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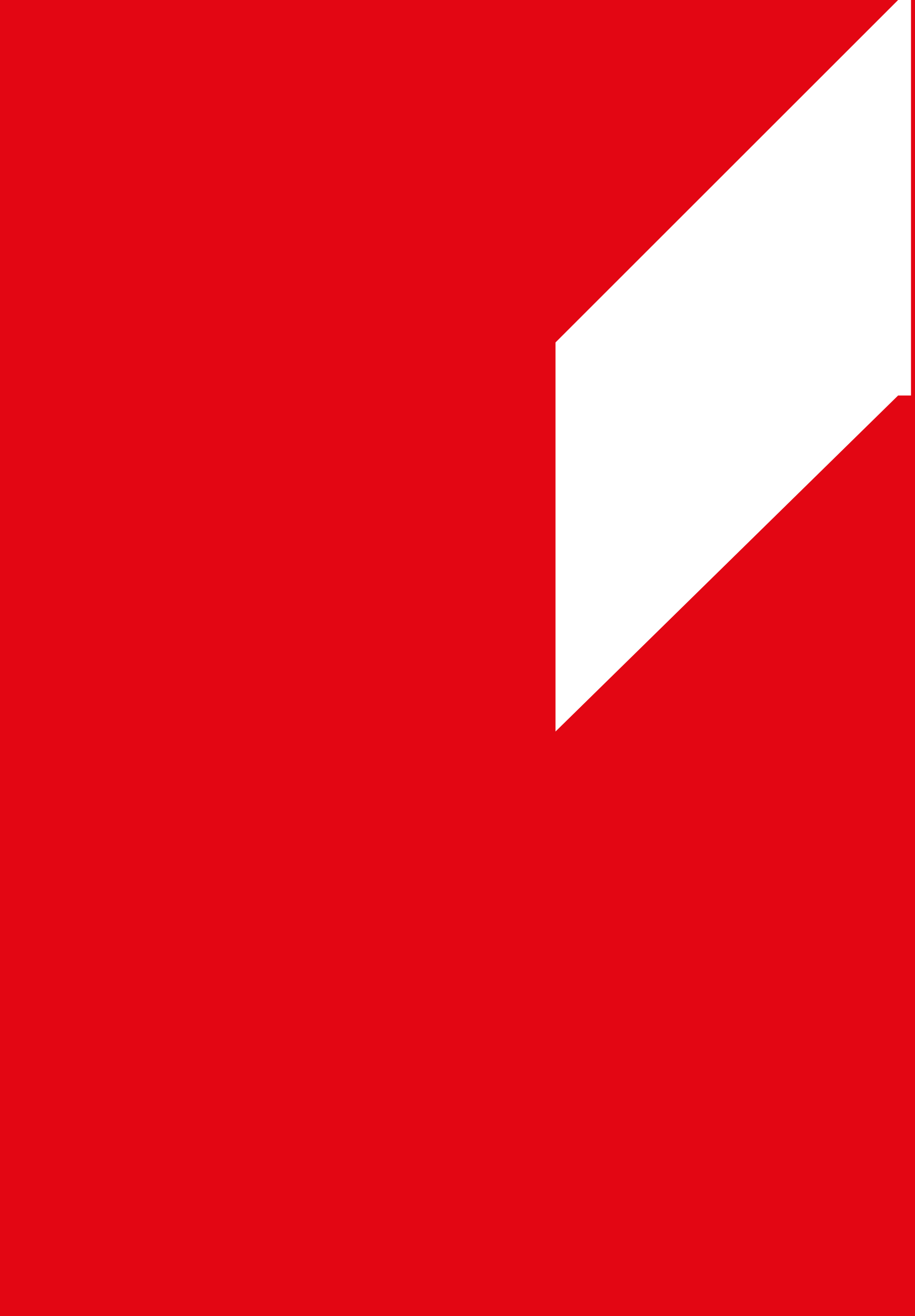
betop

MAGAZINE OF THE FRIEDHELM LOH GROUP

FOCUS PARTNERSHIPS

Stronger together

About the benefits of perfect organisation and cooperation –
inspired by the natural world



Openness and trust

Dear readers,

Competitor or market associate? Customer, partner or supplier? While these terms amply categorised most business relationships until a few years ago, digitization has started blurring the boundaries. Value creation now takes place across networks. Bilateral relationships between customers and suppliers are being replaced by “value chain networks”.

This new constellation presents both risks and opportunities. Opportunities to move forward faster together – by learning different skills from and with one another, and saving resources by harnessing synergies. Set against the risk of leaving familiar territory, sharing knowledge and revealing data.

Value chain networks therefore require two linchpins – candour and trust. Once we have understood what each partner can contribute, a new ecosystem will emerge – creating value for all concerned. We can draw inspiration and learn from Nature in this respect, too. Our cover story examines why companies need to form networks in order to flourish in the era of digitization.

As one of the company principles of the Friedhelm Loh Group states: “Our customers are our partners.” In fact, we go one step further than this. For example, where we used to optimise individual components in collaboration, nowadays we create entire data centres – together with partners, customers and suppliers. In the Siemens MindSphere World, we are collaborating across sectors to create a global ecosystem for the Internet of Things and explore data-based services. We are working on predictive maintenance concepts to lower servicing costs and boost machines’ reliability, for instance.

Machines and companies alike need to be able to think for themselves and look ahead. We do this as a matter of course, as the Dutch company Thomas Regout says of our steel service centre. Another example of good foresight is Stahlo’s decision to invest 45 million euros in a new production facility in Gera. This extension, which will almost treble production capacities, will ensure that we continue to perform robustly for you and deliver what you need “just in time”.

We invite you to join forces with us in this new kind of relationship – get actively involved with creating new business models, shaping our industry and forging a flourishing future and environment.

I hope this edition provides a valuable source of inspiration.

Yours,

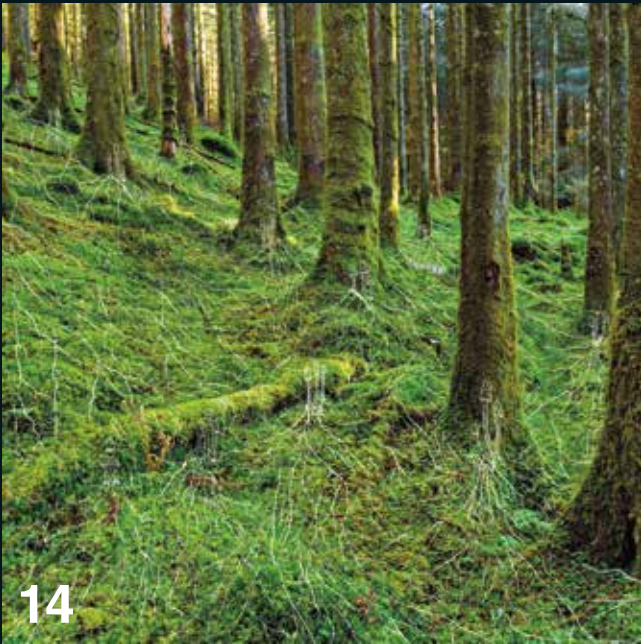
Professor Friedhelm Loh



Professor Friedhelm Loh
Owner and CEO of the Friedhelm Loh Group

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UNDER LOCK AND KEY

Achieving international success through collaboration. LKH is providing a global automotive specialist with locking systems.




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For millions of tourists, Dubrovnik Airport stands for being on holiday. For the airport's operator, Rittal and ABB stand for maximum IT security standards.

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► **Your opinion matters**
Do you have any questions, suggestions, praise or criticism about the current issue? Simply email the editorial team at: betop@friedhelm-loh-group.com



SNAPSHOTS

Reliable steel production

At first glance, steel production seems to be all about flying sparks and glaring light. But take a look behind the scenes and you will discover a sophisticated IT infrastructure. **thyssenkrupp Steel**, one of the world's leading suppliers of high-quality flat steel, uses modular, preconfigured edge data centres from Rittal in its operations. The two companies teamed up to develop custom solutions based on Rittal data centre containers (RDCC) directly at the production sites, enabling fast, secure and cost-effective IT capacity to be established at each and every location. The partners are continuing their work on the container-based edge data centres so that further custom requirements can be integrated into the solution in the future.

► www.thyssenkrupp.com







SNAPSHOTS

As the wind blows

If you've ever stood at the foot of a wind turbine and looked up high above you, you'll no doubt have been blown away by the technical construction of these 150-metre-high towers with 60-metre-long rotor blades. **Shanghai Electric Wind Power Group** from China is a leading manufacturer and supplier of these gigantic structures. The company produces onshore and offshore wind turbines, deploying software from Eplan during the electrical planning – Eplan Electric P8 and Eplan Pro Panel, for example.

 www.shanghai-electric.com



SNAPSHOTS

A bright idea

Deutsche Telekom is using multifunctional enclosures from Rittal in its drive to expand the broadband network. The aim is to provide 80 per cent of households in Germany with high-speed internet based on fibre-optic technology by the end of 2019. The upgraded network will be capable of sending even massive volumes of data at the speed of light. In support of this project, Rittal has supplied the telecommunications giant with 34,000 modular outdoor enclosures over the past four years.

► www.bit.ly/infrastruktur-highspeed



Solutions across the globe

Success stories. Energy, mobility, automation – customers around the world are rising to their challenges with the aid of products and solutions from **Friedhelm Loh Group** companies.



CANADA

Safety first

One of Canada's largest sewage plants is located on Annacis Island, where around 175 billion litres of waste water are treated every year for approximately one million residents. After almost 20 years, the pump systems' frequency converters needed to be replaced. To ensure the necessary infrastructure measures were taken quickly while not compromising on safety, the administration of the **METRO VANCOUVER** Regional District opted for enclosure and power distribution solutions from Rittal and software from Eplan.

USA

Flexible and adaptable

The United States is home to a switchboard manufacturer that specialises in complex control systems. The California-based company requires enclosures that can be easily modified, which made the TS 8 models from Rittal an excellent choice. For example, the company used these enclosures during the installation of one of Hewlett-Packard's largest 3D printers at the University of California in San Diego to assist with developing medical products.

LUXEMBOURG

Software expertise

Software support for all processes – from acquiring customers to manufacturing – can make things a whole lot easier. **LUXFORGE**, a leading supplier of metal structures for private, commercial and industrial purposes, put its entire IT infrastructure to the test. Cideon supported the company in the process, providing comprehensive advice and the right solutions throughout. The result was more efficient product development, consistent data throughout the company, and reliable end-to-end product data management processes.



GREAT BRITAIN

Smart saver

Whatever business you're in, unnecessary expenditure has adverse effects and is undoubtedly better avoided – provided you can identify where it stems from. During a visit to the Rittal Innovation Center in Haiger, Germany, **BURNELL CONTROLS** from Dartford discovered the Eplan Pro Panel software solution and the Perforex machining centre. Having since purchased both, the switchgear and control manufacturer is now reaping the benefits from the savings it has achieved in its processes.

GERMANY

A shoe factory made of glass

Corporate identity (CI) is becoming an increasingly crucial aspect of any business, even affecting what employees wear – from top to toe. One manufacturing company built a factory east of Frankfurt that can tailor the work footwear it produces to meet customers' specific requirements thanks to the CI factory's shuttle services and just-in-time principle. Rittal has installed five data centre containers to ensure processes in the glass building are safe and sound.



CHINA

Keep cool

SAIC-GM CHINA – a joint venture between General Motors and Shanghai Motors that employs around 58,000 workers at four production sites – is the fifth largest company on the Chinese automotive market. The automotive manufacturer came across Rittal during its search for new, energy-efficient cooling units. Following a trial run with a Rittal Blue e+ cooling unit, the company was won over by the energy savings made and placed an order for 50 units.



Collaboration. Nature shows how it's done – organised systems are more successful. This also applies to companies in the era of digitization. Above all, they could take a leaf out of the book on “forest algorithms”.

Text: Ingrid Kirsch

Wood Wide Web

“Nature is a successful business that has never gone bust in millions of years.”

Gudrun Happich
Biologist, bionics expert
and business coach

End-to-end networking, smart communications, optimal organisation and professional production. Nature shows how indispensable networking players, processes and information is for us nowadays – as much within individual companies as together with others in the same sector, players in different industries and fields, and even the competition. It also reveals how such networks and partnerships function efficiently and effectively, along the same lines as flora and fauna.

In effect, our woodlands and nature are nothing other than a Wood Wide Web. A wood-wide network of fungal filaments threading their way around the entire forest floor, acting in the same way as LAN connections in a computer network. The thin channels of the fungal hyphae ensure the essential exchange of nutrients, water and semiochemicals, while the trees transmit information to the plants that surround them. It's a sophisticated system of give and take in which thin, white fungal filaments – encasing the roots of trees and plants like wadding – embellish the intricate network to supply additional water and nutrients. Trees and plants “remunerate” them in the form of carbohydrates. This is not a bad deal, considering that their collaboration partners also spin a communications web for the trees and plants. Trees are connected both chemically and electrically via these fungal networks, which enable them to warn one another about pests or nourish their offspring with sugar solution.

But trees can do a lot more besides. They also transmit molecules above ground, releasing complex acids to ward off enemies, for instance, or gases to warn against approaching storms. In other words, the Wood Wide Web has many pathways and the trees are its most important servers. “Plants and animals constantly anticipate difficulties and can react faster to unexpected changes,” says the biologist, bionics expert and business coach Gudrun Happich, explaining the secret to survival employed by flora and fauna. “Nature is a successful business that has never gone bust in millions of years.”

**DECENTRALISED NETWORK WITH
CENTRAL DATA PROCESSING**

The renowned botanist Stefano Mancuso (University of Florence) is working flat out to decipher the algorithm behind Nature's network. He is convinced that plants are intelligent beings. What makes him so sure? It's because the world of plants – in contrast to that of humans and animals – is not

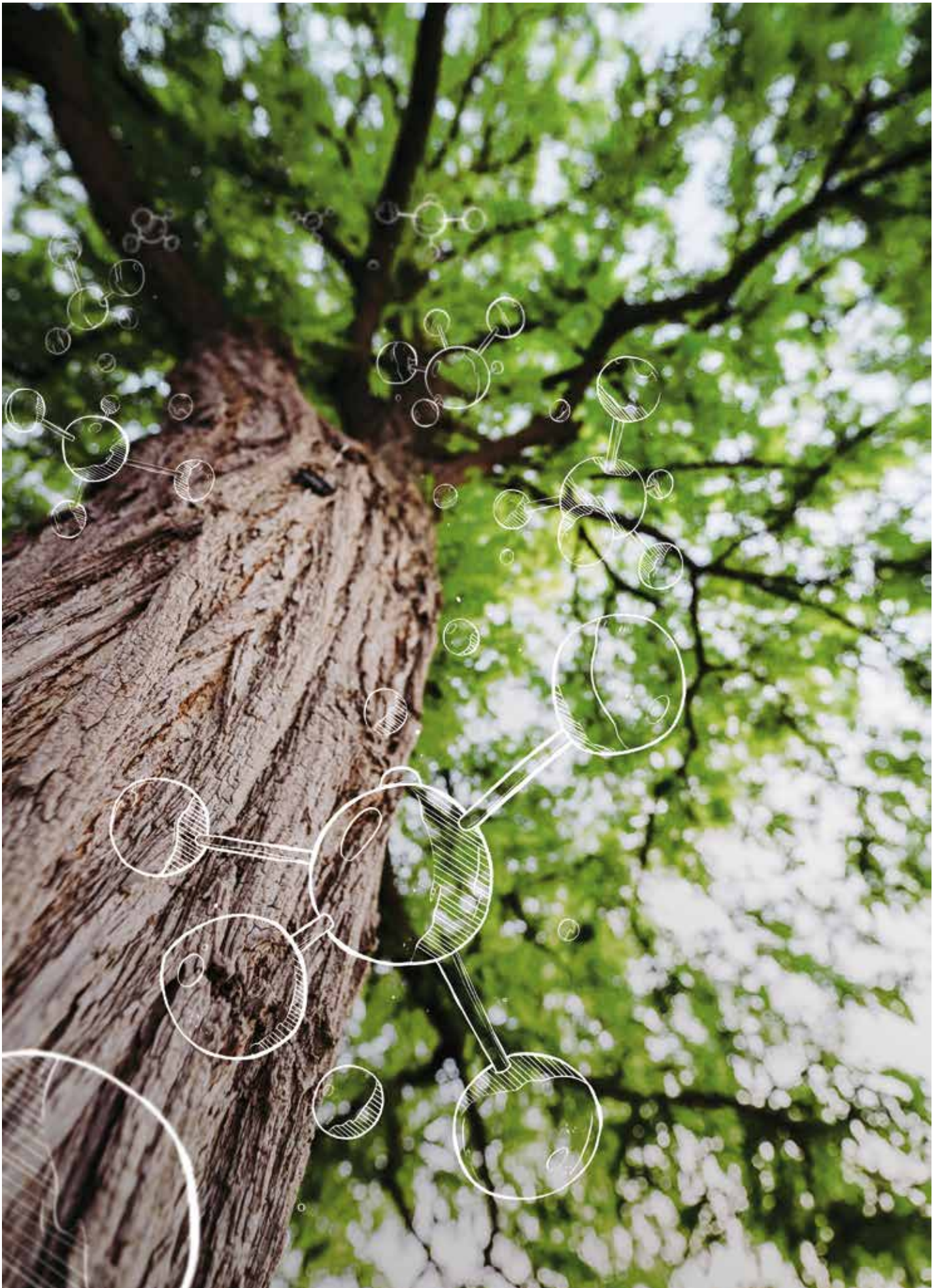
based on hierarchies but a decentralised network of equal elements. Instead of a central brain, trees, bushes and flowers use distributed intelligence – their root tips acting in the same way as data processing centres, and the individual plants forming a team that can react intelligently to its environment.

Thus the practice of sharing skills and knowledge is widespread in Nature and essential to the survival of species and ecosystems. When an ant finds food, it marks its return journey from the source to the nest with aromas. This makes the others more quickly aware of where to find sustenance. When bacteria cross paths, they instantaneously exchange gene sequences. This bacterial conjugation strengthens their resistance to medications. Ants like seeds because of the starch and sugar that they contain. They ingest the nutrients, clear the seeds from their nest, and in this way ensure that another blue flower blooms in exactly the same place next spring.

LEARNING FROM NATURE'S EXAMPLE

What can management experts learn from ants and bacteria? The necessity of sharing information transparently and accurately in complex organisations. Both within companies (for example, between different departments that are supposed to collaborate) and across company boundaries. In this case, a partnership only flourishes and bears fruit if both sides benefit – for

**CLEVER
WARNING SYSTEM**
Under attack! Trees use special molecules to sound an alarm above ground to neighbouring plants if they come under attack.



INTELLIGENT AIDES

Roots both anchor trees in the ground and absorb water and nutrients. However, some substances can only be accessed by trees via fungi, whose mycelium can stretch for several kilometres and thus supply all the nutrients they require.

example, in cases where manufacturing companies collaborate with companies that produce machinery. Production supplies data from the machines' sensors, while in turn the machinery manufacturers optimise their machines or provide smart maintenance services, all of which helps reduce downtimes.

