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Platzhalter  
265.0mm x  
185.0mm

# Problem zone on the edge of Europe?

Dear Reader,

The Turkish economy with its constant growth over the last ten years has gone through considerable development. The average economic growth over the last 10 years was 4.7 % and was very dynamic. However the years of success are over. And so the growth in Turkey had already slowed down significantly in 2014 and was then still only at 2.9 %. And also in 2015 the prognoses of 3 % were just about achieved. The cause for this downturn above all is the subdued domestic demand at home and the significant crash in the construction industry. In addition there are the political and geopolitical risks and problems that do not exactly help with an upturn. But what role does mechanical engineering play in the country on the Bosphorus? If the mechanical engineering industry had been growing by 20 % or even 30 % per year since 1990, then with an increase here of 5 % we can also no longer follow on from days gone by. In the medium term however we can reckon with a more favorable economic situation in engineering, so say the experts. According to them the planned expansion of production capacities in the industry leads to a growing demand for machines and plant equipment. Some two thirds of this is introduced from abroad. Germany is the most important supplier. You can experience the engineering abilities Turkish companies possess, irreplaceable for competitiveness in an international market, at the WIN Eurasia trade fair this March in Istanbul, Turkey. You will learn more about this in our article from page 5 onwards.

In order that mechanical engineering is also powerful enough in future, according to Adnan Dalgakıran, Chief Executive Officer of the Export Organization of Machine Manufacturers, however several far-reaching re-structuring measures will be required. According to him there are too many small companies in the industry who copy one another. This reduces the quality of the products and has a negative effect on exports. For this reason the companies should place more and more importance in research and development. In order to reach this ambitious goals by 2023 Turkey must take a leap forwards in mechanical engineering. Small steps of progression will in any case not be enough.



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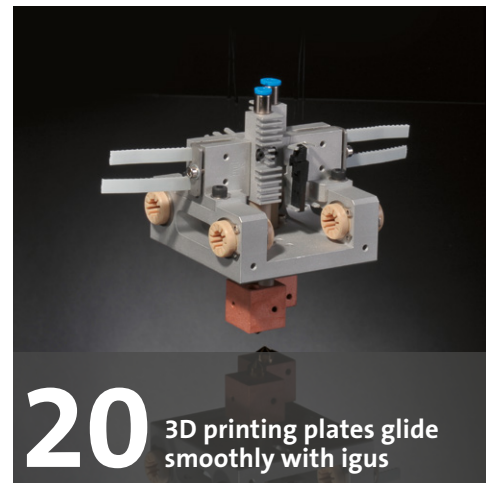
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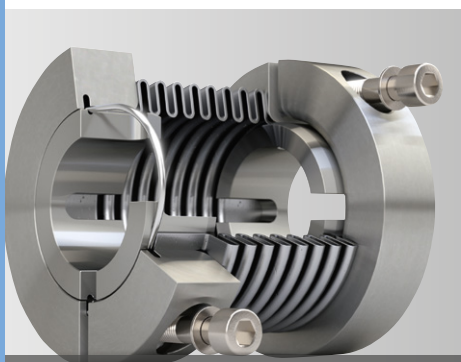
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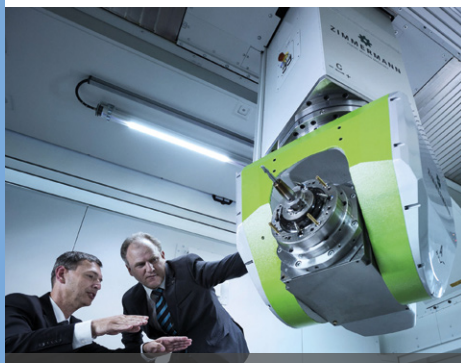
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# Engineering in Turkey – the current situation

Sevda Yilmaz, Chairman of Kayahan  
Group and member of the board of  
Turkish Machinery

*Turkey is located in a politically tense region. But what does this mean for mechanical engineering sector in the country? And what are the current trends? We talked to Sevda Yilmaz, Chairman of Kayahan Group and member of the board of Turkish Machinery.*

**The boom of recent years in Turkey seems to weaken. Where are the current problems?**

While the growth in the world economy in 2015 was rather weak with 2.5 %, the world trade shrank 10 % in dollar values. Naturally, Turkey was also affected by this. In addition to this, geopolitical developments in the region and the decline in oil prices have prevented us from catching the performance of the previous years. Two general elections in Turkey in 2015 have also led to the postponing of reforms in economy and a slowdown in trade. Nevertheless, with a better performance than many other countries, it is estimated we have grown by 3.5 %. In the medium-term economic program announced by the government it was seen that priority was given to R&D and production. Our main goal is to raise our technological value-added level of production and export. This is in particular much more important for the machinery sector. With the reforms to be made in 2016, a level of 4 to 4.5 % will be reached as estimated by some international organizations. This is an acceptable level of growth when the global developments are considered even though it is not sufficient for our country. The forthcoming process is the normalization and consolidation of Turkey.

**What are the current trends in mechanical engineering?**

The main topics and priorities are;

- To develop and implement control systems on the accurate parts production in machinery and components

- Further improvements in data collection, evaluation and transfer processes or the control of process parameters,
- SMED dissemination in all molds and processes,
- Merging different materials for production of components and machineries, and increasing the use of composite materials with lower weight and higher strength
- Remote access to process data and production of machinery with artificial intelligence that complement the concepts of industry 4.0

**With “Turkish Machinery” your companies want to make more co-operations with other companies, e.g. in Germany. How far are you in this regard?**

As Turkish Machinery, our first target was to show our quality and competent products to a wider customer platform because many enterprises, institutions and organizations in Germany and in Europe did not exactly know the potential of Turkey in this field. We have made significant progress in this aspect. Now, machines are being exported from Turkey to more than 200 countries. However, on the other hand we know, how important it is to have excellent technological knowledge and expertise in order to be successful in this industry. To eliminate the deficiencies of Turkish enterprises in this field, we started to develop technological co-operation on enterprise and institution basis. For example, we conducted a research on cluster of University and R&D institutions formed by the leading significant corporations in Germany and we focused on how to develop this kind of co-operation and what are the relevant fields and subjects. At the end of this study, we signed the first co-operation agreement with OWL-Maschinenbau, that has developed major projects in Germany's Industry 4.0. Afterwards, we signed a collaboration agreement with VEMAS Innovativ under Fraunhofer that realized significant innovations in machinery industry. Bringing together these two institutions and their member enterprises, we took the first steps for the future. We will witness that this cooperation will transform into more concrete projects.

In the forthcoming period, we will give priority to the projects in Europe and Germany in which our enterprises may personally be involved. In addition, we will increase our activities to include highly technologically advanced institutions and businesses in Turkey.

Author: Dirk Schaar is editor-in-chief of MDA Technologies

[www.makinetanitimgrubu.com.tr/en](http://www.makinetanitimgrubu.com.tr/en)





# Looking at the bright side of Turkey

***WIN Automation EURASIA 2016, which runs 17– 20<sup>th</sup> March at the Tüyap Fair Convention and Congress Center in Istanbul, will focus on the current challenges and business opportunities in Turkey and its nearby region. With the successes of last few years, WIN Eurasia has consolidated its position as the region's most important industrial trade fair.***

Its location between Europe and Asia, gives Turkey a vital strategic importance for trade and economic activities and also for various geo-political scenarios. Commonly referred to as the West's bridge to the Muslim world, Turkey has long been a key NATO partner and a strategic ally of Europe and the United States. For decades, Turkey, the EU and the U.S. have cooperated in areas from the Mediterranean and the Persian Gulf to Central Asia and even Korea.

In spite of being a key NATO partner, Turkey sees itself as a separate entity from its Euro-Atlantic allies, sitting in the center of three concentric geopolitical circles:

- the Balkans, the Black Sea basin, and the Caucasus;
- the Middle East and the Eastern Mediterranean; and
- the Persian Gulf, Africa, and Central Asia.

This vision of Turkey in a multipolar world emphasizes Turkey's access to the Caspian Sea, the Black Sea, the Mediterranean, the Red Sea, and the Persian Gulf.

## The growth path post-2002 decade in Turkey

During the first three years, i.e. in the 2003-2005 period, average growth reached 7.7 % which is a relatively high rate in international terms. The growth rate decreased to 5.8 % in 2006-2007, and 0.7 % in 2008 when the crisis hit the world economy. The growth rate then increased again to 4.8 % in 2009, 8.9 and 8.5 % in 2010 and 2011 respectively. It went down to 2.2 % in 2012, 4 % in 2013, and 2.9 % in 2014. Thus growth has also displayed a certain volatility.

Significant improvements in such a short period of time have registered Turkey on the world economic scale as an exceptional emerging economy, the 16<sup>th</sup> largest economy in the world. Turkey has a high growth potential, provided a number of structural reforms – including in the social and governance spheres – are realized.

Manufacturing is the country's primary growth driver, accounting for a 24 % of the GDP. The manufacturing sector has seen a 12 % compounded annual growth rate since 2003. With a workforce of 7.5 million aged between 24 and 34 years, the country offers an extremely young and a large workforce at competitive wage rates.

The country's manufacturing competitiveness ranking is bound to improve because of the government's recent initiative to boost employment levels and its ability to leverage potential in alternative energy generation as well as within R&D and production.

The factors in Turkey's favor for improving manufacturing competitiveness in the future are

- Low corporate tax rates,
- Low labor costs
- A high growth rate for per capita personal disposable income

Turkey's strategic central location, extensive trade relationships, an abundance of available labor, and policies that enable the increasing of manufacturing competitiveness could further elevate Turkey's position.

## The opportunity

WIN Automation EURASIA 2016, which runs 17– 20<sup>th</sup> March at the Tüyap Fair Convention and Congress Center in Istanbul, focuses on the current challenges and business opportunities in Turkey and its nearby region. With the successes of last few years, WIN Eurasia has consolidated its position as the region's most important industrial trade fair.

WIN Automation EURASIA consists of four trade fairs – the 'Otomasyon EURASIA', Materials Handling EURASIA, Hydraulic & Pneumatic EURASIA, and Electrotech EURASIA. These 4 fairs cover the markets for industrial automation, materials handling and logistics, fluid power and energy, and electro-technology. Exhibitor list includes very well-recognized names as ABB, Argo-Hytos, Beckhoff, Bonfiglioli, Bosch Rexroth, Festo, Kuka, Phoenix Contact, Staubli, Jungheinrich, Kita Logistics, SSI Schaefer and Trelleborg as well as



**In 2016 will be the first WIN Eurasia under the total flag of Hannover Fairs. What is the reason and what will change, starting with the show in march 2016?**

After the partnership we entered into in 2002, we have organized WIN Eurasia exhibitions together with Bileşim Fair Organization for 13 years. In this process, Bileşim has been responsible for domestic sales, while we run overseas sales and organization. Benefiting from international experience of Deutsche Messe in fair organization, we managed to take the exhibitions a step further every passing year. In this respect, I must say we had a good partnership process. As of July 2015, we took another step and acquired hundred percentage of shares. This way we aimed to unite sales and organization under a single roof and get a more productive result. We didn't change main structure of the exhibition but tried to develop existing content by means of events. In the meantime, we have made efforts in order to reinforce international nature of our exhibitions in terms of exhibitors as well as visitors and strengthen our relationships with our partners. We are happy to see that the result of these efforts supports the decision we made. Once again, WIN Eurasia Automation establishes its position of being the most effective trade platform that brings all stakeholders in the sector including public, private sector and academia together.

**What do you expect for the show in 2016?**

WIN Eurasia Automation stands out as the most important industrial event of Eurasia. Each year, the industry's leading manufacturers share their innovative technologies with the manufacturing world under these fairs. This year, it will bring together integrated solutions for new generation factories once again. Covering the Otomasyon Eurasia, Electrotech Eurasia, Hydraulic&Pneumatic Eurasia and Materials Handling Eurasia exhibitions; the event will provide a compact overview of automation, electric-electronic, hydraulics-pneumatic and handling-internal logistics industries and offers all solutions necessary for a factory from cables to fluid power technologies, driver technologies to software, robot arms to unmanned forklifts under a single roof. Along with the conferences and panels held concurrently, WIN Eurasia Automation will also provide an important meeting point allowing the transfer of knowledge and current experience. So we expect that WIN Eurasia Automation will guide to the industry again.

Moreover, WIN Eurasia Automation will host major opportunities for companies who would like to access to growing markets with high potential such as Middle East, Russia & CIS Countries, Africa and Middle Asia. Just like the last year, delegation groups and buyers from many countries will attend the fair this year in order to build business contacts. Also, WIN Eurasia Automation is part of the "Hosted Buyer Program" with the support of Ministry of Economy.

**Why should the visitors come to Istanbul?**

With its wide range product variety -as I've just mentioned, WIN Eurasia Automation is an important innovation platform for visitors who want to choose the best solutions for the developments of the factory of the future. On the other hand, I would like to emphasize that WIN Eurasia Automation is considered as the most important gathering of the sectors not only for Turkey but also for the entire Eurasian economic region. Last year, 1581

companies from 21 countries used the event to introduce their future-oriented solutions and generate new business in Turkey as well as Southern Europe, the Middle East, North Africa, and CIS Countries. Turkey and especially Istanbul is the hub for East-West and North-South axes with easy daily access from 20 nearby countries. It also provides visa advantages to the visitors and buyers who might have met strict visa requirements while travelling to Europe or USA. So we can certainly say that visitors who are looking either innovations or new business contacts will obtain a good opportunity during the event.

