

# WORLD OF INDUSTRIES

02/2017

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Deutsche Messe

MDA





# Creating new value with Industry 4.0

Dear readers,

At the end of April it will be time once again – the 70<sup>th</sup> time – for the largest competitive exhibition in the world to open its gates: The Hannover Messe. And there's still more: This is where the age of networked industry begins. Fully developed technologies for Industry 4.0 meet the market. The trade fair will be advancing this development still further with a record number of specific sample applications. More than 500 trailblazing solutions for Industry 4.0 have already been announced by exhibitors: Robots as easy to operate as a smart phone. Machines that learn from errors. And at the center: humans. The Hannover Messe 2017 will show where to create new added value as we enter the digital era in factories. And this concentrated diversity of so many innovative technologies can be experienced only in Hannover: Industry 4.0, Digital Twin, Machine Learning, Predictive Maintenance, Smart Materials, Networked and Collaborative Robots – to name just a few. Drive and fluid power technology professionals will certainly get their money's worth this year, as the most important trade fair in the world for MDA (Motion, Drive & Automation) is on board again. The expected 1200 manufacturers of drive and fluid power technology will be emphasizing efficiency, intelligence and quality. Their services are crucial in matters of machine quality. Mechatronic modules or CPS modules (Cyber-Physical System) are a key element in the exhibitor presentations. They are important enablers for efficient and intelligent production processes. In this way manufacturers are achieving seamless networking with the control and manufacturing level, thereby making an important contribution to the factory of the future with intelligent, self-optimizing and independent production processes. And let us not forget this year's partner country: Poland will be presenting itself to international industry professionals at the Hannover Messe as an attractive partner in many different industries. About 150 Polish companies are expected. As you can see, this year's event will not only attract 6500 exhibitors with more than 200,000 visitors, it will open up fresh new perspectives, point out the complete potential of digitization for added value and win new markets – very much in keeping with the motto "Integrated Industry - Creating Value." – We took a peak behind the curtains and technologies for you. So leaf through our latest issue and let yourself be inspired. See you in Hannover!



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8<sup>th</sup> year (2017)

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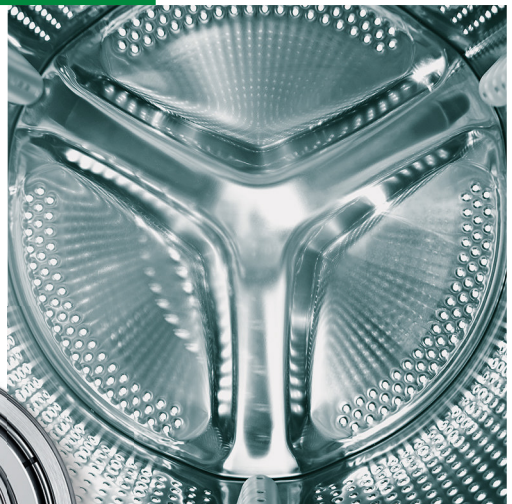
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# our big picture

## THE MOUNTAIN SAW

*Without traffic disruption, on the Autostrada Adriatica, which connects the north of Italy to the heel of the boot, the two tunnels of the Montedomini Tunnel have been widened from two to three lanes. In the existing tunnel, near the port city of Ancona, a further tunnel was built through which the traffic could keep flowing while people and machines worked in the cavity between the two tunnel ceilings. For this purpose the Italian Palmieri Group designed an eight-and-a-half meters long chainsaw, which sawed the new arch of the tunnel in the rock. The technology was faced with extreme conditions: the machine had to endure a lot of dust, heat and moisture. Palmieri therefore settled for a Hägglunds hydraulic motor and a closed hydraulic system by Rexroth, through which the fluid was pumped using two axial piston variable pumps.*

Photograph: Palmieri S.p.A.

[www.palmierigroup.com](http://www.palmierigroup.com)







Ancona





# Germany: the euro zone's growth engine

*Despite all the geo-political volatilities, like the Brexit, US election, China losing its economic momentum and the refugee crisis in Europe; Germany has still managed to keep its economic growth engine right on track.*

For German economy, 2016 ended on a positive note. The strong economic activity in the last quarter of 2016 accelerated the annual GDP more than any analysts could have predicted. The annual GDP rose to 1.9 % in 2016, beating a 1.8 % estimate. This growth is mainly attributed to stronger private and government consumption. Private and household consumption benefited from a drop in the unemployment rate, which is now at the lowest level since the country's reunification more than a quarter of a century ago. At the same time, government spending was boosted by costs related to the provision, assistance and shelter for more than 1 million refugees. Exports grew by 2.5 %, with imports also registering a growth of more than 3 %. Adding to the positive storyline, the German government achieved a record fiscal surplus of € 24 billion (0.8 % of GDP) in 2016 for the 3rd consecutive year, despite the high added cost of the refugee crisis. The positive trends witnessed in 2016 could also be seen in the first quarter of 2017. According to the monthly evaluation reports, German manufacturing PMI (purchasing managers' index) stood at 56.4 in Jan and 56.8 in Feb 2017. This was slightly below the preliminary estimates of 57.0. This index reflects the manufacturing activity, new orders, export orders, and employment numbers. A score above 50 indicates expansion in the sector. Some leading economists have raised the forecast for German GDP and now expect the economy to expand 1.6 % in 2017 instead of the 1.3 %.

## Forecasts for engineering sector: Steady export growth expected

For more than 50 years, industrial exports have been the backbone of Germany's constant rise on the world stage. Automobiles, industrial machinery, electrical machinery and precision machines are responsible for nearly 50 % of its export revenues. The U.S., China and major EU economies have been Germany's top export partners for a long time. Economists at the German Mechanical Engineering

Federation 'VDMA' see good reasons to anticipate positive development, albeit moderate and weighed down with risks of setbacks due to political uncertainty in US and Brexit.

In 2015, export revenue as a percentage of total revenue reached 49.7 % in the manufacturing sector. Since exports represent such a large share of German industrial revenue, let's take a look at the mechanical and electrical engineering sectors, which represent the majority of Germany's exports.

## Mechanical engineering:

Germany's mechanical engineering industry with an export ratio of 62.5 % relies heavily on domestic production. In 2015, total German mechanical engineering exports rose by 1.7 %. Exports to China have started to show decline in the last 2 years mainly due to a slow-down in capital investment and growing competition from local suppliers. However, exports to the USA are rising with some sectors recording double-digit growth. German mechanical engineering should receive a slight boost from the sluggish but relatively stable economic recovery in western Europe, as well as the robust economic climate in eastern Europe (excluding Russia).

## Electrical engineering:

In the electrical engineering sector which includes computer, electronics, optical products and electrical equipment, total exports rose by 6 % in 2015. The demand for computer, electronic and optical products is expected to be stronger in western Europe as compared to the demand for electrical machinery. In China, even though the mechanical sector was struggling to gain some traction, the electrical engineering products are seeing a decent rise in demand. In the coming years, Poland is set to become one of the three most important drivers of macroeconomic demand. Exports to Poland, the Czech Republic and Hungary together accounted for over 11 % of total exports by the German electrical engineering industry in 2015.

In the last few years, China is losing momentum and uncertainties in other major markets are set to make German exports vulnerable. Therefore, in order to maintain high volumes and growth rates, Germany needs to increase its focus on exports to countries like India, Saudi Arabia, Iran, Vietnam and Indonesia.

## Germany's trade surplus

Steady economic growth and low unemployment led the German government to record a total surplus of € 23.7 billion (0.8 % of GDP). In absolute terms, this was the highest surplus achieved by the government since German reunification. Recently, Germany was fiercely criticized over its massive trade surplus from Eurozone

**Author:** Sushen Doshi, International Correspondent for World of Industries - Motion, Drive and Automation



politicians and Trump's administration in the US, who are blaming Germany's export policy and the Euro for the economic imbalance. Critics believe that Germany's trade balance can be systematically manipulated with the exchange rate. But with today's integrated global value chains, even industrial exports now consist many imported inputs, which means, the effect of exchange-rate fluctuations on prices and the trade balance is no more a dominant factor. Germany owes its export success to its strong market position, competitiveness through innovation and the pricing power of its highly specialized manufacturing champions. Even Prior to adopting the common currency, these were the central features of Germany's Wirtschaftswunder ("economic miracle").

Germany's trade surplus reflects the competitiveness of its exports but at the same time it also shows the lack of imports and government spending and investments. It has one of the lowest public-investment rates in the industrialized world. Germany should improve its digital and transportation infrastructure; strengthen market mechanisms to encourage more renewable-energy development; address its shortage of skilled labor; change its taxation policy provide incentives to invest; and reform its regulations to reduce uncertainty. With a general election coming up in September, Chancellor Merkel might be under pressure to debate more on the issue of trade surplus or increase public spending, as voices in Germany rise for fiscal loosening. But in a country where voters view fiscal prudence favorably, it is unlikely to see a major turnaround.

## Industry 4.0: opening new avenues

In the words of German Chancellor Mrs. Merkel "Industry 4.0 is the comprehensive transformation of the whole sphere of industrial production through merging of digital technology and the internet with conventional industry." In short, everything in and around a manufacturing operation including the production process, the factory, the suppliers and distributors, even the product itself is digitally connected, providing a highly integrated value chain.

Industry 4.0 depends on a number of new and innovative technological developments:

- The application of information and communication technology (ICT) to digitize information and integrate systems at all stages of production
- Cyber-physical systems that use ICTs to control physical processes and systems involving embedded sensors and intelligent robots
- Network communications including wireless and internet technologies that serve to link machines, devices, work products, systems and people, both within the manufacturing and with suppliers and distributors
- Simulation, modeling and virtualization during product design and the establishment of manufacturing processes;
- Collection of vast quantities of data, and their analysis, immediately on the factory floor or through big data analysis and cloud computing; and intelligent tools of predictive maintenance

In all these sectors, be it ICT, Cyber-physical systems, Network communications or Simulations, German companies already have immense technical expertise, which makes Germany and its companies not just relevant but in fact market leaders right from the start. Industry 4.0 is expected to have a major effect on global economies. A report from the European Commission says industry 4.0 can deliver estimated annual efficiency gains in manufacturing of between 6 % and 8 %. The Boston Consulting Group predicts that in Germany alone, Industry 4.0 will contribute 1 % per year to GDP over the next ten years, creating up to 400,000 jobs. Historically, technological revolutions have created new jobs and the requirement for different kinds of roles. The nature of manufacturing work has been shifting from largely manual labor to programming and control of high performance machines. As in the past, some jobs will

evolve, some will be eliminated, and others will be created. Workers who are able to make the transition to Industry 4.0 may find greater autonomy and more interesting or less arduous work. Employers need personnel with creativity and decision-making skills as well as technical and ICT expertise. By 2020, labor markets in the EU could be short of more than 800,000 professionals; this shortage may be even more pronounced in advanced manufacturing settings where big data analysts and cyber security experts are required.

Photograph: Lead Fotolia

## 'An application of Industry 4.0 based technologies in manufacturing set up'

The Siemens electronics plant in Amberg (Germany) produces customized PLCs in a state-of-the-art 'smart factory' where product management, manufacturing and automation systems are integrated. Intelligent machines coordinate the production and distribution of 950 products with more than 50,000 different variants, for which roughly 10,000 materials are sourced from 250 suppliers. By linking intelligent machines with data-rich components and workers, innovation cycles can be shortened, productivity raised and quality improved: the Amberg plant now records only 12 defects per million (versus 500 in 1989) and has a 99 % reliability rate.



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# Hannover Messe 2017 to emphasize on the benefits of Industry 4.0

*Over the last few decades, Hannover Messe, the world's largest industrial trade fair, has been a place for demonstrating leading industrial technologies and innovations. In a lot of ways this event showcases the direction in which the industrial world is heading.*

On April 24<sup>th</sup>, the gates for the world's largest industrial trade fair, 'Hannover Messe', will be open for everyone. The show organized by Deutsche Messe AG, runs from 24<sup>th</sup> - 28<sup>th</sup> April in Germany's northern city of Hannover. Over the last few years, the focus of this event has been digitalization of the entire industrial ecosystem. Many innovative companies have displayed various applications in this context, but at this year's Messe we can see the technologies needed for the successful digitalization of industries are fully developed and ready to be implemented. Small or large, all sorts of companies have a multitude of high end technologies like Industry 4.0, integrated energy networks, machine learning, predictive maintenance and collaborative robots (cobots), to choose from. Decision makers, at all levels often find themselves in a spot, where it becomes difficult for them to predict what value these modern technologies can add to their organization. This is where Hannover Messe 2017 comes in. The challenge now is to make these decision makers and industry professionals understand the direct and long term benefits that digitalization offers to their organization.

Speaking at an event, Deutsche Messe's Managing Board member Jochen Köckler said that "Challenging people to 'think outside the

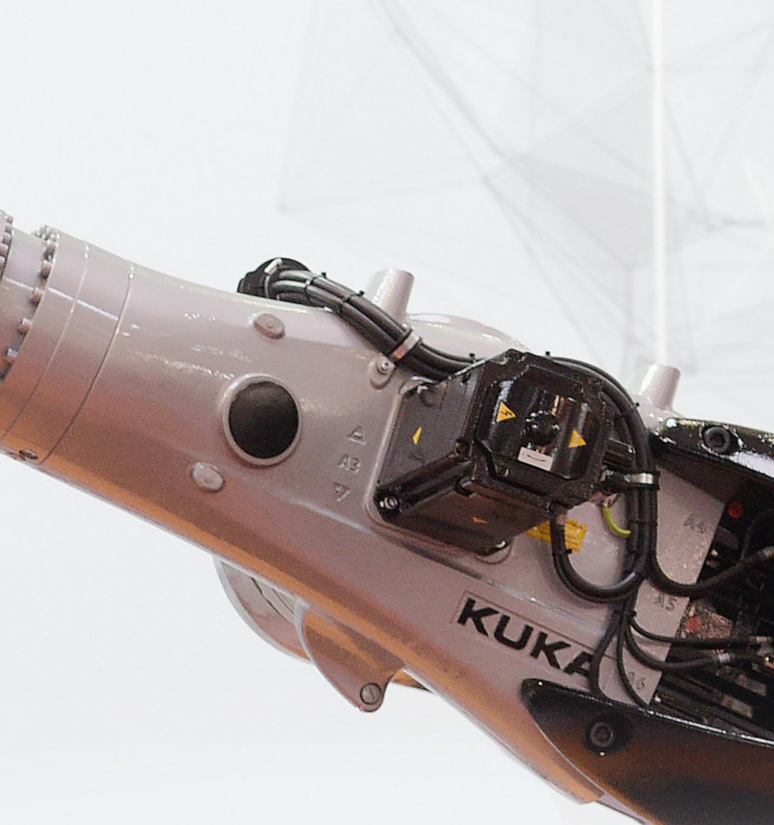
box,' highlighting the various ways in which digitalization can add value, and opening up new markets - that's what this year's Hannover Messe is all about, with its lead theme of Integrated Industry - Creating Value. The show will have around 6,500 exhibitors and will feature Poland as its official Partner Country."