However, the ultimate key to any partnership is honesty. Anyone who deviates from this rule loses out. Wild orchids, which use pheromones to attract insects as fake sexual partners, experience this first-hand. The victims of this duplicity neither forgive nor forget. Not only do they not return to the flowers, but they inform their fellow insects of this deceit. As a result, wild orchids are threatened with extinction. Fakers eventually fail – in Nature and industry alike. The same applies to any products and services that don't live up to the expectations awakened by lavish advertising.

It is vital to look well ahead. Plants and animals don't only react spontaneously to

external influences – they keep on adapting predictively to their environment. For some species, such as the redwood, a crisis becomes an opportunity. It grows in areas where wildfires destroy forests. This is because it takes fire to launch the tree's cones into the air and thus release its seeds. The lesson that companies can learn from this is to tackle change head-on and pro-actively instead of passively awaiting developments. This applies even more in times of upheaval. In other words, it's better to embrace the megatrends of the 21st century – digitization, networking and mobility – and develop new products and lines of business together with partners.





“Digitization means networks, not islands. This broader perspective is essential to seizing the best opportunities.”

Dr Karl-Ulrich Köhler
CEO of **Rittal International**

Networks replace islands

Digitization. Right now, networks are be-all and end-all in industry. Digitization has created a new form of coexistence between companies.

The divisions between sectors are becoming blurred, while industry and IT edge closer and closer together. Anyone wishing to remain innovative, should focus more intently than ever on strong and reliable partners. And on future-proof solutions.

Processing data in real time, operating high-performance IT systems right alongside their machines and facilities, and with short latency times in rough industrial environments – the services promised by the Secure Edge Data Center (SEDC) are as rigorous as our customers' expectations. It's

an attractive business model – but hardly achievable working alone. The solution lies in a strategic partnership – between ABB, Hewlett Packard Enterprise (HPE) and Rittal, which is based on clearly allocated roles. HPE is responsible for global sales of this solution. “HPE hit upon the idea of launching an edge solution on the market and was looking for the right infrastructure. We then developed an edge solution based on our standardised IT infrastructure,” says Andreas Keiger, Executive Vice President Global Business Unit IT at Rittal. “While HPE sees to the global sales of the SEDC, for example, we plough our expertise into providing the necessary physical armour – protecting the IT solution against theft, moisture, dust and dirt; all the adverse conditions that arise in rough industrial environments. Integrated cooling and fire protection are also included.” And the power supply? “That's provided by ABB.” Thus the synergies harnessed between the three partners have produced a solution like no other on the market.

BENEFITING FROM SHARED KNOWLEDGE

This example goes to show that sharing knowledge with others – in the way Rittal, HPE and ABB have done – can generate new and better digital solutions, expand a company's market coverage, attract more

attention and reach entirely new target groups. “Nowadays, customers expect end-to-end and certified solutions, they want to be able to use hardware and software straight away and expect first-class service once things are up and running,” Keiger says. “Such wish lists can only seldom be covered with one company's portfolio alone.”

Anyone stuck in their ways will get left behind. Those who seek to solve every task single-handedly – because they trust only themselves or think along traditionally narrow, sector-specific lines – will lose their place amongst the innovative pioneers. After all, disruptive ideas long since broke through the boundaries between sectors, and successful start-ups don't even consider the concept of sectors in the first place. When it comes to traditional companies, they will only be able to secure their future by joining forces with others to creatively combine their complementary skills to form revolutionary new constellations. It's not without reason that Keiger considers “the ability to collaborate” the key characteristic for managers. He says that anyone seeking to remain creative must know whom to collaborate with for which purpose – and be able to convince their desired partners of the benefits to be gained from joint ventures.

Such alliances go way beyond the kind ▶

of collaboration we could ever have conceived in the past. It's no longer about striking up partnerships with suppliers or customers simply to facilitate marketing and boost sales. Nowadays, we're talking about entirely new digital business models – which frequently carve right through conventional sectors. Thinking in boxes is a thing of the past, replaced by working in a shared world where the most diverse branches of industry move closer constructively. For example, in the way that the clothing industry has started teaming up with companies in the IT sector to co-develop “wearables”, turning T-shirts into prêt-à-porter computers, or how personalised medicine combines pharmacy, diagnostics, medical technology and IT.

**NEW DIGITAL
BUSINESS MODELS**

“Future-focused companies have now started to move on from traditional, linear value chains to increasingly work in decentralised value networks,” says Marion Weissenberger-Eibl, the Director of the Fraunhofer Institute for Systems and Innovation Research (ISI) and Professor of Innovation and Technology Management at the Karlsruhe Institute of Technology (KIT). “This is the only way for companies to manage the increasingly complex tasks that they face, harness synergies and remain competitive.” (See the interview on page 22.)

Nowadays, collaboration goes as far as companies sharing what used to be their most closely guarded data. According to a PwC survey from April 2018, this has led three quarters of all medium-sized and large businesses in Germany to share their data with others – not only with customers and suppliers, but also with companies in other sectors (21 per cent) or even rivals (15 per cent). The aim is to digitize their own business models and tap into new sources of revenue.

If all goes well, those willing to share their sector expertise stand to gain a new business model – which increasingly crosses the boundaries between sectors. For example, Rimowa, Airbus and T-Systems jointly developed an intelligent case. Audi is working together with the Korean car manufacturer Hyundai to develop innovative battery technologies for electric vehicles, and Continental and Nvidia are collaborating to develop intelligent technology for autonomous vehicles. Joining forces makes companies stronger.

A study of “Collaboration as a driving force behind innovation” conducted by the German Aerospace Centre revealed how

**INTELLIGENT
COORDINATION**

When an ant finds food, it marks its return journey from the source to the nest with aromas. This makes the others more quickly aware of where to find sustenance.



SMEs boost their innovative success with collaborative ventures. Innovation management and collaborative management now go hand in hand in the same way as data centres and server enclosures. The one is inconceivable without the other. This is particularly true for collaborations between large corporations and medium-sized companies in traditional sectors, aimed at tapping into future markets and offering their customers networked services, for example. In such cases, they have no choice but to work closely together with information and communications companies or digital start-ups.

After all, networked products are complex undertakings that usually require a broader spectrum of expertise than can be found in a single company. This increasingly leads companies to cooperate intensively with others – in search of technical solu-

tions from other sectors that they can adopt via collaboration. Or to co-develop new services and products with partners in other fields of industry.

**BOOSTING PRODUCTIVITY,
SETTING STANDARDS**

However, it also makes sense to network with others in the same sector. Rittal, for instance, teamed up with its sister company Eplan and the connection and automation technology manufacturer Phoenix Contact to create the “Smart Engineering and Production 4.0” technology network. The three businesses aim to use Industry 4.0 applications to pave the way for boosting SMEs’ productivity and setting universal standards for data and data communication – to investigate how end-to-end data models can be used to automate the entire enclo-



sure production, for example.

Users stand to gain 40 per cent in efficiency thanks to seamless digital connections between engineering, materials management, production planning and production – making manual actions superfluous and eradicating cumbersome switches between media. Each of the companies involved in this project was willing to share its own knowledge to achieve this digital added value. Eplan contributed its engineering prowess, Rittal its expertise in enclosures, and Phoenix Contact the electronic components. “Digitization means networks, not islands,” says Dr Karl-Ulrich Köhler, the CEO of Rittal. He therefore calls for a collaborative effort to create new standards and trusting partnerships, pointing out that companies’ future survival depends upon linking up with others to strategically plan digital transformation. “This broader perspective is essential to seizing the best opportunities for continuing competitiveness.” As long as the knowledge flows in both directions, that is. After all, it’s clear that opening up in this way not only increases the opportunities for growth and profitability, but also makes companies vulnerable. In other words, anyone seeking cross-sector cooperation needs to think beyond safeguarding their own position: “Every company should take precautions to ensure it doesn’t lose out in either the long or short term,” according to networking expert Weissenberger-Eibl. ■

New forms of collaboration

The Friedhelm Loh Group is collaborating with numerous partners in MindSphere World to develop the IT system for the future.

Rittal was one of the founding members of this platform together with Siemens, Festo and Kuka, among other companies. The aim of the association is to keep on developing the MindSphere open operating system around the world and thus advance the Internet of Things. MindSphere’s structure helps producers to integrate machines and sys-



STRONG COMMUNITY

Rittal was one of the 19 prominent companies that came together to found the MindSphere World association.

tems and to develop apps independently from specific manufacturers. The companies are also working on standards for creating a global ecosystem for the Internet of Things. Blue e+ cooling units or chillers, for example, can be networked via IoT platforms such as MindSphere.

IoT-capable cooling systems can be used to gainfully evaluate and represent data. This will make it possible to anticipate, plan and design all kinds of after-sales services more effectively under the banner of predictive maintenance.

Interview. Prof. Marion Weissenberger-Eibl, Director of the Fraunhofer Institute for System and Innovation Research, talks about the benefits to be drawn from collaborations, the role of digitization in networks, and trust as the basis for innovation.

Interview: Manfred Engeser

Professor Weissenberger-Eibl, companies are working together with research establishments, large corporations are collaborating with start-ups – even rivals are joining forces. It seems that organisations can’t function any more without networks and collaborations. Did companies use to be more powerful in the past? The concept of a company developing an innovative idea on its own and creating demand this way is an ideal scenario that seldom occurs. Innovation processes are much more complex than that. It really is becoming increasingly important to look beyond your company’s confines. It’s no longer enough to conduct research and then bring a finished product to market. Companies need to change their perspective.

In what way? Instead of looking from the inside out, they need to develop an innovation strategy from the outside in – to forge partnerships. To start by gaining an understanding of what is going on beyond their immediate horizon, and then to consider how the company can contribute to meeting the challenges people face in the outside world. This calls for a concentrated search for potential, but also for clever marketing and strong collaborations between everyone involved in the innovation process. I am certain that forming networks improves your chances of being heard, compared to going it alone.

Where would you say this shift in paradigm towards cooperation stems from? In part from digitization and the associated increase in networking. Our research shows that digitization acts as a catalyst for collaborative forms of business in industry. This





PROF. MARION WEISSENBERGER-EIBL, 52, is the Director of the Fraunhofer Institute for System and Innovation Research and holds the Chair of Innovation and Technology Management at Karlsruhe Institute of Technology. She is also a member of the supervisory boards of HeidelbergCement, Rheinmetall and MTU Aero Engines.

explains the success of carsharing or pay-per-service models, for example, which involve the widespread sharing of knowledge or usage of goods. Sharing and exchanging material and digital goods this way will continue to increase enormously, which stands to benefit highly digitized small companies, above all. Innovative ideas will no longer only be developed on consumers' behalf, but increasingly in collaboration with them.

Can you give an example? Our "Patient Science" project is examining how people suffering from a rare disease can be involved in the research process – for instance using health apps or wearable tracking devices.

Consumers playing an active role in these kinds of networks might be new. However, the division of labour has been the bedrock of our economy since the dawn of industrialisation almost 200 years ago. Back then, innovations often emerged along clear technological system boundaries and generally progressed through classical development phases. Nowadays, we are experiencing a shift towards open innovation processes occurring at technological interfaces that until now were not linked in any way.

What do you specifically have in mind?

Such as research into batteries and the automotive industry, which developed quite independently from one another for decades but now collaborate intensively. The trend towards creative start-up hubs and co-working spaces also shows how the division of labour has changed. These places offer a high level of innovative potential by mixing interdisciplinary knowledge with free space for creativity – which provides very fertile ground for start-ups. Global players (such as Bosch or Siemens) are also discovering the potential that lies in these work formats. Our research shows that flexible high-tech companies with a strong interdisciplinary focus enjoy a strategic competitive advantage over their rivals in the globalised economy.

What does it take to turn a network into a competitive advantage? A good network ideally involves give and take. This applies to both sharing knowledge and dialogue. Personal recommendations are also very important for gaining access to networks and weighing up whether a particular network is of interest. I am certain that networks present more opportunities than risks. Good networks are based on

mutual trust – and trust is a valuable commodity in our digitized, globalised world. It is important to approach one another open-mindedly and to initially give others the benefit of the doubt. Only then can we get to know the other party's strengths and weaknesses. The stronger and more trusting this connection, the more robust my network will be – and the more likely it is that synergy effects will emerge, to everyone's benefit. And these are exactly what we need to tackle 21st-century challenges such as climate change and other big issues.

In times when data theft is rife, this trust can quickly prove damaging.

Any data that belongs to a company's DNA is certainly sensitive. Revealing information that forms part of a company's core skills would endanger its competitiveness quite significantly. However, it's impossible to ever entirely rule out any risk of someone else siphoning off your intellectual property. I believe it would be a mistake to forego all cooperation for fear of risking too much transparency. Transparency is an important motor of innovation. I am certain that, with all this in mind, it makes sense to invest in honing employees' digital skills. We must enable people to handle technology sensibly, together with the associated opportunities and risks, and equip them with a thorough understanding. Lacking this core digital competence could make things difficult in the future. Germany still has some catching up to do in this regard.

Who is ahead of the game? Companies such as the consumer goods corporation Procter & Gamble, for instance, which had already realised a good 20 years ago that there were millions of researchers worldwide that were at least as skilled, if not more, than its own staff. This led it to set the aim of increasing the proportion of external collaborations to 50 per cent – with great success. Prior to this change in strategy, P & G had been one of the more cautious companies, focused on protecting its own patents and licences. Nowadays, it is one of the world's most prolific patent holders, in part due to the many innovative products born from cooperation between internal and external research departments. All because senior management knew that: "Innovation means forging new links." ■

EXPERTISE



Engineering

Automating processes

What is the best way to incorporate automated engineering into an end-to-end value chain? This question was at the heart of the 6th EEC Forum.

Around 200 guests from companies in Germany and abroad were involved in the Eplan EEC Forum in Neuss in September. In workshops and presentations, the participants discussed the topic of Industry 4.0 in practice. This two-and-a-half-day

event focused on end-to-end, automated processes along the value chain – from processing order to engineering and production. These tasks offer the perfect opportunity to put Eplan Engineering Configuration (EEC) to use. Using EEC,

wiring and fluid plans can be created automatically, as can 3D enclosure designs, PLC programs, documents and even mechanical engineering models.



Investment

Plymouth is growing

Over the next few years, Rittal will be investing approximately 3 million pounds in its production plant in Plymouth, UK, creating over 100 new jobs. This plant is part of Rittal's global production network and is used for the development and production of highly innovative products.



OPEN
Compute Project®

Open Compute Project (OCP)

Meeting of experts

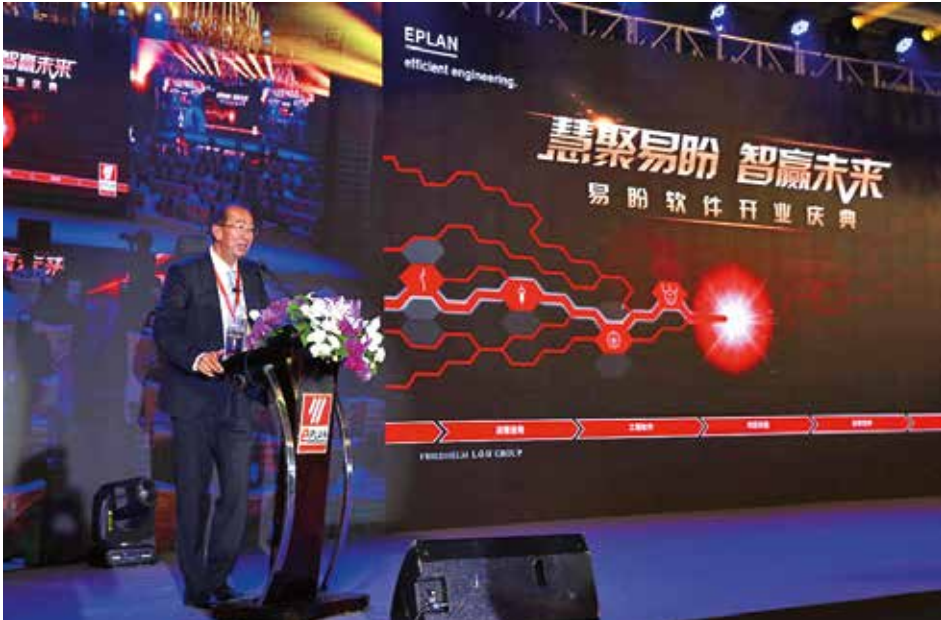
Rittal appeared as a bronze sponsor at the 2018 OCP Regional Summit in Amsterdam in early October, a two-day event, where managers, engineers, developers and suppliers discussed and shared information on OCP-related trends. Rittal sent two members of its team – Resul Altinkilic, Product Manager Global IT Key Accounts, and Steven Moore, Project Engineer – to answer any questions about busbars.



Smart wiring

Wired

Eplan is unveiling the upcoming version 2.8 of Eplan Smart Wiring at SPS IPC Drives. Three striking new features are included in the latest update of this wiring software used in the construction of enclosures and switchgear – the option to divide tasks into sub-projects, a new test mode to support production and enhanced transparency for software users.



Shanghai

Eplan is growing in China

In June 2018, 230 guests from the worlds of science, business and politics celebrated the opening of the Eplan branch in Shanghai, China. During the ceremony, Managing Director Haluk Menderes said: “We want to continue growing in China –

and we will. The conditions are exceptionally well.” At all ten of Eplan’s Chinese branches, the objective is clear – to drive forward intelligent manufacturing there with leading engineering design.



Data centres

Close partners

ABB and Rittal are expanding their global strategic cooperation. Both companies are stepping up their joint activities in data centre infrastructure, with the aim of ensuring that regions like North and South America, Asia and Europe, in particular, benefit from higher security and availability in the future. “Our turnkey, tried-and-tested solutions help companies provide the IT infrastructure required for secure edge computing or other smart applications in order to realise the added value that digitization offers industry,” says Andreas Keiger, Executive Vice President Global Business Unit IT at Rittal.

Cloud computing

Well connected

Value-adding processes need to interact seamlessly and ensure data consistency. A new solution is set to streamline these processes for product manufacturers. “The new Cideon Cloud CAD Integration connects state-of-the-art cloud-based CAD systems with SAP,” says Rolf Lisse, Head of Development at Cideon. A connector links the design data from the CAD application with that of the SAP system, thus enabling solutions to be delivered quickly using the SAP cloud platform. This advantage of this is that it makes design data available across the entire process chain, and material master records and parts lists can be created and updated automatically. Lisse says about the new SAP link: “Our Cideon cloud strategy gives users long-term investment and planning security along the value chain.”

Plastic

Certified

For the first time, LKH has been certified to DIN ISO 14001. Environmental credentials play an important role in many areas of the plastics specialist’s activities. For example, the company makes sure to procure climate-friendly raw materials that it can use responsibly and efficiently. It also grinds in the waste from sprues during the manufacturing process. The certification has a positive influence on much more than just the company’s image – before placing an order, many customers also enquire about the supplier’s environmental sustainability. “This takes us another step further towards excellence,” says Holger Gerhards, Head of Quality Management at LKH.



Change of staff

New management

Sebastian Seitz took over as Managing Director of Eplan and Cideon in August 2018. “His excellent market knowledge, strategic foresight and deep understanding of future strategic business models in software are an important prerequisite for continued development,” says Dr Karl-Ulrich Köhler, CEO of Rittal International. Seitz became the Managing Director of Cideon Systems in 2006 and has worked for the Friedhelm Loh Group since 2013. Prior to his new position, the 47-year-old physics engineer was the COO of Eplan and Cideon.

