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PRACTICE

Experimenting | Learning | Understanding



FOCUS

AUTOMOTIVE TECHNOLOGY

New training systems for companies and vocational schools

30 years of Lucas-Nülle GmbH

Training for the renewable energy sector

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Dear Readers,



The latest training figures from the German Federal Institute for Vocational Education and Training (BIBB) provide fresh evidence of the growing interest in automotive apprenticeships. According to the data, German companies signed over 20,000 new training agreements in 2007 for the job of automotive mechatronics technician alone. Demand for qualified employees in this area is also growing steadily worldwide.

We are convinced that this development will only be restrained temporarily by the present economic difficulties. In the long term, the demand for skilled labour in this sector will grow worldwide. That is why we invested heavily in this area in 2008 and will continue to pursue this strategy.

What we are experiencing at the present time is the collision of two major crises: the climate crisis and the financial crisis. Yet for all the problems of the current situation, it also presents a huge opportunity. Climate-protecting technologies are an excellent way of injecting new impetus into industry.

You don't have to be a visionary to realise that this represents a fantastic win-win situation for the environment as well as the economy. In any case, realists have long since understood that all societies will have to adapt if we want to leave a world worth living for future generations. Highly developed, climate-friendly technologies are the key.

That is why we are developing training systems for the renewable energy sector. Wind, solar, geothermal energy and fuel cells are resources that are sustainably and cost-effectively available virtually anywhere in the world. Environmentally friendly solutions are also becoming increasingly important for the automotive industry. Hence we are currently pressing ahead with the development of new training systems that also familiarise young people with technologies such as the hybrid drive and the fuel cell.

Many governments recognise the importance of climate protection and are investing heavily in environmental technologies, not just as a way of overcoming the economic crisis. These are the kinds of visionary realists we wish for in 2009 – for our mutual benefit.

In this spirit, I hope you enjoy reading this issue of our magazine.

Yours,

Rolf Lucas-Nülle

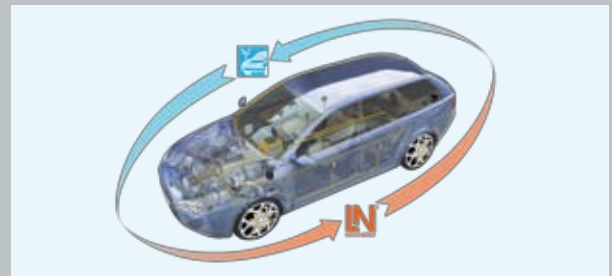
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30 years of Lucas-Nülle GmbH

In 1979, Rolf Lucas-Nülle founded his second company, located in Kerpen, Germany. In the interview on page 25, he reports on the training equipment manufacturer’s beginnings, development and future goals
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Training systems for automotive technicians

Lucas-Nülle GmbH has strengthened its activities in its automotive area in recent months in order to expand its product range. New training systems such as the ADT prepare trainees optimally for the examination.
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Training for renewable energies

The use of renewable energies is an issue of major importance for the future. The report on page 33 points out the economic opportunities associated with the transition to alternative energy sources. Trainees with expertise in this area are in demand.
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International projects

Lucas-Nülle GmbH operates around the world. In 2008, it successfully completed major training projects in Sri Lanka, Spain, Russia and the Maghreb countries, amongst others.

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Cooperation

Partnerships with leading manufacturers in industry guarantee the high quality and practical relevance of the training systems. Reports on current partnerships from Page 12–15



Training and study

The German 'Diplom' and 'Magister' qualifications had to make way for international Bachelor's and Master's programmes. The dual system of vocational training, on the other hand, is an export hit.

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Engineers: new Learning Methods lead to Bologna

The growth in popularity of Bachelor's and Master's degrees in Germany is inexorable. Now the last universities are also rushing to switch to the new system.



According to the provisions of the Bologna Accord, the old Diplom courses are due to be phased out by 2010. Innovative universities and other higher education institutions are demonstrating that the new system can also serve German engineering well by using the new guidelines to give themselves a practice-oriented profile, thereby opening up a wider range of academic and vocational prospects to their students.

Students attain their first professionally recognised qualification after six semesters – a prospect which, at a time of skilled labour shortages, should really be greeted with enthusiasm by industry. Yet those who are desperately seeking capable graduates were initially the most sceptical about the new qualifications. The T9 – the interest group representing the largest universities of technology in Germany – declared the Bachelor's degree a lightweight degree and called for the Master's degree to be the standard qualification.

The large VDI, VDE and VDMA associations claimed that the Bachelor's degree did not qualify students professionally because six semesters were not enough to cover all the necessary theoretical and practical components. Many faculties felt that the change had been imposed on them and that students and lecturers were suffering as a result. And in fact, the first evaluations and studies seem to confirm these fears. A study carried out by the Hanover-

based Higher Education Information System (HIS) in 2007 shows that the number of drop-outs from Bachelor's courses is higher than average at 25 per cent. Prospective engineers, in particular, are not reaching the finish line. Between 33 and 34 per cent leave university without a qualification.

Dovetailing of content

Wolfgang Gollub, a trainee recruitment project manager from the 'Gesamtmetall' employers' association, blames these high drop-out rates not only on the new structure and shorter length of the degree courses, but also on problems that he believes are of the universities' own making: "The content of the former Diplom courses cannot be squeezed into the shorter Bachelor's courses. On the other hand, important topics cannot be neglected if the first qualification is to be professionally recognised. The solution is a closer integration of theory and practice as well as a focus on important content".

The universities need to take a close look at their curricula and revise established dogma in order to separate the essential from the less essential content. This will leave room for practical phases which complement theoretical knowledge and illustrate the benefits of drier subjects such as mathematics, physics and statistics.



Greater understanding of interdisciplinary projects

The Master plan for Bachelor's students

It is precisely this central idea that Professor Manfred Hampe from Darmstadt University of Technology was following when he committed his faculty to the new degree courses. With his focus on practical application and the integrated teaching of theory, he has sometimes made himself unpopular with the hard-core Bachelor's opponents at other technical universities. His call for engineers of the future to acquire not only the necessary technical expertise but also to learn to "talk like Demosthenes, write like John Steinbeck and negotiate like Lee Iacocca" was greeted with incomprehension by advocates of traditional engineering education. But success has certainly proved him right. "We need to encourage project work. Networked thinking and interdisciplinary understanding are in demand in the modern working world. And we must not neglect personal qualifications either", he explains. In addition to process engineering and thermodynamics, engineering students in Darmstadt therefore also study Plato and Habermas as part of a course of general studies. The reason Hampe gives for this unconventional step is this: "We want to educate young people according to the Humboldtian ideal. Innovative solutions are only possible with interdisciplinary thinking".

Project work for interdisciplinary solutions

The first-year students encounter intensive teamwork with a major practical element early on in their studies. In the introductory course, which is compulsory for all

engineering students, they work on a complex problem in teams of ten. Examples of past projects include building a machine that helps older, less agile people to wash their hair or developing a system for waste oil recycling. These courses make the subject more interesting while at the same time giving the students a "painless" introduction to important theoretical principles. "The students understand why mathematics and physics are necessary. This understanding is later manifested in our low failure rates in the hard subjects", says Hampe. In 2006, around 94 per cent of students continued their engineering studies at Darmstadt beyond the third semester. In 2003, shortly before the complete changeover to the new system, this figure was only 79 per cent.

The integration of theory and practice continues to be a priority throughout the rest of the course. To ensure that students really do manage to complete their degree within the standard course duration of six semesters, Professor Hampe and his team have revamped the curriculum and intelligently linked the various course components. "We now only have the natural sciences area, which integrates chemistry, physics and materials science. This also gives the students a better understanding of all the relevant aspects", he explains.

Lifelong learning

The changeover has not only resulted in an increase in the number of graduates; demand from industry has also grown. "Our Bachelor's degree really does qualify our graduates for a profession. They can work autonomously and have strong technical expertise. We nevertheless consider it sensible to specialise by doing a Master's course", says Hampe. That is why his faculty was one of the first in Germany to introduce a part-time Master's course, which also allows those in employment to study for advanced qualifications. ■





Good when compared internationally – even better with international experience

The German 'dual' training system – a model of success

The dual system of vocational training has a long tradition in Germany. As early as the end of the 19th century, apprentices took part in industry-wide courses run by commercial or trade colleges. Today, around 640,000 enterprises train their new recruits in this way. The system is now facing new challenges as a result of globalisation and demographic changes.

The strengths of the dual training system lie in the cooperation between state and industry, which over time led to the formation of a training concept based on three pillars. During in-company vocational training, the young trainees acquire vocational qualifications and practical experience of business management processes. The job of vocational schools is to provide a general training and education as well as teaching social skills. The industry-wide training that is provided by the chambers mainly focuses on practical vocational knowledge, which the companies cannot convey to the same level of consistency. These courses and the final examinations, which are also organised by the chambers, guarantee a consistent and high standard of training independent of the companies. Dual vocational training continues to be the first choice for young people. Around 70 per cent of school-leavers would like to do in-company training. For companies, the practical initial training is often one of the most important and efficient ways of ensuring the recruitment and long-term retention of skilled labour. During the training period, both parties have the opportunity to get to know each other. By successfully completing their training, young people therefore have good prospects of being taken on by the company that trained them. The unemployment rate for 15- to 24-year-

olds is effectively lower with 13.5 per cent in Germany, compared to 17.4 per cent in the European Union.

