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China's progress in automation

Dear Readers,

Interest in comprehensive automation technology solutions remains unabated due to increasing networked machinery and system structures.



Nicole Steinicke
Editor
AUTOMATION TECHNOLOGIES

Andreas Wolf
Project Manager
Hannover Fairs
International



COLUMNS

Editorial
News and Markets
Product News
Imprint

NEWS AND MARKETS

China: factory of the world undergoing automation
Shanghai in focus
Paving the way to 'Make In India'
The core area of 'made in China'
Growth opportunities in China
Mittelstand: the one German product you cant import
Hannover: the hidden champion
Employing, but also empowering through technical training

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RFID system and sensors offer considerable advantages in an assembly plant for injector nozzles
Better quality by improving traceability
Innovative torque measurement applications in motor test benches
One click saves 50 % cost of sensors for Valensina

CONTROL AND DRIVE TECHNOLOGY

More analysis gives faster and better decision making
PC-based control technology for special purpose machines
Simatic sweetens honey extraction
Safe automation between Myanmar and China

INDUSTRIAL COMMUNICATION

Operating and control device positions cranes safely
"Industry 4.0 vs Internet of things" - Three perspectives
Integrating S5 and S7 controllers in the OPC UA world

COMPONENTS AND SOFTWARE

Reliable cables for industry
Safety ceertifications, key to enter international markets

MACHINE VISION

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Thermal imaging provides benefits for continous condition monitoring



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News and Markets

Camera Manufacturer Basler enhances Sales Presence in the Benelux Countries

Basler strengthens its presence in the Netherlands, Belgium and Luxembourg by bringing in Cor Valk as Business Development and Sales Manager. This enhancement reflects the importance of these countries for Basler. These countries are among the most important European markets for the machine vision industry. Valk offers more than 20 years of experience in Sales and Business Development as well as nine years in product management. His résumé includes positions at international corporations such as Omron and Sick, where he was involved in sales and opening up new markets within a technical environment. During that period he gained extensive expertise in the industrial automation and sensor technology fields. Valk will work together with Basler's exclusive distributor DVC Machinevision B.V. providing better support for local customers and developing new potential sales. Herfried Beckdorf, Head of European Sales at Basler, is glad to have Cor joining Basler

www.baslerweb.com



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Hansford Sensors new office in Germany

Hansford Sensors, the manufacturer of industrial accelerometers, has opened a new office in Germany in response to growing business and increasing demand for vibration monitoring solutions in the region. The new office in Herzogenrath in Aachen, Germany, is responsible for delivering customer and technical support to both new and existing customers operating in a variety of industrial sectors, such as metals, marine, food and drink, pharmaceuticals, mining and wind power. By establishing a base in Germany, the manufacturing and engineering powerhouse of Europe, the company can further enhance their business, product offerings and customer support. As a result of its strong performance and rising demands for the vibrations monitoring systems in the foreign markets the office in Germany is a part of the company's expansion programme in the Western Europe

www.hansfordsensors.com

Endress+Hauser acquisitions in Columbia

After two decades serving the Colombian market, to fortify the Endress+Hauser brand even further, the company is acquiring 100 % of the process automation business of Colsein Ltda., its longtime sales and service partner in Bogotá. "With a population of almost 50 million, Columbia is one of South America's largest growth market" explains Michael Zieseimer, COO of the Endress+Hauser Group. To date, the Swiss measurement and process automation specialist has been represented by local partner Colsein Ltda. To gain additional market share and fortify the Endress+Hauser brand even further in the country, Colsein's process automation business will be transferred to a new Endress+Hauser sales subsidiary on 1 January 2016. The company will continue to maintain its headquarters in the capital city of Bogotá. Gabriel Navas, founder and managing director of Colsein, will stay on as a member of the board. "We're plea-

sed that we can rely on a skilled team of employees in Columbia who have worked hard to establish the Endress+Hauser brand in the country," says Michael Zieseimer.

www.endress.com



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www.pepperl-fuchs.com/A-distance-ahead

Automatic driving with innovative 3D real-time view of the surroundings

It premieres at Autosalon, the Geneva Motor Show: the Budii concept car. This visionary electronic automobile from Swiss idea factory Rinspeed leads the way for the future of driverless cars. Whether driving oneself or being driven in the relaxing auto-driving mode – in the Budii, one enjoys maximum freedom. Data for automatic driving are delivered by the TrackView telescope on the Budii's roof, into which are integrated a laser scanner, a highly light-sensitive Ethernet camera module from German camera manufacturer Kappa optronics. The driver

assistance system combines the data into a real-time 3D view. The camera relays image data, including color information; the scanner provides depth information. All static and dynamic environmental information is fully displayed, calculated and graphically mapped allowing the Budii to automatically recognize and avoid obstacles. Kappa's pragmatic vision and innovation driven systems are in a league of their own, far above the level of today's driver assistance systems.



www.kappa.de/en/home

Pilz's first production site outside of Europe

The automation company Pilz has opened a production site of 9,000 m² in the Chinese city of Jintan. Along with the production sites in Germany and France, Jintan is the first production site outside of Europe, the family business from Southern Germany will produce PNOZ safety relays here. Jintan is situated between the economic centres of Nanjing and Shanghai. The province is one of the country's most active regions economically. As a result, Pilz will be able to supply the growing Chinese market more quickly and consolidate its position there. The PNOZ safety relays manufactured here will be in accordance with the same standards employed in the European production sites. „The new plant sends a clear signal that the Chinese market is particularly significant, for us“ says Thomas Pilz, Managing Partner of Pilz GmbH & Co. KG. “The production landscape in China is changing. The trend in manufacturing is towards automation and safety, with the aim of increasing quality and efficiency”.

www.pilz.com



New Programming protocol to improve efficiency in coding

The importance of software in the industrial environment is increasing, so are the complexities and the costs associated with it. To deal with these complexities, a need for structured approach to support the modern software development is realized. Also the necessity to improve the efficiency in coding via re-using of pre-defined functionalities and understanding the program better over its life cycle, has increased. Although all the programming languages have their coding guidelines, these are mainly non-existent in the area of industrial control. Considering these aspects, a working group was started to create guidelines on software construction process with focus on IEC 61131-3 and PLCopen extensions. The goal of this group is to provide the definition of rules, coding patterns and guidance on how to use them in the automation environment. Large automation companies have their own rules but many mid-sized and newcomers in this field are interested in actively participating and using the PLCopen guidelines. This initiative will have a larger impact especially in training users and can be a good basis for universities to help them teach IEC 61131-3 programming more efficiently.

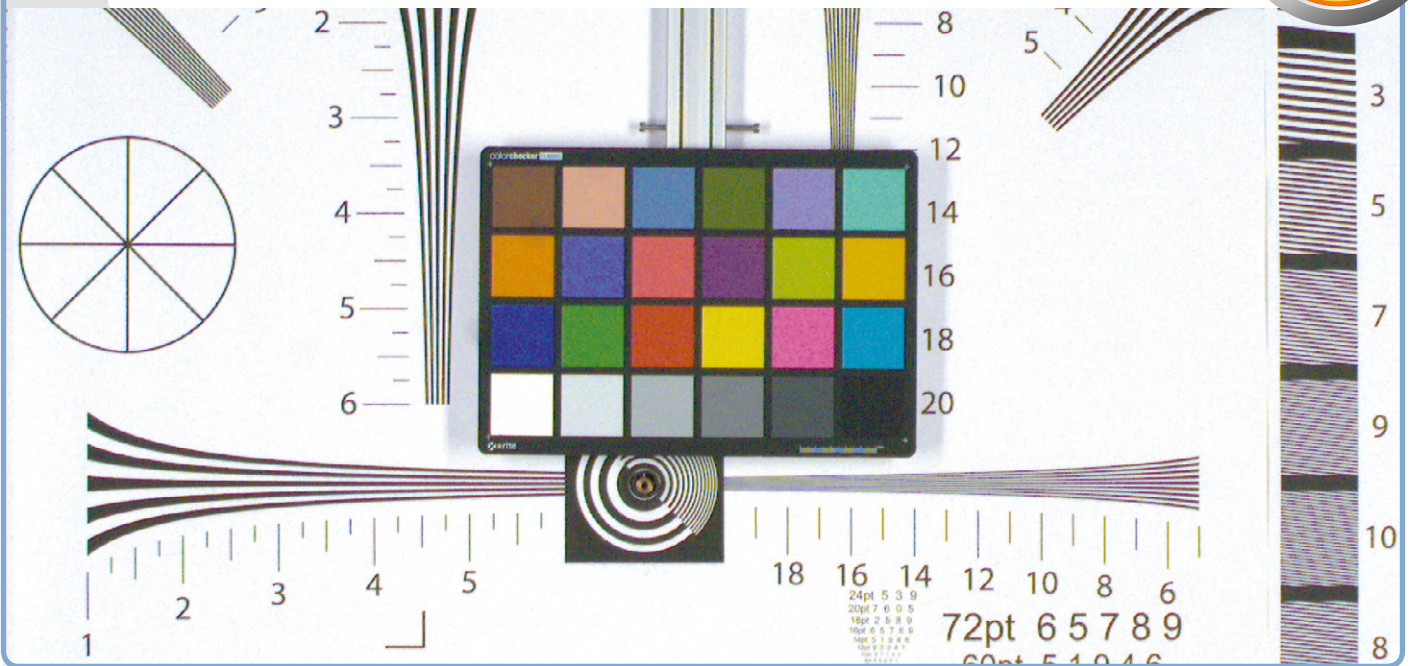
www.PLCopen.org

How to assess image quality?

Images provide vital information, so how do you get your hands on maximum information with optimum number of images. Producing images that are sharp, high on contrast, and accurately detailed with low in noise gives you the perfect combination. But with so many images available how do you decide on which image is the best one. What parameters to look for and what are the criteria to compare the image qualities accurately. In

this series of introductory lessons on image processing, you can learn how to investigate the images and which principles play a decisive role in assessment of image quality. To know more about image processing, tune in to the Whitepaper with the link given below.

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News and Markets

Molex acquires Soligie, Inc.

Molex Incorporated, announced today the acquisition of certain assets of Soligie, Inc. Soligie specialises in printed and flexible electronic solutions. This strategic acquisition complements Molex printed circuit-based solutions. "Soligie expands our capabilities in the high-growth field of printed electronics. With this acquisition, we can deliver a more comprehensive and high value technologies and innovative electronic solutions." said Todd Hester, vice president and general manager, Molex Printed Circuit Products business unit. Soligie brings innovative design services, process development, prototype fabrication, product development and a range of printing platforms for high precision, high volume roll-to-roll printed electronic manufacturing. These technologies enable the development of custom proprietary solutions that are cost-effective for customers and contain fewer components.

www.molex.com

Test laboratory Phoenix Testlab establishes subsidiary in Taiwan

The Bloomberg based test and certification company Phoenix Testlab GmbH is expanding. On June 18 the Phoenix Testlab Ltd. in Taiwan started its operations. With this step the company plans to expand its certification business in the Asian market. The company already maintains a representation on the Asian market since 2011. The focus will be the certification of electrical and electronic products. Nearly one quarter of the worldwide supply of electronic products is manufactured in China. The U.S. are the most important export partner for China with a market share of 17 %, closely followed by Europe with 15 %. Phoenix Testlab has own certification bodies for the European, Japanese and North American markets and therefore is an important strategic partner for Asian manufacturers of electric and electronic products.

www.phoenix-testlab.de/en

Aucotec expands with subsidiaries in Poland and Sweden

Aucotec AG, an engineering software provider for over 30 years, is continuing to expand its market presence. Two new subsidiaries that were established this year enlarge the international family of the company, which has recorded a growth in turnover of 74 % in the last 5 financial years. In January Aucotec founded the "Aucotec Polska" and "Aucotec Sweden AB" in May. Taking over from their respective polish and Swedish sales partners, now as a wholly owned subsidiaries, the respective work force will now develop solely for Aucotec. Citing the huge potential for the strategically important polish market, Executive board member Markus Bochynek explains the role of these subsidiaries as focusing and coordinating on sales and technical activities not only in Poland, Sweden but also in their neighboring countries. With this new additions to the family, the number of employees now rise to 220.

www.aucotec.com

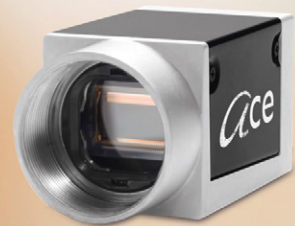




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China: factory of the world, undergoing Automation

The law of large numbers says that, as the economy gets larger, it becomes further difficult to grow at previously possible faster rates. This is exactly what is happening to China. But more important question is why and what are its effects on the industries and businesses associated with China.



Industrial automation

- Assembly and Handling systems
- Control systems, PLC, Scada, DCS
- Industrial PC
- Embedded Systems
- Image processing
- Sensors and Actuators
- Measuring Tech systems
- Laser Technology

Electrical systems

- Transformers and power supply systems
- Electrical and Mechanical drive systems
- Electrical Switchgears and motor control systems
- Frequency invertors
- Cables and cabling accesories

Automation software

- Manufacturing software
- Internet and intranet solutions
- IT hardware

Robotics

- Industrial Robots
- Simulation and Vision system
- Service Robots
- Machinery components for Robots

The product category at IAS Shanghai

read article



Shanghai in focus



*In conversation with Mr. James Fu,
General Manager, Hannover Milano
Fairs China. We talk about the
future of Automation industry
in China with the industrial
automation show -
Shanghai in focus.*



With more than 120,000 visitors and 500+ exhibitors, Industrial Automation Show Shanghai is one of the biggest trade shows in Asia. What makes this 'Event' stand out?

As an international pageant for automation technologies, the Industrial Automation Show (IAS) has always been a professional trade exhibition with its strategic location leading to a high degree of participation and internationalization. Industry experts, buyers and trade visitors can all obtain information and acquire technologies on this platform. Several professional activities and forums held simultaneously with the exhibition, provide every participant with maximum benefits.

As a branded show supported by governments at all levels, we as organizers also have timely insight into the market, interpret the industry trends, provide customized services, and convey messages through media to improve the influence of the exhibition to the maximum extent. Coupled with the concepts of 'Made in China 2025' and 'Internet Plus', the IAS will further advance with the times, and bring high-end manufacturing equipment and technologies from the world to Shanghai, so as to make the exhibition more splendid than ever.

Since its inception, this show has been displaying innovative technologies for industrial development, what is the highlight of the show this year, and what brings the visitors to Shanghai?

This year's exhibition will be held for the first time in the National Exhibition and Convention Center in Hongqiao CBD. The number of exhibitors will be

further increased, and the exhibition area will be expanded in a comprehensive manner. The exhibitors will all increase their investments in this regard, bring the latest products and technologies to interpret the intelligent and high-end nature of Industry 4.0.

Well-known exhibitors include: Siemens, Phoenix, Bosch Rexroth AG, Mitsubishi, Honeywell, Omron, Beckhoff, Turck, Festo, Rittal, P+F, B&R, Delta, Harting, Weidmuller and Banner.

It is worth mentioning that Festo will debut several latest biomimetic technology products on the exhibition, well demonstrating that Festo attaches great importance to and thinks very high of the IAS. Bosch Rexroth will launch its latest Industry 4.0 technical products and experience zone for the first time in China. The Chinese visitors may experience the most advanced Industry 4.0 technologies without stepping out of the country.

What is 'Made in China 2025' and does the 'Industrial Automation' industry benefit from this?

In 2013, Germany put forward the strategy of Industry 4.0. And in 2014, the Chinese government have also organized forces to formulate the 'Made in China 2025'. This is a grand blueprint of rejuvenating China through manufacturing from the level of national strategy.

The so-called Made in China 2025 is also a Chinese version of Industry 4.0, which aims that, after 10 years of efforts, by 2025, China's manufacturing industry will have a greatly improved the overall quality, significantly enhanced its innovation capability and labor productivity. In short, it is the

change of China from a manufacturer of quantity to the one of quality.

The concept of Made in China 2025 is of extraordinary significance for many industries.

Although it is still a document for the time being, it has determined the direction of future economic transformation and upgrading, and it will guide the industrial automation industry towards higher degree of intelligence, network and digitization as well as continuous innovations. The basic guideline of optimizing quality and structures will be followed for improving the industry's overall level and quality; an all-new talent cultivation approach will be adopted for promoting industry management, making contributions to the industry and boosting further development.

With a sharp correction on China's growth index, what impact does it have on the Automation and related segments of the industry?

The significant scaling down of economic growth index is an inevitable step of China on the road of adjusting its economic structure for realizing the Made in China 2025. This is a process for optimizing and upgrading China's manufacturing industry. The automation industry is full of opportunities. China's manufacturing industry will gradually improve its level of intelligence and automation during the process. Therefore, the automation industry and related areas need to follow the needs of Chinese markets, and provide

more pertinent products and technologies for the upgrading of Chinese enterprises.

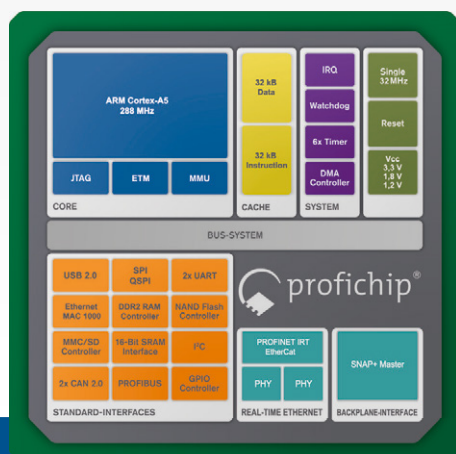
With China shifting its gears from 'low cost manufacturing' to 'high tech manufacturing' how do you see the future for the Automation and Robotics industry sectors?

Turning from low-cost manufacturing to high-end manufacturing is a new stage for "Made in China" to improve its quality and enhance efficiency. The transformation and upgrading of manufacturing industry will certainly usher in a new development pattern for various walks of life. Nevertheless, it is already a future trend for automation and robot sectors. The increasing number of intelligent and automated products indicates that the advent of industrial automation era is on the horizon, and that the emerging Robotics is facing with an unprecedented opportunity of development. At present, China is strongly encouraging "robotic labor substituting manual labor" so as to improve the industrial economy with highly automated production. As a result, the automation industry is progressing vigorously along this path. In the future, it will also create more benefits for industries including automobile, metal processing, food & beverage, 3C, pharmacy, wind energy, solar energy, transportation, construction materials, logistics.

Photographs: Fotolia teaser, Hannover Milano Fairs China

www.ciif-expo.com/en/

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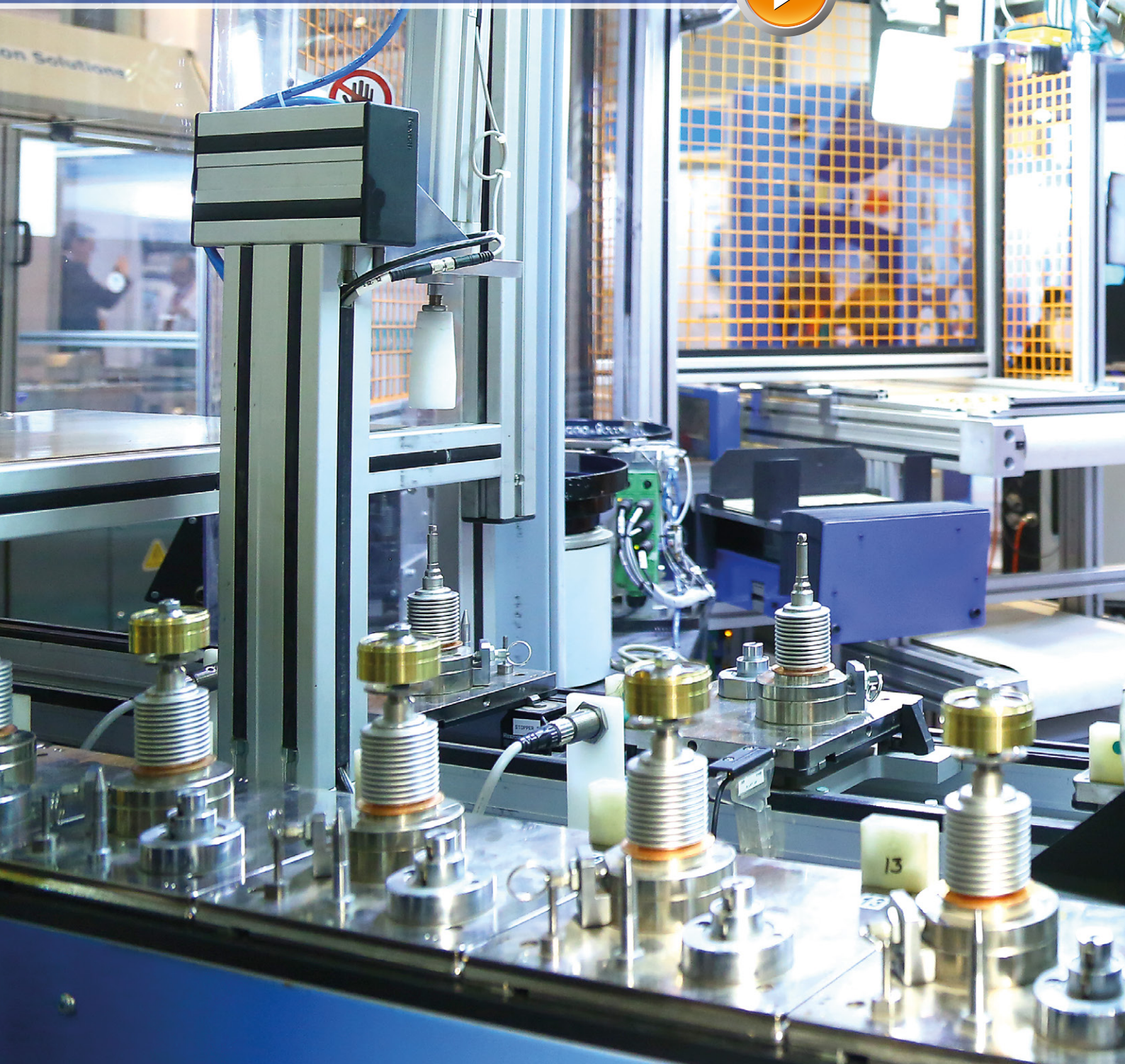


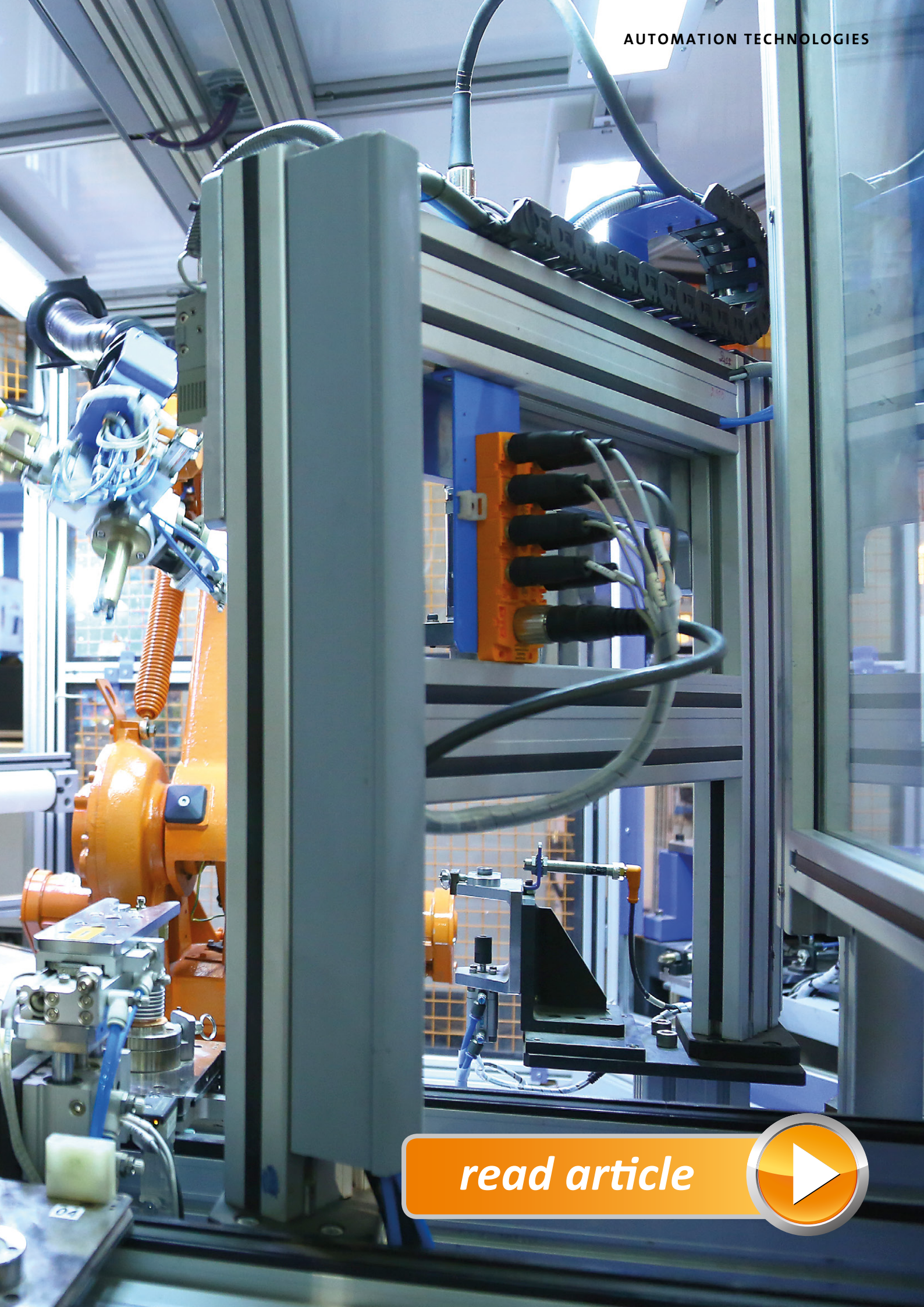
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Paving the way to 'Make in India'

The manufacturing industry in India is in a process of transformation. WIN India 2015 will focus on various objectives to support the Indian government's 'Make in India' vision.





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The core area of “made in China”

Dirk Schaar

*What makes people visit trade exhibitions?
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these aspects. Come to gain knowledge about
the world of automation technology in China.*





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fair review



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Growth opportunities in China

Nicole Steinicke

The further development of the Chinese industry infrastructure provides furthermore a high demand of machines and systems. Thus, the demand for products around the automatisisation and industrial safety technology. Euchner is a company, which goes for growth in this segment in China.



next page



China is said to be the biggest market for machines and systems globally. This year, the German Engineering Federation (VDMA) assumes a turnover growth of approx. 8 % of the Chinese mechanical Engineering, although the general economy is weakening and export not gaining proper momentum. The present overcapacities and price wars at increasing costs must be absorbed in order to achieve this. Modernisation measures of the systems, machines and production facilities are a possibility, which China however, cannot face on its own. Thus, the German mechanical engineering remains in demand.