Confidential channels

Making the connection.

Removing obstacles – bringing people together. The Store Share View cloud concept from **Eplan** overcomes long-established barriers in the product lifecycle, resulting directly in measurable time savings.

Text: Ulrich Kläsener

Industry has long known about the benefits of the cloud – at least as far as the theory is concerned. Now the focus is on the practical aspects. With the Store Share View cloud-to-cloud connection, Eplan and Lenze SE are showing what creates new added value. The name Store Share View says it all. The solution enables Eplan engineering projects to be stored in the cloud, where they can be viewed and commented on by those involved using any end device. This is reminiscent of the basic principles of logistics, which specify that the right information needs to be available in the right state in the right place at the right time.

Who benefits from smart access to data that is always the same, regardless of time or location? Besides the various departments of companies with in-house product development operations, this also naturally includes customers and users, who are keen to have their say right from the product creation process. Other beneficiaries are suppliers, partners, users and maintenance engineers, some of whom are located in far-flung parts of the world. “These are genuinely necessary collaboration scenarios, some of which are still costly today,” says Eplan Product Manager Claas Schreibmüller. After all, he explains, if there is a lack of connectivity, exceeding timeframes, overstretched budgets, loss of quality and frustrated customers would become a serious problem.

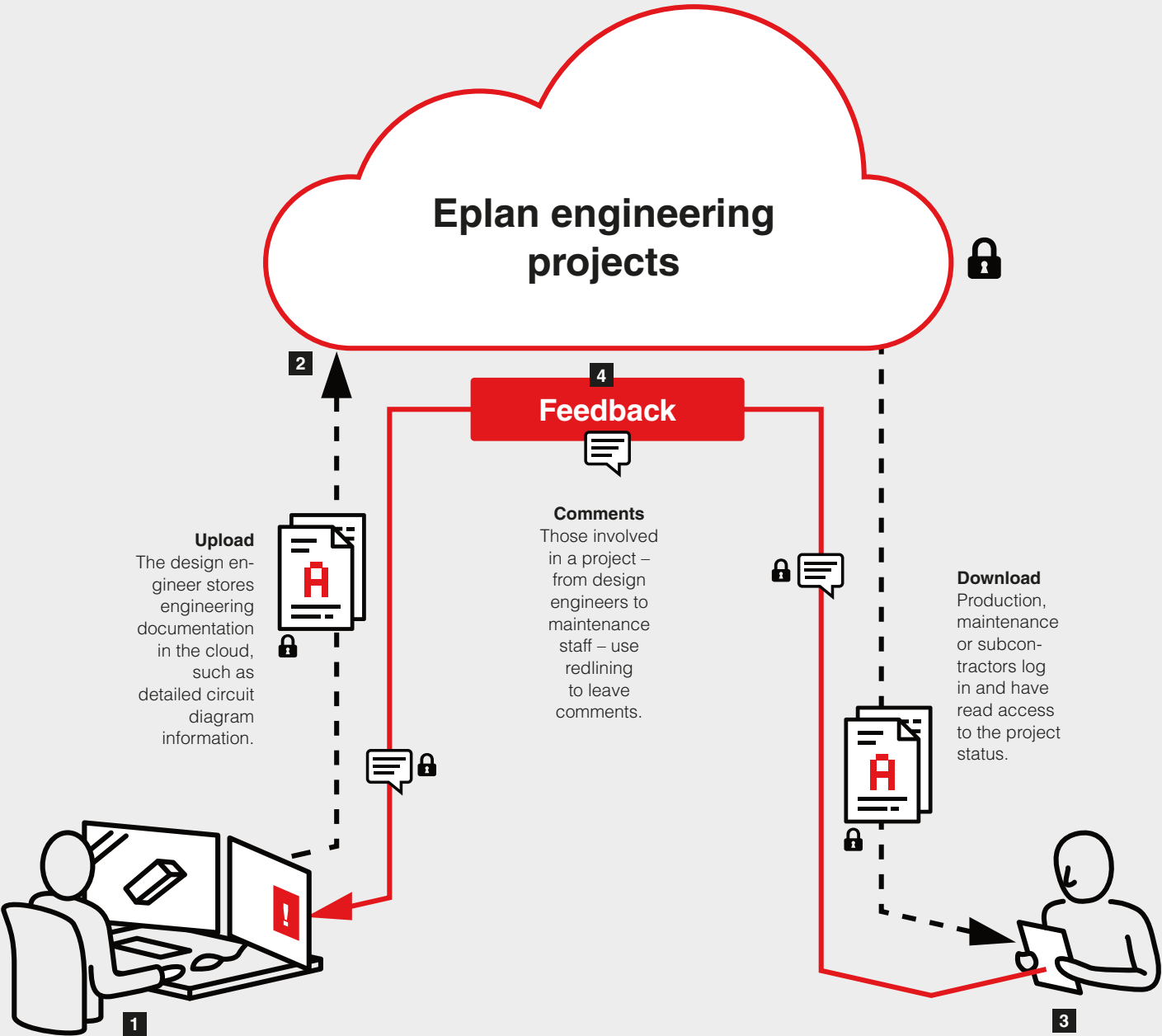
The new alternative is taking shape in a pilot project, where Eplan and Lenze SE – a manufacturer and developer in the fields of drive technology and automation – have taken things to their limits. Two of their clouds – the Lenze Asset Management System and the Eplan Data Portal – dock with each other using Store Share View from Eplan and continuously share information. The Lenze Asset Management cloud solution notifies the maintenance engineer about all the relevant components of a machine (asset). The Eplan Data Portal is a cloud-based online database comprising hundreds of thousands of equipment and component data records, including those of Lenze. Eplan users can drag and drop this data into their Eplan project. Once the component is designed, manufactured, delivered and taken into operation, the maintenance engineer comes into play. They can log into the Lenze cloud at any time and check items such as wiring schematics and parts lists during servicing. In this process, the maintenance engineer automatically accesses the Eplan Data Portal and thus the original documentation stored in the Eplan project via Store Share View. “The customer therefore has an overview of all equipment installed in the system,” says André Luhmann, Product Manager Digital Services at Lenze. “This significantly reduces the incorporation time for assets.” ■

“Manual updates are replaced by fully digitized cloud-to-cloud applications.”

André Luhmann
Product Manager Digital Services
at **Lenze**

Barrier-free working

Everyone involved benefits from Store Share View, as shown by the following example of planning and designing switchgear.



It's never been so easy to move into the cloud. Store Share View from Eplan enables users to log in via their web browser, view a project, make comments using the redlining function and highlight progress without having to install anything. The solution, developed on the basis of Microsoft Azure, acts as a hub for all relevant engineering information and as a meeting point for everyone involved in a project. A defining characteristic of the Eplan cloud is communication at the highest level based on the company's clear security and compliance models, both for the workflow and in terms of the security architecture. Engineering know-how is protected against unauthorised access by manag-

ing access options. Assignment of rights itself is the responsibility of the customer's relevant department.

With the appropriate authorisation, users can access up-to-the-minute data at any time, anywhere in the world, via a PC, tablet, etc. The design team performs the first step by uploading the generated engineering data **1** from the Eplan project into the cloud **2**. This may include circuit diagram information that downstream departments need. Thousands of pages of printouts are eliminated, with the paperless workflow cutting costs and improving communication processes. This becomes even more important as the number of people involved in a

project rises. Who relies on the information? Enclosure construction, commissioning and maintenance teams, for example **3**. This includes in-house staff, customers, third-party suppliers and subcontractors. They can read the original documentation and use redlining to add comments **4**, which ensures the product history is consistent and clear for everyone throughout a product's lifetime. Ideally, the commissioning and/or maintenance teams introduce a feedback function by making suggestions for optimisation to the design engineers via Eplan Store Share View.



Experts wanted

Shortfall in specialists. The control and switchgear engineering sector is flourishing and orders are coming in thick and fast – yet the lack of specialists is still a great cause for concern among companies in the industry. **Plenge GmbH** from the German town of Oelde has concocted a winning recipe – exceed the capacity for young trainee positions, deploy specialists efficiently and tap into the opportunities opened up by automation across the board.

Text: Dr Jörg Lantzsch and Hans-Robert Koch

We have plenty of craftsmen in the family, but no electricians as of yet.” It was for a somewhat unusual reason that Noah Suedhues took up a training position at Plenge GmbH in Oelde/Münsterland three years ago. This summer, he completed his training to become an industrial engineering electrician, but before his training had even finished, Suedhues was invited to join a colleague to commission a project at a customer’s premises – a true sign of trust in Suedhues’s eyes. “Coming into direct contact with the customer during the on-site commissioning and the diverse tasks in our workshop really spurred me on,” he points out. When the company then offered to keep him on after his training, he didn’t need long to mull it over: “I said yes there and then.”

The number of trainee positions at the family-run business Plenge GmbH based in Oelde – which carries out electrical and control system engineering projects with some 70 employees – actually exceeds capacity. “If we can, we hire three or four trainees so that we can take them on as qualified staff after they’ve completed our trainee programme,” explains Wilfred Schnieder, who is responsible for HR matters within the company. “After all, trained, qualified staff are extremely hard to come by.” What’s more, some trainees decide to head to university once they’re fully trained. But recruiting trainees isn’t exactly plain sailing in the first place. Fifteen years ago, there were still around 50 applicants each year for each trainee position – today the figure is only around ten.

To make matters worse, applicants’ qualifications often don’t meet the company’s requirements.

EFFORTS ON MANY FRONTS

“It doesn’t always go as smoothly as it did with Noah,” recounts Nicholas Visser-Plenge, the control system and switchgear engineering company’s General Manager. Plenge uses any opportunity it can to win over young trainees, such as taking part at every training fair held in both Oelde and neighbouring towns. “We also attach great importance to a positive working atmosphere as this secures the company a positive image and consequently draws in applicants,” says Visser-Plenge. In order to retain qualified staff, the business offers numerous opportunities for further training and development, such as in hardware or software engineering. “Dedicated employees can make a career for themselves at our company. Many staff who now work in the electrical planning department were previously qualified team members in the workshop.”

The shortfall in specialist staff isn’t new, with Germany’s unemployment rate continuously falling since the last review was conducted. Although the rate currently still stands at around five per cent, many businesses are finding it increasingly difficult to find trained applicants, which is partly down to the fact that many jobseekers don’t possess sufficient qualifications. Another reason is that unemployment is very unevenly distributed across Germany. In many districts in Bavaria, Baden-Württemberg, Hesse, Lower Saxony and North Rhine Westphalia, the rate is approximately two per cent. Here, specialists talk of ‘full employment’. Companies in these regions sometimes have extreme difficulty in finding any applicants at all – finding qualified specialists is practically impossible.

UNFAVOURABLE CONDITIONS

The control system and switchgear engineering sector is particularly affected by the shortfall in specialists. Companies are often located in well-developed areas in the vicinity of customers in the mechanical and plant engineering business, chemical industry or other sectors that also have a large number of positions to fill. “Because the control system and switchgear engineering sector mostly receives orders for very small batch sizes that follow the particular customer’s specifications – often, it’s for a one-off piece –



NO TWO DAYS ARE THE SAME
 Noah Suedhues (left) stayed on after his training due to his enthralling experience in the Plenge GmbH workshop.

qualified staff are an absolute must,” says Visser-Plenge.

To add to the problem, many jobs in the workshop still need to be done by hand. The Fraunhofer Institute for Mechatronic Systems Design (IEM) conducted a review as part of its “Digital in NRW” project, which revealed that simply wiring an enclosure takes up 50 per cent of the overall time spent working on it. Further labour-intensive jobs include machining enclosures and fitting the necessary components onto mounting plates.

One way that control system and switchgear engineering companies can counteract the shortfall in specialists is to automate processes on the shop floor, focusing primarily on the long list of manual jobs that don’t call for any special qualifications. “The fact that a trained electrician cuts cable ducts and support rails to length and screws them onto an assembly plate is anything but efficient,” says Visser-Plenge. Most of the time, these types of processes can be easily automated. If trained work-

ers are then able to concentrate on the remaining specialist tasks, workshop productivity rises without the need to hire any additional staff.

OPPORTUNITIES OFFERED
 BY AUTOMATION

Nowadays, automated solutions are available for many of the tasks described above. One typical example is machining enclosure panels. Perforex CNC machining centres from Rittal Automation Systems are specifically geared towards the challenges of switchgear manufacturing. Drilling, milling, cutting bolts – they can do it all. An automatic tool-changer and a magazine that can hold up to 20 tools means all the work can be done in one go – the operator doesn’t have to lift a finger. The machining centre is suitable for every material commonly used in switchgear production such as steel, aluminium, copper and even plastic. Mounting plates, doors and even entire enclosures can be machined quickly and with precision.

Laser machining centres are the ideal choice for machining stainless steel enclosures. This year, Plenge decided to invest in this kind of machining centre from the Perforex LC range. “50 per cent of our orders involve stainless steel enclosures. The laser machining centre enables us to complete our long list of orders requesting stainless steel enclosures with a great deal of efficiency,” says Visser-Plenge.

Even for SMEs the payback period for these kinds of machining centres is relatively short, often lasting just two to three years – depending on the number of enclosures machined each year. “When we were deciding whether to invest, we didn’t have to think very long about the payback period because the benefits were plain to see,” recalls Visser-Plenge.

Other control system and switchgear engineering tasks, such as cutting support rails and cable ducts to size, fitting terminal blocks onto support rails or assembling cables, can be automated – even the labour-intensive job of wiring can be

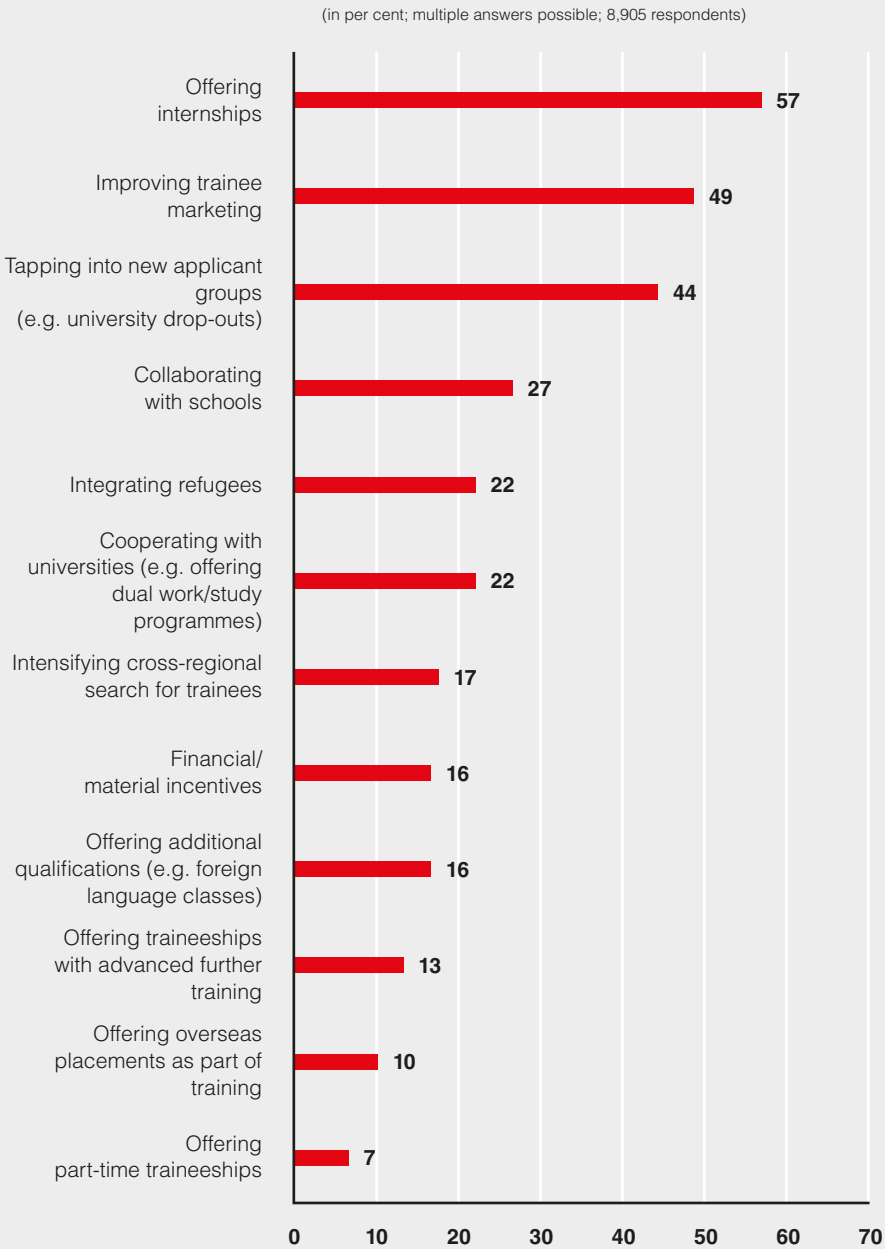



“Our number of trainee positions exceeds capacity to ensure we have enough trained staff.”

Nicholas Visser-Plenge
General Manager at **Plenge**

Trends in trainee recruitment

Some 10,335 companies – more than a quarter from industry – took part in the “Training 2018” online survey conducted by the German Chamber of Industry and Commerce (DIHK). The findings revealed that one in three companies in Germany are failing to fill their trainee positions. Trainee recruitment and new incentives are vital to ensuring a fresh supply of trained staff in the future. The following graphic shows how companies are tackling this challenge.



**Further information**

about the DIHK’s “Training 2018” survey can be found (in German only) at:
bit.ly/ausbildungsumfrage-dihk




optimised. The Smart Wiring software tool from Eplan supports employees when fitting wires inside an enclosure, showing all the individual connections that have to be wired on a tablet. Besides the start and end point, the software also maps out the colour, cross-section, wire end preparation and connection point designations. If a virtual prototype has been created for the system in Eplan Pro Panel, the route for the wire or cable can also be depicted.

**COMPLETELY OPTIMISED
WORKFLOWS**

Achieving maximum efficiency in the workshop calls for all processes to be digitized. The circuit diagram generated during electrical planning and the virtual prototype form the basis for all subsequent working steps. The more detail that goes into the planning, the more efficient production can be. Digitization is seeing some tasks in the workshop being outsourced to the planning office, which generally means projects can

be completed with a lot less manpower. Visser-Plenge is just one of many who have discovered that such solutions boost efficiency, having recorded a significant increase in machining efficiency thanks to the new Perforex LC. Previously, two employees were charged with machining – one of whom can now see to other tasks in the workshop. “To ensure everything goes perfectly, one of the things we need is for data to be stored consistently – from electrical planning and work preparation through to manufacturing and the ERP system,” explains Visser-Plenge. State-of-the-art automated solutions also help to boost employee motivation, as Suedhues’s statement shows: “I’m already looking forward to working on the new laser system in the future.” ■

HARNESSING AUTOMATION
The man at the machine – Plenge employee Jerome Gröning (right) is introducing Perforex into the company.