The debate about quality

Nevertheless, the dual training system is regularly subjected to harsh criticism. Opponents of the system question the quality of the training. They say it eludes comparison and is difficult to verify. The standard of vocational qualification achieved at the end varies from company to company depending on the intensity of training provided. The second point of criticism is primarily put forward by the employers in order to explain the declining training quota. They claim that trainees are not adequately prepared by their school education, which hinders effective training that meets the needs of companies. The number of trainee commitments did, in fact, drop to 58 per 100 school-leavers in 2005. One year after reunification, the number of commitments signed in the dual system was still as high as 78 per 100 training applicants. The gap that has appeared has therefore had to be closed through vocational training in schools as well as other qualification measures. The experience with these alternative solutions has, in turn, revealed the advantages of dual vocational training. Young people who have been trained in the dual system are less likely to be affected by unemployment



after the end of their training and feel better prepared for their day-to-day working lives than graduates of vocational colleges. The close link between vocational school and company ensures practical relevance from beginning to end. This avoids the provision of training which does not meet company requirements.

New challenge and new opportunity: the international dimension

This model is an export hit. Asian countries, in particular, have recognised the value of hands-on, practice-oriented training and see the dual system as a way of addressing the impending shortage of skilled labour. The governments of Oman, Malaysia, Madagascar, India and China are vigorously implementing the dual system. Lebanon already has over ten years of positive experience with the dual training system in the automotive sector. There is an urgent need for skilled workers that have passed through the dual training successfully as Lebanon has a higher car density than can be found anywhere else.

The Institute of Technology and Education, which is part of the University of Bremen, works in cooperation with the German Society for Technical Cooperation (GTZ) to provide advice and support, particularly to emerging countries, on introducing the dual system. In a report, Professor Georg Spöttl concludes that these countries need the dual training system in order to create the basis for the “development of their own know-how, their own patents and their own understanding of production”. Practical experience during their training enables trainees to incorporate business management, functional and technical aspects into problem-solving at an early stage. This turns them into developers who can think independently.

Conversely, the assessment of the Federal Institute for Vocational Education and Training (BIBB), as put forward in its new promotional film, is that Germany, as an exporter, should also align its training system more closely with the working environment that exists within Europe and internationally. Trainees should therefore gain their first international experience while they are still undergoing their vocational training. So far, however, only around two per cent of trainees have spent any time abroad. Yet international experience as part of vocational training is beneficial to both the young people themselves and the companies that train them, and is a contribution to lifelong learning.

Trainees abroad

For several years now, students at the Nikolaus-August-Otto-Berufskolleg in Cologne, Germany, a vocational college that cooperates with Lucas-Nülle GmbH, have had the opportunity to spend some time in another European country in order to acquaint themselves with how things are done there. Since 2005, the vocational college has organised an exchange of automotive engineering apprentices between Germany and Hungary in cooperation with the chamber of trades and crafts in Cologne and the chamber of commerce in Budapest. In September 2008, Philipp Weihert, Lukas Puchalski and Sven Schmidt travelled to Budapest in order to take part in vocational classes and practical training for three weeks. After that their Hungarian counterparts came to Cologne.

“The young people widen their horizons and gain new insights into working life here and in the host country”, explains Hans-Joachim Loose, vocational teacher at Nikolaus-August-Otto-Berufskolleg. The limited number of places available on the programme are highly sought after, even though some of the trainees have to take leave in order to be able to participate in the exchange. “It is



Exchange trainees:
Phillipp Weihert, Sven Schmidt, Lukas Puchalski



Hungary: a fascinating exchange country

definitely worth it. I have learned a lot about training and working in Hungarian garages. Besides, we had a great time with the Hungarian trainees, some of whom even spoke very good German”, says Philipp Weihert, who is serving his apprenticeship at BMW. The Hungarian vocational college was very accommodating to the trainees from Cologne and even held some lessons in German. “At work we communicated in German, English and sign language”, says Lukas Puchalski, winking, who was greatly impressed by the hospitality of his colleagues. The young trainees also found the differences between the two training systems interesting. “In the theoretical part – for example at college – the Hungarian trainees were definitely ahead of us. But in the workshop they were treated more like students on a work placement. I jumped right in straight away, just like I would back home”, reports Sven Schmidt, a trainee at VW. Practical experience and safety awareness in real working conditions also stood Lukas Puchalski, a Daimler trainee, in good stead: “In Hungary, I could really get involved in the work and so quickly integrate into the team”. Now he and his Hungarian colleagues sometimes write each other e-mails, and he definitely wants to stay in touch.

The positive effects of international experience are long-lasting. The young trainees gain confidence in their own abilities and therefore become more flexible. The experience of personal enrichment from such an exchange motivates individuals to embrace lifelong learning and increases their willingness to analyse their own ways of working. For some young people, the international experience during their training is just the first of many.

International and European exchange programmes

Trainee exchange is facilitated by a range of programmes and instruments at the European level. In particular, the European Credit System for Vocational Education and Training (ECVET) helps in terms of awarding credits for experience gained abroad. ECVET mirrors the ECTS system (European Credit Transfer System), which has already been partially introduced in the higher education sector. ECVET makes it possible to document learning outcomes and competencies using so-called “training credit points”. This “educational currency” therefore facilitates the formal recognition of qualification units within the EU.

The international training and development organisation Inwent (Internationale Weiterbildung und Entwicklung gGmbH) offers help with organising and financing exchanges. It provides an advisory and organisational service and is dedicated to human resource development, training and dialogue worldwide. In this capacity, Inwent provides information about current programmes and handles the application process.

Inwent: For projects at European level, financial support is available from the Leonardo da Vinci Programme, whose purpose is to promote occupational mobility. Placements abroad and cross-border exchanges between vocational training providers are subsidised through this programme. Help with the application process is frequently provided by the chambers of trade and commerce. ■

▶ Information on the transfer of the dual training system:

- <http://www.itb.uni-bremen.de>
- <http://www.sequa.de/>

▶ Information on trainee exchange:

- ECVET: <http://www.bibb.de/de/wlk18242.htm>
- Inwent: www.inwent.org
- Leonard da Vinci: http://www.na-bibb.de/leonardo_da_vinci_3.html
- Nikolaus-August-Otto-Berufskolleg: <http://www.naob-koeln.de/index0.htm>



News from the InsTrain Group

As planned, the InsTrain Group has once again expanded its training system for installation technology in the past year. The project group has teamed up with another partner – Rutenbeck – for the development of the new “network technology” module. The communications specialist Rutenbeck is contributing original industry-standard components.

Future electronics technicians for buildings and infrastructure systems will use this new module in their vocational training. The trainees will use the new InsTrain module to simulate the complete installation of a home office or a small office area. This installation task literally challenges the trainees to think in terms of networks because a lot of things need to be provided for an office space, which require optimal coordination. The tasks covered by InsTrain range from the creation of a simple network between two PCs through to the connection of fibre-optic cables and the relevant transformers for data transmission without bothersome network cables. Any office needs telephone, ISDN and Internet connections. W-LAN networks have also been in demand for some time. With InsTrain, the trainees learn to connect these different services autonomously and to think through their installation before installing it.

Task: networking a home office

“The main focus of this module is to teach trainees structured network cabling in accordance with EN 50173-x for a wide range of service installations, so that they are provided with a good overview of sensible solutions and

can identify faults or impractical configurations”, says Lutz Schulz, Product Manager for Installation Technology, explaining the basic educational principle.

Like the three other popular InsTrain modules, this one is structured in a way that enables trainees to work very autonomously. A fault simulator, which presents the trainees with a series of tricky tasks, and a custom-made multimedia course, which acquaints them with the theoretical content through easily understood explanations and examples, are key elements of the typical Lucas-Nülle educational concept, whose main emphasis is on the active participation of the learners.

Realistic industry-standard network technology

In order to develop the trainees’ occupational competence, it is important to familiarise them with realistic industry-standard components at an early stage. The InsTrain Group has therefore teamed up with Rutenbeck specifically to plan and develop the fourth module in the InsTrain series. Rutenbeck has been developing and manufacturing competitive products and systems in building communications for over 50 years. This collaboration guarantees that the training system is of industry standard. This is yet another example of successful cooperation between the InsTrain Group, consisting of WAGO Kontakttechnik GmbH & Co. KG, DEHN + SÖHNE GmbH + Co. KG, bfe-Oldenburg, Hager Tehalit Vertriebs GmbH, Busch-Jaeger GmbH, Data Design System GmbH, Gossen Metrawatt GMC-I Messtechnik GmbH and Lucas-Nülle GmbH, and leading suppliers of equipment and software in the field of building services engineering.

Like the other modules in the InsTrain system, this new module also provides an excellent simulation of reality. When using InsTrain, the trainees always work with original and up-to-date products and data sheets.

These quality features apply in equal measure to the other modules in the series, which cover the topics of building mains feed, lighting and appliance circuits and building systems engineering.

