

The Magazine

for the Digital Enterprise

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A vision for success

Digital Enterprise –
implement now!

#mindsphere

In focus
Digitalization and SMEs –
seizing opportunities

Process Industrie 4.0
Digital solutions even
for safety-critical industries

“It is of
crucial significance
that small and medium-
sized enterprises
as well as large
corporations
both actively adopt
Industrie 4.0.”

Are SMEs leading the way – or not?



Jan Mrosik



Dr. Jürgen Brandes

Small and medium-sized enterprises are a constant source of outstanding innovation and of tremendous importance to the national economy and as a partner for larger companies.

For example, Germany's powerful small and medium-sized enterprise sector employs two out of three people, trains four out of five apprentices, generates more than every third euro of sales revenue, and applies for some 90% of all new patents. Impressive numbers!

Is Germany also a role model for digitalization? Certainly in several outstanding examples, but unfortunately not yet across the board. In Germany, for instance, currently only every fifth SME is a digital pioneer that already uses Industrie 4.0 technologies. But it is of crucial significance that small and medium-sized enterprises as well as large corporations both actively adopt Industrie 4.0.

However, this does not mean that small and medium-sized enterprises must completely overhaul their software or IT infrastructure overnight, or even wait for new developments compatible with Industrie 4.0. Instead, they can gradually deploy technologies and products at appropriate points in their company to accelerate the transition to digitalization.

In this issue, we show you how some small and medium-sized enterprises are already tapping into their digital potential: They have developed new business models and are taking advantage of the tremendous volume of data in the cloud to do so. These companies are analyzing their customers' business data and helping them make their production more efficient. Or they are offering customers an enhanced level of service and add-on services to gain their loyalty over the long term.

This issue will also show that the first step toward digital transformation is easier, and faster than you might think. Plus, you will also learn that a lack of data security and standardization have long been laid to rest as arguments against going digital. Investment costs are also manageable and with careful planning can be recouped within a very short period, in particular because needs-based financial solutions for investment have long been available. Learn more about this in this magazine.

We hope this issue of *The Magazine for the Digital Enterprise* offers you plenty of inspiration so that small and medium-sized enterprises can continue to thrive.

Jan Mrosik
CEO Digital Factory

Dr. Jürgen Brandes
CEO Process Industries and Drives



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Interview with Dr. Hagen Gehring, Bausch+Ströbel Maschinenfabrik, and Klaus Helmrich, Siemens AG, on the opportunities digitalization offers in industry

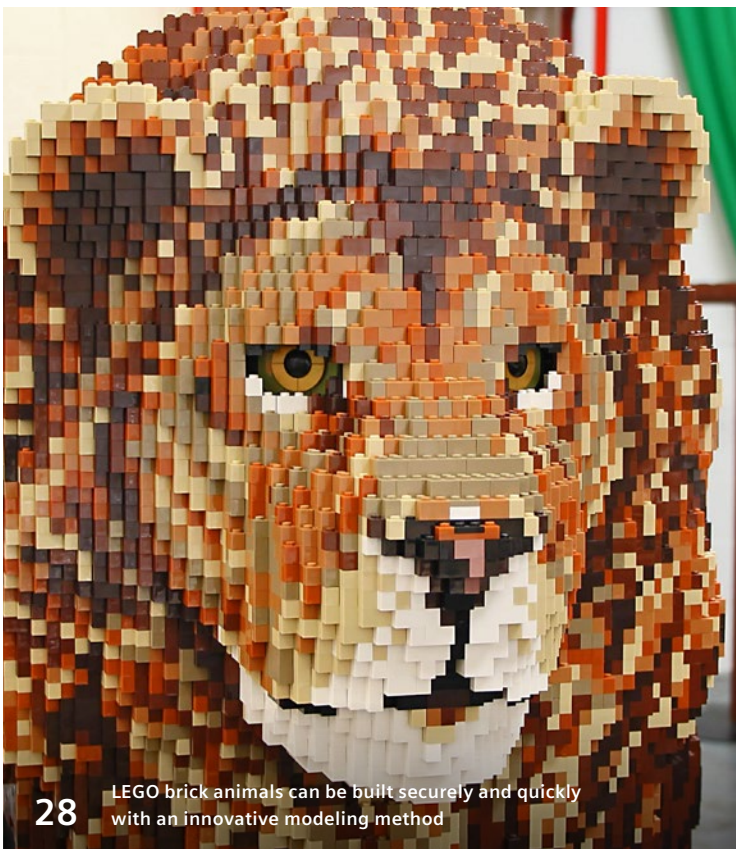
Siemens AG/B. Minx



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Thanks to a specially-designed app, detergent and disinfectant manufacturer Calvatis always has an up-to-date overview of the consumption of chemicals

Siemens AG/W. Geyer



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LEGO brick animals can be built securely and quickly with an innovative modeling method

Bright Bricks



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At Great Wall Wine Yantai in China: quality wines thanks to precise data

Great Wall Wine Yantai Co. Ltd.

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Creating a clearer vision with data: The tangible reality the young boy experiences using a mixed-reality headset also applies to small and medium-sized enterprises. Discover more in this magazine.

(Siemens AG/B. Minx)

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Arachnophilia

Crawling spider robots equipped with printer nozzles could add fresh impetus to 3D printing: Siemens researchers in Princeton, New Jersey, US, have developed prototype spider-like robots that can work collaboratively to print structures and surfaces, thus potentially accelerating production of large-scale, complex structures such as the fuselages of planes and the hulls of ships.

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A vision for success

In 2015, John Chambers, chairman and CEO of Cisco Systems, declared his credo: “Disrupt or be disrupted.” Anyone unable to produce innovations and displace existing technologies, products, and services will be pushed aside themselves. Digital transformation is the key to keeping your own company from fading away into oblivion.

Chambers’ forecast is already coming true today. “Digitalization is the main reason why more than half of all Forbes 500 companies from the year 2000 have now disappeared,” explained Pierre Nanterme, CEO of leading consultancy Accenture, to the World Economic Forum. Bright ideas and disruptive technologies have long been able to put significant pressure on entire business models within a very short period, as has been demonstrated by companies such as Uber in the taxi business or Airbnb in the hotel industry.

Are small and medium-sized enterprises falling behind?

Global players are being affected and to a greater and greater extent small and medium-sized enterprises as

well. Today’s customers are very demanding and lose their patience quickly. That is why not only products but also the underlying production processes must be made available and visible to end customers in a more customized, intelligent and rapid manner – while maintaining consistent quality at the lowest possible price. This means the pressure is on – yet many SMEs are still hesitating to effectively implement or even to initiate a digital transformation of their companies. Concern over the high capital expenditure involved, problems with data security, and the lack of qualified specialists act as a disincentive. In the long run, this may result in small and medium-sized enterprises losing ground.

However, at the same time, the profit margins of those who are willing to make targeted investments and transform their businesses are rising. In a recent study, the consultancy McKinsey concluded that “by 2025 consistent digitalization of Germany’s small and medium-sized enterprises will increase German economic growth by 0.3 percent a year.” That corresponds to an additional value-added potential of €126 billion. The most significant opportunities for SMEs are above all in production optimization based on data entry and analytics, and in the development of new business models and expanding their own portfolios (learn more about opportunities for SMEs and areas where they can improve on page 10).

The moment for the operator

If small and medium-sized enterprises want to take advantage of these opportunities and remain competitive, they have to undergo an internal and external transformation. On the one hand, they need to add digital solutions and services to their portfolio. This is the only way they can continue to satisfy customer requirements in the long term. On the other hand, they must also gear their internal processes to reflect the requirements of digital transformation. This does not mean that every business must quickly carry out this transformation at immense cost, as Siemens managing board

member Klaus Helmrich explains in an interview on page 12. However, a clear commitment by the company to a digitalization strategy is essential.

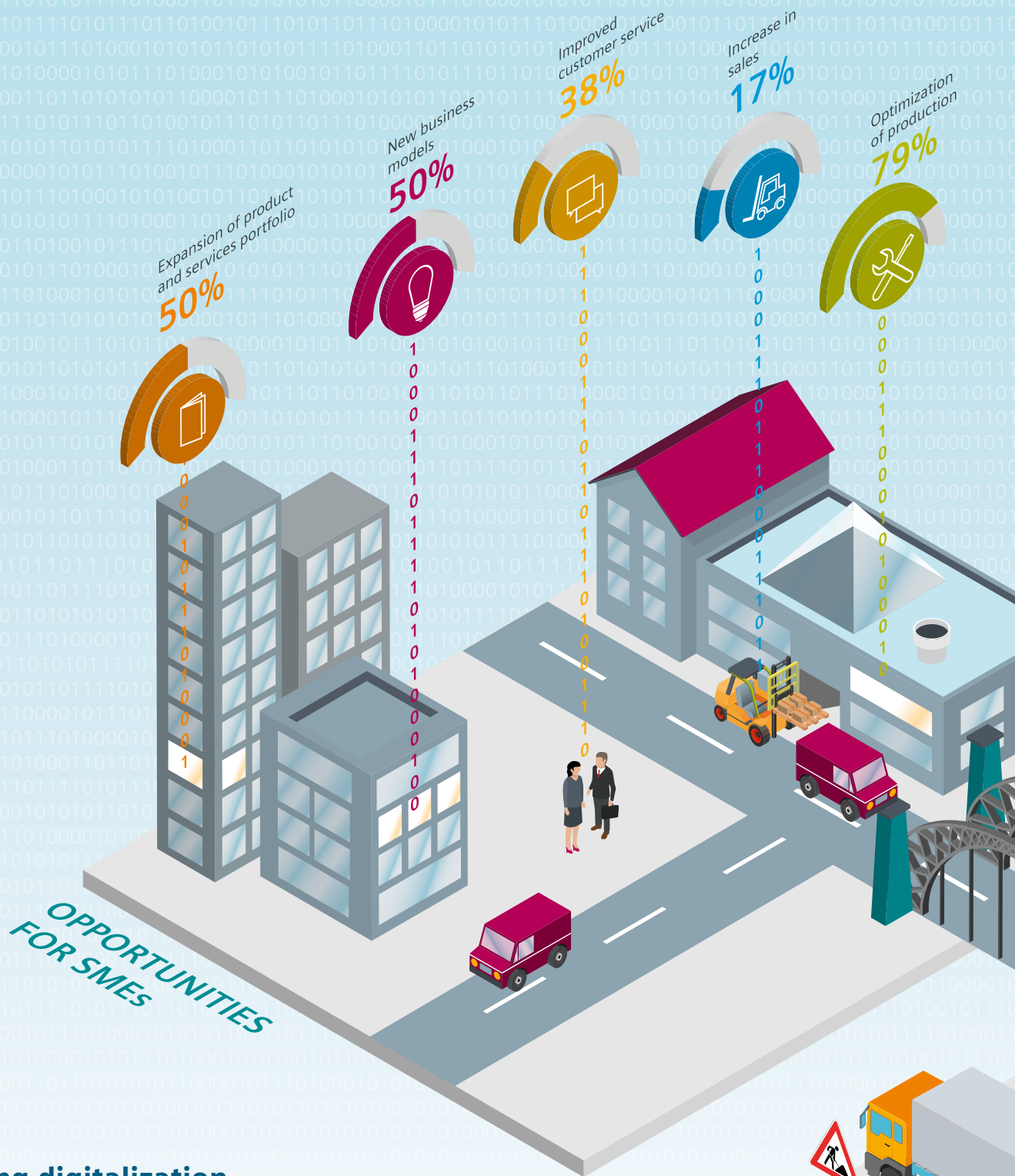
How quickly a commitment to digitalization pays off is demonstrated by the examples of the tool manufacturer Gebr. Heller Maschinenfabrik GmbH and the detergent and disinfectant manufacturer Calvatis, which you can read about on page 19. Both companies have opted for access to MindSphere, the open, cloud-based IoT operating system from Siemens to connect their machines and physical infrastructure with the digital world. This opens up new possibilities for them to analyze data from production and operations and draw critical conclusions based on this. By doing so, they can boost the production efficiency of their customers and minimize downtime, for example through predictive maintenance. At the same time, they can develop innovative and profitable business models.

These examples are consistent with the trend that widely respected institutions and consultancies have identified in studies of small and medium-sized enterprises: Digitalization is not primarily a threat; it is an opportunity for SMEs to continue their success story and reinvent themselves. However, it takes clear commitment to digitalization on the part of the companies. It is up to them what they do with this opportunity. ■



(Source: The Boston Consulting Group: Time to Accelerate in the Race Toward Industry 4.0, May 2016)

The challenges posed by Industrie 4.0 affect companies worldwide. The differences between companies in Germany and the US are therefore only small.