You can find an overview of the solutions for control system and switchgear engineering from Rittal at: www.rittal.com/ras

Why system engineers are opting for automation

Solutions from **Rittal Automation Systems** and **Eplan** offer clear-cut advantages. But don't take our word for it, listen to what Plenge GmbH from Germany and other European control system and switchgear engineering companies have to say. Users and experts from Italy, the UK and Austria share their opinions. A recurring theme is that they all believe Perforex machining centres and laser centres, in conjunction with Eplan solutions, boost capacity and process efficiency, enhance quality and open up new opportunities for growth.

STRONG GROWTH

"We are a growing company. Every year, we grow by between 15 to 25 per cent. Thanks to Perforex LC, we are positive we will grow even further in 2018."



Friedrich Gartner
Managing Director,
Gartner Elektrotechnik,
Austria



MUCH FASTER

"One of our projects, where it previously would have taken four hours to machine the enclosure, is now completed in 20 minutes – and to a higher standard of quality."

Adam Wilson
Production Manager,
Pneumatechnique, UK



MORE EFFICIENT

"It doesn't make any sense to deploy our highly trained staff to carry out basic tasks such as drilling holes."

Jim Venters
Managing Director,
Pneumatechnique, UK

INCREASED CAPACITY

"We have been able to increase our capacity significantly since we introduced Perforex into our production workflow."



Franco Ferrari
Managing Director **IEMA,**
Italy



BETTER QUALITY

"Eplan Pro Panel and Perforex allow us to standardise our processes and improve quality – all that in a lot less time."

John Blake
Director, **Burnell**
Switchgear & Control, UK



Forever identical

A true trailblazer. The digital twin plays a key role in digitalization, helping companies expedite innovations and boost productivity.

Text: Sonja Koesling

According to research on twins, their genetic features are not the only reason they feel, think and act alike. External environmental influences are also a factor. Common experiences cause twins to develop in the same way. Scientific research into what it is to be a twin dates back almost 150 years. By comparison, research focusing on the virtual equivalent – the digital twin – is still in its infancy. Despite that, the digital twin has become synonymous with the industrial revolution and is feted as a key trailblazer accompanying Industry 4.0.

According to IDC FutureScape 2018, just two years from now, 30 per cent of the world's 2,000 largest companies will be using data from digital twins to improve the success rate of product innovations and raise productivity. The market research company is forecasting productivity gains of up to 25 per cent. Gartner, another market research company, also sees digital

twins as a positive development. It predicts that half of large industrial companies will already be working with these virtual avatars by 2021 and improving their productivity by up to ten per cent as a result.

NEW VALUE CREATION

"The digital twin opens the door to new, exciting areas of business for industrial companies," agrees Prof. Rainer Stark, Chair of Industrial Information Technology at the Technical University of Berlin and Director of the Virtual Product Creation division at the Fraunhofer Institute for Production Systems and Design Technology IPK, whose research in this field dates back ten years. "Value creation used to be confined to the real world, but the digital twin is now laying the foundation for companies to obtain information from the actual product life cycle for further processing. This gives models that have to date been restricted to the start

of the development chain a new value creation component and they now accompany a product throughout its entire life cycle," he explains.

In the automotive industry, for example, this could help create a more customised driving experience by offering additional functions that suit a particular driving style. Use-based findings could also be incorporated into the design of further models. In the production environment, there is potential for deviations from the norm to be detected and rectified faster because problems such as tool wear would be identified at an early stage. Ad hoc changes to production workflows would also be conceivable, with their effects being simulated prior to commissioning. According to industry association Bitkom, the economic potential of all digital twins in the production sector will total over 78 million euros by 2025.

AN EMPATHIC NATURE

This is all down to the nature of the digital twin. "The way the digital twin is interpreted varies a great deal. According to our definition, it's the digital depiction of a specific product, using models, information and data to define this product's characteristics, status and behaviour. It's based on a digital master – the original virtual model according to which the product is to be manufactured," says Stark. In the digital master, developers define what the product will look like and how it will work. Attribute models are then added. These computation models provide information about what happens if the product starts vibrating, how it reacts to impacts or collisions, how it is opened and closed, and so on.

"Some people believe that's all there is to the digital twin, but our definition goes further. Each product creates a digital shadow with operating, status and process data. Only when a link is created – that is to say an intelligent connection between digital master and shadow – do we have a true digital twin," Stark continues. In other words, the digital master is enhanced by real data from actual product usage and thus enables conclusions to be drawn and changes or optimisations to be tested and implemented.

However, the concept can only work if companies adopt a software-based design approach. "Many mechanical and plant engineering companies currently still rely on a mechatronic design approach in which functional integration is followed directly by physical integration in the form of a prototype," explains Stark. The majority of

companies will need a rethink to bring about the digital transformation. They will only succeed if rigid process chains are broken and replaced by functional units that communicate with each other. The key to a common language lies in standardising data formats. The data structure constitutes the DNA of the digital twin.

SIMPLY A MATTER OF NEGOTIATION

The Smart Engineering and Production 4.0 technology network is devising a solution for vertical data integration in the engineering and production process. Based on the example of an enclosure, partner companies Eplan, Rittal and Phoenix Contact are creating a digital twin to accompany the product throughout its life cycle – from development and commissioning to operation and maintenance. “Detailed digital descriptions of the product’s individual components, functions and special features form the basis for this. Given that eCI@ss is becoming established as the global standard-compliant solution for classifying products and describing them unambiguously, manufacturers are already feeding component data in this format into the Eplan Data Portal,” says Eplan Product Manager Thomas Weichsel. “This represents a practical additional benefit for our company because it makes accessing product information very straightforward – by scanning in a QR code, for example,” adds Dr Andreas Schreiber, Head of Business & Product Innovation at Phoenix Contact. The main potential as he sees it lies in the ability to make the entire product life cycle more efficient and transparent, with all relevant product features available in a standardised form for both engineering and production processes. “That dispenses with the subsequent time-consuming manual steps of obtaining this data and entering it in the system,” says Schreiber. Enclosure manufacturer Phoenix Contact is therefore using Eplan Pro Panel software to design a 3D model that already provides full details of the individual wires, equipment, terminal blocks, wire bridges and signage as well as the component machining processes required. The digital master is now defined.

Efficient twinning

The applications of digital twinning are wide-ranging, as the following three examples from different sectors show:

IN WATER

Cruises are becoming increasingly popular. Maintaining ships is an expensive business, so General Electric is looking to equip cruise liners with sensors that measure wear and also factor in weather-related data. The intention is for a digital twin of the vessel to simplify maintenance and repairs by enabling engineers to simulate possible solutions using the virtual avatar before the ship comes into dock.

ON FOOT

Fashion-conscious consumers want the material, colour and fit of their sports shoes to be customised. Adidas is working with Siemens to develop a digital twin of the Adidas Speedfactory production facility so that it can be flexible in catering to customer requirements. In the future, this will enable the entire production process to be simulated, tested and optimised. The sports industry is a frontrunner when it comes to fully customised products.

UNDER THE SKIN

Charité Berlin is combining biology and IT. The university hospital has joined forces with biotech company Alacris Theranostics to produce the digital twin of a cancerous cell taken from skin cancer patients and is testing the effects of various drugs on it. If the drug works, it is administered to the patient. Initial treatments have proved successful.

“The next step is using a manufacturer-neutral interface to incorporate the digital prototype into the production environment and, for example, into an intelligent production control system,” explains Weichsel. This system then checks which production steps are needed, whether production can meet the requirements for the relevant step and in which order these requirements can be met. “It’s always a case of using the data in the engineering process and implementing it in a machine control system for production purposes. This enables components to be prepared for machining, support rails to be made the correct length and terminal blocks to be fitted onto these as specified,” says Jan-Henry Schall, Head of the Rittal Innovation Center.

CONNECTING ELEMENT

If this step is to be automated, the control system and machinery need to communicate and negotiate to agree on the upcoming tasks. “We’re making use of findings from the open Asset Administration Shell project initiated by RWTH Aachen University and the ZVEI industry association, which are working with mechanical engineering companies and the electrical industry to put Industry 4.0 into practice. And we’re adding specific switchgear engineering applications to these findings,” reports Weichsel. The project defines administration shells for all systems, machinery and components in a given value chain that are involved in the process and negotiate with each other. “It already works on a simple level,” reveals Weichsel. The aim is for systems also to be able to negotiate highly complex processes and production workflows in this way in the future. Having a positive impact on engineering decisions by factoring in production findings is just one example. “That’s currently a long way off, but we already revealed some initial progress at Hannover Messe,” says Weichsel.

Examination from head to toe

Process workflows. Like a check-up at the family doctor's, the Engineering Quick Check from **Cideon** – a member of the Friedhelm Loh Group – examines the design engineering processes in mechanical and plant engineering from head to toe.

Text: Ulrich Kläsener

From case history and diagnosis to a complete treatment plan – naturally taking into account the subject's specific state, current and previous problems and risk factors – there are striking similarities between a medical check-up and the Engineering Quick Check (EQC). "Yet our customers are not patients," says Gerhard Wulff, Head of Product Management Engineering at Cideon, with a smile. "We see them as top-flight sportspeople, primarily from mechanical and plant engineering, who are keen to improve their performance. However, companies also come to us that have a vague awareness of problems, but can't verify whether there is potential for improvement." ▶

WELL ADVISED

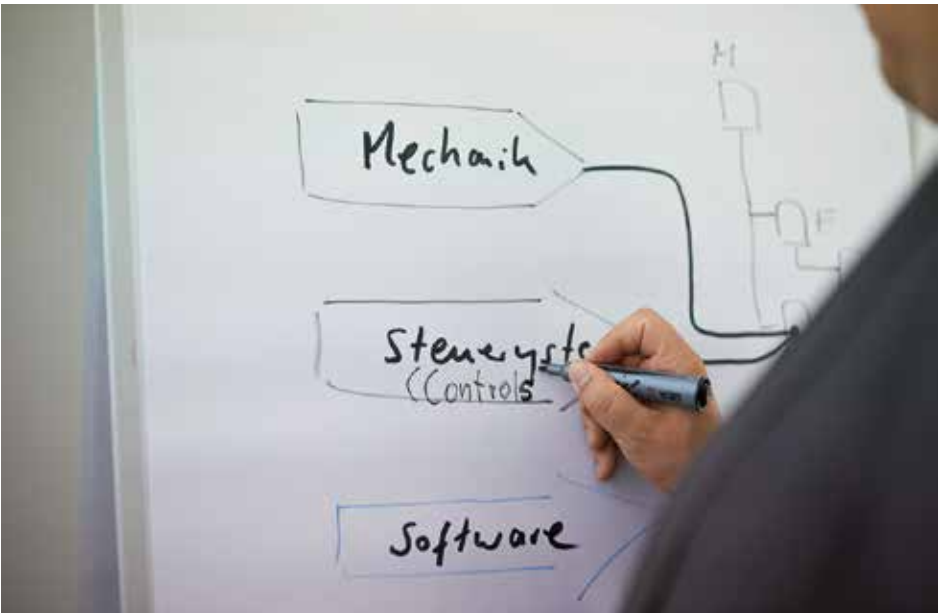
Gerhard Wulff helps his customers improve their performance with the Engineering Quick Check.

The EQC is a compact, interdisciplinary analysis tool for companies with their own product development operations. Initially, the engineering activities of mechanical and plant engineering companies are looked at in isolation, then in combination with other departments such as sales, work preparation, production and purchasing. The EQC creates the basis for an efficient engineering process and is also ideal whenever a system change, a CAD/CAE software update or the introduction of a data management system in the product lifecycle is due. Managers and users draw on interviews, workshops and a final check to obtain practical recommendations for optimising technology and process management. "We produce a top-down overview with a technological, methodological and business focus," says Wulff, "which is why the results aren't just of interest to the head of design but also for the management team." Presenting the findings to management is an obligatory part of the EQC – "otherwise we won't take any action," he adds.



WELCOMED WITH OPEN ARMS

Alexander Remes, Managing Director at IEM Fördertechnik GmbH, was impressed with the expert approach and in-depth engineering know-how. IEM Fördertechnik – one of 83 companies across Germany that have already completed an EQC – designs, develops and manufactures conveyor systems for bulk materials and scrap in Kastl in Germany's Upper Palatinate region. The on-site EQC identified three areas for action – standardisation of product development, optimised methods for using CAD and the necessary consistency of data and workflows in product data management. Remes, who took over IEM Fördertechnik in 2014, is in no doubt: "The Engineering Quick Check was carried out highly efficiently. Although we'd more or less expected the results due to having conducted our own analysis, we lacked the expertise to harness the potential for optimisation." For example, he explains, the 3D solution had repeatedly come to nothing at IEM Fördertechnik in previous years. "The reasons for this were many and varied, but the main ones were



WORKING MORE EFFICIENTLY

After presenting the results, Cideon discusses with customers how processes can be enhanced.

undoubtedly the lack of in-house experience and expertise and an unstructured approach."

The approach is now structured, and after introducing 3D engineering, a new data management system is being implemented. "The two combined help to reduce the workload," says Remes. "We can now obtain all the production documentation from engineering directly, such as drawings and parts lists, and are much more efficient, particularly in work preparation. It will also soon be possible to send 3D data to machines directly, without having to produce drawings." There is great optimism among staff in the departments involved, he says. "The approach with end-to-end digitization has been welcomed with open arms, and this is in part thanks to the highly professional launch."

HUMANS, SYSTEMS, PROCESSES

The EQC views engineering as a unit comprising the three critical factors of humans, systems and processes. There are many different key questions. Are the systems able to cover the actual requirements? Do the interfaces work from one IT module to another? How is the software used? Are the established methods suitable for meeting the requirements? Are the systems used consistently and clearly? "Each position offers considerable potential for optimisation, even when viewed in isolation," explains Wulff. "Things tend to get really exciting when it comes to interfaces and points of contact. This is where end-to-end workflows with seamless sharing of data are needed, as an end-to-end system is essential for smart product development and products."

How smart a product development process really is can be seen, among other things, in the productivity of individual departments and the quality of the data flow from research and development through to design, production, sales, commissioning and maintenance. The EQC is thus used for examining the compatibility of people, IT systems and processes. Critical points include the handling of systems by staff, the acceptance of processes in the company

and harmonising IT systems and processes. The best indicator of errors at the interfaces is divergence between targets and the actual situation in everyday practice. "The best processes are pointless if no employees use them," says Wulff, "which is often the case when systems give a cumbersome or inadequate representation of processes." The problem is frequently exacerbated if IT systems allow redundant working processes and switching between media. As a result, the data is neither consistent nor available in near real time. In other words, the ideal smart product begins to falter because its foundations – data of the highest quality – crumble.

LOSSES AT THE INTERFACES

Let's look at the human-to-human interface. This calls for pragmatism – after all, shortcomings in communication stem from the differing data in the dialogue between the engineering disciplines of mechanics, electrical engineering and software. "There is a historical reason for this," explains Sebastian Seitz, Managing Director at Cideon and sister company Eplan. "Although using expert systems since the 1990s has significantly increased departmental productivity, a great deal of action still needs to be taken with regard to communication and collaboration. This comes as no surprise if one person works in an assembly-oriented way, the second person has a function-based approach and the third adopts a modular method." To reduce throughput times and the outlay needed to make changes, electrical designers, mechanical engineers and software developers have to compare their data and do so in all languages so that everyone understands the information shared. "Working side by side – mechatronics in its truest sense – is then possible," says Wulff. ■

Three questions



Alexander Remes

Mining and industrial engineer,
Managing Director
IEM Fördertechnik GmbH

The results of the Engineering Quick Check are presented to management. Is that useful?

I think it goes without saying. End-to-end digitization is simply too important for us. That's why these days, 3D CAD is no longer a nice-to-have option either. Quite the opposite, in fact. If you make a professional start in engineering, you can communicate much more efficiently with customers, partners and suppliers in the long term – especially as engineering lays the foundations for paperless, digital manufacturing.

The EQC identifies potential in engineering automation. What insight has IEM gained from this?

There used to be modular systems, but these fell by the wayside with the advent of CAD. This is where we need to take action once again. We were pleasantly surprised by the proposals from Cideon for an approach using rules-based configured modules, even for custom designs.

What do your staff say?

Satisfaction levels among project staff have risen considerably. We have formed teams and provide regular updates on how the project is progressing. Effective change management is key to acceptance.



Smart move

Expansion. The **Friedhelm Loh Group** is expanding its steel expertise with a takeover. The focus will increasingly be on Eastern European markets in particular.

Text: Markus Huneke

A STRONG TEAM

Guido Spenrath and Katrin Dietzmann, the previous owner of Blech-Service Nordhausen, are now heading the company together.

When Magnus Carlsen plays chess, he isn't doing it for show. There are no dramatic moves. Instead, his concentration soars, and he reaches an unparalleled level of performance. Thanks to this strategy, the Norwegian has been the reigning world chess champion for five years running. Keeping one step ahead doesn't depend on making theatrical decisions but on analysing your position and using this to make your move.

Stahlo Stahlservice GmbH & Co. KG made a strategically important move at the start of this year when it took over Blech-Service Nordhausen GmbH & Co. KG. Located on the southern edge of Germany's Harz mountains, Blech-Service Nordhausen specialises in the manufacture of sheet steel blanks with optimum surface quality. This makes the company a perfect fit for Stahlo, with the expansion representing a logical step in the latter's strategy. Despite all the political risks that currently threaten global markets, the economy in Germany is booming.

RISING DEMAND

However, it isn't all sweetness and light for companies. Although order levels continue to be encouraging, as does the resultant capacity utilisation, growth also presents risks. The major challenge for steel service centres also lies in being able to meet growing demand when economic conditions are good, without neglecting service, deadlines or product quality or losing sight of customers.

This is precisely where Stahlo has acted tactically by investing in Blech-Service Nordhausen and bringing on board a strong partner. The new Stahlo site's production expertise perfectly matches the steel service centre's strategic focus. The machinery and equipment at Blech-Service Nordhausen include three cut-to-size lines. The site doesn't just produce standard formats but also customised blanks, as well as small blanks and special sizes manufactured on fully automated cutting centres.

"Stahlo's takeover of Blech-Service Nordhausen is a huge boon for both companies. This enables us to further expand our end-to-end expertise in manufacturing sheet steel blanks," says Guido Spenrath, Managing Director at Stahlo, explaining the benefits of the acquisition. This view is shared by the previous owner of Blech-Service Nordhausen, Katrin Dietzmann, who will continue to contribute her experience and knowledge to the company as Managing Director, alongside

Spenrath. "We're looking forward to working with Stahlo and to the prospect of continuing to grow with one of the largest independent steel service centres in Germany on the sheet steel market," she says.

POSITIVE FORECASTS

The takeover is also a smart move in terms of the Eastern European markets. In particular, the immediate neighbouring countries Poland and the Czech Republic are dynamic markets with strong economies. These countries are already key customer regions for the Friedhelm Loh Group's steel service centre. The site in Gera, where Stahlo is opening a completely new factory building at the start of 2019 with state-of-the-art, networked production and logistics facilities, means the two countries are practically right outside the factory gates.

Just as in Germany, the economic indicators in the two eastern neighbours are encouraging. Two figures underline this. Gross fixed capital formation in Poland rose more than 5 per cent to 82 billion euros last year. The picture looks even better for this year – on average, experts predict an increase in growth of 9 per cent for gross fixed capital formation, as reported by Germany Trade & Invest, Germany's foreign trade and location marketing agency. This provides a sound basis for investing in steel-intensive sectors such as mechanical and plant engineering and mobility.