“The new network technology module is an ideal addition to the InsTrain series. Instructors can use the system to teach learning fields 4 and 9 to their trainees”, explains Lutz Schulz. The combination of the four modules facilitates hands-on, practice-based training in installation technology. Other models are in the pipeline. ■

Lucas-Nülle continues successful cooperation with Lenze

Didacta with drive

As in previous years, the Lucas-Nülle Group will once again have the largest stand in company history at the 2009 Didacta exhibition. It will showcase training systems and multimedia training software together with Lenze AG, its industry partner for drive technology.



Lenze Jonglator

the world of work in short practical courses. At the training and education day, school-leavers have the opportunity to find out more about the various occupations offered by the specialist in drive and automation technology. Through the Hans-Lenze Foundation, the company supports able graduates who wish to go on and do postgraduate courses or study for a doctorate. Bringing the technical know-how into vocational education is regarded by Lenze as an important development task.

“Our cooperation with Lucas-Nülle allows us to interact with the next generation of users at an early stage. Our core competencies complement each other ideally for the planning of new training systems”, says Harald Hilgers, responsible for Corporate

Communications at Lenze AG.

The contacts with teachers and trainees that take place at the trade fair are also the main reason for Lenze AG to showcase itself at this event. “We get direct feedback on our products, which we can hardly expect to get in such concentrated form elsewhere”, stresses Hilgers. ■

The education and training sector is meeting in Hanover, Germany this year. Lucas-Nülle GmbH will use this opportunity to enjoy dialogue with specialists, education experts and trainers from the industry. “Contacts are always very intensive. This is because we set up complete training systems at our stand, which can be tested on site”, explains Robert Redling, Head of Sales for the region Germany, Austria and Switzerland at Lucas-Nülle. In developing its drive technology training systems, Lucas-Nülle works closely with one of the largest suppliers in this segment: Lenze AG offers industrial components which ensure that the training systems are practice-based and feature industrial standard.

“Trainers and trainees benefit enormously from the fact that our systems simulate a realistic working environment. Only in this way can trainees acquire the hands-on know-how they will need in their jobs. Working with a partner from industry therefore guarantees the quality of our products”, says Mr Redling, explaining the aim of the collaboration. The positive feedback we have received from trainers and instructors confirms the effectiveness of combining technical and didactic competence.

Lenze AG has a wide-ranging involvement in projects for the future of young people. Students are introduced to



Lucas-Nülle at Didacta

▶ Tip

From 10 to 14 February, the joint stand of Lucas-Nülle GmbH and Lenze AG – with the focus on vocational training – can be found in Hall 15, Stand E60.



Hands-on and descriptive:

"Safety Integrated" training systems

The requirements regarding safety components and controls have changed markedly as a result of new EN regulations. Especially now, manufacturers and users need to inform themselves in order to keep up with the latest technology. Lucas-Nülle has found an optimal cooperation partner for the development of suitable training systems in Siemens AG, the leading manufacturer of safety engineering components.



The safety technology training systems are available for a variety of levels. A conventional safety application is suitable to begin with. Protective doors are found in any factory with automated manufacturing processes. Monitoring them is therefore essential for industrial safety. The basic module from Lucas-Nülle simulates a safety monitoring system. Trainees can assemble and test different safety circuits, with safety position switches with and without tumbler lock. "In this way the participants learn very quickly how to set up a protection monitoring system and put it into operation in accordance with relevant standards", explains Ralf Linnertz, Product Manager for Safety and Automation Technology at Lucas-Nülle.

Building on this basic model, the trainees then look at more complex safety measures. For example, the system offers a module for AS-i-safe and PROFIsafe. Lucas-Nülle and Siemens complement each other in this area: a safety monitor from Siemens that evaluates the signals is integrated into the training system. "We are glad to be able to contribute in this way to giving young trainees an insight into modern safety systems", emphasises Michael Zumann, Safety Technology Promoter at Siemens in Cologne, Germany.

The AS-i safety monitor is used for monitoring all the safe AS-i slaves on an AS-Interface network. The trainees learn to configure the monitor with the relevant control software. From here it is a short step to integrated safety.

The trainees use the PROFIsafe training components to familiarise themselves with S7 distributed safety programming and practise using fail-safe function and data modules.

A complete safety concept should also include optical systems. Light curtains and light grids are used for safeguarding hazardous areas without contact. A light curtain or light grid consists of a transmitter and a receiver. The infrared LEDs of the transmitter produce short light pulses which are picked up by the receiver diodes. The trainees learn to carry out such an installation.

With the relevant instructions, the learners can acquire the necessary basic knowledge about the practical implementation of current guidelines and standards. The training system is equipped for basic exercises as well as highly complex experiments and plans for a complete safety chain in accordance with the European Machinery Directive. The high industrial standard is guaranteed by the Siemens AG components. Siemens uses the embedding of its safety components into a realistic educational environment for its own presentations and customer training courses.

"Our customers can therefore test the effectiveness of the technology themselves. The training systems are the most effective presentation medium since they simulate a real safety-related requirement in a practical way", says Michael Zumann. ■



Lucas-Nülle creates virtual training worlds in cooperating with tarakos GmbH

The new IMS® Virtual emulates the Industrial Mechatronics System IMS® on the PC screen. In order to faithfully render the comprehensive training system and its functions in virtual reality, Lucas-Nülle GmbH is cooperating with tarakos GmbH.

The complex 3D visualisation applications of Magdeburg-based firm tarakos GmbH enable trainees to delve into a realistic virtual IMS® world where they can practise start-up and programming with PLC. In addition to the three-dimensional representation, the main competencies of virtual reality specialist tarakos lie in the detailed and realistic real-time animation of machines and complete material flow systems. The technological foun-

ation of the software is provided by the tarakos applications for creating 3D content – the “taraVRbuilder” and the 3D online visualisation tool taraVRcontrol – which have been configured according to Lucas-Nülle’s specifications. The IMS® also consists of subsystems for selection, assembly or storage as well as several types of conveyor belts. Using the mouse, the user can vary the components for different systems and set the parameters as required. They can select virtual measuring and control instruments from the integrated object libraries and use them to complete the model. Thus a virtual representation of the system is created in line with the module principle and without special programming or modelling skills. As soon as the design of a 3D model is complete, the student can bring it to life by means of a virtual start-up. But first the model has to be programmed, just like the real system. In IMS® Virtual, the STEP 7 software and the Soft PLC PLCSIM, both from Siemens, are used for this. Thanks to the tarakos technology, the virtual system functions as an interactive model whose behaviour fully conforms to the real components. The programming results can be followed and checked directly on the virtual system. ■

IMPRINT

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UniTrain-I in the student-teacher laboratory of the Deutsches Museum

The TUMLab, the Technische Universität München's (TUM) student-teacher laboratory in the Deutsches Museum, offers exciting courses on current research topics. The programme includes automation technology, robotics, computing and much more besides.

Here students can discover and experience for themselves the kinds of things that they can only marvel at in the museum. Lucas-Nülle has now donated eight UniTrain-I Systems to the TUMLab in order to provide the laboratory with up-to-date equipment for tuition in electrical engineering and electronics.

School classes and other groups can use the multimedia self-learning systems under the guidance of students and scientists from the TUM in order to get first-hand knowledge of phenomena in every area of electrical engineering and magnetism. The TUMLab thus offers an exciting supplement to the science that is taught at school.

The hands-on practice laboratory is closely linked with the technical exhibition in the Deutsches Museum. The background information and theoretical knowledge that is imparted there can subsequently be explored in practice and consolidated in the TUMLab. A large number of

challenging tests and experiments arouse the school children's curiosity. The declared aim of the laboratory is to give young people and young adults a playful introduction to natural sciences and technology and create lasting enthusiasm through this joint project.

The "experimenting, learning, understanding" approach pursued by the TUMLab has been successfully implemented by Lucas-Nülle GmbH for 30 years. "We are therefore particularly happy to be able to enhance the TUMLab with UniTrain-I", explains Jörg Sprengel, Product Manager for Blended Learning at Lucas-Nülle. ■

Tip

The TUMLab offers courses for children and young people aged ten and over. Registration at:

http://www.tumlab.de/dpages/tl_module.html

Lucas-Nülle GmbH cooperates with Heliocentris Fuel Cells AG

Two partners with limitless energy

Fuel cells are an energy source with a big future. Lucas-Nülle GmbH has therefore set itself the goal of developing modern training systems for this technology. As one of the leading suppliers of training systems – modelled on real applications – for vocational and academic training, Lucas-Nülle places particular value on original components from leading industry partners.

The new partnership with Heliocentris Fuel Cells AG, one of the leading system integrators for fuel cells, ensures that this mark of quality also applies to fuel cell technology training systems. As part of this agreement, Heliocentris will supply Lucas-Nülle with OEM solutions for fuel cell and hydrogen training as a basis for the development and worldwide distribution of fuel cell training systems.

"The training of young people in the field of alternative energy resources, particularly fuel cells and hydrogen use, is one of our main concerns. Our collaboration with Heliocentris Fuel Cells AG, a company with ten years' experience in training and a wide spectrum of educational platforms, opens up new prospects and opportunities", explains Christoph Müssener, Head of Research & Development at Lucas-Nülle. The signing of this cooperation agree-

ment brings together two global players with a wealth of experience in the German and international education sectors as well as in the development of high-quality training systems. Both Lucas-Nülle GmbH, which generates over 80 per cent of its turnover abroad, and Heliocentris Fuel Cells AG will profit from this partnership. The two companies will pool their strengths and competencies in order to produce even more innovative training systems for the renewable energy sector and market them worldwide.