## Trade Fair Line Up

Hannover Messe covers a wide range of themes with its 7 international leading trade fairs, at the same time and under one roof. The topics and exhibits covered at Hannover represent the most fundamental industry sectors like - Industrial Automation, Motion Drive and Automation, Digital Factory, Energy, Compressed Air and Vacuum Technology, Industrial Supply and Research Technology. The Industrial Automation show is one of the world's leading trade fair for factory and process automation and Robotics. At the Motion Drive and Automation show, manufacturers of power transmission and fluid power technologies feature prominently in Hannover. It is one of the most important trade fair for the manufacturing sector, attracting more than 1200 exhibitors and 80,000 visitors from around the globe. The strength of the show's international reach can be seen from the fact that it draws about two thirds of its exhibitors from abroad. The Digital Factory is a unique trade fair for industrial IT solutions and integrated processes. The exhibitors at Digital Factory present a full array of solutions for tomorrow's smart factories - for example, production planning and control software, data exchange concepts, virtual product development systems and tools for predictive analysis.

Cobots, Artificial intelligence, these are exciting topics in the manufacturing industry. But neither the factory of today nor





tomorrow runs without compressed air and vacuum technology. The ComVac show covers the complete range of compressed air and vacuum technology, from generation and processing to pumps and measuring instruments to financing and management. The Industrial Supply show covers wide variety of sectors from lightweight construction, sheet metal working, surface technology, engineering ceramics and highly complex machining technology. The visitors benefit from the sheer range of solutions this trade fair provides.

## Creating new business models

When Jochen Köckler talks about opening new markets at this year's Hannover Messe, it means a lot more than just acquiring new clients and customers. A lot of companies all over the globe talk about smart factories and advanced manufacturing, but Hannover Messe with its lead theme of Integrated Industry means much more than smart factories and smart production. The goods produced by smart factories will stay connected with their manufacturers throughout their service lives, supplying a constant stream of valuable data. This data will enable the manufacturers

## The motto of Hannover Messe 2017 is

### "Integrated Industry - Creating Value". What does it mean?

Decision makers in the manufacturing and energy sectors need to identify which advantages of digitalization they can use to increase their competitiveness. Hannover Messe showcases the complete value-adding potential of digitalization, so expect to see not only the latest products and technologies, but also new concepts, new business models and new markets.

#### Which innovations do you expect for the show – especially in the field of Industry 4.0?

The Hannover Exhibition Center is completely booked with 6,500 exhibiting companies this year. The highlights include robots that are as simple to operate as smartphones, machines that learn from their mistakes and digitally integrated and controlled energy systems. Plus, we have top trends like Industry 4.0, Digital Twin, Predictive Maintenance, and Smart Materials. Workforce development is also crucial in the digital age, so expect more technologies like augmented reality, smart glasses and tablet computers.

#### Poland will be the partner country. What do you expect from this partnership?

Partner Country Poland will promote three key points at Hannover Messe: reindustrialization, increasing foreign trade and promoting Polish innovation in industry. Many Polish companies offer Industry 4.0 technologies, which makes them attractive partners for foreign companies. Poland will showcase roughly 150 exhibiting companies across all sectors of the fair, with especially big contingents in the energy and industrial subcontracting halls. Partner Country Poland will further strengthen business and scientific cooperation between Poland and all countries at Hannover Messe.

#### Why should engineers and technicians come to this year's Hannover Messe?

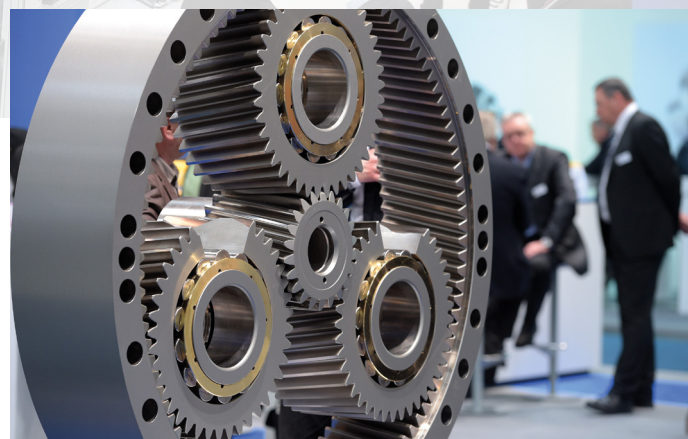
Because Hannover Messe covers all important industrial topics, from Integrated Industry and Integrated Energy to lightweight design, applied research and startups. No other event in the world provides such a complete picture of global industry.



**Dr. Jochen Köckler, Member of the Managing Board  
Deutsche Messe AG**



# Industrie 4.0 goes live. Here at SmartFactory<sup>KL</sup>



to develop additional web-based services and to pursue new business opportunities outside the boundaries of traditional industries. At Hannover, companies demonstrate how digitalization can create innovative and highly customized solutions more quickly than ever before. The biggest potential of digitalization lies in the development of completely new business models. Hannover Messe is increasingly turning into a platform for partnerships between IT companies and engineering firms, or between startups and major corporations; something which was previously unheard before.

## Rise of the 'Cobots'

Hannover Messe gives prime importance to collaborative robots or 'Cobots', as they are known. Cobots are designed to work alongside human workers, assisting them with a variety of tasks. The biggest advantage these Cobots provide is that they are as simple to operate, just like a smartphone. Moreover, they are affordable, self-learning and they can be placed in small-spaced assembly lines. They are highly adaptable and they are flexible to handle repetitive, boring and ergonomically challenging tasks. As time goes on, these Cobots are getting cleverer and cheaper to buy, making them a cost-effective gateway to the benefits of Industry 4.0, particularly for smaller companies. Much like drones today, cobots will eventually develop into a mass market that will give rise to a wealth of totally new business ideas.

## The Energy show: showcasing tomorrow's energy system

Digitalization is transforming the energy industry. The energy system of tomorrow will be fundamentally different from today's system which is based on centralized power plants. Creating a futuristic energy system is not just about digitalizing all the individual components. It requires a highly co-ordinated effort involving all the key players and technologies from energy generation, storage and transmission to distribution. Under the banner 'Integrated Energy' at Hannover, leading companies from all over the industrialized world cover a wide spectrum of topics including integrated and smart grids, renewable energy, decentralized supply, energy

storage, energy efficiency. With more than 1200 companies taking part in the Energy Show on a combined display area of 43,000 m<sup>2</sup>, Hannover Messe is about to shape the future of our energy systems. The Integrated Energy Plaza's forum programs are organized by the German Energy Agency (dena) in partnership with a number of German industry associations, including the VDMA and ZVEI, offers the visitors a chance to learn more about the key issues affecting industry.

## Poland: the partner country at Hannover Messe 2017

For Germany and many other EU nations, Poland is an important international trade partner. Poland's biggest trading partner is its neighbor, Germany. Machinery, automobiles and electronic equipment are amongst Poland's strongest segments. In 2016, imports and exports generated total foreign trade of more than € 350 billion for Poland. Germany is responsible for 23 % of all Polish imports and 27 % of Poland's exports. As the Partner Country at this year's show, Poland wants to send a clear signal that the Polish government sees re-industrialization as one of its most important objectives. Hannover Messe 2017 will be officially inaugurated by German Chancellor Angela Merkel and Polish Prime Minister Beata Szydlo.

Photographs: Deutsche Messe AG

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# Welcome Poland

## Partner Country 2017



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## Partner Country 2017: Poland at its innovative and dynamic best

*At the world's leading trade fair for industrial technology, Poland will be stepping on the stage in front of an international audience to make its case as an attractive partner in a large and diverse range of industries.*

Innovation and growth are two key areas in which Poland is set to shine as the official Partner Country at Hannover Messe 2017. Apart from domestic re-industrialization, the country's main economic focus is on opening up foreign markets and supporting innovative Polish companies. Poland has been enjoying rapid and stable economic growth for many years and is one of the five most dynamic economies in the European Union. According to Germany Trade & Invest (GTAI), Poland's combination of strong gross fixed capital formation and EU funding are a boon to the mechanical and plant engineering industry, with Poland's machinery imports increasing by 12 % in 2015 alone. Sales of metalworking machinery

also grew by a double-digit figure over the same period. Demand for new technology is booming in Poland's energy sector. In 2015, the sector's import-to-GDP ratio increased by 16 % on the back of sustained investment in electric generation and distribution infrastructure.

"Being next-door neighbors, Poland and Germany are already strong partners. At Hannover Messe 2017, Poland's industrial sector will demonstrate its innovative spirit and its dynamic uptake of digitalization – factors that make it a key player on the global stage," remarked Jochen Köckler, a member of the Managing Board of Deutsche Messe, the trade show's organizer. A Polish Economic Development Ministry official explains his country's objectives heading into Hannover Messe 2017: "As the Partner Country at this year's show, Poland wants to demonstrate that it is not just interested in rapid economic development for its own sake. Our country's development must be sustainable and it must be driven by an innovative industrial base. Among the core components of this base I would name industrial automation and industrial IT, energy, alternative powertrain solutions, and compressed and vacuum-air technologies. Another objective of our Partner Country showcase is to send a clear signal to the EU that re-industrialization is the way forward for us all."



## Poland's Morawiecki Plan

Poland's government has in fact clearly set out its economic policy direction in what has come to be known as the 'Morawiecki Plan'. Apart from re-industrialization, the plan gives priority to support for innovative companies, to digitalization, and to greater development of foreign markets. Under the plan, Poland also wants to remain an attractive destination for foreign direct investment, while at the same time encouraging private domestic investment. Digitalization of Poland's manufacturing processes is certainly proceeding rapidly, with digital manufacturing technology accounting for 4.1 % of the nation's GDP in 2015. Moreover, the Polish government is actively supporting the process of economic digitization with an extensive program of financing options for the R&D sector. Another core focus of Poland's overall economic strategy is energy. The renewable portion of the country's total energy mix currently sits at just 7 % but is prioritized for expansion.

Around 150 Polish companies will exhibit on about 43,000 sq. ft. of display space spread across all of Hannover Messe's 7 constituent trade shows. The Partner Country showcase will comprise theme-specific group pavilions in many of Hannover Messe exhibition halls. For instance, NCBR, the National Center for Research and Development, will be running a pavilion at the Research & Technology show in Hall 2. Meanwhile, the Polish government's central pavilion will be in Hall 3. This is the heart of the showcase and will feature group presentations by ten of the country's provinces. There will also be Polish group pavilions dedicated to industrial subcontracting (**Hall 4**), the foundry industry (**Hall 5/6**), electrical engineering (**Hall 13**), heating and cooling supply technology (**Hall 27**) and electric transportation (open-air site).

Photograph: Deutsche Messe AG

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Power Transmission Engineering  
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# New Edition: VDMA Directory 2017

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# Innovations you definitely shouldn't miss at Hannover Messe



## Encoders with high precision and signal quality

Faulhaber expands its portfolio with the high-precision IER3 and IERS3 encoders. Both encoders are highly precise and have an excellent signal quality, thanks to the optical measuring principle. A DC-micro-motor or brushless servo can be positioned with an accuracy of 0.1 to 0.3° with the IER3 and IERS3. Encoders are therefore the ideal solution for

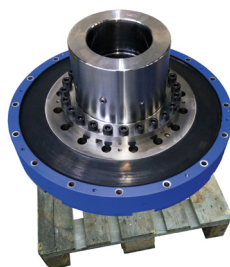


high-precision positioning applications. These encoders form a single-chip opto-reflective system, as the LED, photo-detectors, the analysis unit and interpolation levels are installed in one chip. Both encoders are available with Line Driver, which generates complementary output signals and makes the transmission of data particularly resistant to electrical interference. The IER3 provides the highest resolution for its class (up to 10,000 lines per revolution). The encoder achieves an angular resolution of 0.009° with the evaluation of 40,000 edges per revolution. The high resolution results in high control dynamics and precise speed control.

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## Highly reliable couplings for engine

The couplings experts at Reich-Kupplungen have designed the new highly flexible TOK couplings specifically to meet the high require-



ments of engine manufacturers and test bench operators. The design of the TOK series manages the critical resonance frequencies of the drive train to below the operating speed range. By employing torsional vibration calculations and dampening the alternating torques generated by the engine's combustion process, all the drive components are protected against critical shocks and loads, thus increasing the service life and availability of the entire installation. Designed for speeds of up to 10,000 rpm, they offer a high torsional flexibility and torque transmission capacity from 100 up to 70,000 Nm and are particularly well suited in test benches for combustion engine testing. Their design also permits them to be used on flexibly mounted engines in various drive trains. It comprises coupling sizes for a torque range from 1 600 to 140,000 Nm.

[www.reich-kupplungen.com](http://www.reich-kupplungen.com)

## New high-tech seal materials from COG

Today, the requirements for seals are getting more and more complex. Companies now require seals to be temperature, vapour, pressure and chemical resistant. For such applications, the company, COG has developed a new range of high quality 'FFKM' material 'COG Resist'. The company launches 4 new compounds: 2 universal materials, 1 special FFKM compound for use in the oil & gas industry and 1 for the food & pharmaceutical industry. The 2 universal materials, COG Resist RS 75 AL and RS 80 AL demonstrate outstanding resistance to chemicals, acids and a low gas permeability. RS 75 AL is heat resistant up to temperatures of 325 °C,



and RS 80 AL up to +260 °C. The COG Resist RS 92 AED seal material was developed for applications where resistance to explosive decompression, high pressure, extraordinary chemical and thermal resistance is required like the oil and gas sector. COG Resist RS 75 HS developed for the highest demands of the food and pharmaceutical industries.

