largely self-determining production lines. This is not only a challenge for industry itself but also for the training of qualified technicians and engineers.

With our training systems you can teach the underlying principles along with the technical possibilities of smart factories.

Training contents:

- Customer-specific manufacture (coding) down to single-item batches
- Interconnection of manufacture via the internet using web interfaces
- Virtual project planning for plant using 3D simulation
- Energy-efficient and time-efficient working
- Compliance with regulations and safety of machinery
Four different communications protocols form the interfaces between you in the field and our ERP software. Via such interfaces data from a production facility can be uploaded to the cloud.

**Benefits:**
- Connection to the cloud
- Web shop
Robotics

Robots already play a key role in highly automated and efficient production processes. The KR6 R900 sixx industrial robot from Kuka offers you the perfect introduction to the programming of industrial robots and to the project planning they require. In combination with our multimedia course, the introduction to robot programming is entirely simple.

Benefits:

- Multimedia course with theory, experiment instructions and projects
- All the theory you need for understanding multiple-axis robots
- Many projects for 6-axis robots, even in conjunction with industrial PLC systems
- Interconnection of robots with control systems
Smart Homes

The requirements for modern buildings and wiring installations are demanding. They need to provide the maximum energy-efficiency, flexibility and optimum comfort. The solution to this is the development of smart homes.

In a smart home, the wiring installation and all the appliances it supports in the building are connected and centrally controlled. Open and closed-loop control systems govern the lighting, heating, blinds, alarm systems etc. via bus systems by means of controllers, ballasts and sensors to ensure that all the building’s systems, inside or outside, are operated as and when they are needed, whether you are at home or at work. Operation is via conventional controls or via control panels, tablet computers and smartphones.

With the new Lucas-Nülle smart home training system, a complete smart home project for a typical residence can be implemented.
The training project is made up of the following sub-projects:

• Control board with central controller and basic lighting functions allowing you to set up a smart home network
• Lights controlled by external conditions
• Closed-loop heating control
• Security monitoring when you are not at home

Apart from including the Lucas-Nülle training software which teaches the basic knowledge needed, the smart home system can also be set up or controlled using its own app.

Training contents:

• Configuration and parameter setting of a smart home network with a Z-Wave central controller (which can be extended with ZigBee, KNX and other products)
• Operation of smart home systems as needed
• Control of lights, shutters and blinds plus heating
• Scenario control
• Security monitoring when you are not at home
• Analysis and visual display via PC, tablet computer or smartphone
Power Engineering
Investigation of battery storage in photovoltaic power supply systems

This is the training system with which the technicians of the future will learn how to improve consumption and reduce electricity costs. In the course of time, such knowledge will set us free from electricity supply companies and their price increases.

**Training contents:**

- Set-up and installation of a battery storage system
- Configuration of storage system
- Interaction between photovoltaic system and storage unit
- Improvement of consumption with the help of the storage system
- Remote control of storage system by means of SCADA software
- Optimisation of operating response by means of smart consumers
- Integration of storage system into a smart grid
New techniques are being introduced to equip the electricity supply network better for the future. More flexible management of the network should make the increasing number of renewable energy sources compatible with the conventional power station infrastructure. The variety and large numbers of these non-centralised power generation facilities requires electricity grids to be managed in a new way, as an intelligent network – a smart grid.

Training contents:

- Smart grid training system
- Energy management
- Energy generation
- Regenerative energy generation
- Power distribution
- High-voltage transmission lines
- Protective systems
Smart Microgrids

Stand-alone power networks are systems which are self-contained and not linked by interconnections to other parts of the electricity supply. A stand-alone network is notably smaller than a linked grid and does not usually involve any high-voltage transmission lines. There are two ways to operate such a network, fully stand-alone or in parallel with the main grid. This model is often used for the industrial power supply systems of large companies. If such stand-alone networks are linked to a smart grid, they are called microgrids. Microgrids will come to play a major role in the smart grids of the future.

Training contents:

- Principles of stand-alone networks
- Control of a generator in a stand-alone network
- Coordination of energy consumption and generation in a stand-alone network
- Use of modern information technology, such as networks sensors and actuators, programmable logic control and a SCADA user interface
- Smart metering for a balancing node to make a sub-network autonomous
Automotive Technology
Driving Simulators for Electric Vehicles

This training system makes it possible to simulate and investigate a wide range of driving situations for an electric vehicle. In addition to the drive train formed by the motors and inverter, all other parameters such as rolling resistance, drag coefficient and vehicle weight can also be taken into account with the aid of the servo-machine test bench.

Training contents:

- Drive systems in electric vehicles
- Investigation of power flows under real driving conditions
- Effect of driving style on range of electric vehicles
- Energy regeneration
Modular Engine Management System

This is a particularly flexible training system. By interchanging various components it is possible to implement various fuel injection systems including a diesel injection system. Parameters can also be adapted within the arbitrarily programmable engine management controller. This means trainees can learn all about programming of controllers and carry out the work themselves. In future there will also be other enhancements available for the modular engine management system.