Author: Nicole Steinicke, editor,
Automation Technologies

China's advancing automatisisation

To stay competitive the Chinese factories will have to move more and more from manual labour towards automatisisation. This concerns the automobile industry, the electro industry and the machinery and plant engineering. Therefore, also safety technology solutions and systems are in demand. In production and manufacturing it provides the required protection for human, machine and manufactured products. Euchner is a company that develops and produces high quality solutions around the industrial safety technology since more than 60 years. Today, the medium-sized company, based in Leinfelden-Echterdingen, close to Stuttgart globally represented with 15 distribution subsidiaries and 24 authorised sales offices.

Investment in safety technology

In 2006 Euchner founded a subsidiary in China following Brazil, UK, Spain, France, USA, and Korea. The increasing demand for safety-related products and services lead now to an expansion and a relocation to

South China furthermore invests in improved equipment and automatisisation technology

a new office building within Songjiang/ Shanghai. The manufacturer of industrial safety technology highlights its commitment in the country and goes for further growth with the relocation. The building comprises a total space of more than 3,000 m² and integrates all company divisions under one roof. The location is conveniently located at the main connection between Shanghai-Hangzhou and offers sufficient space for further growth. Which importance does the Chinese market have for Euchner, where are risks and which are the perspectives? We talked with George Hindi, Export Director at Euchner GmbH + Co. KG on this topic.



Mittelstand: The one German product you can't import



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Sushen Doshi

Hidden Champions: The German mittelstand are widely regarded as the 'hidden champions' of the German economy. But why 'hidden'? Nowhere in the world, other than Germany or the German speaking part of Europe, will you find highly successful and technologically strong companies with a global presence, tucked away in the small towns and bucolic corners of the region.

Hannover – the Hidden Champion

Airbnb - a hip startup, based in California, with a brand new idea. Private hosts offer their own accommodations to complete strangers. The host earns some extra money, and guests get an affordable place to stay – often becoming “a part of the family”. The company was created in 2008 and has become well-known worldwide. But do you know when people in Hannover came up with such an idea? In 1947, nearly seventy years ago, the first industrial fair “Hannover Messe” took place. Housing was in short

supply among the ruins of post-war Germany, so Hannover created a platform for guests from all over the world to share private accommodations. Not only was this a brilliant and simple idea - it has developed over the years and has been the basis of friendly relations between international visitors and their local hosts in Hannover.

It is one of the reasons why Hannover should rank first in Germany in terms of international personal relationships. But also typical of Hannover, this has been implemented without excessive marketing and PR. The same goes for IT. Do you know when the first CeBIT took place? In 1970 – a time when the majority of the population did not even know computers existed. Here, again, Hannover was a trendsetter. Since then, CeBIT has grown to become a global brand in the industry and far beyond. Why? Because facts and performance speak for themselves and are still the best form of advertising. That is exactly what makes Hannover unstoppable. It does not blatantly beat the publicity drum but, rather, stresses the facts and figures. This corresponds to the temperament of the people who live here. A typical Hannoverian stands out because of his or her efficiency and practicality. In Hannover, people would rather be a “hidden champion”. The successful mid-sized companies in Germany are an excellent example for this; companies that are primarily distinguished by the quality of their products. These businesses do not need to pretend to be larger than they really are nor do they need advertising referring to old traditions, which are now of secondary importance.

Hannover does not boast about being a “Gateway to the World”, as Hamburg has advertised itself since the Middle Ages. The city does not overemphasize cultural events, like Munich with its Oktoberfest, like Berlin via its “international” attitude towards life or



Peter Eisenschmidt,
Hannoverimpuls GmbH





the Ruhr area with its industrial competence. Hannover has, for example, earned the title of a “UNESCO City of Music”. The city has the biggest “green lung” in Europe, the “Eilenriede”; an urban forest spanning 640 hectares. The cost of living is low and medical care is top-notch.

“Hard facts” - that is what matters. But the city makes an especially good impression with regard to its “hard facts”, which are particularly important for investors. Hannover is located in the heart of Germany and, as a result, it serves as a crossroads for main transport corridors between northern and southern Europe or between Paris and Moscow. The Deutsche Messe AG is located here - the largest trading center in the world. With 463,275 m² of hall space it overshadows all other trade fairs. The SNIEC in Shanghai has about 200,000 m² of capacity. Around 100 trade fairs are organised by the operating company “German Messe AG” in Germany and abroad, making it a market leader.

International companies rely on Hannover

But let us leave the fairgrounds and focus on Hannover itself. Can you name a product from Hannover? No? Have you ever seen a VW Bulli? If there were a symbol of the German economic miracle and a car that stands for robustness and efficiency, it would be the VW bus. And since 1956 it has been

produced, of course, in Hannover. Or take Continental, a company which not only used to be one of the world’s largest tire producers but also a hi-tech supplier for mechanical engineering, railway, printing or construction industries, chemicals industry as well as the aviation sector. In the spirit of internationalism, foreign companies have invested in Hannover and created important pillars in the economy. Johnson Controls has its European headquarters in Hannover. The company is considered “one of the most admired” and “world’s most innovative companies” and it is no coincidence that it opted for Hannover. Further, the Hannover Medical School (MHH) serves as just one example of the pioneer role Hannover plays in the field of research as well. It is one of the leading institutions of its kind worldwide and this position is likely to be strengthened in the coming years.

As a result, Hannover is in many ways an ideal location for innovative and pragmatic businesses and investors. In this city, there are a multitude of ways to successfully establish a business and network in Germany. Here, the economic development agency “hannoverimpuls” is at your service as a reliable partner. We provide pragmatic and unbureaucratic assistance, open doors for you, thereby laying the foundation for your success in one of the most important economies in Europe.

Photographs: HMTG, Mahramzahdeh, HannoverImpuls

www.hannoverimpuls.com



LAOS

Peace, independence, democracy, unity
and prosperity

6.8 million Population

102nd most populous country on earth

17 Provinces

Capital : Vientiane

Currency : Kip (LAK)

Languages : Lao, French, English

ASIA

Employing, but also
empowering through
technical training



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Vientiane

With more than 61 % people in the working age group, Laos doesn't have a demographic problem, the problem is lack of trained engineers, especially measurement engineers. Due to inadequate education system and infrastructural benefits not reaching the far corners of this south east asian country the development of the population remains patchy. Endress+Hauser is doing its bit to overcome this deficit, by helping people to help themselves.

RFID system and sensors offer considerable advantages in an assembly plant for injector nozzles

Achim Weber

Special machine builders Sonplas developed and built two machines for assembling high-precision injector nozzles. To meet customer requirements in terms of precision and repetition accuracy, the individual nozzles and their components must be identified accurately in the process. For this Sonplas uses Turck's RFID system and proximity switches which detect aluminum workpiece carriers on the conveyor belt.



read article



The RFID reader reads the tag on the workpiece carrier in order to identify the individual components

Better quality by improving traceability

The globalization of technology is influencing the wave of intelligent innovation. Mostly from Germany and is sweeping the entire industrialised world. China obviously is deeply affected. Currently, the chinese enterprises are faced by two problems: first, product upgrading; second, transforming the industry processes in order to meet the international market demands.





Vision Sensor
VISOR V20-P
Code Reader



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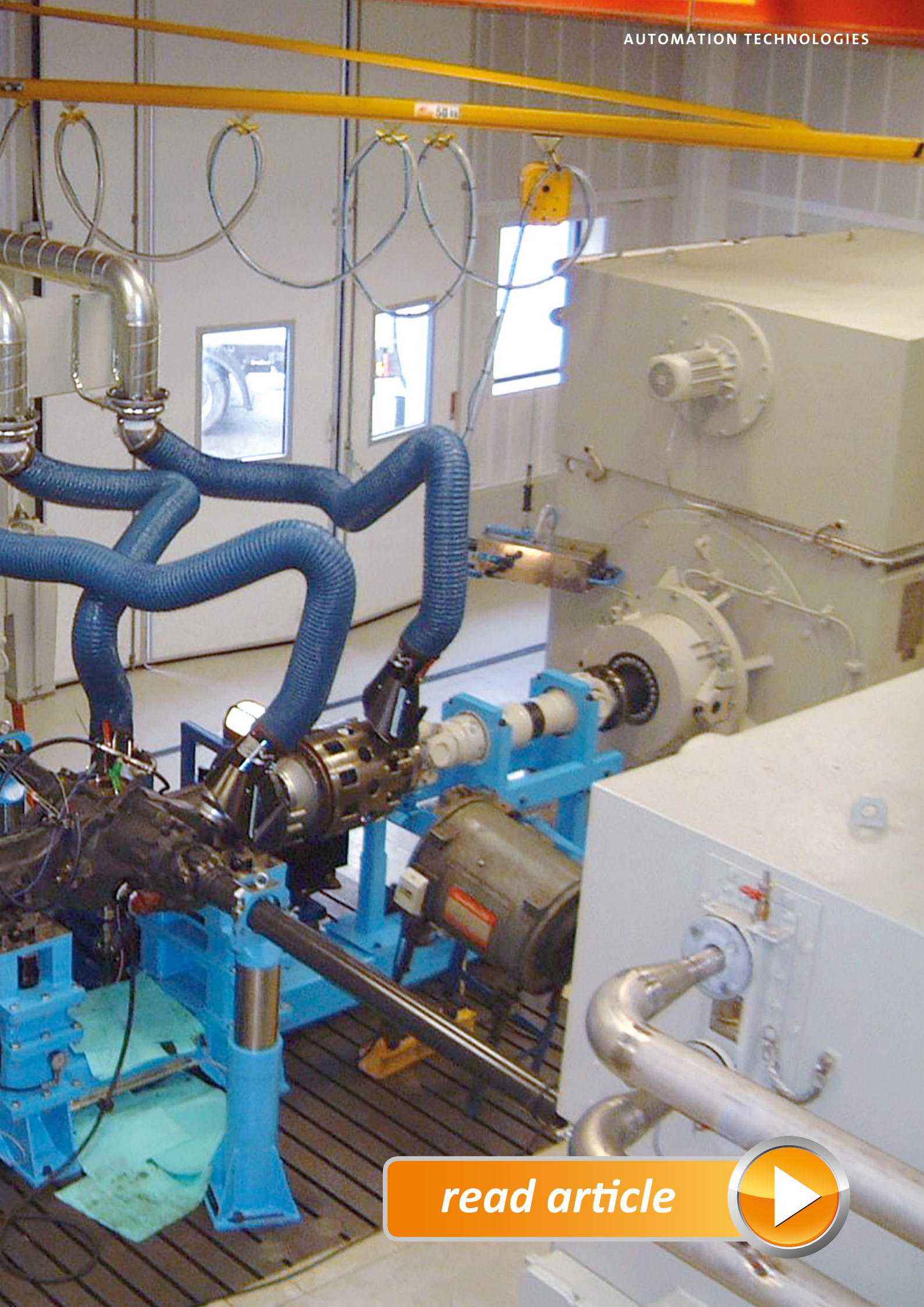


Innovative torque measurement applications in motor test benches

Michael Guckes

Measuring torque, rotational speed, angle of rotation and the quantities derived from these variables are assuming an ever greater role in the design of new test benches for use in industrial environments. In addition to higher requirements for accuracy and speed, further determining criteria for the selection include options for automation and efficient operation. How can all of this be achieved?





read article



One click saves 50 % cost of sensors for Valensina

Every day, up to 500,000 litres of high-quality fruit juice can be filled on the 5 lines in the Valensina's Mönchengladbach plant. As a supplier to the major trade chains, the Valensina group has largely automated its production site in the headquarters, to meet the high requirements on freshness and delivery times. The required sensors are purchased via the internet which reduces costs and simplifies logistics.





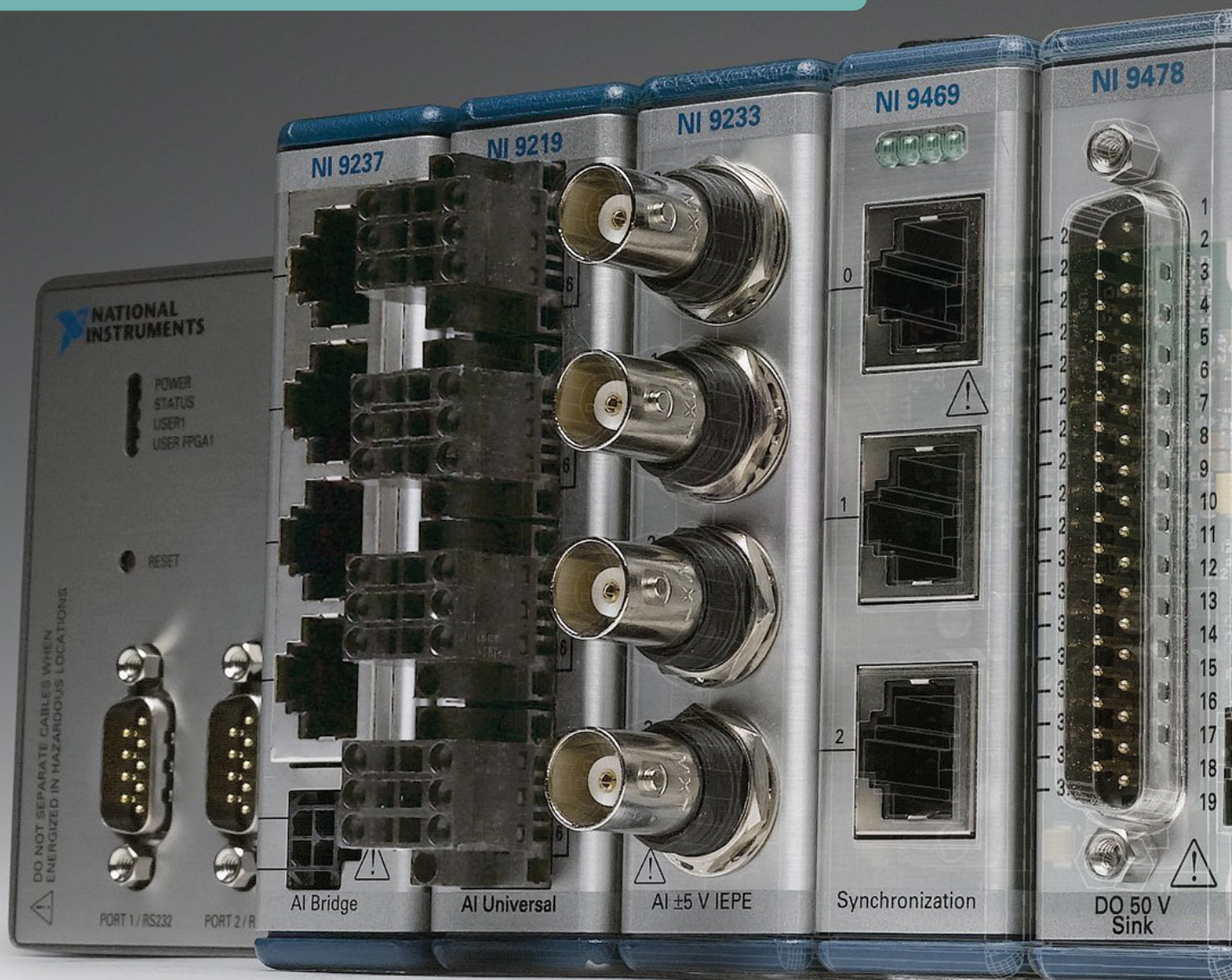
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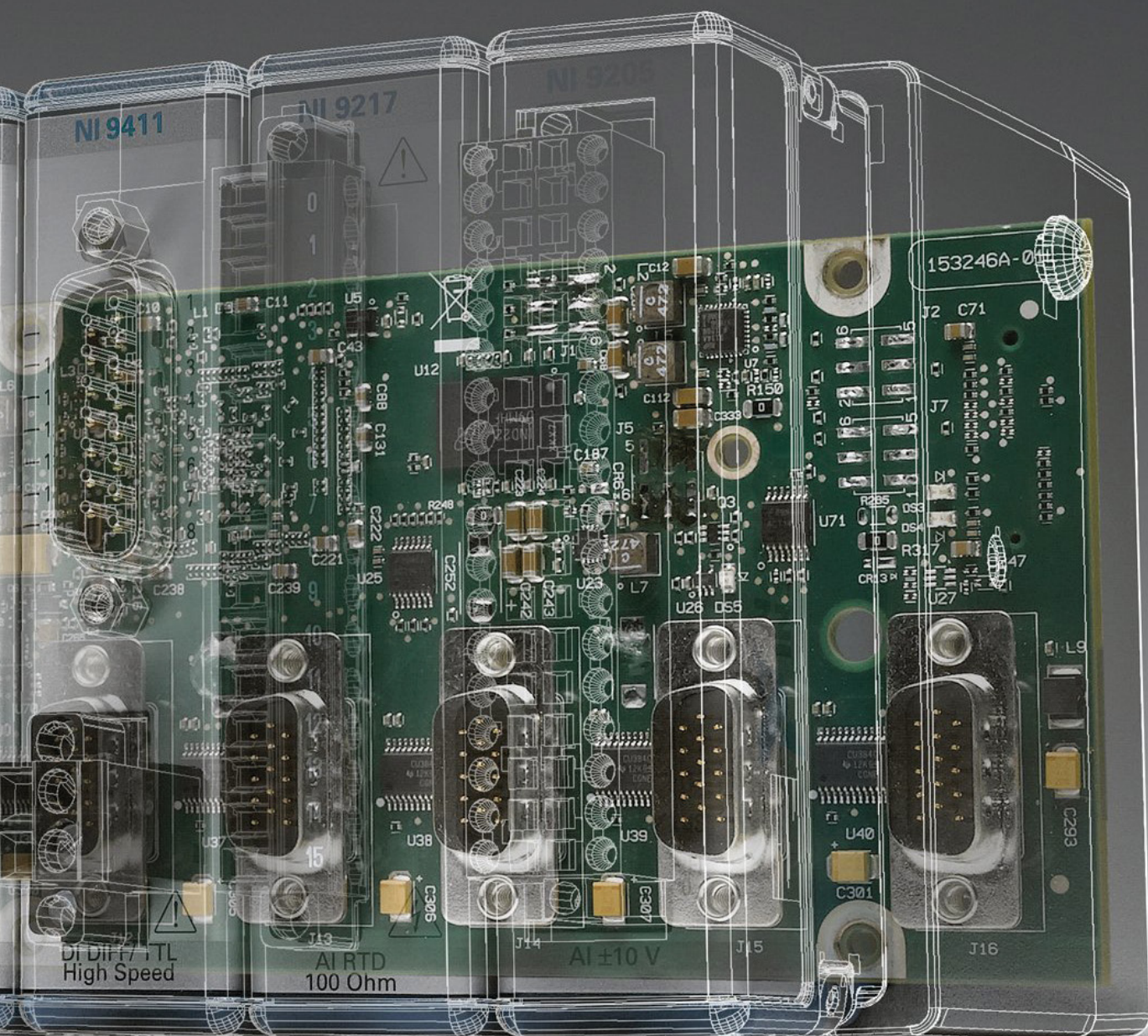


More analysis gives faster and better decision making

Brian Phillippi

In USA alone, there are 2.5 million miles of pipeline, with only 137 inspectors and huge amounts of data collected. This leaves 80 % of the time for data acquisition and only a mere 20 % of the time for data analysis. That's 80 % of your highly trained analyst time spent on taking measurements and entering the data. What is required here is a new way to approach process controls by integrating complex, disparate systems that improve data collection and analysis this also provides safer operational environment and improved efficiency..

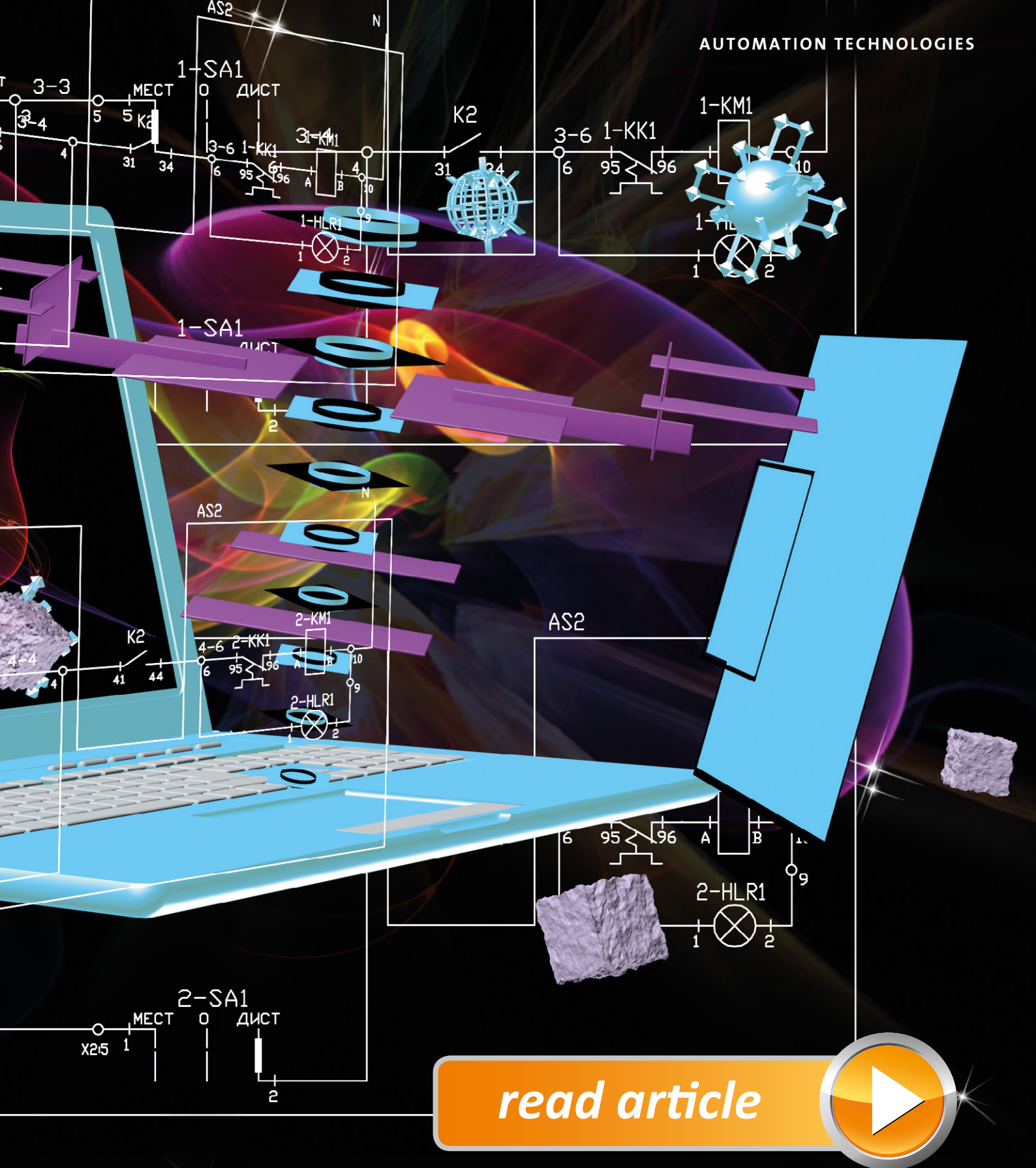


[read article](#)



**PC-based control technology
for special-purpose machines**





Robert Urech

Vehicle steering column shafts are very sensitive, yet important, components of automotive steering systems. Accordingly, high demands are placed on the production of these products. LCA Automation AG specializes in these types of assembly plants, and values the openness and flexibility of PC-based control and drive technology from Beckhoff.

Simatic sweetens honey extraction

The company Harzer Antriebstechnik GmbH based in north-western Germany, specializes in special purpose engineering and sophisticated automation solutions focusing mainly on drive technology. The company recently began to fit honey extractors with Siemens technology, optimizing the efficiency of the entire honey centrifugation process from the controller through the frequency converter to the operator unit.



read article



Safe automation between Myanmar and China

A 2,500 km gas pipeline from Myanmar to China requires smooth failure-free operation. To make sure that the gas pumped from Myanmar reaches China's energy hungry industry, safely and consistently, a largely automated operation and monitoring system with safe process controls and functional safety in accordance to SIL 3 is being employed. This automation system PSS 4000 from Pilz follows the mechatronic approach and is characterised by the consistent distribution of control functions to the periphery. For the control function, it is irrelevant where the respective program section is processed. But that's not all: PSS 4000 performs automation and safety-related tasks simultaneously, in the one system.