**What are actually the main topics in the Turkish industry? What moves the market?**

A new era is beginning in the industrial world. Named Industry 4.0, this new era is shaped under the light of digital technological developments and puts "smart factories" to the center of the industry. These new developments allow the machinery, computers, drives and control devices in the manufacturing process to communicate with each other as well as to coordinate and optimize themselves almost entirely independent of human intervention. This reduces manufacturing time, cost and energy use whereas increasing production quality. This trend is a powerful force for transformation in the world's manufacturing industries now and it is affecting the countries in which machine industry is a driving power for all economy such as Turkey. The engineering capabilities and reasonable labor costs enable machinery industry to offer a range of high-quality, reasonably priced products and components in Turkey. But on the other hand, since Turkey's machinery industry is currently labor intensive rather than capital intensive, cost-efficient manufacturing and digitization will become crucial for Turkey in near-future. This is why Turkish companies need to learn all about Industrie 4.0 now and adapt to this new era in order not to lose their competitive power. With WIN Eurasia Automation we aim to contribute to the development of Industry 4.0 in Turkey with the innovative products and solutions displayed by the exhibitors.

**Photographs: Hannover Fairs Turkey**

[www.win-fair.com](http://www.win-fair.com)

**Alexander Kühnel, General Manager,  
Hannover Fairs Turkey**



small and medium-sized companies and national pavilions from Bulgaria, China, the Czech Republic, Germany, Italy, Japan, South Korea, and the U.S.

The Eurasian region accounts for 1.5 billion people and a GDP of \$ 5 trillion. The international trade fair in Istanbul provides the exhibitors with a direct access to this huge market.

Statistics illustrate the trade show's appeal as an ideal platform to showcase and market their products for global as well as regional companies. WIN Eurasia 2015, had more than 1 500 exhibitors from over 40 different countries. Among all the countries, Germany had the highest participation with more than 20 % exhibitors being German companies, followed by Italy, USA, and China. With a display space of more than 29,000 sq. meters, WIN Eurasia hosted more than 77,000 international visitors.

## A for automation

In the coming decade, Turkey aims to be one of the world's top 10 economies and top 5 machinery manufacturer and exporter as well. In order to do this, Turkish manufacturers are aiming to improve their quality standards while trying to hold on to their competitive pricing advantage: a challenge that can be overcome by advanced automation solutions. Otomasyon EURASIA presents the latest applications and solutions for industrial automation – including linear positioning systems, automatic assembly and handling systems, Communication and network systems like Field Bus, Ethernet and ProfiBus systems, control systems like PLC, SCADA, along with industrial IT and software, and robotics. To know more about what the regional and global automation companies have to offer, in order to satisfy Turkey's challenges in manufacturing and production sector, WIN Eurasia is the perfect place to start with. The fair in Istanbul highlights the sales opportunities in growing sectors as automobile production, chemical processing, energy efficiency, food processing, mechanical engineering, and water and wastewater engineering.

## Material Handling Eurasia

Increase in the manufacturing activity leads to increase in demand as well as the complexity of the material handling and the logistics sector. To satisfy the demand and resolve the complexities, the need for improved handling, stowage and storage arises. The WIN Material Handling fair focuses on the needs and requirements of the Material handling and logistics industry and provides economical and technologically viable solutions in this regards. In Turkey, matters such as reduction of investment costs and storage space are the most significant subjects for logistics and storage managers.

## Electro-Tech

Today, Turkey is one of the world's fastest growing energy markets owing to various initiatives from the government like privatization of generation and distribution of energy, establishing an energy exchange to ensure a stable supply and demand, and a target to increase the share of renewable energy. It is an extremely attractive market in which total investments in the energy sector are expected to reach \$ 120 billion by 2023. Electrotech EURASIA provides a good platform to tap into Turkey's growing power sector demands. It showcases systems and equipments for electrical energy generation, power transmission and distribution, equipments like electric motors and frequency inverters, electric and electronic measuring and test equipment, as well as accumulators, transformers and UPS.

Photographs: Teaser Fotolia

[www.win-automation.com](http://www.win-automation.com)

### Otomasyon EURASIA

- Linear positioning systems, Automatic assembly and handling systems
- Communication and network systems like Field Bus, Ethernet and ProfiBus
- Control systems like PLC, SCADA and DCS
- Industrial IT and Software
- Robotics

### Electrotech EURASIA

- Cables and equipment for electric power transmission
- Electric test and measurement equipment
- Electric motors, frequency inverters and drives
- Electric switch-gear and equipment for power distribution
- Electronic and Opto-electronic components
- Gears and Mechanical drive systems
- Transformers, Accumulators and Uninterruptable power supply systems

### Hydraulic & Pneumatic EURASIA

- A complete spectrum of Hydraulic and Pneumatic equipment and components
- Pumps, valves, pipes and tubes
- Sealing and Lubrication technology
- Lubricants for machinery and hydraulic components, and entire Lubrication systems
- Services, accessories and software for drives, gears, Hydraulics and Pneumatics

### Materials Handling EURASIA

- Accessories for industrial trucks, fork lifts, cranes, hoists, lifts, escalators, monorails and remotely operated transportation systems
- Complete robot handling systems, as well as mechanical handling and warehousing systems
- Loading bridges, transfer bridges and ramps, Pallets, bins and containers
- Production logistics and turnkey solutions for logistics
- Labeling and identification systems, packaging and picking order systems, packaging materials
- Technological solutions for warehouse operations
- IT and software for intra-logistics, identification technology and transportation logistics etc

The product category at four concurrent trade fairs in WIN Eurasia





## Added Value Through Digitalization

We are renowned for our passion for bearing supports in machine tools. At the 2015 EMO in Milan, our enthusiasm culminated in a world premiere – “Machine Tool 4.0”. This innovative concept combines existing technology with new networked solutions including cloud technology. Recommended actions for our customers and their end users are derived from countless measurement values for determining the machine condition. Visit our corporate website to find out how this story continued:

[www.schaeffler.com/stories/machine-tool-4-0](http://www.schaeffler.com/stories/machine-tool-4-0)

**SCHAEFFLER**



# Why is WIN Eurasia so important for you?

**T**urkey has been one of the fastest growing markets in Europe for years. The importance of WIN Eurasia, where we have already presented ourselves for the fourth year in a row – and this every year with great success - is correspondingly high for Stober. The trade fair in Istanbul is the ideal platform for us to present new products in the field of servo drive technology and automation to potential new customers. There are also very good opportunities for us to maintain and further expand existing customer contacts. In view of the number and quality of the contacts, WIN Eurasia can be regarded as above average. Stober regularly welcomes a large number of decision-makers and senior managers from leading machine manufacturers from Turkey as well as neighboring countries to its stand. Many visitors already come to us with specific queries and new



applications. In the last few years, WIN Eurasia has clearly contributed in establishing us as one of the leading system providers for industrial drive technology and automation in the Turkish market.

*Daniel Lohse, Director Business Development  
Americas & Europe, Stober Antriebstechnik*



**W**IN Eurasia is the most comprehensive fair in Turkey for Automation Industry. Yaskawa Turkey has started to attend the fair from 2013 with 50 m<sup>2</sup> and now we have 160 m<sup>2</sup> area in 2016. This data not only shows Yaskawa Turkey growing but also shows WIN Eurasias importance for us and Automation Industry. As I mentioned above actually we give a service with Total System Solution with our various product range to our customers in Automation Industry. WIN Eurasia is the best place where we can show this services to reach large masses.

*Turgay Halimler,  
Managing Director, Yaskawa Turkey*

**D**esch Antriebstechnik is one of the worldwide leading manufacturer of complete drive solution for application such as, Marine drives, innovative press drives, oil and gas industry, agriculture and heavy duty applications. Gear-boxes, clutches, brakes complete drive systems allow us to deliver standard and also solutions, that we develop together with our customers around the world. Our production sites in Canada, China, Brazil and Germany safeguard that we are never far away from our customers. WIN Eurasia with 75,000 expected visitors from around the world, opens the opportunity to meet potential customers. Especially the location on the interface between Europe and Asia with it's very good connection to the Middle East attracts customers that may not easily come to other exhibitions. Hence we expect a better visibility of our products in new markets.



*Martin Hammerschmidt,  
Managing Director, Desch*



# Worldwide News

## 3<sup>rd</sup> International Rotating Equipment Conference 2016

The next International Rotating Equipment Conference will take place on September 14<sup>th</sup> and 15<sup>th</sup>, 2016 in the Congress Center of Düsseldorf, Germany. This event will consolidate three forums under one roof: the Pump Users International Forum, the Compressors Users International Forum and the EFRC (European Forum for Reciprocating Compressors). With about 850 participants in 2012 this event is one of the significant events in this industry sector. The proved combination of lecture and discussion sessions, presenting technical papers, training

seminars (one day before) and an accompanying technical exhibition provides an ideal platform for all relevant industry personnel.

After receiving the technical papers back in November 2015, the program committee, consisting of high-ranking representatives from science, manufacturers and users, will decide on the selection in an approved procedure.

[www.vdma.org](http://www.vdma.org)

## NKE Austria and Fersa Bearings form strategic alliance

Fersa Bearings based in Zaragoza, Spain acquires a 49% stake in Austrian bearings manufacturer NKE Austria GmbH. Both manufacturers combine their strengths and competences to become even stronger strategic suppliers of bearings for global OEMs and distributors in their market segments, with NKE as a premium alternative for the industrial market sector, and Fersa in the automotive market sector. Both bearing companies complement each other and combine know-how in manufacturing and distribution of bearings. Through this new partnership, the Spanish multinational company together with the Austrian bearing manufacturer will now have three state-of-the-art production facilities, five distribution centers as well as three R&D centers.

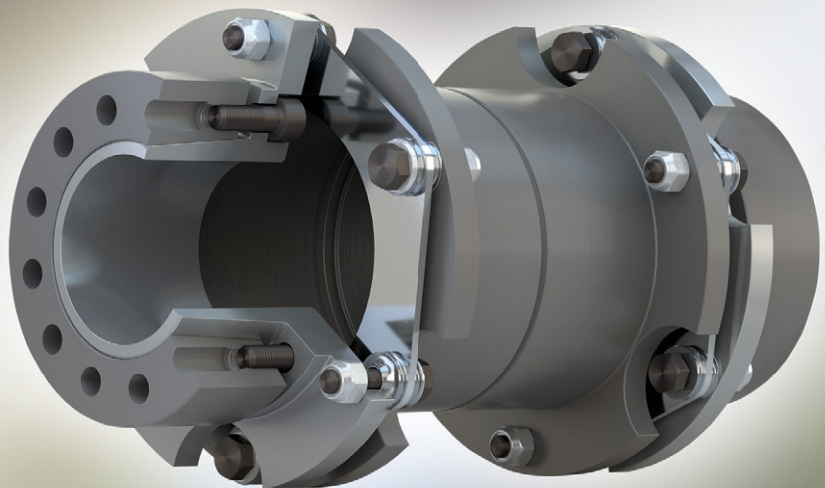
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*Joachim Heidemann, Deputy Head of Engineering at  
ThyssenKrupp System Engineering in Langenhagen (Germany)*

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## Ebm-Papst buying Spanish electronics specialist Ikor

The ebm-papst Group, the worldwide company in fans and motors, acquired a majority shareholding in Spanish electronics specialist 'Ikor'. In doing so, the company with its headquarters in Mulfingen Germany is boosting its competence in the field of developing and manufacturing electronics. Moreover, the acquisition is set to strengthen its market position in North America and China, among others.



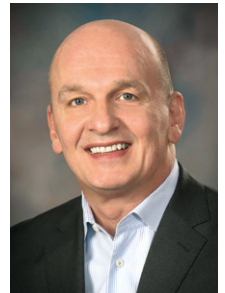
Ikor, based in San Sebastian/Spain (€60 million turnover / 600 staff), has an R&D center as well as 3 modern production sites in China, Mexico and Spain. Founded in 1981, the focus of the company is the development and production of customized electronics with extensive knowledge in controls and controllers for industrial applications. "For us as system supplier, acquiring the electronics specialist IKOR means that our technology expertise and know-how is enhanced and boosted even further", explains Rainer Hundsdörfer, chairman of the ebm-papst Group management. "The additional production capacities especially in China and Mexico lead us to expect new market potential and thus further growth."

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

## Andreas Gerstenberger takes charge of ContiTech's industrial hose business

Andreas Gerstenberger, former head of the European trading companies under ContiTrade's umbrella, has now taken over as the head of ContiTech's global industrial fluid systems business unit and the industrial hose segment. Gerstenberger has worked for Continental Corporation for 21 years and for almost half of this time has managed various organizations in North America. In his new role he will be based in the Ohio, US.

Industrial Fluid Systems operates globally with around 2,500 associates at 27 locations in 14 countries. The business unit is divided into two product market segments: Industry Hose and Oil & Gas, with development, production and sales centers for the food, chemical and pharmaceutical industries among many others.



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

## 34<sup>th</sup> Motek und 9<sup>th</sup> Bondexpo shine with record number of visitors

The international trade fairs, Motek and Bond-expo in Stuttgart, Germany, presented a new hall layout this year and increased the visitor count by 8 %. The expo organiser P.E.Schall informed that 38,568 visitors had access to 908 exhibitors in Motek and 112 exhibitors in Bondexpo. Even the area of the expo has increased significantly to 68,000 m<sup>2</sup>. The new, block type division of halls led to a situation that the visitor flow was uniform. In addition, a focus on process and system solution competence in the production and assembly automation has expanded the target group spectrum.