Dr. Henrik Colell, Managing Director of Heliocentris Fuel Cells AG said: "Our agreement with the renowned global player Lucas-Nülle is an outstanding opportunity for Heliocentris to become involved in major laboratory equipment projects. These are frequently financed by large organisations or with government funds". Lucas-Nülle will distribute the products resulting from this contract worldwide under the brands of both companies. ■

Production technician: a new occupation for the modern production process

The interface manager



A demanding training programme awaits young people who choose to train as a “production technician”, a newly created occupation that was launched on 1 August 2008. The training, which takes place both in-company and at vocational colleges, is practice-oriented and based on state-of-the-art technology. The initiative for the new occupation has come from industry.

With the new ‘production technician’ job profile, we will further strengthen the global technology leadership position of German engineering”, explained Hartmut Rauen, Member of the Executive Directorate of the German Engineering Federation (VDMA), when the new occupation was launched. “More than ever, companies need skilled personnel who are good at testing, securing and optimising production processes”, emphasised Rauen.

The trainees learn how to install, test and maintain production systems during their three years of training. Production technicians work at the interface between design and production. They have to consider both the logistical and the IT processes, which they harmonise and constantly check for discrepancies. “Production technicians often work in a team with colleagues from different departments. They mediate between these departments while at the same time having to take account of all the requirements associated with a new production system. Personal competencies such as communication skills,

assertiveness and self-motivation are essential for this job”, says Dr. Gert Zinke, Coordinator at the Federal Institute for Vocational Education and Training (BIBB), in reference to the profile of trainees, who should at least have GCSE or A-level equivalent qualifications.

The training is not only challenging for the trainees. Most companies who wish to train qualified production technicians in just three years have to adjust and modernise their training methods. “These businesses need a training concept that allows trainees to acquire both specialist and interdisciplinary skills as well as personal competencies”, explains Zinke.

Modern training systems for project work

Lucas-Nülle GmbH is meeting the new training requirements of industrial production in an ideal way with its IMS[®] training system and corresponding IMS[®] Virtual programme. The training system is designed to create optimal learning conditions for practice-oriented instruction in the field of automation technology.



“I am a big fan of IMS. The range of expansion options makes it very easy to expand a parallel wiring system through to bus systems, for example”, reports Michael Lorf, a senior teacher at Leopold-Hoesch-Berufskolleg, a vocational college in Dortmund, Germany, who often uses IMS for project work. It is possible to use the entire system or just individual modules, as all the components can be used by several students at a time. “IMS offers real industry standards and is therefore ideal for use in project work under real conditions”, adds Lorf enthusiastically. These are precisely the kind of possibilities that are required by vocational colleges and companies that want to train production technicians in a practice-oriented way.

“Project work is an important part of the day-to-day work of a production technician. It is important to use methods that involve the trainees practising the necessary competencies during their training”, Zinke confirms. A meaningful integration of theoretical and practical content is beneficial in any case. Particular emphasis is placed on the topic-based linking of the course content in view of the fact that there are only three years of training for such a demanding job.

IMS® not only combines theory and practice, but also integrates different levels of learning. Different subsystems can be used to recreate a complete production system in a small format that is suitable for the classroom. The system’s modular design allows it to be optimally tailored to the level of the different training courses. In a vocational college, for example, the conveyor belt is suitable for an introduction to IMS. The students can learn the necessary theoretical part through the basic course that is designed for the conveyor belt. The material is presented in a clear multimedia format so that the often less popular theory part is learned in parallel and automatically linked with the practical applications. This leads to better and quicker learning successes. In this way, the vocational students easily acquire the fundamentals of PLC programming. Many students find the two robot modules a fascinating highlight. The two programmable industrial robots, Katana and Kawasaki, represent two different applications. Kawasaki is a typical industrial robot, as frequently used in industrial practice. It is used subject to industry-standard safety measures and clearly demonstrates the common applications of robots in automation. The Katana, on the other hand, is a compact robot with minimal space requirements and a wide range of individual programming options. Since it is approved for interaction with humans and can therefore be accessed directly by the trainees, it allows a wide range of tests to be carried out.

Virtual production systems

How should the conveyor belt be programmed so that it conveys products safely and reliably? What entries are important for controlling the production line? Where does the fault lie, if the belt comes to a stop? Trainees can also find out the answers to these questions in complete safety in a virtual environment. The ISM® Virtual programme simulates a complete IMS® training system consisting of 3D elements. The instructors will find these in the screen view. Using drag & drop, they can add components to the system or remove them from it. The virtual subsystems and production lines are then animated on the PC screen as 3D scenes that are true to the original and can be viewed from different angles. The settings can be easily set in the menu. There are also virtual measurement and control instruments to allow smooth operation of the system.

“The software is very comprehensive and offers the trainees a virtually unlimited field of experience in automation technology. The knowledge they gain with it can later be transferred practically one-to-one to the real hardware application”, product manager Jörg Ludwig explains. The main reason why this is possible is that the 3D elements behave exactly like real applications. For example, the 3D conveyor belt and lifting devices run in real time. Even the movement of the Kawasaki industrial robot is the same in the virtual environment as it is in real production.

“IMS® Virtual is ideally suited as an addition to a real IMS® production unit. It allows every student to test all the functions and operate a system. This is not always possible with just one hardware system per class. IMS® Virtual allows the trainees to give free rein to their creativity”, underlines Ludwig. Production technicians thus learn to work autonomously from an early stage. “Production technicians trained in this way will be in demand, especially in companies that manufacture a wide range of products or variable product lines”, says Zinke.

Training as a production technician is a good basis for launching a successful career in industry. Advanced training as a process manager opens up further career opportunities. ■

► Tip

Further information on training and working as a production technician has been compiled by the German Engineering Federation (VDMA):
www.produktionstechnologie.de



The new cornering light

is an accurate and realistic training system for the retrofitting of a static cornering light. In order to be able to use it in class, all that is needed is a lighting wall with indicator, reverse light and dipped headlight, to which the cornering light is connected. The system comes with a control unit complete with yaw rate sensor. It also has a continuously adjustable speed signal as well as a fog light function. Trainees use the training unit to familiarise themselves with the statutory regulations as well as the installation instructions. They also learn to read circuit diagrams and make electrical connections. As with all the training equipment from Lucas-Nülle, the static cornering light unit comes with a comprehensive manual that deals with the topics in greater detail, making it a helpful companion to instructors and trainees alike.

"It is important for trainees to familiarise themselves with this new lighting system at an early stage", says Siegfried Schulz, Product Manager Automotive Engineering.

The new Connect

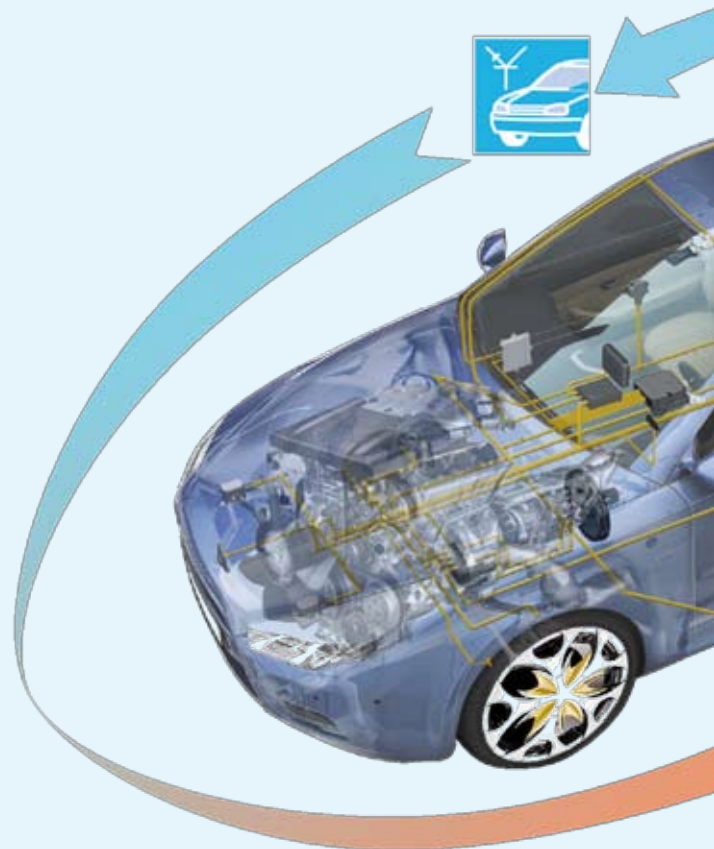
boasts a shiny new design. But the beautiful surface is just the icing on the cake of the new components that make up the impressive second edition of this popular system. The software that comes with it is now based on the HTML programming language, which greatly simplifies translation into every other language and different writing systems. Direct gasoline injection has now also been added as a topic. These innovations also benefit institutions that are using the older Connect I system. Thanks to a special gateway, this system can also be upgraded for the new "Direct gasoline injection" topic.

"We have added lots of useful extras to the new Connect, which make the product more flexible", emphasises Sebastian Neumann, Product Manager Automotive Engineering.