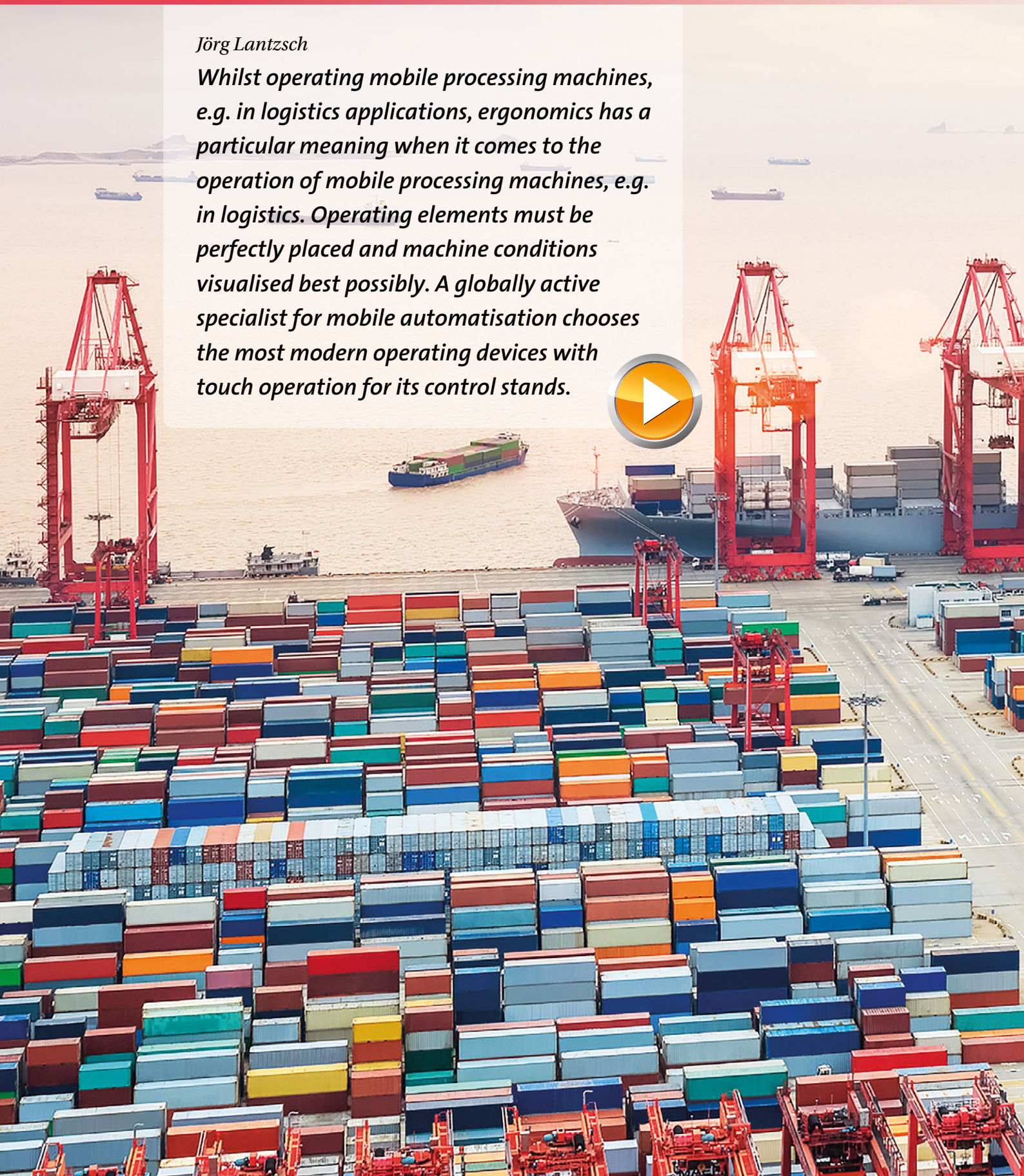
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Operating and control device, positions cranes safely

Jörg Lantzsch

Whilst operating mobile processing machines, e.g. in logistics applications, ergonomics has a particular meaning when it comes to the operation of mobile processing machines, e.g. in logistics. Operating elements must be perfectly placed and machine conditions visualised best possibly. A globally active specialist for mobile automatisisation chooses the most modern operating devices with touch operation for its control stands.



read article

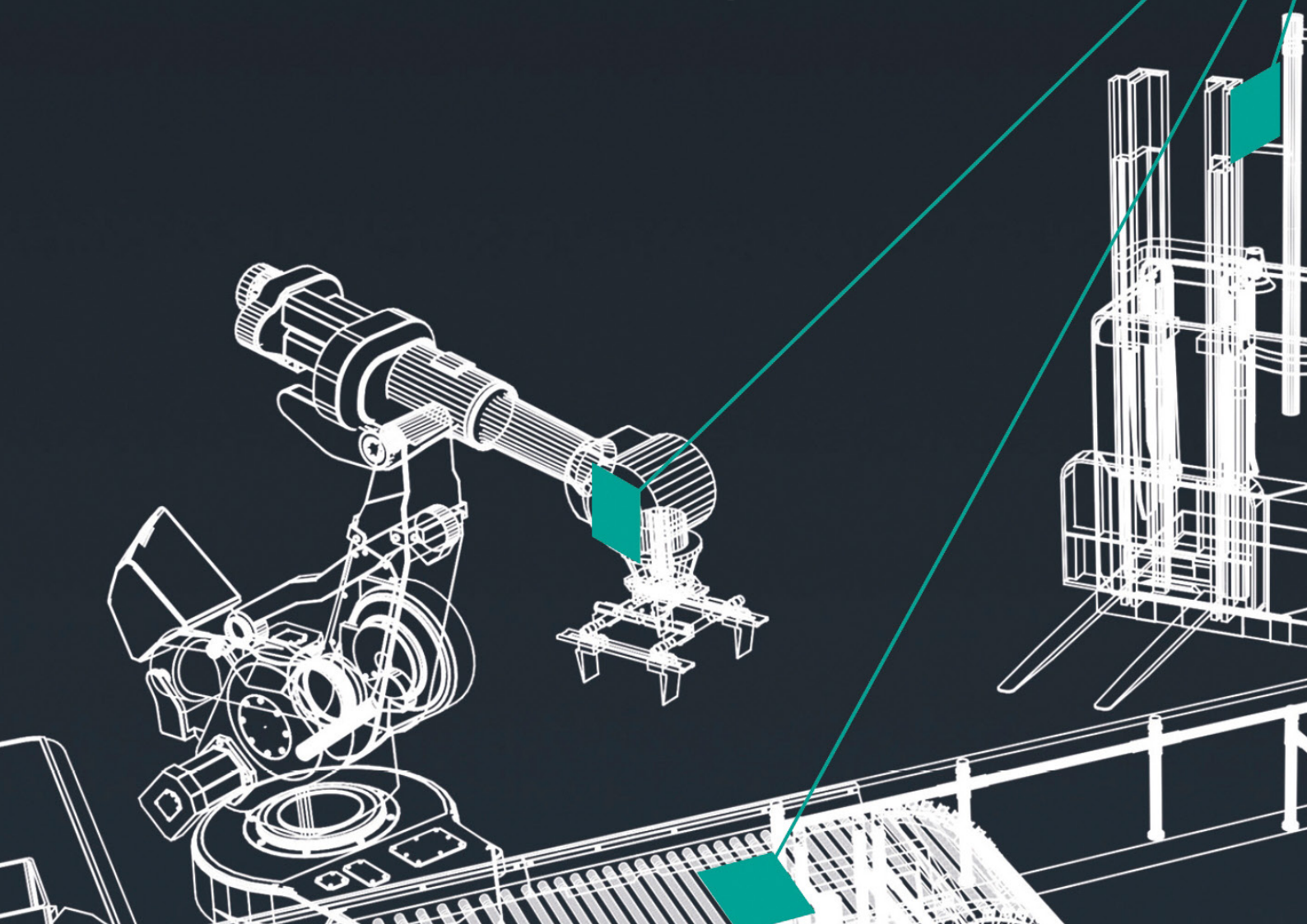


“Industry 4.0 vs Internet of Things – Three perspectives”

Ser

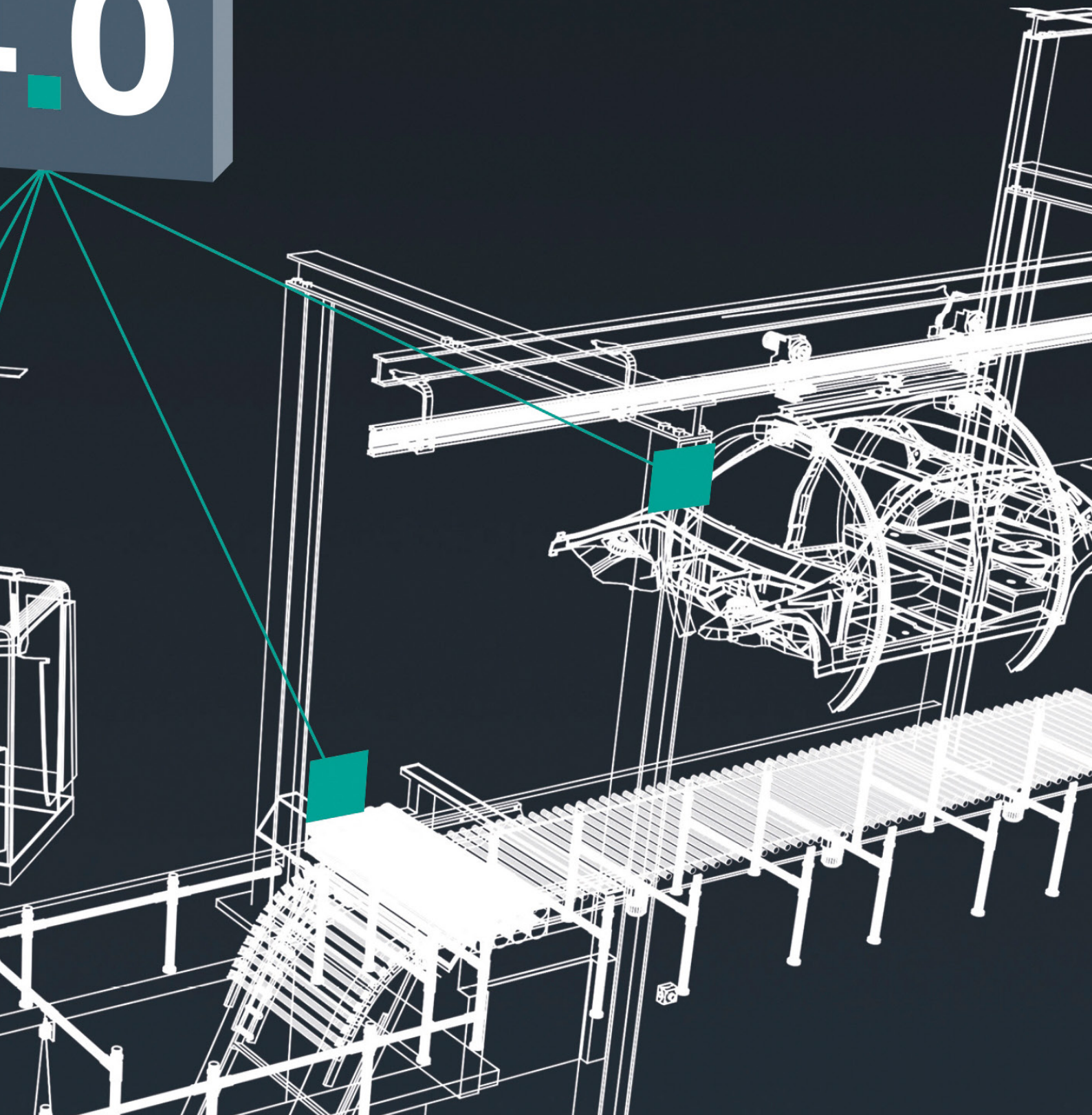
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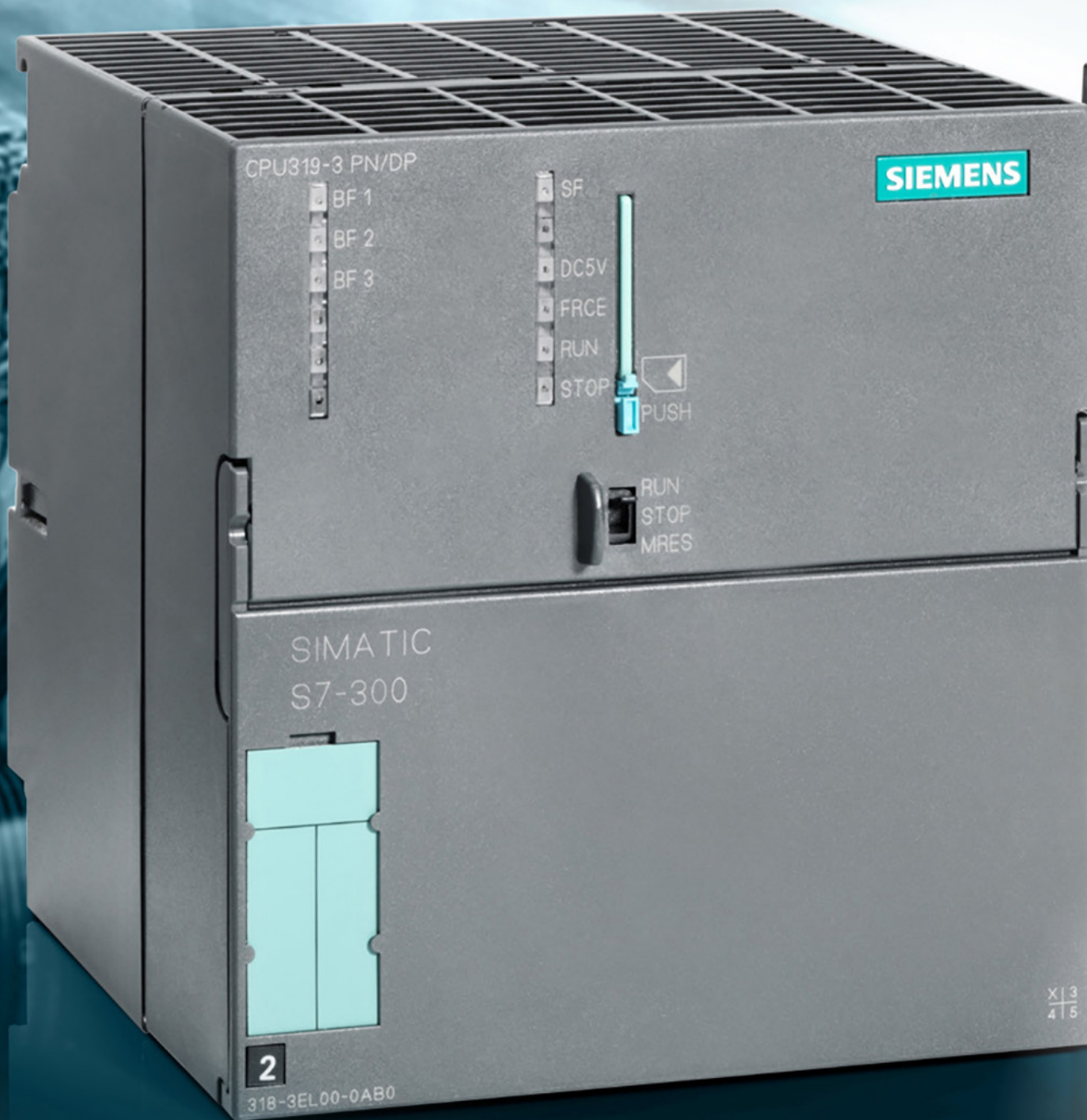
As a result of the Internet, the real world and the virtual world are growing together – the economy is on the brink of the fourth industrial revolution. Concepts such as the “Internet of Things” and “Industry 4.0” are being discussed extensively across Europe. But what is the situation in other regions of the world?



nsorik
-0

read article





Integrating S5 and S7 controllers in the OPC UA world

The basic objective of Industry 4.0 is to make manufacturing more competitive by utilising the information and communication technology (ICT). In order to implement this technology efficiently and as quickly as possible, modularization and standardization are important. Both these factors reduce the complexity and increase the flexibility of the system. In this context, OPC UA has proven to be the pioneering communication standard. With OPC UA the industry 4.0 requirements for minimum dependence on the manufacturer and company-communication-systems are fulfilled.





[read article](#)

Reliable cables for industry

There is continuous movement of all sorts of things in the industry. In general, when there is movement on the floor it's good for production. But what is good for production, is a major challenge for cables. These energy chains are used to protect moving machine cables and hoses from tensile and torsional forces as well as external influences such as impact or welding sparks. They also reduce wear and stress on cables and hoses, prevent entanglement, and improve operator safety.



Products undergoing tests up to 2 billion test cycles in 58 test stations in the igus test lab.

read article



Safety certifications, key to enter international markets

Dirk Müller

To market a control panel for controlling machinery or plant equipment, the control panel must comply with numerous guidelines. This means system integrators must be able to rely on the certifications of their hardware platform. Since there are no uniform standards as yet, manufacturers and system integrators should know their target market's safety regulations as well as the exact application of the product.





[read article](#)



High speed imaging for high speed amusement

Razor sharp images of objects moving in high speeds are extremely important in industries ranging from food beverage and pharmaceutical to machinery makers. These images provide the engineer the ability to see, analyse and make adjustments to the complicated interactions of various components. Apart from the manufacturing industry but they are also important in formula-1 racing events and the roller coaster rides all over the world.



read article



Thermal imaging provides benefits for continuous condition monitoring

Markus Moltkau, Frank Liebelt

Presentation and delivery are critical parts of product quality. Recochem, a Canada-based manufacturer and distributor of chemical products and fluids understands this all too well. That's why the company is using thermal imaging to continuously monitor the quality of its package sealing.





read article



Product News

Basler Beat area scan camera enters series production



Humidity & temperature transmitters with BACnet interface



A new age tablet for hazardous environment



Opto presents its new 3D Cylinder Inspector



High speed and German precision for EWS metal bellows coupling



Networking made further easy through 'Kunbus'



Thermal imaging with innovative 'Eversharp' feature



Measuring humidity, temperature, and CO2 content wirelessly



Kyland Technology's new series of versatile entry-level switches



Eliminating the wiring complexity



Industry's first Intel Xeon-based PXI embedded controller



Optical distance sensors for various application areas



Optimized connectivity solutions for international challenges



High quality Aluminium energy cables and conductors



Siemens develops versatile Motion Control System in an industrial PC



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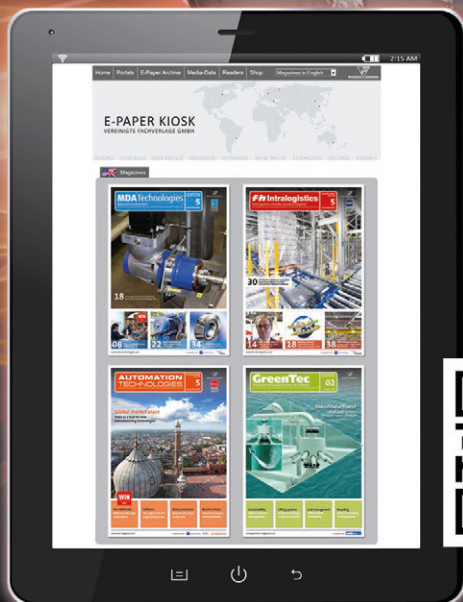
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Third year (2015)

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VEREINIGTE FACHVERLAGE

China's progress in automation

Dear Readers,

Interest in comprehensive automation technology solutions remains unabated due to increasing networked machinery and system structures. It is not just about regional system concepts, it also covers solutions that go beyond national boundaries. The company Pilz from Ostfildern in Germany provided us with an exciting storyline. It is a story about a 2 500 km long gas pipeline, which goes from Myanmar to China and is reliably controlled and monitored with an automation system for safe process control and functional safety. A challenge that was not easy to overcome.

Safety is not only an important aspect in widely distributed systems, but it is also important for protecting people and machinery. Euchner as a company is active in China for many years and observes that industrial safety technology will gain extreme importance in Asia in the coming years. German expertise in mechanical engineering provides important stimuli. You can read more details in the interview with Mr George Hindi from Euchner.

We are proud to present you our country special China, Shanghai and IAS Industrial Automation Show Shanghai, which will take from 3rd to 7th November in the National Exhibition and Convention Center Shanghai. This expo is considered as industry barometer for China's automation market and also showcases – in addition to production of industrial automation technology – solutions from robotics and IT industry, above all in the automotive, paper, packaging, renewable energy and tooling machine industries. IAS takes place in conjunction with Robotics Show and MWCS Metalworking and CNC Machine Tool Show.

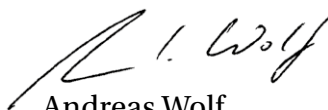
So get inspired to feature next-generation technologies. We will help you with our magazine AUTOMATION TECHNOLOGIES. Subscribe free of cost by visiting www.ate-magazine.com.

Yours sincerely,



Nicole Steinicke

Editor AUTOMATION TECHNOLOGIES



Andreas Wolf

Project Director

Hannover Fairs International



China: factory of the world, undergoing Automation



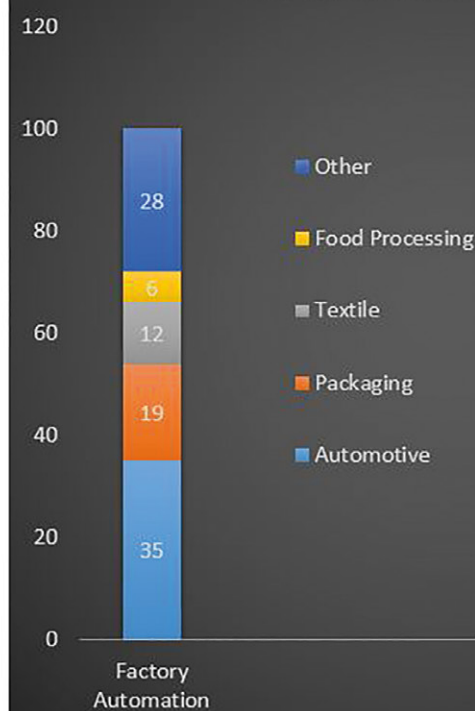
The law of large numbers says that, as the economy gets larger, it becomes further difficult to grow at previously possible faster rates. This is exactly what is happening to China. But more important question is why and what are its effects on the industries and businesses associated with China.

For the last 30 years or so, China has been consistently growing at 10% or more. But this year, China has cut its growth target to 7%, this means it is the 'slowest' growth in the last 20 years. Even at its modest 7% growth it is the envy of most countries. But this might not seem much to fret about, right

now. To a certain extent, this slowdown of growth is what the Chinese government wanted to achieve. The Chinese government are looking to change its economic growth model. They want to shift from investment based model to the 'more innovation based on more consumption' type of model. They want to transform this resource driven economy into a more innovation driven economy.

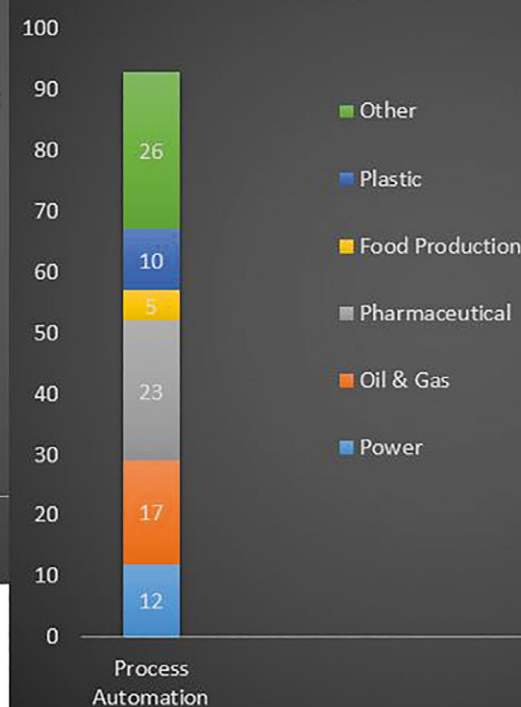
China's manufacturing firms that make labor intensive goods are rapidly losing its competitiveness due to the rising wages and other costs. This is popularly known as 'middle-income trap.' Therefore the industries are realizing the need to upgrade in order to stay competitive. This is where the Industrial automation shows like the ones in Beijing, Shenzhen and Shanghai come in to picture. Regarded as the Asia's largest industrial trade fair, Industrial Automation Show - Shanghai is a perfect platform for China's in-

Factory Automation Market Share by individual sector



01 Sector-wise market share for Factory automation and process automation

Process Automation Market Share by individual sector

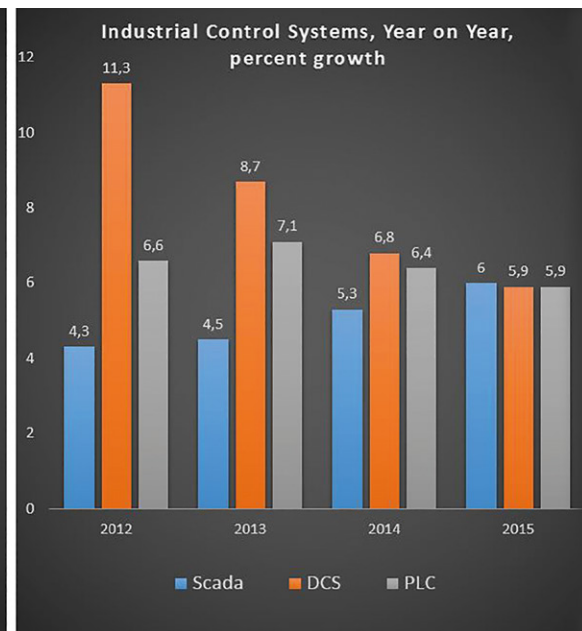
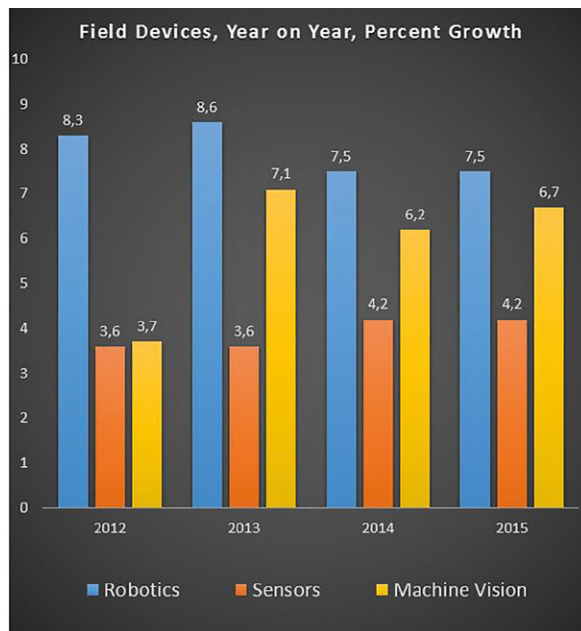


dustrial transformation and upgrading.

Shanghai, with its \$ 350 billion GDP is the most important city in China in context of economy. With more than 32 million containers every year, it is also the world's busiest container port. The Shanghai & Yangtze river delta economy circle has the best industrial clusters of automobile, ship-building, metallurgy, aerospace & aviation, clean energy, die & mould, power generation, IT etc. The economic and industrial importance of Shanghai in China cannot be rivaled by any other city. Therefore it is an unparalleled location for an industrial trade fair. The IAS has been a convenient place for the industry leaders to present and demonstrate the latest technologies, equipment and the market ready solutions. With more than 120,000 visitors and 500+ exhibitors, IAS – Shanghai has become a must attend event in the eastern hemisphere for the automation industry.

Production and process automation

In 2013, the automation sector in china created businesses worth \$ 34 billion and posted an annual increase of 14.9%. In 2014, though the rate of growth may have declined to single digit, it still is a significant increase. The Chinese automation market is very fragmented, 82% of the domestic companies being small and only a 2% domestic companies as large players in the market. These domestic companies lag behind their foreign counterparts in terms of technology, brand, product range and innovations. But they do have advantages in terms of cost, distribution channels, market segments, and personalized services. Domestic Chinese companies account only for a 30% share in the Chinese markets, this leaves a huge scope for the foreign players to improve their standing in china. The IAS facilitates the exhibitors with a chance to tap in this enormous market. The trade fair in Shanghai offers both, the domestic as



02 The year on year growth statistics for various automation sectors

well as the foreign companies a chance to connect with their clients in east china. It also provides the domestic Chinese companies with a great opportunity to get acquainted with the products and the advanced technologies from the international markets.

Robotics

China has been responsible for more than 20% of the worldwide robots and robotics systems, with such a huge market share in a rapidly growing sector, the IAS Shanghai becomes an extremely important event for the companies from the industrial robotics division. 17% of the trade visitors at the IAS in previous years have been interested in finding new innovations, while 15% of the total trade visitors were seeking solutions to their special requirements, this provides a good opportunity for the masters of the robots to impress and showcase their technological advances.