Mastering digitalization – opportunity and challenge

All companies are affected by digitalization – including small and medium-sized enterprises (SMEs). However, it is hard to get these companies interested in digitalization because it involves meeting several challenges: Reliable data security is a considerable hurdle for 41% of SMEs, 40% have difficulties recruiting qualified staff, and 35% are hesitant about the high capital expenditure required. However, optimal use of digitalization also opens up a number of opportunities for small and medium-sized enterprises: 79% of SMEs see potential for optimizing production, 50% want to develop new business models with digitalization, and 38% see opportunities for improving customer service.



DIGITALIZATION MEETS SMEs



(Source: The German Federal Ministry for Economic Affairs and Energy: "Mittelstand-Digital" (SME-Digital). Brochure, March 2017)



Dr. Hagen Gehringer, Managing Director of Bausch+Ströbel Maschinenfabrik Illshofen, has gained valuable experience from digitalizing his production

Siemens AG/B. Minx



Klaus Helmrich, a Member of the Managing Board of Siemens AG, explains the opportunities and potential for digital SME pioneers using Industrie 4.0 technologies

Siemens AG

“There is no stopping digitalization!”

They want every wish to be met, the highest quality and all of it for a low price. And they want it delivered now. That is the customer of today. Hardly any two end products are similar to one another. For instance, a BMW model with the same paint options and features is produced an average of only 1.2 times a year. This has far-reaching consequences for companies because in order to meet those requirements they have to manufacture more and more efficiently and flexibly. Large companies are affected by this trend, but to an increasing extent small and medium-sized enterprises as well. Dr. Hagen Gehringer, managing director of Bausch+Ströbel Maschinenfabrik Ilshofen, and Klaus Helmrich, a member of the managing board of Siemens AG, are both familiar with the market and understand how companies can handle this increasing pressure.

Dr. Gehringer, you are currently digitalizing your product development process. From your perspective as a mid-sized machine manufacturer, what motivated this decision?

Hagen Gehringer: Our customers require highly specialized systems from us and want intensive support. There's also a trend towards standardized, highly

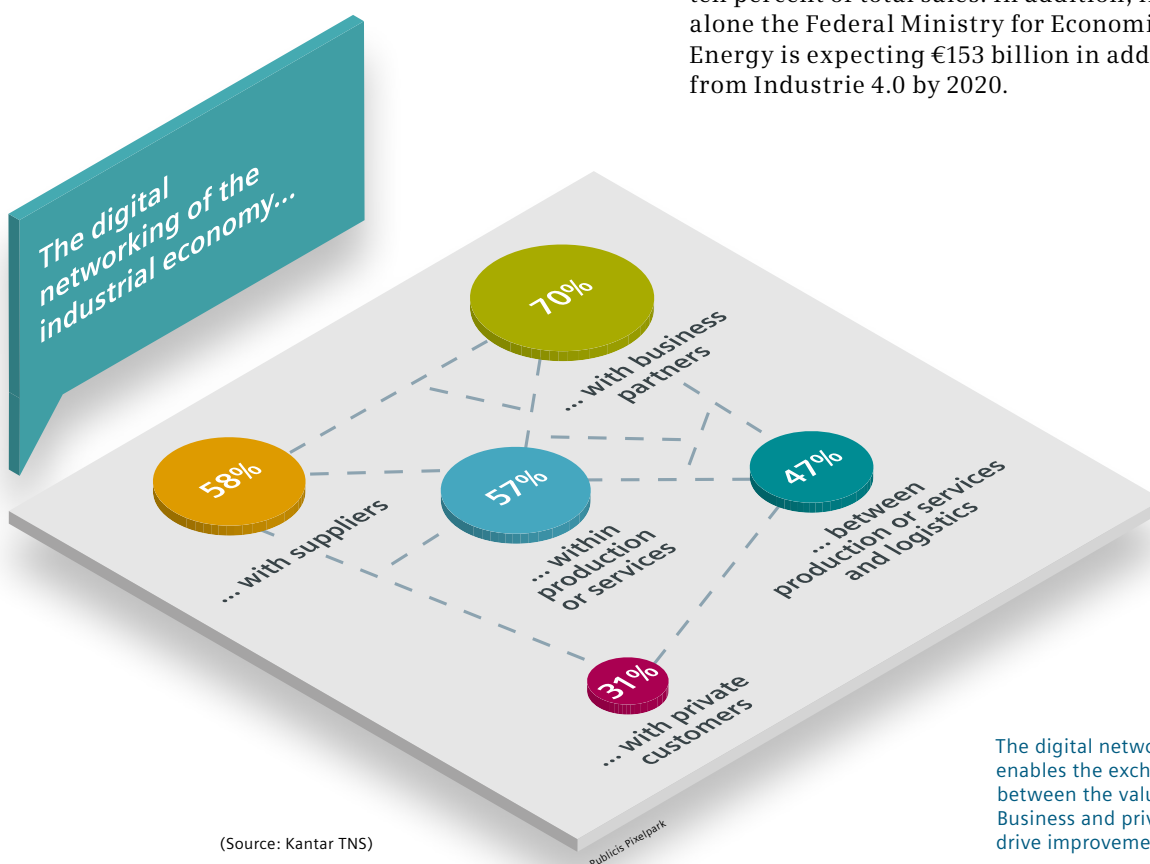
flexible machines and short delivery times. A digital image of the machine allows us to coordinate the specific requirements together with the customer at a very early stage and begin programming immediately after that.

What does this look like, specifically?

Gehringer: In the past, we had to construct a wooden model for each new special-purpose machine to test mechanical properties, ergonomics, and transport routes. Today, this is done in a completely virtual environment thanks to the digital twin. After virtual commissioning, all data from the simulations and tests is uploaded to the development department's data pool. This allows us to eliminate faults and optimize processes even before a single component is installed. It improves and considerably speeds up the actual commissioning process for our customers, making it less prone to errors and drives costs down.

Mr. Helmrich, a general question: What does digitalization offer small and medium-sized enterprises?

Klaus Helmrich: Siemens Financial Services recently surveyed managers at 60 international manufacturing companies in eleven countries. They anticipate digitalization will enable productivity gains of up to nearly ten percent of total sales. In addition, in Germany alone the Federal Ministry for Economic Affairs and Energy is expecting €153 billion in additional growth from Industrie 4.0 by 2020.



The digital networking of enterprises enables the exchange of information between the value chain stages. Business and private customers also drive improvements and innovation.



“Digital business models and the digital design of value chains in particular offer new opportunities for medium-sized enterprises.”

Klaus Helmrich, Managing Board Member, Siemens AG

That sounds like all players should be interested in joining in.

Helmrich: Not yet. In Germany, for instance, only every fifth mid-sized enterprise is a digital pioneer already using Industrie 4.0 technologies today. There's also lots of potential in Europe. Digital business models and the digital design of value chains in particular offer new opportunities for medium-sized enterprises. However, companies by no means need to carry out a complete and immediate transformation and upgrade their entire software and IT infrastructure. The important thing is to start in the right place and then to design the transformation in a commercially viable manner with a forward-looking migration program.

Dr. Gehringer, what does Bausch+Ströbel expect to gain from digitalization in the long run?

Gehringer: We expect quite a lot! Digitalization will allow us to implement specific customer requirements more and more quickly, efficiently, and flexibly. We strive to complete configuration of a given system together with our customer within two days so that clear processes and modules are in place and development can quickly begin. That is why we rely on consistent digitalization of the entire value chain: from design, structuring, simulation and optimization at our in-house virtualization center, right down to commissioning and service. By 2020, we anticipate engineering efficiency gains of at least 30%, also due to being able to do virtual commissioning. In addition to NX software for CAD design and Teamcenter as the data backbone, we are now also relying on TIA Portal, which substantially increases our engineering efficiency.

As a result, your customers can start using new machines a lot sooner. Are there other benefits as well?

Gehring: Yes, such as in service. We are able to offer customers more comprehensive service than ever before and provide even better support in day-to-day operations. Even after construction and delivery, the digital twin continues to exist in each machine and collects data to, for example, enable predictive maintenance or increase system availability. This allows us to prevent downtime and cut costs by optimizing energy consumption – a genuine competitive edge.

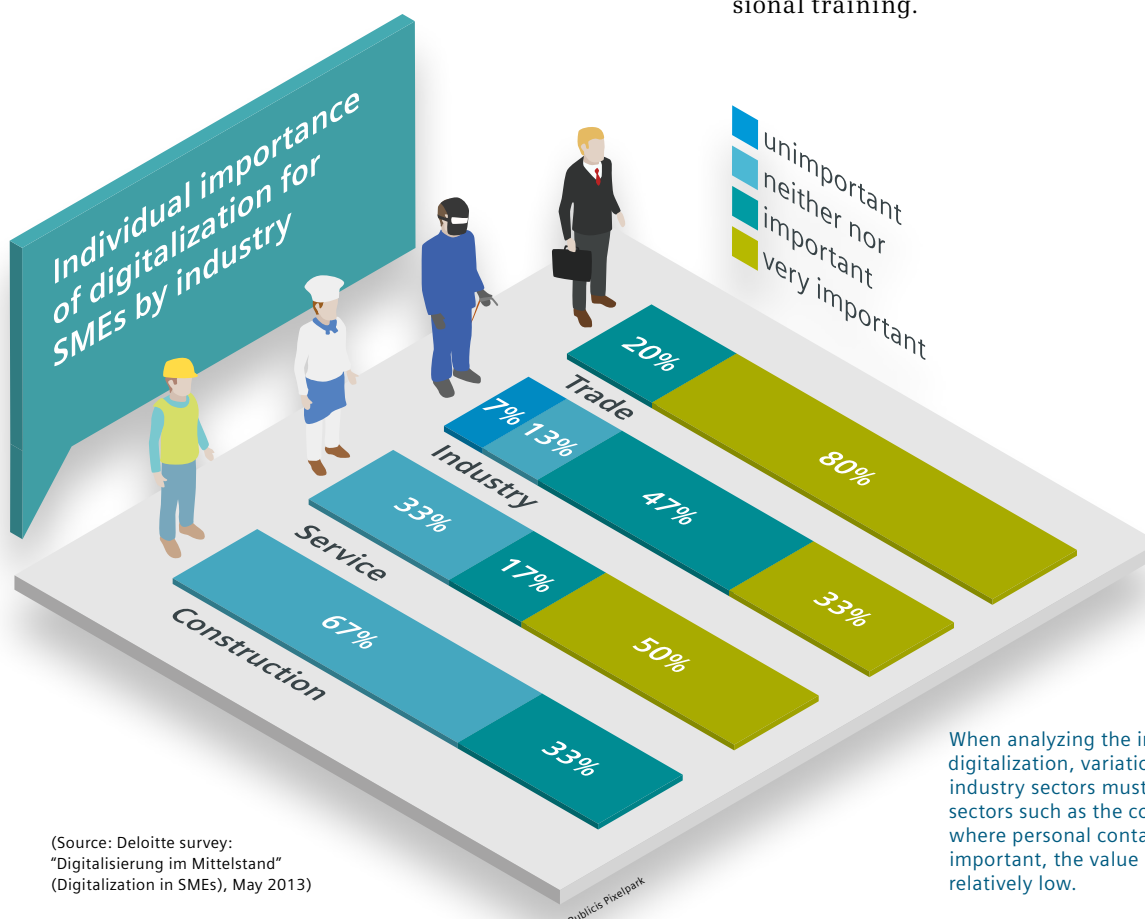
Where are the limits to digitalization?