[www.schall-messen.de/en](http://www.schall-messen.de/en)  
[www.motek-messe.de/en](http://www.motek-messe.de/en)  
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**It's our turn!**

## HydraForce moves to Advanced Manufacturing Hub in Birmingham

Hydraforce, manufacturer of hydraulic clamp-in valves, customer-specific control blocks, electro-hydraulic controllers and electrical vehicle controllers, has moved into a new hub in Birmingham. The specially constructed plant has an area of 11.150 m<sup>2</sup>. Production and test benches are in the ground floor and the top two floors have design and sales offices as well as training rooms. There is also a new "Application Engineering Laboratory". With this new building, Hydraforce is adding 7 000 m<sup>2</sup> of production capacity.

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



## International Bearing Conference in Hanover

Bearing world – the expert forum for the Bearings industry, is organizing an international bearing conference on 12<sup>th</sup> and 13<sup>th</sup> April, 2016, in the German city of Hanover. The main theme of this international event is the “Industrial Research and Science in Dialogue with Practical Application”. Bearing World addresses all aspects of bearings industry, with the aim of promoting the exchange of concepts, knowledge and experience between universities, researchers in industry and engineers in the development, design, manufacturing, and assembly of technical systems wherever bearings are involved.

For more information and registration:  
[www.bearingworld.org/en](http://www.bearingworld.org/en)

[www.bearingworld.org](http://www.bearingworld.org)

## Hannover Messe 2016: global stage for integrated industry

Hannover Messe 2016, the world's leading trade fair for industrial technology runs from 25 to 29 April in Hannover, Germany. This international trade event features five parallel trade fairs: Industrial Automation, Digital Factory, Energy, Industrial Supply, and Research & Technology. The show will be jointly inaugurated by President Obama of United States along with Chancellor Merkel of Germany. As this year's Partner Country, the U.S. along with their German partners intend on leveraging the fair to promote the TTIP free trade agreement. The TTIP promises to

promote growth and employment on both sides of the Atlantic in the mechanical, electrical and the electronics industry. With a strong lineup of some 5,000 exhibitors from 70 countries, Hannover Messe proves to be the perfect stage for transparent and constructive dialogue to shape up the economic policies of the future. The lead theme of this year's fair is “Integrated Industry – Discover Solutions”. Here, the visitors can learn how they can systematically turn their production plants into smart factories, and also find solutions on how to digitalize their energy systems. As this year's Partner Country, the U.S., will be injecting even more power and appeal to the show. Leading American companies like General Electric, Eaton, Molex, Microsoft, AT&T and IBM will present their latest solutions for advanced manufacturing. “Hannover Messe 2016 will serve as a crucible for Industry 4.0 expertise from around the world. The show delivers major gains for everyone who takes ‘Integrated Industry’ as an invitation to find out how digital integration can help them gain and maintain a competitive edge,” says Jochen Köckler, the Deutsche Messe Managing Board member responsible for the event. Video: <http://bit.ly/20spp79>

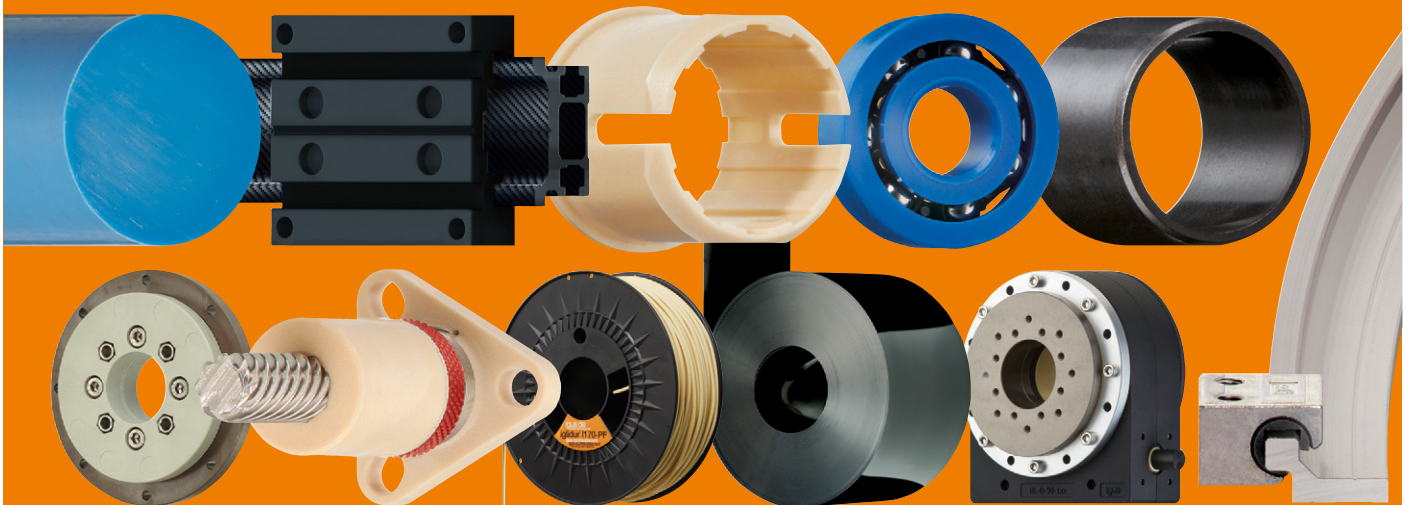
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# “It goes round and round ...”

*It was only meant to stay there for five years. Now it has already been there more than 15 years. I travelled to London, England to learn more about the condition of the bearings installed in it. Even at corporate headquarters in Germany I was able to gain interesting insights into the history of the Ferris wheel which was once the largest in the world.*



## Acknowledgement

I should like to thank Karen Preston and Chris Head of Schaeffler UK most heartily for their great support on site in London. My thanks go also to Dieter Göbel and Gerhard Halbig of Schaeffler in Schweinfurt, Germany who described the creation of the London Wheel to me impressively and naturally also to the company Coca-Cola, who made the interviews in the capsule possible for us.

What a beautiful morning! Although a few clouds were still floating by above the city, the first rays of sunlight still let us hope for a very promising day. I allowed my view to wander and enjoy the gorgeous view of the skyline, which gradually appears before me. To the left below me I can make out an old time-honored buildings complex, which in my line of view reveals its full splendor – the Westminster Palace with its even more well-known clock tower ‘the Big Ben’. Just behind it the dome of Westminster Abbey appears and if I move my eyes towards the horizon, towering there above the rich green treetops of St. James Park, the roof of Buckingham Palace stands out. And I wonder of course whether the Queen is there today, but the many impressions of this grandiose skyline allow me to quickly forget these thoughts again. I turn to the right and allow my view to wander along the curves of the Thames. Here and there a ship is fighting its way through Britain’s capital city, past all the sights such as St. Paul’s Cathedral and Tower Bridge. At the highest point of my journey both of them are now not too longer hidden from me, so that at this moment I easily count as one of the millions of people who can of course experience the same feeling each year: On a trip with the London Eye.

Just like me, even at this early hour numerous tourists are certainly having a lot of fun enjoying easily the most impressive view of the City of London occurring in 30 minutes intervals. However I am still interested in a completely different aspect: How can the safety of the London Eye actually be guaranteed from a technical point of view? And for this my view is directed through the glass capsule directly to the hub of the big wheel. In the heart at the core here, the FAG

self-aligning roller bearings two meters (over six feet) across and weighing tons can be found and allows for a smooth turning action.

## From a new Perspective

Location: Schweinfurt, Germany, the headquarters of Schaeffler’s industrial production. Here I am meeting Dieter Göbel, Application Engineering Wind Energy Turbines, and Gerhard Halbig, Department Manager Service Operations. Both men know the London Eye project like the back of their hand, as they were so-to-speak involved with it from the outset in the year 1995.

But one at a time - in the closing years of the last century there was a large demand for visitor attractions and events in order to celebrate the start of the new millennium. The visionary architects David Marks and Julia Barfield had an amazingly simple yet bold idea: they wanted to create a beautiful and technologically innovative construction for London which would also allow visitors the opportunity to see one of the largest cities in the world from a new and stimulating perspective. Therefore they decided that a giant wheel would be the ideal step into the new millennium. And thus the idea was born.

“In October 1995 we had already received the first technical enquiries to determine the cost of the bearings for the concept”

Author: Dirk Schaar is editor-in-chief of MDA Technologies





**01** Editor-in-chief Dirk Schaar (center) meets Karen Preston and Chris Head in front of the London Eye

Dieter Göbel recalls. The British airline company British Airways had commissioned a London-based consulting engineers office, which had in turn commissioned a Japanese group of companies with the overall project. “We tested the feasibility then and prepared a proposal which we presented once again in the second step in 1998 following corrections to the loading conditions. Our idea was to use two self-aligning roller bearings”, Dieter Göbel tells me. However the contract was finally placed with a competitor in Japan. “To our surprise in September 1998 we received a request for the design of the bearings for the London Eye from a Dutch company. In the meantime they had received the order for the construction work”, Halbig told me with amazement. The structure of the bearing was then immediately realized in October 1998 and the bearings specialist from Schweinfurt, Germany received the order to deliver it just one month later. However the conditions were tremendous, as the bearings had to be delivered within 20 weeks. “A great challenge, which we however wanted to take on, for we of course knew that we had the know-how required from numerous large-scale projects and over 100 years of tradition. Even then we were already seen as a preferred development partner and supplier where people were looking for special and intelligent bearing solutions”, Gerhard Halbig told me.

### A shrewd idea

Up here at the highest point, I am already 100 meters (330 ft.) off the ground. The London Eye, which is operated by the company Merlin Entertainment plc, amongst the best in Europe for running visitor attractions, is over 135 m high overall, has a circumference of 424 m and an overall weight of over 2,100 tons. I enjoy my view from one of

### 10 impressive facts and figures about the London Eye

- The London Eye can carry 800 guests per rotation – equivalent to 11 London red double decker busses.
- You can see around 40 km from the top – as far as Windsor Castle on a clear day.
- Each of the 32 capsules weighs 11 tonnes. To put that figure into perspective, it's the same weight as 1,157,894 pound coins.
- In one year the London Eye will rotate 7668 times, or 2300 miles, as far as from London to Cairo in Egypt.
- Each rotation takes approximately 30 minutes, meaning that a capsule travels at a stately 26cm per second, or 0.9 km per hour – twice as fast as a tortoise sprinting.
- It took seven years and the skills of hundreds of people from five countries to make the London Eye a reality.
- The 80 spokes laid together would stretch for 6km
- The total weight of the wheel and capsules is 2,100 tonnes – or as much as 1,272 London black cabs.
- The spindle which holds the wheel structure is 23m long – the height of nine classic London red telephone boxes.
- There are 32 capsules in total. For superstitious reasons they are numbered up to 33, with capsule 13 left out for good luck.





**02** What a beautiful view over London

**03** The hub is introduced with self-aligning roller bearing

## The Operators view

Of course, I also wanted to know what significance the attraction has for the operator, owner and sponsor. For this I spoke with Stephanie Francis, press officer for the Coca-Cola London Eye:



**Mrs. Francis, could you please tell us something about the visitor frequency of the London Eye and your feeling of the accepting of tourists and the citizens of London?**

Although we cannot release exact visitor numbers, the London Eye receives more visitors annually than ancient wonders of the world like the Taj Mahal, Stonehenge and even the Great Pyramids of Giza. The London Eye has become a source of pride for the whole country as well as the capital – it's the most distinctive addition to the world's greatest city this century, loved by Britons and tourists alike.

**With Merlin Entertainments and Coca-Cola the City of London won a new sponsor for the attraction. What do you expect from the new partnership in the next years?**

For 128 years, Coca-Cola has been associated with moments of happiness and occasions that bring people together. Given this heritage, we think Coca-Cola is a great fit for the London Eye and we're looking forward to what that brings during the partnership.

**Could you please give us a short preview for the future: How can you uphold the appeal of the wheel?**

Originally, the Coca-Cola London Eye was intended to be a temporary structure for five years but with millions boarding it every year, its popularity has prompted its lease to be extended. Today it is a permanent fixture on the London skyline and a beautiful symbol of modern London – we play an integral role in the community, have become an internationally recognised symbol for London, a hugely popular filming location and also a unique venue for corporate events, launches and entertainment. We'll continue this along with offering the breathtaking views of London's ever changing skyline.

the 32 glass cabins, in which another 24 passengers can travel alongside me. Actually there are 3 more people in the cabin accompanying me – not tourists, Karen Preston, Marketing Manager at Schaeffler UK, Chris Head, Application Engineer in the Schaeffler Technology Center in Minworth, close to Birmingham in England, and my colleague as cameraman.

“The London Eye is a superb feat of engineering which fulfills all aspects of safety, naturally also with the bearings we supplied. Our bearings were designed by our colleagues in Schweinfurt for a working life of 50 years. And this is just as well, for after the first five years of operation that were planned, the London Eye may now be allowed to remain in place on the south bank of the Thames”, explains Chris Head.