At the Shanghai new international expo centre, it's not just the industrial automation show, but a bunch of other events as well like the Metalworking and CNC Machine Tool Show (MWCS), Energy Show (ES). This creates a crossover interest generated by the concurrent trade shows. With total space of 150,000 square meters, and more than 1,500 exhibitors, IAS makes "One-Stop-Procurement" really work.

Statistics: Credit Suisse 'Global Industrial Automation', teaser fotolia

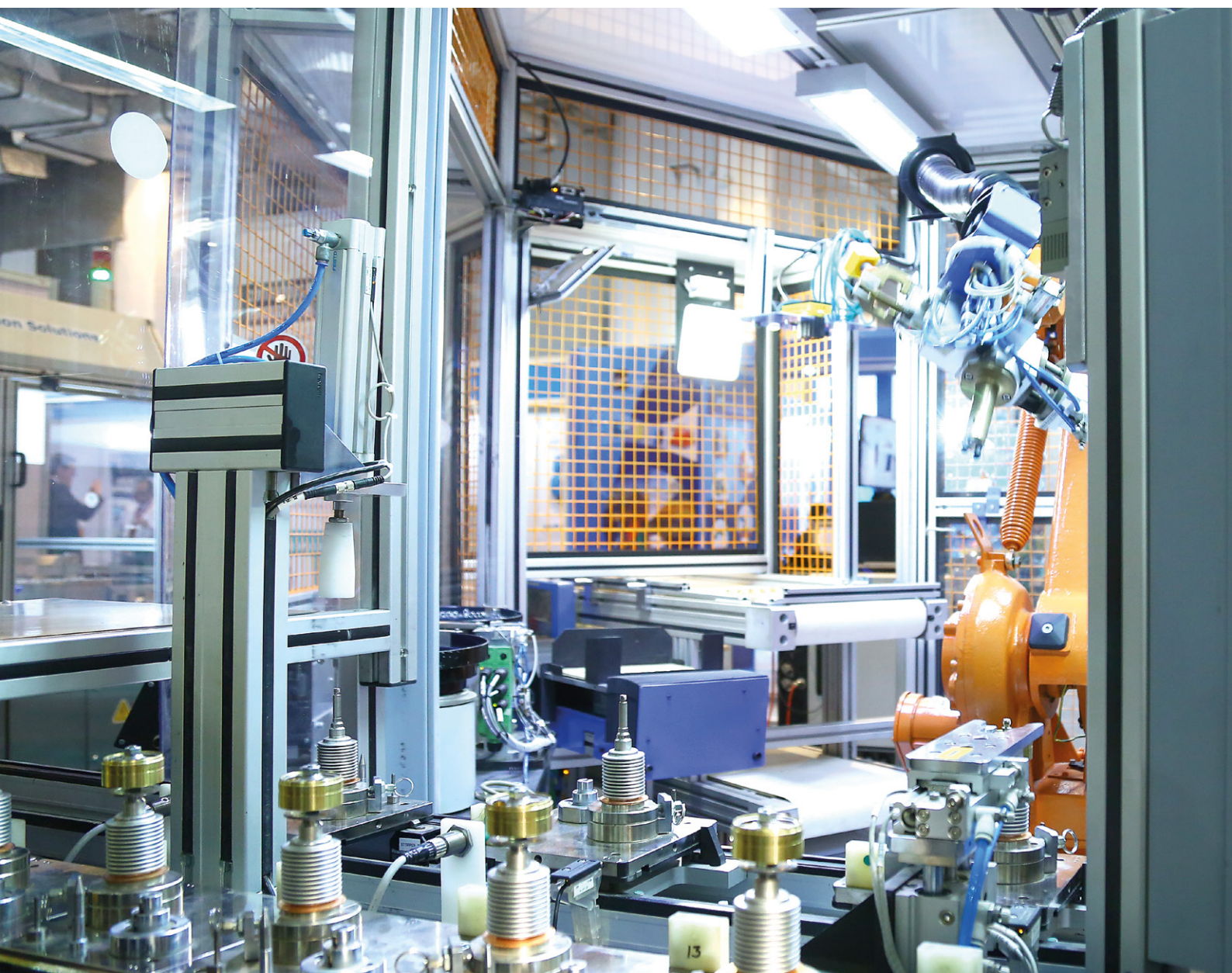
www.industrial-automation-show.com

Paving the way to 'Make in India'



The manufacturing industry in India is in a process of transformation. WIN India 2015 will focus on various objectives to support the Indian government's 'Make in India' vision.

WIN India 2015, the leading trade fair for the manufacturing technologies and intralogistics, will bring together world-class technologies and machinery from India and across the globe. Scheduled from 9th to 11th December 2015 at the Pragati Maidan exhibition center in New Delhi, the event will bring together four concurrent trade-shows: MDA (Motion, Drive & Automation) India -, Industrial Automation India, Surface Technology India and CeMAT India.



Seminars, workshops...

WIN India 2015 has partnered with Automation Industry Association (AIA) to stage the Automation Training Zone at WIN India 2015, a two-day skill development and training program designed to promote the Indian government's "Make in India" and 'Skill India' initiatives by educating end-user sectors with the latest automation technologies. The program addresses the needs of equipment makers and automation users in the food and beverage, automotive, pharmaceuticals, fast-moving consumer goods, and consumer durables sectors as well as process industries such as chemical, cement, energy, oil and gas, and paper and pulp.

WIN India will also organize seminars and conference under the name 'WIN Industry Summit' (WIS), with its main theme 'Integrated Industry'. It will focus



WIN INDIA 2015 will be demonstrating products and services, from pneumatics to electro-mechanical transmission, automation components to process and factory automation systems and materials handling equipment to logistics infrastructure systems

on all topics related to building and managing the factories of the future.

... and application parks

The Automation Application Park (AAP), running for the second time, will feature system integrators demonstrating live applications and educating end-users and visitors about the latest automation solutions. The CeMAT Application Park, a smart warehouse display, will showcase a complete logistic chain management system of an end-product, from loading and unloading of a truck, material handling in warehouse, and sorting of products to automated storage system and transportation and shipping services.

Major potential for the growth of the Indian industry

"After a successful India Partner Country program at our flagship event, Hannover Messe 2015, WIN India 2015 will continue to resound India's calling to 'Make In India'. We are very excited about this year's edition of WIN India, which will focus on 'Integrated Industry' – a digitally networked industry. WIN India will organize seminars and workshops in line with the Indian Government's various campaigns, such as 'Make In India', 'Digital India' and 'Skills India', said Mehul Lanvers-Shah, Managing Director, Hannover Milano Fairs India Pvt Ltd.

WIN India will showcase around 350 exhibitors, with dedicated country pavilions from Germany, China and Korea.



"In the pursuit of increasing the manufacturing capacity of India, we see a major potential for the growth of the capital goods manufacturing industry. With India's strength in human resources, strong base of entrepreneurship, and a robust and growing domestic demand, the manufacturing industry in India is about to see transformation. WIN India 2015 will provide a platform for enterprise and user industries to interact, creating a complete solution marketplace."

*Mehul Lanvers-Shah,
Managing Director, Hannover
Milano Fairs India Pvt Ltd.*

The core area of “made in China”

Dirk Schaar

What makes people visit trade exhibitions? Professional exhibitors, interesting technology, meaningful discussions and optimal location. Industrial Automation - Shenzhen covers all these aspects. Come to gain knowledge about the world of automation technology in China.

It is going to be a special week for me – I am going to travel to China for the first time. After 11 hours of night time travel, I finally arrived in Hong Kong, the city of millions and special administration zone at the southern coast of China. To my surprise, I did not even have to leave the airport, because a speedboat quickly took me to my actual destination: Shenzhen!

Unending growth

Shenzhen, in the Guangdong province of China is a well-planned city and is considered as one of the important hubs for foreign investments in China. Mainly due to its ‘Special Economic Zone’ status and also because it is one of the fastest growing cities in

the world. With a population of approx. 13 million, it is amongst the cities with highest per capita income in China – in the league of Hong Kong and Macau.

After a journey of few minutes and without the expected chaos in the traffic, I reached and checked in my hotel. Waiting for me in my room, there was a very nice view of the city.

Best way to promote in South China

Shenzhen, this city showcases China’s developing miracle of the past 30 years. It has become the core area of “made in China”. Especially in the fields of electronic communication, metal, machinery equipment, automobile manufacturing, building materials & hardware etc. As one of the fastest-growing area of global manufacturing, South China is accelerating the pace of transformation and upgrading. This is the main reason for my trip to China: one of the most important trade exhibitions is starting here today, namely Industrial Automation Shenzhen – and to look around for our readers.

Organized by Deutsche Messe AG and Hannover Milano Fairs Shanghai Co., Ltd., Industrial Automation Shenzhen (IA Shenzhen) is one of the most popular automation exhibitions in China. Choosing to be the exhibitors at this Exhibition is absolutely the best way for enterprises’ to promote their products and technology in South China as well as the entire Asia Pacific region. This was confirmed by James Fu, General Manager and organizer, when I meet him at the exhibition ground: “For Chinese companies, the key to competitiveness is investing in modern

Author: Dirk Schaar, editor-in-chief,
Automation Technologies



machinery that increases productivity and improves product quality. In Shenzhen, one of the world's fastest-growing production regions, manufacturers and suppliers from all over the world gather at IA Shenzhen to present the latest products and services for production and process automation. Industrial buyers from all over southern China visit the fair because it is the one event in the region where they can find everything from control systems, industrial IT and machine vision to lasers, robots and test and measurement systems."

Pure automation

In its 19th year, the event was inaugurated today on 1st July 2015. I entered Shenzhen Convention & Exhibition Centre (SZCEC), a huge building with large glass facades. Since 2014, IA-Shenzhen is part of Hannover Messe's 'Global Industrial Exhibitions' series. The entire spectrum of automation technology is concentrated here, including the industrial image processing sector. Many reputed companies from all over the world presented their cameras, lenses, lighting etc. in hall 4 in a special show called "Vision China". Thus I had an opportunity to visit companies like Basler, Cognex, IDS, Allied Vision, OPT Vision or even MVTec and take a look at their products.

Huge market potential

Covering a total display area of 30,000 m², this fair was attended by 450 exhibitors from 35 countries. The number of trade visitors and buyers hit 24,792 in the 3-day-event. Once again the exhibition closed with a tremendous success. James Fu, the General manager of Hannover Milano Fairs China said, "Shenzhen has a huge market potential. Faced with booming business opportunities, local automation companies are building strength, to present themselves and facilitate their going global strategy." Moreover, several specialty forums and activities were held during the exhibition period, covering hot topics in industrial automation, which included Robot and Machinery Automation, Automation Technology Salon, Machine Vision Technology Development Trend and Application Cases. During the exhibition, the buyers and exhibitors conducted fruitful trade negotiations, expressing deep appreciation for the highly professional arrangements made by the organizers. The number of visiting delegations reached over 100, a significant increase over the previous year. Roughly a 29 % of the visitors were



decision makers or the key persons to influence the purchase.

Successful show

Today, at 3rd July 2015, the show comes to an end. For me it's time to say goodbye to a beautiful city and a successful Industrial Automation Shenzhen, but not without obtaining a voice of the exhibitors, like Mitsubishi Electric Automation: "On the whole, it was a good exhibition. Its comprehensive promotion and relatively big line-up attracted quite a number of professional visitors, giving the exhibition some good popularity." A representative of DongGuan XiaoLei Mould Technology confirmed: "We were happy that we participated in IA Shenzhen 2015. It was a good exhibition with good effect. We chose IA Shenzhen, the opportunities of such professional exhibitions to expose ourselves, let more people know us, winning more potential customers. Looking forward to our next co-operation."

Three days of intensive discussions with visitors, exhibitors with technologies from around the world as well as numerous impressions are now behind me. Before my flight from Hong Kong goes back to Germany, I once again meet a visibly enthusiastic James Fu: "We look forward to seeing you again at Shenzhen Convention and Exhibition Center from 29th June to 1st July 2016" - I can only agree.

www.industrial-automation-shenzhen.com



previous page

Mr. Hindi, you expand in China and commit yourself in this country. What precisely are your activities in China?

As you know, we have started Euchner Shanghai 10 years ago, but we have been active in China long before that. We have recognized early enough that we have to be close to our Chinese customers in order to offer them the needed care and service, no matter where the product is purchased. On top of a large warehouse for German-made products, we are able to offer special product versions which are assembled locally in order to satisfy the demands of our Chinese customers. This saves time and shipping costs.

01 The new company building in Songjiang / Shanghai is conveniently located at the main connection between Shanghai – Hangzhou and offers sufficient space for further expansions

Which solutions from your portfolio of the industrial safety technology are of particular interest for the Chinese market?

The demand of our customers in China is very different. Some of them work today according to ISO standards and apply high-end safety solutions, such as our Multifunctional Gate Box (MGB). However, still there are many who want to fulfil the minimum requirement only; respectively do still not consider any safety technology at all. Euchner is able to offer different options here.

In which areas does your company expect growth potential in the Asian markets? Meaning, which engineering sectors do develop positive and which



About

Company name: Euchner GmbH + Co. KG

Headquarters: Leinfelden-Echterdingen, Germany

Employees: approx. 600 worldwide

Products: industrial safety engineering (safety switches, safety systems), products for the man-machine-interface and switchgear for automation

impacts does this have on your development in China? Which perspectives does China offer you?

Basically the deployment of industrial safety technology in Asia will gain importance during the coming years and will surely grow further. When Chinese machine builders are looking for exporting their machines to Western countries, they will need assistance. Euchner is already assisting the machine engineers as competent partner and helping them with safety technology. In particular in China there is a high number of companies, which are only locally active and do not deploy any safety technology as yet. There is a tremendous potential for growth here.

Many EN and ISO standards have been converted in Chinese standards already. However, the Chinese standards often do not comply with the European standard. Is this an obstacle for Euchner?

The Safety Standards in China do not contradict the ISO standards. However, and as in many countries, they are not consequently implemented nor enforced by law. Thus, machines are produced and sold in China in which only the minimum requirements are fulfilled, respectively no safety technology is used. We realise that this changes only slowly and we know that the importance of compliance with the valid EN and ISO standards will increase.

With 16 subsidiaries, including nine in Europe, four in Asia and three in North and South America, Euchner is presented around the globe. Which region would you like to conquer next?

With 16 subsidiaries and 24 trading partners, we are globally very well positioned. Nowadays, the world is very dynamic and quick. Therefore, we pay attention to every country and we steadily check the need of an extra activity. This starts with an Exhibition, discussions with our end-customers, and their need for a strong local support. The



02 George Hindi is the Manager Export at Euchner GmbH + Co. KG

market potential is important, but the local support is crucial when dealing with Global customers. Shortly, a Global customer asked us if we can support them in Vietnam. Who knows what comes next...

Presently, how do you assess the strengths of the German industry on the Chinese market?

The German industry has an excellent reputation in China. Presently, the strong Yuan offers additional chances to be successful in the Chinese market. Most Chinese customers are ready and willing to pay more for a German made product in a comparison to a locally made product from the same German brand. These two factors are a perfect mix for success.

Photographs: Fotolia teaser, Euchner GmbH + Co.KG

www.euchner.de/en-us

Mittelstand: The one German product you can't import



GERMANY

Unity and justice and freedom

EUROPE



16 States
CAPITAL : BERLIN

82 million
Population
16th most populous
country on earth

Sushen Doshi

Hidden Champions: The German mittelstand are widely regarded as the 'hidden champions' of the German economy. But why 'hidden'? Nowhere in the world, other than Germany or the German speaking part of Europe, will you find highly successful and technologically strong companies with a global presence, tucked away in the small towns and bucolic corners of the region.

Technically, the German 'Mittelstand' is defined as the small and medium sized, family run businesses generating annual turnovers of upto € 50 million with work force less than 250. But these quantitative indicators do not do justice to the actual meaning of the word. In fact there are a few large corporations with more than 40,000 employees referring themselves as 'mittelstand', which suggests the qualitative aspect is more important than the quantitative definition. Tradition, values, ownership structures and owner-employee relations that influence the decision making gives us the better understanding of the term.

next page



Why are they so important?

Well, the numbers speak for themselves. Of the 3.7 million companies in Germany, 99 % of them are mittelstand companies. With 52 % of the entire nation's economic output, they contribute a lion's share to the German economy and not only that, they employ 16 million people in Germany, that's 60% of the German labor market. The various training, internship and skill development programs offered by these companies usually located in small towns of Germany helps keep the labor pool skilled and employed. Even when the world's economy shrank and unemployment was peaking in double digits, Germany managed a mere 7.9 % unemployment, well below as compared to other larger economies. A major factor for this relatively low unemployment rate were the German family owned business that stuck by their employees during tough times. (Source of statistics: Federal ministry of Economy and Technology)

Why are they so successful?

What is it that they do that makes them successful for generations after generation? Innovate, not imitate, is what they do. They develop products with great quality, and tremendous efficiencies. They occupy a 'niche' in a certain product category generally so narrow that they attract very few rivals. R&D and innovation has a very high place in the German system all together. Not just companies, but also the various stake holder groups such as the state and federal government that assist the companies with investment and subsidies in R&D, a research society like Fraunhofer with more than 67 research institutes in various fields assists the private sector with high levels of R&D.

To compensate for their razor thin focus on just a single product category, they diversify internationally and enjoy the economies of scale. For example, an equipment manufacturer in a small town of

Paderborn makes processing equipment like mixers. They have achieved tremendous efficiencies and precision in mixers specially required for biscuits and confectioneries. And now they are exporting their machines at premium costs to food giants in China and India. Even in the international markets,

The 'Mittelstand' are innovatively successful and successful in innovation

German mittelstand and their products are placed in the premium price segment, justifiably so, on account of their technological strength and the above average after-sales-service that most of them are able to provide.

There are a few other factors that make them so successful, first of which is the commitment towards the business by its owners. Of all the mittelstand companies in Germany, more than 85 % of them are run by their family bosses. The bosses generally avoid organizational complexities and intricate structures resulting in lean management hierarchies. The family ownership also brings quick and responsible decision making. Take Beckhoff Automation for example, the company which posted the annual turnover of € 510 million has 2,800 employees worldwide and is now represented in more than 70 countries but completely managed by its family boss, Hans Beckhoff.

Long term benefits, not short term profits

To be successful in innovation and innovatively successful are 2 different things, but both of them require one common resource. The highly skilled young as well as experienced work force. Most of the Mittelstand companies rely heavily on their



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skilled workers. The tie-up between industries and technical, academic institutions at regional level creates a factory of skilled employees. The vocational training and skill development makes the younger generations more relevant in the job market. The mittelstand already employs 83 % of Germany's trainees. Majority of these companies are micro multinationals with their operations now in most of the world's important markets, but their business culture has deeper provincial roots. Consider Miele, 113 year old manufacturer of kitchen equipment, located in a small bucolic corner of Westphalia. They offer 'academic apprenticeship' with hands on experience at their facility combined with a technical education in the university. Being located in a small town has not affected the company whose annual sales reach more than € 3 billion. There are a few things old fashioned in the way these family owned companies run their business. One of them is their approach to 'borrowings or debt', it's simple to define their approach to debt 'They are against it'. Their view is not to maximize the short term profits but to prepare for long term benefits and sustainability. Though this might be old fashioned, it definitely keeps the company healthy.

Market structure

The industry has developed a pyramid like structure with 3 fundamentally different quality and price segments.

- Premium segment: with 10-30 % market share, components are generally imported and then assembled locally, product design with the best features satisfying international standards and high price range. This segment is generally dominated by the German mittelstand.
- Mid-range segment: 30-40 % market share, products with similar design that of the premium segment but with less features, higher localization and only the most important components are imported. 30-50 % cost advantage as compared to premium price segment.
- Low cost segment: 30-60 % market share, less innovation in design and limited lifespan. This range has prices as less as 30-50 % of the mid-range-

segment. This segment is totally dominated by volume requirements and local manufacturers.

Alternatives for future sustainability

There is no doubt that the German mittelstand has thru out the world enjoyed success. But where do they go on from here, what does the future look like? With markets in the developed countries remaining saturated and rising challenges from the local players in developing markets it will be increasingly difficult to maintain high growth rates in the future.

Apart from strengthening or defending their market share in their specialized product category, the German mittelstand has a few options for future sustainability and growth.

- Deeper penetration into larger emerging markets like China and India. China and India are large countries, in order to tap the complete potential of these economies the presence should not be limited to Ahmedabad-Mumbai-Bangalore corridor in case of India and the Guangdong-Jiangsu corridor for China. Increasing the presence in other rapidly developing regions is definitely one of the key factors for sustainable growth.
- Acquisition or Joint Venture: Forming a partnership of acquisition with a local company from mid-range segment can be very progressive option in order to consolidate their position in the high growth mid-range segment. However this is a high risk zone as well, as the German mittelstand with western mindsets will find it difficult to adapt to the business models and competition from the local players. Another important factor is the time. The further the local manufacturers progress the larger their cost advantages and higher will be the hurdles needed to overcome in order to catch up.

Recent Trends

To solidify their place in these developing markets, the most recent trends that are catching up are the concepts of 'frugal engineering' and 'reverse innovation'.

- **Frugal Engineering:** It simply means reducing the complexities, getting rid of the nonessential

features of the products, hence reducing the cost of the product itself and consequently the cost of manufacturing. In this way, the firms do not compromise on basic quality of their product by procuring cheaper raw materials and resources. So the German Mittelstand can hold on to their 'niche' and still manage to lower the costs considerably.

■ **Reverse innovation:** The reverse innovation process begins by focusing on needs and requirements of the consumer from countries like India and China. Then these products are developed and sold at low costs in these countries itself. And then by upgrading them slightly they are sold in

the western or developed markets at low costs, hence creating a new market and new uses of these innovations.

Conclusion:

You can study the Mittelstand model on an intellectual level, you can even understand it. But you can not emulate it. Even the Germans themselves are somewhat struggling to emulate the success of the Mittelstand in eastern regions Germany.

Photographs: Beckhoff Automation, Teaser Fotolia ■

Statement

With our PC Control technology based on German engineering we are very successful in different market segments worldwide. We always try to be state of the art in our field in order to use the most advanced developments in the hardware and software in our products. However, the core of our innovation culture is simply people: Nobody here is afraid to speak openly about their ideas whenever and wherever. We cultivate a truly friendly development atmosphere. And ultimately, we want to develop technology to serve the needs of people, to use a big phrase. With automation technology, we want to produce products more quickly, more efficiently and less expensively, with greater efficiency in the use of resources. Especially, in conjunction with Industry 4.0 PC control is now successful in taking full advantage of the convergence of IT and automation.

*Hans Beckhoff,
Owner and Managing Director,
Beckhoff Automation*



Employing, but also empowering through technical training

With more than 61 % people in the working age group, Laos doesn't have demographic problem, the problem is lack of trained engineers, especially measurement engineers. Due to inadequate education system and infrastructural benefits not reaching the far corners of this south east asian country the development of the population remains patchy. Endress+Hauser is doing its bit to overcome this deficit, by helping people to help themselves.

Since the economy opened up 25 years ago, Laos has been progressing. The per capita income of majority of the population is increasing, the social middle class is growing. But the development of the country is still patchy due to uneven sharing of the growing economy and infrastructural benefits but mainly due to inadequate education system.

In the mountainous north of the country, international mining corporations are tapping into the rich deposits of copper, gold and silver, processing the excavated ores on site. The mines and plants also offer the local population work and a livelihood. "But it's almost impossible for our customers to find the required specialists locally," reports Rolf Leber, Head of Endress+Hauser's Asian-Pacific Support Center that facilitates sales in the region.

But not for long, things are set to change. At the Lao-German Technical School in the capital city, Vientiane, the country's first instrumentation specialists are soon to be trained. The project being co-financed by the 'develoPPP.de' program of the German Federal Ministry of Economic Cooperation and Development, has also got extensive support from the private players in the region. For example



About

Company name: Endress+Hauser AG

Headquarters: Reinach, Switzerland

Turnover: € 2 billion

Employees: 12,400 worldwide

Products: Flow, level, pressure, temperature and analysis measurement instruments, services and solutions for process automation





Endress+Hauser training rig provided to the Lao-German Technical School

Endress+Hauser, actively supporting the establishment of a training center with its know-how, material and manpower. The training program for instrumentation is designed for web-based training course and tutorials at the Application training center in Reinach Switzerland. Apart from tutorial and conventional

The training program will demonstrate our corporate responsibility

teaching materials, the company is providing a training rig which allows processes to be simulated, enabling first-hand experience of operating the modern measurement instrumentation.

Sign of responsibility

Endress+Hauser is involved in the project as a partner of the development organization, 'sequa', which is jointly supported by Germany's private sector and the German Federal Enterprise for International Cooperation. A € 200,000 of development assistance funding is flowing into the project. However, the actual costs are far higher: Endress+Hauser is contributing an additional € 250,000 in goods and labor. "We see this as a contribution to the country's development" says Rolf Leber.

Interest in the new qualification is high, and so are the requirements. Applicants – usually with basic training as an electrician – have to submit a project with their application and take a selection test. The first course is already under way. The classroom is still virtual, with learning and practice carried out only on computers. All web-based training as well as teaching materials have been translated into the national language 'Laotian'. Soon the first students should be able to gain practical experience on the training rig. Endress+Hauser has trained five Laotian specialists as course tutors.

Endress+Hauser will follow the project closely, particularly in the early stages. But the principle objective is very clearly to help people help themselves. The Lao-German Technical School is to take over complete responsibility for the training program by 2016. By then the planned qualification as Junior Instrumentation Engineer should be state-recognized. Rolf Leber is already looking forward to the first graduates: "That will be a really special moment – not only for Laos, but also for Endress+Hauser!"

The program by the German Federal Ministry for Economic Cooperation and Development specifically aims to create development partnerships with the private sector.

Photographs: *teaser fotolia, others Endress+Hauser*

www.endress.com

RFID system and sensors offer considerable advantages in an assembly plant for injector nozzles

Achim Weber

Special machine builders Sonplas developed and built two machines for assembling high-precision injector nozzles. To meet customer requirements in terms of precision and repetition accuracy, the individual nozzles and their components must be identified accurately in the process. For this Sonplas uses Turck's RFID system and proximity switches which detect aluminum workpiece carriers on the conveyor belt.

Injector nozzles for injection systems basically consist of a nozzle tip, the needle with a spring seat, a spring, sleeve and a type of cover that encloses the entire unit. Mounting them is a complex process since components of each individual injector nozzle are all separate parts. This makes each injector unique. The needle or spring of one nozzle cannot simply be refitted on another nozzle without a loss in quality. Many nozzle components, from the spring seat to the spring, right through to the individual ground needle, have to be measured precisely and matched with each other. The assembly of these unique nozzle products is fully automated on the conveyor belt.