Benefits:

- One engine management controller – multiple engine management systems
- Readable fault memory via OBD connector
- Built-in all-in-one measuring instrument
- Modular design of an entire engine management system
- Measurement of signal traces
- Multimedia course for optimising successful learning
CarTrain Diagnostics & Repair of High-Voltage Batteries

This training system focuses on the digitally interconnected CAN-bus battery management system for the traction battery and its components. Its special feature is that it provides training in the measurement and testing of function for high-voltage components under power. Trainees can measure, diagnose and replace individual battery cells while they are powered up. The high-voltage battery is designed in such a way that it can be dismantled in order to replace individual cells and sensors. This means that students can be trained in how to repair high-voltage batteries.

Training contents:

- Design and function of battery cells, temperature sensors and high-voltage charging systems
- Fault memory read-out
- Identifying possibilities for diagnostics and repairs
- IPO model
- Interaction between sensors and actuators
The basic idea of HELLER’s CNC Profi Trainer is to teach the building and manufacture of machines by actually building and making one. It conveys all the skills, procedures and interactions from development of the product to manufacture and assembly and right down to delivering the final product with the help of a real machine.

**Benefits:**

- Genuine milling with full configuration of machine
- Original industrial components
- Realistic emulation of reality with a true-to-life model
- The machine can stand up to operating errors
- Safe, reduced-risk operation
- Non-static mobile unit
- Miniature format encourages experimenting
Gearing Training System

In the era of smart factories, work benches in factories will be fully automated. This training system lets trainees and students do practical basic training on a geared conveyor belt. The work bench drawers are fully stocked and every tool needed is ready to hand.

Training contents:

- Understanding how spur and bevel gear systems function
- Self-assembly of a gearing system
- Control of double-acting cylinders
- Training in how a gear system is connected to a complex conveyor module
- Understanding technical documentation with LOGO! 8 logic module
- All necessary tools are supplied with the bench
Cyber-Physical Systems Training System

Smart factories are based on the interaction between actuators and sensors, how they are connected to the internet, and processing of all the information by a CPS (cyber-physical system) platform. With the help of this CPS training system, technicians of tomorrow can build microcontroller systems into a full-scale cyber-physical set-up, program it and use interfaces to link it to the cloud and the CPS platform. The CPS training system can obviously also be incorporated into any smart factory system.

Benefits:

- Complete CPS
- Links a microcontroller to a conveyor belt and sensors
- Can be incorporated into a smart factory system
- Programming using graphic programming language Flow Code
- Processing of analog and digital input and output signals
- Ethernet built in
Two-Tank System

Measurement and control of level and flow rates covers a wide area of process control engineering. The two-tank training system enables a large number of different applications to be modelled, starting with a simple level monitoring system and extending to a complex coupled tank system. Apart from sensing levels in both tanks, the system can also measure flow rates.

Benefits:

- Two separate tanks which can be filled to a height of 50 cm
- Measurement of filling level via differential pressure sensors
- Two diaphragm pumps with built-in power amplifiers
- Flow measurement for both tanks
- Adjustable outlets for each tank
- Tanks are coupled via an electronic valve
- Switchable overflow between tanks
UniTrain – The Desktop Lab

UniTrain is the best-known multimedia training system for technical education from Lucas-Nülle. UniTrain revolutionizes the familiar student-teacher interaction and opens up new possibilities for laboratories and their management. The system offers 6-channel high-tech measuring instrumentation combined with WiFi. Measurements can be shared with the class or with the whole world. This means UniTrain provides unique experiment access for learning management systems.
Benefits:

- Timeless design
- 130 training programmes for all disciplines
- Quicker measurement inputs (100 megasample sampling rate)
- Four additional measurement inputs, including 2 for measuring current
- New power supply
- WiFi interface
- Safe experimenting thanks to safety extra-low voltage
- Suitable for training panel frames
- Administration using Classroom Manager
UniTrain Multimédia courses for electrical machines use previously prepared experiments and animations to show the whole world of electrical machines. The motors are distinguished by their open, freely accessible stators. They are constructed on experiment cards and therefore allow an in-depth look at the internal design of such machines. The open design also allows for quick replacement of rotors without the need for any tools.

Training contents:

- Teaches the fundamental aspects of electrical machines
- Open, accessible stators
- Design, commissioning, control and positioning of electrical drive motors
- Experiments on DC machines, asynchronous and synchronous machines and many more subjects
UniTrain
Classics and bestsellers

This is how we’re presenting the bestsellers at our exhibition stand

UniTrain Photovoltaics
UniTrain Digital Technology
and UniTrain Vehicle Sensors

THE CLASSIC – NOW EVEN BETTER
“Learning is experience.
Everything else is just information.”
Albert Einstein