



Lucas-Nülle
Group



SOLUTIONS & SYSTEMS FOR EDUCATION TRAINING RESEARCH

Excellence in science and
technology

 **made**
 **in**
 **Germany**



Innovative and effective solutions
Systems developed and made in Germany
Planning tailored to your needs
Excellence learning concepts
On-site installation and application
On-site training of instructors



Who are we?

Lucas-Nülle Group combines two German companies with a long tradition in the fields of education, training and research: Lucas-Nülle GmbH and PHYWE Systeme GmbH & Co. KG.

Together, our two companies have been developing, manufacturing and marketing modular and turnkey solutions for over 100 years – for primary schools, professional and industrial training centres, secondary schools, universities and research centres. All of the state-of-the-art technical concepts and innovative solutions we offer comply with international standards. They enable high-quality, effective training tailored to meet today's technological challenges.

Along with the materials that we develop and manufacture in Germany, we offer appropriate technical, educational and scientific solutions of the highest calibre with our extensive network of international partners, with whom we share the goal of doing things better.

Our innovative, effective solutions help you plan projects that provide students and trainees with modern learning environments and combine theory with practice. It's this combination that enables the powerful qualification required for the establishment of a qualified middle class, which in turn fosters the country's long-term economic growth with local employees, technicians, engineers and entrepreneurs.

Throughout the world, our experienced teams offer you concepts and solutions that are perfectly matched to your needs in the following areas:

- Basic natural sciences for engineering and professional training
- Professional and technical training
- Natural sciences
- Engineering and industry
- Research

 **made**
 **in**
 **Germany**

OUR EXPERTISE AT YOUR SERVICE



Hardware

Development of effective,
innovative, turnkey solutions



Software and cloud

Local and cloud-based
digital learning tools



Production

Customised production that
complies with international
standards

made
in
Germany



SUPPORT FOR PROJECT DEVELOPMENT & IMPLEMENTATION



Consulting and planning

Assistance with programme
modernisation and
appropriate technical
solutions



Delivery and installation

On-site assembly,
installation and application



Training of instructors

On-site training or
requalification of instructors
and full after-sales service



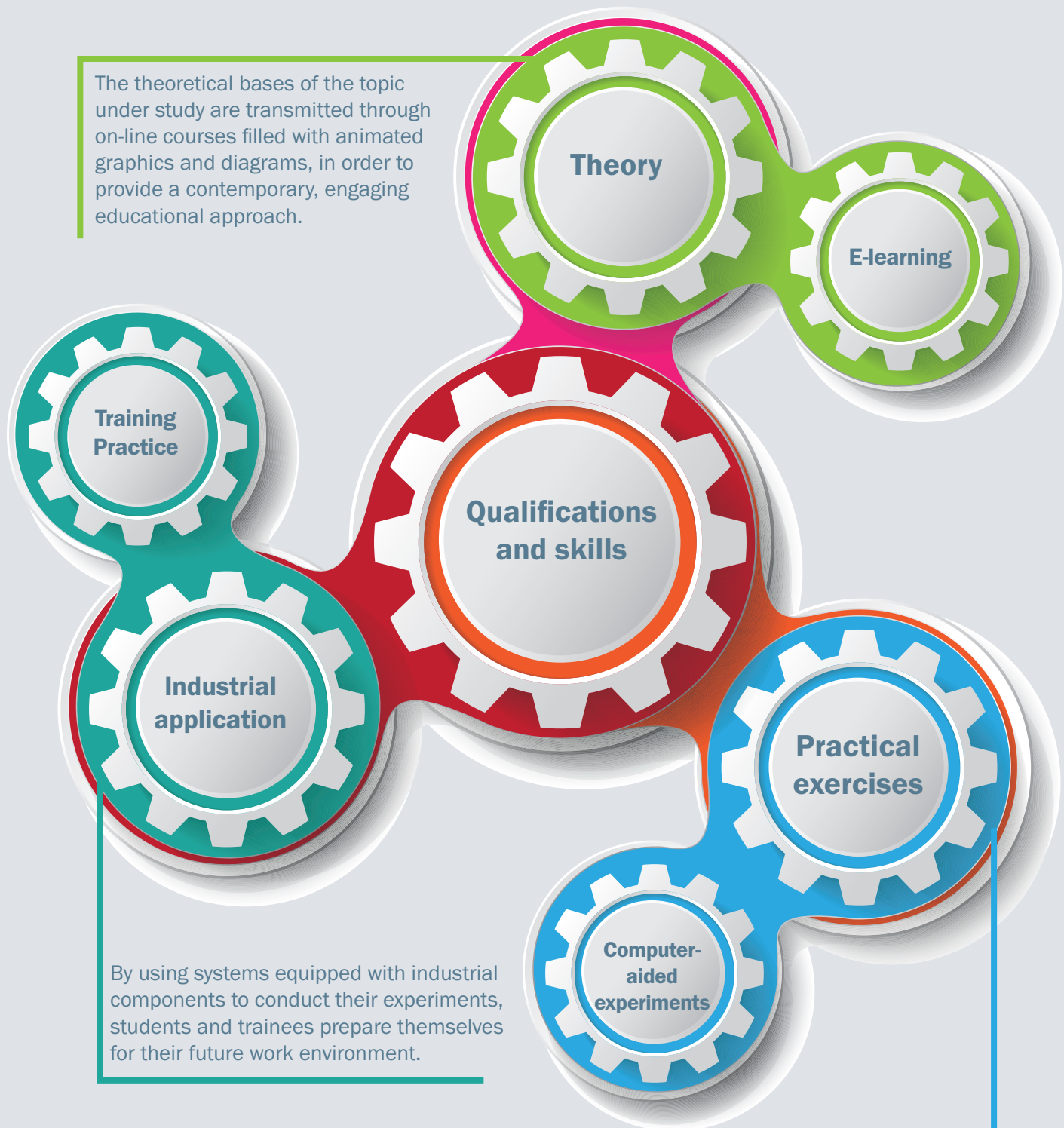
INNOVATIVE TRAINING CONCEPTS



- Turnkey solutions
- Plug-and-play systems
- Complete interactive learning courses
- Monitoring of learning progress
- Blended Learning => Combination of e-learning and hardware
- Complete learning platform => off-line and on-line
- Pragmatic solutions "Made in Germany"
- Remote instruction

Performing practical exercises under real-world conditions allows students to gain expertise while assimilating theory and practice.