[www.cog.de](http://www.cog.de)



## IMI Precision Engineering launches 4 new products

Visitors to IMI Precision Engineering's booth can experience various fluid and motion control technologies through a highly interactive display. The company is transforming its IMI Norgren product range by launching a new generation of 3 platform pneumatic products. ISOLine, an advanced range of ISO



standard pneumatic cylinders offers improved performance and a 'fit and forget' system that adjusts the cylinder cushioning to changing loads. A new generation of flange valves is being added to the IMI Buschjost range. The valve piston features a proven Labyrinth technology that makes it robust enough to withstand surges in back pressure.

[www.imi-precision.com](http://www.imi-precision.com)

## Energy and data transmission



The single-cable technology can contribute greatly to save material costs and space, by achieving power supply and data transmission through one single cable. Kübler's single-cable technology is based on the proven RS485 hardware architecture - this architecture is a widely established standard in many frequency converters. The interface is fully digital, open-source for the sensor and the drive system, SIL3 - capable and perfectly suited for dynamic axes with very high accelerations, uniform speed control and best positioning accuracy possible. Kübler encoders with the single-cable technology are ready for Industry 4.0.

[www.kuebler.com](http://www.kuebler.com)

## Baumüller's servo converters talk Powerlink

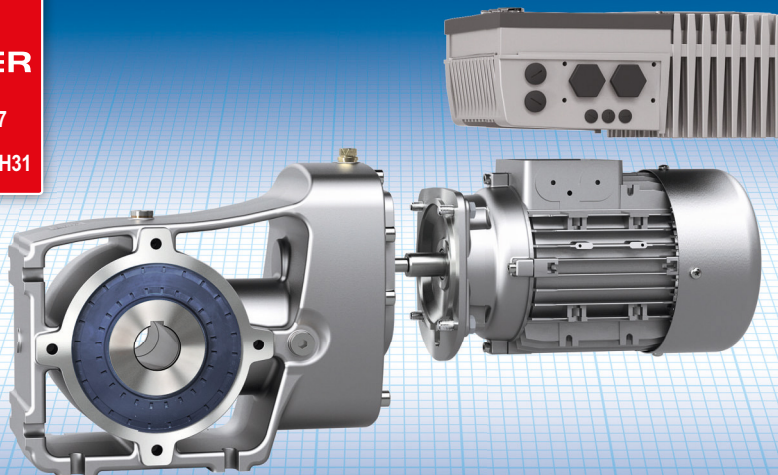
Baumüller, is now offering its servo converter series 'b maXX' with a certified powerlink interface. The series consists models such as b maXX 2500, 3300, 4400 and 5000, all of which are now available with a certified Powerlink interface. In addition to EtherCAT, Baumüller also supports powerlink and standard Ethernet as well as fieldbus systems, such as Sercos, EtherNET/IP, CAN-open, ProfiNet IRT and Varan. With the software modules from Baumüller, mechanical engineers and machine users benefit from pre-programmed comprehensive features, which simplify the commissioning of its servo converters on powerlink networks considerably and thus help achieve a faster time-to-market and high level of error security.



[www.baumueller.de/en](http://www.baumueller.de/en)

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# Worldwide News

## Mann+Hummel establishes new office in Colombia

In February 2017, Mann + Hummel opened an office in Bogota and therefore for the first time has its own business premises in Colombia. The filtration specialist with headquarters in Ludwigsburg, Germany has already opened a sales company in the South American country in November 2016. They will primarily support automotive aftermarket customers and industrial customers in Colombia, Ecuador and Peru. Products and solutions of the brands Mann - Filter and WIX Filters will be provided. As a result of this new location, the company is now represented in South America with 9 locations in 4 countries. Josef Parzhuber, President & GM Automotive Aftermarket at the Mann + Hummel Group says: "After Brazil and Argentina, Colombia is the third largest economy in South America and its automotive market is characterized by a significant growth potential. This allows us to strengthen our position at the continent. We are close to our customers in terms of location and the solutions we offer."



[www.mann-hummel.com](http://www.mann-hummel.com)

## Kisssoft acquired by Gleason

US manufacturer Gleason has acquired Kisssoft, the Swiss developer of design software for tooth systems and gearboxes. Gleason reports that together they will be able to "offer added value by directly connecting drafting and production know-how," adding that design efficiency can also be "radically improved" now. The entire management and staff of Kisssoft are being acquired. Gleason is a leading provider in the development and manufacturing of machines for the production of gears including accessories, automation solutions and plastic gears.



[www.kisssoft.ag](http://www.kisssoft.ag)  
[www.gleason.com](http://www.gleason.com)

## Siemens Mechanical Drives division to become independent

Siemens is restructuring its Mechanical Drives division. To expand its scope of action, it will act in the future as an independent company. The reason for this is that the market environment is currently marked by weak growth, which is associated with growing competition from the Asian region, excess capacities and accompanying price pressure. Siemens is also planning to invest in its locations worldwide and its product portfolio. With two

brands on the market, Flender and Winergy, the Mechanical Drives (MD) division focuses primarily on applications with high torques such as wind energy and the cement industry. The business division has about 6000 employees worldwide and belongs to the Process Industries and Drives division.

[www.siemens.com](http://www.siemens.com)

## Faulhaber strengthens its presence in Malaysia

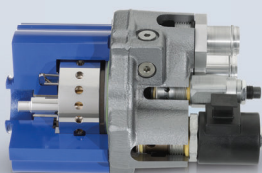
Products and services of Faulhaber drive systems have been distributed in Malaysia by Faulhaber Malaysia Sdn Bhd. since January 2017. The recently founded sales company is headquartered in Penang. "The Malaysian market has become increasingly important for us," explains Marcus Rummel, Sales Director of Faulhaber and Managing Director of Faulhaber Malaysia. "On the one hand we have business transfers to Malaysia, on the other hand there is a growing demand for products offered by domestic companies. The company's own new branch brings our customers even closer. We are looking forward to exchanging ideas with them in extensive discussions about our joint development efforts for products tailored to individual customers. Our presence on site will be a milestone in the further development of the Malaysian market."



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## WEG acquires steam turbine manufacturer in Brazil

Drive technology manufacturer WEG has acquired TGM, the Brazilian manufacturer of industrial steam turbines and gearboxes. Located in the state of São Paulo, the company is a leading provider of drive solutions for generating electrical power in South America. TGM drives are used mainly to generate electrical power from thermal and renewable energy sources, especially wind



energy. The company also produces mechanical gearboxes for fans, blowers, shredders, water pumps, grinders, sugar cane straightening machines, turbo compressors and fans as well as industrial processes. In addition to the headquarters in

Sertãozinho, the company has two branch offices in the Brazilian cities of Maceio and São José dos Campos, as well as an office in Nuremberg, Germany. The company has about 1000 employees, including 75 at the office in Germany, TGM Kanis Turbinen.

[www.weg.net](http://www.weg.net)

## Reintjes opens a new office in England

Drive specialist Reintjes is pleased to be able to offer its customers around the world another contact point in the market. The new Reintjes Britain & Ireland office was the outcome of the previous sales partner, European Marine and Machinery Agency, shutting down in the mid 2016. With headquarters in South England, the new branch will be serving the markets in the United Kingdom and Ireland. The office will be managed by the Reintjes Benelux subsidiary in Antwerp, Belgium. Philip Martin will take over management on site, bringing with him many years of experience in the drive sector. Before coming to Reintjes, Philip Martin's responsibilities included the United Kingdom and Ireland markets for MAN Diesel & Turbo UK Ltd, including both slow and medium-fast running engines as well as turbochargers, propellers and drive systems.

[www.reintjes-gears.com](http://www.reintjes-gears.com)

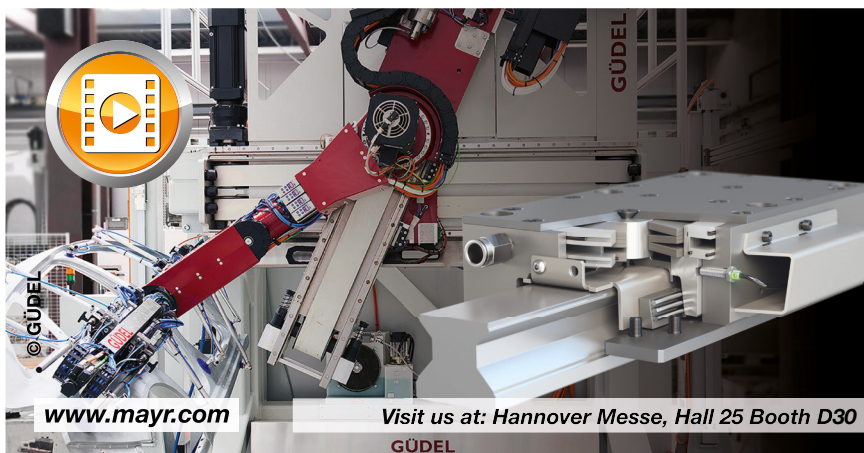


## Schaeffler's net income for 2016 rises by 45 %, creates 2,500 new jobs



Global automotive and industrial supplier, Schaeffler continued its successful run in 2016. The company increased its revenue to € 13.3 billion. At constant currency, this represents a growth rate of 3.4 %. Net income of the parent company increased by 45 % to € 859 million. The company lowered its net debt by € 2.3 billion in 2016. Last year, Schaeffler invested around € 1.1 billion for capacity expansions and machinery. The company also generated around 2,500 new jobs. The Automotive division for Schaeffler was the main driver of growth with 6 % revenue rise at constant currency. The Industrial division declined in a challenging market environment. Its revenue declined by 4.8 %. Region-wise; Revenue in Europe was up 1.8 %, the Americas were stagnant and driven by the automotive business, revenue in the Greater China and the Asia/Pacific region increased by 13.3 % and 4.7 %.

[www.Schaeffler.com](http://www.Schaeffler.com)



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GUDEL

# Polymer bearings: long-lasting and cost-effective alternative to metal bearings

*Today high-performance plastics are used in a multitude of applications from kitchen appliances to industrial environments. Bearings made from high-performance plastics are lubrication and maintenance-free and are increasingly superseding metal solutions.*



The “motion plastics” of igus, the plastics specialist based in Cologne, Germany, are resistant to rain, extreme temperatures and are impervious to oil and chemicals. They are also lighter and more energy-efficient as compared to metal solutions and most importantly are cost-effective. Design engineers from all over the world are now considering plastic bearings as a long-lasting and a cost-effective alternative to metal bearings. This is due to the special material properties as well as the excellent performance in motion that these high-performance plastics offer. The ability to withstand stationary stress says little about a bearing’s performance capability. The degree of wear-resistance of a bearing and how low its coefficient of friction is do not become apparent until it is used in moving applications, where wear is unavoidable. And this is exactly where the strengths of high-performance or motion plastics are.

## Largest combination of materials and dimensions

The company, igus has been developing and producing polymer bearings for over three decades under the brand name “iglidur”. The bearings are self-lubricating and therefore maintenance-free; they can withstand enormous loads and are light in weight. The materials are developed and tested in the industry’s biggest test laboratory. In an area of around 2,750 sq. metres, more than 135 billion test movements are executed each year. The result of more than 30 years of R&D, is the largest standard range of lubrication-free polymer bearings. Around 50 materials are available, including 16 full-range materials. They are in stock in at least 113 dimensions and up to a shaft diameter of at least 50 mm in accordance with DIN ISO3547; the largest catalogue bearing has an inner diameter of 195 mm. In addition, there are many materials available in the form of bar stock, liners or for 3D printing, filament or SLS powder. Polymers enable a great deal of design freedom: with little effort, even extremely complex parts can be made or their characteristics can be significantly influenced by means of specific additives. This is precisely the core competence of igus: the optimisation of technical polymers for use in moving applications.

## Wear-resistant and lubrication-free

To this end, igus has its own material development department, which is continually coming up with new iglidur materials to match specific areas of use. The individual components of the compounds are mixed homogeneously during the injection-moulding process. The excellent performance of iglidur plastic bearings derives from this homogeneous structure, whereby the basis of an iglidur bearing consists of thermoplastic polymers that ensure the bearing’s good basic resistance to wear. Fibres and filling materials increase the bearing’s load-carrying capacity. In addition, solid lubricants have been included in the material. All the components work together and result in very good sliding and abrasion properties.

In contrast, rolled metal bearings have a layered structure. The inner layer is very thin and, in the event of high loads, edge pressure or vibrations, can easily be stripped off or damaged by dust particles. Moreover, the sliding layer represents a limit to the degree of possible wear. The homogeneous composition of the plastic compounds, in contrast, is considerably more robust as the wall thickness of the bearing acts as a ‘wear zone’. Unlike iglidur bearings, which made of high-performance plastics, bearings made of metal alloys have to be permanently lubricated, a disadvantage that is cost-intensive

## About Igus

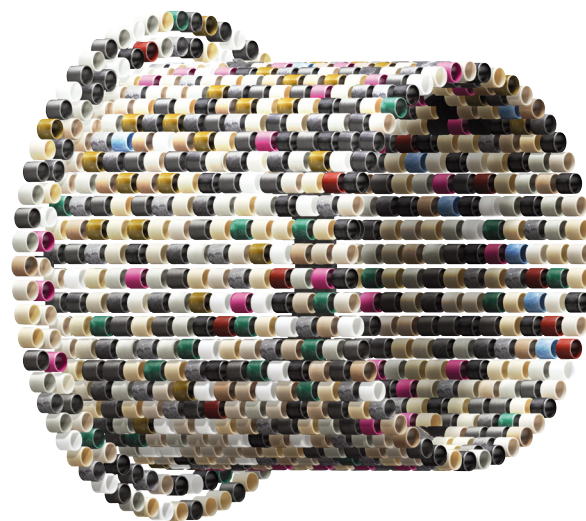
Igus GmbH is a leading manufacturer of energy chain systems and polymer plain bearings. The Cologne-based family business has offices in 35 countries and employs around 2,950 people around the world. In 2015, igus generated a turnover of 552 million euros with motion plastics, plastic components for moving applications. igus operates the largest test laboratories and factories in its sector to offer customers quick turnaround times on innovative products and solutions tailored to their needs.