The Czech Republic's importance as an economic region is shown by a further figure. In 2017, the volume of trade exceeded 300 billion euros for the first time. Over half of this is made up of machinery, equipment and vehicles. The country is a significant importer of semi-finished goods, and demand is rising. Its most important trading partner is Germany.

To supply these markets, Stahlo has taken numerous steps, both big and small, to position itself. "With Blech-Service Nordhausen on board, we're not just gaining new customers – our growth in Eastern Europe is also being supported," says Spenrath. And that is precisely the overriding strength of world chess champion Magnus Carlsen – manoeuvring himself into a strong position, game by game, move by move. ■



Good prospects in Germany

Forecasts for Stahlo's key consumer sectors are positive, particularly in mechanical engineering, vehicle manufacturing and the metalworking industry. Vehicle manufacturers reported a five-year high for new car registrations in the first seven months of 2018, while the mechanical engineering sector recorded an increase of seven per cent in incoming orders for the first six months of the year. The long-term prospects also look good – GDP in Germany for 2019 is forecast to be between 1.7 and 2.3 per cent, depending on the source.

COMMITMENT



Education

From pre-school to university

For the last two years, Rittal has been supporting the Acharya Sri Rakum School for the visually impaired in Bangalore, India's third largest city with over eight million inhabitants.

The facility provides around 500 blind or visually impaired children with free access to education – from kindergarten through to school education and even as far as post-graduate studies. A few months ago, Ajay Bhargava, President Rittal India, donated a cheque to the school management worth €20,000 as part of the CSR Initiative. "Without this financial support, it would not be possible to provide any education for

the children," says Acharya Sri Rakum, the school's founder. The school offers instruction in reading, writing and arithmetic, as well as additional movement therapies for children who are completely or partially blind. Sri Rakum is certain that many of the students will gain the confidence they will need in the future. "They are learning here that they do have a chance in the world, even with a disability." www.rakum.org

Foreign assignments

English:
A+

In May 2018, a dozen pupils from the Holderberg School in Eibelshausen completed an internship in Norwich, UK. The German school and English city have been in contact for many years, and their intern exchanges are funded by the Friedhelm Loh Group. This year's participants impressed their British hosts with their excellent English, polite demeanour and confidence. The fact that some of these pupils subsequently ranked highly in nationwide language competitions goes to show that the initiative and their dedication is having a positive effect here in Germany, too. Congratulations!



Concerts

Three cities,
one spectacle

"Carmina Burana" earned standing ovations at the Rittal Arena. In June 2018, 270 choral singers, soloists and orchestral musicians wowed their audience. This is the third time that the Friedhelm Loh Group has supported various musical institutions from the three cities of Giessen, Wetzlar and Frankfurt for this collaborative project in Hesse. Around 1,400 guests attended the 70-minute classical concert conducted by Jan Hoffmann.

Girls' Day

Just give it a go

For this year's Girl's day in May, 37 young women got to experience the day-to-day routine of typically male-dominated professions. In the training workshop at Rittal's Wissenbach plant, 17 participants soldered LED figures or constructed pneumatic circuits under the guidance of current apprentices. Technical Product Design also made a great impression on the par-

ticipants. At Eplan in Stuttgart and Monheim, 20 girls were introduced to a range of skilled trades in IT and business and given a taste of work in a software company. The Friedhelm Loh Group has been opening its doors to potential future young recruits for ten years. Every year, around 100,000 girls across Germany take part in Girls' Day.

Top employer



For the tenth time in a row, the Friedhelm Loh Group has been named one of "Germany's Top Employers". According to the Top Employers Institute, who launched the award, the family-owned enterprise scored top marks in 2018 with its exceptional employee focus.

The Group demonstrated its strengths as an employer particularly when it came to benefits, performance management, and training and development.

Online database

Managed
efficiently

To make it easier and quicker for administrative offices in central Hesse to find helpers for their projects and to coordinate workflows more efficiently, the Rittal Foundation is supporting the "Paritätische Hessen" association in establishing an online database.

This benefits many such social initiatives. For instance, the database allows people and institutions working with refugees to contact helpers throughout central Hesse more quickly, and share their experience and specialist knowledge more easily. This will help to avoid a lot of duplicate work – a clever solution.

Share and learn

Corporate culture. Experience and practice are the best teachers. The **Friedhelm Loh Group** is convinced of this fact, which is why it strongly encourages staff to support one another. Everyone stands to win – including the company.

Text: Rebecca Lorenz and Sophie Bruns



MULTI-GENERATION

The Friedhelm Loh Group benefits from the pooled expertise of its former employees, such as in voluntary service.



MULTI-PLAYER

The apprentices are introduced to cross-company teamwork at the workshop in Gnadenthal Abbey.





MULTI-CULTURAL
Global success calls for open minds – hence this pilot project aimed at integrating refugees.



Pages of statements, days spent waiting for a reaction – not anymore! Internet, email and social media are the way we all interact nowadays. Some 917 billion emails will have arrived in Germany's inboxes during 2018, according to the joint prognosis by its two largest providers, Web.de and GMX. Communications run even faster and more informally on social media platforms. The trade magazine "Monitoring Matcher" estimates that 34 million Germans use WhatsApp and 13 million Facebook each day. And, according to the sector association Bitkom, they embellish each text with an average of two emojis to get their message across as succinctly as possible.

Surging digitization is transforming the world of work – not only production methods and workflows, but also employees' social interaction. "Mobile phones, computers and cameras can overcome space and time barriers very easily," says management consultant and author Barbara Liebermeister (See the interview on page 47). "It has never been easier to make contact with others and communicate – but these digital channels still can't replace close personal relationships."

EXPERIENCING COLLEGIALLY

A survey conducted by the Allensbach Institute entitled "Discussion Culture 2.0" confirmed this fact, revealing that some 60 per cent of Germans still prefer "proper" conversations. This kind of contact is felt to be more intensive, open and honest. The reason for this is the physical presence, which makes it possible for those taking part to augment their words and voice with facial expressions, gestures and body lan-

guage. "This generates trust – which in turn forms the basis for positive and constructive relations," Liebermeister explains.

This effect benefits employees and company alike. "Many managers underestimate the extent to which human relationships influence a company's success," she says, "Which is why they are seldom nurtured." This is a mistake, as positive relationships improve the atmosphere at work, boost motivation and thus increase the drive for innovation, efficiency and productivity.

"We are conscious of the correlation between training, motivation and business success," says Regina Mundel, Head of Staff Development at the Friedhelm Loh Group, "Which is why we consider good and close relationships an intrinsic component of the whole entity." The authenticity of this statement is reflected in the company principles of the Friedhelm Loh Group, which not only promote employees' professional development, but also cooperation.

This is no simple undertaking with 80 subsidiaries, 18 production sites and a workforce of more than 11,500 spread across the globe. "Of course, it would be impossible for everyone to always communicate face-to-face under these



Inter-cultural relations

"Both professional and personal relationships are different in Germany from in my home country of Syria," says Bayan Ahmad (30), who works in the European internal sales team at Rittal. He fled to Germany four years ago and became a permanent member of staff after completing an internship at the Friedhelm Loh Group. "My co-workers helped me to find my way, despite the cultural differences. Language is the biggest barrier to integration. Which is why I'm so pleased I can speak German well by now," Ahmad says. After all, personal conversations are not only important for bonding with customers, but also for daily interaction at work.

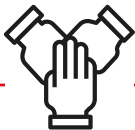
conditions,” Mundel says: “It would be completely unrealistic to expect this, as well as completely inefficient.” Nonetheless, the Group regularly provides opportunities for employees to meet colleagues from the other companies, countries and age groups in person.

FOSTERING ENCOUNTERS

Whether young, old or from a different country – the Friedhelm Loh Group helps people to meet one another. To ensure that staff members’ contact with their colleagues doesn’t disappear when they retire, the Friedhelm Loh Group founded a seniors’ club 18 years ago. Since then, members have been meeting on a regular basis for group activities such as outings or voluntary service. Young staff members also meet regularly. Once a year, the Group’s young new recruits gather at Gnadenthal Abbey with the aim of promoting collegiality throughout the Friedhelm Loh Group from day one. The second-year apprentices take part in a group workshop that helps them get to know one another, work together on projects and thus lay the foundation for close and focused collaboration.

To be successful on the world stage, companies need staff who understand the needs and characteristics of their international customers. Above all, this calls for open minds and cultural diversity. One of the ways that the Friedhelm Loh Group works to achieve this is via its pilot projects to integrate refugees, which bolster cultural exchange.

Everything that the Friedhelm Loh Group offers aims beyond simply improving work results. “All this interaction provides inspiration that boosts workers’ performance, which of course is a positive side effect,” Mundel says. “We are conscious that we reap what we sow.” After all, the employees’ commitment to fostering good relationships generates learning and working success. Ultimately, the family-run company pursues another aim – that of strengthening solidarity long-term. In Mundel’s words: “What is a family without a sense of community? Of being close? And belonging?”



Inter-generational relations

“Our employees should keep on feeling part of the community even when they get older,” says Heidi Bastian, who’s in charge of the seniors’ club at Loh Services. Besides lending young members of the workforce a helping hand with social projects, the retirees occasionally also offer them advice when it comes to product development. “Above all, the following generation can benefit from the expertise and experience of employees who have only just entered retirement,” Bastian says. “In return, the retirees also learn from the younger workers – gaining an insight into the latest digital trends and technologies, for instance.”



Inter-company relations

“We have found out that close relations are most likely to develop naturally if they are nurtured from the start,” says Tina Pfeiffer-Busch, the Team Leader for Commercial Training at Loh Services. This is one of the reasons why attendance at the Friedhelm Loh Group’s annual workshop is a compulsory part of apprenticeships. “While working together on projects, the trainees get to experience how important it is to work as a team and all pull together.” After all, each and every participant has to contribute his or her professional expertise to the project if the team is to be successful. They continue to benefit from the contacts they make in the process far beyond the workshop itself – basically, whenever they need advice from a different department or sister company.

Things are best done in person

Interview. Barbara Liebermeister is an expert in business communications, focusing on the role that they play in securing both personal and business success in the era of digitization.

Interview: Sophie Bruns



BARBARA LIEBERMEISTER

Founder and Director of the Institute for Leadership Culture in the Digital Age and author of the book “Digital ist egal” (“Digitization – so what?”).

Video conferences, emails, chat messages – everyday working relations have changed enormously in recent years. Does actual personal contact still play any role in the era of digitization?

Digital media simplify work processes, but they can't replace personal interaction. Anyone who seriously wants to be successful cannot rely on their professional expertise alone. Emotional ties play a key role in working relationships. Human beings are social creatures. They need personal contact to establish close and trusting relations. In other words, it can be said that the more personally people interact, the better they will communicate in the end. The futurologist John Naisbitt had good grounds to predict that: “The most exciting breakthroughs of the 21st-century will not occur because of technology, but because of an expanded concept of what it means to be human.”

How do close and positive relations affect how people and companies work?

Nurturing personal relationships intensively helps us to understand our colleagues better. The atmosphere at work improves as a result. This is particularly important for com-

panies when specialist workers are in short supply, as it strengthens employees' loyalty. It also boosts their motivation – which in turn increases efficiency and productivity. Incidentally, this doesn't only apply to co-workers, but also to our working relationships with partners and customers. Eating lunch together, brainstorming or attending a workshop strengthens our personal relationships, which can motivate people immensely during a project.

What benefits can be reaped from collaborating across cultures, age groups and national boundaries?

Employees and even entire companies can gain inspiration from “strangers”. How do your colleagues or customers work in Japan? What are the workflows like there? And what expertise can I take on board from experienced or digital-savvy colleagues?

By observing someone else's strengths at the same time as owning up to our own weaknesses, we can learn from one another and harness new synergies.

How can companies promote positive relations?

For this kind of collaboration to have a positive effect, people have to stand eye-to-eye. This is the only way to nurture values such as tolerance and appreciation. People generally notice very quickly if something changes in the manner of their social relations – for instance if someone takes longer to respond to an email, writes more briefly than before or suddenly seems more formal. In cases like these, I would advise people to immediately instigate a conversation. This is important because misunderstandings arise much more quickly in digital communications than in face-to-face conversations. ■

EXPERIENCE



Container data centres

Production-related processing power

The innovative IT infrastructure provided by Rittal is helping thyssenkrupp Steel to digitize its production-related processes.

Whether in research, product development, manufacturing or customer service, more and more processes are based on ongoing data evaluations – and the steel supplier thyssenkrupp Steel is no exception. In order to continue making high-quality use of large volumes of data and to drive forward its digital transformation, the Duisburg-based group is now upgrading its IT infrastructure

and implementing modular, pre-configured data centres. Rittal Data Centre Containers (RDCC) are being installed all over the company grounds and connected to the cloud. "We developed our requirements for impeccable safety standards in collaboration with Rittal and had them incorporated into the Rittal Data Centre Containers," says Dr. Michael Kranz, CIO of thyssenkrupp Steel.

Certification

Assured quality for the automotive industry

In August, the plastics processor LKH was certified to IATF 16949:2016. This certification is valid for three years and replaces the quality management standard ISO/TS 16949, which had been agreed upon by the International Automotive Task Force (IATF), a group of leading car manufacturers, in October 2016. The automotive industry wants to ensure that production faults are kept to a minimum and no raw materials are wasted. This calls upon suppliers to make full use of their innovative capacity and work on efficiency gains. The new standard includes 25 new demands and 34 enhanced requirements regarding quality management, which have been evaluated, introduced and implemented by interdepartmental teams at LKH.

Eplan Efficiency Days

Registration for the tour still open



Eplan is touring Germany with its Efficiency Days until spring 2019. Topics such as EI&C planning, digitization in enclosure construction and automated engineering will be addressed in numerous talks and workshops. Registration is free of charge and still open for the events in Stuttgart, Munich and Konstanz. www.eplan-efficiencydays.de



Expansion

Stahlo is investing in the future

The capacity of the Gera plant is being expanded to 400,000 metric tons, creating 40 new jobs.

Stahlo Stahlservice GmbH & Co. is investing over 45 million euros in its new production facility in Gera. Spanning a total of 22,600 square metres, a plant is being built at the Langenberg industrial estate for machining steel and, for the first time, aluminium, which is in high demand – particularly in the automotive industry. The Friedhelm Loh Group subsidiary is drastically increasing its production capacity with this new

construction. While the old Gera plant currently splits and presses up to 150,000 metric tons of steel every year, this is set to increase to approximately 400,000 metric tons from 2019. The installation of machines and systems has been underway since September. To make sure production gets off to a smooth start, 40 new employees are being added to the workforce.

www.stahlo.de

Eplan Data Portal

Better data thanks to new functions

Digital device data forms the basis of efficient engineering – and this depends, first and foremost, on the quality and depth of the available data. To meet this challenge, the Eplan Data Portal is now upgraded on a monthly basis. Users and manufacturers will also benefit from a new evaluation function, which makes searching in the portal more efficient. What's more, starting in spring, they will have access to a "lab version" for viewing and testing updates to the software.

www.eplandataportal.de/en/

VX25 large enclosure system

Conversion at the click of a mouse

Rittal is launching several web-based software tools to help plant engineers complete the switch to the VX25 large enclosure system both quickly and accurately. For instance, they can use the VX25 conversion assistant to convert the parts lists from their previous TS 8 enclosure system to the VX25 with the click of a mouse. All this involves is uploading their Excel files to the conversion assistant.

www.rittal.com/com_en/vx25/conversiontool/

Online planning

Configuration made easy

The Rittal Configuration System enables you to simply select your chosen enclosure system and launch the configuration with the click of a mouse. Above all, this new online application makes the process more transparent. For example, users can now track the progress of their configuration at any time in 3D, and (after logging into the online shop) view prices while the process is still underway.

www.rittal.com/configuration-system

Precision second by second

Industry 4.0. Intelligent, efficient and perfectly equipped for the future – to manufacture its new star enclosure, the VX25, **Rittal** is transforming its Rittershausen plant into a highly networked factory of the future. We visit the visionaries who are driving forward innovations for their customers.

Text: Thomas Schmelzer



Carsten Röttchen, Technical Managing Director at Rittal, takes great strides as he leads me through the manufacturing facilities in Rittershausen. To the left of him, sparks fly from the automatic welding systems as the robot gripper arms do their work behind safety glass. On the right, there is the hum of the profiling system presses, punching profiles with millimetre precision into the metres of sheet steel, joined by dozens of castors. Step by step, this creates the stable frame sections of the enclosures.

Röttchen is a happy man. As usual, production is going to plan. And, also as usual, the employees working with the machines are delivering perfect Rittal quality. However, at a certain point during the tour of the factory, Röttchen stands still, looks across the room and says: “In one-and-a-half year’s time, things won’t be the same here.” And he’s right, too.

The reason for Röttchen’s observation is already rolling off the production line – the new Rittal VX25 large enclosure system. This is a logical enhancement of the existing quality – making the best even better. Intensive discussions with customers, a large-scale, scientific usability study and years of development work have all resulted in a completely new product that is based on the proven virtues of its predecessor, the TS 8, and hones these even further.

“For this type of newly developed, cutting-edge product, we naturally also needed new production systems,” explains Röttchen, while near him the finished steel profiles roll off the line into a container. “We took the opportunity to bring the entire production facilities at the Rittershausen plant up to the very latest standards – making us fit for the future with Industry 4.0.”

REDEVELOPMENT DURING ONGOING OPERATIONS

This is a project that is truly something else. Once the redevelopment work is over, the VX25 will be manufactured in Rittershausen on profiling systems each measuring over 70 metres in length. Thirty of the 70 new welding and handling robots have already been moved into the production facilities. “We’re investing 70 million euros here to manufacture the VX25 with the maximum possible levels of efficiency and quality,” says Röttchen. This is all happening while regular TS 8 production continues unabated. The result is a highly complex redevelopment project that is taking place in the midst of ongoing operations.

To ensure things run smoothly, Röttchen – together with his team and Norbert Peter, Plant Director at Rittershausen – has drawn up redevelopment plans, requested calculations of models and repeatedly worked through the various redevelopment scenarios. Even so, he knows that such projects constantly present fresh challenges in practice. “There’s probably as much chance of everything going to plan as there is of winning the lottery,” he says, laughing.

Röttchen speaks from experience – he knows all the ins and outs of mass redevelopment processes such as that in Rittershausen. Before he joined Rittal, he brought a number of production plants in the automotive industry up to the very latest technological standards. During that time, he amassed a wealth of experience. He says one of the huge challenges in such processes is that the flow of materials constantly changes during a redevelopment phase that lasts a number of years. Furthermore, he adds, adaptations need to be made to the building such as new support structures and alterations to foundations.

That everything is going so smoothly is something that Röttchen and Peter say is first and foremost thanks to the staff. They have always been flexible and willing to do extra shifts at weekends. This is not something to be taken for granted, says Röttchen. “It deserves our utmost respect.”