The theoretical bases of the topic under study are transmitted through on-line courses filled with animated graphics and diagrams, in order to provide a contemporary, engaging educational approach.



By using systems equipped with industrial components to conduct their experiments, students and trainees prepare themselves for their future work environment.

Computer-aided experiments transmit practical basic knowledge through the use of safe and reliable experimentation materials.

**ADVANCED
EDUCATION,
UNIVERSITY STUDIES
AND RESEARCH**

**PROFESSIONAL
AND TECHNICAL
TRAINING**

**PRIMARY AND
SECONDARY
EDUCATION**

**INNOVATIVE EDUCATIONAL
CONCEPTS FOR DIFFERENT LEVELS
OF INSTRUCTION**



RANGE OF TRAINING PROGRAMMES

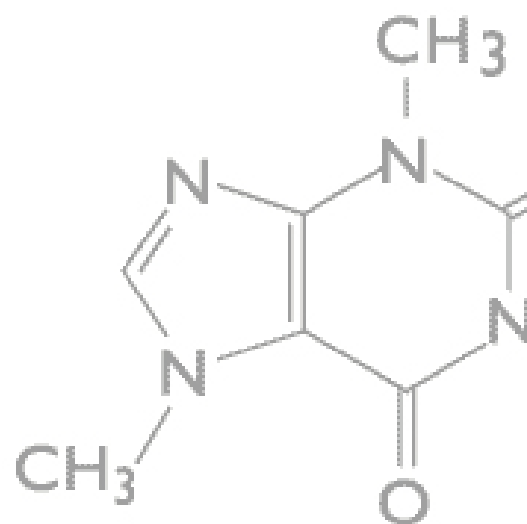
- Basic training
- Continuing education
- Adult education
- In-house employee training
- Training for instructors

CERTIFICATION

- Instructor certification training
- Certification of training centres, such as IMI, TÜV, Dekra, etc.

Primary and secondary education

For future technicians, engineers and researchers, acquiring a solid foundation in primary and secondary school is absolutely essential. Moreover, their interest in science and technology generally develops during their introductory courses.



STEM

With well-equipped physics, chemistry and biology laboratories and technical systems, you will give future generations a solid foundation.



Professional and technical training

We offer laboratories and workshops with complete turnkey solutions for professional and technical training, especially in the following areas:

- **Basic sciences**
- **Electronics / electrical engineering**
- **Welding, general mechanics**
- **Plumbing, painting, sheet metal working, carpentry**
- **Refrigeration, agri-food technology**
- **Automotive mechanics / mechatronics**
- **Other specific needs**

Today, professional education and technical training are essential elements of a country's economic and social development.

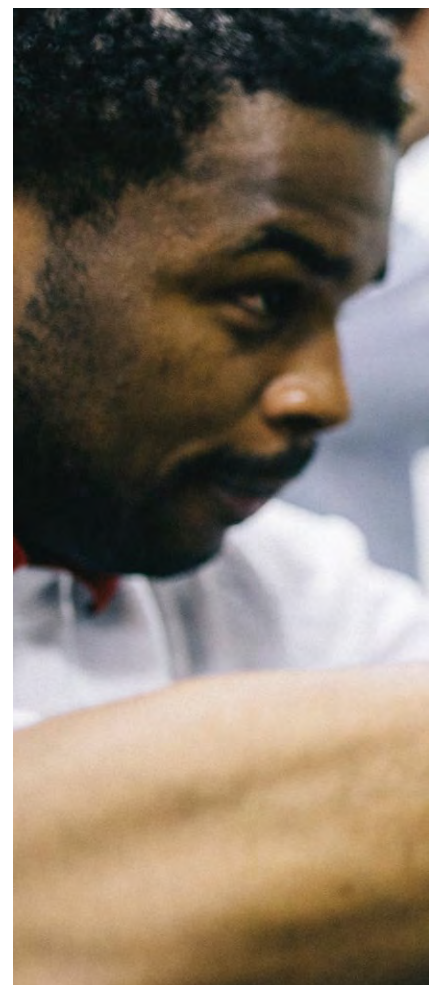
We are convinced that the German "Dual System" is one of the best approaches for large-scale professional and technical education: a solution that exposes trainees to professional reality. Many countries around the world have finally adopted this system, which has proven effective for more than 60 years in a Germany where the need for qualified labour continues to grow.

This learning system must be adapted to the specific industrial realities of each country, however. In addition to educational and professional materials, for example,

centres of excellence can also integrate pilot mini-factories or industrial demonstration units if the industrial fabric of the region has yet to develop enough or lacks up-to-date technologies. In this way, training courses can anticipate and foster development in the regions concerned.

There are several ways – even in the context of training – to generate self-financing through production in the various workshops and the provision of continuing education seminars for industrial technicians. With this approach, in addition to its pedagogical function, your training centre can not only self-finance, but even generate profit, which can then be used to enlarge and/or modernise your facilities.