**01** Igus bearings are developed and tested in the industry's biggest test laboratory on 2,750 m<sup>2</sup>



**02** Igus offers the largest standard range of lubrication-free polymer bearings. Around 50 materials are available, including 16 full-range materials

and also time-consuming. What's more, lubrication with grease or oil is becoming increasingly unpopular for hygienic and ecological reasons. Sinter bearings that are commercially available also have oil lubrication incorporated into them and are therefore not dry-operating bearings. The same applies to rolling bearings, which, especially in the case of needle bearings, are often being replaced with iglidur plastic bearings for technical and economic reasons.

## Application in agricultural machinery sector

The agricultural industry alone is a good example of the potential of plastics bearing technology from igus. The iglidur bearings that are used in agricultural machinery are extremely wear resistant and can cope with high surface and edge pressures. They are non-corrosive and resistant to impacts. Fertilizers, slurry or fuels have no effect on their ability to function. The machines can therefore be used reliably even after being out of use for a long time. Especially in agricultural environments where machines can be exposed to extreme amounts of dirt, iglidur bearings guarantee optimum functionality and long operating times. The Cologne-based company has developed special materials in the form of 'igidur Q2' and 'Q290', which are specially suitable for typical agricultural applications involving slow pivoting at high loads.

## Application in the food industry

In the food and packaging industry, the absence of lubrication also plays an important role in view of the strict hygienic and safety standards in these sectors. According to the regulations of the Food and Drug Administration (FDA), it must be ensured that products are not contaminated by lubricants or other substances. As a consequence, only plastics that are FDA-compliant and suitable for use with food are used in these sectors. In contrast to metals, plastics are always non-corrosive due to their organic structure and are also resistant to inorganic media, including acids, dyes and aqueous salt solutions. Plastic bearings from iglidur are being used by various manufacturers of food processing machines. The biggest advantage being that polymer bearings are not sensitive to water, penetrating through the seal during cleaning and maintenance, as the metal bearings are. The plastic machine elements, on the contrary, are characterised by a low level of water absorption and are resistant to chemicals.

## Special materials for respective application

For most typical bearing applications, five standard iglidur materials are used. But at the same time the demand for specific materials used for specific applications is growing. From underwater use to high-load applications, from medical technology to the automotive industry: Igus has developed tailor-made materials for all these

cases. Which material is the right one for the respective use can be quickly determined with the help of online tools such as the Product Finder, the Configurator or the Service-life Calculator. Users can click on their special requirements ("Longest service life with dry operation", "Dirt-resistant", "Vibration-dampening", "Resistant to chemicals" etc.) and indicate the permissible static surface pressure and the upper and the lower operating temperatures.

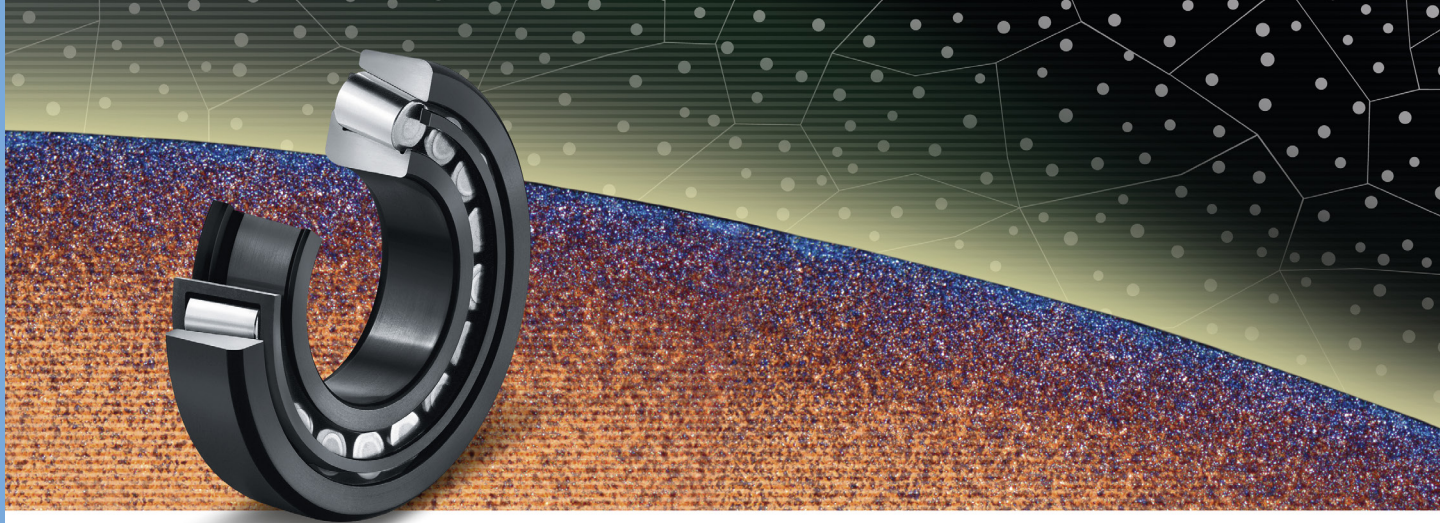
## Cost-effective polymer bearings

In all branches of industry, polymer bearings have been replacing metal bearings. For engineers, the wear-resistance, low coefficients of friction, the non-corrosiveness of the motion plastics and freedom from lubricants have become indispensable as they increase the service life of their machines and are also up to 40 % less expensive than metal bearings. New materials and properties are continually opening up further possible uses for polymer bearings, igus is continuing its research activities in the company's own technical facility. Given that development in the area of shaft materials and surface treatment does not stand still, continuous tests that react to shaft changes and are aimed at a perfect matching of shafts and bearings are absolutely critical. Especially the issue of running partners illustrates the versatility of iglidur bearings, which can be used on very different shafts – and above all on cost-effective, so-called soft shafts. This is a clear advantage over many other types of bearing. In addition to the cost benefits associated with plastic bearings, the user can also utilise a non-hardened shaft and thus reduce his costs even more. It is important to choose the shaft that is best in terms of price and performance, depending on the application in question.

[www.igus.eu](http://www.igus.eu)

**03** Find the right material with the igus product finder





# High performance rolling bearing material for particularly demanding applications

*When rolling bearings fail prematurely in the steel, mining, or railway industries due to contamination or inadequate lubrication, this ends up costing the operator many 10000 of € every day. Schaeffler has carbonitrided the new Mancrodur rolling bearing material as a solution for such difficult cases. This provides more than twice the operating life compared to standard rolling bearing materials.*

For a long time now, materials experts have been trying to make steels for rolling bearing less sensitive to contamination. This is because when a particle penetrates into the raceway of the rolling contact, the displaced material produces a bulge, which is subjected to a lot of stress every time the rolling element rolls over it. The material very quickly becomes fatigued at this spot, which leads to the formation of micro-cracks and causes the bearing to fail prematurely.

## Inadequate lubrication gives rise to friction

Inadequate lubrication can also cause micro-cracks, although the process is a different one. The tangential (tensile) stresses arising from the rolling contact in the raceway are readily tolerated with the proper design and full lubrication. However, if the lubrication in the rolling contact is insufficient, then the rolling partners touch metal-to-metal in places, with the high metallic friction between the rolling partners, it causes the temperature in the surface to go up considerably. This rise in temperature not only ages the lubricant, but also decrease the strength of the steel – even to a point where tangential decreases are able to produce micro-cracks in the bearing material.

## A material needs to be hard as well as soft!

The effects of contamination and inadequate lubrication on the material can generally be handled well with a ductile surface. The softer and more malleable the material surface, the better and faster the bulge will smoothen out, thereby reducing the high stresses around the foreign particle. No cracks are formed, and material fatigue is greatly delayed. However, this results in a conflict of interests that needs to be resolved. It is necessary for bearing surfaces to be very hard and the material to have high fatigue strength

so that the bearing will attain a load-carrying capacity as high as possible. Offering solutions to the conflict of interests, Schaeffler demonstrates its new 'Mancrodur' rolling bearing material combined with carbonitriding. Meanwhile tests results show that these new bearings have more than twice the operating life under extremely demanding conditions.

## Special heat treatment of Mancrodur

During carbonitriding, carbon and added nitrogen are embedded in the surface layer. On the one hand, this increases the surface hardness, and on the other, the heat treatment specially tailored to the Mancrodur steel forms a microstructure with finely distributed spherical carbides. In comparison, conventional rolling bearing steels have carbides with an elongated needle shape. They are not only embedded in the grains, but are also at the grain boundaries, thereby increasing the risk of crack formation. In Mancrodur, the carbides are distributed more uniformly in the material and not concentrated as much at the grain boundaries, helping to make the material more ductile. (Fig. 01 and 02). Temperature-stable retained austenite at a percentage with a tight tolerance increases the ductility of the new rolling bearing steel even more. The combined effect of these individual microstructural properties decreases the risk of crack formation considerably where there is either contamination or inadequate lubrication. The raceway surface is harder, more resistant to wear, and yet more ductile.

## Higher load rating with full lubrication

The new high-performance rolling bearing steel features two other properties as well. There is less temperature-related loss of strength due to inadequate lubrication compared to other steels, reducing the risk of micro-cracks even further. In addition, the heat treatment is set up in such a way that residual compressive stresses are concentrated on the raceway surface. These compressive stresses reduce the resulting tangential stresses (tensile stresses) caused by the rolling contact. Under normal lubrication conditions (full lubrication), carbonitrided Mancrodur offers a 30 % higher load rating due to its material composition and heat treatment, equivalent to a 240 % increase in the nominal operating life. Test results with full lubrication have shown that the operating life of Mancrodur is up to six times longer. However, in harsh environments with contamination, mixed friction, or inadequate lubrication and heavy loads – like those that can be found in the railway and steel industries and sometimes in the area of wind energy as well – it is endurance tests under difficult conditions and experi-



ence from pilot projects that really count. The field experience so far with carbonitrided Mancrodur is very promising.

## Higher operating life in steel industry

One of the largest hot strip mills of Thyssenkrupp Steel Europe (TKSE) is located at its Bochum site. The hot strip mill is specially designed for milling high-tensile quality steels. The rolling bearings need to be able to withstand 45 million Newtons at high temperatures and with a large amount of contamination. After downtimes occurred because of the premature failure of conventional bearings, TKSE installed four-row FAG tapered roller bearings made of carbonitrided Mancrodur. The international steel producer has confirmed that these bearings have a significantly longer operating life.

## Higher load-carrying capacity in wind turbine gearboxes

This is how Bernhard Köhler, Business Development Manager in the Regional Wind Business Unit at Schaeffler, describes the current situation in the development of wind turbine gearboxes: "Since design lifetimes of at least 20 years apply in the wind energy industry – corresponding to 175,000 hours – and the bearing positions more and more frequently max out the planetary bearings' load ratings, the industry is in desperate need of bearing solutions that will provide longer bearing life even under extreme lubrication conditions." With a load-carrying capacity that is 30% greater and an operating life that has now been all but proven on the test stand to be at least twice as long, the wind energy industry can once again tap into margins of higher power density and longer runtimes by using carbonitrided Mancrodur. "For instance, downsizing planetary wheel bearings makes it possible to increase the wall thickness of the planetary wheels or the ring gear within the same installation space, which is precisely where the limits of feasibility are often reached. Besides the lower mechanical load of the gear rings, the greater wall thickness also reduces their elastic deformation, improving meshing considerably," explains the specialist.

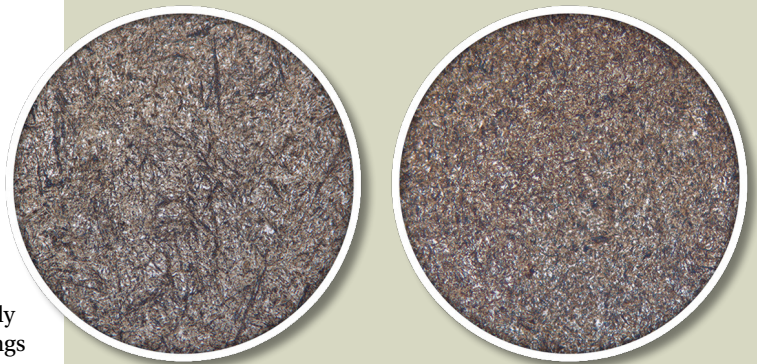
## Handling overloading in freight transport

"Occasionally, operators will look for various non-standard ways to increase the productivity of their machines and facilities. In rail freight transport, for example, this might be done by regularly overloading the freight cars with over 10% more payload than specified by the design," stresses Schaeffler Senior Manager Matthias Kilian. He goes on to say, "The overloaded bearings, such as inch-based AAR class K bearings (AAR = Association of American Railroads) with about a 157 mm bore therefore need to be replaced early and often unexpectedly. The premature material fatigue is usually the result of the mechanical overload combined with mixed friction and excessively long maintenance intervals for these load conditions."

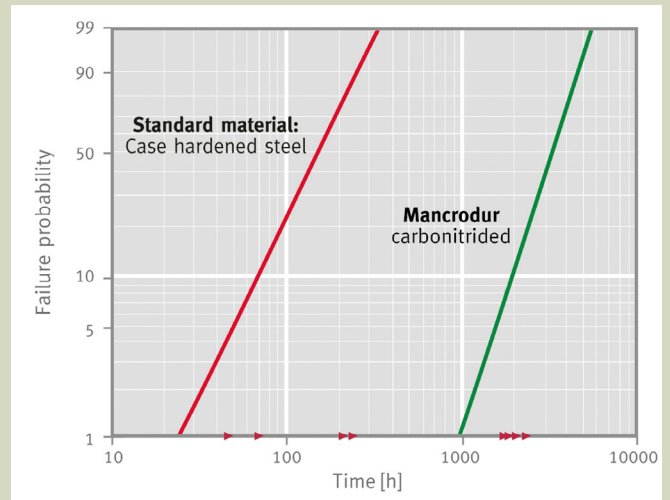
By exchanging the axlebox bearings with structurally identical bearings made of carbonitrided Mancrodur, the operator can still have the increased payloads while returning to reasonable maintenance intervals, and it will no longer be necessary to purchase new bearings as frequently. However, the greatest economic benefit for the operator comes from the fact that the cars' existing bogies can still be used. "Otherwise, the operator would have to resort to the next larger bearing series, such as AAR class G bearings with a bore that is around 20 mm larger, which would naturally make larger wheelsets, wheelset shafts, and other bogie components necessary," Matthias Kilian explains.