PUTTING INDUSTRY 4.0 INTO PRACTICE

In the Rittershausen manufacturing facility, he has now arrived at the point where the old and new systems meet. Two profiling systems stretch out before him – on the left, the old one, and on the right, the new system in power pink. “In principle, the new system works in a similar way to the old one,” explains Röttchen. It, too, punches, rolls, bends and creates robust profiles with millimetre precision from the vast coil of sheet steel for Rittal enclosure frames. Yet, just like the VX25, the new production facilities have also been refined. Hundreds of sensors monitor the manufacturing process. For example, the new flexibility means that rivets are added automatically to the frame section, which is then cut to length and prepared for welding. “And with the sensors, we’re systematically implementing our vision of Industry 4.0 and making our quality control even more efficient.”

When the redevelopment is complete, the entire factory will operate according to Industry 4.0 principles. “We want to introduce a fully automated, fully networked



“We’re committed to driving forward innovation for our customers and we do not stop at anything to achieve this goal.”

Carsten Röttchen
Technical Managing Director
at Rittal





- 1

The new profiling system at the plant in Rittershausen is just as reliable as the old system, but with its hundreds of sensors it is hypernetworked and fit for Industry 4.0.
- 2

Dozens of castors gradually create sheet-steel profiles with millimetre precision from the vast coil of sheet steel, which go on to form the VX25.

production system here,” says Peter. An ever-increasing number of processes will then run fully automatically and with continuous monitoring – from the customer order all the way to the finished product. The software in the warehouse detects what parts need to be reordered. Thousands of sensors monitor each production step. “As a result, we can eliminate errors and work even faster,” adds Peter.

EUROPE IN 24 HOURS

Hypernetworking is the logical response to the growing complexity in production. Rittal will shortly be offering a 24-hour delivery service throughout Europe. To keep this promise, each production step in the highly complex value chain needs to be just right. The vision is clear: “If a customer in Italy orders ten VX25 units, our manufacturing execution system here in Rittershausen is notified directly and fully automatically and then starts production autonomously,” says Röttchen.

The networked and intelligent machines automatically know when they require maintenance and send appropriate signals. This works because an artificial intelligence system in the background continuously evaluates data from the sensors, thus optimising both production and maintenance.

The employees at the Rittershausen plant are the key support for this change. They continually learn how the new systems work and how they can be controlled. The relevant further training sessions are booked solid for weeks ahead. More than 250 people have registered already, says Peter. “Anyone wishing to do further training with us enjoys the best conditions,” he explains.

For customers, the Rittershausen transformation project offers two-fold benefits – the optimised product and the innovations in production. Tracking where exactly a VX25 order is in production at any given moment will soon be as normal for them as the enclosure’s tailor-made quality. “We’re committed to driving forward innovation for our customers,” says Röttchen, adding: “and we do not stop at anything to achieve this goal.”

Smart saver

Saving energy. Voith attaches great importance to sustainability and energy efficiency. For years, this global technology group has been committed to achieving long-lasting success under fair and environmentally friendly conditions. The results are outstanding, with the company's environmental management receiving multiple awards. Now the Heidenheim-based company has discovered yet more potential savings – this time in enclosure climate control.

Text: Dr Jörg Lantzsch and Hans-Robert Koch



While giving a tour of the manufacturing facilities, Markus Brunkal has a story to tell about every machine he passes. Now aged 54, he has been at Voith ever since he began his apprenticeship as a machine fitter. He feels at home here and knows this place like the back of his hand. Since 2011, Brunkal has been focused on sustainability. This friendly figure, born and raised in the Swabia region, is responsible for resource and energy management at Voith Turbo in Heidenheim – the drive technology division of the Voith Group. In Brunkal's words: "My job requires you to look very closely because it covers every single consumer – from the floor lighting and heating in the manufacturing facilities through to the large production machinery."

AMBITIOUS GOALS

Everywhere you turn, there are units in operation whose energy and resource consumption influences the company's overall usage. "The targets at Voith are highly ambitious, with 20 per cent of energy to be

saved over the course of six years,” explains Brunkal. “And we have of course seen to the proverbial low-hanging fruit first.” In other words, the more successful projects that are completed, the harder it becomes to make further progress. Voith Turbo's savings targets don't just cover energy, but also water and waste.

Wolfgang Steck, who as the Head of Assembly and Test Field is responsible for areas such as production, recalls: “In the beginning, our main priority was to harvest the necessary data. We hadn't even taken detailed measurements of energy consumption values at that point.” Bit by bit, a consumer list emerged, which served as the basis for depicting how much energy was being used and where. “It goes without saying that we examined the highest consumption values first,” says Steck. Due to the high amount of energy they consume, the hardening shop, the machining centres for metalworking, the test benches and the paint shop are all high on the company's consumer list.

BEST PRACTICES FROM ALL SITES

In Voith's Turbo division alone, a total of seven employees from different departments work together to examine how resources and energy can be used efficiently. Over the years, this working group has already achieved great success in its quest for measures to boost efficiency. Primary energy consumption, for example, was lowered from 37 gigawatt hours in 2011 to 30 gigawatt hours in the last financial year. In the same period, fresh water consumption shrank from 127 to an impressive 77 cubic metres, and waste levels were reduced by around 1,000 metric tons.

At its sites across the globe, Voith is dedicated to increasing resource and energy efficiency. “Voith Turbo's working groups in Germany meet up twice a year to share ideas among themselves, and now and then we also invite external specialists,” says Steck. “During one particular working group meeting, there was an employee from Rittal who gave a presentation on the savings that could be achieved with climate control solutions for enclosures,” he recalls. Energy efficiency of machine tools in production had of course already been looked at in previous years. “But we were concentrating mainly on the drives, hydraulic units and utilisation of the individual machines. Until then, we hadn't given any thought to enclosure climate control,” explains Steck. “Straight after the event, we set to work,” recalls Brunkal, adding: ▶



- 1** When considering machine tools' energy efficiency, staff focused mainly on the drives, hydraulic units and utilisation of the individual machines.
- 2** Together with Markus Brunkal, a Rittal customer service employee checks a Rittal Blue e+ cooling unit's current efficiency values.

“After all, we had just discovered a new consumer and we were keen to look at its energy efficiency in greater detail.” And this turned out to be much easier than first thought. The Rittal customer service team conducts service and efficiency checks to provide customers with a detailed outline of potential savings – one such customer being Voith Turbo. “Two employees from Rittal spent a week with us at the factory, closely examining each and every machine tool and its enclosure climate control,” says Brunkal.

SAVINGS OF OVER 70 PER CENT

In total, 50 different machines featured climate control technology in their enclosures. “The Rittal customer service team made our job very easy,” Brunkal points out. The result of the service check contains a variety of information pertaining to the condition of the enclosure’s climate control for each machine examined. The comprehensive documentation also gives a recommendation on whether it would make sense to replace a cooling unit, which unit would be best suited, and how much energy the customer could save if they opted for a replacement.

In the case of Voith’s Heidenheim site, Rittal recommended replacing 21 machine tools in total. Depending on the cooling output required, the cooling units from the Blue e or the Blue e+ range offer energy-efficient alternatives. “We hadn’t expected the results of the efficiency check to really take us by surprise like they did,” said Brunkal, amazed by the considerable energy savings to be made. The documents Rittal drew up for Voith also calculated the payback periods and estimated that the energy cost savings would be over 70 per cent, i.e. 25,000 euros each year. This meant that retrofitting the more energy-efficient cooling units would pay off after just two years on average.

Voith is a stickler for numbers. “We prioritise measures based on a new KPI,” explains Steck. Besides the impact on planned energy savings and the proportion of costs of the overall investments envisaged, the company also considers cost-effectiveness – in other words, the payback period – when making its decisions. A short payback period is a key argument for Steck: “The management team usually

doesn’t take long to approve measures that have a payback period of less than three years.”

AFTER THE RETROFIT

The company retrofitted its machine tools with the new cooling units last summer. All in all, 28 cooling units from the Rittal Blue e+ range and seven cooling units from the Blue e range were installed in the 21 machine tools. A few adjustments aside, the retrofit went without a hitch. “The employees from Rittal made the job very easy for us,” says Brunkal, commending the Rittal customer service team for its support. As the working groups regularly move between the different sites, Voith Turbo’s other sites in Germany have also made use of the Rittal service and efficiency check – and the outcome has been just as impressive. “Owing to our positive experience here in Heidenheim, the other sites will also switch to using more energy-efficient cooling solutions in their machine tools over the new few months,” says Brunkal. ■



“We were pleasantly surprised by the calculations from Rittal.”

Wolfgang Steck
Head of Assembly and Test Field at
Voith Turbo





Discover
what's possible

When adopting measures to boost energy efficiency, enclosure climate control is often forgotten about – despite it offering a very short payback period in many cases. This is where the service and efficiency check from Rittal can lend a helping hand, with its service experts checking all installed enclosure cooling units. Rittal generates in-depth documentation, recommending where retrofitting would be beneficial and highlighting where savings can be made. What's more, calculating the payback period helps customers decide whether they want to make the investment.

Want to know more about the efficiency check from Rittal? Contact us at: servicesales@rittal.de

Surprising solutions

Whenever it's on the lookout for ways to increase efficiency, the energy and resource efficiency working group at Voith Turbo comes across surprising solutions time and again that have made significant improvements. Retrofitting test benches with generator brakes and removing the mechanical ones, for example, brought about several advantages at once. Because the wells on the company premises offered a cost-effective supply of water, test benches were previously cooled with fresh water at a low cost. Once warm, the water would be channelled into the nearby river. Electrical energy is now produced as a result of using generators as brakes in the test benches and is used within the company. Although the test piece is still cooled on test benches using water, water warmed in this way is now used for heating and supplying hot water, which cuts energy costs even further.



- 1** The retrofit saw energy costs fall by more than 70 per cent, equating to an annual saving of 25,000 euros.
- 2** By conducting a service and efficiency check, a Rittal service engineer revealed new potential savings for the customer.

A city that thinks



Smart city. Urban planners and researchers in Songdo, South Korea, have created a smart city with the ability to think and make residents' lives safer and more convenient. The data it produces is gathered in a high-performance data centre from **Rittal**.

Text: Iris Quirin and Christian Abels



It's 7 a.m. and all is well in Songdo, South Korea. The sun has long since risen and the smell of freshly brewed coffee is wafting through a modern apartment. The blinds rise automatically, revealing the city's 40-hectare central park in the distance. The apartment was a lucky find for Timothy from Wisconsin (39), who only recently moved to this newly developed district of the sprawling city of Incheon. Timothy works in a nursery, looking after the children of the new local residents employed at one of the large corporations just a few blocks down the road.

Songdo is certainly drawing in the crowds. Over the past few years, people from overseas and the overflowing capital Seoul have flocked to the new district and moved into its fully networked apartments. Designed as a smart city from the very beginning, the district brings together living and working spaces side by side. At first, the roads, parks, residential complexes and commercial centres existed only on the drawing board. Before construction could begin, South Korea had to bring in around half a billion metric tons of sand to reclaim land from the tidal flats in the Yellow Sea. Today, countless skyscrapers reach up to the heavens between the city of Incheon and its international airport of the same name. The smart city continues to grow.

In his apartment, Timothy saunters into the bathroom. As his favourite music plays quietly in the background, he brushes his teeth and taps a smart wall panel to check today's temperature and news and see what the traffic is like. The panel can even offer him a second view of the extensive park around which the city is built – webcams provide live streaming.

Timothy and his neighbours enjoy the many conveniences the smart city of Songdo has to offer. Data is harvested and evaluated everywhere to make residents' lives as easy as possible. Cameras positioned near traffic lights, for example, relay video streams to the transport control centre. Meanwhile, built-in road sensors provide measurement data on the current traffic density, and special weather sensors register temperature, wind speeds and air purity. Further information is obtained from police officers, fire crews, and private companies such as telecommunications providers.

SAVING ENERGY AND RESOURCES

The urban planners' idea was to come up with a smart city that would require just two thirds of the energy and resources consumed by similar conventional cities by evaluating residents' activities and habits. South Korea isn't the only place where such forward thinking is urgently needed. The United Nations predicts that by 2050 around 70 per cent of the world's population will be living in cities – that equates to around three billion people. Experts estimate that metropolitan areas account for one third of our overall energy consumption.

In intelligent cities like Songdo, state-of-the-art technology is set to help tackle climate change. Networked information and communications technologies (ICT), cloud systems and the Internet of Things (IoT), managed via a common platform, are destined to help mega cities evolve into smart cities in the future. Engineers and IT specialists predict that smart cities are much more cost-effective to run, consume much fewer resources, and improve residents' quality of life.

Songdo's project developers, who come from both the United States and South Korea, were eager to see their planned city, located in the Incheon Free Economic Zone (IFEZ) between Japan and China, set a new benchmark for urban development. They were certainly successful, as Songdo is now considered to be the blueprint for a new urban future. "Songdo is a globally competitive smart city," says Jongwon Kim, local government official for the IFEZ's smart city. "All services are based on state-of-the-art information technology, providing residents with a secure and extremely comfortable environment," he says. The IFEZ authorities have patented the smart city model and its underlying technical platform and already sold the rights to buyers from various far-flung

countries including Ecuador, Colombia, Vietnam and India. The world over, intelligent, networked and sustainable cities are in the pipeline.

Back in Songdo, the smart city's residents profit from innovative technical developments. Anyone living in an apartment in one of its energy-efficient residential complexes doesn't need a key to open their front door – placing their finger or a key card onto the fingerprint scanner incorporated into the door handle does the trick. The lighting and blinds are centrally controlled in all rooms via a smart wall panel or smartphone app. If any problems occur, residents can video call the caretaker via their TV, which helps save time – a rare commodity in hectic South Korea. They can even chat with neighbours from the comfort of their own sofa using a video conference system.

But convenient technical innovations aren't just found within residents' homes. Street lighting, for instance, only turns on when someone is actually strolling down the street, while intelligent traffic signals analyse traffic densities to coordinate a 'green wave'. Sensors determine how much electricity is being used and where, or how much lighting and heating is required based on the number of people present in a certain location at that moment. They register how many vehicles are on the roads, measuring air pollution levels as an additional precaution. If a fire breaks out, sensors raise the alarm before anyone even notices something is up, initiating an immediate response from the fire brigade or other emergency services. Displays on underground railway platforms and at bus stops show arrival and departure times for the city's many transport systems – all updated in real time.

MEASUREMENT NOT SURVEILLANCE

It is as if the city has eyes and ears everywhere – something that takes some getting used to. "Initially, people misconstrued smart cities as being synonymous with total video camera surveillance," says Sangho Lee, Director of the IFEZ Smart City Integrated Operation Center. The main focus, however, is on evaluating measurement data. A specially developed technical platform processes the never-ending stream of data in real time, which forms the basis for information and services.

First and foremost, this calls for a stable infrastructure with powerful servers, networks and computers. After all, the system must be able to react extremely quickly to



COLLECTING DATA
All information collected by the cameras and sensors flows into the data centre.

“Residents should feel that they live in the safest and most modern city in the world.”

Sangho Lee
director of the **IFEZ Smart City Integrated Operation Center.**





SPLENDID VIEWS

Webcams ensure residents have everything in sight – be it the park or the roads.

any new circumstances or deviations. This is in part why IT expert Sangho Lee opted to use a dedicated, fail-safe cloud data centre on the third floor of Songdo’s distinctive G-Tower, which is where the “U-City Management Center” is headquartered. The “U” here stands for “ubiquitous”, another epithet used to describe smart cities. This is where the data from all transport, environmental, crime prevention, fire protection and building management sensors is brought together.

“I was looking for a suitable solution and was very impressed by the data centre’s design modelled on cloud computing,” Lee recalls. “Rittal already provided solutions for all the data centre system’s components, which could be configured in next to no time thanks to the standardised IT infrastructure.” In addition to the TS IT racks from Rittal, the data centre also comprises the necessary modules for climate control, power distribution, uninterruptible power supply, fire protection, monitoring and access control. “The data centre meets the smart city’s needs down to a tee because it provides everything needed to process and analyse the data spread across the city and gathered in decentralised edge data centres in the future.”

Besides supplying the hardware, Rittal Korea assisted the IFEZ Smart City Integrated Operation Center with devising its data centre concept. “With the aid of 3D de-

signs, we showed the customer what would be ideal for their specific needs,” says Brian Moon, who manages Rittal IT sales alongside his fellow colleague Eric Yang. There were certainly various construction challenges to overcome. “The building isn’t really a suitable location to install a conventional data centre due to its low ceilings and raised floors, which meant that the rooms required special insulation and cooling.” What’s more, the customer was keen on having a scalable infrastructure so it could grow alongside the city.

TURN-KEY SOLUTION

“The solution we proposed was a system comprising cold aisle containment and in-line cooling with busways,” Moon explains. Deploying cold aisle containment for the IT racks on the third floor of the G-Tower enables energy-efficient cooling of the IT systems. The actual cooling is provided by Rittal Liquid Cooling Packages, with redundant air-water heat exchangers installed directly on the racks. The customer received everything from a single supplier – from the racks and cooling to power distribution. Once the cables were laid, the data centre took just under three months to fully install. “That makes it one of the fastest projects in the world,” says Lee with pride.

Work in Songdo continues and self-driving cars are soon expected to ensure greater road safety and reduce pollution levels. Purpose-built camera drones, meanwhile, collect traffic and environment data, which is then analysed using artificial intelligence to develop yet more innovative services for local residents. Lee sums up the objective behind the IFEZ’s smart city: “Residents should feel that they live in the safest and most modern city in the world.” He intends to rely on the expertise of his tried-and-trusted partner for future projects, too. “The underlying technology behind new services in our smart city will also come from strategic partners such as Rittal who provide turn-key solutions,” he says.

Timothy might soon be able to use his smart panel to do much more than control the lighting and blinds in his apartment. In the near future, there’s a good chance he can summon his autonomous vehicle, which will drive up outside his front door as soon as he locks it – simply by way of his fingerprint. ■

Halle 02



The enclosure testers



VX25. The maiden flight is a make-or-break moment in the aviation industry. Whenever technology is put through its paces for the first time, it's about the nitty-gritty. It's about the facts and nothing but the facts. Will the technology deliver what it promises? There's no room for hot air here. Read a somewhat different "flight report" about the VX25 and the **Schaper Group** that offers interesting insights for technicians and anyone who has the final say on enclosure technology.

Text: Dr Jörg Lantzsch and Hans-Robert Koch

5 -1 – this is where the cable clamp rail needs to be fitted," explains Eugen Franzen to a staff member. The team leader for mechanical installation at Controller Steuerungstechnik GmbH, part of the Schaper Group, has recently started to work with a new enclosure technology. It was a small, almost nondescript detail that won him over. "The hole counting on the new frame sections means we can now pinpoint precisely where enclosure mounting parts should go." The enclosure expert can therefore mount support rails or cable clamp rails at the same height across all system enclosures without exception. "Previously, we often had to revisit such details, which always involved extra work that we no longer have to worry about," says Franzen.

He is willing to try out any solution if it can save him a lot of time, particularly seeing as fit-to-burst order books, high time and cost pressure, and the ever-present lack of specialist workers on the job market are causing the company constant headaches. "All in all, we currently have seven vacancies in the manufacturing department alone and could hire trained applicants on the spot," explains Nils Mentrup, technical manager at Schaper Steuerungstechnik GmbH. Automated solutions that can achieve a higher output with fewer trained staff offer Mentrup some relief. But new

components and systems that save time during assembly can also boost efficiency in manufacturing operations.