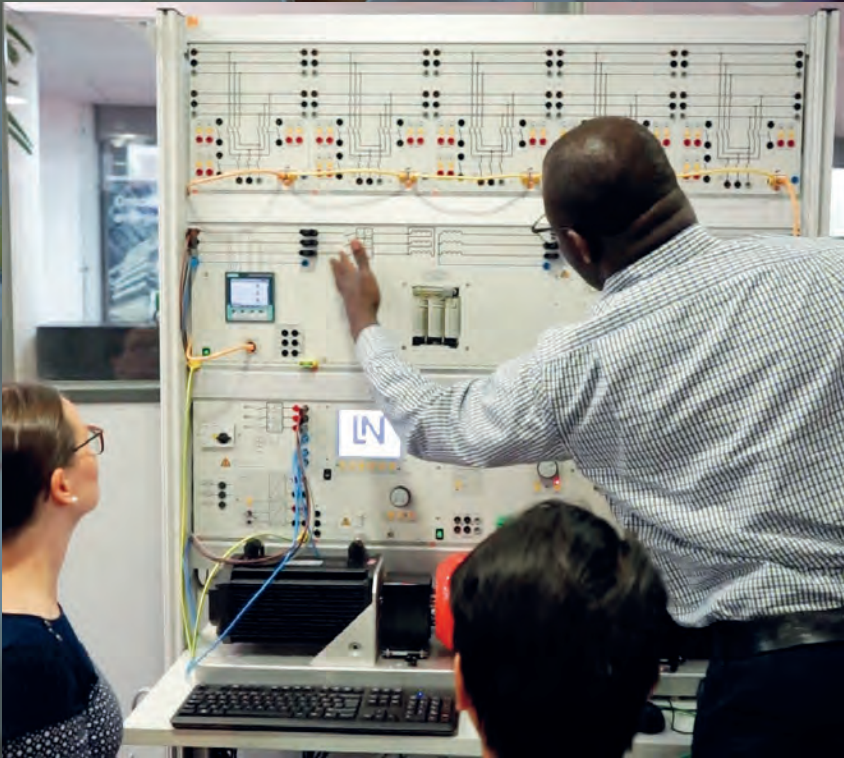
Please do not hesitate to contact us regarding your various training and technical education projects – whether they involve a complete laboratory/workshop or merely a part of one, we will be glad to share our experience, our know-how and our vast partner network with you.





individual solutions, give us the opportunity to present a modern concept to you: one that is specifically tailored to meet your needs – from the basic elements to production – as well as the regional and budgetary realities. Whether it involves a centre of excellence or a professional/technical training centre, we offer you solutions covering every aspect of education.





HIGHER EDUCATION, UNIVERSITY STUDIES AND RESEARCH



Lucas-Nülle Group specialises in several basic fields of scientific, applied and technical research intended for higher education institutions and other state and independent research organisations.

Industry also covers a large share of the needs relative to research - not only to make full use of scientific discoveries, but also to monitor, evaluate and improve products and production processes.

Some of these tools are complex, and many factors determine which ones may be right for the job, but extensive experience in the field is indispensable in order to prevent possible mishaps.

Furthermore, for your governmental or private regulatory laboratories (supervisory bodies that provide certified analyses or production monitoring), we offer individual or complete solutions which are clearly configured and tailored to your needs.

Whether for your university or your laboratory specialising in:

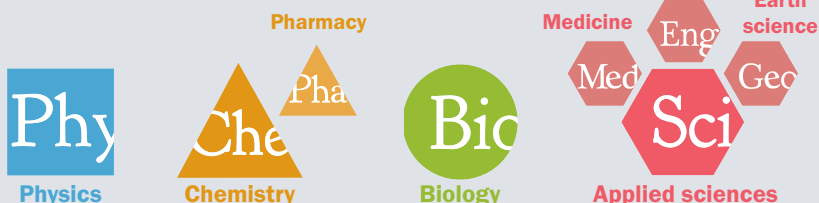
- Instrumental analysis
- Analytical chemistry
- Agro-food analysis
- Pharmaceuticals
- Petrochemistry
- Environment
- Civil engineering
- Drive engineering
- Matlab Simulink development
- Scada Smart Grid
- Renewable energies
- Air-conditioning and cooling
- Mechatronics and Industry 4.0
- etc.

Traditional and modern – over 100 years of quality!

Göttingen is a German city where many Nobel Prize laureates and other great, internationally renowned scientists studied and did research work, including Otto Hahn, James Franck, Gustav Hertz, Carl Friedrich Gauss and many more. Göttingen is also where PHYWE's headquarters are located.

With a long tradition spanning more than 100 years, PHYWE is synonymous with technical performance, innovation, quality and customer satisfaction. As a leading manufacturer of high-quality materials for education and learning, PHYWE is one of the largest manufacturers and suppliers of systems and solutions for natural sciences education and instruction – whether by classic or digital methods.

Its product range comprises scientific equipment, experiments, solution systems, and of course, digital sensor technology, data recording, all-in-one experiments, measurement software, modern e-learning systems, and services for the fields of physics, chemistry, biology, applied sciences, and many more solutions – all tailored to meet the needs of customers the world over. In sum, PHYWE offers everything needed for modern education, from experimentation instructions to technical equipment and software – a complete solution from a single source.