The radial FAG self-aligning roller bearings were installed as fixed bearings and as floating bearings in the hub which sits on the axis of the giant wheel. Here, we are concerned only with the self-aligning roller bearing F-804543 as the floating and the F-804544 as the fixed bearing. The fixed bearing with an external diameter of 2.66 m weighs 6.3 tonnes and is fixed to the shaft. The loose bearing with its external diameter of 2.62 m and a weight of 5.2 tonnes can move back and forth on the shaft, in order to equalize the extensions in length. In order to achieve a long lifespan FAG's engineers in Dieter Göbel's team decided on using self-aligning roller bearings with drilled-out rollers and pin type cages. “These allow the largest number of rolling bodies per row as compared to standard cages and in this way guarantee a high radial load bearing capacity”, Chris Head explains the advantages to me.

For simple installation both on the front sides of the internal as well as the external rings, threaded holes are present into which eyebolts can be screwed for installation. In order to save time and money with any exchanging of bearings which may occur in future, the German specialists have had another clever idea as a solution: the floating bearing has a larger drill-hole than the fixed bearing, so that it can be taken apart through the installation space of the fixed bearing on the side facing the river.

## Manufactured in record time

Back to Schweinfurt in Germany: “After we had accepted the challenge to deliver the bearings, proposal drawings were prepared and we already ordered the blanks from our suppliers ahead of time – in this way we did not lose any time”, Dieter Göbel reports on the planning phase at the end of 1998. For installation reasons we still had to carry out numerous changes to the bearings. “Originally the bearings were designed for example for lubricating with



oil. Due to inadequate sealing solutions, it was not possible to implement this technology at that time. For this reason, the lubrication system was changed from oil-based to grease-based instead. This is one problem that we were able to quickly overcome with our experience”, Dieter Göbel recalls. And then things really moved very quickly: In mid-January we completed the changes, at the end of the month the drawings were approved by the company ‘Hollandia’ and in March the blanks we had ordered were already being delivered.

The final assembly of the bearings was completed at FAG’s factory in Wuppertal (Germany) with the final fitting to the hub castings being carried out externally. Produced in case-hardened steel, the bearing’s rolling elements have a gentle convex curve, the radius of which is slightly tighter than the matching concave curve of the raceways, to ensure the load is transferred through a narrow ‘contact eclipse’ well within the roller’s overall width at all times. As might be expected, the tolerances are very small indeed: a mere 2 microns, or 0.002 mm, covering all the rolling elements, and around 10 microns for the raceways.

Once the production plan had been co-ordinated exactly, the two self-aligning roller bearings were produced in only seven weeks throughput time. On the 30<sup>th</sup> April these could finally be delivered to site. “The design and load spectra for this project were not significantly different to other large-scale projects, but the icing on the cake for us was the that we had to work close to the limits for the materials and the sizes as any oversizing would have caused unnecessary costs and would have ended up heavier. In addition, up to that point we had not actually built any internal wheel bearings. However, we met the requirements and were able to deliver the ideal solution to our customer. For this reason today I still look on the London Eye with respect and pride”, Dieter Göbel explains.

## Bearings also provide elegance

The two self-aligning roller bearings were however not the only products that FAG delivered for the Millennium Wheel. I move over to the land side of the gondola and allow my view to gaze downwards. Two radial large-scale GE 440 DW ball-and-socket joints have been installed down there below us in the two giant masts which support the London Eye, giving it the required stability. Surface pressures of over 450 N/mm<sup>2</sup> occur here, “With their help the wheel was swung from its horizontal installation position flat out across the Thames into its vertical working position”, Chris Head recalls this exciting piece of work. “After the large individual components were delivered onto swimming platforms and were then brought across the English Channel and the Thames right into London, we then had a four month installation phase. The hub with the self-aligning roller bearings which had already been installed by FAG’s installation project manager, and the four segments of the wheel were then assembled onto steel columns which had already

**04** Dieter Göbel (left) and Gerhard Halbig at Schaeffler headquarters in Schweinfurt, Germany



## The Chronology from Schaeffler’s perspective

27.09.1995	first inquiry to the bearings manufacturer FAG
16.10.1995	first technical details for the design from the company OVE Arup & Partner/UK
02.05.1996	the first proposal
28.01.1997	new load calculations by FAG
19.03.1997	change in dimensions of the bearings
30.10.1997	first inquiry from Mitsubishi Kobe, Japan
10.09.1998	inquiry from Hollandia via FAG Netherlands
21.09.1998	Mitsubishi hands the contract back
15.10.1998	first technical data for the design from the company Hollandia
18.11.1998	FAG received the contract order from Hollandia, 20 weeks delivery time
11.12.1998	Completion of proposal drawings
14.12.1998	Advance order for the blanks
08.01.1999	Hollandia visits the factory in Wuppertal, Germany – external diameter changed
28.01.1999	Approval of the bearing drawings
13.03.1999	blanks arrive
30.04.1999	Delivery of the bearings (7 weeks production throughput)
02.05.1999	Installation of the bearing into the wheel hub (4 days)
21.06.1999	Insertion of the shaft into the wheel hub (3 days)
10.10.1999	Giant wheel is raised (2 days)
16.10.1999	Positioning (2 days)
01.02.2000	Official commissioning and starts working

been erected, and the bracing ropes tensioned. On the 10<sup>th</sup> October 1999 we had then finally finished: the wheel could be set upright. That was naturally also a very important and tense moment for us too, for this showed us that our ball-and-socket bearing had been chosen correctly and mastered the objectives very successfully”, Chris Head explains.

The radial large-scale ball-and-socket joints thanks to their PTFE Elgoglide floating lining, can carry extreme loads and requires no maintenance. In this way also with the very high surface pressures which occur for this type of bearing they guarantee a high working life expectancy with a low-momentum connection to the fulcrum. “Without the ball-and-socket joints a different static design would

**05** Two Elges bearings equalize the wind loads



## Winning plaudits



"Our city has an unrivalled range of unique attractions that draw people from across the

world and the much loved London Eye is one of the most recognizable."

*Boris Johnson, Mayor of London*

"It is hard to believe that 15 years ago we conceived, designed, led a team of architects and engineers, and started a new company



to create something that is now as much a part of London today as Tower Bridge or Big Ben. We are proud that the London Eye has become an integral part

of our culture as well as much loved symbol of London."

*David Marks and Julia Barfield, Architects*

"The London Eye is a must for all visitors and it has given huge pleasure to our local community. I just can't imagine the South Bank without it."

*Kate Hoey, Labour Member of Parliament for Vauxhall*



"The London Eye shows what unbelievable engineers and mechanical engineering can achieve. And above all it is a great symbol for London and the many people here. I hope you shall head home later and say that engineering can also be fun."

*Chris Head, Application Engineer at Schaeffler UK*



then gets to the large-scale bearings through the hub. Endoscopic examinations of the running line and the roller bodies would show up any damages which occurred at an early stage", Gerhard Halbig explains to me during my visit to the Schaeffler headquarters. On site, the service engineer removes samples of the lubricant, which are then examined in Schaeffler's own laboratory, as well as in an independent laboratory for particles and worn abrasions. "From these results we can then quickly deduce whether wear and tear occurred or if everything is alright. But the best thing about it is that up until today we could not discover anything wrong. And that the bearing has been running now for 15 years without any problems, tells us that it should also be like this in years to come", Gerhard Halbig tells me proudly. For constant follow-up, lubrication of the two main bearings is carried out from a central greasing pump, installed a few years ago by the operator. The ball-and-socket joints however are not included in this, as they require almost no maintenance at all and are only very occasionally greased manually by the operator during the regular maintenance works.

## Always the best solution

Schaeffler has not just been an important and competent partner when we are interested in the development and production of large-scale bearings since London's landmark for the 21<sup>st</sup> century was built. "The London Eye is definitely one of our most cultured projects, which we carried out in co-operation with our colleagues in Holland and Germany. We allowed ourselves to be inspired by each other daily, and this is the difference Schaeffler makes. We work very closely with one another throughout our global network in order to give our customers the best possible solution. And we have already proved this on other projects", explains Karen Preston, the Marketing Manager at Schaeffler. Thus for example at London's Wembley Stadium arena, Schaeffler supplied the bearings to support the Wembley Arch. Another challenging project was the roof on Wimbledon's Center Court. The bearings installed there ensure that the roof can be closed in order to do enough to satisfy the typical British weather. "Whether now in oil, gas or wind energy, in the automotive sector or in heavy duty applications: We like to find the best solution for the customer in order that they can save time, money and resources. And not just the design of the bearings is decisive here but also the installation works, the maintenance and our many other services with which we support our customers", Karen Preston tells me.

## A breath of engineering talent

The wheel is still turning with a speed of 0.26 m/s. Gradually our gondola with number 32 on it however is reaching the level of river-bank. I enjoy my last view across the Thames in the direction of Westminster. For me the journey is over after 30 minutes, that is after one full revolution. Today I not only had the opportunity to get to know an attraction which played a key role in the transition from one millennium to the next and has become an important symbol for this British capital city, but above all I could experience a whiff of high-level engineering talent and how sophisticated and well-

planned bearing technology can contribute to the safety of such gigantic machines. Or as Karen Preston put it in closing: "I should be happy if young engineers would also have such visionary thoughts in future. I hope that young people – at Schaeffler too – will be inspired by such projects." – There is nothing more to say to this.

Photographs: Fotolia teaser

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

have been required and the wheel would probably have worked out far less elegantly", Chris Head is convinced.

Up until today the two ball-and-socket joints have had the job of equalizing the micro movements caused by the wind, which would otherwise impact with full effect onto the comparatively rigid steel structure. Therefore they also take on a further important function for the London Eye.

## The bearings hold in place

15 years after its official opening on 9<sup>th</sup> March 2000, I finally had the opportunity to go for a ride on the London Eye. And it is not only the view that gives me a good feeling, but also the feeling of safety which is guaranteed by using Schaeffler's technology. And in order that they can still carry out their valuable work in years to come, the self-aligning roller bearings are regularly inspected by the experienced Schaeffler industrial service engineers. In this way the faultless and safe functioning of the self-aligning roller bearings can be guaranteed for many years to come. "We carry out these inspections every two years. For this our service team from Schweinfurt accesses the masts and

### Link to visual insight



In order to allow you a visual insight, I also recorded my visit to London. You will find the exciting video at the following link.

<https://vimeo.com/155648376>



# TECHNOLOGY

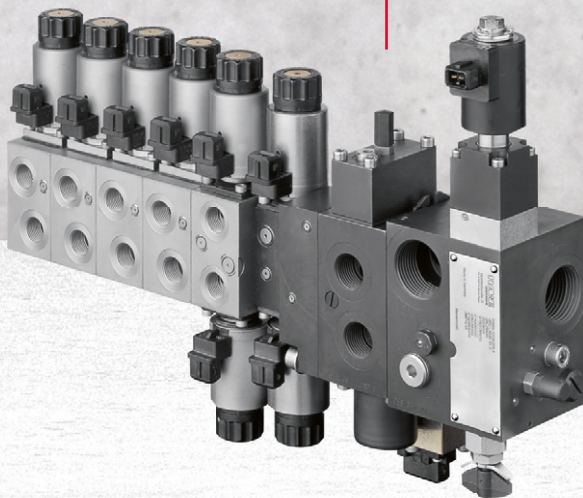
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- $Q_{max}$  300 lpm



### Uniquely combined. Proportional directional spool valve PSM



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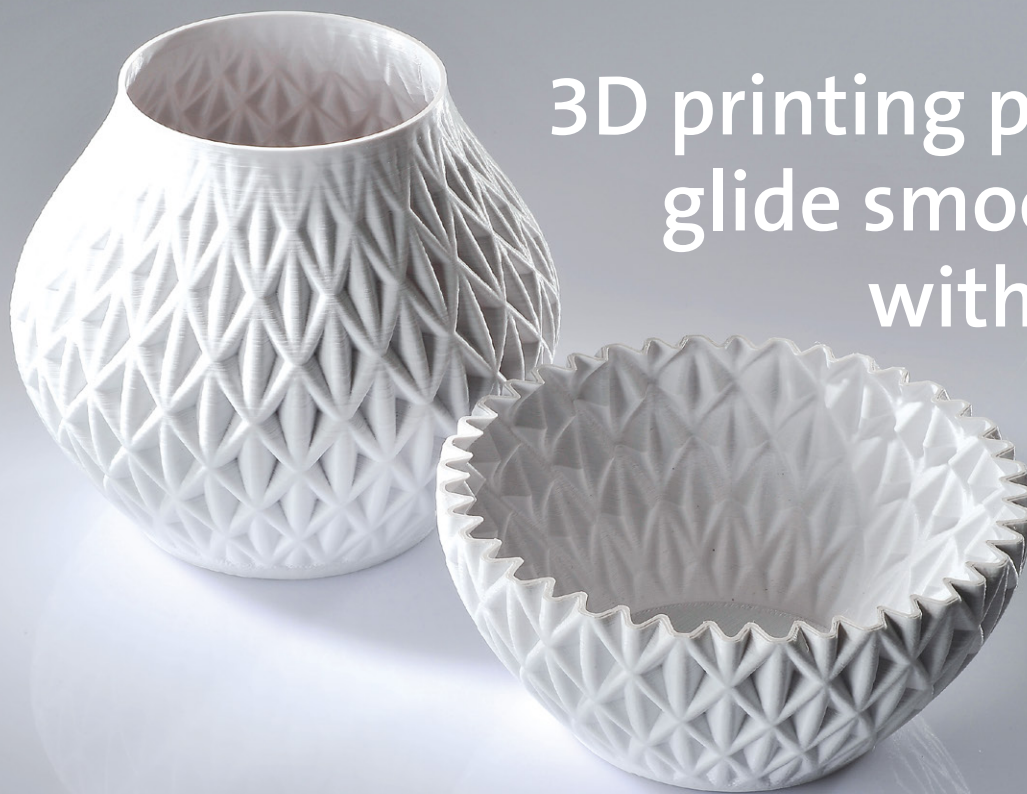
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# 3D printing plates glide smoothly with igus



*For both, rapid prototyping or mass production – 3D technology provides fascinating options: open source printing systems are being developed and produced world-wide for personal use. On the other hand, high-end 3D printers for professional use are making prototypes and small volume series. Linear and drive technology, plain bearings and energy supply systems from Igus are used in wide range of kits and plans. Design engineers for 3D printers for professional use – such as EVO-tech GmbH – rely on fully installation-ready linear glide solutions for lubricant-free and low-noise operation.*

**V**ery slowly and quietly, the print table moves from top to bottom: the vase emerges layer by layer until it assumes the exact shape of the digital model then the 3D printer releases the product. The components of the EVOlizer 3D printer from the company EVO-tech GmbH, Austria, need to work with extreme precision to make such delicate artisan structures. Printing is performed based on the fused filament fabrication process (FFF). This involves melting thermoplastic fibres in a heated nozzle, which are then layered on the print table in X and Y direction by the print head. Lowering the table in Z direction causes one layer of the plastic filament to be deposited onto the next until the object is complete.