The On-Board Diagnostics II system

simulates all the necessary vehicle functions. It also features a completely new design, giving the training panel system a brighter, friendlier appearance and clearer layout. With an original OBD II interface, fault switch and vehicle readings such as air flow, engine temperature, speed, rpm and lambda sensor voltage, the new OBD II training system has all the required functions. The simulator is supplied with a handy scan tool as well as a teaching manual. The trainees use the scan tool, for example, to diagnose mal-

Automotive Trai





functions in OBD-related components. The manual also refers to the ADT course, in which the trainees familiarise themselves with the diagnostic steps for this defect. The OBD II Simulator works independently from other systems. All that is required is a power supply.

“The new OBD II Simulator with CAN interface is a great economical solution for educational institutions that do not want to incur the expense of a training vehicle. But even in institutions that already have a real vehicle, the simulator ideally complements the use of this vehicle”, explains Siegfried Schulz, Product Manager Automotive Engineering.

The new Auto Diagnostics Trainer (ADT)

is a simulation of an internal combustion engine and all the necessary diagnostic tools and instruments based on precise mathematical models. The diagnostics trainer from Lucas-Nülle provides a detailed display of the engine compartment with all its components, the dashboard with its fault indicators, and all the necessary measuring, testing, checking and auxiliary equipment. The instructor can choose from around 40 faults that are graded by difficulty. The exercises start with the picture of an engine compartment. The edges of the display screen feature bars with virtual tools and measuring and testing equipment including an OBD scan tool, multimeter and test lamp. The students can use the mouse to operate these tools, dragging and dropping them onto the engine parts that are to be tested. With just a few clicks, trainees can zoom into the inner workings of the components. If they get stuck on their own, they can use the Help function, which will point them in the right direction through targeted questions. The instructor can subsequently check the result logs in a central database. In addition to the repair results entered by the trainees, all the steps they have chosen can also be tracked in a clearly structured table.

“In the final exam for automotive mechatronics technicians, fault diagnostics and repair are the main tasks. The diagnostics trainer allows trainees to improve their skills in this area by themselves”, illustrates Product Manager Siegfried Schulz.

ning Systems



Germany: well prepared for the "extended examination"
for automotive mechatronics technicians



Reaching the goal in two Steps

The Automotive Mechatronics Technician examination is now established after a two-year probation period. The examination regulations are more transparent but also more demanding for both trainees and their instructors. Because from now on the results of both parts of the examination will count.

Whereas previously the obligatory intermediate examination only served as a means to determine the level of progress made by trainees, the result now also counts towards the final mark. This results in a more realistic picture of individual performance over the entire training period", says Siegfried Schulz, automotive product manager at Lucas-Nülle and long-standing member of an automotive examining body, summarising the most important impact of the new examination method. This may not be to every trainee's liking, but it is also an opportunity.

Well prepared from the start

"A trainee that has prepared well for the first part of the examination and passes it with reasonable marks is on course for successful completion of training. This gives security to both the trainees and the businesses", says

Schulz. After all, the result of the intermediate examination, which some trainees viewed as an insignificant, if obligatory, event, will account for 35 per cent of the final mark. "Young people are taking vocational school more seriously now and are more likely to be on the ball at work", adds Schulz. Furthermore, the new examination rules regulate the examination times and content very precisely. This means that examiners and trainees can better prepare for the crucial hours of the exam.

"Optimal preparation involves commitment on the part of the young people as well as tailored instruction at the vocational colleges and in the companies. For examination preparation, we recommend the ADT (Automotive Diagnostics Trainer), which allows trainees to immerse themselves in the important examination topic of engine management", says Schulz.

The new ADT from Lucas-Nülle allows trainees to internalise strategies for successful automotive diagnostic analysis and fault repair. ADT is a simulation of an internal combustion engine and all the necessary diagnostic tools and instruments based on precise mathematical models.

“In the final exam for automotive mechatronics technicians, fault diagnostics and repair are the main tasks. The diagnostics trainer allows trainees to improve their skills in this area by themselves”, says product manager Schulz, explaining the benefit of the training system. The importance given to fault diagnostics in the practical test is a precise reflection of the kind of work the trainees will be expected to do in their later working lives. In order to enhance practical relevance, the diagnostics trainer provides a particularly detailed and realistic display of the engine compartment with all its components, the dashboard with its fault indicators, and all the necessary measuring, testing, checking and auxiliary equipment.

Looking for the source of a fault

It is therefore very easy to make lessons exciting and practice-oriented. At the start, the instructor selects a fault. He can choose from around 40 different, typical faults that can occur in a car. The exercise starts with the picture of an engine compartment. The edges of the display screen feature bars with virtual tools and measuring and testing equipment including an OBD scan tool, multimeter and test lamp. The trainees can use the mouse to operate these tools, dragging and dropping them onto the engine parts that are to be tested. With just a few clicks, trainees can zoom into the inner workings of the components.

To test a fuse, trainees first click their way towards the fuse panel and then open it with a further click of the mouse. There they can make use of the circuit diagrams and data documentation that are provided in the software package and which can be printed out if required. “We avoid random searching by making it necessary to use the measuring devices and the manual in combination. The trainees learn to read the documentation and apply it to the display in the engine compartment. In practice, this ability saves a lot of time”, Schulz asserts. Thus the ADT is ideally suited as a self-directed learning programme as well as for continuous preparation for the extended examination and project-based training. ■



Key to success: practice-based exam preparation

Training Night

Handtmann, a company based in Biberach, Germany, is actively committed to high-quality training. The automotive supplier hosted an extraordinary event – the Training Night – to showcase technical-industrial occupations and dual system courses of study.



Trainees at Handtmann GmbH

Around 1500 young people and their parents took the opportunity on 4 July 2008 to find out more about the training on offer as well as the prospects for a career. The company opened its doors at 6pm, and interested school-leavers were still pouring in shortly before closing time at 11pm.

In the workshops, instructors and current Handtmann trainees welcomed the visitors and informed them about technical-industrial occupations. The students had the opportunity to put their questions directly to the trainees and thus get an authentic insight into what the training involves, both in the factory and at the vocational college. The young people were therefore able to experience at first hand the excellent atmosphere as well as the good chemistry between the instructors and trainees. The large number of training projects on display in the workshop proved that there is a real emphasis on practical experience from day one.

For example, the industrial mechanic trainees build a go-kart in their second year. This major task not only demands a great deal of technical knowledge but also, and in particular, team spirit, project expertise and complex thinking. This challenge pushes the young people to their limits and enables them to grow even further. When the go-kart is finally ready to drive, the work proves to be worth it for everyone. “Building a functioning go-kart is just great, and at the same time we learn all the important steps in the creation of a product, from the original idea to the drawings through to completion and assembly”, says one enthusiastic trainee. The go-kart built by the previous year’s trainees was just one of the highlights of the exhibition. Another attraction was the Carrera Night Wheeler race track. Visitors were able to test their racing skills against a robot. Predicting the winner of each race wasn’t easy. The challengers’ fascination with the robot technology therefore grew with every round. “It is very important for the trainees to be familiar with robot technology. As skilled

Training Night



★ *Self-built: the BART*



★ *Exciting: technical training*



★ *Programming by trainees*

employees, electronics technicians for industrial engineering need to have this knowledge. That is why we always use state-of-the-art technology in our training”, explains Thomas Arnold, responsible for training electronics technicians at Handtmann.

Experimenting, learning, understanding

This philosophy was also clearly demonstrated at the “Experimenting, Learning, Understanding” station, where the trainees presented their training systems from Lucas-Nülle. In the spirit of hands-on training, the visitors were able to try out the automation technology training systems themselves. After a brief introduction, the students were already able to make some settings on their own. Handtmann primarily uses the Industrial Mechatronics System IMS®, which simulates a modern production plant including robots. Trainees quickly familiarise themselves with the technology through exercises and project work. “The training systems are a valuable part of our electronics

training portfolio. We think that the quality of the training depends on practical relevance as well as enjoyment in what you are doing. With the training systems from Lucas-Nülle we can achieve both”, says Ruth Berg, Training Manager at Handtmann.

The company has already received several awards for its high-quality training and its commitment to the professional future of young people. In addition to the Training Night, Handtmann also takes part in Girls’ Day. This initiative is intended to attract girls to technical occupations. Practical taster courses, the student engineering academy, school mentorships and technical workshops complete the company’s comprehensive career orientation programme. With regard to the supporting training activities, Ruth Berg says: “Helping young people choose a career is also the main objective of our Training Night. But we provide information and application tips all year round”.

Training Night



Practical 'racing car' project



Trainees advise school students



The goal is to provide excellent training

Applications with the 'wow factor'

The right application and correct interview technique were two more important subjects at the information stands. Because at Handtmann, too, the number of applicants for 35-40 training places has long exceeded the 1000 mark. "A good application is the applicant's calling card for the selection procedure", explains Ines Wimbauer, a trainee industrial clerk. When applying to Handtmann, as anywhere else, this calling card should be perfect in terms of form and content and underline the applicant's technical skills and personal qualities.

In addition to the technical-industrial vocational training in the dual system, Handtmann also offers industrial training courses and dual system courses of study. The students complete the practical part in-company while theory is taught at the BA Ravensburg vocational academy.

A practical focus is encouraged at both training locations and this is coordinated through close cooperation.