LUCAS-NÜLLE'S MAIN AREAS OF EXPERTISE



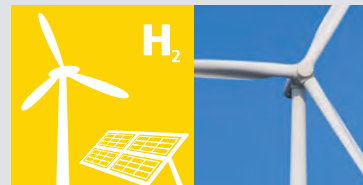
Building Management Systems

Electrical installation,
Smart Home



Electrical Energy Engineering

Smart Grids
(SCADA Smart Grid)



Renewable Energies

Photovoltaics, wind power,
fuel cells



Electric Machines, Power Electronics Drive engineering

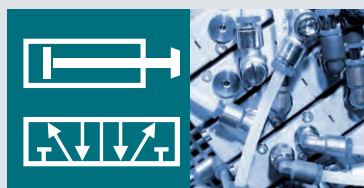


Basic Electronics and Electrical Engineering



Communication Technology

Transmission, coding,
cyber security



Pneumatics / Hydraulics



Machinery & Systems Engineering

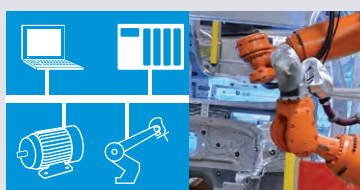
Fundamentals, lathes, milling
machines, machining centres



Measurement Technology

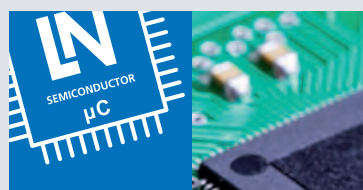


Cooling and air-conditioning technology



Automation, Mechatronics

API, process and Industry 4.0



Microcontrollers, Microprocessors

Internet of Things



Control Engineering



Automotive Engineering and Diagnostics

Conventional, electric, hybrid and
utility vehicles



Process Engineering

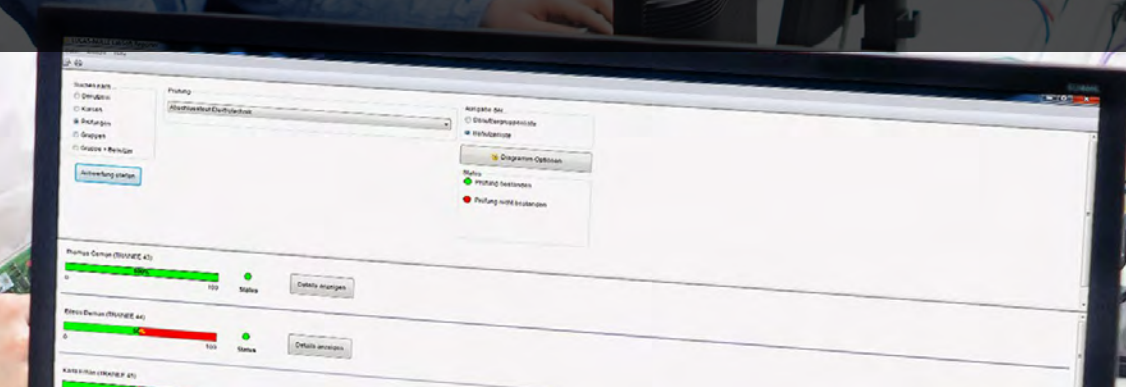
Chemical processes

EXAMPLES OF LUCAS-NÜLLE LABORATORIES AND WORKSHOPS



LOCAL OR CLOUD-BASED LEARNING ENVIRONMENT

All our learning systems include complete interactive learning courses. Those courses are incorporated into a work environment that can be installed locally on a PC or hosted on the training centre's server or in the cloud. Blended Learning makes it possible to effectively combine theoretical and practical learning for rapid results. Powerful tools enable the instructor to adapt the materials, monitor the trainees' progress, etc.



Manager – Simplify administrative tasks



- A complete solution: Manage trainees, trainee groups and exams
- The right content at all times: Provide only the courses that the trainee groups require

Questioner – Create tailor-made questions and exercises



- Test knowledge: Create customised exercises and knowledge tests for courses and exams
- Many types of questions: Individual selection, multiple choice, fill-in-the-blank, etc.

Reporter – Keep an eye on everything



- Monitor learning progress: Consult progress toward course completion and review test scores
- Focus: Evaluations for users, groups, tests or courses

TestCreator – Test knowledge and know-how



- Determine knowledge level: Create exams or tests from a collection of questions / from questions contained in the courses
- Option: Many ready-made collections of questions featuring customised questions and exercises

Editor – Adapt the pedagogical content



- Personalise: Adapt courses to meet personnel requirements / trainee levels
- Innovate: Create new courses