Helmrich: Regarding time zones, locations, companies, or countries, initially there are no limits. That is precisely what makes digitalization so special: The fact that the entire value chain can be completely digitalized and integrated, from product design through to on-site customer service. However, since you asked me

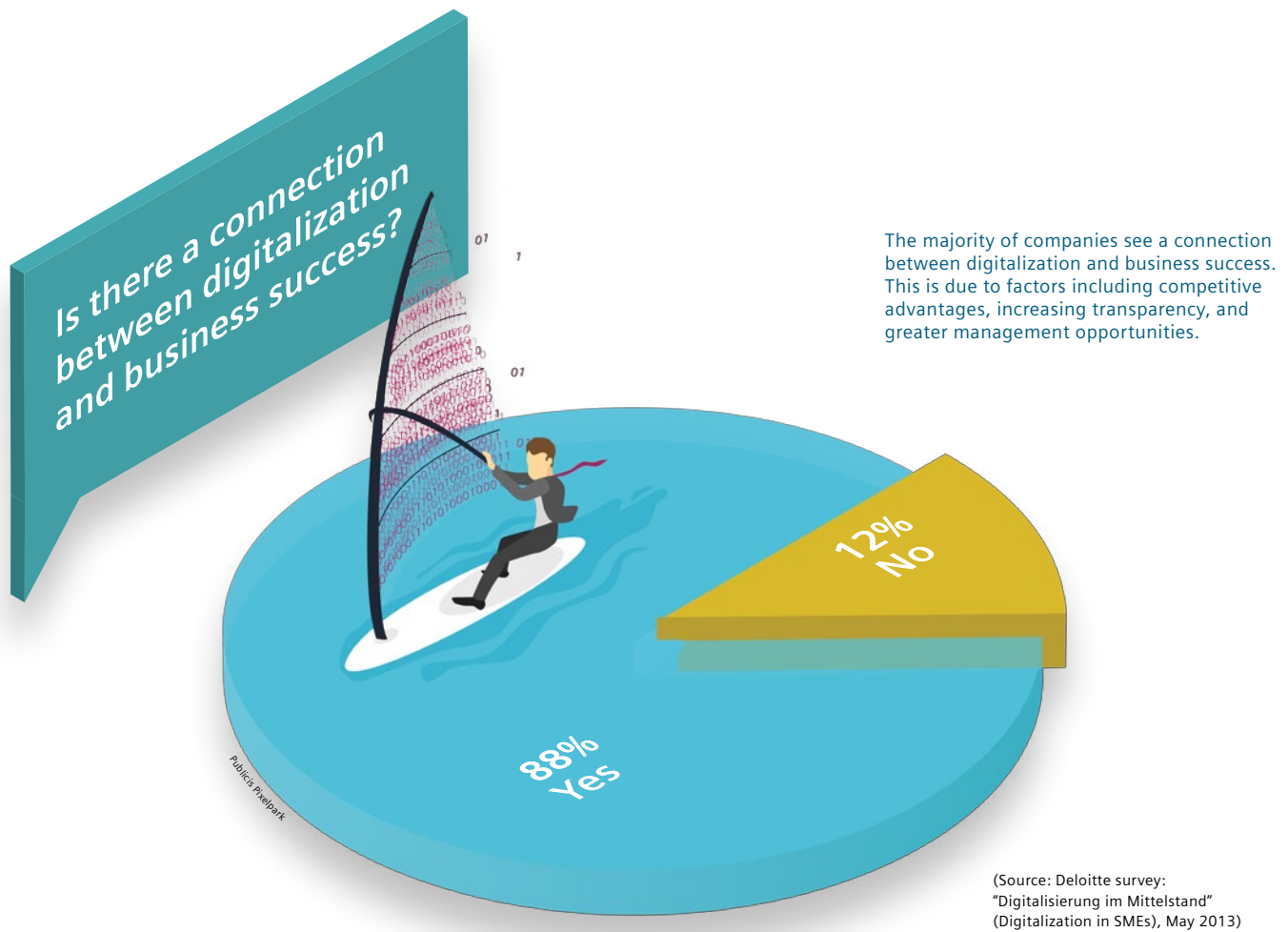
about limits: On the one hand, even if production processes are easier and easier to optimize digitally and production environments can be adjusted and improved for variable operational sequences ever more independently, at the same time, even in Industrie 4.0, humans will continue to play a crucial role in the complex interdependencies, planning, and controlling of digital systems.

What does that mean for small and medium-sized companies? Will companies who don't participate inevitably get left behind?

Gehring: In the long run, they definitely will. As is true for globalization, I believe there is no way of stopping digitalization. To ensure there are no losers as a result of Industrie 4.0, however, we must not overlook the jobs that are perhaps not so digitalized. They are equally important, and we also need to involve the people working in these areas. I believe there will continue to be many jobs wherever in-person services are needed. However, in areas where jobs will disappear, it is important to take employees along on the path to Industrie 4.0 – such as through education and professional training.



When analyzing the importance of digitalization, variations in the different industry sectors must be considered. In sectors such as the construction industry where personal contact and tradition is very important, the value of digitalization is relatively low.



What does management need to consider so a company can keep up?

Helmrich: Managers need to make clear strategic decisions as they transform into a digital enterprise. Digitalization must be a top management priority on two levels: On the one hand, companies need to align what they offer to reflect Industrie 4.0 and add digital solutions and services to their portfolio. On the other hand, they must undergo transformation and gear their internal processes to meet the requirements for digitalization.

Gehring: It takes a considerable amount of creativity and courage to generate disruptive ideas and implement them. What's more, we need to interconnect more strongly on a global basis. Only then will it be possible, for example, for a mid-sized enterprise in Germany to successfully roll out an innovation on the Chinese market. For me, one thing is certain: The slow cycles of change are a thing of the past. We all need to learn how to continuously reinvent our companies.

The concept of the digital twin has been mentioned a lot. Doesn't this also require a unifying element that holds everything together?

Helmrich: Very definitely, and that brings us to the subject of open platforms and eco-systems – in other words, the intelligent interaction of providers, users, industry associations, and universities. Data needs to be centrally collected, read out, interpreted, and imported with specific instructions for action. With MindSphere, we offer an open, cloud-based IoT operating system which allows customers to integrate devices from other manufacturers or customers' own apps. The machine tool manufacturer Heller, for example, has developed a predictive condition monitoring app for its customers, which allows collected data to be read out and interpreted. The company has used it to develop a new business model and offer customers a comprehensive service model. This allows work such as maintenance to be done in a more targeted way while keeping plant facilities online (see more about this on page 19).



Siemens AG/B. Mink

“As is true for globalization, I believe there is no way of stopping digitalization.”

Hagen Gehringer, Managing Director, Bausch+Ströbel
Maschinenfabrik Ilshofen GmbH+Co. KG

What would your advice be to a medium-sized company interested in or having to implement cloud applications?

Helmrich: Have a clear strategy and communicate it within your company. Thanks to plug & play, it often only takes an hour to connect a company to MindSphere so it can tap into the benefits of open data analysis. Plus, the costs are frequently lower than an exclusive cellphone plan. However, the path to Industrie 4.0 is long and takes several years, and calls for a deliberate decision to invest. At Siemens, we worked on our digital twin for over ten years and invested nearly ten million euros in our software portfolio being used by our customers today.

That is quite a large amount!

Helmrich: Yes, but our customers do not need to invest the same amount of money, of course. They can rely on our experience. There is, after all, no one-size-fits-all solution. For medium-sized companies, in particular, it makes sense to analyze your company's requirements and to gradually move forward with digitalization with targeted investments. Every industry, every company is different and requires solutions it can integrate into existing processes and the production structure step by step while not restricting operations due to downtime. Today, this naturally implies that not only greenfield plants are built based on the new concept, but also brownfield plants can be retrofitted during normal operation.

Dr. Gehringer, for you as a medium-sized enterprise, what are the benefits of collaborating with a corporation as large as Siemens?

Gehringer: The consistent, integrated range of solutions is extremely valuable for a medium-sized company like us. We use the individual modules and need to be certain they can be used in the foreseeable future. However, we do not have any capacity of our own and no competence when it comes to the interface between the modules. Siemens provides us with extremely valuable work and – given that the modules fit one another and the interfaces are clarified – we can also use several modules in sequence and quickly and easily commission them. We have had a thriving partnership with Siemens for many years, and it would be highly beneficial for it to continue this way. ■

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MindSphere, the open, cloud-based IoT operating system

The future is now

There is no avoiding digitalization anymore. However, for many, the actual term digitalization is still an intangible concept, even though each day it has a significant impact on the economy as well as on society.

The Internet of Things (IoT) is the driving force behind digitalization. Expressed in simple terms, the IoT is a network of devices connected to the Internet so they can communicate with each other “independently.” This is made possible by a cloud server, which connects the devices digitally and is used for gathering, linking, and evaluating data. With MindSphere, Siemens offers an open, cloud-based IoT operating system that can sustainably optimize enterprise productivity and efficiency across various industries.

Even small and medium-sized enterprises can improve their production by connecting their machines to MindSphere to read out and analyze data and improve operations. Siemens only uses the latest security and encryption technologies for protecting sensitive machine data.

For example, in machine building and plant engineering MindSphere allows machines to connect with the digital world. At the EMO in September 2017, the world’s leading trade show for machine tools and metalworking, Siemens already demonstrated how easy it is to implement digitalization in the field of machine tools, and how many companies in this industry have already taken this step. Across the fairgrounds, Siemens connected around 240 different machine tools,

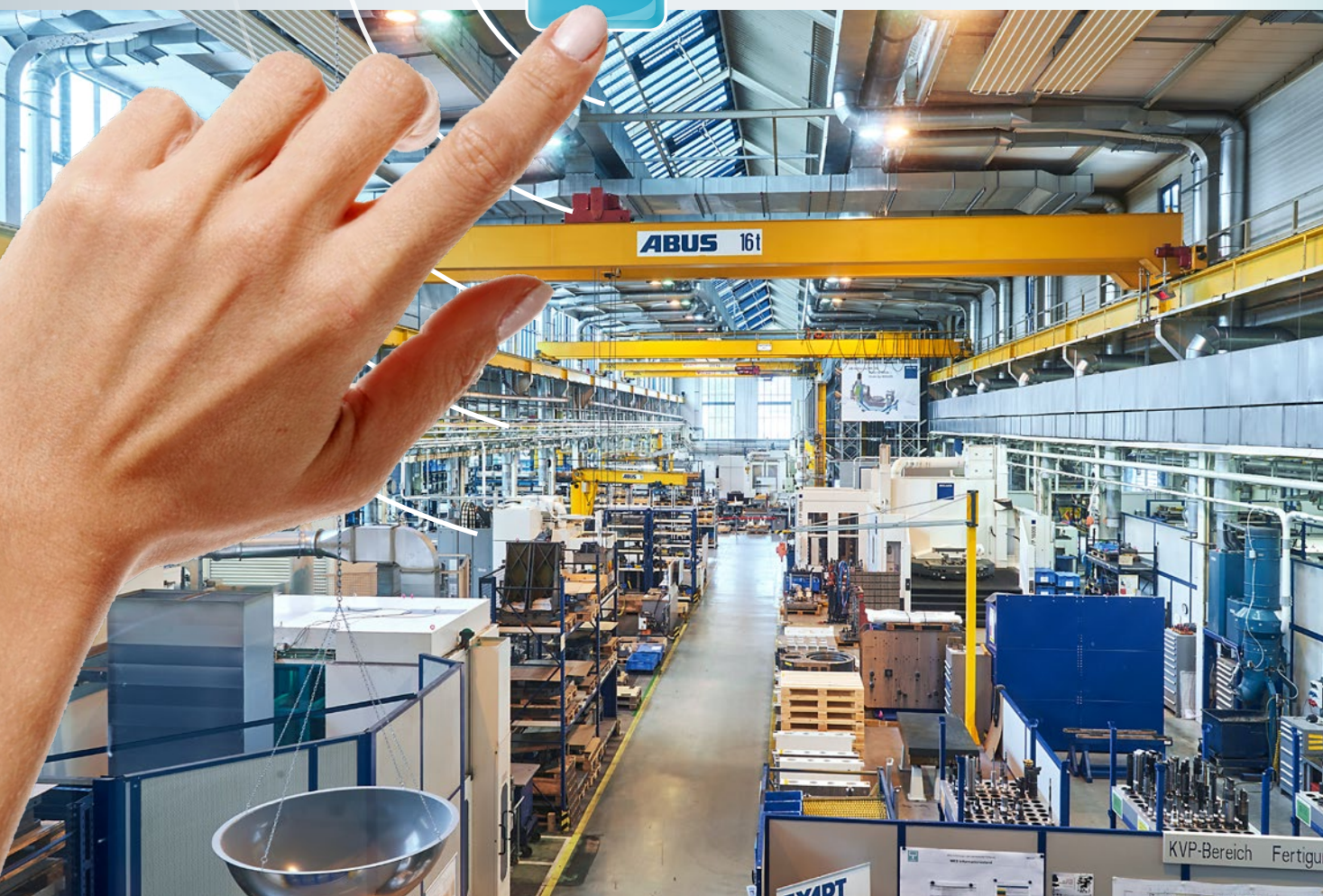
made by over 140 manufacturers, to MindSphere. The amazing level of participation by machine tool manufacturers shows the kind of potential the industry sees in cloud-based digitalization solutions.