For the third year in a row now, Handtmann is one of the biggest sponsors of the Ravensburg vocational academy's BA Racing Team, at its branch in Friedrichshafen. The BART 08, a racing car similar to a Formula 1 car, is being designed and built by budding mechanical engineers. The students and their BART 08 will take part in the Formula Student races at Silverstone in June and at Hockenheim in August. They can then pit themselves against international teams from all over the world. At the Training Night, the students demonstrated their racing car's roadholding.

By 11pm, it had become absolutely clear that training at Handtmann involves a lot of fun and opens up excellent career prospects ■

“The first designs were created in my swimming pool”

Thirty years ago, Rolf Lucas-Nülle founded Lucas-Nülle GmbH in Kerpen, Germany. Ever since, the company has stood for educationally innovative training systems modelled on real applications. Today, over 90 employees in Kerpen and in the representative offices abroad are working hard to continue this success story. In an interview, Rolf Lucas-Nülle talks about how everything began and what trends he thinks will shape the future of the company as well as the sector.



Interview with company founder Rolf Lucas-Nülle

Lucas-Nülle is 30 years old this year. How does that feel?

I am happy about the successful path that my employees and I have travelled together. We created the first designs in my swimming pool, which had been converted into an office. Since then, our development has gone quite well, I think.

How did you get the idea back then to develop training systems? After all, you were already successful in further training with INTEA GmbH as a training provider.

Indeed, we had already been providing vocational and advanced training for engineers for ten years when the demand for training courses for skilled workers and engineers grew even further in the mid-70s. We wanted to provide even more practically relevant training for this target group. We wanted our participants to carry out experiments themselves. This approach was later reduced to the simple formula “Learning by doing” and supported by scientific research. But back then the concept was new. In order to put it into practice, we needed didactic training systems, which weren’t readily available. So we designed our own systems.

So at first you only produced training systems for your own requirements?

Yes, but word of the quality and success of our systems quickly got around, so it wasn’t long before we started supplying other training providers as well as companies that employ trainees. This led to the creation of a separate branch of the business and ultimately the Lucas-Nülle GmbH.

You quickly outgrew the swimming pool. Lucas-Nülle GmbH developed into a medium-sized enterprise in a short space of time. How did you manage to convince the market so quickly and continue to supply it successfully to this day?

We already had a comprehensive didactic approach back then. Our concept covers several aspects, so that any system based on it satisfies the requirements of three groups involved in the training process: the trainees, the instructors and the companies. Furthermore, we have been pursuing the same high quality objectives for 30 years: practical relevance, flexibility and quality using state-of-the-art technology.

How do you develop a system so that it does in fact meet the requirements of all three groups as well as the training and quality objectives?



We always ask ourselves what skills trainees need in order to be successful in their jobs. What competencies are being demanded by industry? How can these be imparted to trainees in a realistic way? And we always test whether our ideas prove worthwhile in practice. That is why we work in an interdisciplinary way with technical developers, operators and educational experts from vocational colleges, universities and industry. Everyone brings a different, enriching perspective to the process.

So teamwork is the key to a well-designed system?

Interdisciplinary cooperation is important in every area of the company. We have thus created a culture of communication in which everyone can express their ideas and concerns. I have always been committed to promoting the personal and professional development of each employee. I am certain that this has led to our well-above-average staff

In this way, we are often one step ahead of the market and learn of emerging trends before anyone else.

retention rate, from which we benefit greatly. This means that valuable know-how is kept within the company. Regular further training ensures fresh impetus. In this way, we are often one step ahead of the market and learn of emerging trends before anyone else.

This also applies to international markets, which you ventured into early on even though foreign education and training concepts frequently differ from German ones. What makes Lucas-Nülle so successful worldwide?

Thanks to joint projects with GTZ, the international development banks and other development cooperation

organisations, we learned early on to look beyond purely national training and education requirements. We find out about the latest trends in training and education through our five independent regional sales teams as well as international trade fairs. When working abroad, our employees adapt precisely to the regional linguistic and structural requirements. Cultural adaptability is one of our main strengths.

How important is the international market for Lucas-Nülle GmbH?

At present around 80 per cent of our turnover is consistently generated in foreign markets, which we also interpret as proof of the flexibility and versatility of our systems and services.

Speaking of flexibility, the plug-in system is one of Lucas-Nülle's trademarks...

It's simple and flexible, and therefore timeless. I got the idea for this on a flight from Canada to Germany. We wanted to make a system that was versatile but also robust enough for everyday use in lessons. I have always found planes a good place for thinking. And so by the time we landed in Germany, I already had the main features of the universal panel worked out in my head. Even the Syba technology series, our first system, was based on the plug-in system.

Apart from the plug-in system, are there any other products that you are particularly proud of?

Several of our first didactic measuring instruments have proved to be so robust that they are even used by industry and are only now showing their first signs of fatigue. That is also why we call the three measuring instruments the "indestructibles". Furthermore, we are playing a pioneering role in the area of multimedia-based training systems. We anticipated the development of the new media very early on and started to connect our instruments with computers over ten years ago. With the UniTrain-I product family we had a market-ready system that integrates this connection. It is a PC-based learning and experimentation system that covers every area of electrical engineering, electronics and automotive technology.

Lucas-Nülle is one of the market leaders today. Even so, would you do anything different with the benefit of hindsight?

It would just be minor things. My management style has changed over time. I have learned to delegate. Nowadays I am even happy to leave important tasks to my experienced

colleagues. That would have been completely unimaginable 30 years ago.

What trends and developments will be important for Lucas-Nülle GmbH in the future?

The trend towards multimedia-based instruction will continue to grow and will become increasingly important in other countries. Many emerging and developing countries in Africa and Southeast Asia have a lot of catching up to do in the education sector, and we will react to this with our products and services. Environmental technology, renewable energies and alternative drive systems for motor vehicles are major issues for the future. In Germany, too, the training and education system will have to adapt to this in the coming years.

When are you planning to develop the first training system for renewable energies?

The work has already begun. It's only fairly recently that this subject has become so extremely popular, but for us it is not new. This technology – just like environmentally friendly automotive technology – is a vital step in terms of modern energy use. One of our main tasks in the coming years, therefore, will be to develop training systems in this area. Providing high-quality training to the coming generation is the best basis for promoting these technologies. We very much want to contribute to this process. ■

That is also why we call the three measuring instruments the "indestructibles".



Russia – Maghreb – Sri Lanka – Spain



International Projects 2008

Ever since its foundation, Lucas-Nülle GmbH has been engaged in international projects. The German dual education system enjoys an excellent reputation worldwide. It is therefore no surprise that training systems for vocational education “Made in Germany” are in great global demand.

*Cordoba University*

Even in its first years of operation, Lucas-Nülle worked together with GTZ and other development organisations, carrying out international projects. Since then, international markets have become increasingly important for the company. Lucas-Nülle has formed specialised sales teams for each region to ensure that the best possible consideration is given to local cultural and economic conditions. These teams know their customers' requirements precisely. Here they report on their successful projects and the current trends.

From Russia: Heinz Keppler and Vladimir Kosin

“Language is the key”

Vladimir Kosin, responsible for Lucas-Nülle sales in Russia, is pleased. For several years now, Russia has been investing substantially in upgrading the standard of vocational and higher education throughout the country as part of a nationwide project. As a specialist in technical vocational training and education, Lucas-Nülle has provided equipment for a training and educational centre in Magnitogorsk and a university in Moscow among others. The trainees have recently begun using the new training systems. “The initial feedback from the vocational school has been very positive. The instructors are coping well with the training systems and the trainees have been able to complete the first experiments without any problems”, says a delighted Kosin. In order to ensure that this remains the case, Lucas-Nülle GmbH always includes comprehensive and long-term service for all of its training systems.

Fast on-site service

This advantage was also an important factor for the institution in Magnitogorsk, located on the southern edge of the Urals, in terms of deciding in favour of the equipment from Lucas-Nülle. “It goes without saying that such an institution has to be able to rely on competent service after it has purchased a training system. Otherwise a small problem can quickly make it difficult to use the training system”, Kosin underlines. Problems are rare, however, because Lucas-Nülle intensively trains the teaching staff on the relevant training systems in advance and carries out the on-site installation and start-up for the customer. The fact that the courses and manuals have been translated into Russian is a major advantage for customers. “Often teaching material is only offered in English. However, it is



Software in Russian

crucial for our customers to have all media available in their native language. This saves the teachers comprehension problems as well as translation work”, Kosin explains. A large number of universities have also recognised this benefit for their students and research facilities. “We chose Lucas-Nülle because we value their international status, their high technical standards and their competent training of the teaching staff”, says Prof. F. I. Manyakhin, Head of Electrical Engineering at the Moscow State Institute of Steel and Alloys.

The use of multimedia resources in teaching and learning was another argument in favour of Lucas-Nülle. “Practice-based blended learning” is big in Russia as well. “It is fascinating how advanced the equipment in many universities is. They really do train people directly for and in close collaboration with industry”, says an impressed Kosin.