During this process, the plate structure only moves a tiny distance, in increments of a tenth of a millimetre. In order for the print table to accurately glide from top to bottom with little noise, EVO-tech, used components from the drylin product range from Igus.

Among other issues, the key to selecting Igus linear plain bearings is that their components glide quietly and vibration-free because there is no mechanical rolling action between hard friction partners, as is the case with metal or ceramic balls. This was an important criterion for EVO-tech since the company wanted to develop a 3D printer for the immediate working environment. The compact desktop 3D printer was developed for architects, prototype builders, and small series fabricators as target groups.

## 3D printers: lubricant and maintenance-free Igus plain bearings inside

Apart from quiet operation, the quality of the produced objects is important for professional applications. For instance, lubricants can contaminate the raw material or the printed product. Because solid lubricants are integrated into the raw material, Igus high-performance polymer plain bearings completely avoid lubricants. This eliminates any contamination risk. In addition, the dry-running properties render the 3D printer maintenance-free and decrease the likelihood of malfunctions. Other factors, such as acceleration and positioning accuracy also play a role in moving components in 3D printers. These allow detailed features of products to be accurately reproduced based on CAD models. Regardless

### About igus

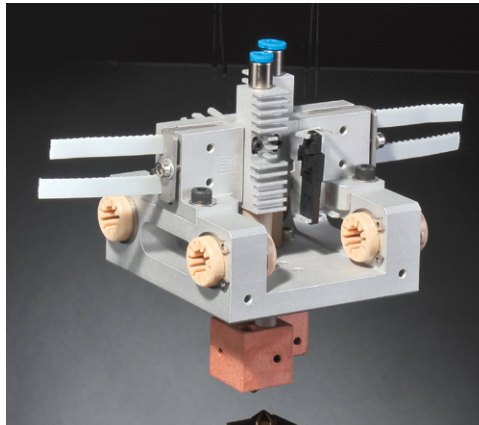
The company founded in 1964 by Günter Blase in a garage located in Cologne, Germany now has a world-wide reach with more than 2,700 employees, € 469 million annual turnover and operations in more than 80 countries. Igus specializes in Energy chain systems, plain polymer bearings, linear bearings, piston rings and various low cost automation systems.







**01** The EVOLizer prints based on the fused filament fabrication process (FFF). Thermoplastic fibres are melted and applied in layers



**02** The print head layers the plastic fibres on the print table. Dry-running drylin R linear bearings ensure accurate travel

of travel, smoothly operating drylin linear plain bearings and lead screw units can be used with slow as well as high accelerations.

Regardless of whether the extruder head is moved from left to right, forward or backward, or the plate structure is moved from top to bottom – Igus provides a complete construction kit that contains profile rail guides, linear units with lead screw drives or toothed belts, and even complete linear axis including the motor. Designers have access to five drylin linear technology type series. The flexible construction kit provides various sizes and widths, therefore giving developers unlimited options: the drylin W linear guide system alone includes 14 different profiles and 50 carriage versions. The compact linear shaft guides of the drylin R type series are particularly suited for guiding the print head since they do not damage the axis and have very low bearing clearance. Due to its small installation space, the drylin N low profile linear guide system can be installed for Z-axis height adjustments. The carriages on all drylin guides operate without lubrication. Due to high wear-resistant polymers and their special geometry, the linear units from Igus are very rugged and promise long service life. Moreover, the compact solutions for the 3D printing industry represent a cost-effective alternative to conventional guide systems.

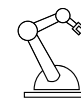
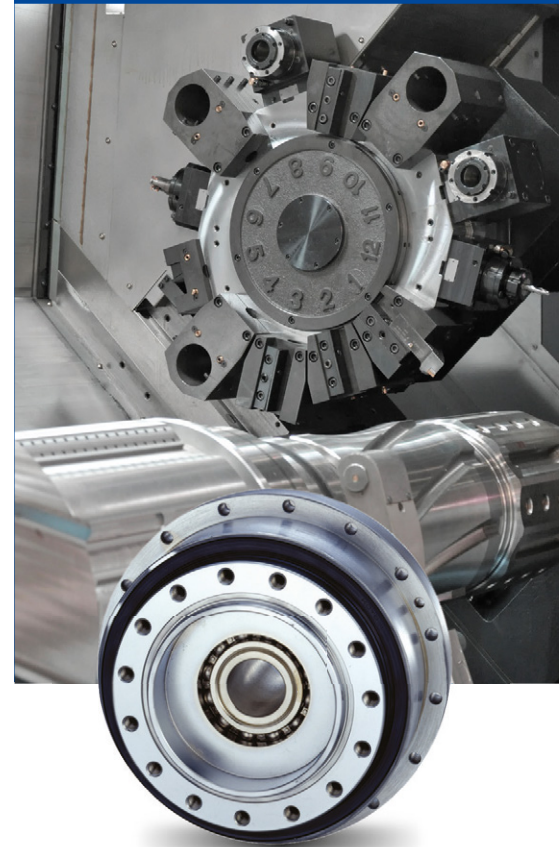
## Everything from a single source: system solutions for the 3D printing industry

Igus energy chains ensure that connected cables are reliably guided during the computer-controlled printing process. Due to their low profiles and tight bending radii, products from the micro-chain series are particularly suited for confined installation spaces in 3D printers for dynamic applications in any direction of travel. As is the case for linear bearings, micro-chain series also feature very low weight. The chainflex control and motor cables guided in these are specifically designed for continuous motion applications. This prevents cable failures and guarantees a long service life for 3D printers. In combination with motorised drylin linear axis, which include motor flanges, extensions, and drylin E stepper and direct current motors, Igus can supply a completely ready-to-install operating unit from a single source.

This full-service capability is also important for EVO-tech as it relates to the user-friendliness of 3D printers, an important aspect in professional environments. In order for the EVOLizer to work trouble-free and to prevent downtime, EVO-tech installs and calibrates its 3D printers on-site, trains users, and makes an expert available for the Auto-CAD system. EVO-tech itself also values this comprehensive service in its collaboration with Igus: process costs and development time were reduced based on the advice provided by Igus engineers for selecting the correct plain bearings and energy chain solutions for the desktop 3D printer.

Photographs: EVO-tech GmbH

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



## Motion Control Drives

## Simply Precise.

High precision, high efficiency drives, manufactured in Europe.

The competitive advantage.  
Drive technology from Sumitomo Drive Technologies.



Hall 3, Stand B120

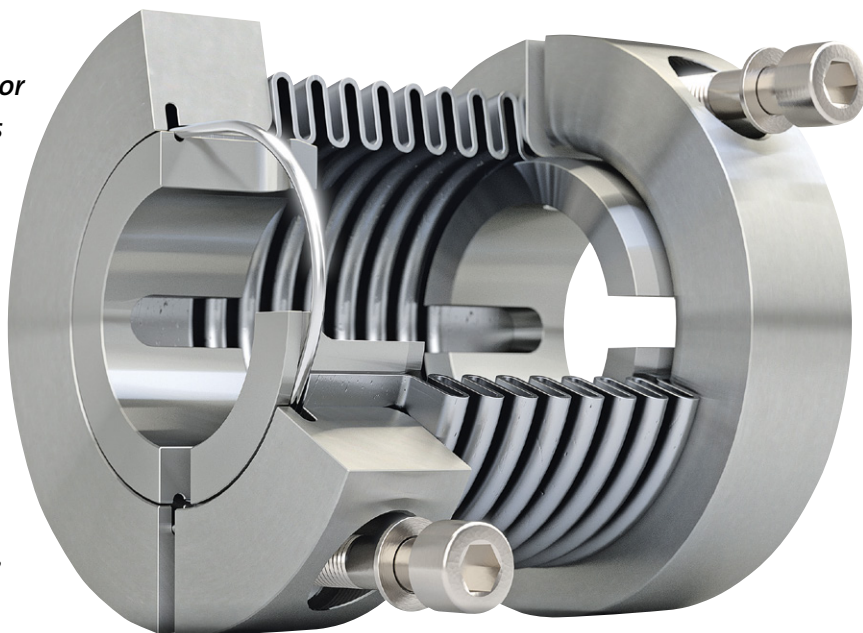
## Sumitomo Drive Technologies

Sumitomo Cyclo Güç Akt. Sis. Tic. Ltd.Sti.  
Ataşehir, Istanbul, Turkey  
Tel. +90 216 250 6069  
[www.sumitomodrive.com](http://www.sumitomodrive.com)

# Characteristics and strengths of high-quality servo couplings

*The manufacturing accuracy, feed rate or service lifetime in production systems essentially depend on the quality of the servo axes and their components.*

*Depending on the application, very different requirements are placed on the couplings to be used. Mayr power transmission represents a wide range of backlash-free, reliable shaft couplings, also providing future-oriented solutions in the field of high-power couplings with high speeds, the demand for which is increasing.*



With their strong, force-locking connection, the 'smartflex' steel bellows couplings provide backlash-free and reliable torque transmission. The perfectly moulded steel bellows ensure maximum misalignment capability

Servo technology is an innovative growth market, and the number of servo axes installed into machines and systems is continuously increasing. The dynamics and the acceleration torques of the servo drives are also increasing, which in turn increases the demands placed on the shaft couplings. The couplings in the axes are basically used to transmit the motor power accurately from one shaft to another, whilst compensating for shaft misalignments. In servo technology, steel bellows, elastomer and disk pack couplings are preferred, which are among the most common and most attractive backlash-free shaft couplings. However, each drive has its own specific characteristics and places extremely different requirements on the couplings. Therefore, Mayr power transmission provides an extremely wide and sophisticated product range for very different drive constellations.

## Precise and absolutely backlash-free

The 'smartflex' steel bellows coupling, for example, is designed with a multiple-layer steel bellows which gives the coupling extremely high torsional rigidity. This ensures very high positioning accuracy and 'shaft run-out' accuracy in servo axes even under difficult conditions, and guarantees an absolutely backlash-free and therefore flawless torque transmission between the two shafts. Furthermore, the multi-layer bellows design provides a much higher misalignment capacity in comparison to single-layer bellows. Higher misalignment capability also means greater reliability, operational safety and service lifetime.

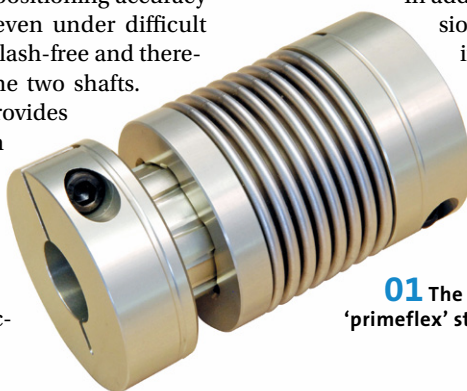
In addition, the 'smartflex' couplings distinguish themselves through a clamping connec-

tion between the shaft, hub and steel bellows which is unique on the market. This means that these couplings do not have any thermally pre-loaded, welded or soldered connections or non-media resistant glued connections. The clamping connection allows extremely easy and flexible assembly of the couplings based on the modular principle.

The coupling hubs consist of a clamping ring with latched reducing bushings. In operation, this clamping ring connects the steel bellows, bushings and shaft through force locking. Therefore, simply by changing the reducing bushing, the 'smartflex' coupling can be easily adjusted to changed shaft diameters. In addition, the direct clamping of the steel bellows guarantees the optimum centring of the bellows to the shafts and also ensures high running quality and torsional rigidity. Thanks to the consistent use of high-strength aluminium, the coupling also features a high performance density with a low mass and inertia.