Photographs: Schaeffler

[www.schaeffler.com](http://www.schaeffler.com)



**01** Grinding patterns from case-hardened steels (left) and carbonitrided Mancrodur (right)



**02** Comparison of the effect of mixed friction on the operating life of bearings made of standard bearing material with that of bearings made of carbonitrided Mancrodur

Use of Mancrodur in	Wear caused by mixed friction	Increased load rating	Contamination and particle overrolling	Downsizing
Railway, wheelsets	●	●	●	●
Steel, rolling mills	●	●	●	●
Pumps, compressors	●	●	●	●
Marine drives	●	●	●	●
Mining	●	●	●	●
Vehicle transmissions	●	●	●	●
Wind power gearboxes	●	●	●	●

● Depending on the application

**03** Benefits of Mancrodur depending on application area

## About Schaeffler AG

Schaeffler Group is a leading integrated automotive and industrial supplier. The company based in Herzogenaurach, Germany, generated revenues of approximately 13.3 billion Euros in 2016. With around 86,600 employees, Schaeffler is one of the world's largest family owned companies. The group has approximately 170 operating locations in more than 50 countries with a worldwide network of manufacturing plants, research and development centers, and sales subsidiaries. Schaeffler makes key contributions towards 'mobility for tomorrow' with precision components and systems in engines, transmission and chassis applications as well as rolling and plain bearing solutions for industrial applications.

# Product News

## Measurement becomes nanoprecise

Wittenstein, the mechatronics drive specialist, will unveil the IDS3010, an Industrial displacement sensor with sub-nanometer resolution at the upcoming Hannover Messe 2017. IDS3010 is ultra-compact, highly dynamic and a contactless interferometric measuring sensor. With a data acquisition bandwidth of 10 MHz, it can simultaneously track targets in up to 3 axes at velocities of 2 m/s. The sensor provides 10-12 m position resolution and reaches working distances of up to 5 m. As officially confirmed by the German National Metrology Institute (PTB), IDS3010 enables accuracies previously unheard of in industrial position sensing. The sensor is also compatible with extreme conditions such as ultra high vacuum, very high or low temperature or radioactive environments. This innovative sensor can be used to calibrate machine tools, detect vibration amplitudes in machines, measure the concentricity of motor shafts, crankshafts and camshafts or implement ultra-precise pick-and-place robotic applications, for example in the semiconductor industry.



[www.wittenstein.de/en-en](http://www.wittenstein.de/en-en)

## New manufacturing facility in Romania for Timken's roller bearings

As a global supplier of tapered roller bearings, The Timken Company is all set to increase its market share in Europe, with the opening of another production plant in Romania. The existing plant in Romania manufactures large-bore roller bearings. The new plant will be located nearby and will complement the existing manufacturing sites for tapered roller bearings in France, Italy and Poland. This means the company is geographically well-positioned to be more responsive to customer needs at peak times. The new facility will have 120 new employees on a space of 15,000 m<sup>2</sup>. At Hannover Fair, Timken will discuss how optimized materials, surfaces, geometries, and designs can benefit manufacturers and end-users by helping reduce noise, support higher loads and prolong service life. Timken is also presenting a newly extended range of spherical roller bearings and a wide range of long-lasting and low-maintenance couplings.



[www.timken.com](http://www.timken.com)

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## Brake Technology 4.0 at Hannover Messe 2017

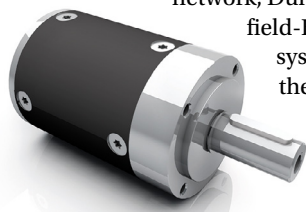
With Industry 4.0 gathering momentum, more and more companies are presenting their applications. With Brake technology 4.0, Mayr power transmission is offering reliable safety brakes, which are equipped for the challenges for the fourth industrial revolution. Brake technology 4.0 by Mayr stands for monitoring modules of the latest generation. Modules such as the 'Roba-brake-checker' allow permanent brake monitoring. These modules monitor the switching condition as well as the tension path or tension force reserve without sensors and detect safety-critical changes in voltage, air gap and temperature. On reaching the tension path reserve, the module therefore sends a warning signal indicating that the brake can continue to be operated for a certain amount of time at an early stage. During this time, the machine owner can undertake targeted maintenance. The perfectly-coordinated system guarantees utmost level of operational and functional safety, and also increases the productivity of machines through preventative fault detection and maintenance.



[www.mayr.com](http://www.mayr.com)

## Smart motors ready for Industry 4.0 at Hannover Messe 2017

As an exhibitor at the Hannover Messe 2017, the company Dunkermotoren, is set to present its wide range of DC and BLDC motors with gearboxes, encoders and brakes. The company will also display its new planetary gearbox range PLG 63/75/95, a high power version with up to 160 Nm torque. Furthermore, the drive specialist puts on display, how they set up their products for the future-factory. Integrated intelligence and sensors inside the motors are the basis for data analysis, energy and condition monitoring and predictive maintenance. For the communication inside the network, Dunkermotoren offers their motors with the latest industrial field-Bus and Ethernet interfaces. With motors and various drive systems from Dunkermotoren working at a high efficiency, they are able to support the factory's demand-based distribution of energy. A visit to company's exhibitor booth at Hannover Messe 2017 sounds fun, as the company offers the opportunity to participate in 'cash box' which promises light hearted action and prizes.



[www.dunkermotoren.com](http://www.dunkermotoren.com)

## High-temperature grease for rolling bearings

The new 'Klübersynth BHE 46-403' grease has been developed to meet the long-term requirements for lubrication of rolling bearings subjected to high loads. The innovative lubricant design of the fully synthetic, high-temperature grease reliably contributes to extending the component life across a wide service temperature range. Additives were carefully selected to provide wear and corrosion protection, and reduce frictional resistance for long runtimes. Thus, a lasting increase in efficiency can be attained depending on the component design. It was especially developed for the lifetime and high-temperature lubrication of rolling bearings subject to sliding friction, i.e. tapered roller bearings, cylindrical roller bearings and spherical roller bearings. Klübersynth BHE 46-403 can also be used as a sealing grease or for the lubrication of rolling bearing seals, thus contributing to product streamlining and minimising the risk of lubricant mix-ups.

[www.klueber.com](http://www.klueber.com)



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# Technologies for smooth port logistics

*Ports facilitate international trade and commerce. The giant cranes and ground conveyors that handle the loading and unloading of cargo are one of the most important piece of equipment for any port to be successful. In order to ensure smooth operation of these gigantic machines, hydraulics plays an extremely important role.*

Ports are an important aspect of the modern economy. They play a key role as important shipment hubs for a variety of goods. They are complex, high-performance centers and a key economic factor all over the world. In this busy environment, the international tech giant 'Continental' is doing its bit to ensure fluidity in operations, and plays a vital role in the construction of new ports.

Jade Weser Port, Germany's only deepwater port, during the construction of this mega-project, the contractors were in need of floating hoses. They contacted Continental for their hose requirements. Special-purpose hoses were used for shifting 12 million cubic meters of sand from the dredgers. Continental also supplied the high-quality, special-purpose hoses for transporting concrete to







**01** In the Batumi terminal in Georgia, highly resistant bunkering hoses from Continental transport fuel oil, carburetor fuels, and hot asphalt to and from the ships



**02** The special TractorMaster tire has been specially designed for tractor units deployed for handling operations in port terminals and forwarding agent's yards

container terminals under construction. Whether it is deepening of the port on the coast, river deepening for inland water transportation, or land reclamation for expanding terminals, companies have counted on Continental and its technological expertise wherever they require regular clearing of waterways. For these tasks, companies need highly wear-resistant hoses that are not only durable and flexible, but also meet individual customer requirements. Along with wear-resistance and flexibility, safety is of equal importance here. The floating hoses are designed to withstand three times the pressure stipulated in the planning data. The floater dredges deployed to perform such tasks are also equipped with conical mounts from Continental to ensure the required stability. These components continuously compensate for the movements and shifts in weight that occur as a result of the extreme stresses. Installed on the ring mount in the dredger, the mount ensures that the water engineering vehicle always stays on course during construction operations.

## Solutions for mobile dockside logistics

Wireless signals allow the crane operators to locate the assigned bays for goods from all over the world. Everything works fully automatically. In tandem operation, the LHM 600 Litronic from Liebherr – a mobile dockside crane for heavy goods and project cargo – can load up to 320 metric tons of general cargo. The dockside cranes move very slowly and avoid tight curves. Continental offers a range of special tires for these mobile colossi. The 'CraneMaster' tires can support extremely heavy loads and, thanks to their low rolling resistance and, in turn, lower energy consumption, meet the stringent demands of these vehicles. Meanwhile, Continental's drive solutions ensure maintenance-free, low wear solutions for lifting systems and ground conveyors. As alternatives to chain drives, polyurethane flat belts featuring ultra-high-strength steel cord tensile members are ideal for a host of challenging applications.

Continental's technology and products are also deployed for forklift trucks as well. Axle boxes help to cushion the front axles, ensuring that the chassis runs quietly. For Linde's electric stacker 386, two special axle boxes made from natural rubber were developed. These take up very little space and ensure mobility when the lift pole is tilted. The boxes absorb the three-dimensional loads generated when the stacker is in operation as follows: The load from the lift pole is absorbed vertically, while the load generated when the stacker is in motion is absorbed horizontally. In addition, the noise emissions from the forklift truck are permanently reduced. Continental also offers the special 'TractorMaster' tire for port logistics. This product has been specially designed for tractor units deployed for handling operations in port terminals. These tires allow large and heavy loads to be transported – and all that with uniform wear to

prevent the tread from tearing. The tire is highly damage-resistant, has extremely low wear, and helps to cut not only fuel consumption but also CO<sub>2</sub> emissions. And with StraddleMaster, ContainerMaster, DockMaster, and Continental CraneMaster, the highly resistant 'V.ply' tires for port fleets also help to ensure smooth operations in port environments.

In the trucks that unload the containers from the ships for onward transportation, air springs featuring lightweight plastic pistons save weight and fuel – for example, in the Mercedes-Benz Actros. Continental also develops sleeve air springs that gently cushion the driver's cab.

## Handling oils and fuels safely

Bunker hoses are used for conveying heavy fuel oil, carburetor fuels, and hot asphalt to and from the ships. Whether in Hamburg, Rotterdam, Antwerp, or Batumi, Georgia, these highly resistant hoses from Continental are essential for conveying these substances either onto dry land or onto the ships. When in operation, they have to be absolutely safe and reliable in order to avoid environmental damage. Decades of knowhow in the production of hybrid hoses lead to ever-improving product quality. And what's more, when iron ore or coal in Rotterdam, Hamburg, or Narvik in Norway needs to be extinguished, oil-resistant and fire-retardant, energy-optimized covers from Continental ensure problem-free unloading to the designated bays – highly efficient and energy-saving.

**Photographs:** lead and 01 ContiTech, 02 Continental AG

[www.contitech.de](http://www.contitech.de)

## About Continental AG

Continental AG develops intelligent technologies for transportation of goods. The company is known to be a reliable partner that provides sustainable, safe, comfortable, and affordable solutions. In 2016, the corporation generated preliminary sales of € 40.5 billion with its five divisions, Chassis & Safety, Interior, Powertrain, Tires, and ContiTech. Continental currently employs more than 220,000 people in 56 countries. As a division in the Continental Corporation, ContiTech is one of the world's leading industrial specialists. With around 43,000 employees in 44 countries, the company generated sales of approximately € 5.5 billion in 2016.



# Control technology that moves aircrafts on the ground safely

*Continuously increasing air traffic volumes are a constant challenge for ground operations at the airports. The aircraft tow tractors from the company Goldhofer, fitted with STW's control technology are a big help - providing safe, economical and flexible movement of the aircrafts on the ground.*

At "Inter Airport Europe 2015", the world's largest trade fair for airport equipment and technology, the company 'Goldhofer' presented the 'AST-2P/X', its new generation of high speed aircraft towing tractor. Using the AST-2P/X, a wide range of aircrafts from Embraer170 up to the Boeing B777-300ER and the Airbus A340 can be moved.

The AST 2 of the fourth generation is characterized by a new, compact and modular vehicle concept. The hydrostatically driven steering mechanism and axle delivers optimum traction, even in case of low superimposed load. For airport management companies that require the towing tractors, they can choose between two engine powers for the vehicle which offers a 3-circuit braking system which optimally distributes the braking force for maximum stability and safety. The engines fulfill all required international emission stan-

dards, Euro IIIa or IVf. The airplane power supply during towing operation is ensured via a Ground Power Unit (GPU), which can be retrofitted into each of these vehicles. Ground operations at airport entail a lot of waiting periods. The automatic start-stop function which is installed in the AST 2 provides a high cost savings potential. This function provides not only a substantial reduction in the diesel consumption but it also brings down the maintenance costs, as maintenance intervals depend directly on the operating hours. These factors help in reducing the "Total Cost of Ownership" (TCO).

## Drive Line Controller (DLC)

The AST-2P/X has a diesel-hydraulic drive system as its central component. It is built on a pump and two hydraulic engines, which drive a differential steering axle via a summation gearbox. The pump and the engines are controlled with electrical proportional adjustment. The energy for the drive system is supplied by a 231 KW (optional: 283 KW) Cummins QSL9 diesel engine. The drive system is controlled by the DLC or the Drive Line Controller. The DLC is responsible for managing the entire drive and limiting the tensile forces depending on the type of the aircraft. During the towing process, only a limited tensile force may be applied to the nose wheel (Fig. 1). The tensile force limitation in the DLC is realized through a dynamic, high pressure regulation, which again varies from aircraft to aircraft. In addition, the DLC is also responsible for the automatic start-stop function.