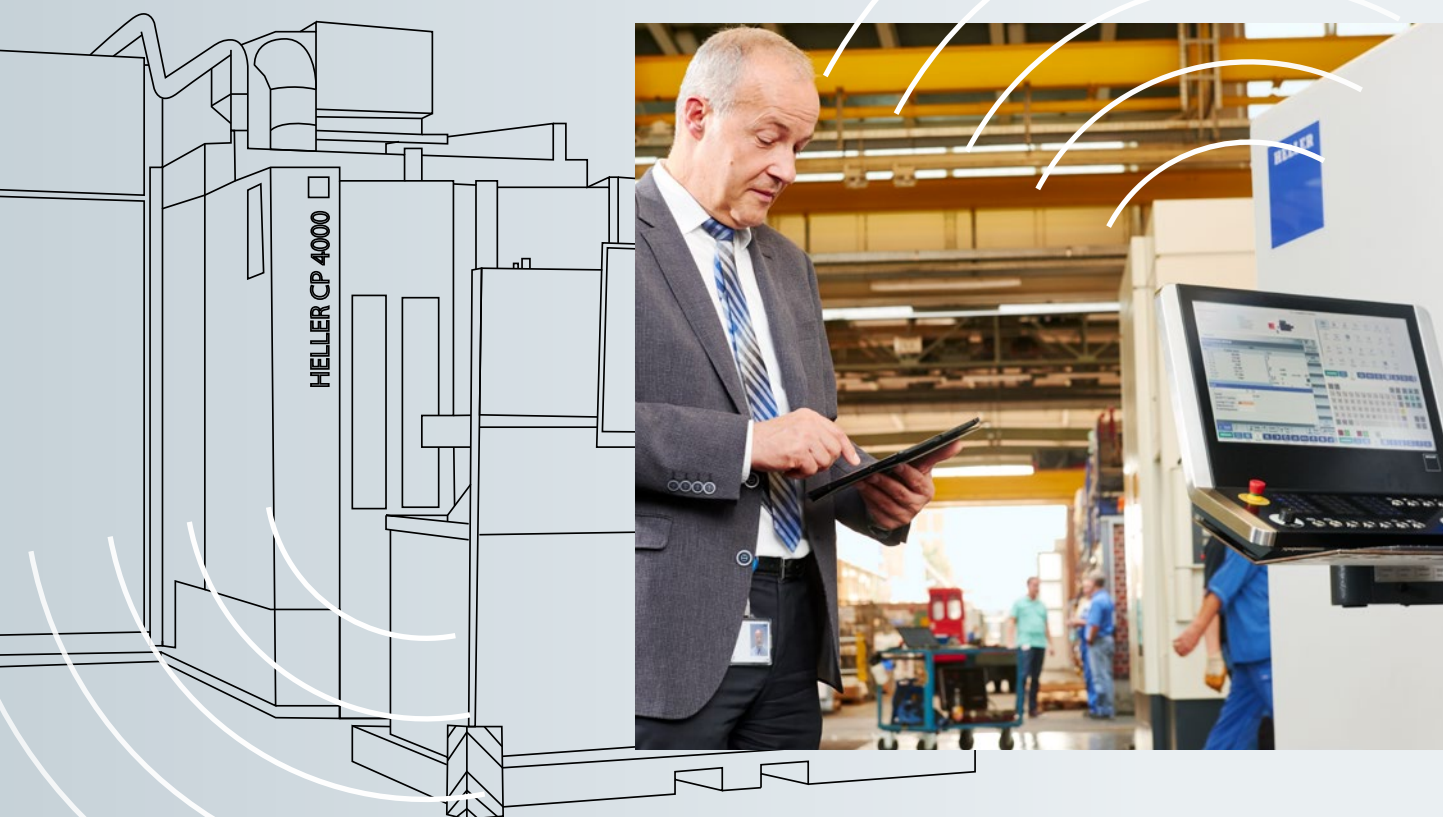
MindSphere offers machine manufacturers and operators many different ways to gain a competitive advantage. For example, they can now make use of their comprehensive, industry-specific expertise to develop high-performance applications and provide optimal support to customers in meeting their specific challenges, just as the machine tool manufacturer Heller did (learn more about this on page 19). Alternatively, they can use existing MindSphere applications, called MindApps, to monitor and analyze their own machine park, and to optimize their efficiency and maintenance processes (learn more about this on page 24). This provides an excellent foundation for new services and new business models. On the next few pages, you can read about how this is now also possible for smaller enterprises and how digitalization can also be put to effective use in the field of drive solutions. Find out about the valuable services and profitable business models you can achieve with MindSphere. ■

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Appsolute efficiency

Help your customers to cut costs and manufacture more efficiently while creating new business opportunities: Heller knows how. The machine tool manufacturer has developed its own app for monitoring machine statuses available in MindSphere. The app includes digital services that drastically reduce maintenance, repair, and production costs. >





“In recent years, flexibility in production has increased at a steady pace.”

Bernd Zapf, Head of Development New Business and Technologies, Heller

Keeping an eye on the machine status

Heller knows what impact machine downtime can have and how important it therefore is to continuously monitor all its machines.

Bernd Zapf quickly crosses the long reception hall of the brick building that is rich in history and has been home to the Heller family-owned business for generations and rushes to a meeting with his colleagues from the service team. As head of development new business and technology at Heller, or “DN,” Zapf often hears at these meetings what challenges Heller customers are facing: “In recent years, flexibility in production has increased at a steady pace. Our customers are currently struggling with the need for more flexibility and greater competitive pressure. They need to deliver better product quality while keeping operating costs down and maximizing production efficiency. This means machine downtime needs to be avoided completely because it costs money.”

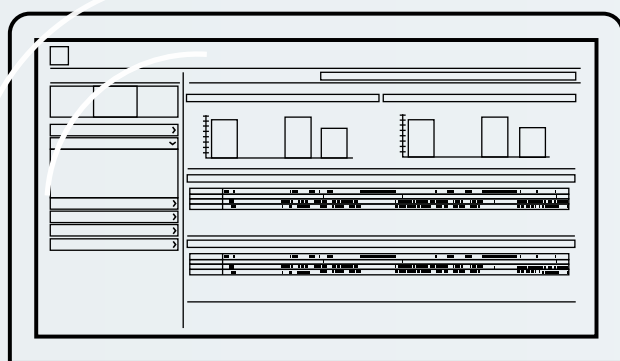
This last aspect in particular has attracted Heller’s attention. The machine tool manufacturer knows what impact machine downtime can have and how important it therefore is to continuously monitor all its machines. When Heller service technicians reported that customers were also looking for a solution in this area, this motivated creativity within the DN and Service Product Development departments. And so the idea for the Heller Services Interface app was born. The app visualizes the status and operating data of machines in a clear and transparent interface. Zapf and his team asked themselves two critical questions in this project: How do app users, that is, customers, get the machine data onto their browser-based device – and what about industrial security in this area? They held intensive meetings with Siemens to answer these questions and come up with a solution.

Reducing prejudice

The idea behind the app is easily explained: In a first step, Sinumerik Integrate makes critical machine status and operating data available in the cloud. Regarding the platform, the company opted for MindSphere, the open, cloud-based IoT operating system from Siemens, because it allows the required data to be retrieved by the app and visualizes it on a mobile device in the Heller Services Interface. In addition, because industrial security is a top priority, Siemens used only the latest security and encryption technologies to record, transmit, archive, and process the data in MindSphere.

Some customers have been testing an initial version of the app since May. If the app continues to run in a stable manner, it can be rolled out as early as the end of the year. However, Heller did not have to face the actual challenge until after the Heller Services Interface was developed. As Zapf explains: "To our customers, our app, and in particular everything that happens with the data from the machines' monitors, was initially very abstract. We had to develop trust and explain to them that this really would deliver significant benefits and value added and ultimately save them money."

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Repairs and predictive maintenance

Heller does all the maintenance work itself because the machine tool manufacturer can also use the app to maintain an overview of all of its customers' machines.



Siemens AG/Ch. Madere

Rent or buy?

In the future, customers will have two options for using the new app. On the one hand, they can conclude a comprehensive service agreement as part of the Heller TPS options, which Heller offers for all its machines and also can include retrofitting existing systems, where required. Under this agreement, the customer receives the Heller app, which enables a transparent presentation of all the primary production and maintenance data. Heller does all the maintenance work itself under this agreement, because the machine tool manufacturer can also use the app to maintain an overview of all of its customers' machines and their respective statuses. If maintenance is necessary or if there is an unexpected machine overload, Heller can intervene immediately.

Heller's thinking went further for the second option: How can we reach even more customers? In particular, also customers for whom the purchase of a machine tool is a major financial burden? In response to this question, a machine usage model called Heller4Use

was developed: Heller provides its customers with its machines and ensures 24/7 system availability with the new app. Ultimately, customers only pay for the time during which the machine is running, which allows them to reliably calculate costs.

Win-win situation for all

This cloud-based application was developed in the course of an intensive, two-year collaboration between Heller and Siemens. The resulting application delivers value added to all parties. On the one hand, Heller can maintain an overview of its machines and their statuses. On the other hand, regardless of whether the machine is provided by Heller4Use or is a proprietary Heller system, customers can be sure they receive reliable service from Heller which prevents unplanned downtime as well as possible. Thanks to the collaboration, Siemens has also found a competent specialist in the machine tool industry. This is, quite literally, a hAPPy ending for everyone involved. ■

Machine data accessible anywhere

How do app users, that is, customers, get the machine data onto their browser-based device – and what about industrial security in this area? Heller held intensive meetings with Siemens to answer these questions and come up with a solution.



Drive technology of the future

In the field of technology and services, digitalization is currently providing a powerful impetus to the field of drive engineering. Intelligent analysis of the operating data of motors and complete drive applications is no longer a vision of the future, says Tim Dawidowsky, CEO of Large Drives, Process Industries and Drives at Siemens AG.

Mr. Dawidowsky, where do you see the challenges being faced by your industry customers today as digitalization continues to increase?

Tim Dawidowsky: Industrial applications are imposing extremely high demands on the productivity and efficiency of motors, because production must run without downtime. Downtime periods cost time and money, and therefore need to be avoided to the greatest extent possible. However, drive technology as a whole is continuously exposed to wear and tear, which in many cases is invisible to the naked eye. To meet these high standards and avoid unscheduled outages and downtime, digitalization is indispensable for drive technology, too. Among other things, it allows companies to obtain an overview of the current operating state of their motors, predictively plan maintenance work, and intervene immediately when a fault arises.

What support does Siemens offer its customers when it comes to the digitalization of their drive technology?

Dawidowsky: We help our customers tap into the full potential of digitalization. Together, we put the future within reach – and implement solutions that enable simplicity and efficiency. During the operations phase, the primary focus is on intelligent, data-based concepts, which makes condition monitoring



“We help our customers tap into the full potential of digitalization. Together, we put the future within reach – and implement solutions that enable simplicity and efficiency.”

Tim Dawidowsky, CEO Large Drives, Process Industries and Drives, Siemens AG

and detailed analysis of the motor possible. To achieve this, Siemens Simotics IQ offers customers the opportunity to quickly and affordably complete the digital transformation of their drive technology. As part of Simotics IQ, in the future our standard Simotics SD next generation motors will be fitted with Simotics Connect. Simotics Connect is a compact box attached directly to the motor that acquires operating and process data such as temperature and vibrations via a digital interface and sends this data to MindSphere, our open, cloud-based IoT operating system. The MindApp for Simotics IQ analyzes the gathered data and converts big data into smart data and optimizes processes.

Let's take a look into the future: What will Siemens be able to offer its customers in the field of drive technology?

Dawidowsky: In the future, we will ship our standard motors in the new Simotics SD series with Simotics Connect and will also offer related digital drive train services. We are also working on equipping motors that our customers will soon be using with this IoT connectivity solution. This will enable them to benefit from digitalization without having to purchase a new drive system.

➔ [siemens.com/ids](https://www.siemens.com/ids)

Frugal cleaning fairy thanks to big data

Data is said to be digital gold. But how do companies mine the information that is so important to them from the glut of data in the cloud? The detergent and disinfectant manufacturer Calvatis analyzes and visualizes data from industrial washing plants in MindSphere.

The dirty food crates are lined up and glide into the machine. A few yards farther down the line, they leave the washing tunnel all shiny, clean, dry, and like new. This happens tens of thousands of times a day at four sites of the large German commercial enterprise. Cleanliness is the top priority in the food industry, because fresh produce is very sensitive and perishes easily.