This type of assembly is made possible by special machine builders such as Sonplas GmbH from Straubing. The company specializes in assembly and testing equipment for car parts suppliers. Based in Lower Bavaria they have made a name for themselves in the sector, with machines that assemble or test supplied parts through which fuel later flows in the vehicle. Many international car parts suppliers appreciate this expertise with almost 200 employees with this know-how.

Achim Weber is a sales specialist at Turck, Mülheim, Germany



About

Company name: Hans Turck GmbH & Co. KG

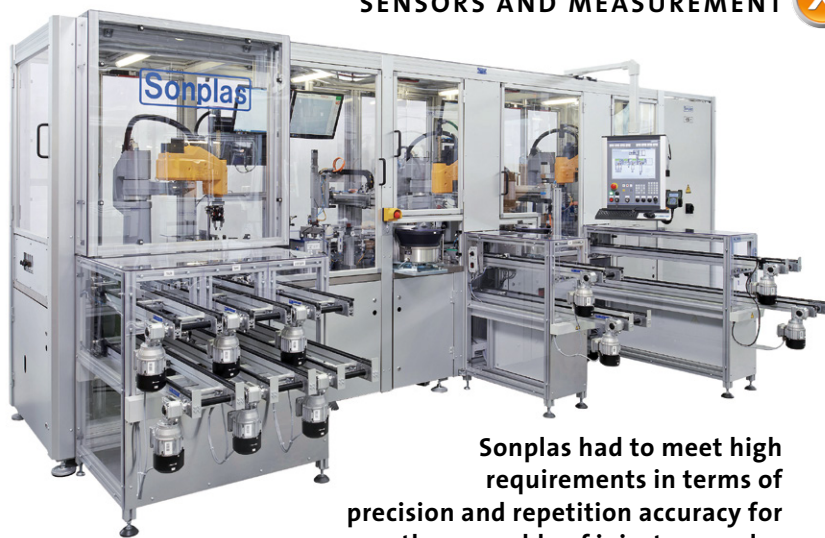
Headquarters: Mülheim an der Ruhr, Germany

Turnover: € 470 m (2014) Group

Employees: 3 500 (2014)

Products: sensor, fieldbus, connection and interface technology, human-machine interfaces (HMI), RFID systems for factory and process automation

RFID read/write heads and uprox+ proximity switches are fitted at each individual station of the assembly line; the tag is fitted directly in the aluminum workpiece carrier



Sonplas had to meet high requirements in terms of precision and repetition accuracy for the assembly of injector nozzles

At the end of 2012 Sonplas won the order to design and build two machines for assembling injector nozzles. “The special feature of these machines was the fact that measuring was carried out in front of each assembly station and then the workpiece machined according to this measurement,” Sonplas sales manager Hermann Pankofer explains.

Assembly process requires traceability

The complex coordination of measurements and assembly processes requires the relevant measuring data to be tracked and assigned uniquely. “Each component is tracked, not only the injector nozzle in its entirety, but also each individual part itself,” says project manager Manuel Lehner. In order to assign the components to a nozzle, they move on the workpiece carrier of the nozzle. The workpiece carrier specially optimized for the plant provides a separate place for each required injector component. RFID readers read the tags that are fitted on each individual workpiece carrier.

For the assembly machines Sonplas looked for an RFID system that can be mounted compactly in the machine. “The problem was not so much the large read/write distances involved but the fact that the tag had to be fitted directly on the aluminum of the workpiece carrier,” Lehner describes. The ideal tag could be found in the extensive portfolio of the Turck RFID system: Turck’s TW-Q25L12,5-M-B128 tag – not much larger than a thumb nail – meets all the requirements. Eleven TN-M18-H1147 read/write heads in an M18 threaded barrel are fitted in each of the two machines in order to identify the workpiece carriers.

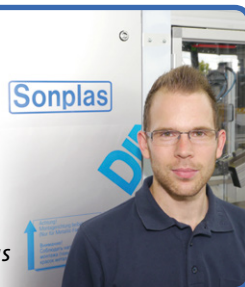
Long switching distance on aluminum

Sonplas looked for inductive sensors as initiators in order to detect the material carriers on the belt and to check the correct position of the workpiece carriers for the tags to be read. This required a compact switch with a long switching distance on aluminum. Only an uprox+ sensor was ultimately able to meet this set of requirements. Other proximity switches do

not manage to guarantee such a large switching on aluminum with the same level of reliability. The 4 mm switching distance of the NI4U-EG08-AP6X used is considerable for a sensor in the M8 housing – and is the same for all metals. Sonplas fitted 56 sensors in each of the two assembly machines. They

The fact that the Turck sensor detects aluminum so well was a major benefit for us. This saved us having to implement any labor-intensive alternative solutions.

Manuel Lehner, Sonplas



detect the workpiece carrier on the conveyor belt, control stop and positioning operations, are used for detecting jams and initiate read/write operations.

Communication via Profibus

The test data at the individual measuring stations is linked with the ID number on the tag via the RFID read/write heads and stored in a database. The data reaches the database of the machine via Profibus using Turck’s BL67 gateway. “The challenge with this machine was to maintain a tolerance below one micrometer while coordinating the high-precision measurements and the equally precise assembly operations. This also had to be repeatable in a continuously running production plant. Everything is coordinated here, each cog interlocking with another one,” project manager Lehner sums up the particular requirements of the assembly plant and adds: “Here we must be able to rely on each component installed – and naturally on each sensor – one hundred percent.”

www.turck.com

Better quality by improving traceability

The globalization of technology is influencing the wave of intelligent innovation. Mostly from Germany and is sweeping the entire industrialised world. China obviously is deeply affected. Currently, the chinese enterprises are faced by two problems: first, product upgrading; second, transforming the industry processes in order to meet the international market demands.

In the field of industrial sensors, the manufacturers are constantly working on product upgrading by developing better quality, precision and improved protection rating of the products. This improves the usability for their clients and increases the scope of applications even under harsh conditions. To meet the challenges from the markets, strategies that provide the integrated solutions are gaining more

traction. As is the case with Sensopart, a German family owned company, located in Gottenheim. Providing integrated solutions and customer service backed by the strength of skill and experience of more than 20 years. This helps their clients achieve higher efficiency, optimized utilisation of resources and minimized production cost.

Considering the working of German mittelstand company, a significant investment of resources on R&D to improve product performance is obvious. But also important is focusing on the next phase of technological innovation i.e. Industry 4.0. Internet of Things being one of the intelligent core technologies of Industry 4.0. Manufacturers are all required to add 2D codes on their products, to track, control and plan each part in production through a way which can be identified by machines. The reaction to Industry 4.0 is inconsistent from each industry. There also is a large gap between the markets of various industries. Therefore decisions must be made by each enterprise on how to place itself in the market and how to achieve personalized development based on its own



About


Company name: SensoPart Industriesensorik GmbH

Headquarters: Gottenheim, Germany

Turnover: \$ 23 million

Products: Optoelectronic sensors particularly laser sensors, colour sensors, distance sensors, and vision sensors, code readers, fiber-optic sensors, ultrasonic inductive and capacitive sensors

*SN: 4187002
Quality: B*



characteristics. A large number of industries want to improve the process while another significant number of them want to improve the product itself. For companies looking to improve the product quality system, SensoPart induced a high performance code reader - the Visor code reader. It not only can adapt to high-speed product lines, but also achieve approximately 100% code-reading rate under limited engraving conditions.

Application in food and beverage industry

Since the establishment of food safety traceability system by EU in 1997, other countries successively made appropriate initiatives in accordance with their own conditions. To cope with quality safety traceability trade barriers set by Europe, America, and other countries for imported food and requirements for life quality security from consumer group in these areas, China actively introduces food safety traceability systems. A world-famous drinking water supplier prints 2D codes onto their products to achieve the product quality traceability system. By reading information in the 2D code, inquiry of information such as water source, ID number, production batch, product specifications can be achieved.

The high volume of production and packaging at higher speed is a prominent feature of food & beverage industry worldwide, therefore ordinary code readers cannot fulfil its requirements for speed. With its unique functional advantages, SensoPart's Visor code reader provides a rapid, flexible, stable and intelligent solution. It has multiple and selectable resolutions; therefore, different resolution can be selected to meet different requirements of reading speed, without affecting the reading rate. In addition, it also has basic functions of ordinary object recognition vision sensors, e.g., pattern contrast, grayscale, contrast ratio. Therefore, the Visor code reader not only can read various of 1D and 2D codes, but also detect different characteristics of objects.

Application in electronics industry

An essential element of the quality traceability system is code reading. The code reader reads out information in barcodes to collect product informa-

tion and to realize the tracing of the products based on collected information. The best example being the built-in lithium batteries of today's iPhones and iPads. The built-in lithium batteries are all manufactured by the best-known electronics manufacturer in the world. In order to achieve quality control for lithium batteries, they print multiple 2D codes on the surface of each lithium battery with laser marking machines. Product quality can be effectively traced in this way. However, due to technological limitations and the inconsistency in size and quality the laser engraved 2D codes cause some difficulty in reading the code. Engineers of this company tried using code readers from various manufacturers but were unable to achieve the desired reading rate. After early communication, the customer decided to try SensoPart's Visor code reader. With its humanized operation interface, easy operation and high precision, a desirable reading performance in terms of quality and rate was achieved.

Application in the automotive industry

The automotive industry has always been the biggest customer for high tech, highly intelligent systems. In the past, high-load works such as installation check were assigned to workers. Today, intelligent systems not only bring breathing space for workers, but also increase the accuracy of auto parts, save time and cost. A complete car consists of tens of thousands of parts, and personalized production is simply a fantasy without product identification setting and all-intelligence tracing and control.

A famous German auto parts supplier was faced with such problems for a long time: it cannot be guaranteed that all 2D code qualities reach the same high standard due to production processes, leading to impact on consequent code reading as the 2D code reading rate of ordinary code readers on these codes is not very good and unstable. This problem has been effectively improved by using the Visor code reader from SensoPart, which attributed to the employment of high-grade processing chip and logic compensation algorithm.

Photographs: *SensoPart*

www.sensopart.com

Innovative torque measurement applications in motor test benches

Michael Guckes

Measuring torque, rotational speed, angle of rotation and the quantities derived from these variables is assuming an ever greater role in the design of new test benches for use in industrial environments. In addition to higher requirements for accuracy and speed, further determining criteria for the selection include options for automation and efficient operation. How can all of this be achieved?

Focusing on cutting the carbon footprint and hence the costs, the Engine manufacturers and drive train engineers are facing a real challenge: To enhance the performance of current and future engines such that they offer better fuel efficiencies in order to lead over their competition and satisfy customer expectations. In addition, efficient and flexible testing methods are expected to be provided. Preparing and conducting tests at different times and assigning them to different organizational units allows for efficiency improvement by a factor of 10.

Author: Michael Guckes, Product and Application Manager, Industrial Amplifiers, Hottinger Baldwin Messtechnik GmbH, Germany



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One of the requirements of these tests is that they have to be accomplished in short period of time. Intelligent sensors and amplifier systems make this possible. Precise measured values and accuracy of the torque flanges combined with dynamics and high rotational speed are other important requirements of the system. At the same time, the amplifier and the test bench control system must be capable of processing the measurement data with high resolution and in real time, making them available for analysis and storage.

Ideally, an amplifier system combines all these functions in a single device, for example PMX from HBM. Such systems are flexibly fitted with measurement and output channels for use in testing phase

and also as measurement and automation systems in production phase. Depending on the level of automation, either analog or Ethernet-based fieldbus interfaces can be used in real time.

Torque sensor design

Modern torque transducers work with high sample rates to be able to meet the high requirements of the tests. Output signals such as torque, rotational speed and angle of rotation enable quantities such as power and energy conversion efficiency to be calculated in the downstream automation system.

The measurement signals are converted into frequency signals to ensure noise-free transmission.

**02****03**

01 Hbm's comprehensive range of torque transducers

02 PMX measuring amplifier system provides simple integration in industrial automation systems

03 Efficient service through built-in diagnostics and fault memory



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This is a decisive advantage in harsh ambient conditions, as even larger engines or frequency inverters with their electromagnetic fields do not adversely affect measurement quality. The most important metrological properties of torque sensors include: accuracy class, sensitivity tolerance, temperature stability, linearity deviation and hysteresis. However, the user should also take into account the application areas and load limits: Rotational speed limits, permissible oscillation bandwidths, lateral and longitudinal limit forces, maximum temperatures

Enhancing the performance of torque measurement

Plug-in modules for frequency measurements such as the PX460 work with an accuracy of 0.01 % enable up to four torque sensors to be operated, even in mixed operation. A whole series of internal computing channels has been specially designed for operation and use of torque transducers. They work in real time, exactly like the measurement channels, at a calculation rate of 50 microseconds. High-precision calibration equipment is used to capture the behavior of the sensor under various load cases, for example, operation with dynamic right or left rotation. Besides the 100 % measuring range also an accurate measurement in partial ranges is needed, e.g. to capture the residual breaking torque.

Other important functions include parallel, independent processing of raw measurement values, for example filtering. Special filter for testing combustion engines: Due to the work cycle with compression and expansion in the individual cylinders and the corresponding fluctuations in combustion, the torque generated by an engine exhibits highly dynamic behavior. In many measurement systems it appears as “noise”. This can be eliminated by using a

Casma filter. The Casma filter achieves excellent stabilization of torque measurements in correlation with the engine speed, which also varies.

Fieldbus based measuring technology

The spectrum of measurement signals to be acquired, ranges from simple signals, acquired at a low frequency, for example a slowly changing temperature value, to complex measurement data that have to be simultaneously measured at a high measurement frequency, for example torque signals, with angle of rotation signals and rotational speeds that must be acquired synchronously. In both cases, a decisive factor in addition to the robust and precise sensors, is measured value acquisition. Both should lie within the same accuracy class and be at least 0.1 % or rather 0.01 %.

The sample rate of the signals is just as important as measurement accuracy. It should be high enough so that fast and small partial changes can still be reliably resolved and displayed. To ensure adequate peak value acquisition, calculation speed and control quality, all measurement and calculation channels must be sampled in parallel with at least 20 kHz, which is equivalent to a measurement and calculation rate of 50 μ s.

PC based system or embedded system ?

Embedded systems are used when high real time capability is required. The volume of resulting data is relatively low here, however, it is very time-critical. Control operations cannot be executed on PC-based systems in real time. The resources here are distributed evenly across all components so that control tasks sometimes need to “wait” before they can be executed. The cycle times here therefore are around

CODESYS web and target visualization via Ethernet



PMX, the modular CODESYS PLC controller with integrated visualization



Process control through on-site web visualization



Simple remote maintenance with smart phone and micro or HTML5 browser



Transparent monitoring from plant control room or machine PC

50 ms or more, which is totally insufficient for rapid and secure test bench control. Embedded systems can demonstrate their full strengths here as their resources are fully reserved for the control tasks via the internal CPU.

Two distinctions have to be made for data storage in the test bench sector. If it is only necessary to log or save test end results, this can be implemented by the embedded system itself. But, if larger data volumes and raw data need to be stored, PC systems have a clear advantage.

Conclusions

Modern and powerful torque sensors combined with embedded systems with open communication interfaces are equally suitable for use in high-quality measurement and regulation tasks.

The general trend that can be seen here is a process of convergence in classic measurement technology

systems and automation solutions. In addition to controlling the measurement sequences, such modern systems also enable machines to be controlled and modern, future-oriented test benches to be implemented.

Photographs: *Hbm*

www.hbm.com



About

Company name: Hottinger Baldwin Messtechnik GmbH

Headquarters: Darmstadt, Germany

Employees: 1 700 worldwide

Products: Force sensors, torque sensors, displacement sensors, load cells, optical fiber sensors, data acquisition systems and software, signal conditioners

One click saves 50 % cost of sensors for Valensina



About

Company name: Autosen GmbH

Brands: Online sales and trading in sensor technology

Headquarters: Essen, Germany

Products: inductive proximity switches and photoelectric sensors on the actual needs of the industry

Every day, up to 500,000 litres of high quality fruit juice can be filled on five lines in the Valensina's Mönchengladbach plant. As a supplier to the major trade chains, the Valensina group has largely automated its production site in the headquarters, to meet the high requirements on freshness and delivery times. The required sensors are purchased via the internet which reduces costs and simplifies logistics.

When one of your major sales points are the food retailers, availability and visibility of the products is extremely important for your brand and you just cannot afford a plant downtime. The logistics chain in fruit juice production, expanding from harvesting, squeezing, packaging up to the sales counter, is tightly timed. To guarantee optimal freshness and the maximum best before date, Valensina's juice packages usually go directly from Mönchengladbach-Giesenkirchen to the refrigerators in the stores, without any delays and within 24 hours of the order

receipt. A small buffer stock in the neighbouring town Korschenbroich is used to meet peaks in production and demand. The goal is to reduce delivery times to ensure maximum freshness.

Every day, up to 500,000 litres of high-quality fruit juice can be filled on five lines in the plant in Mönchengladbach. The juice, which is freshly squeezed three times a week, is mainly exported to Europe, whereas the direct fruit juice, filled daily and cooled, goes mostly to the German supermarkets. The especially careful pasteurisation and permanent cooling of the juice ensures a fresh taste experience. Hygiene is the highest priority in all production processes, also because it is important for the best before date. In addition to two conventional filling lines, they also operate three sterile ultra-clean lines.

High hygienic requirements

Due to the high hygienic requirements the sensors installed in the plant are put to the test. Juice production on the ultra-clean systems starts from Sunday evening to Wednesday morning without interruption. Then the installations are cleaned by means of chlorinated cleaning agents and foam nozzles, at an operating pressure of 25 bar. The conventional installations are cleaned daily. This

means that the inductive and photoelectric sensors that are developed to detect and transmit information reliably and precisely, are exposed to chemicals and moisture unfavourable conditions for the devices.

Wear and tear in sensor technology

For the harsh and wet production environment, sensors with a high protection rating and special equipment for the food industry are chosen. Devices such as the AO001 diffuse reflection sensor from the supplier autosen featuring a flush front lens made of resistant and shatterproof plastic for residue-free cleaning, stainless steel housing with the protection rating IP68/IP69K and double seals. The robust design reduces the risk of defects, nevertheless they cannot be entirely excluded. "To reduce downtime to a minimum in production processes, sensors must be easily replaceable if need be", says Ernst Peter Froitzheim, technical leader of the FSP Frischsaft Frische Produktions GmbH, operator of the production installations at Valensina's facility. The foreman is increasingly using Autosen products which he can order online 24/7 and that make a spare parts stock almost redundant. "Significantly easier and faster than via the wholesaler", says Froitzheim who also has to keep economic efficiency in mind. He estimates the savings to about half of the usual price, thanks to switching over to Autosen who dispenses with the conventional sales tools, commissions and passes the cost advantages on to the customers. So far, Froitzheim has replaced about 15 percent of the sensors, each including connector and cable.

Autosen positioned itself as a quality supplier at the interface between manufacturer and user. Under its own label the company offers a range of thoroughly selected and tested inductive as well as photoelectric sensors of established suppliers. A routine test is carried out on all sensors before being dispatched. Only those who meet the quality requirements will get the Autosen quality seal and will be distributed under the Autosen label – on notably better terms.

Optimisation through automation

In the past decades Valensina has increasingly invested in the production installations, and in 2004 the production was completely switched over to fully automated operation which led to a considerable increase in the economic efficiency. Since handling errors are virtually excluded, significant optimisation

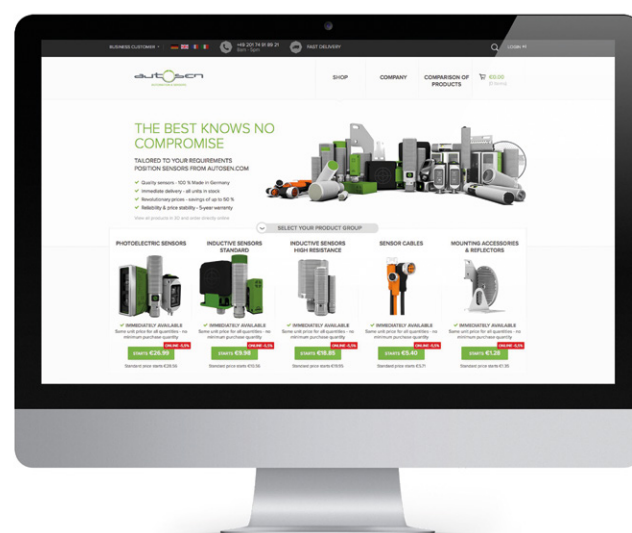
potentials were created through automation. The manually operated butterfly valves were replaced by automatic two-way ones through which the juice and the cleaning agent run separately from each other without mixing. All plant states are permanently detected and monitored, all operations are automatically controlled and documented.

For each of these processes step sensors are required. Froitzheim estimates that they use hundreds of sensors in their plants, about 70 to 80 % in standard applications such as the packaging and picking area. Here, simple devices with plastic housings are used that have the same functions like their more robust counterparts, but are economically even more efficient. Also in this area, Valensina plans to switch over to Autosen.

In conclusion, the logistic and financial costs for the sensors are considerably reduced thanks to the online procurement. With significant savings of up to 50 % per sensor and several hundred devices used daily, Valensina can achieve considerable cost advantages without having to make concessions with regard to the sensors' lifetime. Moreover, in the medium-term the spare parts stock can be reduced so that less capital is tied up. The procurement process is simple and requires no specialist knowledge thanks to its intuitive handling. Moreover, "compatibility is fully guaranteed" says the technical leader who has now even equipped the highlight of the production – an Italian ultra-clean filling line put into operation in 2014 – with green glimmering sensors from Autosen.

Photographs: Autosen GmbH, Valensina GmbH

www.autosen.com



Autosen online shop for sensors

More analysis gives faster and better decision making

Brian Phillippi

In USA alone, there are 2.5 million miles of pipeline, with only 137 inspectors and huge amounts of data collected. This leaves 80 % of the time for data acquisition and only a mere 20 % of the time for data analysis. Thats 80 % of your highly trained analyst time spent on taking measurements and entering the data. What is required here, is a new way to approach process controls by integrating complex, disparate systems that improve data collection and analysis this also provides safer operational environment and improved efficiency.

Author: Brian Phillippi,
Product Marketing Manager,
National Instruments, Texas, USA

Process control is an expansive topic that covers a wide range of applications, from drilling techniques like hydraulic fracturing to refineries. One common consideration prevalent across all applications is a critical focus on improving HSE (Health, Safety and Environmental). Some recent illustrations of this trend include pressures to increase machine safety, optimize more operational efficiency, and implement remote monitoring for operator safety.

One major caveat with the increasing trend of health, safety and environment is that it makes applications increasingly complex. Process control can be done quite simply through the use of a traditional controller such as a PLC because it provides an easy to use, reliable programming paradigm. Where PLCs fall short is in the implementation of advanced functionality, which is required by the HSE trend.

Regarding advanced functionality, while different control packages may offer high functionality, but at the same time they lack in flexibility and or I/O speed. Alternatively, a control package may offer high I/O speed but limited functionality from a programming perspective. Consider the subject of improving efficiency. There are many updates that can help improve the efficiency of a machine. Updates could include:



- Adopting high-speed data collection and analysis to improve processes.
- Adding power quality monitoring to improve overall plant efficiency.
- Incorporating condition monitoring to ensure that machines operate with maximum uptime.

Complexities in high speed data acquisition for condition monitoring

Condition monitoring requires high-speed data acquisition and processing to gain insight into the machine. Because PLCs are not equipped for this level of acquisition and processing another solution must be incorporated. This leaves users with the following three key options:

- Use a route-based system with periodical measuring of each machine to detect anomalies.
- Bring in a specialist vendor in condition monitoring and stack on an additional system to the PLC.
- Customized solution with control and condition monitoring integrated into one.

As a standalone solution, all options listed above can work well depending on users' needs. However, for complex applications the act of integration adds artificial complexity to an already complex task. As a consequence, organizations are left to fit pieces of a puzzle together that were never designed to 'fit' together. Fortunately, merging technologies and adding functionality does not need to be so complex.

The complexity added by integrating new solutions into existing systems is intensified when incorporating multiple solutions. This weaves a tangled web of new and existing technologies. Even more, all of this creates additional cost. Other challenges arise for both tack-on and custom solutions, such as adding new features within a solution, adapting to new or legacy equipment or paying a third-party vendor to add the functionality. Even if the original design was custom, it soon becomes easier to just tack-on a solution to get the job done immediately, and for the short term, it often is. In the age of big data and the Industrial Internet of Things (IIOT), the traditional approach of tacking on a new 'widget' is no longer sufficient. Each piece of machinery can generate enormous amounts of data that need to be analyzed and communicated between machines to improve the long-term throughput and efficiency of plants.

01 NI cRIO 9014, Real-Time Controller

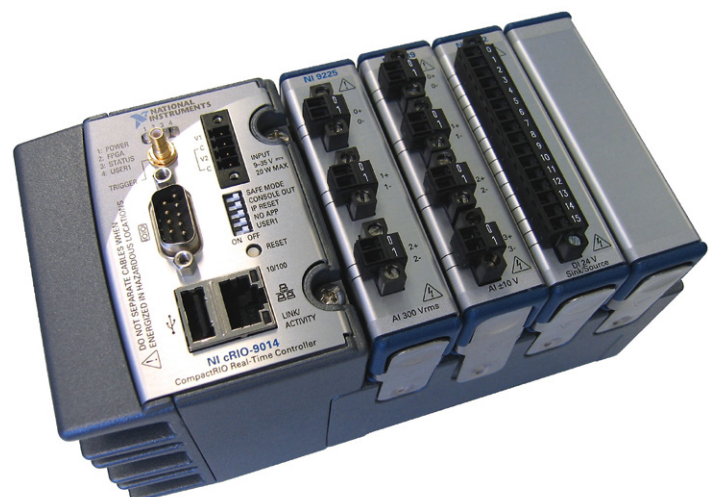
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The route-based solutions unfortunately present a more dire situation. In the USA alone there are over 2.5 million miles of pipeline. Federal law mandates that pipe is inspected every five years. With only 137 inspectors on staff, each inspector would need to inspect more than 3,600 miles per year. The data they collect may not directly integrate into the enterprise, which makes real-time decision making nearly impossible. On an average, 80 % of their highly-trained analysts' time was being spent taking measurements and entering data, while only 20 % of their time was available to analyze data. This problem goes far beyond implementing condition monitoring to make processes more efficient. Integrating complex, disparate systems can also improve data collection and analysis, creating safer operations and increasing the general efficiency of workers.