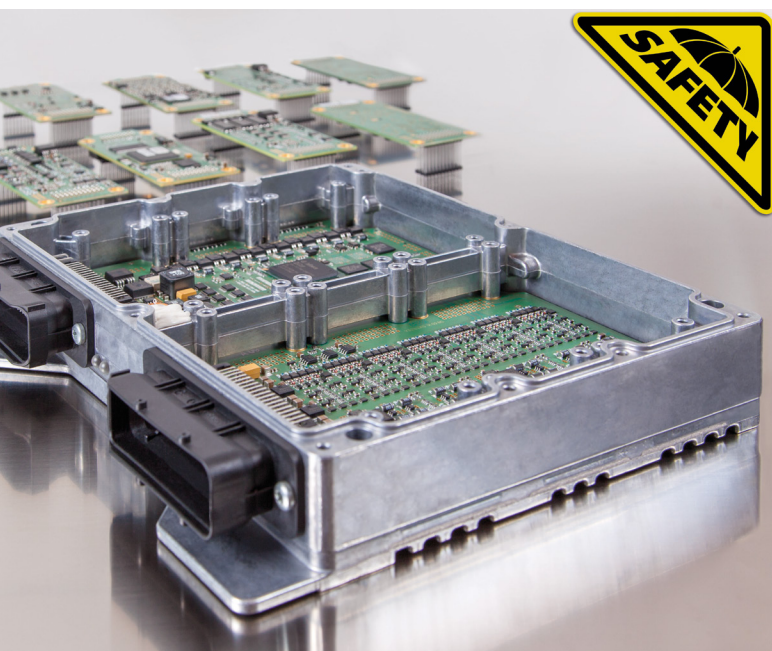
## Selection of the DLC control platform

During the towing operation, DLC is the heart of the towing tractor. Therefore selecting the right DLC is extremely crucial. For the selection of the drive control, focus was mainly on a flexible and high power control unit which would be in a position to reliably execute the functionalities related to safety. The control unit should be adaptable to other types of aircraft tractors and provide the required performance to safely cover the current and future requirements. The 32-bit control unit ESX-3XL Safety from the company Sensor-Technik Wiedemann (STW) seems like a perfect solution that caters to all the requirements. The ESX-3XL is certified according to the DIN IEC 61508: SIL 2 and DIN EN ISO 13849: PL d standards (Fig. 2).

The control unit is based on a 32-bit Tri-Core controller with a 150 MHz core, 4 MB RAM, 6 MB Flash and 32 kB EEPROM. In addition to the flexible adaptation possibilities in the basic version – e.g. all inputs can be configured via the functions in it as current/voltage/digital or rpm inputs – the possibility to extend the device via expansion boards represents an outstanding feature of the ESX-3XL. Because the control unit can be configured with up to six of these boards, it simply provides more flexibility to the operation. At the moment, 14 expansion board versions featuring different inputs and outputs, in addition to RS232 / RS485 / CAN interfaces and a programmable Linux system including Ethernet and USB are available. Generally, development environments for programming in “C”, Matlab and Codesys are available. For the development of the DLC, the development environment Codesys in version Codesys Safety SIL2 was chosen (Fig. 3).

### DLC: safety functions and standards

In accordance with the applied standards, a risk analysis for the drive functionalities was carried out, which required several functions to be in a safety level of  $AgPLr \geq c$ . Safety-orientated development represents a substantial cost factor during product development and during maintenance of the subsequent product. Therefore, particular attention was paid during drafting of the technical safety concept to a clear and unambiguous definition of the safety functions and their assignment to the appropriate software components. The focus was placed on keeping safety-relevant parts as simple as possible and creating clear interfaces



Disconnection of safety-relevant / non-safety-relevant components

## About Sensor-Technik Wiedemann GmbH (STW)



The company Sensor Technik Wiedemann, based in Kaufbeuren Germany, develops a wide range of products in measurement technology, control and automation systems, telematics and machine connectivity. The company also offers services in system design, implementation support and software solutions for communication and control functionality. STW caters to companies that are manufacturers of mobile machines and industrial vehicles both on and off-road. The company has subsidiaries in UK and USA, and employs more than 440 people.

between safety-relevant and non-safety-relevant software parts. In the software architecture, this is presented in appropriate safety-relevant and non-safety-relevant modules (Fig.4). The clear assignment of functionalities and the precise definition of the interface between the two software worlds is always meaningful. But it will only lead to cost reductions for development and maintenance if the separation of different software components is supported by the hardware.

IEC 61508-3, 7.4.2.9 defines that software parts with different safety classifications are to be developed on a control unit in accordance with the highest safety level, unless they are suitably independent through temporal and spatial separations. The ESX-3XL control unit supports temporal and spatial independence of application parts by providing appropriate memory protection and watchdog functionalities. With the supplied safety mechanisms software with different safety requirements can be independently executed on the ESX-3XL. This opens up the possibility for the development team to develop non-safety-relevant parts of the application in accordance with a simplified development and verification process.

### Optimum DLC parameterization reduces costs and complexity

The objective was to guarantee a standard compliant parameterization of the DLC. In addition, it was necessary to verify that parameter changes to non-safety-relevant application parts would not have any effects on the safety relevant application parts, in order to keep the required validation and verification expenses as low as possible here, too. Basically, every additional parameterization provides additional complexity, additional error sources and therefore increased validation and verification expenses. Accordingly, attention was paid in the specifications and design of the safety relevant modules to limit the number of parameters to a minimum. The process of safe parameterization is supported via the ‘ESX-Kefex’ toolchain. This Toolchain is part of the ESX-3XL development environment and comes with a detailed user and safety manual. The ‘ESX-Kefex’ toolchain has been certified for use in projects with safety requirements in accordance with DIN IEC 61508: SIL 2 and DIN EN ISO 13849: PL d.

The entire development process including risk analysis, hardware assignment, preparation of safety concept, software architecture, implementation and verification has been realized in close coordination between STW and Goldhofer, which has resulted in a safe, maintainable and optimally tuned drive system.

Photographs: Lead Photo Goldhofer AG, 01-03 STW GmbH

[www.sensor-technik.de/en](http://www.sensor-technik.de/en)

# Product News

## EtherCAT measurement technology modules - accurate and fast



With accurate data arriving from Beckhoff's new EtherCAT measurement modules, the raw material and energy consumption can be optimized, while it also forms the basis for condition monitoring and predictive maintenance. With these modules, high-end measuring devices and traditional automation technology

can be combined into one universal system. For this purpose, Beckhoff offers a combination of a comprehensive I/O system that supports all common sensor types, and TwinCAT as a central software platform. This new generation hardware ensures extremely high-quality measurement data, with measurement accuracy of 100 ppm at 23 °C, precise synchronization of < 1 µs, and a high sampling rate of up to 50,000 samples per second. Beckhoff offers 11 modules with different interfaces and input circuitry. They can cover, for example, voltage measurement of 20 mV to 30 V, current measurement of ±20 mA, thermocouples, RTD (PT100/1000), or load cells. The measuring ranges of the input channels can be flexibly parameterized, both electrically and on the software side.

[www.beckhoff.com](http://www.beckhoff.com)

## Direct operated DC valves for closed loop controls

Parker Hannifin, the specialist in motion control technologies, has completed its range

of direct operated proportional DC valves with the new zero lap spools for the D1FC/D3FC series. This option makes the use of the valves for closed loop controls possible. The most important innovation for the D1FC/D3FC is a position feedback system which is completely integrated in the housing. The direct coupling of the sensor to the spool also facilitates precise control of the spool position. Thanks to the integrated position feedback sensor, there is no need for an exposed cable connecting to the position control; this alleviates the risk of potential faults through inadvertent breaking of the connection. The robust, compact valves stand out with their new zero lap spools as well as their high dynamics and repeat accuracy in closed loop controls. Thanks to the inbuilt digital electronics, the valve parameters can be flexibly adapted with Parker's ProPxD parameterization software.



[www.parker.com](http://www.parker.com)

## Danfoss debuts new generation of 'Orbital X' motors

Danfoss Power Solutions recently launched the new product line of motors 'Orbital X'. The new motors will replace the current OMP, OMR, DS and DH motor models. In comparison to existing models, Orbital X has up to 15 % higher torque capacity than current OMP or OPR motors, and up to 45 % more than current DH and DS motors. It also offers to improve the bearing capacity by 20 % over DH and DS motors. Furthermore, the shaft seal lifetime is improved by 50 % and the motor has a finish that meets the corrosion class C3 standard. Two new modular platforms will replace six existing options. With new modular platforms, Orbital X increases flexibility in use, improves application performance and reduces the total cost of ownership for OEM customers. Along with the physical product launch, Danfoss also debuted a line of Orbital X app to improve user experience and customer response time. OEMs will have direct access to the product conversion tool, which simplifies the process of integrating an Orbital X motor.



[www.powersolutions.danfoss.com](http://www.powersolutions.danfoss.com)

## IO-Link makes sensors fit for Industry 4.0

Industry 4.0 needs sensors that not only collect data but also communicate the data up to controller and enterprise level. For this, the company Ifm, opts for IO-Link technology. With IO-Link's digital data transmission, the measured values cannot be distorted by any cable interferences. With IO-Link, the parameter settings during sensor configuration can be directly adopted from an IO master, hence saving a lot time. Ifm's new generation of IO-Link masters is extremely robust and offers 2 Ethernet ports with a switch for Profinet. The 'LR Device' software is used to configure the connected sensors and actuators. Something completely new about the software is that, it finds all IO-Link masters in the Ethernet network and creates an overview of the whole plant.

Additionally, ifm offers the Line-recorder, which enables bi-directional communication between sensors and higher-level ERP systems. With this system, the data can be transmitted directly to the ERP system without putting additional strain on the PLC.



[www.ifm.com](http://www.ifm.com)



## Fan blades inspired from nature

Taking inspiration from humpback whales, the company, Ziehl-Abegg is developing its new radial fan, that allows for energy savings of up to 10 %. To improve further, it was essential to optimize the angle of incidence between the air flow and fan blade, which in turn depends on the flow volume. The movement of the whale fins causes the angle to constantly change. If its pectoral fins were at an angle too steep to the flow this would produce a lot of turbulence as the water passes over them. Changes in the fan blade design, create an optimum angle of flow over the entire span, hence keeping the turbulence in control and minimising the losses. The bionic design of the blade surfaces reduces the noise level and its corrugated shape gives additional strength and optimises the weight.

[www.ziehl-abegg.com](http://www.ziehl-abegg.com)

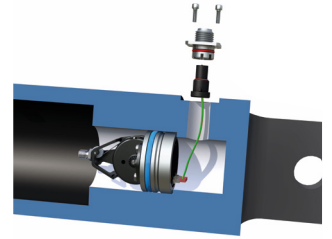
## Saving time during assembly

Layher AG is expanding its product line with the addition of pressure switches with integrated plugs. With types 471 and 472, Layher AG adds to the previous models with integrated plug, now with two and three-pin Deutsch plug. This eliminates the need for connecting the cable. The electrical contact is made reliably and without complications, simply by bringing together the mating connectors. Plug variants such as M12x1, bayonet plug DIN72585 and Deutsch plugs 2P and 3P are now available. Depending on the plug variant, protection classes up to IP67 or IP6K9K can be achieved. The pressure switches are available as normally open, normally closed or changeover contacts. They are also available as a membrane or piston switch in the range from 0.5 bar to 350 bar.

[www.layher-ag.de/en](http://www.layher-ag.de/en)

## Unique technology for stroke measurement in hydraulic cylinders

Measuring the stroke of a hydraulic cylinders used in mobile machines is an important task, as this enables the monitoring of the motions further to be carried out. The company, Siko has developed a unique system SGH10, for direct stroke measurement in hydraulic cylinders. Other systems in the market are based on magneto-restrictive, inductive, or hall based technology. In contrast to these systems, a wire-actuated mechanism installed directly in the piston head is used to measure the stroke. This means the entire system is built into the cylinder and cannot be influenced by the environment. Another advantage is the reduction in costs as this does not need the sensor rods to be integrated into the piston over the entire measuring path. In the SGH10, just one small thread is needed in the piston to mount the cable. This allows the system to offer major potential cost savings for hydraulic cylinders. Another highlight is that, this can even be used in telescopic cylinders.



[www.siko-global.com](http://www.siko-global.com)



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# User-friendly variable-frequency drives for intralogistics systems

*In general, conveyor technology and intralogistics require drive control systems which can be simply installed and are easily accessible during operation and maintenance. Field distribution systems from Nord Drivesystems provide exactly this as well as significantly reduced system costs.*

## About Nord Drivesystems

A developer and manufacturer of drive technology for over 50 years, Nord Drivesystems employs more than 3,300 people and is one of the world's leading suppliers of drive solutions. In 2016, the company's gross sales amounted to EUR 560 million. With subsidiaries and distributors in 89 countries around the world, Nord has an extensive service network. Nord's wide variety of gears covers torques from 10 Nm to 250 kNm and more. The company also supplies motors with outputs from 0.12 kW to 1,000 kW and manufactures frequency inverters up to 160 kW. Nord's inverter line-up features conventional models for installation in control cabinets as well as fully integrated drive units and the all-new field distribution systems for decentralized automation environment.



The company Nord Drivesystems has developed a new line-up of user-friendly, low-maintenance electronic drives for intralogistics systems. These new frequency inverter and motor starter models for distributed installations are especially easy to deploy and operate. Coded plug-in connectors ensure comfortable handling throughout a system's lifetime, from the initial installation, to maintenance, to eventual replacement. Branded as the Nordac Link series, these devices provide very flexible feature customization options that can be configured to individual requirements: interface ports, manual switches, and a range of functions that even include closed-loop control and sequential control managed by an integrated PLC.

Distributed drives must execute commands from a higher-level central control system with absolute reliability. In many scenarios, however, operating staff and service technicians may also require optional direct access to individual drives or drive axes on location. Such access enables them to quickly resolve small problems like a jammed conveyor belt that might otherwise lead to a shut-down of the entire line, sometimes putting hundreds of conveyor modules out of work for a considerable amount of time. Nord Drivesystems has therefore developed the new 'Nordac Link,' an electronics drive for particularly convenient and time-saving operation and maintenance.