The sheer size of the systems supplied by Calvatis to food industry customers cannot be compared with conventional household dishwashers. The industrial washers also come with sophisticated technology for optimal dosing of detergents: Sensors determine the conductivity of the mix of dirty water and detergent as well as the consumption of chemicals and the machine temperature. This information helps streamline the process to minimize consumption of energy and detergents.

But the data is not only valuable in day-to-day operations. It can also contribute to more transparency regarding the consumption of detergents and chemical additives. This, in turn, allows benchmarking of various plants and the ordering process in purchasing to be optimized. So it is no wonder that companies which operate industrial washing systems are highly inter-

ested in collecting and centrally analyzing as much data as possible.

Detailed information at the push of a button

A project jointly implemented by Siemens and Ladenburg, Germany-based Calvatis GmbH demonstrates the benefits this offers in practice. With over 400 employees, the company is one of the world's leading independent detergent manufacturers. The food industry is only one of many sectors represented in its customer portfolio. One of Calvatis' best-known brands is calgonit industrial.

"A lot has changed in recent years," says Matthias Schäfers of Calvatis. "Our customers expect more and more detailed information about the cleaning process." This level of detail also applies to the commercial company and its four production sites in Germany. The dosing devices for its industrial washing systems were already fitted with Simatic S7-1200 controllers from Siemens, which can collect a high volume of data and output it to flash drives.

Company management wanted to regularly calculate values such as water consumption and the consumption of detergent and chemical additives per box and hour – and to do so in the cloud so that all

results are available and can be accessed from a central location.

A crucial factor for Calvatis was that the installed washing systems be easily connected to the cloud and the data analyzed with minimal effort. This is where MindSphere came in: All that was needed to connect the machines was an IoT gateway with a plug & play connection to the Internet and the cloud – which offered the additional benefit of not requiring additional programming work.

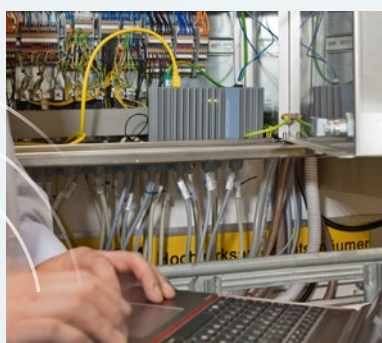
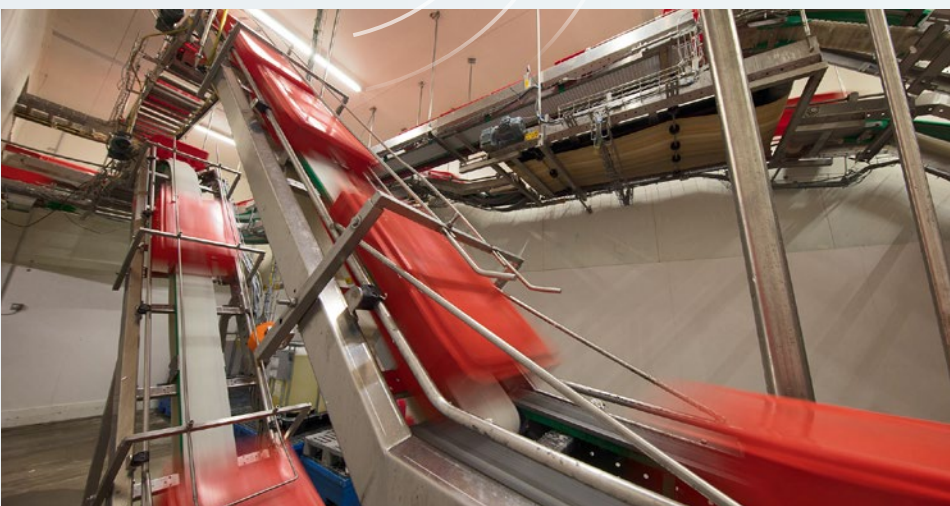
New business options in service

The data can be easily analyzed: MindSphere offers users tools for data analysis such as the MindApp Manage MyMachines application, which Calvatis also uses for analyzing dosing information. It analyzes incoming data and in addition to online monitoring of machines installed worldwide, also enables new functions such as predictive maintenance, energy data optimization, and resource management.

Thanks to MindSphere, Siemens and Calvatis were able to implement the cloud project in record time: It took less than three months from the first meeting with the company until the new solution was first used. "In the meantime, we and the employees at our customer site have an up-to-date overview of all data at all times," says



Alle Bilder: Siemens AG/W.Geyer



The MindApp Manage MyMachines showing the current chemicals consumption is being used at a plant for cleaning crates at a commercial company. The app is also a key tool for quickly identifying faults

Schäfers. “Via online access, we can use the MindApp Manage MyMachines to review how high chemicals consumption is, what the plant temperature is, and the current conductivity of the water and detergent mixture. Our customer uses the data intensively: It has become a key tool for identifying faults and for planning the work of service technicians.”

By using MindSphere, Calvatis will also be able to monitor automatic cleaning systems and foam cleaning devices in the future. And by relying on data in the cloud, the service team can organize its work more effectively – because technicians can already see in advance what problems are occurring in the plant.

A new three-level service model is also in the pipeline: With the basic variant, Calvatis customers only obtain raw data. The advanced version allows limited access to the cloud, and with the professional version customers can initiate analyses themselves. “The response from our customers is very good,” says Schäfers. “In particular among customers that operate globally and have plants all across the world, we are seeing substantial interest in solutions like this one.” ■

➔ [siemens.com/mindsphere](https://www.siemens.com/mindsphere)

The future at your fingertips

Siemens is No. 1

According to Forbes magazine, Siemens took the top spot among the world's most highly regarded companies for 2017. With sales of approx. US \$90 billion, profits of US \$6.4 billion and market capitalization of US \$119.7 billion, Siemens finished ahead of global corporations such as the Michelin Group (ranked second), Nintendo (4th), Walt Disney (5th), and Apple (7th).

➤ forbes.com/top-regarded-companies/list/

The little girl snaps her fingers and looks in awe. Every direction she turns her head, everywhere in the room she discovers virtual objects and can control them with her gestures. That's because everything she is looking at is directly connected to the cloud via a mixed-reality headset which allows her to experience for herself how the virtual and real worlds are interconnected.

Anyone who has immersed themselves in a virtual augmented reality world before is familiar with the underlying principle: It's really fun to interact with fictitious things in the world on the other side of the glasses. That's what students in the dual-studies program in electrical engineering and information technology at Siemens thought: so they quickly connected a mixed-reality headset – activated by snapping your fingers – to a Simatic IOT2000 single-board Siemens computer. Data from the connected cloud provide the person wearing the headset with information about their environment.

Trends in the maker scene

Many examples of creative technical solutions like this can be found in what's known as the “maker scene.” Many “makers” are trying to solve technical problems as cheaply as possible using their own resources. Annemarie Löttsch – who is enthralled by both technology and building things – has been familiar with the scene since her student days. “Makers are people who are fascinated by technology and who use things like single-board computers or microcontroller boards to develop solutions for everyday life, education, or intelligent building technology. It's part of their way of life to share ideas with each other and tackle projects together,” says Löttsch, who is responsible for digitalization scenarios with TIA Portal at Siemens. “That's why open-source approaches to software are also paramount to them.”

In addition to the Internet of Things, the scene is especially interested in 3D printing, among other things, to make replacement parts for a wide range of devices. “Many of them even use 3D printers to print the parts they need to build their first 3D printer,” says Löttsch, “and they find free instructions on how to do that online.” Makers love life-hack applications

– in other words, anything that enhances their lives and makes things easier.

The scene is networked throughout the world. People go online to exchange ideas with other makers and to share, develop, and implement innovative solutions. According to a survey commissioned by Make and Intel, three-quarters of US makers in the scene are in contact with each other. Almost 60% include things other people have built in their projects or put ideas into practice together. Many of them also get involved offline in what are known as FabLabs and makerspaces or hackerspaces. Open workshops like these allow makers to get in touch with each other directly or use expensive modern equipment such as 3D printers and laser cutters.

“Turning a hobby into work is the best thing that can happen to you.”

Ralf-Michael Franke, CEO,
Factory Automation, Siemens AG

Significant potential for the future

The maker scene and private industry should forge a mutually beneficial relationship in the future, says Ralf-Michael Franke, CEO of the Factory Automation Business Unit at Siemens. “I think it's a prime opportunity to encourage people to move from purely creative games to creative design work that adds value. Turning a hobby into work is the best thing that can happen to you.”

That has already been a success on a small scale. Some of the students in the dual studies program in electrical engineering and information technology also attended the Hack&Make festival in Nuremberg, Germany. Visitors had the opportunity to view the Siemens booth through the data headset the students had developed and snap their fingers to retrieve information on selected exhibits. The information came straight from the bust of Werner von Siemens: The young makers had brought him to life in the virtual world. And so, the little girl had the newest inventions explained to her by the founder of Siemens himself. ■

➔ [siemens.com/careers](https://www.siemens.com/careers)

A LEGO zoo

"If you can imagine it, we can build it!" is the motto of the LEGO® model-builder Bright Bricks. The company is relying on convergent modeling to create elephants and other models more quickly and securely – building an entire zoo in record time.

Bright Bricks uses convergent modeling to create elephants and other LEGO models more quickly



When Kirsty House arrived at Bright Bricks for a summer internship two years ago, she knew immediately that she wanted to stay longer. The company south of London builds life-size models using LEGO bricks, which fulfilled a childhood dream of the trained industrial designer: “I always wanted to be a toy designer. My parents own a toy store, and I’ve loved LEGO ever since I can remember.”

Bright Bricks assembles the models itself by hand, one brick

at a time. The whole team pitches in when figures are particularly large or complex, or when deadlines are tight. But Kirsty generally works on designing individual figures: “We create a 3D model of the design the client has agreed on and transform it into a model composed of LEGO bricks.” The virtual model then serves as the basis for the figure made of LEGO bricks and steel. For safety reasons, Bright Bricks must use an interior steel structure to stabilize all models taller than one meter.

Counting bricks is a thing of the past

Designing the steel structures used to take Kirsty several weeks. The old CAD software couldn’t visualize the interior of the 3D model, so she had to count the individual LEGO bricks in each design and

then estimate how big the safety structure had to be. “You needed a magnifying glass, and it really gave you a headache,” Kirsty recalls, “and even after we’d figured out more or less what the structure needed to be, we had all sorts of incidents in the past. Often a corner wouldn’t fit, and we had to manually shave off some steel.”

The entire Bright Bricks team has been working for months on an exhibition for Marwell Zoo and has built some 80 LEGO models – from a teeny-weeny spider to a 1.5-ton elephant. During this major project, Kirsty used Siemens’ Solid Edge PLM software for the first time to design the steel structures required for the large 3D models.

Steel elephants from a PC

Bright Bricks is the first company to use the newly developed convergent modeling method in Solid Edge for production. Convergent Modeling simplifies work with geometries composed of a combination of facets, planes, and solids. Time-consuming data conversion is no longer necessary.

“In the past, it would have taken at least two weeks to figure the structure out for the 1.5-ton elephant,” says Kirsty, “and now it took less than two days! Convergent modeling makes it possible to directly transfer the files of our 3D models into Solid Edge and to use them there as a reference for the corresponding steel structures.

More than two million LEGO bricks were assembled for the exhibition at Marwell Zoo. Like everyone at Bright Bricks, Kirsty looks forward to seeing the results of her work: “I love that we create amazing things that make kids really happy – and that everyone, even adults, is in awe of what we do.” ■

Convergent modeling with Solid Edge

Solid Edge is a 3D design software that enables products to be created virtually and accelerates manufacturing processes. The software seamlessly combines traditional “b-rep” solid models with triangular mesh models without time-consuming and error-prone conversions. Convergent modeling allows for traditional b-rep operations on digitally scanned 3D data and generative design models. This reduces rework while supporting the latest additive manufacturing processes for complex shapes.

Solid Edge includes generative design, reverse engineering, and additive manufacturing – capabilities that are also enabled by convergent modeling technology.



For safety reasons, Bright Bricks installs an interior steel structure to stabilize larger models

Fed up with standards? Don't be!

Standards are often very helpful, but sometimes they can be quite a nuisance, too. Staying up to date with the latest technological developments can be overwhelming – and requires time and effort. In an interview with the Siemens expert Gerhard Flierl, he explains how control panel manufacturers can stay up to date – despite new guidelines – without getting bogged down in details.

Standards are complex – like control panels. Building a control panel not only requires skilled craftsmanship and a great deal of creativity, but also in-depth knowledge of planning, engineering, testing, and documentation of mostly customized solutions. Furthermore, it is important to understand and adhere to the safety regulations and standards of the particular target market and of the specific area of application.