A more balanced and practical solution

Fortunately, there is a new way to approach process control that offers the best of a commercial solution combined with custom design. This solution provides the low level customization of reliable custom circuit design. Additionally, it features an agnostic hardware platform that is independent of the equipment provider. Platforms enable the same hardware technology to be applied to nearly every aspect of an application. What makes the platform concept so powerful is that it eliminates a lot of redundant work and unnecessary complexity. By using a hardware platform hardware issues can be limited since using the same architecture throughout a system provides the best interoperability. As a result, each new chal-





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challenge becomes a software issue, which enables faster design cycles and provides improved field upgradability. The same principle can be applied from a software perspective when a hardware platform is combined with powerful software to create a unified solution. Now the challenge becomes neither hardware nor software focused, but instead about the application itself. The utility company mentioned above used this platform to move to an integrated, automated system. By doing so, they reversed the trend with respect to operators' time so they can spend 80 % of their time analyzing data and only 20 % performing manual inspections. They were able to realize the IIoT by managing a huge network of machines and generating massive amounts of data. Additionally, they were able to remove their operators from a hazardous environment so they can analyze data and make better business decisions, faster.

Re-programmable chip equivalent to design customization

Platforms are proven to simplify the complexity of system design while increasing efficiency. One such platform is available with the NI CompactRIO software-designed controller, which is based on the NI LabView reconfigurable I/O (RIO) architecture. This architecture tightly integrates a real-time processor with a user-programmable FPGA (Field programmable gate array) and modular I/O and is programmed with NI LabView system design software. The FPGA is a reconfigurable chip that makes it possible for users to embed their algorithms into

hardware similar to custom design. Users can reprogram the FPGA through high-level software to iterate on their design much more quickly than a custom design. This means users can provide firmware updates to the field when a feature needs to be added or revised. Additionally, by using an FPGA users can run with higher levels of reliability to develop a safer solution since many of the algorithms and logic can be embedded into hardware. By adopting a reconfigurable architecture users can benefit from a platform that is powerful and flexible enough to handle any application from condition monitoring to complex model-based control and everything in between.

Understanding the solution in parts

The NI LabView reconfigurable I/O (RIO) architecture is an integral part of the NI graphical system design platform. A modern approach to designing, prototyping, and deploying monitoring and control systems, graphical system design combines the open NI LabView graphical programming environment with commercial off-the-shelf (COTS) hardware to dramatically simplify development, which results in higher-quality designs with the ability to incorporate custom design.

Architecture

The NI LabView RIO architecture is based on four components: a processor, a reconfigurable field-programmable gate array (FPGA), modular I/O hardware, and graphical design software. Combined, these components give you the ability to rapidly create custom hardware circuitry with high-performance I/O and unprecedented flexibility in system timing control.

Processor

The processor is used to deploy code to communicate with other processing units such as the FPGA, interface with peripherals, log data, and run applications. NI offers RIO hardware systems in a variety of form factors ranging from high-performance multi-core systems with symmetric multiprocessing (SMP) running the Microsoft Windows OS to small, real-time embedded systems such as NI single-Board RIO and CompactRIO.



About

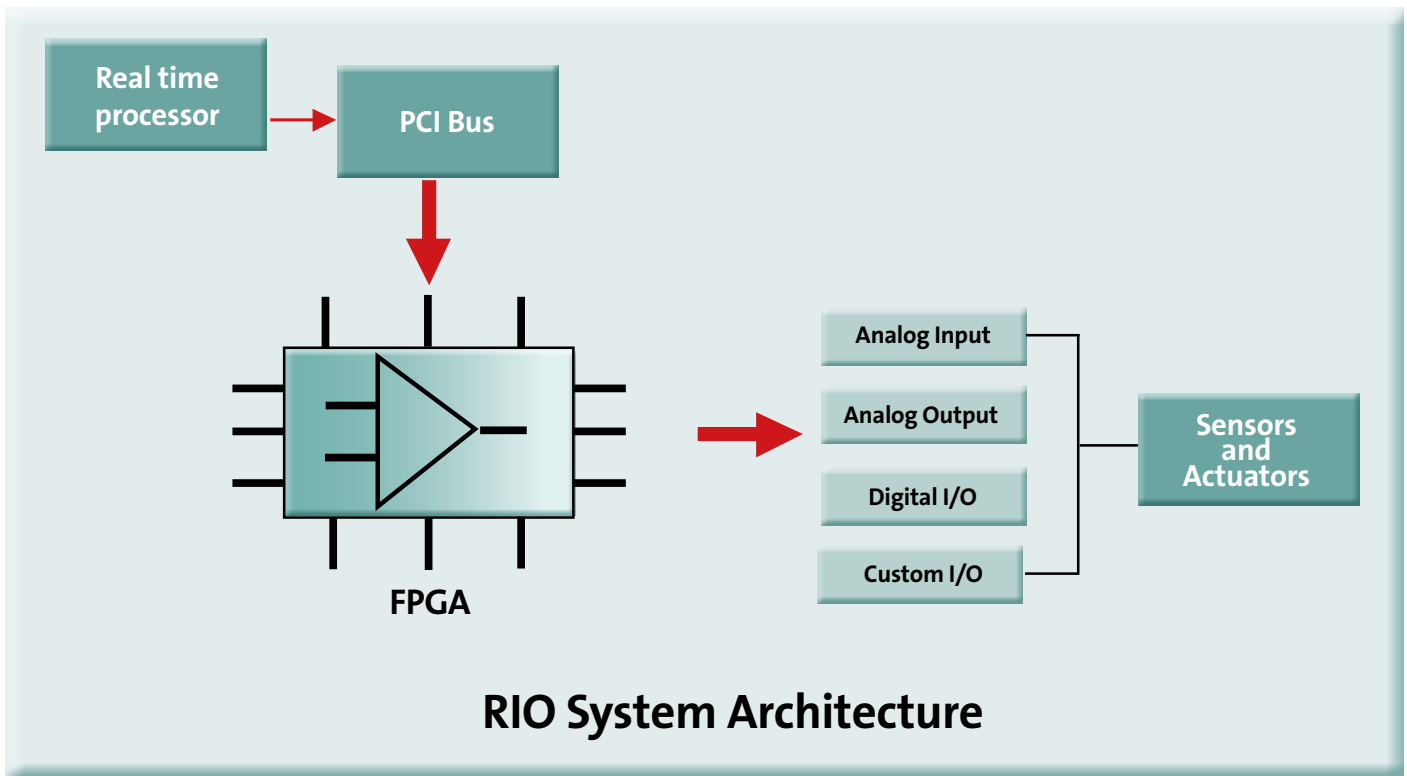
Company name: National Instruments

Headquarters: Austin, Texas, USA

Turnover: \$ 1.24 billion

Employees: 7,100 worldwide

Products: Data acquisition systems, Embedded control and monitoring hardware, industrial communication busses, instrumentation and control, hardware platform, programming environments and application software



02 RIO system architecture

FPGA (Field programmable gate array)

The reconfigurable FPGA is the core of the RIO hardware system architecture. It is used to offload intensive tasks from the processor and provide deterministic execution with extremely high throughput. The FPGA is directly connected to the I/O modules for high-performance access to the I/O circuitry of each module and unlimited timing, triggering, and synchronization flexibility. Because each module is connected directly to the FPGA rather than through a bus, you experience almost no control latency for system response compared to other industrial controllers.

Because of the FPGA speed, RIO hardware is frequently used to create controller systems that incorporate high-speed buffered I/O, very fast control loops, or custom signal filtering. For instance, using the FPGA, a single CompactRIO chassis can execute more than 20 analog proportional integral derivative (PID) control loops simultaneously at a rate of 100 kHz. Additionally, because the FPGA runs all code in hardware, it provides the high reliability and determinism that is ideal for hardware-based interlocks, custom timing and triggering, or the elimination of the custom circuitry normally required with custom sensors.

Modular I/O

NI C Series I/O modules contain isolation, conversion circuitry, signal conditioning, and built-in connectivity for direct connection to industrial sensors/actuators. By offering a variety of wiring options and integrating the connector junction box into the modules, a RIO system significantly reduces space requirements and field-wiring costs. Additionally, with the NI cRIO-9951 CompactRIO module development kit, one can develop custom modules to meet application-specific needs.

LabView development platform

LabView is a complete development solution for the graphical system design of embedded applications to efficiently design, prototype and deploy the system on a single software platform. With this system design software, one can develop applications for the processor, synthesize your own custom measurement circuitry on the FPGA, and then seamlessly integrate the two with modular I/O to create a complete RIO solution.

Photographs: *National Instruments*

www.ni.com

PC-based control technology for special-purpose machines

Robert Urech

Vehicle steering column shafts are very sensitive, yet important, components of automotive steering systems. Accordingly, high demands are placed on the production of these products.

LCA Automation AG specializes in these types of assembly plants, and values the openness and flexibility of PC-based control and drive technology from Beckhoff.

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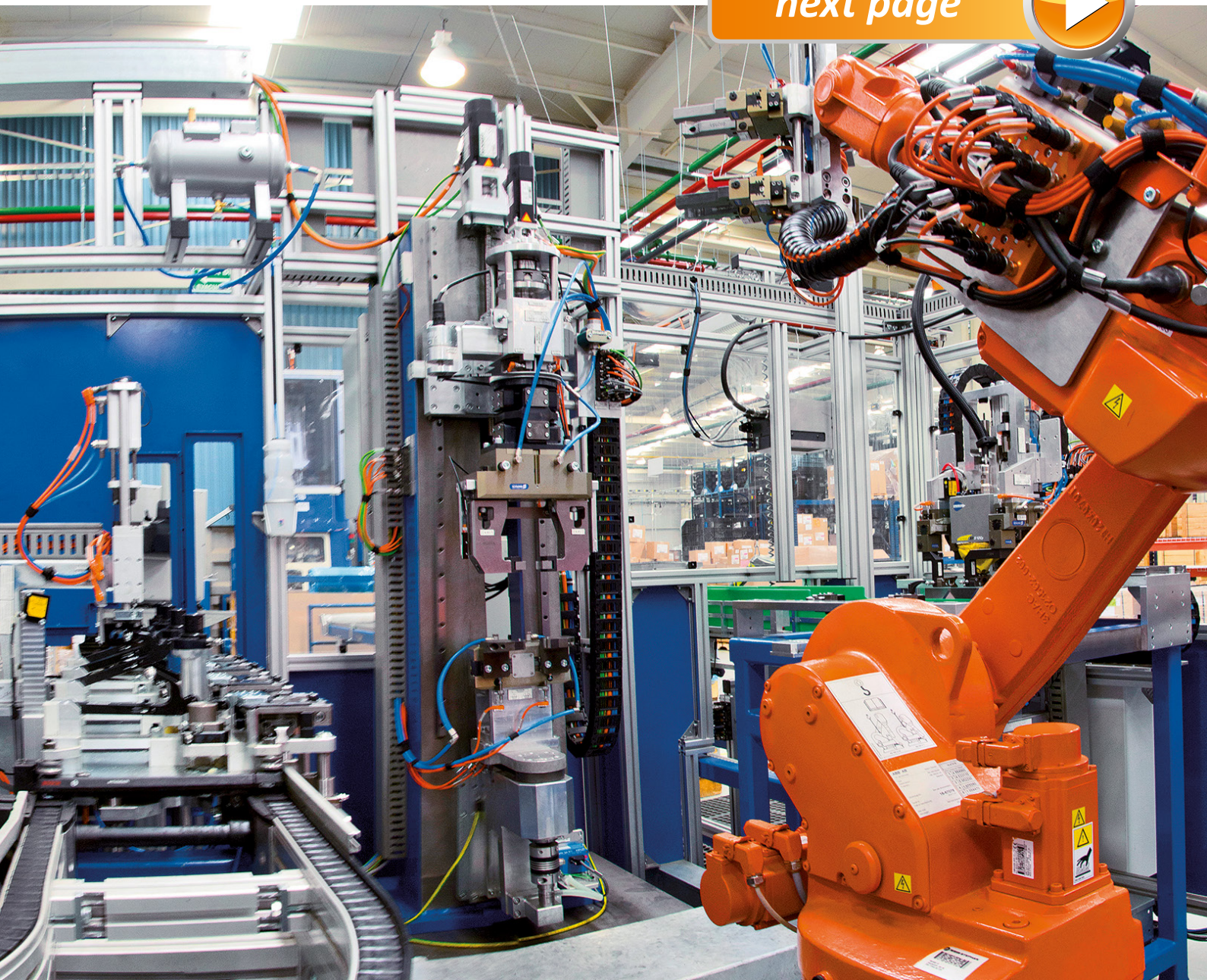


LCA Automation AG, based in Switzerland, is a special-purpose machine manufacturer, particularly in equipment for the automotive industry. One of LCA's core production areas includes steering components, which it supplies to almost all of Europe's vehicle manufacturers. Rainer Pölzl, who is responsible for project planning and control engineering, explains: "LCA Automation has benefitted from Beckhoff's PC-based control technology since 2000. Originally we used our own proprietary hardware and software. However, since our customers increasingly demanded high end technologies, a decision to switch was made in 1999. There were good reasons for choosing Beckhoff, including the broad, scalable and open product range, and the high performance of Industrial PC (IPC) technology. It was important for us that PC control offered a highly flexible

and integrated system of coordinated software and hardware, right down to the I/O level. The technology also offered significant advantages in terms of horizontal and vertical integration, due to the fact that the openness of the system facilitates the integration of our machines in interlinked assembly lines at the end customers, as well as communication with their MES and ERP systems."

Due to high complexity of the proprietary axis and process control system, the only way to move forward was a gradual migration towards a fully PC based control solution, as Rainer Pölzl recalls: "First, the existing control software, which had been specifically tailored to our needs, was mapped to TwinCAT. Over the years, more and more processes were migrated and developed further." Due to the openness of PC control, LCA automation was initially able to run it in

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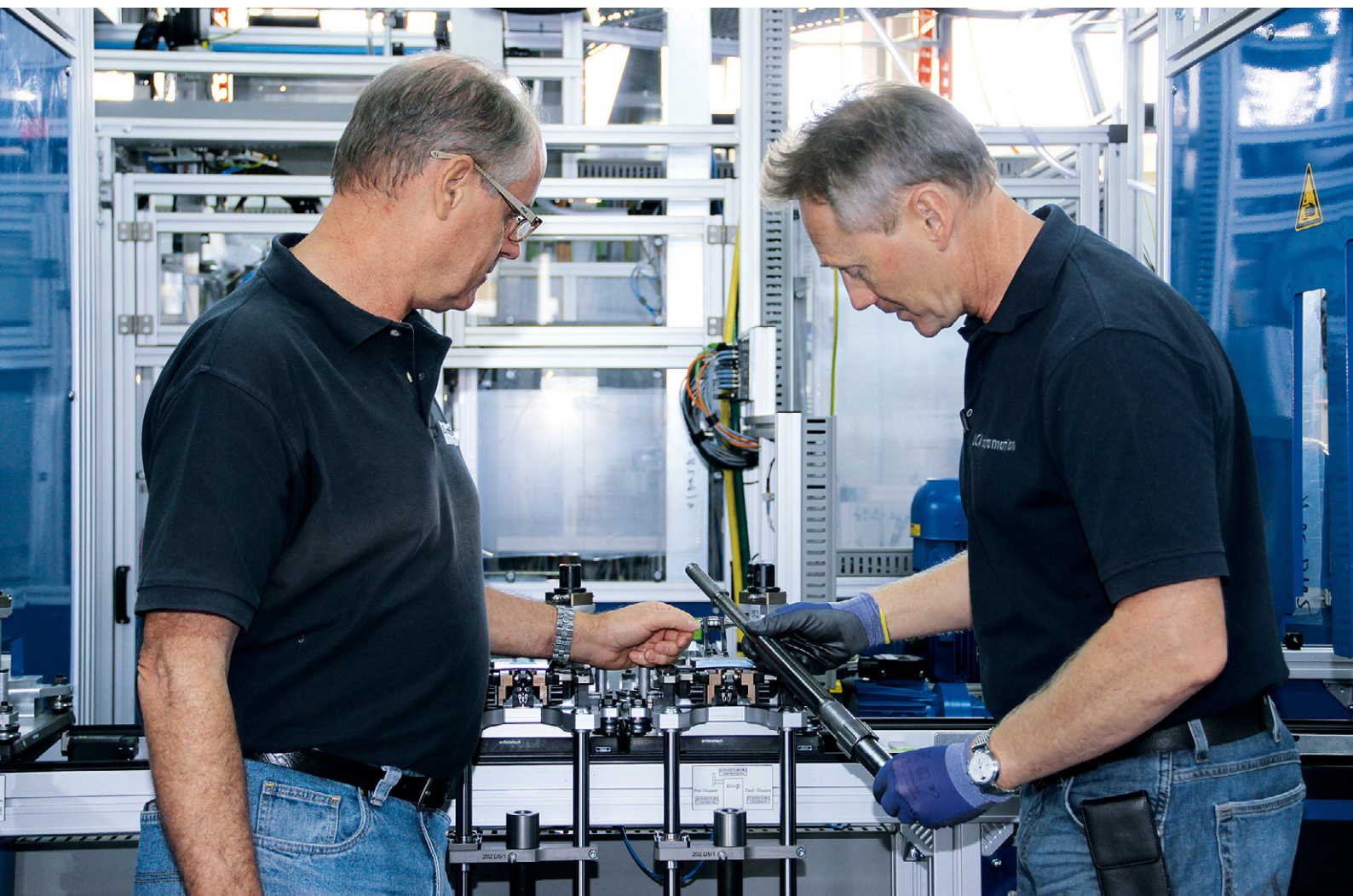
parallel with their own motion and process control, which they were then able to integrate via Profibus quite easily. Supported by the continuous development of Beckhoff systems, for example in the form of high-performance processors or through the introduction of integrated, very fast EtherCAT right down to the I/O terminal, at LCA they were finally able to fully retire their old system in 2010.

Complex assembly lines with flexible control

The recently developed steering shaft assembly line uses PC based control throughout. The finely scalable, modular design of PC-based control, and the resulting high degree of flexibility in the application,

proved to be very beneficial during this process. Based on the approach of flexible control technology which optimally supports modifications in the machine design, the company was able to implement the whole steering shaft assembly line in just eight months.

The line features 3 manual feed stations, where the individual components are placed in the workpiece carriers of the automated transport system. The carriers then pass through the individual processing stations. At one of the stations, the tubular raw material is pressed and shaped, and before it is connected with other components, it is greased and oiled. At each processing station, checks are carried out for dimensional accuracy. For example, the presence of all the required parts is verified as is the compliance with specified forces in joining processes. This results in very reliable part quality assurance and reject identification. The corresponding information is then assigned to the respective workpiece carrier. A



complex final examination takes place in a measuring station that represents the most important part of the LCA expertise, as Rainer Pölzl points out: “On the one hand, vehicle steering components must be backlash-free, but on the other, the connections must not be too tight to prevent ‘telescoping’ in the event of an accident.

An excellent system integration

According to Rainer Pölzl, existing systems also increasingly benefit from the performance of PC-based control technology: “Many of our systems have been operating reliably at our customers facilities for 20 years or more. In order to modernize these machines without prolonged production downtime, we simulate our previous control components with the PC-based system. In this way, the existing control system doesn’t even ‘notice’ that the hardware has been upgraded with advanced components. This allows us to exchange different modules one by one, thereby replacing the existing hardware gradually.

Due to the increasing variety of product types to be produced, the control software has become too complex to be replaced directly. The approach described above has the advantage that, by simulating the hardware, it is possible to continue using the existing software. During the modernization of individual-machine modules, we also benefit from the wide range of IPC form factors. The modules can initially be realized flexibly using the compact Embedded PCs from the CX series. A control cabinet IPC lends itself when it finally comes to replacing the ‘heart’ of the system. This modularity and diversity is very well suited to our approach.”

The current steering shaft assembly line uses four C6930 control cabinet IPCs with Intel Core 2 Duo processors (2.53 GHz), each connected to a 15“ CP7902 control panel. One of the computers is used as a master, e.g. for transferring process data and interfacing with the ERP level. The other IPCs control the internal processes of the assembly line. The complex process comprises more than 1 000 I/Os, which according to Rainer Pölzl - are implemented locally via IP 67-rated EtherCAT box modules, particularly

Rainer Pölzl (left), project planning and control engineer, LCA Automation, and Managing Director LCA Automation Christoph P. Rennhard examine the assembly results



About

Company name: Beckhoff Automation
Headquarters: Verl, Germany
Turnover: € 510 million
Employees: 2 800 worldwide
Products: Industrial PCs, I/O's and Fieldbus components, drive technology, and automation software

when it comes to logging analog data. Other components include 18 servo axes, which are composed of AX5000 servo drives and AM3000 servomotors and controlled via TwinCAT NC I. EtherCAT is used for high-performance networking, which perfectly blends into the PC Control system. With excellent system integration, TwinCAT enables optimum access to the data. As a result, subsequent extensions can be implemented much more easily than would be the case with third-party software.”

Opportunities for further innovation

For future projects, Rainer Pölzl sees further innovation potential, due to PC-based control. For example, the software is currently being upgraded to TwinCAT 3: The main advantage for LCA is the use of C/C++ as a programming language, due to its long standing expertise in this regard. With C programming as an integral part of the process, it is possible to integrate these quickly and easily as encapsulated functions, e.g. for hydraulic axes that are synchronized with high precision.

Rainer Pölzl also sees many advantages in the advanced multi-touch control technology, particularly in connection with the CP-Link 4 one-cable technology for displays. Smaller target markets, such as the medical or railway industries, tend to be much more open in this regard than more standardized markets like the automotive industry. Multi-touch offers significant enhancements for machine users with regard to operating preferences and safety. Pölzl concludes: “Together with the introduction of TwinCAT 3, we will also migrate our safety solution to the Beckhoff system, which was previously implemented separately.”

Photographs: Beckhoff, LCA Automation AG, Fotolia

www.beckhoff.com/ipc

Simatic sweetens honey extraction

The company Harzer Antriebstechnik GmbH based in north-western Germany, specializes in the special purpose engineering and sophisticated automation solutions focusing mainly on drive technology. The company recently began to fit honey extractors with Siemens technology, optimizing the efficiency of the entire honey centrifugation process from the controller through the frequency converter to the operator unit.

To harvest the best quality honey, beekeepers use what are known as honey extractors to extract the honey out of the comb by centrifugal force. The key to efficient operation is to ensure the seamless interaction between the controllers, the operator unit and the drive. The production conditions for the different types of honey are defined at the discretion of the beekeeper by simply selecting the spin program and setting the drive parameters.

Centrifugation process

Harzer Antriebstechnik GmbH honey extractors work using a controller model based on Simatic

technology, and a Sinamics G110 frequency converter as a variable-speed drive. During the extraction process, a motor connected to the frequency converter is controlled via the communication module CM1241 (RS485) by a Simatic

S7-1200 controller from Siemens. Depending on the extractor and drive type, CPU model 1212C or 1214C is used. Communication takes place using the USS (Universal Serial Interface) drive protocol. The motors have an output of between 0.37 and 2.2 kW with a single phase 230 Volt AC supply. Using a Simatic HMI KTP400 Basic combined button and touch operator panel, the beekeeper selects the spin program and the configuration. It is also possible for the beekeeper to monitor the program sequence and individually modify the set motor speed. An exchangeable cover film protects the panel's control buttons and switches from becoming gummed up with honey. If maintenance is required, only the controller itself needs to be sent in.



About

Company name: Siemens AG

Headquarters: Nuremberg, Germany

Employees: 357,000 worldwide

Products: Integrated hardware, software and technology-based services for manufacturing companies worldwide



Harzer Antriebstechnik GmbH

Harzer Antriebstechnik GmbH has been producing series control units using Siemens technology in honey extractors by beekeeping specialist CFM (Carl Fritz Mellrichstadt). Until introducing the new control units, CFM worked using conventionally produced controllers which required a good degree of experience and intuition to ascertain precisely the right parameters. By introducing new control units, the company was aiming at a more compact solution with self explanatory functions which was easier to control. The founder Marcus Warlich and his team opted for a Siemens solution. "We have put our trust in Siemens, from the controller through the frequency converter to the operator unit, and the experience has been all positive. Key factors contributing to the success of the solution have been the outstanding reliability and the optimum cost-to-performance ratio of the components, as well as the innovative engineering.

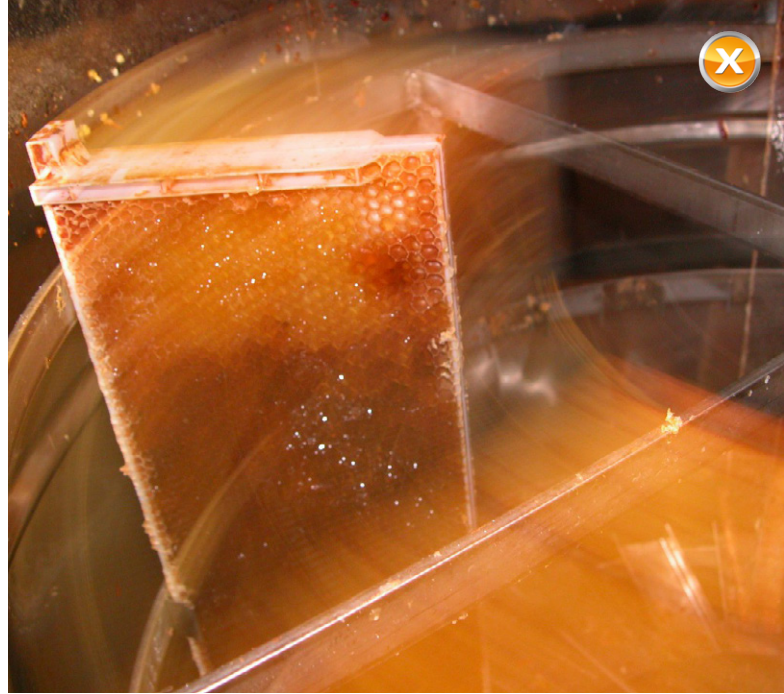
Honey extractor

A honey extractor is a mechanical device that extracts the honey from the honey comb without destroying the comb. Extractors work by centrifugal force. It comprises of a cylindrical stainless steel drum which accommodates a honeycomb basket with a rotating axis. This is connected to the drive below the drum. Depending on the size of the extractor, the honeycomb basket can accommodate between four and 16 comb frames in which the combs are placed.

Once the lid is closed and the spin program has been selected, the drive sets the honeycomb basket in rotation. The centrifugal force flings the honey against the inner wall of the drum. It flows down the wall and is collected at the base of the drum. To ensure that honey is centrifuged out of both sides of the comb, the combs are turned by reversing the motor direction. Finally, the honey is guided through a drain valve into a collecting bin.

Photograph: Teaser Fotolia

www.siemens.com/s7-1200



Honey extractors with Simatic technology and a Sinamics G110 frequency converter

Honey extractors

Extractors are either tangential or radial depending on how the frames are put into the basket.