Walking at a steady pace and with a certain sense of pride, Mentrup accompanies Franzen through the cutting-edge manufacturing plant in Herford. Everything is state of the art. Everything has been meticulously planned and perfectly organised. The facility, which features numbered wiring areas, was built in 2009 and expanded more than twice in size just last year. Together with Controller Steuerungstechnik, a total of 70 workers manufacture control and switchgear solutions of various sizes at the site. "Owing to the facility's expansion, we now have enough space to produce several large systems 30 to 40 metres in length at once," explains Mentrup.

The first control systems based on the new VX25 enclosure from Rittal can be found in this facility. Mentrup, Franzen and their teams have not long since finished their "maiden flight" and inspected the new system from top to bottom. "Its predecessor, TS 8, was a flawless enclosure," recalls Mentrup. "That's why we were pleasantly surprised that Rittal had evidently put a lot of thought into many different potential improvements when it devised the VX25." The young technical manager believes the most important advantage is the lower number of mounting parts. In his words: "You see it straight away because storage is less of an issue now – both in our central warehouse and the parts warehouses for the individual projects that we set up directly at our workstations."

GREATER STABILITY

Franzen has discovered yet more key advantages to the new system: "The enclosure itself is more stable now – that's one of its major benefits." This becomes clear if you look at the new gland plates, for instance. When expanding enclosures, fitters repeatedly have to go inside. "In the past, the gland plates were often somewhat bent as a result, meaning we had to carry out reworking," remembers Franzen. Reworking is no longer necessary, which helps to increase the overall time saved by using the new enclosure system. Franzen is also tinkled pink about another aspect of the enclosure flooring's design: "The frame is now designed so that there is no space between it and the gland plate. Back in the day, we often had problems with a screw falling down the gap."

The new hinges make things even easier, as staff are now able to simply remove the enclosure doors and no longer have to worry about levering any hinge pins. "Even if we don't plan to carry out machining on one of our Perforex machining centres, we usually take the enclosure doors off because it makes wiring so much easier," explains Franzen. This advantage particularly applies to larger switchgear, where wires need to be installed across multiple enclosures. "The time saved in assembly and dismantling can be anything up to one minute or more for each enclosure," says Franzen, who also sees the VX25's fewer mounting parts as a major advantage:

"We no longer have to wonder which rail goes where because with the VX25, the rails fit on both the vertical and horizontal frame parts and can be fitted from the side or the rear." For example, this means staff can now screw on a rail from the back, even if the mounting plate has already been fitted in the enclosure. "In the past, if we ever forgot about the rail – which is an absolute must for some switchgear built to UL – we had to take the mounting plate apart or at least tip it forwards," says Franzen. Luckily, this is no longer the case and it is easier for Franzen and his team to carry out their work, including if they are fitting mounting components or side/rear panels.

What's more, only Torx 30 screws are used these days. "During assembly work, we always used to have two cordless screwdrivers that were equipped with the appropriate screw bits – now we only need one," says Franzen, highlighting how his day-to-day work has improved. The idea of one-person assembly has also won the team leader over and he demonstrates how it works, using a rear panel as an example. "I can simply attach the rear panel at the top and it stays securely in position until I've tightened the screws."

If you take a look at the manufacturing facility, you immediately notice how all steps are perfectly coordinated. But does switching to a new enclosure system not pose serious risk? "At the start, most people are sceptical whenever things change, but we found the switchover to be quick and seamless," says a delighted Mentrup. This smooth transition is partly thanks to the VX25 conversion assistant from Rittal – a web-based tool that enables customers to simply convert parts lists from projects planned using the TS 8 into parts lists for the VX25. Customers just drag and drop their old parts lists onto the designated site, upload them as Excel files, and download the new parts lists once converted. Even

"The VX25 often saves us time, which is useful when we're under a great deal of time pressure."

Nils Mentrup
Technical manager at
Schaper
Steuerungstechnik GmbH

3D engineering plans generated by Eplan Pro Panel can be converted without almost any manual intervention. "Now that the first two large systems with the new enclosure are nearly finished, we have a good handle on how the conversion works," says Mentrup with confidence.

FAST ASSEMBLY

Mentrup is a big fan of the new enclosure system. "It often saves us time, which is useful when we're under a great deal of time pressure from our customers." In this respect, he also sees advantages to using the 24-hour delivery service from Rittal. "Nowadays, most units that we use in our systems take a relatively long time to deliver – that's not the case with Rittal enclosures, which are always delivered the day after we place the order," says Mentrup.

Eager to use the new enclosure system in as many projects as possible in the future, the technical manager declares: "We're going to spread the word among our customers and we're certain that they'll soon see the benefits, too."



PRECISE POSITIONING

The hole counting on the new VX25 frame sections means it is now possible to pinpoint precisely where enclosure mounting parts need to be placed.



ONE-PERSON ASSEMBLY

Eugen Franzen from Controller Steuerungstechnik GmbH shows how it's done. Simply attaching the rear panel at the top keeps it securely in position until the screws are tightened.

Movement with a profile

Steel. Thomas Regout International turns high-precision steel rails, ball bearings, plastics and elastomers into customised rail systems. To ensure its systems work perfectly, the company relies on top quality from **Stahlo** for its sheet steel.

Text: Meinolf Droege



The drawer of the high-quality kitchen closes gently, gliding smoothly and almost silently shut. It features an invisible stop mechanism to prevent over-zealous cooks from pulling the drawer out with excessive force.

The doors of a luxury-class saloon car close with a satisfying 'thunk.' The driver settles in, placing his right arm on the central armrest, which he can move silently into the most comfortable position using just his fingertip.

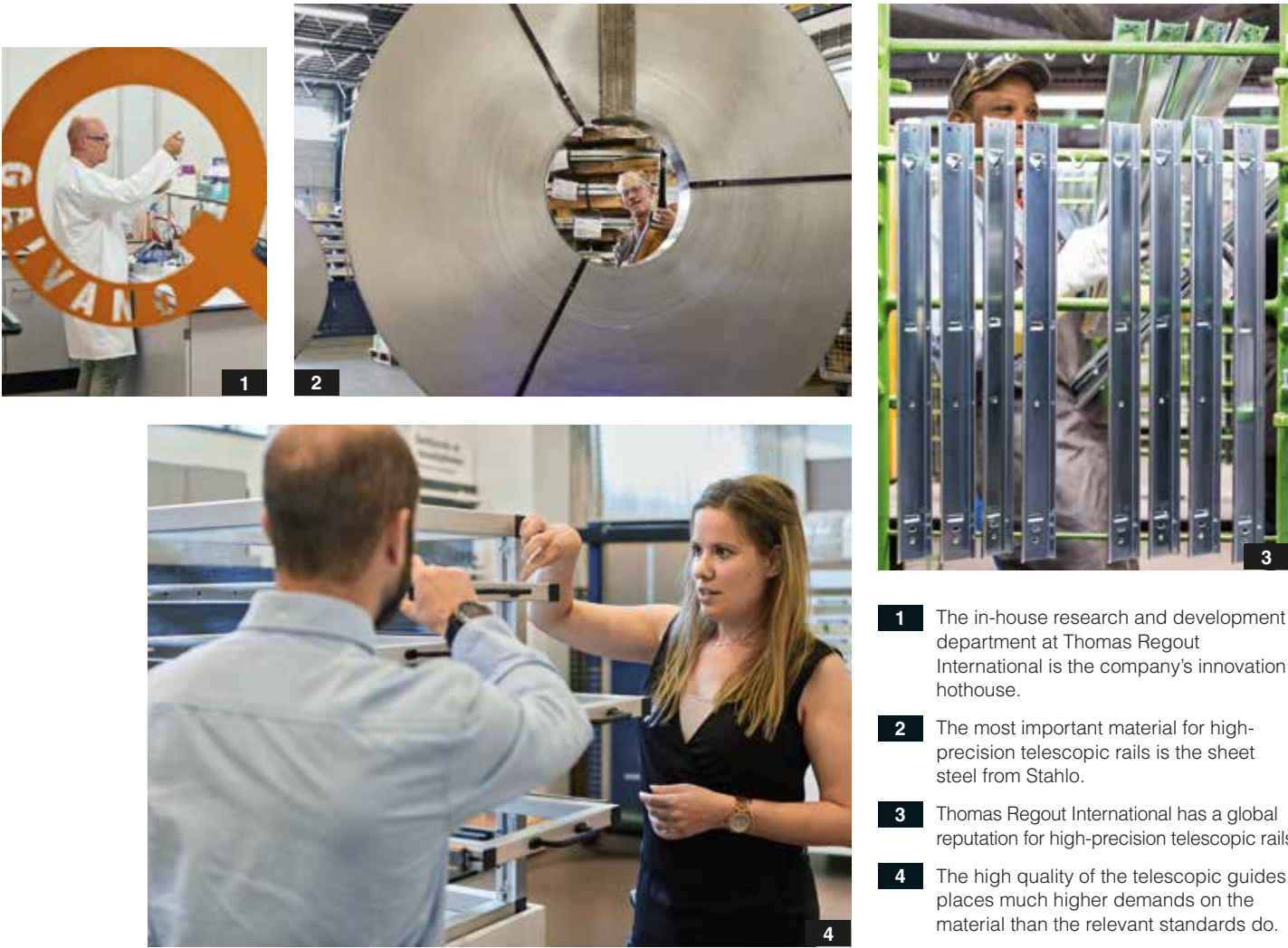
In both scenarios, the features responsible for this comfort and durable functionality remain out of sight. They are customised high-precision telescopic slides, and ensure all kinds of loads can be moved with ease – in the above applications and countless others besides. Car manufacturers, mechanical and plant engineers, logistics companies and even furniture manufacturers use many different variants of them.

STATE OF THE ART

Thomas Regout International in Maastricht, the Netherlands, manufactures these slide systems from high-precision roll-formed steel bars, ball bearings and other components made of plastics and elastomers. This is where high-tech meets tradition. The factory, founded in 1834, now sits directly on the outskirts of the picturesque old town of Maastricht. For years, however, the company has been running an innovation process that covers not just products, machinery and plant technology, but the entire factory itself, organising all processes along Industry 4.0 lines.

Founded following a management buy-out in 2008, the leadership team has pursued a clearly defined strategy from the outset in order to gain market share in the face of international competition. On the one hand, it focuses on customer-specific products and solutions, some of which incorporate patented special equipment up to the highest load-bearing classes, and, on the other, it provides extremely short delivery times and exceptional flexibility. At the same time, the company has to ensure it's not paying over the odds to create its solutions.

"We have design facilities with comprehensive user experience, toolmaking and prototyping – all in-house," says Managing Director Kees Verspaandonk. "Furthermore, a large proportion of production is now highly automated. Around six years ago, the company also began to speed up processes significantly, including with our suppliers. We are basically doing exactly what are ▶



- 1 The in-house research and development department at Thomas Regout International is the company's innovation hothouse.
- 2 The most important material for high-precision telescopic rails is the sheet steel from Stahlo.
- 3 Thomas Regout International has a global reputation for high-precision telescopic rails.
- 4 The high quality of the telescopic guides places much higher demands on the material than the relevant standards do.

our customers are doing.” This is the only way to achieve defined goals such as shorter delivery times and increased flexibility for customers.

On this basis, Thomas Regout International also reviewed its existing suppliers of sheet steel – by far its most important material – analysed market conditions and made enquiries about new partners. The Stahlo steel service centre based in Dillenburg in Hesse had initially supplied smaller quantities, but has gradually sent significantly higher tonnages of sheet steel to Maastricht over the years. “And Stahlo will continue to be an important partner if we keep reducing the number of suppliers in this sector,” says Verspaandonk, referring to the ongoing selection process.

The investments made in technologies and processes following the management buy-out are paying off as Regout is growing exactly to plan – and doing so sustainably. It’s up to Stahlo to keep up with the pace. The high quality of telescopic guides places much higher demands on the material than the relevant standards do. In Verspaandonk’s words: “We are running our

plants at the upper to highest range of what is theoretically possible.” The systems can only achieve maximum throughput rates – and thus competitive costs – with extremely low thickness tolerances and excellent surface qualities. For Thomas Regout, however, other material properties are also kept within much narrower limits in order to guarantee the tolerances of the final product components as specified by the design.

FORMING A STABLE NETWORK OF EXPERTISE

Besides helping to select the types of steel that meet such requirements, Stahlo also advises on how to enhance processing parameters. “We are also driving forward new ideas. For example, we look for added value when using special steels, and not just in automotive applications,” explains Verspaandonk, outlining one current direction of development. Stahlo has practical expertise and the appropriate product range in this regard, too. What’s more, Verspaandonk appreciates that Stahlo not only responds to enquiries from his compa-

ny, but also makes proactive proposals, which are then discussed together in a spirit of genuine partnership. Collaborating on ongoing processes and thinking ahead are sought-after characteristics in suppliers. They are also advancing Thomas Regout International’s successful research and development work.

According to Verspaandonk, reliability is key in other respects – not just in terms of material properties. “Even during boom periods, we depend on deliveries being made with absolute reliability, especially bearing in mind that we have significantly reduced our own inventory while increasing output, and yet we are still promising our customers ever shorter delivery times.” Currently, the company’s own material storage facility has a horizon of only a week or a little less. Not everything, says Verspaandonk, can be spelled out in specifications, which is why suppliers such as Stahlo are required in order to ensure targets are hit. A few years ago, the management team had considered alternative locations due to the company’s special location near Maastricht’s old town and cost struc-

tures in the Netherlands. Following a detailed analysis of a variety of scenarios, however, it was decided to maintain the enormous employee expertise and flexibility with the company's own tool construction and prototyping facilities and to support them with state-of-the-art manufacturing concepts.

MAKING ROOM WITH AUTOMATION

Since then, modernisation has picked up even greater pace, which has seen many design tasks become automated and designers increasingly take on the role of problem-solvers in direct customer contact. Production has been automated and networked even more. Although sales have followed a constant upward trajectory over the last four years, automation and increased throughput speeds mean that space has been freed up in the existing production facilities, which can now be used to achieve further

growth at a manageable cost. "We had already taken the first steps towards Industry 4.0 before the term had even been invented," Verspaandonk adds. At the same time, supplier structures have been adjusted – a process that is still ongoing. "All in all, it is hardly possible to manufacture more cost-effectively anywhere in the world. We also have the benefits of high flexibility and customer proximity. This is in response to a new generation of buyers with a certain 'Amazon mentality' who place great emphasis on ever-increasing delivery capabilities. "At one time, we had suppliers with clear unique selling propositions," Verspaandonk says. "Nowadays, top performance is needed across the board – flexibility, quality and cost." So, the next time you bump that heavy cutlery drawer shut with your hip and nothing rattles or crashes, remember: It's all down to steel coupled with innovative design and machining. ■



“At one time, we had suppliers with clear unique selling propositions. Today, we have to deliver top performance at all levels.”

Kees Verspaandonk
Managing Director at **Thomas Regout International**

**The solutions
in use**

The high-precision telescopic guides from Thomas Regout International are deployed the world over. Nevertheless, users are often unaware of them.



EMERGENCY SERVICE VEHICLES
Customised telescopic rails make it easy for emergency service workers to lay their hands on the materials they need.



TRUCKS
Incorporated into the centre console, the rails provide additional storage surfaces and better access to the refrigerator for added convenience.



KITCHEN CUPBOARDS
Many kitchen designers opt for telescopic rails from Thomas Regout International to make sure drawers open smoothly and silently.

The cable harness experiment

3D engineering. Laying individual cables around 120 metres long in a wind turbine per phase makes for a complex and time-consuming project, with challenges arising right from the planning stage. An experiment conducted by **Nordex** has shown that using software offers huge potential savings and ensures a high degree of precision.

Text: Thomas Schmelzer



Two teams, one task – survey a wind turbine’s machine housing to lay 50 cables. Nordex – the world’s fifth-largest manufacturer of wind turbines – hoped its experiment would confirm whether supporting cable harness planning with software does indeed reduce the time needed for engineering. The results paint a clear picture. While the engineers on one team measured cable lengths by hand using a prototype, their colleagues took a quicker route with some help from digital technology.

Martin Richter, responsible for cable harness planning at Nordex, still remembers the experiment well. “The two team members who measured by hand needed a full working day to record the exact values,” he says. It was much faster on the computer. “Thanks to Eplan Harness proD software, their colleagues were able to finish the same task in just a third of the time.” Further testing confirmed the result, and the error rate dropped significantly. “Deviations in the lower centimetre range mean the wiring path at Eplan always fits – so you don’t have to plan for any additions, even with long cables,” explains Richter.

Calculating the cables’ exact route – to the tower and from enclosures to the consumers – takes time, which is why Eplan

To determine the length of wires, the electrical engineers at Nordex call upon a tried-and-tested duo – Eplan Pro Panel and the Smart Wiring module. The data from the 3D assembly layout and the circuit diagram’s connection information form the basis of this team’s work, with Eplan Pro Panel calculating the necessary length of the wires with some help from precise 3D routing. These calculations then form an electronic master file, which is sent to someone outside the company to create the wires. Wolfgang Conrad, Head of Enclosure Development at Nordex, says: “We now plan any new enclosures exclusively with Eplan Pro Panel and the Smart Wiring module, which ensures they meet a high standard of quality.”

RECOGNISING ERRORS IMMEDIATELY

One of the many advantages to Nordex’s and Eplan’s collaboration is that complex cable harnesses can now be calculated to the nearest centimetre. The company is reaping the full benefits of Eplan software in terms of 3D assembly layout in enclosures, too. “All components used – right through to screws, bolts and washers – are accurately recorded and automatically assigned to a project,” says Conrad, commending the outstanding quality of the circuit diagrams.

Faster sheet steel processing

With some help from the Eplan platform, the electrical engineers at Nordex aim to standardise development as much as possible. The software records all installed components – with all the details gleaned from parts lists and circuit diagrams – and thereby ensures tasks are completed with greater precision and in less time. Using the machining of enclosures’ steel sheets as an example, development engineer Enrico Durka explains: “We used to mark out drilling patterns with a template when manufacturing enclosures and switch boxes. Now we generate the drilling pattern in Eplan Pro Panel and send it directly to the machining centre as a file.” Drilled enclosures, which used to take several weeks to deliver, are now supplied in 48 hours to one week at most.

Nordex produces its series in vast numbers and is a classic series manufacturer. Its main production facility was transformed into a cutting-edge assembly line early on, with enclosures migrating from station to station on five different lines and gradually forming a complete unit. Besides the centre box, seven decentralised enclosures and switch boxes for separate functions are installed into each machine housing.

Harness proD software maps it out quickly and easily in a 3-sD model. Explaining the advantage to this, Richter says: “The cable harnesses run along the inner side of the machine housing, which is what makes judging the length so taxing.” This is where Eplan plays its trump card, ascribing properties – such as control points, bending radii and even the positions of cable ties and earthing straps – to every single cable. “In the end, we benefit from the fact that all cable lengths, connector variants and other details are clear and consistent,” says Richter.

Inconsistencies on a physical level, meanwhile, are spotted immediately.

AUTOMATED ASSEMBLY LINE

Besides for standardising its database, the wind turbine manufacturer also uses software to automate its assembly line. “Our goal is to tap into the opportunities opened up by standardised development and production as much as possible,” explains Conrad.