Key features of the new drives are coded plug-in connectors for all power and communication lines, as well as for various sensors, actuators, and encoders. These greatly facilitate accurate, quick, and safe connections. LEDs on the field distribution systems enable error diagnostics on the production floor, and operators can



Featuring plug connectors and flexible switch and interface configurations, the new, compact Nord field distribution systems make installing, operating, and servicing conveyor installations easier than ever



## Basic data for Nordac Link

- Protection class: IP 55, IP 65
- Power range: 0.55 – 7.5 kW
- Voltages: 1/3~200-240 V, 3~380-500 V

## Functions

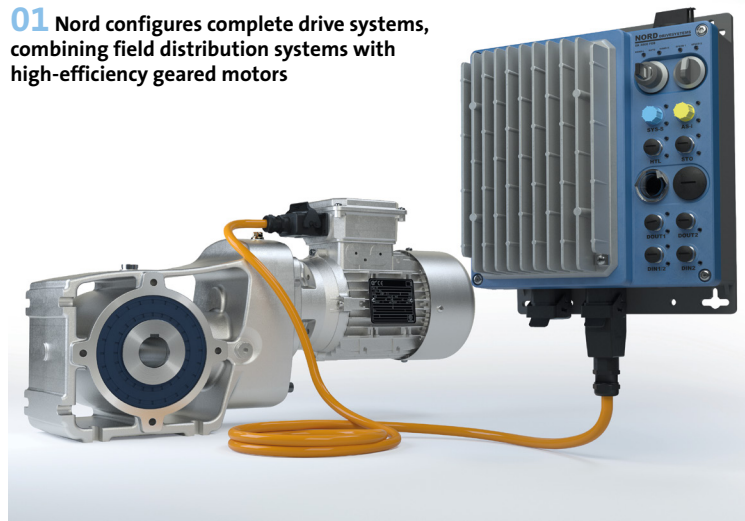
- High precision with current vector control
- PLC for motor-related functions (PLC on Board)
- Energy-saving function for partial load operation
- Control and parameterization tools and simple parameter structure
- Integrated line filter for compliance with EMC regulations
- Operation with synchronous and asynchronous motors
- Control and closed loop regulation
- 'Posicon' – Integrated positioning mode and synchronization
- STO and SS1 – Integrated functional safety
- Integrated brake rectifier for motor brake control
- Load monitor
- Hoist and lifting gear functionality
- Master / Slave operation

remedy problems then and there using the maintenance and control switches on the drives. The compact units are designed for wall or frame mounting. Featuring a busbar for the mains supply, they can be daisy-chained with short cabling from one drive to the next, which saves time and expenses. The field distribution systems are able to control asynchronous or synchronous motors. They come with comprehensive certifications for operation everywhere in the world. The drives support Profibus, CANopen, DeviceNet, and AS-i communication, as well as the Industrial Ethernet protocols ProfiNet, Ethernet Powerlink, EtherCAT, and EtherNet/IP.

## Expert solutions for conveyor applications

Distributed conveyor drives have been a focus for drive technology developments at Nord for many years, resulting in a versatile portfolio of distributed drive electronics that cover a considerably wider range of functions than competing products. In 2009, the company first introduced motor-integrated frequency inverters featuring rotary encoder feedback, position control, hoist functions, and Safe Stop. 2015 saw the addition of a PLC in motor-integrated drive

**01** Nord configures complete drive systems, combining field distribution systems with high-efficiency geared motors



units. Now, years of experience in various sectors and close cooperation with customers have led to the new line of field distribution systems. These intelligent drives with a proven user-friendly user interface can be flexibly configured for a wide range of conveying tasks. An integrated PLC and PI controller functions even enable the establishment of autonomous modular systems. Frequency inverters and motor starters in the 0.55 to 3 kW performance range are immediately available. Now in 2017, inverters for motors up to 7.5 kW rated output will also be added to the line.

## Reliable drives with a high overload capacity

Nordac Link series motor starters control soft starts and stops, as well as reversing operation in fixed speed applications. Just like inverter-type field distribution systems, these wear-free electronic switches integrate extensive monitoring and protection functions – this saves the cost for typical control cabinet components such as motor circuit breakers and reversing contactors. In more demanding drive applications, frequency inverters ensure efficient and precise speed control and wear-free brake actuation. Employing field-oriented vector control, they deliver the required speeds reliably even under great load fluctuations and provide full torque even at standstill. These AC vector drives have a high overload capacity of 150 % for one minute and up to 200 % for brief periods. An integrated load monitor prevents damage to the equipment in case of blocked applications. The inverters also support direct connection of incremental and absolute encoders. Multiple drives in master/slave operation can synchronize speed or positions. Additional optional features include the STO (Safe Torque Off) and SS1 (Safe Stop 1) safety functions according to EN 61800-5-2.

Photographs: Getriebebau Nord GmbH & Co.KG

[www.nord.com](http://www.nord.com)

**02** The Nordac Link line comprises soft and reversing starters (a) and two frequency inverter sizes for motors from 0.55 to 7.5 kW (b + c)

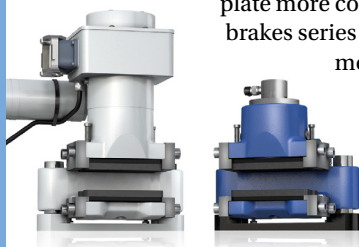


# Product News

## Floating caliper brake with one-piece brake caliper

KTR has developed a floating caliper brake with one-piece brake caliper being made of special LT nodular iron. This qualifies the floating caliper brake for applications in the cryogenic temperature range down to  $-40^{\circ}\text{C}$ . All other components such as pad retainers, pistons and guide pins are made of steel. The brake pads are made of powder metal. Depending on the application's preference and basic conditions, the brake can be operated either hydraulically or electromechanically, with clamping forces up to 15 kN being generated in the passive design and 16.5 kN in the active design. With the one-piece design, there are no more bright contact surfaces, hence improving the brake's corrosion resistance and making the power transmission from the brake caliper to the base

plate more consistent. The new floating caliper brakes series 'XS' are intended for use in the most demanding environments and can be used both as service brakes, for high numbers of cycles and as stop brakes, even above ground or underground, onshore or offshore applications.



[www.ktr.com](http://www.ktr.com)

## Robust power supply with 40 A for adverse ambient conditions

The new versions from Trio Power, the power supply range of Phoenix Contact provides a reliable supply even in adverse ambient conditions. Like its predecessor, the new 40 A device is robust, both electrically and mechanically. High system availability is a top priority for all machines and systems. This power supply therefore provides dynamic boost, which also starts heavy loads, with 60 A and thus 150 % of the nominal current for 5 seconds. The robust design, with its high electric strength, high MTBF (Mean Time Between Failure) values of over 1 million hours, along with active function monitoring with an LED and floating signal contact, ensures that all connected 24 V DC loads are reliably supplied. With an overall width of 110 mm, and tool-free wiring with Push-in connection saves time and space in installation. The extensive temperature range of  $-25$  to  $70^{\circ}\text{C}$  guarantees a high level of flexibility in applications. The wide input voltage range from 320 to 575 V AC enables its use worldwide.



[www.phoenixcontact.com](http://www.phoenixcontact.com)

## Eaton showcases integrated industrial technologies at Hannover Messe 2017

Eaton offers machine manufacturers a comprehensive range of solutions in energy and automation for both electrical and hydraulic applications. Its cooperation with T-Systems, allows it to offer industrial applications with cloud based services. A visit to Eaton at Hannover Messe 2017, visitors can learn more about the fully integrated industrial technologies that Eaton and its partners provide. Also the company showcases its developments in hydraulic and electro-hydraulic systems. The company is now focusing on helping machine manufacturers to make their products ready for Industry 4.0. Furthermore, Eaton is actively supporting the implementation of the OPC-UA standard, both for M2M and for machine to cloud communication. The company is presenting a range of innovative energy storage systems and power distribution systems that can be utilised within industrial and commercial applications.



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# COMPRESSED AIR NEWS

*Compressed Air and Vacuum Technology*



ComVac

HANNOVER  
MESSE

# Compressed Air *for the Smart Factory*

*The Hannover Trade Fair addresses Industry 4.0 again this year under the motto “Integrated Industry – Creating Value.” This hot topic serves as a unifying idea for the various leading trade fairs. ComVac is no exception in this regard, as the Smart Factory would be inconceivable without sophisticated compressed air and vacuum technology. Sonia Wedell-Castellano, Global Director ComVac, Deutsche Messe AG, gives a forecast of what awaits visitors at the trade fair.*

**The lead theme of HANNOVER MESSE 2017 is “Integrated Industry – Creating Value”. What exactly does it mean?**

Industry 4.0 is once again the focal point at HANNOVER MESSE. We are at an important point in time, because the technologies for digitalizing industrial production are ripe. Now it is time for decision makers in the manufacturing and energy sectors to identify the long-term advantages of digitalization for their companies. “Integrated Industry - Creating Value” represents digitalization’s potential to create new concepts, new business models and new markets.

**Can you name some additional trends in Hannover?**

We have a broad range of current, exciting topics related to Industry 4.0. For example, machine learning and predictive maintenance process huge amounts of data to create a distinct benefit. Additional topics include Integrated Energy, cobots, digital twin and smart materials. Of course, energy efficiency remains an important issue and is a top theme at ComVac.



**How many exhibitors do you expect at ComVac this year?**

ComVac is quite strong this year, which is great news for us and underscores the importance of this branch for the future of manufacturing. In December we recognized that Hall 26 would not be sufficient, so we now have an additional 2,500 square meters in Hall 27. This represents display-area growth of 14 percent. More than 240 companies will exhibit.

**Where does the growth come from – Germany or other countries?**

Seventy-five percent of the exhibiting companies at Comvac come from outside of Germany. A number of these foreign companies have increased their display area this year – first and foremost China, Italy and Turkey. Combined these three countries account for more than one third of ComVac’s total display area.

**Which trends await visitors this year at ComVac?**

ComVac covers the complete range of compressed air and vacuum technology, from generation and processing to pumps and measuring instruments to financing and management. Industrie 4.0 is also an important theme. For example, sensors and software enable machines and work pieces to communicate with each other, resulting in continuous monitoring that improves productivity and production security. On the compressed air side, companies show how heat recovery, control technology and predictive maintenance can improve energy efficiency. Companies from the vacuum technology branch emphasize customer service and sustainability with speed-controlled, oil-free pumps.

**Are there synergy effects between ComVac and other sectors at Hannover Messe?**

Yes, and these apply to all sectors of the fair. Whether we are talking about automation, pneumatics or environmental systems, without well-engineered compressed air and vacuum technology there is no factory of the future. You simply cannot develop energy efficient, sustainable production processes without these fundamental crossover technologies. The connection is especially strong between ComVac and the trade fairs Energy and MDA-Motion, Drive & Automation. MDA exhibitors in particular are customers of ComVac exhibitors. We also see synergies outside of HANNOVER MESSE and are bringing compressed air and vacuum technology companies to other markets.

**You also organize ComVac events outside of Germany. What does the upcoming calendar look like?**

We offer our exhibitors the chance to join us in important international markets with the high level of service they are accustomed to from Deutsche Messe. In September 2017 we are launching ComVac Canada in Toronto. Then we have ComVac Asia in Shanghai at the end of October 2017. In September 2018, ComVac North America runs parallel to IMTS in Chicago.

[www.hannovermesse.com](http://www.hannovermesse.com)

Sonia Wedell-Castellano, Global Director ComVac, Deutsche Messe AG



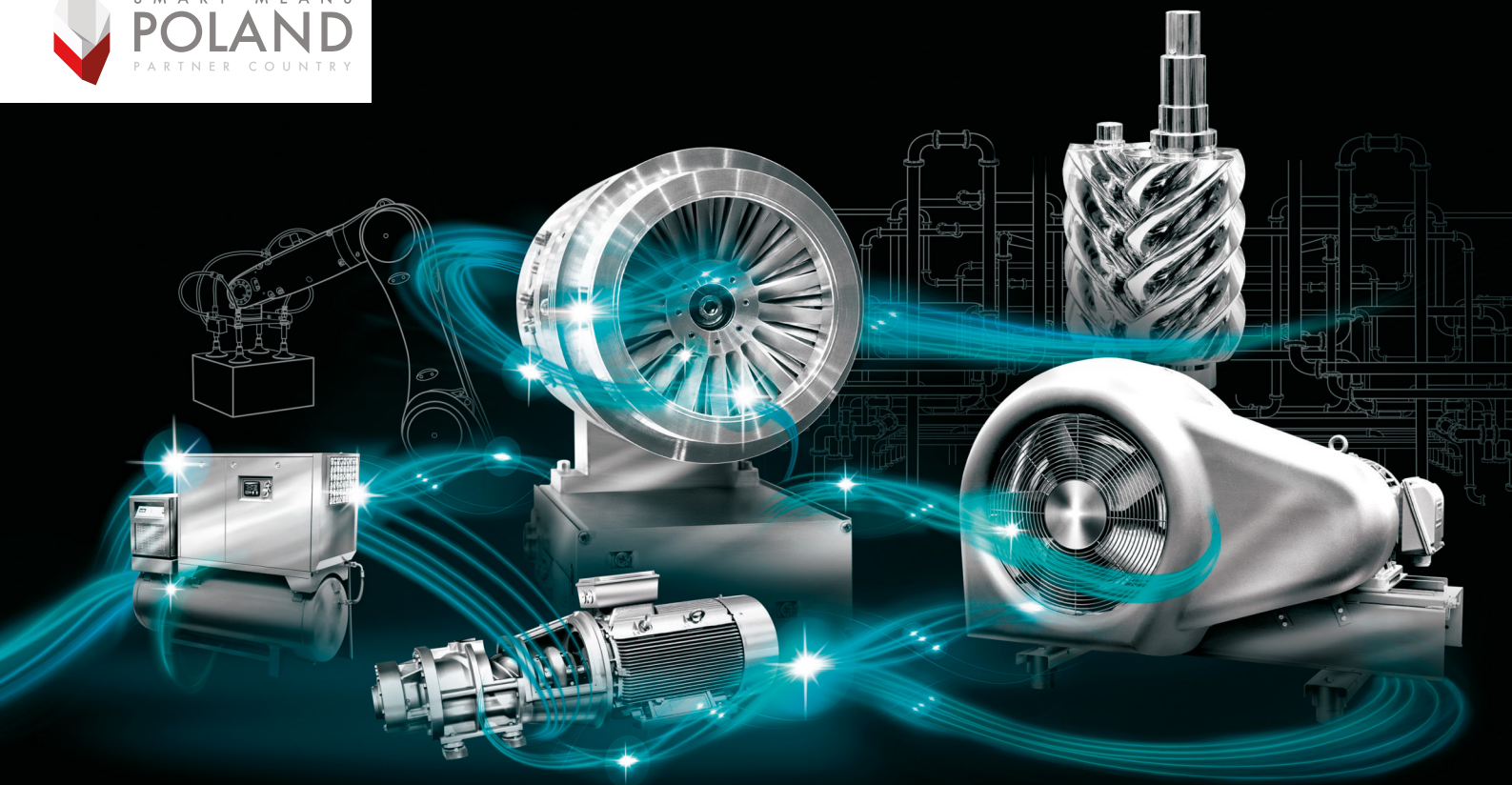
# ComVac. How can we combine innovation and expertise?