- Radial baskets have the top bar of the frame facing outwards while tangential baskets have one side of the comb facing outward.
- Large commercial extractors are radial and rely on the upward slope of the comb cells. This slope allows to extract honey by applying centrifugal force toward the upper edge of the comb (opposite to the direction of gravity while in the hive).
- The amount of work during extraction is reduced in the radial type because the frames do not have to be turned over to extract the honey from the other side of the comb.
- The smallest extractors hold two frames. The largest commercial extractor holds more than a hundred frames. During the extraction process the honey is forced out of the uncapped wax cells, runs down the walls of the extractor and pools at the bottom. A tap or honey pump allows for the removal of honey from the extractor.
- Honey must be removed in time and always stay below the rotating frames as otherwise it prevents extractor from spinning with sufficient speed.

Safe automation between Myanmar and China



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A 2,500 km gas pipeline from Myanmar to China, requires smooth failure-free operation. To make sure that the gas pumped from Myanmar reaches China's energy hungry industry, safely and consistently, a largely automated operation and monitoring system with safe process controls and functional safety in accordance to SIL 3 is being employed. This automation system

PSS 4000 from Pilz follows the mechatronic approach and is characterised by the consistent distribution of control functions to the periphery. For the control function, therefore, it is irrelevant where the respective program section is processed. But that's not all: PSS 4000 performs automation and safety-related tasks simultaneously, in the one system.

The gas pipeline extends from the west coast of Myanmar, formerly Burma, to Kunming in Yunnan province and is intended to cover part of China's huge energy requirement and make the country less dependent on sea transportation. The pipeline is a joint venture between the state-owned China National Petroleum and Myanmar Oil & Gas Enterprise. The ambitious project was launched in 2009; the gas pipeline has been operating since July 2013. Around 30 billion cubic metres of gas now flows annually from west to east; a crude oil pipeline planned simultaneously is under construction.

Reliable and safe operation over 2,500 km

14 compressor and transmission stations along the length of the pipeline are responsible for a smooth, failure-free operation when transferring the gas. The automated processes are linked to defined safety levels, which are intended to keep the hazard risks for man, the environment and damage to the pipeline as low and improbable as possible. In order to transport the gas reliably and safely over long distance, a certain pressure and the corresponding optimum temperature must be maintained. If the pressure falls the temperature will drop. Due to the specific properties of the gas, this increases the risk of ice formation – with the subsequent negative impact on gas flow and the pipeline.

Beijing based Guo Peng Technical Co.Ltd, as part of the consortium of project partners it was responsible for preventing ice formation and maintaining a continuous gas flow, using an electrically heated system. Multiple sensors monitor the temperature and the flow rate along the entire length of the pipeline system: if values of these parameters fall below a defined minimum value, the heating system starts up. Similarly, a defined maximum value ensures that the heat supply is switched off again appropriately. According to the requirements of the pipeline operator, this safeguard procedure runs automatically with absolute reliability.

But what type of safety device is suitable for monitoring the execution of the switching signals reliably? If temperature and gas flow values were to exceed or drop below defined values without being detected, in an extreme case this could cause an explosion with harmful effects for man and the environment, as well as long-term loss of the gas supply. Consequential costs would quickly run into millions.

Zhu Yi Ming is the engineer at Guo Peng Technical Co. who is responsible for the development and reliable operation of the heating system; he recalls one of his early stays in Germany: "I was struck by what at the time was an outstanding safety solution on a large hydraulic press; it was a Pilz solution". So he contacted Pilz's subsidiary in Beijing. As a gas pipeline is essentially nothing other than a complex



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01 Part of compressor and transmission station

production plant with a wide range of the most varied control and safety requirements, owing to its success in the past, it was worth considering the automation system PSS 4000 for this project.

The automation system from Pilz stands for optimum interaction between hardware and software components, network devices and the real-time Ethernet SafetyNET p. The system features the most varied functions and combination options, which distinguish it from classic automation solutions. This applies to both stand-alone machines and interlinked plants: due to its consistent distribution of control functions, project implementation can be flexible and therefore simpler. At the same time, it can also construct the “classic” automation structures with a centralised PLC control system.

PSS 4000: Safe monitoring of PID controllers

A mandatory requirement in terms of safe monitoring of gas temperature and flow was that the intended solution should be able to implement safe PID controllers. Although there are numerous automation systems on the market that are able to monitor non-safety-related PID controllers, only a very few PLC control systems are currently able to implement safe process control. The automation system PSS 4000 offers reliable safety and automation in one system: the PID controller is implemented via a specific software block in the software platform PAS4000. The control system PSS-universal PLC belongs to the automation system PSS 4000, which communi-

cates with the higher level plant control system via Modbus/TCP and is used in each of the 14 compressor stations. It can safely monitor the gas flow, temperature, pressure, but it can also monitor and control automation functions such as sirens or signal lamps. “The key factors for us were that PSS 4000 provides safety and automation in one system, the whole thing can be implemented simply using intuitive software” says Zhu Yi Ming. And with various editors for programming in accordance with EN/IEC 61131-3 or for configuration, any changes and adjustments are easy to implement in future via software. “On this project Pilz not only supplied the technology but was also an equal partner in developing an optimum project solution, a safety expert consultant, and a supporter when programming and during the ramp-up process” says Zhu Yi Ming.

Judging by its use in the classic engineering sector, application of the modular automation system PSS 4000 on pipeline projects is still somewhat exotic. However, the wealth of solutions that can be implemented using this system, the logical structure, simple implementation and, last but not least, positive experiences in daily use, have still proved convincing: there is currently another gas pipeline project between China and Uzbekistan at the planning stage where the PSS 4000 is to be employed.

Photographs: Fotolia, Stratfor.com, Pilz

www.pilz.com



About

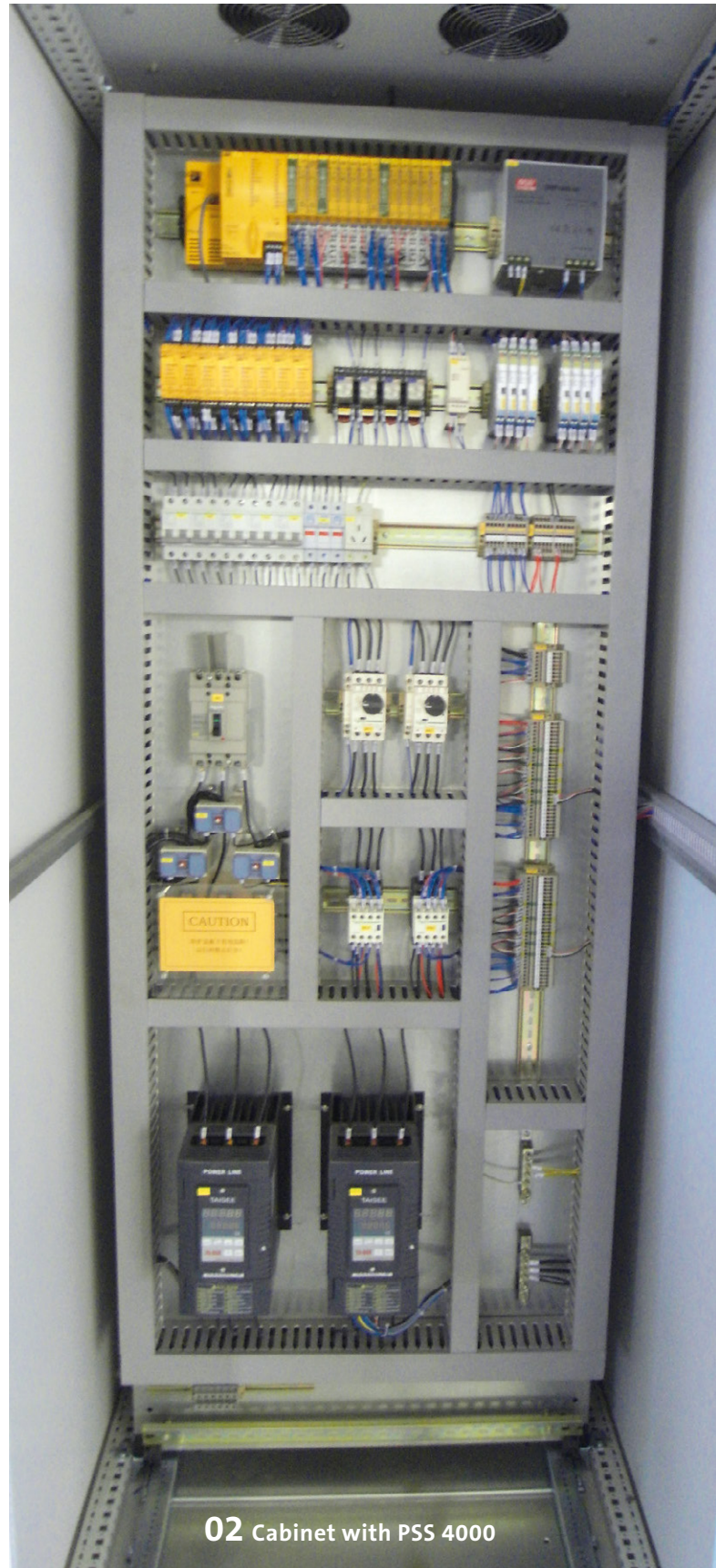
Company name: Pilz GmbH & Co.KG

Headquarters: Ostfildern, Germany

Turnover: € 260 Million

Employees: 1900 worldwide

Products: Sensor technology, electronic monitoring relays, automation solutions with motion control, safety relays, programmable control systems, safe bus systems and Ethernet systems



02 Cabinet with PSS 4000

Operating and control device, positions cranes safely

Author: Dr. Jörg Lantzsch is free author in Wiesbaden Germany

Jörg Lantzsch

Whilst operating mobile processing machines, e.g. in logistics applications, ergonomics has a particular meaning when it comes to the operation of mobile processing machines, e.g. in logistics. Operating elements must be perfectly placed and machine conditions visualised best possibly. A globally active specialist for mobile automatisisation chooses the most modern operating devices with touch operation for its control stands.

The operation of a big crane, e.g. in port logistics puts a high demand on the personnel. Heavy loads must be moved from large heights with high precision. During such applications the control stands are very complex and therefore a possibly easy operation is required.

The medium-sized family enterprise Spohn & Burkhardt's electro technical factory, which was founded in 1920 by Karl Spohn and David Burkhardt, is a global player for control switches / joysticks and complete control stands. The broad series programme of Spohn & Burkhardt, which includes switches, resistors, starters and control devices is rounded up



01 Control stands are used in the operation of mobile machines, e.g. in the agricultural and municipal sector and in shipbuilding

by individual variation and combination possibilities of all products according to customer requirement.

One of the specialties of the medium-sized company is customer-specific control stands for different transportation machines, construction, containers and vessel cranes. Comfortable and ergonomic seats with integrated foot rests, which can be adjusted easily, provide relaxed working. The most important operating elements, which are necessary for crane operation, are stored in the side consoles of the control stands.

From the simple switch to the touch display

The equipment of the operating consoles of the side consoles can be chosen from a wide range of possible components. These ranges from simple switches and buttons to ergonomic master switches and up to complete solutions. The assembly of visualisation elements in control consoles is a further possibility. Among others the compact operating and control device D1000 of Graf-Syteco is used. Entries of the

02 The display integrated in the console of a control stand can be used for simple visualisation tasks



About

Company name: Graf-Syteco GmbH & Co. KG

Headquarters: Tuningen, Germany

Products: modular HMI operating systems in mobile machines and complex production facilities for industrial operations



operator can be directly realised at the display by the integrated touch buttons.

Visualisation of the machine conditions

Thomas Scharmach, project engineer, in-charge for the equipment of the control stands at Spohn & Burkhardt says "In many applications the visualisation of machine conditions is very important". Typical examples for visualisation tasks, which could be required in a crane, are the display of the wind load or the present height of the load. Visualisations contribute also to an increased safety. Video cameras can show areas, which are outside of the visibility of the machine operator. For instance, the visualisation enables also a diagnosis to check the function of the master switch directly at the work place. The deviation of the master switch can be displayed as bar graph. By this it is very simple to perform troubleshooting.

Unified Network Protocol simplifies engineering

Different factors have been taken into consideration for Graf-Syteco in the selection of displays for control stands of Spohn & Burkhardt. The size of the D1000, which enables the easy assembly in the operating consoles, was crucial next to the reputation of the company as specialist for mobile automation. Components of Graf-Syteco in control stands were used in the past already. Thomas Scharmach mentions a further benefit: "The displays of Graf-Syteco support the network protocol SAE J1939, which we also used for our master switches." The CAN-Bus based protocol is mostly applied in commercial vehicles and mobile working machines. The unified

In a Nutshell

With the assembly measurements of 96 x 96 mm at an assembly depth of 48 mm, the operating and control device D1000 of Graf-Syteco is compactly designed. The 3.5" TFT display offers a high resolution of 320 x 240 pixels and can perfectly visualise also detail drawn presentations thereby. The control and operating device is operated with four touch buttons with status LED, which are located under the display. The consistent glass surface at the front complies with the protection type IP65. A high performance ARM processor with 64 MB RAM, 32 MB flash and 8 kB FRAM enables also the programming of complex control tasks. D1000 is available in four different versions, which differ in their interfaces. Optionally an internal slot for memory cards is also possible, by which the D1000 can also be used as data logger. Upon request also individual equipments are possible. Along with all devices Graf-Syteco provides the free of charge Software Graf-Design-Studio (GDS), by which the entire functions can be programmed comfortably.



network protocol simplifies the engineering during the integration of components of different manufacturers.

Photographs: Fotolia teaser, Graf-Syteco GmbH

www.graf-syteco.de/home-2

“Industry 4.0 vs Internet of things – three perspectives”



Sensorik
4.0

As a result of the Internet, the real world and the virtual world are growing together- the economy is on the brink of the fourth industrial revolution. Concepts such as the “Internet of Things” and “Industry 4.0” are being discussed extensively across Europe. But what is the situation in other regions of the world?



About

Company name: Pepperl+Fuchs GmbH

Headquarters: Mannheim, Germany

Turnover: € 525 million

Employees: 5,600 worldwide

Products: Industrial sensors, Explosion protection

Product Marketing Manager for Intelligent systems, USA Dr. Helge Hornis, Shane Parr, Managing Director in Singapore, along with John saw, Product Marketing Director in Shanghai provide their assessments of the Asian and the US markets.

Is the term Industry 4.0, as coined by german industrial corporations, as well known and well discussed in America and Asia, as it is in Germany?

Helge Hornis: In America, only the experts know about it. But even then the some of them do not know what it exactly means. Here everyone in the consumer market calls it 'internet of things'. There is considerable hype about it in the building automation and there are already products readily available in the home-automation stores, such as heating regulators, which raises the temperature when the Gps data from the user's smartphone signals that they are on their way home.

John Saw: Many experts in the factory automation divisions are familiar with this term industry 4.0 and also their customers are eager to know more about it. In Asia, the term internet of things is catching up faster, as in the case of USA, where the impulses comes from the consumer market.

What is the situation in the field of process automation?

Shane Parr: In process automation industries, both the terms are well known, with the latter used more throughout asia. However, while the industry press is attempting to build up some substance around the internet of things, the reality is that there are no real or killer applications to drive this technological steps.

Specific terms aside, how far has the idea of increasingly networked automation spread?

Helge Hornis: The automation industry in the US is more cautious towards fundamental innovations. For example, even in baggage systems in airport have been fitted with AC switches, so in some cases 24 VDC switches haven't been introduced yet. Let alone bus systems.

John Saw: In Asia, adoption of most modern systems is favored. In automotive industry, for example, there is discussion and consideration on how industry 4.0 concepts can be implemented in

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01 Dr. Helge Hornis,
Product Marketing Manager,
Intelligent systems,USA



02 Shane Parr, Managing director Pepperl+Fuchs,
Singapore

practice. We are being asked what Pepperl+Fuchs as a sensor manufacturer can contribute in this area.

What topics are the highest priority for the users?

Shane Parr: In Process automation, the main focus is on reliable and efficient operations. Users would welcome industry wide standards to enable platform independent communication across systems and devices. However, as we have seen recently in wireless technologies, there are already



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03 John Saw, Product marketing Director,
Pepperl+Fuchs Shanghai, China

2 competing standards available: wirelessHart and ISA100. What's more, providers of process control systems have no overriding interest in opening up their propriety systems for broad communications. Reliability and safety are crucial factors – in any case factories with potentially explosives materials and atmospheres would only be able to implement tried and tested technologies that offer high protection class.

John Saw: In factory automation, Ethernet based devices are gaining popularity and are already in use in some industries. In the automotive industry, cloud based solutions are also being discussed. Remote access to devices for maintenance and diagnostics is accepted and likely to spread quickly. To enable this capability, manufacturing processes and also flexibility to quickly match consumer demands would then be guided by data. In order to implement this, a reliable means of achieving data security would be an important requirement, and solutions still need to be found in this area.

In what areas do you see or expect to see a strong impetus for change?

Helge Hornis: I expect to see a real breakthrough when a large internet based company comes up with an overall solution that spills over into automation market. Once the idea of the network based automation spreads in the USA, then it will be quickly implemented.

John Saw: Business models relying on low wages will not work forever in China. As such companies

are thinking hard on how to create more value to achieve its competitive and comparative advantage. Increasing efficiency, achieving increased flexibility and reliability, better matching consumer demands to supply through connectivity is a growing trend. Customers want comprehensive, coordinated initiatives that provide a reliable and binding framework, which is as standardized as possible. Many experts are following the discussions on industry 4.0 in Germany with great interest.

Shane Parr: I see a cascade effect happening, starting in the consumer market, carrying forward to factory automation and then into process automations.

What specific actions are planned at present?

Shane Parr: Advanced diagnostics and predictive maintenance are the 2 keywords used in process automation. And with fieldbus our devices already provide both. However, these capabilities have yet to be integrated into each individual system with its specific standards and protocols. It is often the case that the potential of available data is not fully utilized. We are already able to implement a wealth of additional networked intelligence at plant level.

Helge Hornis: With SmartBridge, we are able to offer technology that enables users to take a significant step in this direction, without needing to change the plant and process control systems. As in the case for the heating regulators controlled via smartphones, Smartbridge can be taken off the shelf and put to immediate use. It requires a minimal investment, is easy to understand, and offers a direct benefit. This is not yet industry 4.0, but it a real example of sensor technology 4.0.

John Saw: Our intelligent sensors and devices already offer features of detailed diagnosis, online monitoring, fault detection for predictive maintenance and route parameterization. We are sharing more and more with our customers to better enable them to integrate these features into their applications to achieve remote access and data transparency. The Smartbridge concept is generating interest in Asia as it further bridges field sensors and devices to the industry 4.0 concept.

Photographs: Pepperl + Fuchs

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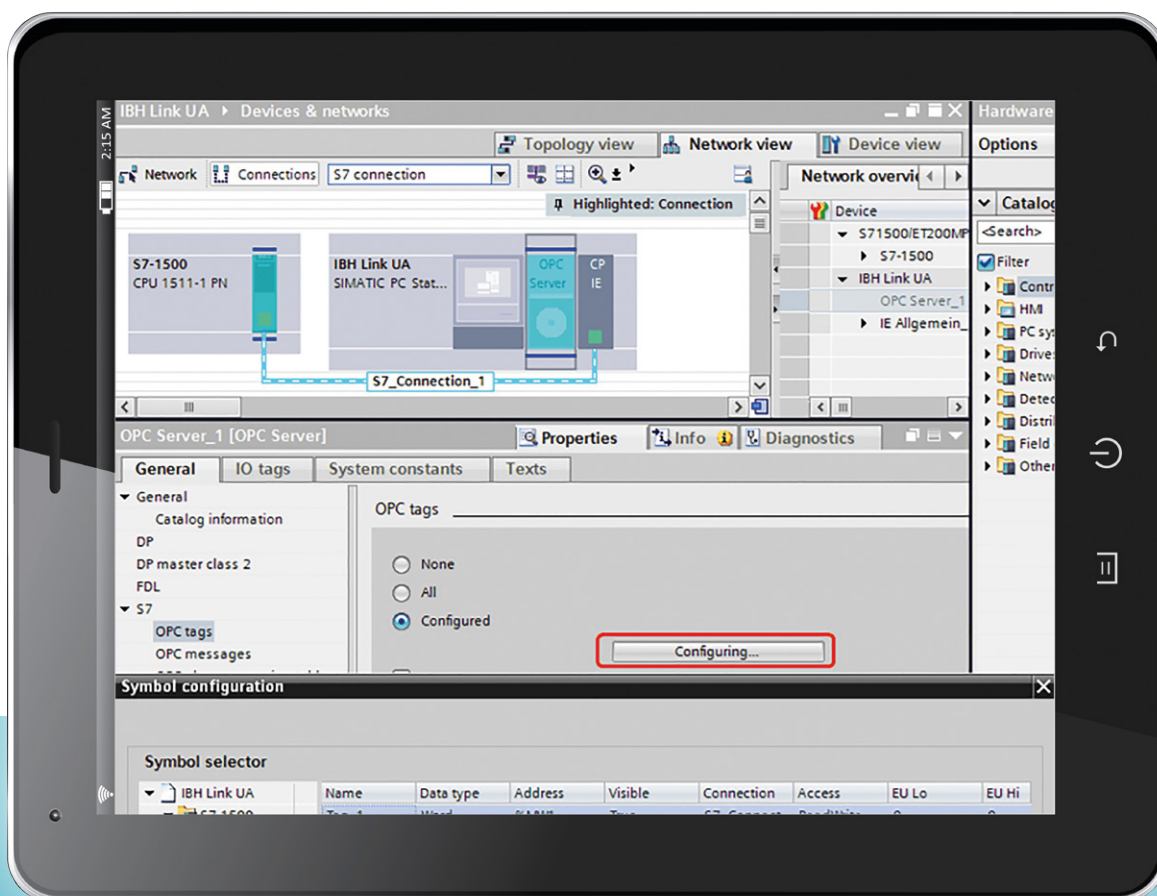
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Integrating S5 and S7 controllers in the OPC UA world

The basic objective of Industry 4.0 is to make manufacturing more competitive by utilising the information and communication technology (ICT). In order to implement this technology efficiently and as quickly as possible, modularization and standardization are important. Both these factors reduce the complexity and increase the flexibility of the system. In this context, OPC UA has proven to be the pioneering communication standard. With OPC UA the industry 4.0 requirements for minimum dependence on the manufacturer and company-communication-systems are fulfilled.

OPC UA is basically an industrial machine to machine communication protocol for interoperability. It is a platform independent, service oriented architecture specification that integrates all the functionalities from existing OPC specifications. Not only does it transfer the machine data such as process values and measured values, but because it allows for describing or expressing the meaning of the data with semantic descriptions, OPC UA is becoming increasingly important to transfer machine data to higher level controller systems.

But how is the process data from Simatic controllers integrated into the OPC UA ?

The solution to this is the IBH Link UA. The IBH Link UA, OPC UA server/client module with in-built firewall, connects the simatic controllers S5, S7-200,

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S7-300, S7-400, S7-1200 and S7-1500 into the OPC UA communication. It is compact in size and is well suited for DIN rail mounting. It consists of 4 ethernet ports and requires a 24V power supply. To configure the IBH Link UA, no special software is required and can be done by using Siemens Step-7 or the TIA (totally integrated automation) portal. This allows total integration into the project. The definitions of the variables are transferred by the programming software via ethernet into the IBH Link UA. The variable attributes are directly defined within the PLC project. Thus a symbolic access to variables and data block structures is possible.

To communicate with Siemens series of PLC, the ethernet port is utilised. If the PLC has no ethernet port then the IBH Link S7++ or S5++ gateways are used. Out of the 4 Ethernet ports 3 of them are assigned to machine level on the IBH Link UA and 1 is assigned for supervision level where only the OPC access is possible. An integrated firewall between these 2 levels prevents any possible manipulation from the supervisory level.

Stepwise configuration

Configuration is done as follows:

- At first a PC station is created by the user.
- The OPC server (SW8.2) is inserted into slot 1.
- In slot 2, the Ethernet interface (IE General SW8.2) is inserted
- Next the S7 connection to the required controls are established
- In the properties of the OPC server, the variables are now easily configured
- Subsequently the configuration is transferred via Ethernet into the IBH Link UA. The IBH Link UA then immediately knows the access paths to the controls and puts the required variables in the OPC client. All done!

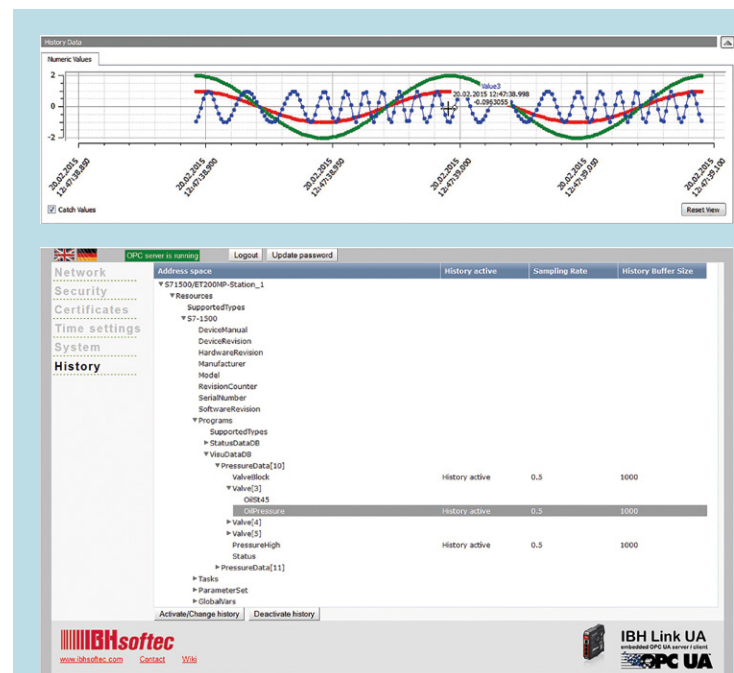
OPC Data Access

OPC Data Access, also known as OPC DA, is a specification that defines how real-time data can be transferred between a data source and a data sink without either of them knowing each other's native protocol. For example, source being the PLC and sink being

the HMI. Earlier, a custom driver that translated the data between the source and sink was required. With OPC DA it is now possible to transfer data directly hence reducing the cost and providing the real time data. Since the IBH Link UA can be accessed by multiple OPC clients, this makes the data source for any OPC UA compliant application like the SAP, MES and ERP systems available.