Manfred Masson and Lionel Hemme on their roadshow in the Maghreb states

“Contact with the users is extremely important to us”

In order to get to know the needs of the educational institutions in the Maghreb states better, Manfred Masson and Lionel Hemme went on a roadshow through the region. They visited vocational schools and technical institutes from Tunis to Siliana in Tunisia and from Settat via Meknes



Training systems in use in Morocco

to Casablanca in Morocco. The highlight of the tour was the annual in-house exhibition in Algiers. This was followed by the first contact with the Académie Internationale Mohammed VI de l'Aviation Civile (International Mohammed VI Academy of Civil Aviation) in Casablanca.

Morocco is promoting technical education and advanced training through state-of-the-art vocational education institutions and technical colleges. The academy is an important flagship project that is setting new standards.

The academy trains aircraft technicians and engineers who go on to work for Moroccan and international airlines after completing their training. As they will have responsibility for the technical safety of the planes, their training and education must be perfect. Strict entrance requirements ensure high-quality applicants and therefore a high standard of training. Out of hundreds of applicants only around 30 are admitted. Those who manage to win over the selection committee will benefit from high-quality technical equipment and excellent tuition based on the latest teaching methods. Lucas-Nülle GmbH has equipped three rooms – one each for communication technology, electronics and drive technology – which meet the academy's particularly high standards. The academy's

management opted for the training systems of Lucas-Nülle GmbH not only because of the high product quality: "The main reason for their choice was our long-term support and the installation by service engineers from our local representative", says Manfred Masson.

The opening, which was given in-depth coverage on Moroccan state television, was attended by instructors and interested students as well as education experts from politics and science.

▶ **Tip**

Further information is also available on the Internet at:
www.aviation.ma/metierselec.htm

News from Sri Lanka: Leslie Twine reports on Galle Technical College.

"One of Asia's most modern training centres has been established in Galle"

The international cooperation enterprise, GTZ, has built the technical college in Galle, in the south of the country, in collaboration with Lucas-Nülle, among others, as part of a tsunami aid project. The result is one of the most modern training centres for ICT and telecommunications. At the opening ceremony, the Minister for Technical and Vocational Education was enthusiastic about the new centre. Due to the high standard of the training institution, the Ministry has elevated it to the status of a "College of Technology".

Lucas-Nülle has contributed towards facilitating state-



Telecommunications training

of-the-art technical training by installing two practical application laboratories. The construction of the training centres was managed by GTZ with the involvement of experts from GOPA Consultants, supported in particular by Ronald Hummel, an expert in this field. The equipment for the first practical application laboratory consists of the microcomputer training system on which the trainees complete exercises in microcomputing, computer programming, data transmission and control technology. Thanks to the UniTrain-I multimedia training system and the LabSoft software package, the laboratory now has interactive learning stations at which the trainees can carry out practical experiments. These include practical hands-on exercises in network technology, fibre optic technology, modulation methods and antenna technologies. The LabSoft software package includes multimedia courses in mobile telephony (GSM), ATM and microwave systems. “The equipment is state of the art, facilitating the provision of modern, forward-looking training”, says Leslie Twine.

The second laboratory fitted with Lucas-Nülle equipment is used for telecommunications training. Until now only companies have been able to offer training in this area. This laboratory now also enables a state educational provider to train skilled personnel in this advanced technology. The equipment covers telecommunication systems, network technology and satellite communications. The training integrates state-of-the-art technology and regionally common ISDN systems.

The patch panel, which is housed in a wall cabinet, is used to connect the terminal devices at the student workstations with the relevant TC system, depending on



Instructors at Galle Technical College

the exercise. This allows versatile and practical project planning exercises to be performed for different TC structures. Furthermore, the trainees can realistically simulate the programming of TC systems and terminal devices on analog and digital ISDN connections. At the ten workstations, they measure the signal characteristics which are displayed on an oscilloscope.

The college’s reputation for high-quality training has led to a doubling in the number of new students. Around 1,000 trainees are now enrolled at the college. A major contributory factor in this success was the intensive laboratory training given to the teachers. The six teachers of the new “ICT & TC Departments” underwent a four-week training period in Germany. They subsequently received three further weeks of on-site training from the Lucas-Nülle experts. The teachers and the two laboratory



State-of-the-art laboratories

assistants were even involved in the equipment planning and installation process. This work was supported to a significant extent by the students at the college, who consequently became particularly well acquainted with the technology and are always happy to share their knowledge during presentations.

“It is fantastic how much success the college has been able to achieve in such a short time. This has only been possible because everyone is pulling together – trainees, instructors and partner companies alike”, says Twine, commenting on the pleasing result. In recognition of this great achievement, Lucas-Nülle has donated a supplementary training system to the college. “We really want to support the further positive development of the college”, says Twine.

► Tip

The college's official website will be launched shortly. A small picture gallery is already available at www.CoTGalle.info.

Gerald Schex reports on the new laboratories for the University of Cordoba:

“The major Spanish project in 2008 inspired new solutions”

This renowned university, located in a city with one of the richest cultural traditions in Spain, has upgraded its technical-scientific laboratories and workshops with state-of-the-art technology thanks to financial assistance from the European Union. As part of this project, an old part of the university building was completely refurbished and adapted to provide a suitable environment for modern seminars and lectures.

In a Europe-wide tendering process, Lucas-Nülle and its Spanish partner Sidilab S.L. fought off fierce international and Spanish competition with high-quality training systems and corresponding laboratory furniture.

The University of Cordoba has, in the space of a few decades, established itself as one of the top universities not just in the Andalusia region but the whole of Spain, with a reputation for high-quality research and teaching. The university's high standards are also to be reflected in the quality of the technical equipment. The Rabanales campus, where the focus is on engineering, is home to the



Flexible laboratories for modular training

Polytechnic University as well as the Escuela Técnica Superior de Ingenieros Agrónomos y de Montes - ETSIAM (Agricultural and Mining University (ETSIAM)).

One of the reasons why the university decided to work with Lucas-Nülle was that, by doing so, it was able to realise its own individual furniture requirements. The developers from Lucas-Nülle specially created aluminium power supply channels with double-sided fittings for use at the University of Cordoba. This solution optimises the use of the rooms and efficiently utilises the available space. In addition, a robust support platform for test instruments was fitted on top of the power channels, which can be used as an additional storage or utility space for instruments. A team of engineers, technicians and well-trained Spanish fitters installed the laboratories in a week without any difficulty. This was also a very clear demonstration, particularly for the customer, of Lucas-Nülle's core competence in collaboration with its local partner Sidilab: namely turnkey projects from A to Z.

In total, Lucas-Nülle has equipped eleven laboratories with technical training systems as well as the corresponding laboratory furniture and aluminium power supply channels. A large number of UniTrain-I courses in, among other things, control technology, power electronics and electrical machines, and training panel systems for electrical machines and 300-W drives as well as safety measures in accordance with VDE, are available for the training of future electrical engineers. The university has been using the new rooms since June 2008. ■

► Information on Cordoba University:

http://internacional.universia.net/espanya/uco/inf_general_de.htm#

Training in renewables for a sustainable future

The Inexhaustibles



The transition towards renewable energy – away from coal, oil and nuclear power – is gaining momentum. The technology is now so advanced that solar energy, wind power, hydrogen and biomass can be readily harnessed as environmentally friendly energy sources. To ensure that this trend can continue, well-trained and technically skilled staff are needed worldwide.

People who deal with renewable energies during their training can play a part in solving one of the most pressing issues facing modern societies and have good prospects for a varied career in an emerging industry. Those who train skilled staff for this industry are acting with foresight. Because by the year 2020, the size of the renewable energies market will put other sectors in the shade. In the past ten years, the number of employees in this industry has increased threefold. And the German Renewable Energy Federation (BEE) is expecting a further 500,000 jobs to be created in the next ten years. Thus, as

well as being environmentally friendly, renewable energies are also a huge driver of economic growth. In 2006, German companies alone generated around 23 billion euros in this sector, according to the Federal Environment Ministry. This volume could increase sixfold in the foreseeable future – provided that the companies are not held back too much by the shortage of skilled labour. The competition for the best talent has already begun. Well-trained young people will find jobs in this sector that are both sustainable and safe.

“The renewables sector is without doubt a job creator,

which is staying strong in spite of the current crisis”, confirms Björn Klusmann from the German Renewable Energy Federation (BEE). Technically skilled staff who keep up with the fast pace of technological developments in the sector are particularly sought after. The conditions for such high quality vocational and advanced training do not exist everywhere. “In order to do justice to the sector, the educational institutions need to provide training using state-of-the-art technology. The necessary equipment for this is lacking in many places”, Klusmann regrets.



Björn Klusmann

Lucas-Nülle GmbH advocates practice-oriented, industry-based training equipment in all technical sectors. That is why Lucas-Nülle, together with its partners from education and industry, is developing technical training systems for the renewable energy sector.

“We are convinced that these technologies are essential for a sustainable energy industry. One of our priorities, therefore, is to develop the necessary systems for basic and advanced vocational training. In the coming months, we will expand our involvement in this area”, explains Christoph Müssener, Head of Research & Development at Lucas-Nülle.

Bright prospects with the photovoltaics board

Ralf Linnertz and Jens Fischbach, both Product Managers at Lucas-Nülle, have developed the first training system specifically designed for the renewable energy sector. The UniTrain-I System with integrated photovoltaics board enables trainees and students to familiarise themselves with solar installations and how they work. Because not only specific electrical engineering skills are required to be able to put such an installation into operation. The board provides trainees with a basic understanding of the properties and operation of a photovoltaic installation. “We have developed a self-contained system that enables both beginners and advanced users to familiarise themselves with the subject in a targeted way at the technician level”, explains Ralf Linnertz.