You'll find out at ComVac:

- Innovative compressed air and vacuum technology
- Saving energy through improved plant technology
- New directions in compressed air contracting

**24 – 28 April 2017 • Hannover • Germany**

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Deutsche Messe

ComVac



# Full-service package for complete peace of mind

*Compressed air is a vital energy source for industrial applications. Without it, production grinds to a halt. Predictive maintenance is important for spotting potential problems at an early stage. This helps to reduce or entirely eliminate unexpected downtime and the resulting production backlogs. The result: improved productivity, product quality and planning security, and lower maintenance and service costs.*

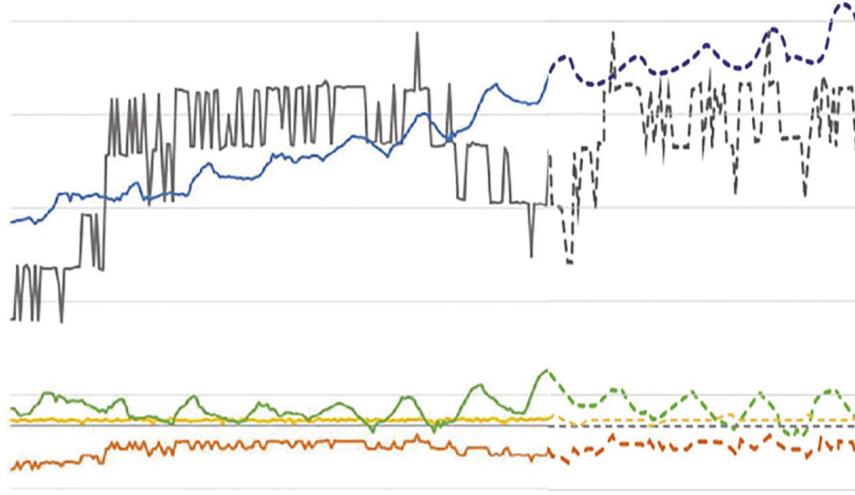
Author: Daniela Koehler, Press Officer, Kaeser Kompressoren SE

Repairing machines only when they break down: that's how things used to be done, even with compressed air systems. Today, modern control technologies such as the Sigma Air Manager 4.0 (SAM 4.0), combined with intelligent data analysis, make it possible to plan ahead when scheduling the maintenance of the compressed air supply system. With digital networking and the networking of machines with each other and with a service centre, operators and manufacturers can track and analyse the status of machine components on a continuous basis in order to predict optimal maintenance times. This "predictive maintenance" concept helps to detect impending faults, speed up processes and prevent production downtimes.

Predictive maintenance is nothing new for Kaeser. For more than 30 years the company has offered operator models under which customers purchase only the compressed air volumes that they actually use. Kaeser retains ownership of the compressed air station (contracting model) and takes care of everything else. To minimise costs and maximise availability, Kaeser has been developing and implementing machine-integrated master control systems and teleservice solutions for many years. But it is only now, with the







**02** Real-time data monitoring is performed in the service centre

availability of modern databases and enormous improvements in sensor technology, that real-time monitoring and predictive maintenance have become a reality.

### Tailor-made solutions

Customer needs vary widely. Kaeser has a diverse range of service packages geared to specific requirements. One model, the Sigma Air Utility, is based on the existing contracting models, which leave nothing for the customer to take care of. Kaeser assumes full responsibility. Similar to the electricity or water supply, customers pay only for the compressed air that they use. This leaves them with more liquid assets on hand for their core business activities.

Another model, Sigma Smart Air, is designed for customers who own their compressed air stations. As regards service and availability, however, they are just as care-free as those who opt for a contracting solution – because Kaeser handles everything. According to Kaeser's estimates and the initial experiences, this model can save up to 30 percent in service costs for customers.

Whether the compressed air station is owned by the customer or Kaeser, the basic requirement for using predictive maintenance is the Sigma Air Manager 4.0. This core control technology was developed by Kaeser – as were the analysis tools behind it. The master control system itself is the core element of a compressed air station and is essential for utilising everything Industry 4.0 has to offer. It functions as a central brain for the controlling tasks and data streaming to the data (service) centre, which performs continual monitoring and analysis. When potential faults are detected, a process is initiated to ensure the problem never reaches the point where components stop functioning. Along with fault analysis, the control system determines when maintenance is actually needed, as opposed to following a fixed schedule. This switch to needs-based maintenance also saves costs.

**01** The Sigma Air Manager 4.0 (SAM 4.0) master controller functions as a management system for the compressed air components and as a central node for secure data exchanges

### Infrastructure, expertise and intelligent services are essential

A system operator planning to introduce predictive maintenance will need an excellent compressed air system infrastructure like that provided by the Sigma Network. Real-time monitoring is possible only if the system components are equipped with sensors that enable the master control system to monitor activity, retrieve data, and transfer it instantly. Naturally the vast quantities of raw, unfiltered data are of little use on their own. Appropriate analysis processes must be developed to extract useful information and predict events. This requires human input – just like the steps that follow. The global service network needs to be just as extensive and effective as the data network to ensure a prompt and cost-effective response when action is needed. The right combination of infrastructure, expertise and intelligent services is essential for exploiting the full benefits of predictive maintenance.

[www.kaeser.com](http://www.kaeser.com)

### The cornerstone: knowledge and experience



Essential for the development of such predictive maintenance concepts is the extensive knowledge, accumulated over many years, on the processes, interrelationships, vulnerabilities and challenges involved in producing and using compressed air. It is this knowledge on the part of Kaeser's specialists – combined with the latest technologies – that makes it possible to rapidly analyse and evaluate the status of a station and to promptly initiate any steps that may be needed.



# Product News

## One screw compressor for all applications

Renner Compressors describes the RSF 127 D as a screw compressor with an extensive control range and an extremely high level of efficiency. It has a nearly loss-free direct drive and supports power classes 75, 90 and 110 kW at pressure levels of 7.5, 10, 13 and 15 bar. The RSF version features speed control with 87, 97 and 127 kW available and a steplessly adjustable pressure range from 6 to 15 bar. In combination with the model RSF 90 D for basic supply, the RSF 127 D is



responsible for control tasks, working especially efficiently in the main control range. Because there is no transmission, the efficiency of the drive is nearly 100 %. The efficiency-optimized compressor stages and IE 3 electric motors ensure optimum energy efficiency. The radial fans, with a static residual thrust up to 130 Pa,

are likewise economical. They serve as the connection to an exhaust duct system. In this way additional "energy devouring" support fans can generally be eliminated. The speed controlled screw compressors are equipped with a RENNERTronic Plus control unit as a standard feature. Despite the space-saving design, the machine is very maintenance-friendly. The compressor is especially economical to maintain. This is due to the low storage and reserve costs resulting from multiple use of service parts within the series. With its small footprint, it is able to pass through most door openings without being disassembled. The system can also be installed close to a wall where space is limited – ideal for container installation.

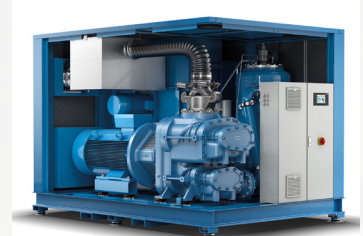
ComVac: Hall 26, Stand B68

[www.renner-kompressoren.de](http://www.renner-kompressoren.de)

## A new efficiency level for compressed air supply

Energy efficiency plays a key role today in deciding which technology to use to provide an industrial compressed air supply. Almig is setting a new standard in efficiency here with its 2-stage compression principle. A specific level of unrivaled power is achieved by two compression stages joined together. In this way the recently introduced G-Drive T series of Almig provides a very high volume flow with lower motor power consumption compared to equivalent market-standard one-stage compressors. Lower speeds and a lower stage-internal pressure differential not only increase efficiency but also lengthen service life while enhancing the reliability of the compression unit.

The G-Drive T200 compressor from Almig at the Hannover trade fair offers all these advantages and also features a small installation space thanks to its carefully planned design. In terms of Industry 4.0, the compressor control unit meets all requirements for participating in company-internal communication and also for being externally monitored via Cloud services.



ComVac: Hall 26, Stand B55

[www.almig.com](http://www.almig.com)

background: fotolia



## New energy-efficient cold air dryers

SPX Flow intends to set a new milestone in energy efficiency with the Flex cold air dryer series from Hankison. The high-performance unit uses Phase Change Material (PCM) to achieve major energy savings. The system pays for itself in one to two years. The cold air dryer series makes use of the latest advances in heat transfer technology as well as an innovative approach for



effectively removing liquids from compressed air. The system is equipped with the 3-in-1 heat exchanger and the PCM encloses the cooling and compressed air circuits. Because of this, the Phase Change Material remains colder for a longer time and the

coolant compressor does not need to run as often as in conventional energy saving designs. Because the dryers can be adapted to the compressed air requirement at any time, they can be dimensioned for the maximum compressed air requirement of the system without any appreciable additional energy loss.

Hannover Messe: Hall 15, Stand G43

[www.spxflow.com](http://www.spxflow.com)

## Information transparency 4.0 for compressed air units

Aerzen's communication-capable control unit, the AERtronic, makes it possible for users to integrate compressed air units into their production and manufacturing interfaces. The WebView module can also be conveniently added to the control unit so that operating and service data can be accessed from anywhere in the world at any time.

Warnings and fault messages of blowers or compressors are forwarded to the relevant points immediately by email. For



diagnostics via remote access with an Internet-capable, mobile terminal device (smart device) or for maintenance of a central process control room, Aerzen customers can use WebView, the integrated AERtronic solution, to access operating data and service information related to their process air units with an html5-capable web browser – with no need for any additional software or apps. This gives them a quick breakdown of the most important measured values and parameters related to operating and maintenance intervals. WebView is designed so that existing systems with AERtronic can be upgraded cost-effectively at any time.

ComVac: Hall 26, Stand E12

[www.aerzen.com](http://www.aerzen.com)

## High compressed air quality and productivity thanks to integrated drying and filter systems



The Parker Zander business unit of Parker Hannifin is presenting the new integrated drying and filter systems CDAS (Clean Dry Air System) and OFAS (Oil Free Air System). Both CDAS and OFAS meet the requirements of ISO 7183 and ISO 8573-1 for compressed air purity. OFAS also complies with purity class 0 for total oil content (applies to both oil-lubricated and oil-free compressors). This classification ensures optimum air quality, even for critical applications, at a fraction of the cost of an oil-free compressor. The innovative drying and filter systems offer long-term high performance capacity over a longer time. Both systems use the special Snowstorm filling technology, which maximizes packaging density and prevents channels from forming. It also ensures a stable dewpoint, contributes to a low differential pressure and minimizes energy consumption. The CDAS and OFAS systems also feature impressively low maintenance times, simplified exchange of replacement parts, maximum operating time and extended maintenance intervals. The latest energy consumption technologies combined with advanced flow rate management and special filter solutions ensure a consistently lower differential pressure for significantly lower energy consumption and low operating costs.

ComVac: Hall 26, Stand B78

[www.parker.com](http://www.parker.com)



# Product News

## Energy-efficient solutions for compressed air preparation

Beko Technologies GmbH will be presenting energy-efficient solutions related to compressed air preparation at ComVac 2017. The manufacturer and provider of components and systems for preparation and management of compressed air and compressed gas is highlighting its management competence for individual projects and its service along with various systems and products at its trade fair stand. Norbert Strack, Technical Managing Director at Beko Technologies, notes: "As a manufacturer we are able to offer our customers



competent and comprehensive consulting. Each sector of industry has its own requirements for compressed air. We therefore develop custom-made system solutions for the entire process of preparing

compressed air from compressor to end application. In this way we can offer customers the optimum technology for exactly the compressed air quality they need for an application in whatever industry – from simple process compressed air to dry, oil-free and sterile compressed air of the highest quality."

The new products introduced by Beko Technologies at this year's trade show include the Drypoint M eco control membrane dryer. It features for the first time an electronically controlled drying system that can be used to set a fixed pressure dew point between +10 and -26°C or a fixed distance between the temperature of the compressed air and the pressure dew point of the outlet.

ComVac: Hall 26, Stand C31

[www.beko-technologies.com](http://www.beko-technologies.com)

## Vacuum pumps for every application

Atlas Copco is exhibiting its wide portfolio of vacuum pumps, some completely new, at ComVac. The Group presents itself as a complete provider. After acquiring Edwards in 2014, as well as the vacuum division of the Oerlikon Group (Leybold), Atlas Copco founded its own Group division for vacuum technology. The exhibit will cover efficient vacuum solutions for all conceivable industrial applications, from speed controlled screw vacuum pumps to rotary vane and multi-claw pumps and also including liquid ring pumps.

The series GHS 3800–5400 VSD+ speed-controlled vacuum pumps are a highlight at the trade fair stand. They are suitable for efficient vacuum supply at up to



4800 m<sup>3</sup>/h. Previously the most powerful model in the series had achieved a maximum of 1810 m<sup>3</sup>/h. With energy savings of up to 50 % compared to conventional rotary vane vacuum pumps plus their maintenance-friendly design, the pumps pay for themselves very quickly, notes Christoph Angenendt, Communications Manager for Industrial Vacuum at Atlas Copco. The screw vacuum pumps are suitable for applications with high vacuum requirements, for example in the glass industry, on packaging lines or for drying processes. As part of a central supply concept, vacuum generation can be precisely adapted to the customer's need with the new pumps. This is because the vacuum pumps, which feature an intelligent electronic control system, work extremely efficiently at a variable speed (VSD+, Variable Speed Drive). Atlas Copco provides the vacuum pumps as complete systems in a housing, wired and ready for connection.

ComVac: Hall 26, Stand B32

[www.atlascopco.com](http://www.atlascopco.com)

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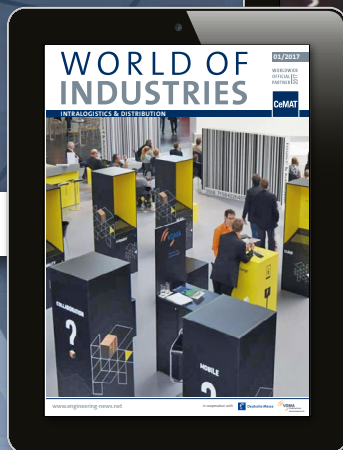
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Hannover, 24. – 28.04.2017  
**Hall 15 · Stand H29**