ControlCenter – Effectively monitor learning



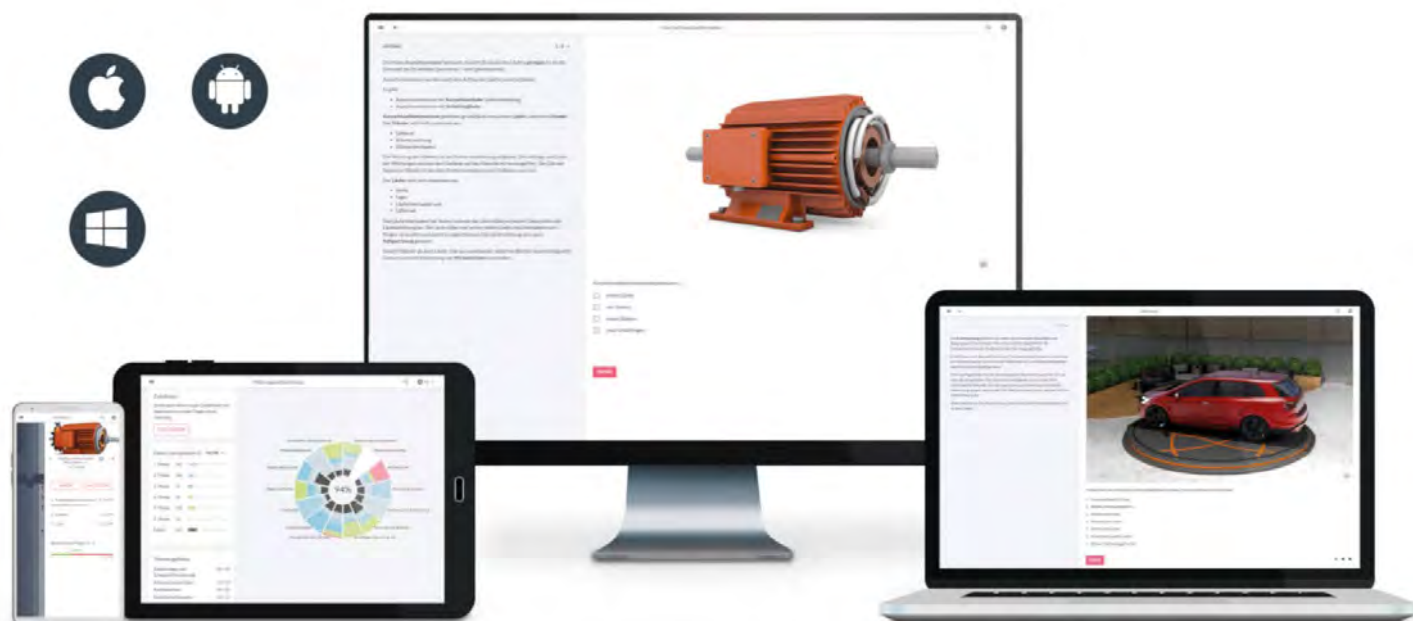
- Monitoring of display screens in the laboratory
- Visualisation of progress in the current course



Local or on-line learning platform

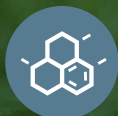
Universal learning platform

- Operates on all devices
- Interactive learning courses
- Protected and editable content
- Create own content
- Ability to use flipped classroom approach
- Easy set-up and no computer maintenance



FIELDS & OCCUPATIONS COVERED

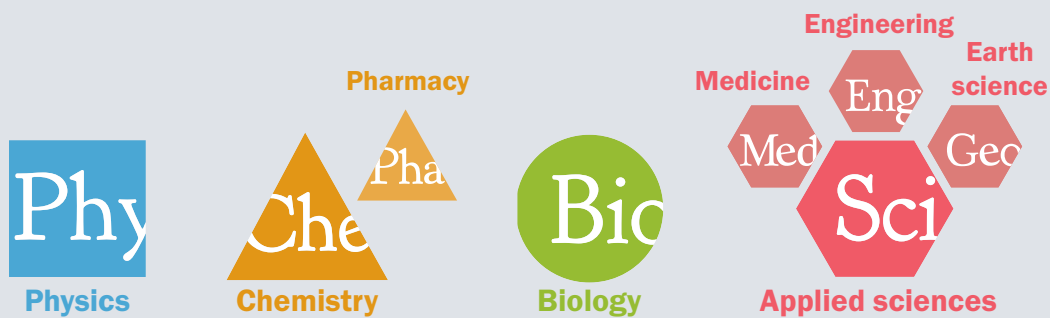
With our product range and strong partners, we cover a large number of fields/occupations. We can provide the expert support you need in these fields to implement your projects rapidly.

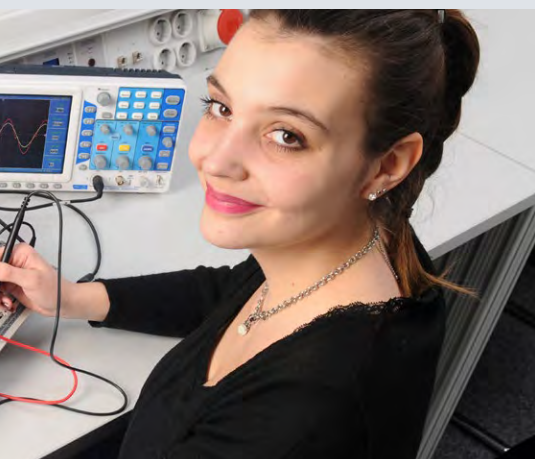




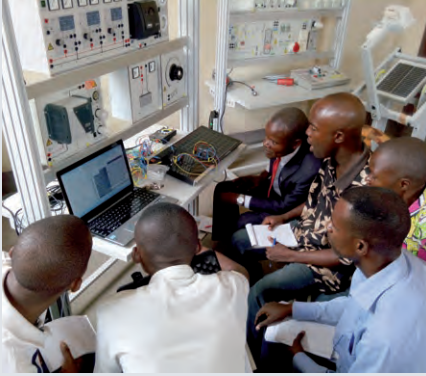
NATURAL SCIENCES AND THE FUNDAMENTALS OF ENGINEERING, MEDICINE AND TECHNOLOGY

- Physics / Chemistry
- Biology / Geology
- Fundamentals of electricity
- Fundamentals of analog and digital electronics