For example, eight revised guidelines have been in force in the European Union (EU) since last year, some of which apply to control panel building. Furthermore, the IEC 60204-1 on the electrical equipment of machines – a very important standard – has been revised and reissued. This standard is expected to be adopted as a uniform, European-wide standard in the fall of 2017. The latest requirements of the standard must be implemented in plants and control panels by this time, following a transition period usually lasting two years.

Mr. Flierl, can you tell us what impact the revised standard will have on control panel manufacturers?

Gerhard Flierl: Numerous amendments and adjustments have been made to meet the market require-



Siemens AG

The interviewee

Gerhard Flierl is head of the Technical Consulting department in the Control Products Business Unit. He is responsible for the comprehensive and holistic approach known as "Integrated Control Panels." With this range of solutions, Siemens offers its customers the technical know-how, data, and software for electrical engineering as well as an aligned product and system portfolio for control panel building. His department also helps Siemens sales teams all over the world provide customer support, events, and on-site technical seminars.

“Staying ahead in an increasingly competitive marketplace means getting a grip on new technologies and, more importantly, exploring the possibilities digitalization has to offer.”

Gerhard Flierl, Sales and Marketing, Siemens AG

ments and conditions regarding control panel building. For electrical drive systems, there are detailed instructions on how to test the protective measure that automatically disconnects the power supply. The requirements concerning electromagnetic compatibility (EMC) are now more specific as well. Furthermore, the options for determining the electrical equipment's resistance to short-circuiting have been described in more detail. There has also been an additional safety-related amendment: sockets with a rated current of up to 20 A must now use a residual current circuit breaker. The requirements regarding documentation have also changed considerably. We have summarized the key changes in technical articles and have explained these in more detail in comprehensive reports in a way that is easy to understand and apply by the user. These resources are available on our website.

Due to their complexity, getting a grip on standards and managing the documentation can be very time-intensive. Is there a simpler way?

Flierl: Well, you can at least try to make it easier for yourself. Siemens helps manufacturers develop the necessary skills and offers them a wide range of software and data solutions for planning and operations

as well as product and system solutions for applications. This makes it easier for manufacturers to implement the requirements specified in the standards and guidelines. With Integrated Control Panels, we cater to specific electrical engineering and control panel building requirements.

So it isn't necessary for every manufacturer to work through the entire standard?

Flierl: Well, let me put it this way: due to rising cost and time pressures, medium-sized companies in particular often have limited capabilities when it comes to getting a grip on new standards and their changing requirements – let alone studying them in detail. The key is to focus on what is relevant to you and how it affects your own plant. This is where we, the experts, come into play. Not only do we offer advice on standards, we also support manufacturers with our product portfolio to enable them to address specific requirements and meet quality standards.

How can electrical designers and control panel manufacturers stay up to date with the latest technology, especially in an age of increasing digitalization?

Flierl: Staying ahead in an increasingly competitive marketplace means getting to grips with new technologies such as changes in industrial controls, drive, and automation technology and, more importantly, exploring the possibilities digitalization has to offer. Integrated Control Panels is our holistic approach to panel building, allowing us to provide tailored support to electrical engineers in the design of control panels.

We also work closely with our sales departments in gaining an in-depth understanding of our customers and their individual needs. This allows us to give customers specific tailor-made advice while taking into account the entire value chain to achieve low-maintenance operation. Furthermore, we offer worldwide seminars as well as web-based training to help our customers stay up to date.

What potential does digitalization offer control panel manufacturers?

Flierl: To some extent, the potential of digitalization is already being widely exploited, for example in electrical engineering. This reduces time to market and enhances flexibility and efficiency, resulting in higher quality and increased cost savings. Furthermore, the increasing demands on documentation are considerably easier to manage thanks to digitalized processes. ■

➤ [siemens.com/panelbuilding](https://www.siemens.com/panelbuilding)



Great Wall Wine Yantai Co. Ltd.

QR codes in the vineyard

Chinese wines have regularly been among the winners of the Decanter World Wine Award since 2011. They are also appearing more frequently on wine lists at top restaurants. Since the 1990s, Chinese winemaking has experienced steady growth and now numbers among the ten largest in the world. Numerous businesses such as the Great Wall Wine Yantai winery are already equipped with state-of-the-art technology.

China started producing wine as far back as 4,600 years ago. However, wine from grapes, referred to as grape alcohol in China, long played second fiddle to the more popular rice wine. For about 30 years, vineyard cultivation has been intensified, resulting in a domestic production of over 11.4 million hectoliters in 2016 (Statista 2017). A study by the international market research institute Mintel forecasts that the Chinese wine market will increase by 5% or more by 2020. The study also reveals that in 2011 the ten best-selling brands in China are produced there and account for nearly 26% of the entire Chinese wine market.

Over the past 15 years, per capita consumption of red wine has doubled in China. At about 80%, red wines also make up the largest share of Chinese wine production, with typical overseas grape varieties such as Blaufränkisch, Cabernet Sauvignon, Carignan, Malbec, and Gamay.

State-of-the-art wine production

Located in the province of Shandong on China's east coast, Great Wall Wine Yantai Co. Ltd. is one of the largest wineries in China. Since 2000, the age-old art of winemaking has been increasingly combined with 21st-century technology.

In fact, each autumn grapes on the 1,270 hectare vineyard in the mountains of Longshan are still harvested in a traditional way. The harvest laborers fan out and fill their 20 kg baskets up to six times a day. Until the harvest, however, quite a bit is done to help the grapes ripen: For instance, measuring stations record data on soil nutrients,

humidity, and temperature. An app specifically developed by Siemens records the current pesticide levels at various points in the vineyard. All this information is uploaded to the manufacturing execution system (MES) and provides a precise overview of the entire vineyard at all times.

"The data allows us to make informed decisions about how to tend our vines in response to changes in the weather and to pests. We can rely on concrete data instead of relying solely on experience to achieve a better grape harvest," explains Liu Jianbo, head of the IT department at the Yantai winery.

From wine preparation to quality control and lifecycle management, many details are given careful attention throughout the downstream process to obtain a consistently high quality of wine. Annually, 50,000 tons of choice red and white wine are produced and sold to customers all across the globe.

Code-based process workflows

The entire production process was standardized using digital technologies, resulting in fewer errors from pressing and mashing to fermentation, extraction, maturing, and bottling. This allows Great Wall Wine Yantai to uphold its vision of continuously improving the entire process from the vineyard to the bottle.

The individual processing steps are monitored, controlled, and managed via the MES platform. The winegrowers can give the employees precise instructions during the various phases. And this information is no longer



of choice red and white wine are produced annually in China



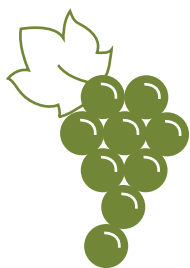
Great Wall Wine Yantai Co. Ltd.



Great Wall Wine Yantai Co. Ltd.

Important information on the vine growth is managed via the MES and can be retrieved during any of the processing steps – from the vineyard to the tank





“We can rely on concrete data instead of relying solely on experience to achieve a better grape harvest.”

Liu Jianbo, Head of the IT Department, Great Wall Wine Yantai



Great Wall Wine Yantai Co. Ltd.

communicated on paper, but by scanning barcodes in the individual process steps, such as in the vineyard, at the grape press, at a tank or barrel, or on a bottle. This ensures that all steps are properly executed or even prevents them from being overlooked. All the key parameters are available on the local network at all times and it is possible to intervene directly where necessary.

This is a great advantage, because after harvesting the grapes, they undergo at least ten steps from fermentation to maturing in stainless steel tanks, all the way to storing the wine in oak barrels. The system makes it clear who was involved in each specific step. Deviations from the optimum process are quickly detected before mistakes or damage can result.

All data is collected and stored in a central location and imported into automated systems. For instance, this allows real-time data from an automated temperature control system to be compared with archived data to provide employees in charge with further step-by-step instructions.

Data for the future

Each grape variety has its own archive of data that can be retrieved and compared with all uploaded data. All data with the relevant information are available for the entire production chain all the way through to quality control. “Wine quality is top priority for this vineyard. Efficiency and quality are improving because more automa-

tion hardware and sensors have been installed. And the MES system can link the control level even more closely and efficiently to the business management level,” explains Ding Jianqiang, project manager, Siemens Industry Software (Shanghai) Co., Ltd.

The winery is working closely with Siemens on another app that makes production information more transparent for customers. This ties them more closely to the process, making it possible to supply even more unique wines. With this app, customers can use their cell phones to retrieve information on the grapes, the individual processing steps, the situation at the vineyard, all the way to the oak barrels, helping them better understand how their wine is being cultivated.

Given the strict food safety regulations, traceability of the individual processing steps is also necessary from a management perspective. In the future, the vineyard will utilize even more automation technology to supply the MES with even more data and thus further improve operating efficiency. The vineyard's vision of enhancing the wine-making process based on state-of-the-art information is about to come true. ■



Great Wall Wine Yantai Co. Ltd.



Great Wall Wine Yantai Co. Ltd.

All relevant information is available for the entire production chain all the way through to quality control – for transparent and efficient production

➤ [siemens.com/magazine/2e0011](https://www.siemens.com/magazine/2e0011)

Industrie 4.0 in the process industries

Markets and technologies are changing and many industries need to adapt or develop a new strategic outlook. For many companies it is still difficult to assess what opportunities are offered by digitalization and where targeted investments will achieve the most added value. Expectations are high.

“Step by step, we are helping the process industries tap into the potential offered by digitalization as well.”

Dr. Jürgen Brandes, CEO, Process Industries and Drives, Siemens AG

Process quality, efficiency, and security are especially important in the process industries. According to a recent survey conducted by the Society for Process Technology and Chemical Engineering in the VDI (GVC), 75.5% of respondents consider Industrie 4.0 to be an opportunity because higher plant availability, more flexible production, and digitalized, model-based process control can substantially increase business success. In areas such as IT security and data protection, this opens up new opportunities, but also poses challenges to companies.

Capturing added value

Most process industry verticals are already highly automated and handle high volumes of data in process control systems. In collaboration with suppliers, device manufacturers, and equipment suppliers, added value can be achieved using this data, such as for condition monitoring, predictive maintenance, and servicing. ■



Case in point: Chemicals

The chemicals industry has particularly stringent requirements in place for process security, production quality, and system availability. Smart maintenance concepts facilitate the efficient planning, execution, and analysis of servicing and maintenance. The use of portable devices for remote and mobile services can increase efficiency in potentially explosive environments in terms of asset usability and asset performance. Find out how the chemicals industry benefits from digitalization at:

➤ [siemens.com/magazine/2d0003](https://www.siemens.com/magazine/2d0003)