## Leading, innovative technology

In addition to the 'smartflex', Mayr power transmission provides an extremely cost-effective, plug-in solution for simple installation or removal with the 'primeflex' steel bellows coupling. Even after longer operating times, the 'primeflex' can be safely removed without damage to the steel bellows. This is one of



**01** The exceptionally cost effective 'primeflex' steel bellows coupling

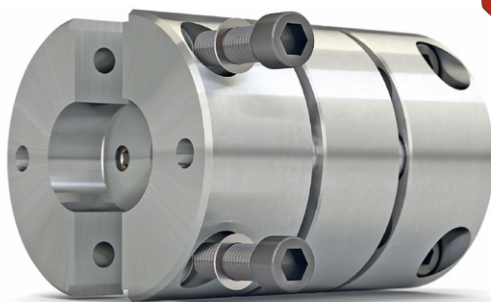


**02** The backlash-free, flexible 'Roba-ES' shaft couplings compensate for radial, axial and angular shaft misalignment. They protect the drive system against critical vibrations



is the steel and high-strength aluminium alloys used in the manufacturing of these products. Thanks to the flexible disk packs, the couplings are able to compensate for radial, axial and angular shaft misalignments. As a result, they safeguard the bearing against undesired loads and prevent unnecessary downtimes and costs.

**03** The high-performance 'Roba-DS' servo couplings with split clamping hubs guarantee easy and quick installation even in difficult ambient conditions



### Robust and reliable

The high-quality 'Roba-DS' shaft couplings simultaneously combine high performance density with absolute backlash-free operation. Here the disks are treated in a special blasting procedure in the clamping area in order to guarantee the backlash-free transmission of the torques. 'Roba-DS' disk pack couplings are robust and reliable. Furthermore, they are temperature resistant and wear and maintenance-free, and are therefore suitable for applications in extreme ambient conditions.

A wide selection of standard modules with a multitude of hub designs ensures adaptability as well as flexibility in diverse drive constellations.

For the selection and dimensioning of shaft couplings in servo axes – in particular in case of complex applications – Mayr power transmission is able to depend upon comprehensive know-how and decades of experience. In addition, the company also has the appropriate testing equipment at its disposal, and accordingly tests all couplings comprehensively under the conditions which also prevail in real applications in order to guarantee the consistently high quality of its products.

**Photographs:** Chr. Mayr GmbH + Co. KG

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

its decisive technical advantages, as on other plug-in steel bellows couplings there is often the risk of damaging or even destroying the steel bellows when unplugging the connection. This steel bellows coupling by Mayr power transmission is also characterized by a very good misalignment capability. It compensates for axial, radial and angular shaft misalignments and transmits the torque backlash-free.

### Protection from critical vibrations

Flexible 'Roba-ES' claw couplings are used in servo axes in which critical vibrations occur and torsionally rigid shaft couplings reach their limits. These couplings transmit the torque backlash-free and compensate for shaft misalignments. The damping compensation element protects the drive system against critical vibrations. In spite of this, the couplings are torsionally rigid enough that, even on highly dynamic servo drives, no compromises have to be made regarding accuracy. On the 'Roba-ES' coupling, claws engage alternately on the input and output-side of the hub into a star-shaped intermediate ring made from elastomer. Under slight pre-tension, this transmission elastomer made from polyurethane fills the space between the claw profiles and absorbs vibrations. The damping properties and rigidity of the coupling can be varied by using different plastic hardnesses. The coupling is maintenance-free, resistant to media and temperature resistant, and therefore guarantees maximum operational reliability.

### High performance in a compact package

Disk pack couplings such as the 'Roba-DS' have the highest torsional rigidity in comparison to steel bellows and elastomer couplings. The 'Roba-DS' servo couplings convince the customers with their minimal dimensions, reduced weight and low moments of inertia, and moreover through their high performance density. They can transmit high torques even using a comparatively small diameter, and are therefore ideal shaft couplings for dynamic drive systems with high speeds. The basis for this extremely compact construction

### About Mayr Power Transmission

Mayr power transmission is one of the most traditional and yet most innovative German companies in the field of power transmission. Mayr specializes in torque limiters, shaft couplings and safety brakes as well as electromagnetic clutches and brakes. The company employs approximately 1,000 employees worldwide and continues to grow. Headquartered in Mauerstetten, Germany the company has production sites in China and Poland. 8 subsidiaries in Germany and 7 international offices including in China, France, Italy, Great Britain, Singapore, USA and Switzerland. After several extensions to the production and administration areas in the preceding years, the company now has a 17,700 m<sup>2</sup> production facility in Mauerstetten, Germany.



# Leakproof tube connection technology for marine and offshore



*For reliable connection of stainless steel and steel tubes above and below the deck, Voss Fluid provides the Voss FormSQR tube forming system. With the solution that is also certified for marine and offshore applications, even frequently changing assembly personnel achieve process-reliable connections. The system offers the highest degree of corrosion protection and withstands even the heaviest loads.*

**L**eaky connection points on ships and wind parks can quickly grow into enormous problems. To make sure that a leak does not occur in the first place and to prevent time and cost intensive localization and repair work, Voss Fluid GmbH developed the 'Voss FormSQR' tube forming system. The system has been in use for more than 12 years and is completely leak-proof. The forming process is just as simple as it is reliable: In the first step, conventional hydraulic tubes





**01** The Voss Form 100 forming machine shapes a 24-degree tube contour at the end of a hydraulic tube

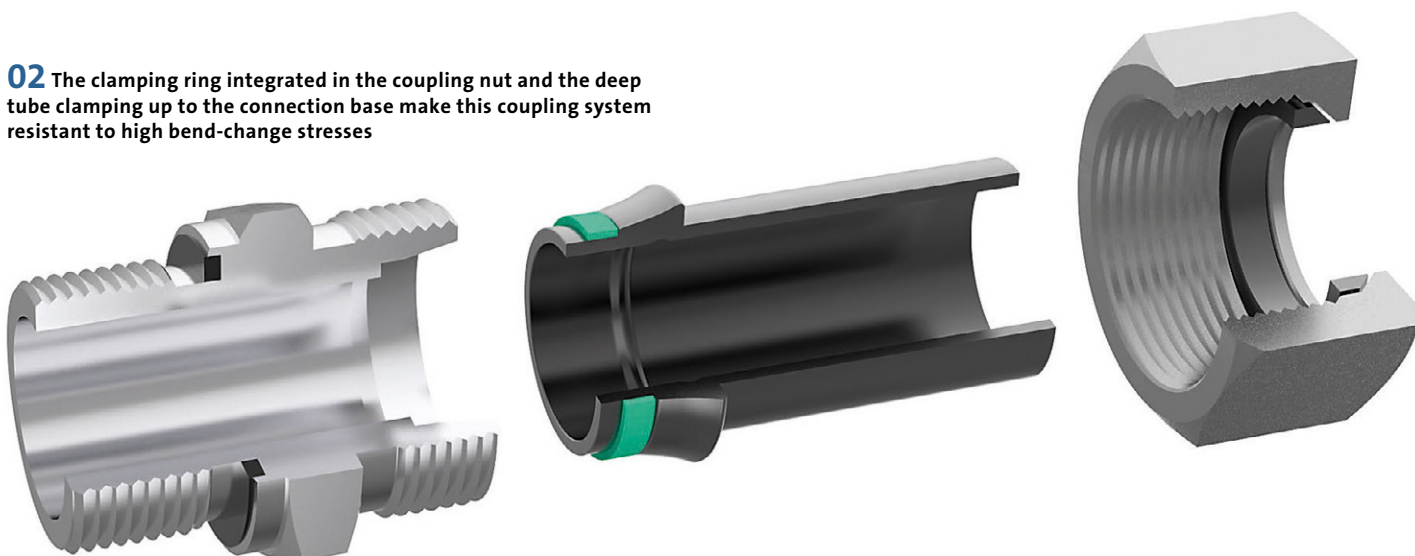


are given a 24-degree tube contour on one end. The Voss Form 100 tube forming machine takes care of the forming completely automatically. The operator merely needs to select the appropriate tool, pushes the tube against the limit plate and presses the start button. After that, the machine forms the Voss FormsQR contour plastically on the tube. To complete the pre-assembly, the formed tube end is provided with an additional soft seal. Then comes the final assembly: The fitter sets the machined tube with the face on the base of the coupling connector. It ensures a stable fit and secure limit stop. He then tightens the nut. Since this is an SQR function, nut with an integrated clamping ring specially developed by Voss Fluid is used, the tube is automatically tightly radial-clamped during the final assembly. This results in an especially secure, high-grade connection.

The noticeable increase in force when tightening the nut indicates the end of the assembly process to the fitter. This practically excludes over - and



**02** The clamping ring integrated in the coupling nut and the deep tube clamping up to the connection base make this coupling system resistant to high bend-change stresses



under-assembly. Another important advantage: When compared to the systems normally available in the market, the assembly distances are significantly reduced with the tube forming system from Voss Fluid. Results are achieved that are nearly identical to comparable taper couplings. This reduces the power requirement along with the assembly time and is especially important under difficult installation conditions such as overhead assembly, in ergonomically unfavorable positions and in particularly tight and compact installation spaces.

### Leakproof connections and high load capacity

Voss FormSQR tube fittings provide a completely leak-proof connection. This is one of the most important pre-requisites for deployment on the high seas. The high leakproofness can be attributed, to the additional soft seal; it provides significant advantages as compared to a purely metallic seal. It effectively prevents sweating of the joint - and that too for a longer than average time. That is because the tight abutment of the tube in the pipe connection base, the so-called primary metallic throttling, causes a damping of the pressure-swing tension. This concept that is unique throughout the market prevents the flexing or rinsing-out of the soft seal, guaranteeing long term leakproof connections.

On top of that, the tube connection system meets the highest demands placed on load capacity and security. After all, due to the constant vibrations marine and offshore applications have to have particularly high flexural fatigue strength. With Voss FormSQR the clamping ring in the coupling nut and deep tube clamping ensure reliable resistance to high bend change stresses: On the one hand, an above-average long part of the tube is supported by the coupling connector. On the other, the clamping ring clamps the tube radially on the circumference, which already absorbs dynamic loads before the critical area. That prevents a potential breakage through the notch effect and enormously increases the compressive strength and security against fracture. Based on the high quality, Voss Fluid holds approvals for all shipbuilding classes from the International Association of Classification Societies (IACS). Under the umbrella organization IACS, internationally recognized classification organizations have combined to stipulate the application specific requirements and test procedures, with the aim of defining the international quality standards.

### Long-term corrosion protection

The Voss FormSQR which is designed for security, load capacity and durability, also features special finish quality of the tube connection

### About Voss Fluid GmbH

Voss Fluid GmbH is an international provider of hydraulic coupling technology. The company, based in Wipperfurth, Germany, has around 400 employees and is part of Voss Holding. Its product range includes tube couplings for stationary and mobile hydraulics, including cutting ring couplings, tube forming systems, and flange couplings. For Voss Fluid, as a development and system partner in mechanical engineering, the focus is on application-specific system solutions. Voss Fluid offers customers everything from one single source: From project planning and engineering to production, assembly, and cost-effective logistics services. With four of its own sales companies in Europe and Asia as well as further representatives of the Voss Group and a global network of traders, Voss Fluid supports the reliable distribution of its system solutions.

components. Voss coat, a coating based on zinc and nickel, defies even the most aggressive media and guarantees an especially high degree of corrosion resistance. By doing so, the finish does not only reach the highest Corrosion Protection Class of K5 as per DMA Standard Sheet 24576; it even exceeds the required resistance values against white and red rust, both under laboratory conditions as well as in more demanding test runs. For some marine and offshore applications this means: The Voss finish protection is so effective that steel tubes with Voss's tube fittings, contrary to conventional practice, no longer need to be over-coated.

For applications in stainless steel, the tube forming system 'Voss Form SQRVA' is used. In this case, all fitting components are made out of stainless steel and exhibit completely identical product characteristics and advantages. The highest degree of process reliability and leakage security, the highest resistance to loads along with corrosion resistance - these attributes make the tube forming system from Voss Fluid the optimal solution for shipbuilding and the offshore industry.

Photographs: Folotia teaser, Voss Fluid GmbH

[www.voss-fluid.net](http://www.voss-fluid.net)



# Product News

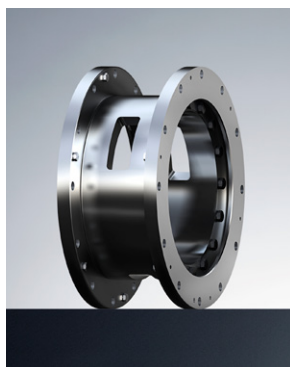
## Siemens offers more options in the servo drive system

Siemens extends its basic servo drive system, consisting of the Sinamics V90 converter and the Simotics S-1FL6 servo motor. The basic servo drive system is now available with 200-volt converters and motors with lower shaft heights and lower moments of inertia, in addition to the familiar 400-volt versions. The 200-volt converters are up to 25 % smaller than the 400-volt versions and therefore save additional space in the control cabinet. With a total of 8 converter sizes and 7 motor shaft heights with a power range from 0.05 to 7.0 KW, the system is suitable for single and three-phase networks. The servo converter also features a rapid pulse train input of up to 1 MHz and supports absolute encoders with a 20-bit resolution. Numerous integrated functions such as pulse train input positioning, USS/Modbus connection, internal positioning as well as speed and torque control, enable the users to reduce their machine costs. The improved servo performance is made possible by a number of features including the three-fold overload capacity of the Simotics S-1FL6 servo motor. The coated electronic modules in the Sinamics V90 and a protection rating of IP65 for the Simotics S-1FL6, make the drive system extremely rugged.