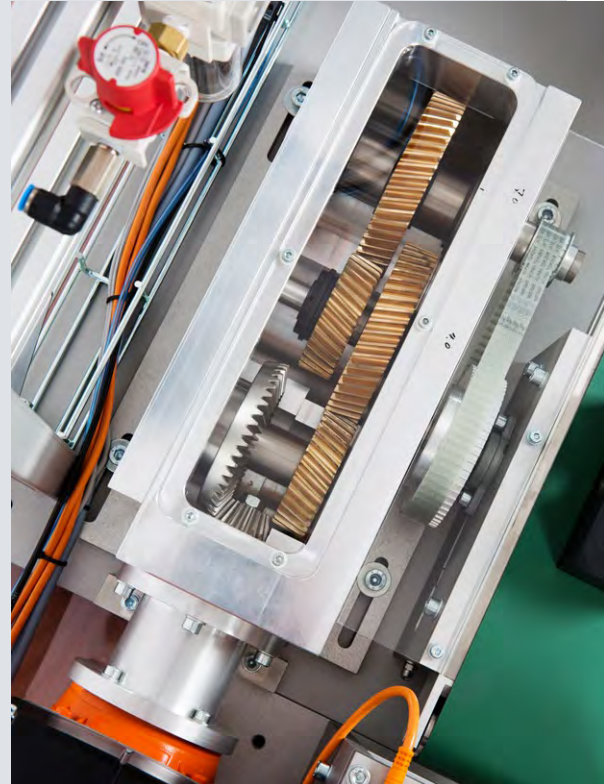
CIVIL ENGINEERING



- Static analysis
- Field measurements
- Material strength and testing
- Fluid mechanics and hydraulics
- Environmental engineering
- Building construction
- Cement and concrete
- Road construction
 - Bitumen and asphalt
 - Geology and rock
 - Soil laboratory

GENERAL MECHANICS

- General mechanics
- Industrial drawing
- Metals processing
- Thermodynamics



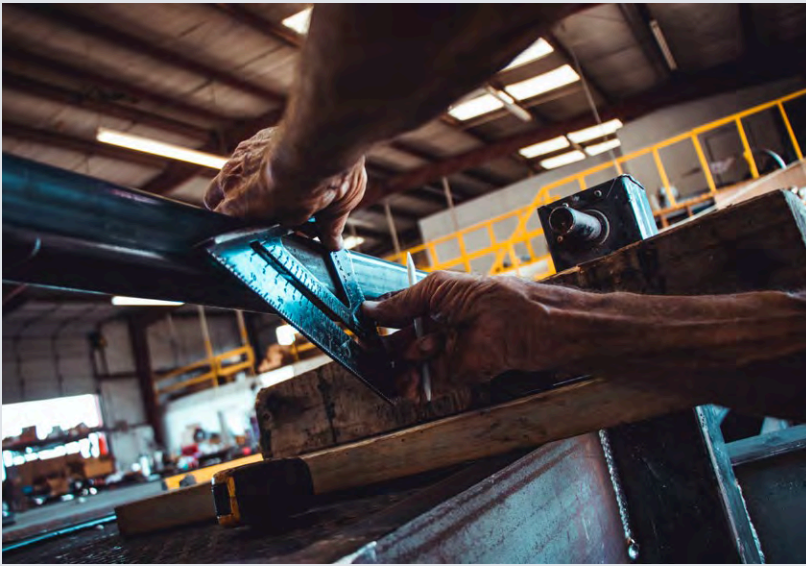
INDUSTRIAL MECHANICS

- Hand-operated machinery
- CNC lathes and milling machines
- Pneumatics and hydraulics



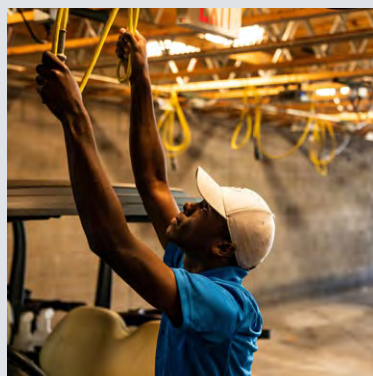
WOODWORKING, CARPENTRY

- Hand-operated machinery
- Complete woodworking tools
- Automated milling machines



CONSTRUCTION TECHNOLOGY

- Plumbing / welding / masonry / construction
- Building electricity / home automation / alarm systems
- Energy efficiency of buildings
- Renewable energies / cooling and air-conditioning



AUTOMOTIVE MECHANICS AND MECHATRONICS



- Paint / bodywork
- Automotive mechanics
- Automotive electronics and electrical systems
- Automotive diagnostics
- Personal-use and industrial vehicles
- Electric and hybrid vehicles

AGRO-FOOD, AGRO-INDUSTRIES



- Fundamentals of biology / glassware / microscopes
- Manual and automated agricultural tools
- Food conservation technology
- Water treatment / waste treatment
- Water management / pumps / irrigation
- Small-scale agro-food production line
- Fertilisers, chemical treatments

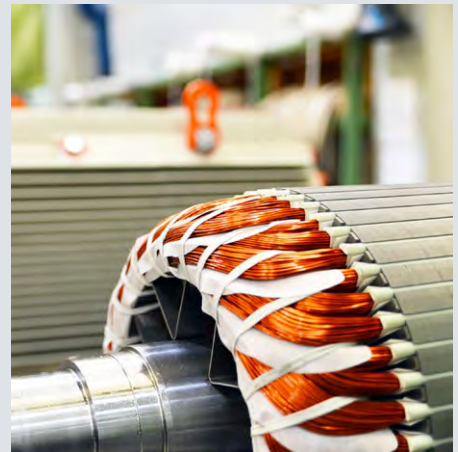
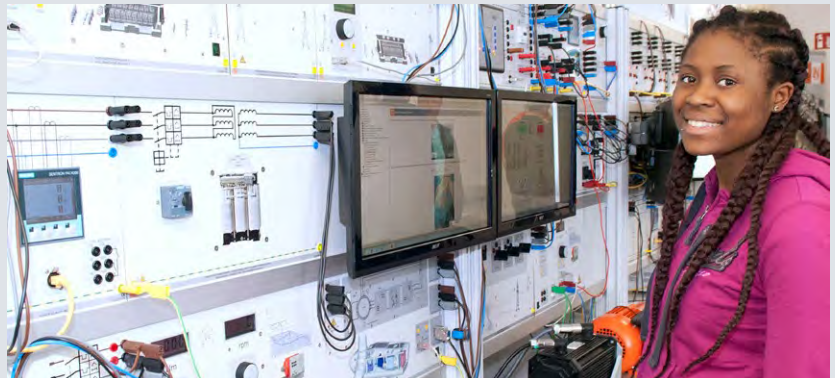
RENEWABLE AND CONVENTIONAL ENERGIES