Case in point: Pharmaceuticals

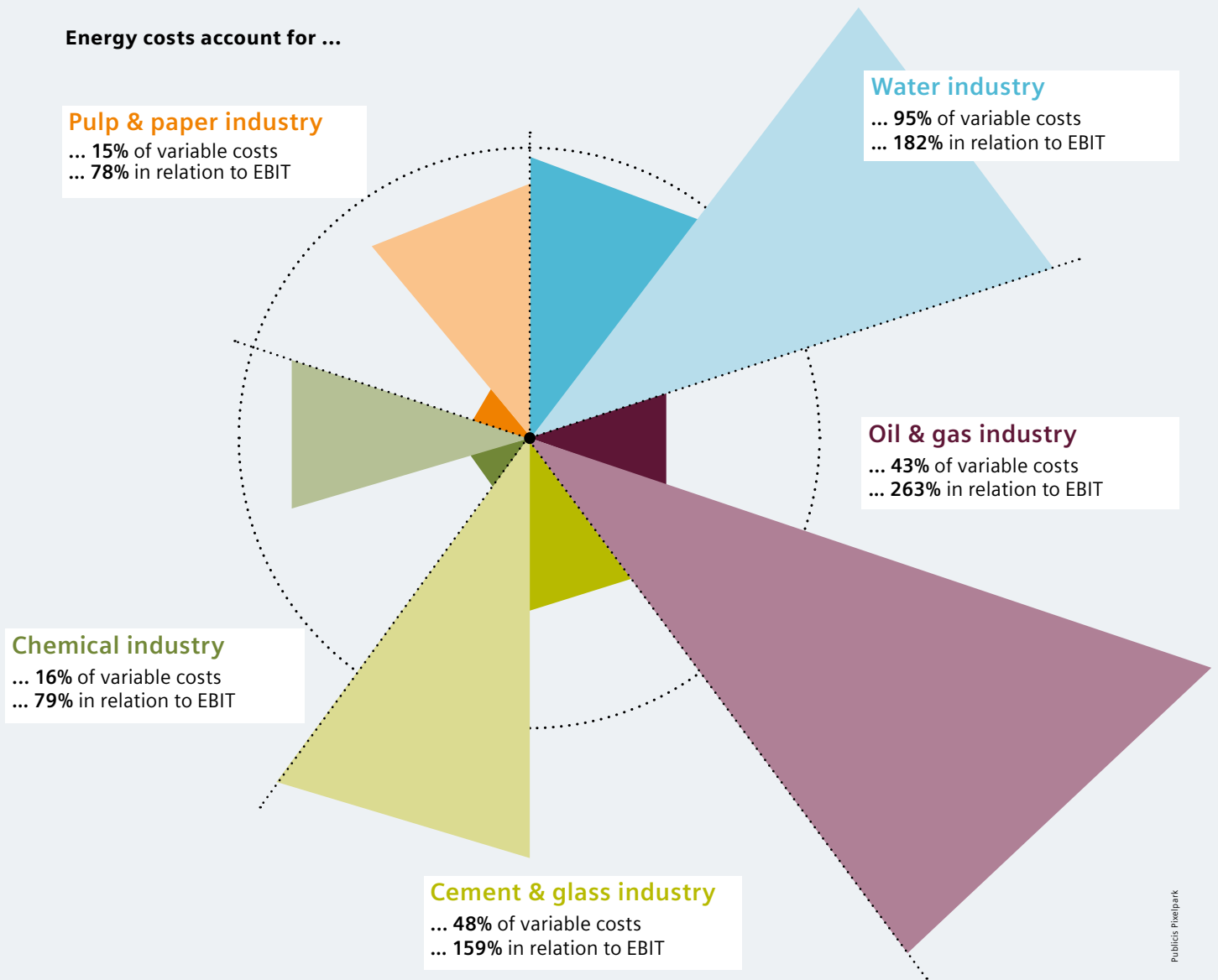
Two things are essential in the pharmaceuticals industry: Getting new drugs and medicines on the market as quickly as possible while also guaranteeing the highest product quality. Integrated hardware and software solutions help speed up product development from research and development through to production. Continuous production and paperless manufacturing are the primary accelerators in the race against time. Find out how the pharmaceuticals industry can ensure the quality of its products based on reliable data at:

➤ [siemens.com/magazine/2e0009](https://www.siemens.com/magazine/2e0009)

From cost factor to success factor

The manufacturing industry's thirst for power is tremendous. Energy costs account for up to 10% of total production costs or as much as 40% in energy-intensive industries. Energy management helps increase efficiency, cut costs, and maximize EBIT.

Energy costs account for ...



Publicis Pirellapark

Those who conserve energy, win!

The figures for the oil and gas industry best show what these percentages mean. Overall, the energy costs account for 43% of the variable costs but in relation to the industry's EBIT (earnings before interest and taxes), they constitute 263%.

This thus means that if the industry EBIT is €10 billion, €26.3 billion of energy costs must first be spent in order to achieve this net profit. This demonstrates that simple, targeted energy-saving measures can dramatically increase profit.

(Source: ARC Advisory Group, US Department of Energy: Energy Management in the Factory of the Future. White paper, July 2016)

The global manufacturing industry faces tough challenges: rising energy costs, new supply models, and strict environmental regulations make energy-efficient production processes essential. “To remain viable into the future, industry has to control and optimize the energy flow in plants and factories,” says Florian Güldner, director of research at ARC Advisory Group, one of the world’s leading consulting companies for the industry. Thus, the targeted use and distribution of resources in factories play a decisive role. “Using too much energy at the wrong time, unexploited potential or, in the worst case, downtime, cost a lot of money. Ultimately, nobody will pay you for this,” says Güldner.

Manufacturing is an energy guzzler

Between 2000 and 2010, delivered energy prices – for fuel, gas, district heating or electricity – went up 70%, with the trend still continuing to rise. This has an especially strong impact on the industrial sector. According to a study conducted by the U.S. Energy Information Administration, the industrial sector is the world’s largest energy consumer, accounting for 51% of total energy consumption. In Germany, the industrial sector accounts for just under 30%. With that in mind, it is clear that the industry plays a major role when it comes to environmental protection.

The extended use of renewable energy sources, decentralization, and digitalization also have an impact on supply quality. The very latest control and storage technologies keep fluctuations in the energy supply from causing problems in production. With intelligent energy management, energy can be transformed from a mere cost factor into a success factor.

Achieving savings in consumption

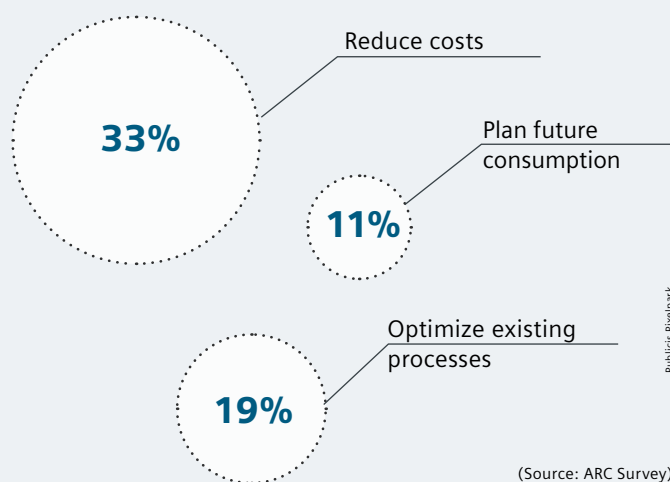
Motors are the industry’s largest energy consumers, accounting for about 70% of consumption. Innovative and efficient drive systems such as the reluctance motor help increase energy efficiency – as does well

Siemens solution: Totally Integrated Power

With a high degree of digitalization, Siemens Totally Integrated Power (TIP) provides a reliable, safe, and efficient power supply. The integrated portfolio includes made-to-measure software and hardware products, systems, services, and solutions across all voltage levels. TIP provides individual power supply concepts for industries, buildings, and infrastructures, with long-term viability tailored for their specific application areas – from planning all the way to maintenance. Intuitive interfaces with industrial and building automation systems make it possible to fully exploit all the potential offered by integrated power supply solutions.

➤ [siemens.com/tip](https://www.siemens.com/tip)

Targets of energy management



thought-out planning. “If we know exactly how production machines and plants will be operated, we can already detect hidden savings potential at the design stage,” explains Dr. Karlheinz Bourdon, senior vice president at KraussMaffei Technologies, a manufacturer of machines and systems for producing and processing plastic and rubber products. “Only well-designed plants achieve maximum energy efficiency – and achieve energy savings of up to 35 percent.”

A holistic approach to optimization

Until now, power has always been generated based on demand. “In the future, companies will have to use energy when it is available,” says Güldner. Four areas are critical: power generation, storage, monitoring, and control. Efficient plants can be planned in advance, for example by using simulation. “In some production scenarios, improved processes can help save up to 40 percent of energy,” explains Michael Kratzert, who is responsible for engineering at Homag Group AG, a manufacturer of machines and systems for the wood-processing industry. “The secret is to not only optimize individual machines but to also perfect the interaction of all plant components.”


“Those who synchronize the topics of production and energy early on will ultimately have a clear competitive edge,” says Güldner, describing the essence of energy management. Thanks to customized solutions, smart power distribution networks are able to react to increasing, yet fluctuating, amounts of renewable energy. Using the right technologies, production facilities can cope with adjustments without any difficulty. ■

More on Energy for Industry:

➤ [siemens.com/magazine/2e0010](https://www.siemens.com/magazine/2e0010)

Comprehensive, integrated energy management in the Digital Enterprise:

➤ [siemens.com/simatic-energy-management](https://www.siemens.com/simatic-energy-management)



Herbert Wegmann, Siemens AG: "Companies can achieve a strategic competitive advantage with innovative solutions" – Würth Industrie Service shows how it's done

The rise of new business processes and models

The "C-Parts supply" logistics service with CPS RFID is increasingly setting the standard at Würth Industrie Service. To set themselves apart even more in the future, the company is working on offering even more added value. Customers are also increasingly turning their attention to data management. For example, "pay per use" models are being considered for RFID boxes, as is infrastructure, hardware and/or software, or even optimization "as a service." Digitalization opens up numerous opportunities in these areas.

Intelligent bins

Streamlining processes to save time and cut costs has always been a key focus at SMEs. In today's fast-moving markets, it is a more pressing issue than ever. Würth Industrie Service GmbH & Co. KG helps its customers achieve this goal by automating and digitalizing the logistics of C-Parts management.

Even a seemingly negligible machining error or mistake in writing can have expensive consequences. For example, if the supplier delivers only 1,000 instead of 10,000 bolts, nuts, or washers, or if there was any other mistake in the order, production can falter or even come to a complete stop. This kind of slip-up is not uncommon for small and medium-sized enterprises that

have not yet carried out seamless end-to-end C-Parts optimization. Once they have identified the problem, many of these companies are prepared to equip their logistics processes to keep up with the competition in a more and more digital and highly agile working world.

Würth Industrie Service, based in Bad Mergentheim, Germany, specializes in C-Parts and helps

small and medium-sized enterprises leverage the potential hidden in their logistics with only a little effort. It uses CPS RFID, the first C-product service in the world, based on a traditional Kanban system and RFID technology by Siemens. With this solution, the company will soon be able to use consumption-based planning to supply nearly half of its customer base quickly, instead of having to

wait for orders or conform to recurring schedules. Users no longer need to worry about inventory levels and can therefore reduce effort while cutting costs.

A reliable bin

The core components of the system made available by Würth Industrie Service are standard bins with an RFID label (the Würth W-KLT®2.0 small load carrier) and RFID boxes, or iBoxes, custom manufactured for them and equipped with communication and identification technology by Siemens. "Ordering is exceptionally easy with these bins," says Christian Schorndorfer, head of key account sales and innovative systems at Würth Industrie Service. "The user places empty bins into an iBox and closes the lid. The Simatic RFID reader on the inside then automatically reads the transponder data," he adds. The boxes transmit updated data several times a day, usually shortening the order process by one delivery

where the ordering process starts automatically. Parts that do not fit into a bin have Kanban cards with an RFID tag. The procedures are identical, the only difference being that the cards indicate what is needed and an "intelligent" mailbox on the iBox places replenishment orders.

This system is as easy as it is reliable and it can be integrated into any running production line and gradually expanded. The system is self-sufficient and has no negative impact on existing network structures. It is even possible to connect logistics systems from other suppliers to the Würth system and integrate them into the customer network.

Tremendous savings potential

The results are impressive: On the one hand, the system considerably increases speed and security of supply. At the same time, it drastically reduces the number of incorrect deliveries as well as the risk of delivery bottlenecks and production downtime. "In addition, by automating and digitalizing their C-Parts management, customers can also reduce inventory and expenses. If only a few bins are in circulation, we have more transportation capacity, and customers have more space available in production," Schorndorfer summarizes.

The results translate into real money. "In a specific project for a customer, we compared the procurement costs for about 500 items with the costs of our RFID-based solution. As it turned out, with more than 190,000 euros annually, the costs were less by a factor of 20," he explains. This figure does not even begin to show the potential of digitalization. In any case, Schorndorfer is sure of one thing: "The time has come for small and medium-sized enterprises to jump onto the bandwagon of digitalization." ■



Data transferred to the central warehouse several times a day by inconspicuous iBoxes automatically trigger ordering processes based on consumption

cycle. The data are unambiguously assigned to customers, bin sizes, fill volumes, and sites.

Thanks to ultra-high frequency technology, this also works well remotely and in bulk. A Simatic industry PC prepares the data and transmits them via a Scalance mobile wireless modem right from the box to the central Würth Industrie Service warehouse,

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Communications
Werner-von-Siemens-Str. 1
80333 Munich
magazine@siemens.com

Responsible for content:

Günter Gaugler (in accordance with the German press law)

Editor in chief:

Ines van Neuß

Editorial staff:

Sophia Bächle, Bettina Schoene (Siemens AG)
Dorit Gunia, Dominik Heinz, Christian Stiegler,
Sarah Werner (Publicis Pixelpark)
Christian Buck (freelance journalist)
Dieter Kett (freelance journalist)

Cooperation:

Helene Ballings, Dagmar Braun,
Kerstin Bürger, Birgit Gottsauner,
Franziska Heinze, Annette Horneber,
Damir Hudak, Andrea Kerber, Karin Knopf,
Andrea Lüdecke, Diana Schauer,
Norbert Vierheilig, Donna Wright

Production:

Andrea Haspel

Publishing house:

Publicis Pixelpark,
PO Box 32 40, 91050 Erlangen

Art direction: Reinhard Sorger

Layout: Bettina Raunecker, Pascal Ehrenberg
Copy editors: Sabine Zingelmann, Julia Robinson
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Networking made easy

Digital operational procedures, integrated processes and a rapidly growing volume of data – high-performance communication networks are crucial for staying competitive. But how should such networks be planned, dimensioned, implemented, and made secure? Wolfgang Schwering, Siemens expert and trainer for Industrial Networks, explains how users can prepare for digitalization.