With the photovoltaics board, the trainees not only learn how a solar cell works but also gain a comprehensive

overview of how an entire solar installation works. The board simulates a much bigger photovoltaic system as well as the sun, so no other components are required. It can therefore be used independently of other training systems and components. The trainees get a grasp of the theoretical principles with the support of the relevant UniTrain-I course. In the multimedia learning environment, the first step is to explain the structure of a solar cell before proceeding to more complex topics such as semiconductor technology, installation and grid feed-in. As with all the other UniTrain-I courses, the emphasis with this course is on closely linking the theoretical parts with practical exercises and experiments. As well as providing easy-to-understand explanations, the multimedia application is also used for checking the trainees’ understanding of how the system works with the help of the integrated fault simulation function. The 12-volt system with solar battery allows measurements of all the electrical parameters as well as the current luminosity to be carried out. Ralf Linnertz illustrates the didactic approach as follows: “This practice-oriented system very quickly conveys the fascination of a photovoltaic system to the trainees. This is the best way to ensure that they acquire a lasting knowledge of theory and practice”.

The sun: a reliable energy source worldwide

One of the primary considerations for the product developers was to ensure that this system could be used independently of other components, as it was supposed to be suitable for international requirements.

“Having talked to training institutions and educational experts worldwide, we have learned how important training and education in this area of renewable energies is for



Solar energy is available worldwide



Renewable and environmentally friendly

development cooperation”, says Leslie Twine, Sales Manager for the Asia Region. In the countries of the southern hemisphere, solar installations provide autonomy from electricity grids, which in some cases are in a poor state. If there is a sudden power cut, being able to rely on an independent solar installation is a potentially life-saving advantage. Furthermore, the increasing industrialisation in these regions of the world demands a move to environmentally friendly energy sources that facilitate sustainable economic activity. Here, too, high-quality training of young people is the key. “Our photovoltaics board is a cost-effective and very flexible stand-alone system that can be used without any additional structural parts or system components”, stresses Ralf Linnertz.

This flexibility is not only important for training institutions in emerging and developing countries. In this part of the world, too, limited budgets often make it difficult to provide high-quality and practice-based equipment at vocational training institutions and universities. With this affordable stand-alone system, however, the topic of renewable energy can be easily integrated into existing training concepts.

From wind to wave

That is exactly what the German Renewable Energy Federation is advocating: “We are against developing completely new occupations or courses. This would take too long and create a level of specialisation that prevents the necessary expertise being widely distributed. Rather, it

should become a matter of course for energy electronic engineers and mechanical engineers to familiarise themselves with wind energy and solar technology during their training”, says Björn Kluesmann.

Lucas-Nülle GmbH has developed the course “From wind to wave” as a foundation course in wind energy. Trainees who take this course learn about how wind energy is produced and the factors that influence this process. The supplementary “Windsim” software allows a realistic simulation of wind speeds and wind turbine generators. In this combination, the machine test bench from Lucas-Nülle serves as the wind-powered generator.

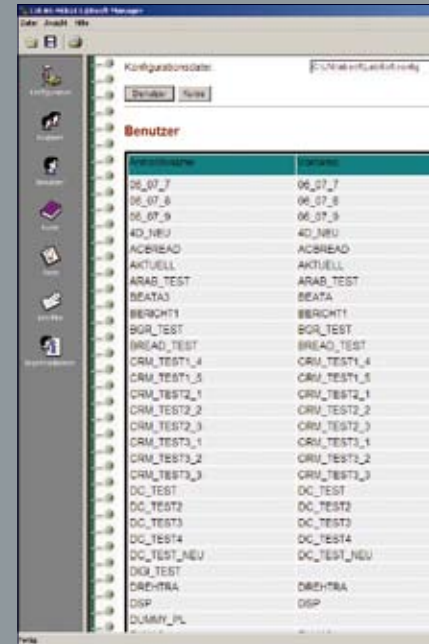
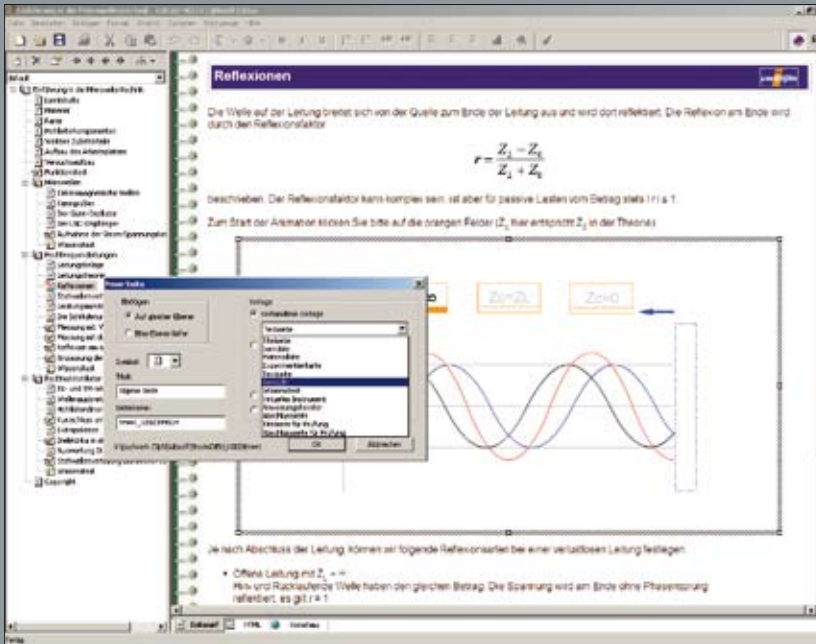
A suitable UniTrain-I course is offered for exploring the inner workings of a hydrogen fuel cell. Trainees learn how a fuel cell stack and an electrolyser work and can familiarise themselves with the production of hydrogen or the typical characteristics under certain loads. ■

► Tip: Renewable energy job fair

The Bonn Science Shop is actively involved in training for the renewable energy sector.

The highlight is the renewable energy job fair that takes place once a year in the Science Park in Gelsenkirchen. Here trainees, students and graduates can meet potential employers in this sector.

The next job fair will take place from 15 to 16 May 2009. Further information can be found at: www.irena.org



LabSoft Classroom Manager

The “LabSoft Classroom Manager” facilitates an electronically-based and highly convenient way of organising lessons with the Lucas-Nülle training programmes. The software tool, which is mainly used to administer LabSoft applications for the UniTrain-I and InsTrain systems as well as for the courses on machine test benches, consists of three complementary programme components – Manager, Editor and Reporter.

With the LabSoft Classroom Manager, we make it much easier for instructors to organise their lessons. They are provided with a much clearer overview of students’ results and are therefore able to plan their teaching more effectively over the long term”, says Jörg Sprengel, Product Manager for Blended Learning.

The Manager as student and course administrator

The LabSoft Manager is the basis for all the other functions. It allows teachers to create courses, administer

students and classes and make different group and course assignments. It can be installed locally and in local networks, thus establishing a computer network within a laboratory or facility.

The Editor offers more flexibility

The Editor offers instructors the opportunity to change courses or even create their own ones. Its functionality goes beyond what is possible with a normal HTML editor, so teachers can use it to edit the structure of the LabSoft courses according to their own preferences and teaching

DATES

We are looking forward to meeting you at the following trade fairs all around the world in 2009:

Germany



DIDACTA, HANOVER

► 10–14 February 2009

http://www.didacta-hannover.de/homepage_d

Spain



MOTORTEC, MADRID

► 10–14 March 2009

http://www.ifema.es/web/ferias/motortec/default_i.html

USA



ASEE, AUSTIN

► 16–17 June 2009

<http://www.asee.org/conferences/annual/2009/>

ACTE, NASHVILLE

► 19–21 November 2009

<http://www.acteonline.org/convention.aspx>

Ukraine



EDUCATION EXHIBITION, KIEV

► 25–27 February 2009

<http://osvita.carshe.com/>

Belarus



"EDUCATION AND CAREER", MINSK

► 26–28 February 2009

<http://www.exponet.ru/exhibitions/by-id/educationmi/educationmi2009/index.ru.html>

Russia



FORUM VDNH "EDUCATIONAL ENVIRONMENT", MOSCOW

► 29 September – 02 October 2009

<http://edu-expo.ru/>

INTERNATIONAL EDUCATION EXHIBITION, NOVOSIBIRSK

► 04–06 March 2009

<http://uchsib.sibfair.ru/>

Kazakhstan



"EDUCATION AND SCIENCE IN THE 21ST CENTURY", ASTANA

► 18–20 February 2009

<http://www.exhibitions.kz/index.php?file=educationastana2009rus>

Turkmenistan



"SCIENCE AND EDUCATION RENAISSANCE", ASHGABAT

► 09–11 September 2009

Thailand



WORLDDIDAC, BANGKOK

► 28–30 October 2009

<http://www.worlddidacasia.com/>

Angola



FILDA, LUANDA

► 14–19 July 2009

<http://www.filda-angola.com/index.html>
http://www.filda-angola.com/default_eng.html

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