Historical Data

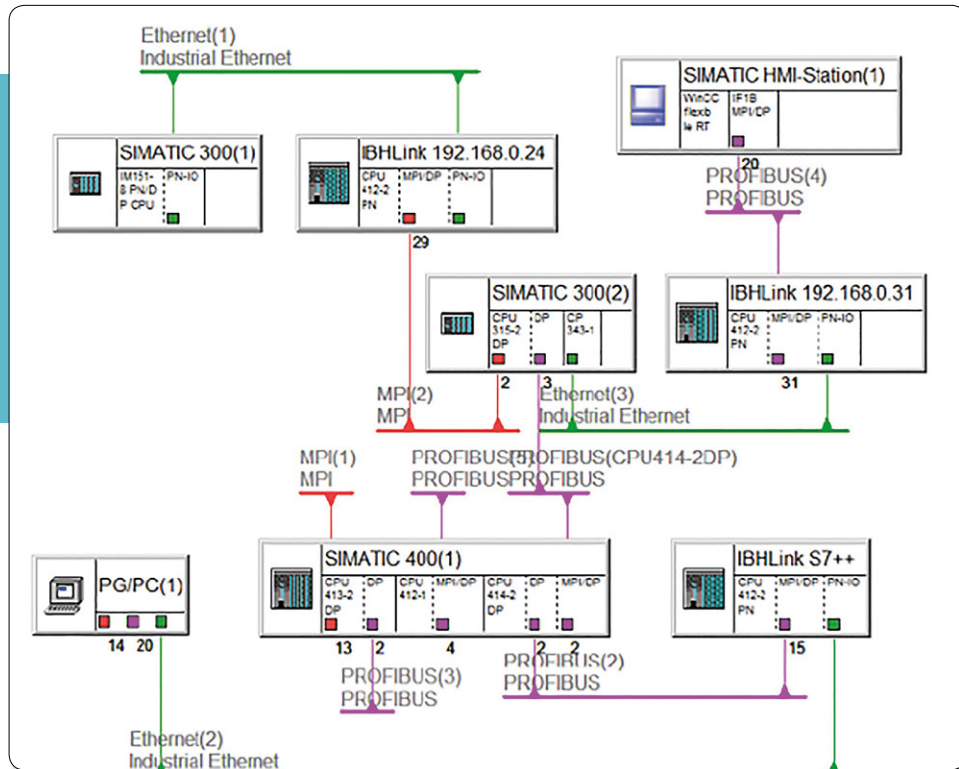
OPC Data Access allows the access to data in real time, but not the archived data. OPC Historical Data Access, called OPC HDA provides access to already stored data. From simple data logging systems to complex Scada system's historical data can be queried in standardized manner.



The activation of historical data can be done using the web browser

Safety

The device has a certificate management for secure communication. The configuration of the security levels and the certificate management is easily accomplished via a web browser with help of an



appropriate software interface which is provided. The communication with the control takes place using TCP/IP. OPC UA Security includes authentication and authorization, encryption, and data integrity by signing. Therefore the main control will be protected from any possible uncontrolled access. The 3 encryption levels are 'No encryption' level, Basic128Rsa15 and Basic256. Basic128Rsa15 is 128 bit encryption and Basic256 is a 256 bit encryption level. Exchange of certificates is another important security level. A communication is only possible, if both server and client have a valid certificates.

The IBH Link UA supports certificates with levels: 'Sign' which contain signed certificates, Level 'Sign and Encrypt' contains signed and encrypted certificates and 'Sign + Sign and Encrypt' which may hold 'signed' or 'signed and encrypted' certificates as well.

OPC Client

One of the advantages of the IBH Link UA is that it supports client and server functions simultaneously. This allows data exchange between different OPC UA servers. For example control systems and other

equipment with OPC UA servers from different manufacturers can exchange data with each other.

The configuration of the client functions will be made using a standard web browser. The controller can easily monitor data connections via the time stamp and variable status using the client function. The OPC UA Server automatically monitors the variable to be read and writes it into the PLC controller. If there is a fault, this is indicated in the variable status.

Additional advantages

An important advantage of this compact device is that it is an independent assembly and does not require a Windows PC.

Photographs: *wiki.ibhsoftec.com, Siemens*

www.ibhsoftec.com



About

Company name: IBH Softec GmbH

Headquarters: Beerfelden, Germany

Products: PLC programming systems, Soft PLC solutions, special network solutions on linkage of PC and PLC, systems for easy connection to MES, ERP, SAP



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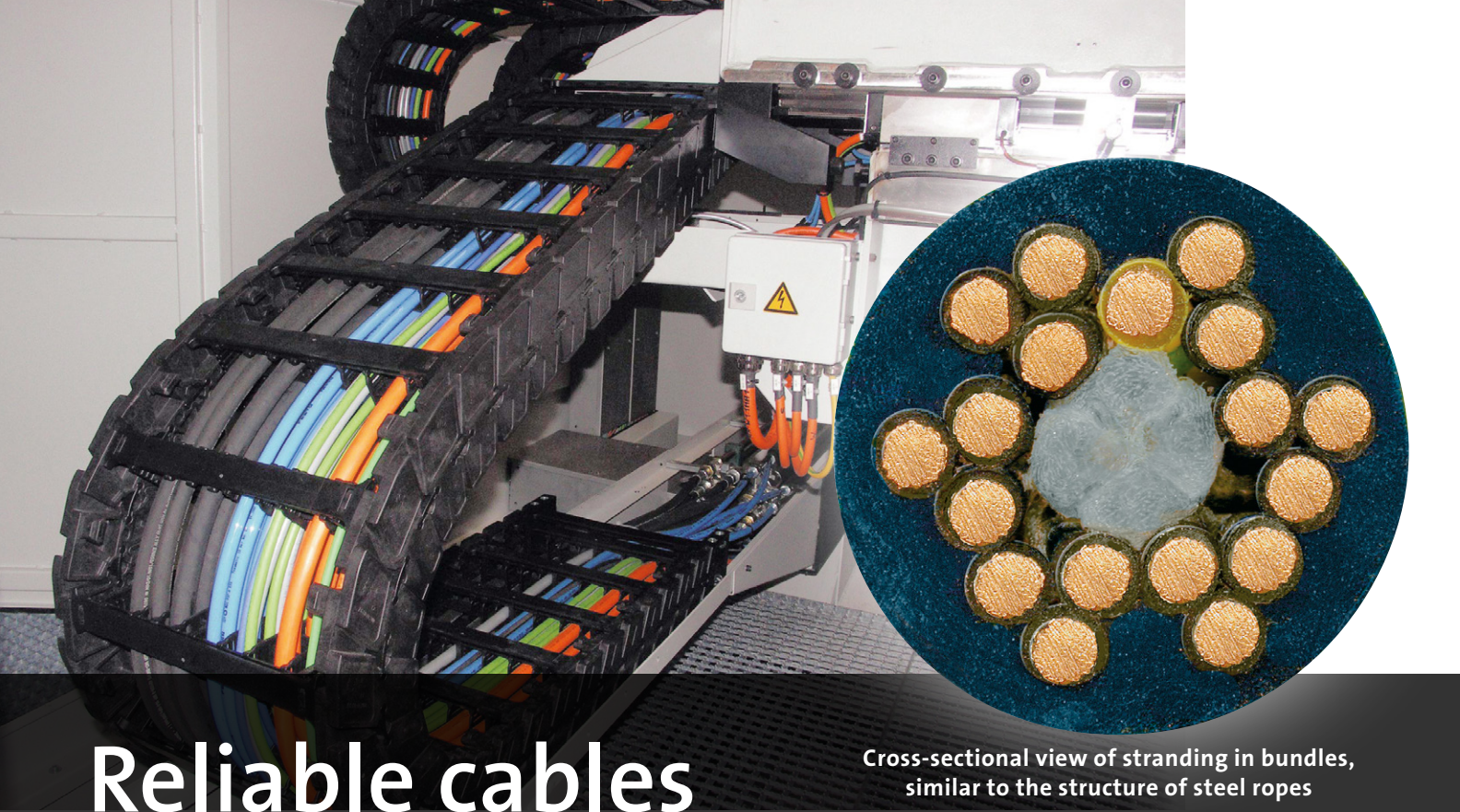
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Cross-sectional view of stranding in bundles, similar to the structure of steel ropes

Reliable cables for industry

There is continuous movement of all sorts of things in the industry. In general, when there is movement on the floor it's good for production. But what is good for production, is a major challenge for cables. To protect moving machine cables from tensile, torsional forces and external influences such as impact or welding sparks, energy chains are used. They also reduce wear, stress on cables and hoses, prevent entanglement, and improve operator safety.

An energy chain is like the umbilical cord of a machine. It supplies a machine part with energy, data and media whilst following its every movement. Energy chains are arranged to accommodate simple linear horizontal, vertical strokes, rotary strokes and even the six-axis robotic applications. For the cables to withstand stresses millions of times without core breaks or the “corkscrew” effect after a few thousand cycles, the material and structure of the cable must be perfectly matched to each other.

Only long-term tests provide predictable reliability

Experience shows that even highly flexible cables in dynamic use in energy chains often quickly reach their stress limits. Can their service life be predicted? The standard tests performed by VDE, IEC or UL don't offer a clear statement, because only a long-term test in the energy chain itself offers this. Relevant standards use other means that merely simulate the wear regardless of the chain or the chain material, again offering little accuracy for cable lifetime in energy chains. To be able to predict the service life reliably, the Cologne based company igus, as a specialist in plastics and cables in motion, operates the largest test lab for cables moving in energy chains in the industry (1,750 m²). Here, products are tested for their resilience in continuous operation in 58 different test rigs. Since the exact re-production of the real working conditions is crucial, test axes are available with different travel distances and accelerations or environmental conditions. For testing large energy chain systems, such as those used in crane facilities, an outdoor test site with a travel distance of up to 240 metres is available. Here components have been successfully tested at 4 m/s and with an additional load of 8 kg/m for a total lifetime of 25,000 kilometers.

Simulating application at extreme temperatures in real conditions

Testing over a range of temperature from -40 up to +60 °C is carried out. The specially adapted container, in which these conditions can be simulated, is of vital importance. Unlike standard “cold winding” tests, in which the cables are wound up on a mandrel and cooled to test in temperature conditions just once, here the cables and chains are put under appropriate test temperatures and realistic motion conditions. They must withstand millions of strokes to prove they will withstand the expected bending stress in a real application. A test is considered passed when no jacket breaks can be detected, and thus proved to have the necessary flexibility in the cold.

The tests are not always about extreme temperatures. Customer requests are often about cables that must operate reliably at -5 °C. Therefore, for the last four years igus has been offering an oil-resistant PVC compound, which has a high abrasion resistance. This is unique on the market, because the usual PVC compounds for chain-suitable cables do not meet these requirements. Another benefit is that in more moderate temperatures it is not absolutely necessary to rely on expensive jacket materials such as PUR or TPR.

Bundle instead of layer

The findings obtained from the ongoing analysis of all tests for more than 25 years have been archived at igus and used for the development of its own, ever-growing range of cables. This has led to, among other things, the introduction of stranding in bundles, similar to the concept used in steel cables. In an elaborate bundle stranding process, the cores are stranded in individual bundles with three, four or five wires, which are then again braided with each other into an overall stranded bundle. For large stranded superstructures this is done around a strain relief element. The result is a

cable that is durable in motion and suitable for chains because, in contrast to a layer-stranded cable, each of the cores moves similarly in the inner and outer radius with the motion in the energy chain and thereby prevent relative stretching and compression.

Cables such as “robot cables”, with a similarly complex structure are used in industrial robots and must follow very extreme movements, bends and torsions. Special damping elements give the cores the necessary freedom of movement in the interior of the cable. Because, the more twisted the cable is approaching its load limit, the more difficult it becomes for the cable to twist further. Special shields and exterior materials also ensure an optimum durability of the cables.

1,040 different cables for application in energy chains

The service life of a cable used in an energy chain depends on a variety of variables that must be considered in the structure and the choice of materials. Thus the chainflex product family from igus currently offers 1,040 different cables. Users themselves can calculate the service life of the cables in their relevant application. This is made possible by the results from the 2 billion test cycles each year, which are incorporated into the igus database. Based on this data, the free online tool on the igus website predicts the service life of cables.

Photographs: *igus GmbH*

www.igus.eu



About

Company name: igus GmbH

Headquarters: Cologne, Germany

Turnover: € 469 million

Employees: 2 700 worldwide

Products: Energy chain systems, polymer plain bearings, linear bearings, low cost automation





Safety certifications, key to enter international markets

Dirk Müller

To market a control panel for controlling machinery or plant equipment, the control panel must comply with numerous guidelines. This means system integrators must be able to rely on the certifications of their hardware platform. Since there are no uniform standards as yet, manufacturers and system integrators should know their target market's safety regulations as well as the exact application of the product.

International market access is of obvious importance for all businesses. If, for example, a British company designs a control system with a circuit board for the American market, and then contracts a Chinese company to manufacture, before it performs essential testing to determine electromagnetic compatibility, it may very well be forced to change the layout of its completed circuit boards again. This is because standards in the U.S. and Europe for various aspects of the circuit boards differ considerably.

Author: Dirk Müller, Manager
Principle Engineer, Underwriters
Laboratories

UL listing assists with market access

To date, safety requirements for industrial automation technology in the U.S. are specified in the product standards for industrial control systems, UL508A and NFPA79, the counterparts to the European standards IEC/EN 61439 and IEC/EN 60204. These are granted by UL, the main certification body for product safety in the U.S. UL is a non-profit organization, and is responsible for numerous standardization processes in the U.S. For example, the standard for installation of electrical equipment, NFPA 70, also known as the National Electric Code (NEC), and NFPA 79: Electrical Standard for Industrial Machinery, refer repeatedly to UL standards.

Every year, the UL mark appears on more than 21 billion products made by more than 71,000 manufacturers. The advantage of the CB procedure is that, with a single test by UL, manufacturers can obtain the national conformity marks of more than fifty countries. Like a passport, a CB certificate allows direct market access for many countries. But, analogous to visa procedures, some countries have additional national requirements a product must meet in order to obtain market access.

In the U.S. – Canada and Mexico have different requirements for example – the National Electric Code is the applicable installation guideline for hardware platforms. Individual product and application standards for manufacturers and system integrators are described in detail. Thus industrial control panels are certified to UL508A, power distribution boards with



plug-in units to UL845 (motor control centers), power distribution boards to UL891 (switchboards), and consumer panelboards to UL67 (panelboards). The UL standards include comprehensive technical details concerning electrical product safety, flammability, and mechanical hazards.

Stricter requirements for certification

As of January 2016, the UL and IEC/EN standards for certification of drives will be globally standardized. This will reduce time-to-market even further but also once again increase the requirements for component fault testing considerably. The same rule still applies: if all safety regulations are taken into account when electrical hardware components for machinery is selected then the company will be able to provide the system integrator with all the necessary certifications, without any need for expensive redesign. This is why a hardware platform certification process is imperative for system integrators.

CB scheme speeds up time-to-market

The growing cost pressure in the field of industrial automation calls for efficient system integration; at the same time, machine and plant operators are becoming ever more demanding with regards to switching controls. For this reason, control panel manufacturers should identify what system integrators in the target markets need in advance. This is the only way to bring national specifications, such as mains voltages, permissible dimensions, or multilingual warnings and installation instructions forward into the production process.

With the CB Certificate, UL provides the Type Test Certificate, the UL Classification Mark to IEC and the UL EU Mark, as well as design support to manufacturers and system integrators at any stage of the development process. Before a company begins to design a new series, it might make sense to provide appropriate training for the designers, or conduct a preliminary study of existing lines of equipment that are similar. If the certifying body is involved from the design phase on, subsequent expensive hardware adaptations can be precluded, and stiff contractual penalties avoided. So the manufacturers and system integrators can profit equally from an “early engagement” with a certifying body like UL.

No matter whether the issue is specimens, components, prototypes, circuit diagrams, schematics, or

parts lists – the sooner the certifying body is involved, the smoother and more efficient the examination process will be, and the more certain control panel manufacturers and system integrators can be that no unpleasant and expensive surprises will occur. In order to ensure a product conforms to UL requirements, UL inspectors visit the manufacturers’ production sites unannounced at irregular intervals. For one thing is certain: without current safety certificates, access to any major international market will be impossible.

Photographs: *Underwriters Laboratories*

www.ul.com



UL certified safety cabinet



About

Company name: Underwriters Laboratories

Headquarters: Northbrook, Illinois, USA

Employees: 10,842 worldwide

Products: UL certification, validation, testing, inspections, audits, training and consultancy services



High speed imaging solution with no motion blurring due to better exposure time and sensor precision



Motion blurring due to inadequate exposure time

High speed imaging for high speed amusement

Razor sharp images of objects moving in high speeds are extremely important in industries ranging from food beverage and pharmaceutical to machinery makers. These images provide the engineer the ability to see, analyse and make adjustments to the complicated interactions of various components. Apart from the manufacturing industry, they are also important in formula-1 racing events and the roller coaster rides all over the world.

Roller coasters and souvenir pictures go hand in hand. For millions of people round the globe, the roller coasters rides are incomplete without a souvenir picture taken of them at the most thrilling point of the ride. With increasing complexities of the rides, the technical challenges in capturing those sharp images also increase. Only a specialist in vision technology can deal with this kind of specialised requirement of high speed imaging system.

Shutters: mechanical or electronic

Typically cameras with DSLR (Digital Single-Lens Reflex) technology which feature mechanical shutters are used. This system works well and provides satisfactory image solutions but it also comes with some limitations. It has a limited lifetime usually of around 100,000 exposures, before the lens assembly



needs to be replaced. These cameras also have an inadequate frame rate for the faster rides.

The alternative to this are the industrial vision cameras which have electronic shutters instead of a mechanical shutter. Exposure time is a very important factor in image capturing. If the exposure times are not appropriate, then for fast rides it means 'motion blurring'. Short or very short exposure times are needed to avoid this motion blurring for a fast moving scene like a roller coaster ride. Here short exposure time refers to the time required by the object to move by less than 1 pixel on the camera sensor during the exposure. Apart from appropriate exposure time, another important factor is precision. In order to ensure that the exposure of the camera occurs exactly when the object is in the correct position, the camera sensor must be precisely triggered. For precise triggering great care must be taken to assess and reduce all of the factors that can influence delays from initiating a signal to the resultant action in the sensor in order to ensure the required image is acquired. In the case of the rides, a number of factors affect the triggering required. These include whether the ride (car) is accelerating or decelerating, how many rows of seats there are in each car that need to be imaged, how many cars will be passing the imaging point and the spacing between the cars.

The imaging solution

Munich based machine vision specialist Stemmer Imaging was asked to design and supply the complete camera and timing solution, engineered to offer the flexibility to be adapted to individual rides, while Picsolve, an image capture partner for leisure and entertainment industry, took responsibility for the lighting and software. The system consists of a camera head mounted at the appropriate position on the ride, and a base unit containing power, trigger timer controller, opto-isolated trigger input, and network switch. The base unit also provides the trigger out to the lighting unit. The camera head features a high resolution colour camera, lens and lens controller mounted in an IP67 enclosure with integrated heater and screen wiper enabling operation in all weather conditions. The camera provides 5 MP resolution and can operate at 29 Fps in burst mode. Remote focus and aperture control is essential since the camera heads are mounted in difficult locations and need to accommodate changing light conditions. Colour imaging is a complex process which is a function of the illumination method being used and the camera technology. Addi-

tional image processing is sometimes required to allow the output image to match the colour quality of DSLR cameras. While the camera used gives excellent colour rendition under the part daylight, part flashlight illumination used on the ride an on-board colour correction capability using a colour recognition and colour calibration tool can deliver corrected colours in all lighting situations. The base unit features an ethernet-enabled trigger timing controller which provides very flexible triggering capabilities that can be reconfigured on the fly if required and offers the possibility to programme over 25 timing variations on a single ride. Picsolve software takes control of the trigger timing unit and is programmed for the specific ride to provide the appropriate triggers back to the camera.

Fast response and future-proof design

Stemmer Imaging has already shipped the first camera and base units to Picsolve for deployment at theme parks across Europe. The project took just two months from initial discussions to prototype units being delivered, with production units following soon after. Since the cameras are generally mounted in locations where access is difficult, the entire camera head is designed for easy interchange and it can be swapped in and out for service and routine maintenance. Apart from the camera's on-board colour correction capability it also has a number of other features that could be invoked in the future, if required. Firstly it contains on-board memory so if the system is used on rides which require a higher than normal image capture rate, then images can be buffered in the camera before transmission. In addition, jpeg compression is available if needed, depending on data rate constraints on the network back to the paystation.

Photographs: Teaser Fotolia, Stemmer Imaging

www.stemmer-imaging.com



About

Company name: Stemmer Imaging GmbH

Headquarters: Puchheim, Germany

Turnover: € 77 Million

Employees: 230 all over Europe

Products: Illumination systems, Optics, Industrial cameras, smart cameras and complete imaging accessories and imaging software 'Common Vision Blox'

Thermal imaging provides benefits for continuous condition monitoring



Markus Moltkau, Frank Liebelt

Presentation and delivery are critical parts of product quality. Recochem, a Canada-based manufacturer and distributor of chemical products and fluids understands this all too well. That is why the company is using thermal imaging to continuously monitor the quality of its package sealing.

01 Combining thermal and visual cameras in a small, affordable package, the AX8 provides continuous temperature monitoring and alarming capabilities



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Recochem is a Canadian owned, privately held company with a global reputation for quality products and outstanding customer service. Recochem's Americas Division is a producer, formulator, contract packager and wholesale distributor of household chemical products and automotive fluids from five locations in Canada. "Packaging is something that is really important in terms of product quality and safety," says Adam Wolszczan, Plant Engineering Manager at Recochem. "Our windshield fluid products come in jugs, which in turn are put in cardboard boxes. The integrity of these cartons that overwrap and protect our products must be maintained at all time."

One of the most cost-effective ways of sealing cartons is to use hot melt adhesive on the carton flaps. However, in the online process, the glue can sometimes be applied inaccurately or inadequately. That is why Recochem needed a solution to allow them to inspect whether the glue had been applied or not, and whether it was applied on the right position.

Efficient glue monitoring solution

"In the past, the carton integrity was determined by periodically taking boxes from the production line and destroying them for further inspecting," says Adam Wolszczan. "This was not only very time-consuming, it was also quite expensive." In their search of an efficient glue monitoring solution, Recochem decided to try a single-spot IR sensor. "Because the glue is heated, we can use temperature

Authors: Markus Moltkau,
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Development Manager
DACH of Industrial
Automation at Flir
Systems GmbH

Frank Liebelt, freelance
journalist, Frankfurt



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02 The AX8 camera is set up to look at predefined areas of the flaps where glue should be applied, and verify spot sizes and their temperatures

Benefits of advanced thermography

Flir AX8 is a thermal sensor with imaging capabilities. Combining thermal and visual cameras in a small, affordable package, the AX8 provides continuous temperature monitoring and alarming for critical electrical and mechanical equipment. The AX8 helps you guard against unplanned outages, service interruptions, and equipment failure. You'll get the benefits of continuous condition monitoring and hot spot detection without the need for periodic manual scans. The AX8 measures only 54 x 25 x 95 mm, making it easy to install in space-constrained areas for uninterrupted condition monitoring of critical electrical and mechanical equipment.

information to inspect the glue spots," says Adam Wolszczan. "However, we did not manage to install IR sensors in a position in which they could look at the bottom carton flaps. Also, the IR sensor was able to look at the applied glue on the open flaps."

Thermal imaging seeing through cardboard

Recochem's quest for an effective monitoring solution finally reached a breakthrough with thermal imaging. "I already knew thermal imaging as a technology," says Adam Wolszczan. "The company has a contractor for roof maintenance and inspection of our electrical panels, and so I knew that the technology can be used effectively to search for moisture, missing insulation and much more. I purchased a Flir

TG165 thermal imaging camera to see whether the technology could be fit for our purpose. And that appeared to be the case indeed!"

Adam Wolszczan used the TG165 to have a look at some of the boxes that come off the production line and the camera clearly showed him where the hot glue spots were located. What's more, the Flir TG165 thermal imaging camera was able to "see" through the cardboard and check the pattern and size of the applied hot melt adhesive. This meant that it was no longer necessary to destroy the boxes for inspection. It convinced Adam Wolszczan that thermal imaging technology was the path to be followed: "We contacted Flir Systems and found a suitable solution with the AX8 thermal imaging sensor. The AX8 is very affordable and very compact: just what we needed for our application."

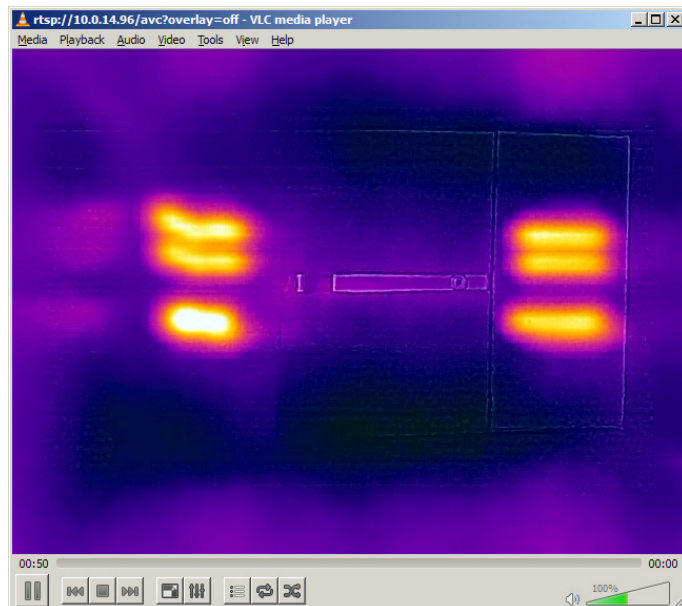
Straightforward and effective

The AX8 camera is now set up to look at predefined areas of the flaps where glue should be applied, and verify spot sizes and their temperatures. Thanks to its compact size, the AX8 thermal imaging sensor can be installed in such a way that it can look at the bottom of the box. And since the AX8 can see the heat through the carton, it is no longer needed to destroy any more boxes for inspection. The acquired video images can be viewed by an operator on a dedicated screen.

"If you look at the AX8 thermal images, then you clearly see the hotter spots where the glue has been applied. Whenever a glue gun is delayed, you see a position shift of the hot spots, so you instantly know when something is wrong. It's very straightforward and very effective."

Improved product quality

"The big advantage is that thermal imaging now allows us to spot quality problem much faster and more efficiently," says Adam Wolszczan. "The thermal image is very convenient for our operator, whereas a single-spot IR sensor just gives you an on/off switch as the box moves along the sensor without any further information."



03 If you look at the AX8 thermal images, then you clearly see the hotter spots where the glue has been applied. Whenever a glue gun is delayed, you see a position shift of the hot spots, so you instantly know when something is wrong

"We are not only able to offer a better product to our customers; we also save a lot of time. If you consider that previously, our operators needed to destroy a box every 10 to 15 minutes for further inspection, and if you know that our production line is operational five days a week, for a good portion of the year, then you realize the amount of time and money we save is very significant."

Photographs: Teaser fotolia

www.flir.com



About

Company name: Flir Systems, Inc.

Headquarters: Wilsonville, Oregon, USA

Turnover: \$ 1.5 billion (2013)

Employees: 2,800 worldwide

Products: thermal imaging systems, visible-light imaging systems, locator systems, measurement and diagnostic systems, and advanced threat detection systems for all industries