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

## KTR's new torque arm for rigid connection of torque motors

KTR's torque arm 'RADEX-N FNZ' for torque motors ensures a torsionally rigid connection of the motor while compensating for axial and radial motions resulting from misalignment, manufacturing inaccuracies or thermal expansion. It allows for reducing the load on the bearing while increasing the service life of the motor bearings by up to 50 %. At the same time the special structure of the torque arm ensures a highly torsionally rigid torque transmission. As a result the torque motors connected are able to transmit the full performance regarding dynamics and control accuracy to the machine axis. By using the RADEX-N FNZ the user generates a detachable screw connection with the torque motor whereby necessary maintenance work such as replacement of bearing or gaskets is easy to perform. The shaft connection, e. g. clamping elements, can be assembled via the assembly window in the spacer when the torque arm is installed. The RADEX-N FNZ is fully made of steel, transmits torques up to 12,000 Nm and can be used up to a temperature of 250 °C.



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

## High precision cylindrical roller bearing from SKF

Single-row SKF high-precision roller bearings are provided with an outer ring driven window cage made of carbon-fiber reinforced polyether ether ketone (PEEK). Together with the optimized cage, the reduced number of rollers makes sure that the bearings can absorb a higher number of revolutions, display less friction and in this way also achieve lower operating temperatures. The series has been conceived for applications with shaft diameters of between 40 to 80 mm. The two-rowed cylindrical roller bearings offer an improved relationship between load-bearing capacity, rigidity and number of revolutions. This series distinguishes itself through a higher number of rotations in conventional belt-drive CNC fulcrum shafts with high rigidity.



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

## FQ rotational speed sensors from Rheintacho



With IP69K protection class, Rheintacho is set to introduce a new series of plastic sensors for detecting rotational speed and direction. Thanks to different sensor lengths, cable outlet directions and connector options, this product line offers a high degree of flexibility. The FQ product line is a further development of the current FK product line, which fulfils protection class IP65.

The electronic design of FQ series is complemented with different variants in order to fulfil different requirements, such as frequency range, distance detection, EMC and temperature stability. According to the current development plan, all versions will be designed as a two-channel sensor, enabling the detection of rotational speed and direction of rotation.

On the question of Why IP69K, Rheintacho Sales Manager Wolfgang Sexauer explains: "There are two main reasons to develop this new series. Firstly, we see a tendency to specify higher IP classes in many applications for safety reasons, than was the case a few years ago. Secondly, the IP69K protection class enables technical potentials to be realised even more efficiently today. This applies to both available materials and, of course, to intelligent constructions."

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

# FR200 combination of technology and performance



*The company Kastas has its headquarters in Izmir, Turkey. With their location in Germany and the help of further sales and distribution partners throughout the entire world, the company is in a position to fulfill the highest requirements of quality and service. The newly-developed FR200, the product of years of research, which came about through a combination of design, development and tests, fulfills all the requirements expected of a modern rod seal.*

**F**R200 friction reduced rod seal is a new generation rod seal that combines several properties in one design without compromising on any of its beneficial features. The main goal of this rod seal is achieving low friction. With the special design and lip geometry, it achieves much lower friction values compared to other rod seals. On the other hand, FR200 does not compromise on low leakage performance. Finally, it ensures a very reliable pressure relief function.

The trend, where the focus of research and design is on fluid power and power transmission technology, has been evolving for some time now. While environmentally friendly fluids and lubricants are becoming increasingly popular, designers tend to focus their initiatives on mitigating system inefficiencies and losses.

Hydraulic market demands friction optimized seals with low leakage and long operating life. These demands are challenging for seal manufacturers due to the following reasons;

- The sealing effect can be improved by increasing the contact force between the sealing element and piston rod/cylinder bore; an increase in the contact force however means increased wear and tear on the sealing elements and a higher energy requirement for the hydraulics system.
- The friction force can be reduced by making the contact surface or

## About Kastas Sealing Technologies

Kastas is a manufacturer and supplier of sealing technologies. The company based in Izmir, Turkey, produces advanced sealing elements for fluid power and various specific applications. Through its European distribution center in Quickborn, Germany, Kastas supports its customers in Europe. The company has more than 500 employees and has a R&D division focusing mainly on material science and design development. Apart from being the manufacturer, Kastas is also one of the largest distributors for sealing elements with an extensive distribution chain in more than 80 countries.





the contact force between the seal and piston rod/cylinder bore smaller; a reduction of the contact area or the contact force however leads to a reduction in the quality of the sealing function.

A team of experienced engineers worked more than two years on the development of this seal. After the marketing team determined the expectations from this design, R&D department came up with several alternative designs. At this point, by the advanced Finite Element Analysis software all alternative designs are simulated on different operating conditions. The design that exhibited the best performance on all three main targets is selected and intensive design work to boost low friction and low leakage performance with minor improvements is started.

FEA software (MARC-MENTAT) used to foresee deformation behavior of design and the friction force generated by the sealing element. Comparison of deformation under “0 bar” and “100 bar” pressures for comparative U-Cup and FR200 are given in the images below.

Parallel to this initiative, Design and Tool department worked on the most efficient and reliable tool design to ensure a smooth production and long-term production efficiency. In addition to several prototypes, 8 months after the start, the first test sample of FR200 is produced. Then, for more than one year, FR200 went through intensive dynamic and static tests on test rigs. The tests aimed to simulate real applications, while also determining the limits of the seal. After a total of 1600 km-long testing in our R&D Test Center and several design improvements in between, FR200

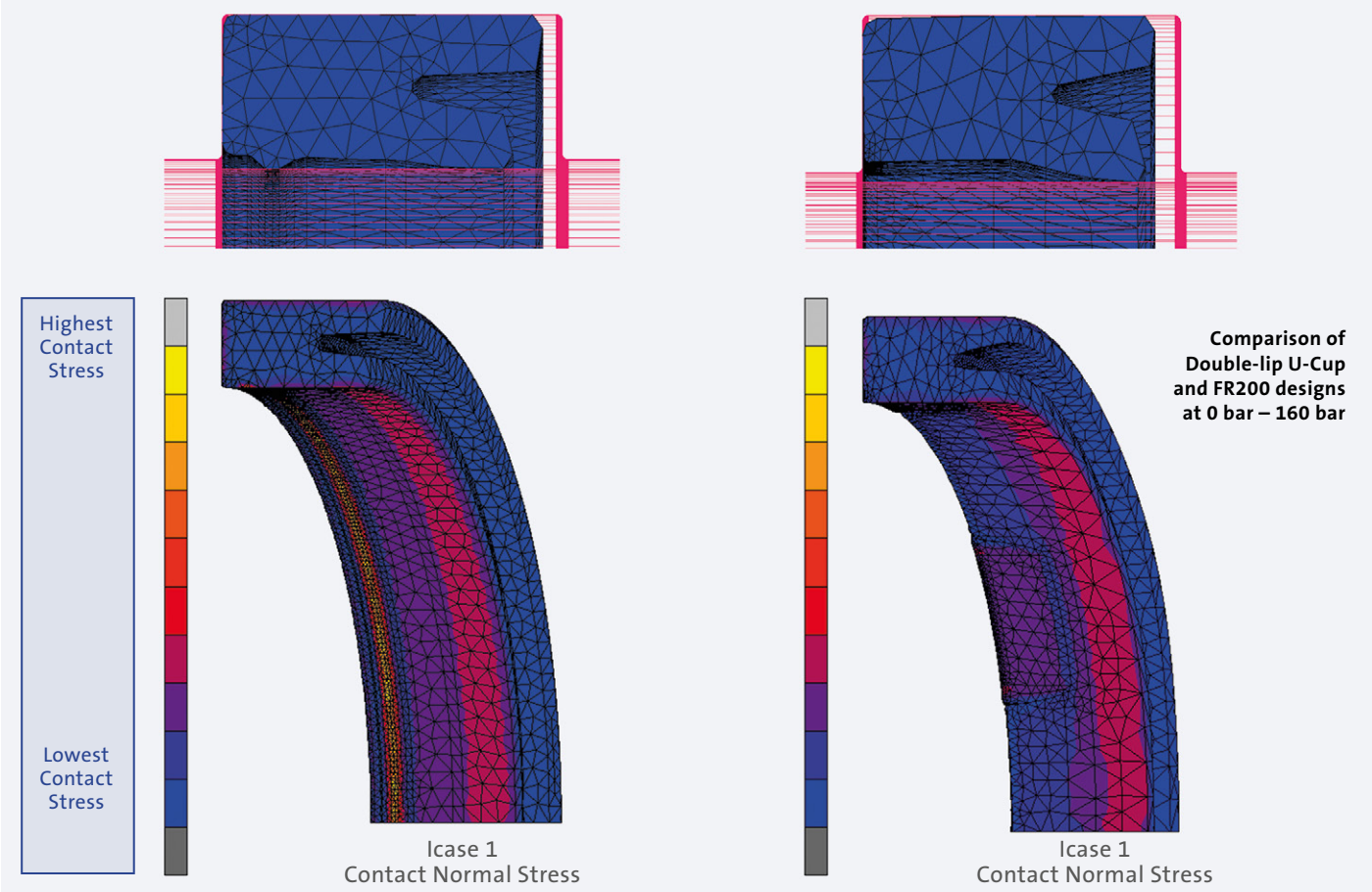
was ready for field tests. For the next four months, FR200 was tested next to two competitor friction reduced rod seals internally and externally in the field to observe friction forces, leakage values, back-pumping abilities and loss of preloads.

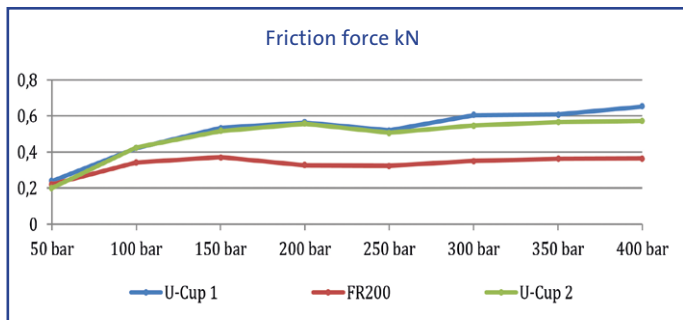
Compared with standard single acting U-Cups, the FR200 generates up to 57 % lower friction force at different pressures while maintaining perfect sealing ability. Lower friction force leads to higher energy efficiency and longer hydraulic system life.

Being a new player in this market, FR200 should improve on the existing performance. According to internal benchmark tests, FR200 provides both lower friction and lower leakage when compared with

1.	2.	3.	4.	5.
100 bar 100 km	50 bar / 10 km	250 bar 100 km	50 bar / 10 km	100 bar 84 km
	100 bar / 10 km		100 bar / 10 km	
	150 bar / 10 km		150 bar / 10 km	
	200 bar / 10 km		200 bar / 10 km	
	250 bar / 10 km		250 bar / 10 km	
	300 bar / 10 km		300 bar / 10 km	
	350 bar / 10 km		350 bar / 10 km	
	400 bar / 10 km		400 bar / 10 km	

Comparison Test Steps: (Average of 2nd and 4th steps are used for graphics.)





peers. Moreover, its pressure relief function is currently unmatched. While providing superior performance in terms of leakage and friction properties, FR200 starts relieving pressure build-up at a very early stage, which enhances overall system reliability.

The main features of FR200 are,

- Special lip geometry
- Shortened sealing lip
- Excellent static and dynamic tightness of the seal
- Improved extrusion strength
- Pressure- relief segments
- Reliable return pumping capacity
- Reduced contact areas

All tools are ready for the initial list of dimensions. FR200 has a very critical design concept. For this reason, the dimension range will be limited to the appropriate cross-sections, mostly ISO dimensions. In line with the target segments and applications, the initial dimension range of FR200 will extend up to Ø160.

In general, FR200 is an ideal solution in all applications where low friction is required specifically forklifts, platform lifts, injection molding machines, gas springs, machine tools and hydraulic power steering systems.



Photographs: Kastasealing Technologies

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

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# Product News

## The ultra-fast brushless DC motor

Maxon motor launches new high-speed motors that are configurable online. The new ECX brushless motors are quiet and feature very high efficiency. These brushless drives are ideal for use in hand-held surgical tools and industrial spindles. With Maxon Motor's configurator, it is easy to put together a customized DC motor- including gearhead, encoder and controller, as per the required specifications. Now, in addition to the brushed motors, the customer can also configure three new high speed brushless



micro motors. The ECX motors are available with diameters of 8, 16 and 19 mm achieving speeds of up to 120,000 rpm. All three high-speed motors are now available in Maxon's online shop, where customizing the drives is easy. This means that customers can fit the drives with specific mechanical and electrical components specific to their application needs. For example, with the ECX 8 mm, the GPX planetary gearheads and ENX 8 encoders are available. It is also possible to customize the shaft lengths, winding types, ball bearings and much more. Lean, automated processes ensure that all configurable drives are ready for shipment within 11 working days.

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

## Faulhaber brings affordable micromotor in the market

Faulhaber is expanding its range of drives in the medium power range with the new 1727...CXR DC-micromotor, and is adding an extremely compact drive to the CXR series. A powerful magnet gives the graphite-commutated motor a high power density with a continuous torque of 4.9 mNm. It generates this power in a housing that is just 17 mm in diameter and 27 mm in length. The



temperature range in which it can be used is from -30 to +100 °C. The CXR series includes DC motors with an extremely attractive price/performance ratio. The drives of the series CXR, can be combined with encoders and with precision gear-heads from a coordinated

product range. It can be optionally actuated with the motion controller for speed control or positioning. The compact dimensions of the 1727...CXR and its performance data opens up a wide range of potential applications.