- Photovoltaics / wind turbines
- Solar thermal / heat pumps
- Traditional electric power plants
- Solar pumping and irrigation
- Micro-grid / Scada Smart Grid
- Complete electrical grid



ELECTRIC DRIVES

- Fundamentals of electric machines and their control systems
- Control systems and power electronics
- Simulation of industrial loads (pump, shell, compressor etc.)
- Safety systems and relays / preventive maintenance
- Commands via contactors or APIs
- Various railway technologies
- Various industrial applications (textile, fishery, etc.)



MECHATRONICS, AUTOMATION, PRODUCTION THEORY



- Fundamentals of automation, control
- Pneumatics and hydraulics with classic and electric control
- Advanced automation, mechatronics, robotics
- Control and safety engineering
- Industrial bus systems, RFID, MMI
- Maintenance and preventive maintenance
- Production lines, Industry 4.0, Smart Factory

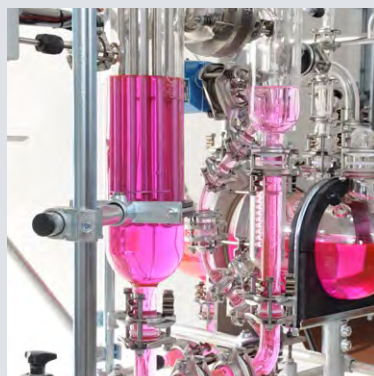
COOLING TECHNOLOGY

- Thermodynamics
- Home cooling (air-conditioning systems / heat pumps)
- Industrial cooling



CHEMICAL PROCESSES

- Control engineering
- Chemical process engineering
- Chemical industrial processes / petrochemistry
- Water treatment / biofuels



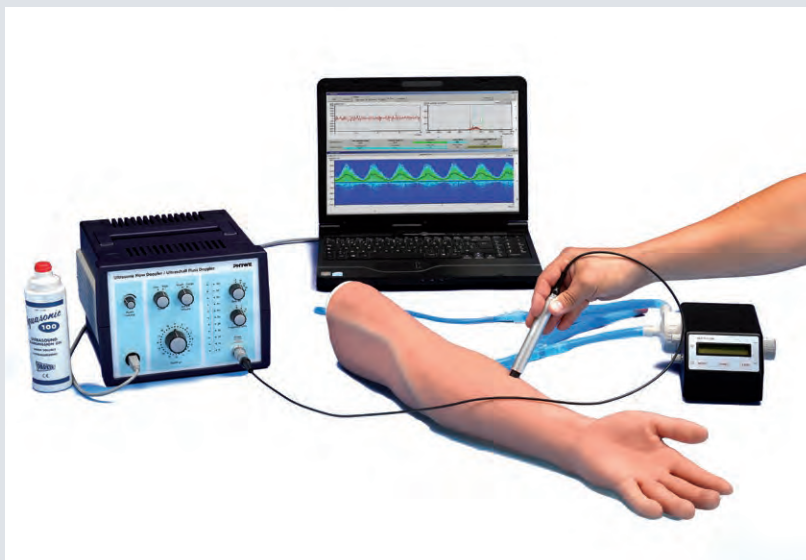
ANALYTICAL AND MEASUREMENT LABORATORY

- Interdisciplinary analyses
- Measurement techniques
- Conformance with standards / technical conformities



MEDICAL TECHNOLOGIES

- Fundamentals of biology / chemistry
- Microscopes
- Maintenance of medical devices



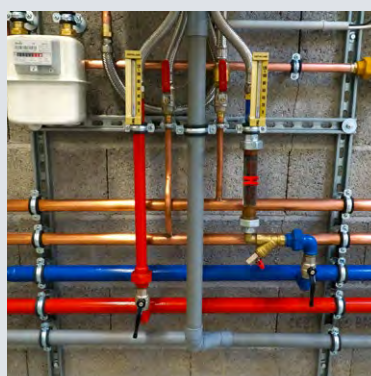
NETWORKS AND TELECOMMUNICATIONS

- Fundamentals of telecommunications
- Micro-controller and micro-computer engineering
- Transmission / antennae engineering
- Conventional and fibre optic cables
- Internet / cyber security
- Connectivity / Internet of Things



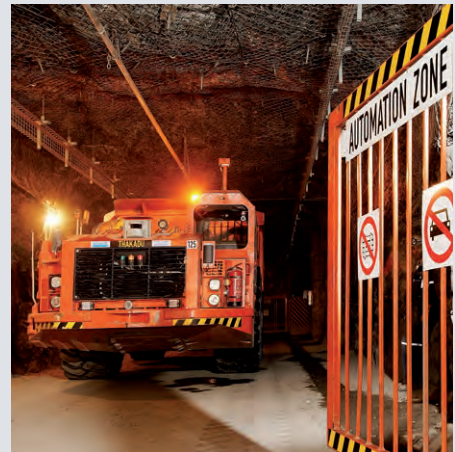
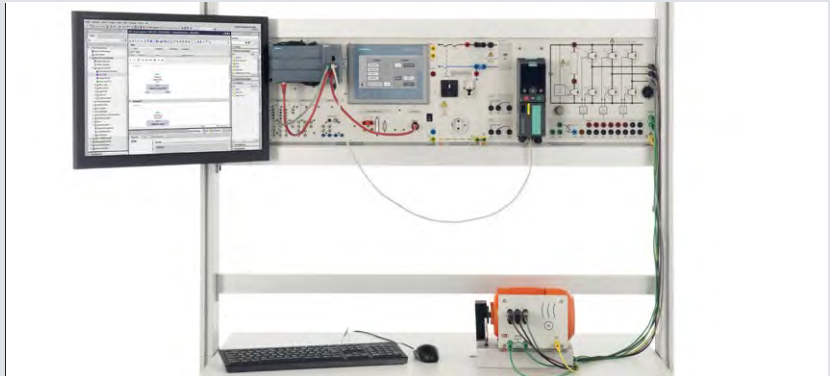
OTHER TECHNICAL AND INDUSTRIAL FIELDS