Mr. Schwering, why should I as a user manage my industrial networks myself rather than simply out-source this task?

Wolfgang Schwering: The production network is part of the production process and thus lies at the heart of every manufacturing company. The production network contains quite a lot of company know-how – and that is something that should be protected! If you out-source the management of your networks, sensitive information can easily fall into the wrong hands, for example information about your newest product. If you prefer or are forced to outsource, then a trustworthy and reliable partner is indispensable. Still, the plant operator should have some knowledge about how the network is structured and how it works. This way, if there is an emergency, for example a failure on a Sunday evening, the operator can intervene himself or herself.

You personally prepare users for these changes and the new demands of the market. What are the greatest challenges your training course participants face on a daily basis?

Schwering: The people we train come from a very wide variety of industries. They are not only the usual automation technicians who want to expand their knowledge, but also IT specialists who are unfamiliar with industrial requirements. It is this point where industry and the office world intersect – production IT – that is of particular importance. We also train our own



Wolfgang Schwering

Expert for industrial networks, works in the Presales Support team at Siemens and in training courses shares his many years of experience and expert knowledge with Siemens employees, certified Solution Partners, and customers of machine manufacturers.



employees and the 36 certified Siemens Solution partners, who are available as direct contacts to the end customers in 14 countries. What most attendees have in common is that often they are already working with machine or plant networks. The next step for them is to integrate those networks into a higher-level structure. This makes these networks considerably more complex. The challenge here is to make them secure and create a remote access point to the plant for monitoring or maintenance. Availability also needs to be ensured. Moreover, modern technicians need to define

what redundancy mechanisms they can use while also meeting automation requirements. Sometimes environmental requirements need to be taken into account, for example for applications in hostile environments such as oil rigs or the desert, or regulations regarding explosion protection and prevention in the chemicals industry.

What do your course participants take back home with them or to their companies?

Schwering: Many of our customers have acquired their network expertise through on-the-job training. So they have a certain level of know-how, but still have some gaps to fill. Our trainers have practical experience and impart solid knowledge about the entire lifecycle of the customer plant. This saves a considerable amount of money, especially in the planning stages. We show our customers how to correctly dimension their network and set it up using the right components so that it runs smoothly and reliably. It is not very easy to improve existing plants at a later time. You need to know certain tips and tricks in order to reduce downtime as much as possible when optimizing customer plants.

Cyber attacks are also more and more frequently causing plant downtime – according to KPMG, more than half of all Swiss companies were the target of such an attack last year. According to a study conducted by Juniper Research, small and medium-sized enterprises are particularly vulnerable to this



“The production network contains quite a lot of company know-how – and that is something that should be protected!”

Siemens Professional Services for Industrial Networks

Networks are becoming increasingly complex. Digitalization is leading to closer interaction between IT and automation technology, giving rise to new challenges for the user in terms of availability, ruggedness, flexibility, and safety. Siemens Professional Services for Industrial Networks helps users plan and implement industrial networks – tailored to their precise needs. The portfolio includes solutions for automated environments and other industrial operation-critical applications – as well as for power generation and distribution, oil and gas, and transportation and traffic.

➤ [siemens.com/industrial-networks-services](https://www.siemens.com/industrial-networks-services)

risk – and the costs caused by such attacks are increasing exponentially. How can this issue be addressed?

Schwering: First, take this problem seriously and invest in cyber security – there is much that can be improved here, especially in small and medium-sized enterprises. Networks are quickly set up, connected to the Internet, and ready to go. Securing them and protecting them against data theft and sabotage is essential, otherwise you'll end up paying twice the amount. Our scaled Defense in Depth concept allows our customers to protect their plants and networks comprehensively. We help machine manufacturers use encryption and authentication to prevent unauthorized access to their plants. They can service their plants and machines securely and conveniently with an easy-to-install management platform for remote networks – even if they are integrated in third-party networks. ■

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Financing new technologies

The industry sector on the Indian subcontinent can rely on an endless workforce like almost no other country. Nevertheless, decision makers in the business world believe it is necessary to automate and digitalize. The packaging manufacturer Ansapack is moving toward this goal with the help of leasing and pay-to-use financing models.

Make in India is an initiative of the Indian government that has set the ambitious target of manufacturing generating 25% of total gross domestic product by 2022. At the same time, India is striving toward international competitiveness. This will require investment in new technology. “Companies often lack the necessary capital,” says Sunil Kapoor, head of commercial finance of Siemens Financial Services (SFS) in India. “Ideally, state subsidies, investments by industry enterprises, and the private financial sector help India’s economy pick up the pace in the areas of productivity, efficiency, capacity, and agility.”

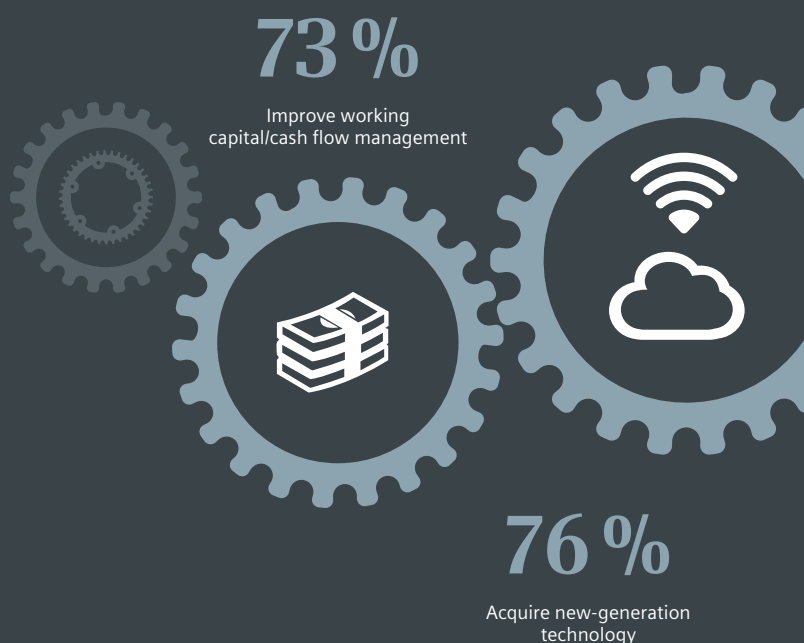
Pay-to-use financing methods are ideally suited to this area because they ensure success in both domestic and international markets. This form of financing enables the very latest technology to be adopted to improve efficiency, productivity, time-to-market, and, ultimately, the ability to compete.

“Asset finance helps us increase our volume of business,” says the CFO of an Indian precision components manufacturer. “We are able to expand. Over the last two or three years, applications for bank loans from many suppliers have gone down while at the same time financing for capital assets has increased correspondingly.”

Real-world examples

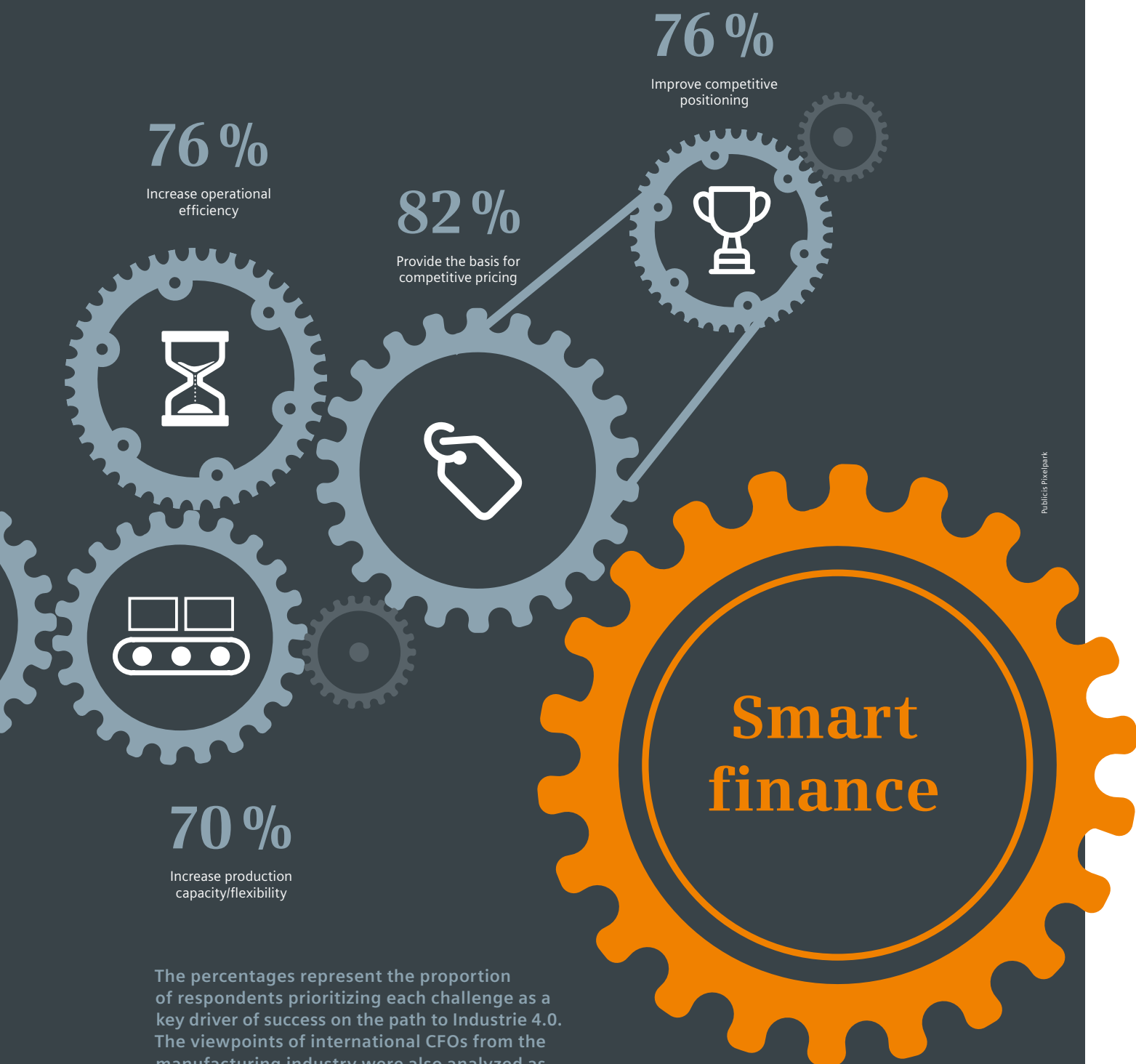
One company using innovative financing models offered by Siemens is the packaging manufacturer Ansapack. Founded 28 years ago, the company has six production sites in western India.

To expand its portfolio and thus increase revenues, Ansapack’s management planned to purchase new printing and packaging machines while making sure the company does not introduce new debt. Ansapack was able to do so by financing and leasing machines with the support of Siemens Financial Services. This investment in machinery enabled Ansapack to increase its existing market share and to access new markets.



“The majority of our equipment investments are critical to our growth, because without them we would not expand into the markets we are targeting,” says Gautam Agarwal, joint managing director of Ansapack Pvt. Ltd. “Our job is to ensure that our machine equipment manufactures the right product at the right level of quality. The financing of the machines is coordinated together with the financial experts. Siemens has done an excellent job fulfilling its role by preparing a tailor-made financing solution and not burdening our books with debt.” ■

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**76 %**

Increase operational efficiency

82 %

Provide the basis for competitive pricing

76 %

Improve competitive positioning

70 %

Increase production capacity/flexibility

**Smart
finance**

The percentages represent the proportion of respondents prioritizing each challenge as a key driver of success on the path to Industrie 4.0. The viewpoints of international CFOs from the manufacturing industry were also analyzed as part of the "Outcomes and Opportunities" survey conducted by Siemens Financial Services.

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