Nordex’s electrical engineers are now therefore eager to digitize the entire wind turbine in one go. Even today, more than 500 sensors are built into a single turbine – and this is set to rise. “If we want to have

a realistic, digital test model, we can do away with a real prototype for engineering purposes and produce an initial sample for manufacture straight away,” says Dr Klaus Faltin, Head of Electrical Drives and Design at Nordex. “In future, we will incorporate Eplan Viewer even further into our work – integrating it straight into production lines, for example,” says Faltin. Testing is underway... ■



Under lock and key

Cooperation. The plastics manufacturer **LKH** supplies a global automotive specialist with locking systems. Its plastic parts are installed in almost all locks. The expansion of deliveries across national borders is taking this collaboration to a whole new level.

Text: Meinolf Droege

The door closes. It clicks. The motor hums. The tyres start moving. The car glides along the road, accelerating, overtaking and leaving a smile on the driver's face. Every driving enthusiast gets the same thrill from speed. Anyone who wants to enjoy their vehicle for the long term has to secure it against break-ins and theft. There's a reason every journey starts and ends with the door – more specifically, its locking system. There's only one thing more annoying to a driver than a car that won't start – and that's a car that won't open.

RELIABLE SERVANT BEHIND THE SCENES

Locking systems are precise, invisible assemblies that have to serve the user over many years, even in adverse conditions. They are only noticeable when the doors cannot be opened or closed by approach-

ing with a keyless system, by pushing a button on a remote control or with a mechanical key. The negative impact such problems have on the car manufacturer as a brand is immense. What does this say to the driver about the quality of the car if problems arise before they've even taken a seat.

What the driver usually achieves with the simple push of a button prompts a great deal of effort behind the scenes. Complex systems consisting of mechanical and electrical components and installed in usually very limited space ensure that doors and boot lids can be locked and unlocked reliably in a fraction of a second. Even in the harshest sub-zero temperatures of the Scandinavian winter, after hours exposed to the blazing heat of the southern European summer, or in the extreme humidity of certain Asian regions, car doors need to offer immediate access.

PLASTICS DRIVING INNOVATION

Plastics play a major role in the ongoing development of locking systems. Integrating many functions into just a few components makes it possible to produce very compact and easily assembled solutions. Lubrication, corrosion and noise issues are easier to keep under control. There is constant desire to keep on reducing weight, particularly in the automotive industry.

As a medium-sized supplier, how has LKH been able to tick all the boxes so far? Thomas Prause, Head of Sales at LKH, attributes this to a combination of skills. "On the one hand, our injection moulding processes can be relied upon to achieve the very low tolerances that are usually required. On the other hand, we have extensive experience with production-integrated, automated 100% inspections, which we also use here." Flexibility is also a very high priority. "For instance, in the case of one special lock in particular, our expertise in designing and constructing injection moulds produced a solution where three 'standard tools' create eight multiples of 14 different parts per shot. Our employees require no more than 30 minutes' retooling time to switch from one standard part to the next." This allows LKH to respond quickly and highly efficiently to modified supply requests instead of amassing larger storage quantities.

In order to reliably meet customers' tolerance specifications, LKH developed an indirectly operating, integrated test device, which measures weight rather than geometric values such as length, ▶

THE PANELLING

of the car door is where the lock sits. It consists of three main components – the lock plate, cover and enclosure.

THE LOCK PLATE

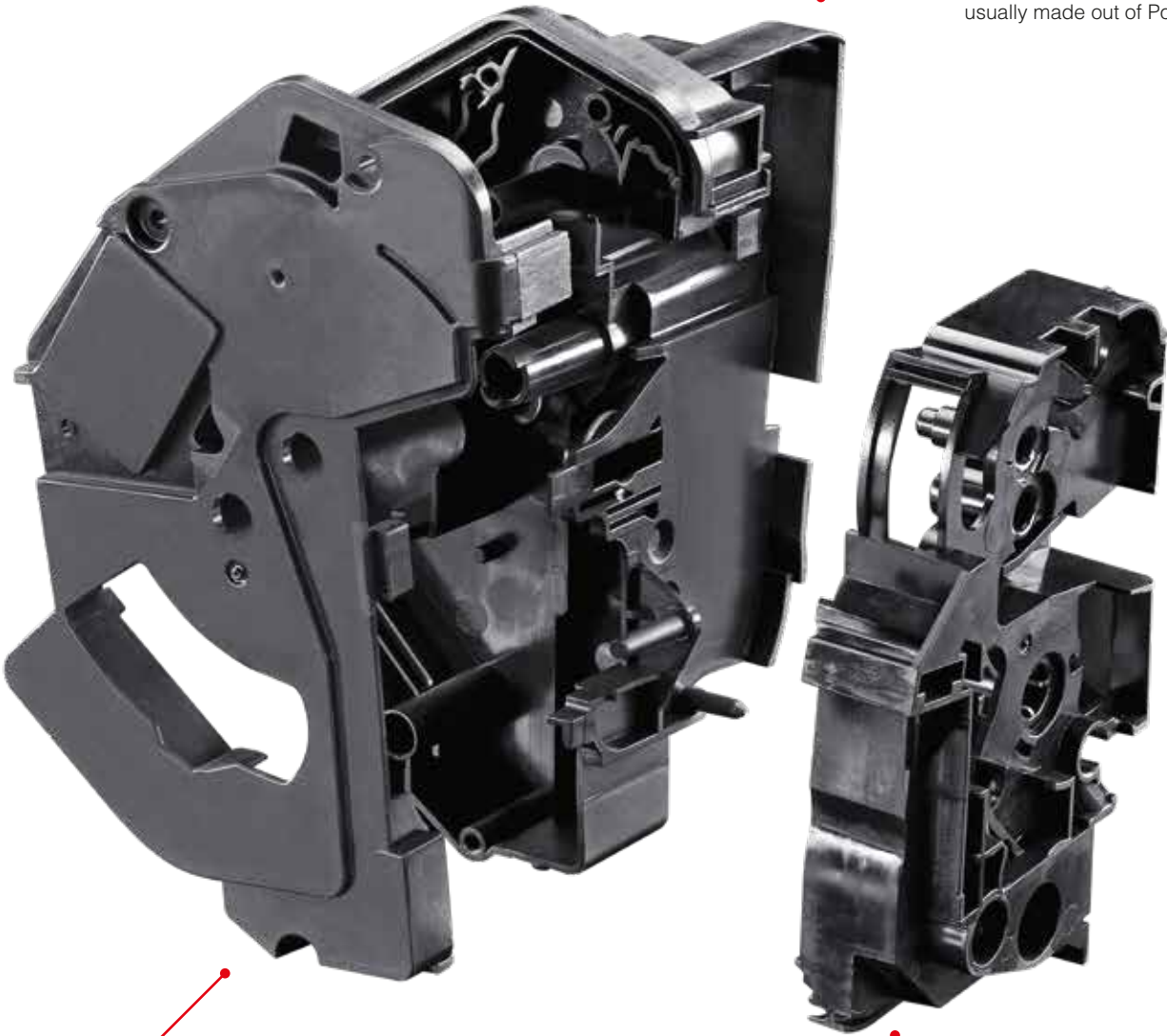
acts as a cover and contributes greatly to the lock's stability, which is why it is usually made out of Pocan.

THE LOCK COVER

protects the enclosure from external influences. It is screwed onto the lock plate.

THE LOCK ENCLOSURE

contains all the moving components and the bearing. For optimum rigidity and thermal stability, it is usually made out of the thermoplastic polyoxymethylene. The movable plastic parts produced by LKH include the clips, interior lock levers, switching nuts and drivers.



Lightweight

They are adaptable, inexpensive, easy to process and are impressively lightweight. Plastics are now an integral part of automotive production.

3,419

METRIC TONS
of carbon-fibre-reinforced plastic are processed in Europe.

0.3

LITRES
of fuel is saved for every 100-kilogram reduction in a car's weight.

115

KILOGRAMS
can be found in an average car.

15

PER CENT
of a car consists of plastics.

2.4

MILLION
metric tons of plastic were produced for the German automotive industry in 2016.

IN
2016,

THE AUTOMOTIVE INDUSTRY
required the third-largest proportion of all plastic used.

50

PER CENT
of the plastic contained in cars is polypropylene.

To achieve redundancy and thus even greater reliability, production is carried out on two systems with identical injection moulding and testing technology.

Moreover, many of LKH's injection moulding tools contain state-of-the-art temperature and pressure sensors that will flag up any deviation from the process parameters in any one of the moulds known in the industry as the "nest". Trends in the recorded values inform the staff well in advance of any maintenance work that will be required. And should a rogue shot occur out of the blue, the parts in question are immediately removed automatically.

FLEXIBILITY RIGHT UP TO THE LOADING RAMP

However, security and flexibility don't end with the products and production. LKH delivers quality-assured parts directly to some sites, without overstocking. The company's own consignment stocks enable it to supply products to several continents – reliably and on time.

Despite numerous international assembly locations and opportunities for worldwide sourcing, more and more customers are turning to LKH as their supplier – but this is nowhere near as surprising as it might seem. LKH is clearly extremely adept at meeting customers' high expectations in terms of the quality of both products and delivery. This ultimately ensures that all kinds of motorists, driving anything from premium cars to vans, benefit from high-quality locking systems that do their job reliably and conveniently behind the scenes for a vehicle's entire life cycle – however adverse the conditions.

One question remains to be answered: Why does LKH use different colours for certain components? It's not as if they will be visible later on. LKH's expertise and attention to process quality can even be seen in small details such as these. This little trick prevents mistakes during the later assembly stages of the lock, as the components are then immediately visible. ■

width or sink marks. For example, the interior lock lever, weighing only five grams, is manufactured out of 30% glass-fibre-reinforced polybutylene terephthalate using the eight-in-one injection moulding tool. A robot takes each batch of eight parts from the tool and places them all on the conveyor belt of a precision scale, which checks the overall weight against the setpoint and the pre-set tolerance limits of just ± 0.3 grams for all eight parts combined. Weight that deviates from these values is an indicator that process parameters were not adhered to or that there are problems with the materials, resulting in potentially faulty components. In this case, the conveyor belt drops the parts into a reject bin. If the scale registers several of these "faulty shots", production is interrupted. At the same time, the scale counts the parts and ensures that all packaging units contain exactly the right quantity.



Keeping to schedule

Aviation. Dubrovnik Airport is off to a flying start: Working alongside the airport operator, **Rittal** and other partners such as **ABB** are developing a new data centre for optimum IT security. The teamwork among the project partners and their good working relationship on a level playing field are key factors contributing to the project's success.

Text: Kai-Uwe Wahl





**READY,
STEADY, GO!**

A reliable IT infrastructure is required to keep waiting times at baggage reclaim as low as possible.

The Croatian port city of Dubrovnik has become a hugely popular stop-off point for travellers from all over the world. Even the Irish author George Bernard Shaw fell for the city's beauty, writing in 1929 that "Those who seek paradise on earth should come to Dubrovnik." What's more, Croatia is now a popular summer holiday destination. The number of overnight stays increased by almost 27 per cent to just under ten million in the first half of 2018. By way of comparison, Greece had over 30 million tourists in 2017. Since holiday-makers now come to Croatia from all over the world, the country's airports are also busier. That's why the infrastructure in Dubrovnik, in particular, had to be expanded, and that included a new data centre.

Nowadays, tourists can get to Croatia with most global airlines, and many of them fly directly to Dubrovnik. As a result, it is important for both the airport's operator and the passengers that the infrastructure can be adapted to the growing influx of visitors in good time. A new terminal is set to be completed in 2019, at which point it will be the largest airport terminal in Croatia. It will be able to accommodate up to 3.5 million annual passengers. To compare this, once again, with Greece – almost 7.4 million passengers checked into Crete's Heraklion International Airport in 2017. ▶



EFFICIENT COOLING
Hot aisle containment combined with water-based Liquid Cooling Package (LCP CW) from Rittal ensure an energy-saving cooling of the IT system. The cooling systems are installed in a redundant way to improve the fail-safeness of the entire system.



SAFETY
The TS IT racks are set up inside a Rittal security room, which provides optimum physical protection against unauthorised access and fire, as is specified in the ECB-S standard (European Certification Board Security Systems).



CLEVERLY CONCEALED
The supply pipes of the water-based LCP cooling systems run in the raised floor. In addition to the pipe supply lines, the raised floor also provides space and protection for the cabling (power and data cables).

In order to keep the airport cost-effective and travellers satisfied, it is vital that aircraft, cargo and passengers can still be dealt with quickly as the airport grows. Powerful IT systems play an important role in achieving this. Processes such as check-in, baggage handling and aircraft ground handling all require a fail-safe IT infrastructure that is available around the clock. An IT failure would lead to delayed flights, unsatisfied customers and financial losses. Not only that, but safety on the ground would be compromised if aircraft were unable to move into their parking positions or were provided with incorrect data during loading.

TIMING IS KEY

Following a tender process, Rittal was commissioned to work on the project on site along with local implementation partners such as Optimal Sistemi, Kodeks and Combis, and global Rittal partners such as ABB. At the same time, Rittal trained members of the airport operator's staff in how to operate the system.

"It's our job to make sure all the experts involved in the project build a close and trusting working relationship. We can only arrive at an overall solution that ultimately ensures smooth operations in the terminal and optimum security if everyone is able to bring 100 per cent of their expertise and personal experience to the table," explains Dejan Dokmanovic, Managing Director of Rittal Croatia.

SECURING THE BRAINS OF THE BUILDING

The data centre uses TS IT racks from Rittal. These are set up in a Rittal security room, which provides optimum physical protection against unauthorised access and fire, as specified in the ECB-S standard of the European Certification Body. The highly standardised nature of all the components means the TS IT racks can be extended particularly quickly and efficiently. A special monitoring system ensures fires are detected early on, while the Rittal CMC III monitoring solution oversees the infrastructure components. This is linked with the building's central monitoring system, allowing the IT operators to check the status of the entire system at a glance.

In addition, a means of safeguarding the power supply using a system with an uninterruptible power supply (UPS) was developed in collaboration with ABB. In the event of a power failure, the UPS batteries

initially keep the IT system running until an emergency generator can spring into action.

"When you're dealing with a vital infrastructure, power supply is a sensitive issue, and an IT system failure would immediately disrupt operations in the terminal. The solution provided by Rittal gives us the security of knowing that we can still run our systems even in the event of temporary power failures," says Tomislav Macan, Maintenance and Development Manager at Dubrovnik Airport. The subject of energy is also central to other aspects of this project, namely when it comes to optimising ongoing operating costs.

ENERGY-EFFICIENT COOLING

Running a data centre involves keeping a close eye on the resulting costs. The process of cooling the IT systems alone accounts, on average, for around 30 per cent of the overall energy costs. It is therefore only logical to look for energy-efficient IT cooling solutions. Rittal developed a concept with hot aisle containment for Dubrovnik Airport and installed Rittal cooling systems from the Liquid Cooling Package Cold Water (LCP CW) range with external chillers for cooling. The heat exchangers are positioned between the IT racks, where they extract warm air and emit cool air. These devices use water as a cooling medium and are very energy-efficient when used for bayed suite cooling with hot aisle containment. To top it all off, LCP CW cooling systems are installed with a redundant design in order to improve the reliability of the entire system.

"We're expecting the number of visitors to Dubrovnik to keep on increasing in the future," says Macan. "Many tourists will be coming by plane, and we're now fully prepared for them. We can offer optimum comfort and security thanks to our state-of-the-art terminal, which we can keep running smoothly also thanks to our new data centre. During the construction phase, we worked with Rittal and other suppliers as a team of professionals to make this project a success."





Further information
about the Rittal solution
for Dubrovnik Airport can
be found here:
www.rittal.com/dubrovnikairport

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Virtual clouds

Before a new Airbus can take off for the first time from the runway at the Finkenwerder site in Hamburg, all systems must first be thoroughly tested by the aircraft manufacturer's staff. These tests last approximately 400 hours and involve powerful computers simulating the various scenarios that could occur during take-off, landing and throughout the flight. To prevent this sensitive hardware from overheating, Airbus uses energy-efficient cooling units from Rittal's Blue e+ range.

FIND OUT MORE IN
THE NEXT ISSUE
OF BE TOP.



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Crossing the finish line in tandem

The twins Peder and Steen Mondrup have been inseparable since they were born 38 years ago. As twins so often do, they overcome obstacles as a team. They even tackled the Danish Ironman together, a triathlon in which participants have to run 42.195 km, swim 3.86 km and cycle 180.2 km. This may not sound all that unusual at first, but many spectators were moved to tears – because Peder was born with cerebral palsy. But with his brother's support, he was able to fulfil his dream in 15 hours and 42 minutes.



Learn to fly

That's the name of probably the most famous song by American rock band the Foo Fighters. In summer 2015, around 1,000 fans gathered in the town of Cesena in an attempt to encourage their idols to come to northern Italy for a concert. They all performed the hit song and uploaded a video of it online, publicly inviting the band to come and play there. And it worked – the Foo Fighters actually gave a concert in Cesena this autumn.

Feeling generous

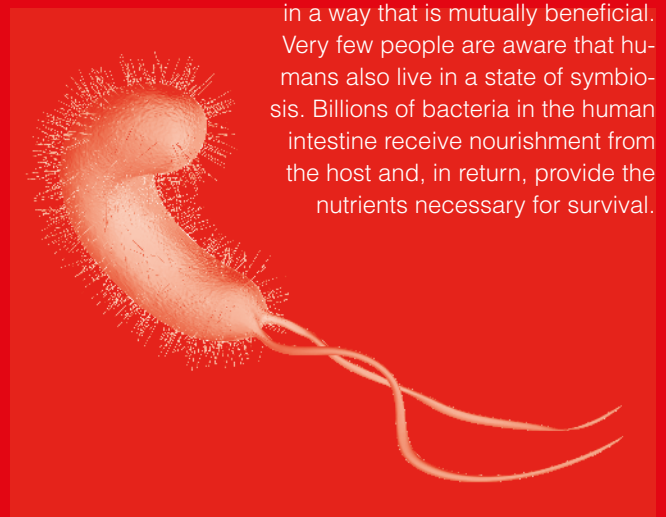
"The Giving Pledge" is made up of 183 billionaires, who believe that with great wealth comes great responsibility. Which is why, instead of just passing on their estate from generation to generation, the members of the organisation decided to donate half of their fortune for humanitarian purposes. So far, 365 billion US dollars have been raised as a result. This charitable organisation was founded by Bill and Melinda Gates together with Warren Buffett.

Totally top!

Outstanding achievements aren't just being made in technology and industry – humans and nature are also making great strides, proving that they too have quite a bit to offer.

Living together

That's what the word symbiosis means in Greek. Symbiosis manifests itself in the cooperation of two organisms that support one another in a way that is mutually beneficial. Very few people are aware that humans also live in a state of symbiosis. Billions of bacteria in the human intestine receive nourishment from the host and, in return, provide the nutrients necessary for survival.



Outstanding collaboration!

This is how a team of German and French researchers was described at the presentation of the Forcheurs Jean-Marie Lehn Prize. Despite living 1,000 km apart, Prof. Benjamin Dietzek from Jena and Dr Vincent Artero from Grenoble worked together to develop a method of producing hydrogen "without any environmental impact". All it requires is water and sun, ruling out any pollution.

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LOH
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