- For professional and university level
- Plumbing / welding / masonry
- Sheet metal processing / metal treatment
- Garment factories (textile, etc.)
- Railway engineering



MINING TECHNOLOGIES

- Assorted interdisciplinary training
- Geology, fundamentals of materials, technical analyses
- Drive engineering, hydraulics
- Electric control systems, APIs, MMI, industrial buses
- Electrical energy, renewable energies
- Rail and road vehicle technologies
- Maintenance and preventive maintenance
- Other mining technologies



Algeria

Universités Alger USTHB, Alger II, Biskra, Constantine, Ghardaia, Laghouat, Mascara, Médéa, Oran USTO, Oum El Bouaghi, Saida, Tamanrasset, Tizi Ouzou
Écoles MDN, ENP Alger Constantine Oran

Angola

IPS Huambo; Barragem de Laúca; ISPTec Luanda

Benin

EPAC Cotonou; CFP Cotonou

Burundi

Différentes écoles techniques, Université Bujumbura

Cameroon

ISTEC Bangangte; ISN Bafoussam, Botswana Francistown College (FCTVE); Univ. of Botswana; Université Yaoundé

Congo (Republic of Congo, RCB)

ENSP Brazzaville

Congo (Democratic Republic of Congo, RDC)

INPP Kinshasa, Mbuji-Mayi, Lubumbashi, Faculté Polytechnique Kinshasa et Lubumbashi
Université MAPON Kindu, ITP Mbumbu Kinshasa

Ivory Coast

SIMDCI; Université Cocody Abidjan; Université de Cocody Abidjan, Lycée Man

Djibouti

Université de Djibouti

Egypt

MTC; Egyptian Armament Authority; Sinai University; EDF; Suez Canal University; Don Bosco Cairo; Helwan University;
Ahran Canadian Univ.; Future Univ.

Ethiopia

Agro Technical and Technology College (ATTC); Nazareth College; Faramtech International PLC; Bahir Dar University
Projet PPPS - 8 Universités repartis dans tout le pays

Gabon

METFP, ENSET Libreville Ecole Polytechnique

Ghana

University of Education Winneba

Kenya

Polytechnic Mombasa; JKUAT Nairobi;
Kimathi University Nyeri

Libya

Governm. Project; Higher Institute, Benghazi; National Food and Drug Control; Al-Fateh University; Nasr University; PTQ

Mali

ADS Solektra Bamako

Morocco

Univ. Agadir, Béni Mellal, Marrakech
FST Settat, ENSET Rabat, ENSAM Casa, EST/ENSA Kenitra, CPT Kenitra
Centres compétence OCP, ENSMR Rabata

Mauritania

ESP, CSET Nouakchott



A map of the African continent with country names labeled in both French and English. The countries shown are: Libye (Libya), Égypte (Egypt), Tchad (Chad), Érythrée (Eritrea), Djibouti, Somalie (Somalia), Éthiopie (Ethiopia), République centrafricaine (Central African Republic), Soudan (Sudan), Soudan du Sud (South Sudan), Ouganda (Uganda), Kenya, Rwanda, Burundi, Tanzanie (Tanzania), République démocratique du Congo (Democratic Republic of Congo), Zambie (Zambia), Malawi, Mozambique, Madagascar, Zimbabwe, Botswana, Swaziland, Lesotho, and Afrique du Sud (South Africa).

ISP, A Politécnica; Universidade Católica de Moçambique, IIC, INEFP; Academia Militar Samora Machel, Escola Profissional

Namibia

Nigeria

Air Defence Lagos; IST Lagos; Institute for Industrial Technology, Lagos; National Power Training Institute
Bola Ige Mechatronics Institute

METPT; Ministère des Enseignements Niamey

IPRC Kigali, IPRC Huye
ACE-ESD CST Kigalii

Lycée technique industriel Maurice Delafosse de
Dakar, Lycée technique André Peytavin de Saint-
Louis, Lycée technique industriel et Minier de
Kédougou, ESMT Dakar, CFPT Sénégal-Japon

Ministry of Labor and Social Affairs for IVTC

MSC College; Volkswagen; UKZN; University of Johannesburg;
UNISA; AIDC; Ekurhulemi East College; East Cape Midlands

Uni. of Dar Es Salaam; Morogoro Vocational
Teachers Training College

IUP de Mongo

CCIT Lomé

ENSIT Tunis, ENSTA Borj-Cédria, ENIG Gabes
ENET'COM Sfax, Polytech Sousse, ENISO Sousse
FS Monastir, ENIG Gafsa, Polytech International
Tunis
Ecole Borj El Amri, STC Teboullag (Monastir)

Uganda Industrial Research Institute (UIRI);
International University of East Africa;
Makerere University Kampala

Ministry of Labour



Lucas-Nülle
Group

PHYWE
excellence in science

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