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

## Frequency converter from Schneider Electric

Schneider Electric supplies frequency converters especially for mechanical engineering in their Altivar Machine series. The first two models are Altivar 320 for simple applications and Altivar 340 for high-tech applications. The Altivar 340 is suited to the control or regulation of servo motors, asynchronous motors, reluctance motors and induction motors from 0.75 to 75 kW, in ambient temperatures up to 60 °C (140 °F). The Altivar 320 is suited to controlling three-phase asynchronous motors and synchronous motors from 0.18 to 15 kW. It has openPLC library and SoMachine library as well as integrated logic. Both devices offer Safe Torque Off for applications up to SIL 3/PL e, and are suitable for printed circuit coating according to class 3C3 for very rough surroundings. With the multi-loader function the devices can be configured without a power supply without removing from the packaging. Typical areas of application are the wood-working industry and the packaging industry or the field of handling and lifting.



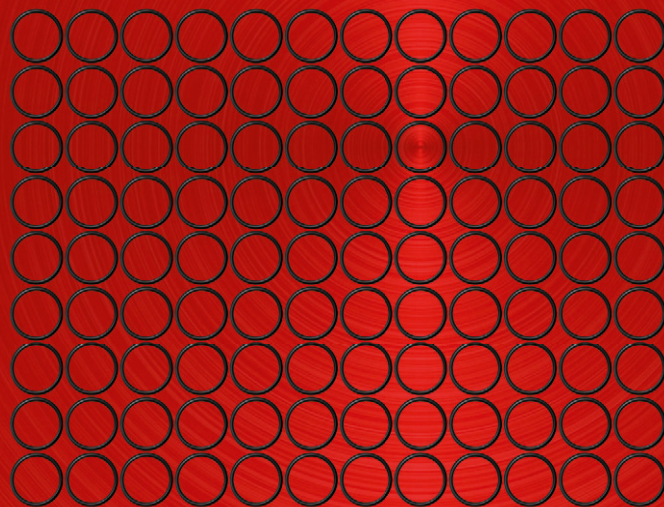
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# Robust drive technology for steel rolling mill in Bahrain

*Two international players with their home bases in Germany have successfully completed a project that will serve a vital role in Bahrain's construction industry. Using drive technology from Nord Drivesystems, steel industry specialist SMS Meer has built a new heavy section rolling mill on the desert island. Only the most resilient electric drives withstand the severe mechanical stress and extreme heat, dirt, and steam.*

## About Nord Drivesystems

A developer and manufacturer of drive technology for over 50 years, Nord Drivesystems employs more than 3,200 people and is one of the world's leading suppliers of full-scale, comprehensive drive solutions. The company's portfolio ranges from standard drives to customized solutions for demanding application requirements. Gross sales currently amount to some € 500 million p.a. With subsidiaries in 36 countries and an extensive distribution network, the company based in Germany ensures a minimal lead time and provides customer-oriented services wherever needed. Nord's wide variety of gear types covers torques from 10 Nm to 242,000 Nm 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.



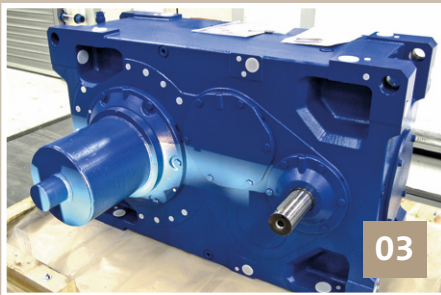
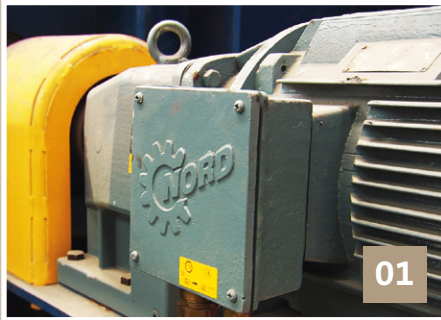
The Kingdom of Bahrain is pushing for the development of domestic manufacturing facilities. A huge integrated steelworks complex in the 'Hidd' industrial zone is to supply enough steel products to replace almost one sixth of all imports of beams and sections into the Middle East. As part of this new complex, German heavy machinery and engineering specialist SMS Meer designed and installed a heavy section rolling mill. The project's principal and local operator is the United Steel Company 'SULB'. In order to quickly achieve the ambitious objective, i.e. to satisfy a sizable portion of the Gulf states' steel demand from within the region, the mill boasts an initial capacity of 600,000 tonnes per year. The drives in these installations are not only faced with the demanding operational requirements found in all rolling mills, but also with the extreme climatic conditions of the Middle East. Working with SMS Meer, Nord Drivesystems was able to provide a broad range of extra resilient solutions comprising more than 600 roller table drives plus other units, including several special-purpose industrial gears.

## Rough conditions for conveyor technology

An endless stream of 16 tonne beams passes through the reversing mill. The drives installed on the roller tables must cope with the shock impact of alternating acceleration and deceleration of these blanks. "This is extraordinary mechanical stress, too much to handle for run-of-the mill geared motors," says Guido Sonnenschein, drive expert at SMS Meer. "Consequently, drive systems for roller conveyors have always been a case for a handful of specialized manufacturers. And it definitely helps to have a broad selection of suitable drive models to choose from, which makes it possible to implement the best solution for every application." Nord Drivesystems has a long history of collaboration with SMS Meer in numerous projects. "SMS Group and Nord look back on some ten years of joint experience," says Sonnenschein. "From the very beginning, Nord was a preferred partner due to their extraordinary broad and varied range of gear models. We find their in-depth expertise for steel industry drive solutions to be indispensable."







**01** Nord gears featuring a single-piece housing ensure minimal wear and tear for excellent reliability and durability

**02** Heavy blanks arrive on Nord-driven roller tables at the rolling stand, where powerful industrial gears from Nord properly align them for a pass under the rollers

**03** In addition to a large number of gears for roller drives, several Nord industrial gears as pictured above were also supplied for the Hidd project in Bahrain

## Robustness and longevity are crucial factors

In addition to the sudden jolts and heavy loads in the conveying applications, high ambient temperatures complicate the operations in Bahrain, where +50 °C are common. A highly resilient design enables the roller table drives to withstand such demanding conditions. Nord gears generally feature a single-piece housing that provides for high radial and axial load tolerance. All helical teeth flanks in the gears are machined and finished to exacting standards, which further ensures the gears' extreme stability under load. Even greater resilience and durability can optionally be achieved by using re-inforced shaft material (e.g. 42CrMo4) and stronger bearings. Shock-absorbing housing materials can also help reduce the impact of abrupt rough movements. Special synthetic lubricants (ISO VG220) and special coatings are available to adapt to extreme ambient and operating temperatures. For steel mill roller tables, the longevity of drive systems is paramount, since steel plants typically remain in operation for decades, and operators expect components that must only very rarely be replaced. "Of course, our roller conveyors are built in such a way that they will perform for many years with minimal maintenance requirements," says Thomas Danne, Project Manager Electrics & Automation at SMS Meer. "But just in case, it is good to know that a drive supplier like Nord is always there to provide parts and service personnel on short notice, basically anywhere around the world."

## From customized to standardized components

The 622 auxiliary drives for roller tables were not the only solutions SMS Meer sourced from Nord for the heavy section mill. Danne says, "Of course, sometimes there were certain modifications and we requested a few extraordinary gear ratios. Mostly, however, Nord's flexible modular construction system has allowed us to choose a standard drive – despite the great number of different models we needed. And this did not only apply to the roller table drives. This was the first time that we did not need any special gears

for the cooling zone's chain conveyors. We used to provide dedicated in-house solutions for this part of the plant. Now, we were able to install four of Nord's standard parallel shaft gears instead." Some gears for SMS Meer are particularly versatile – these include four high-torque industrial gears for orienting the heavy blanks in front of the rollers. These units were fitted with input and output shafts on both sides. The side not in use is fitted with a protective cover. In these units, special shafts with suitable borings were equipped with encoders supplied by SMS Meer. Unlike other manufacturers, Nord provides a full range of industrial gears in single-piece housings – even very large 242,000 Nm models. In contrast to multi-piece constructions, the 'Nord Unicas' design is much less susceptible to torsional damage, even at maximum load. With the successful completion of the project in Bahrain, SMS Meer and 'Nord' are now determined to strengthen their existing cooperation even further in anticipation of new forthcoming joint endeavors.

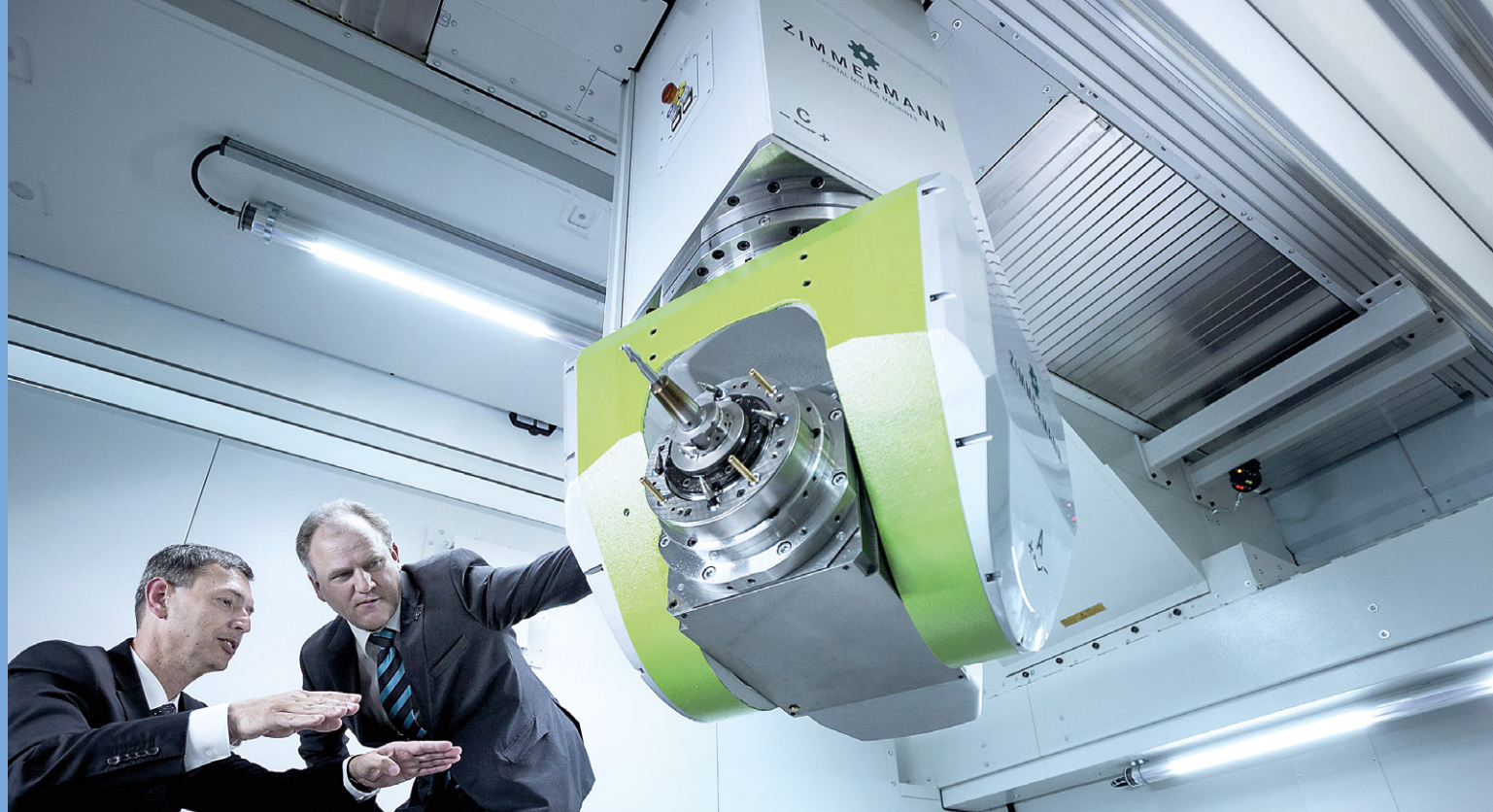
## Versatile metals industry drive solutions

In terms of functionality, the drives in steel mill applications have to fulfill dynamic tasks in typical load cycles, notably for S5 intermittent duty as well as for S9 duty with non-periodical load, speed variations, and frequent overloads. Answering these challenging demands, Nord Drivesystems provides a flexible drive solution for all processes in the metals industry, based on a versatile portfolio of gears, a line-up of 'TENV' (IC 410) and 'TEFC' (IC 411) motors with straight fins or ring fins, and frequency inverters for cabinet installation or mounting close to the motor. Options such as integrated brakes and heavy-duty incremental encoders are available as well. Large industrial gears are available for casting ladles and other applications requiring especially powerful drive solutions. Nord is the only manufacturer to offer even 242,000 Nm industrial gears in single-piece 'Unicas' housings.

**Photographs:** Nord Drivesystems

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

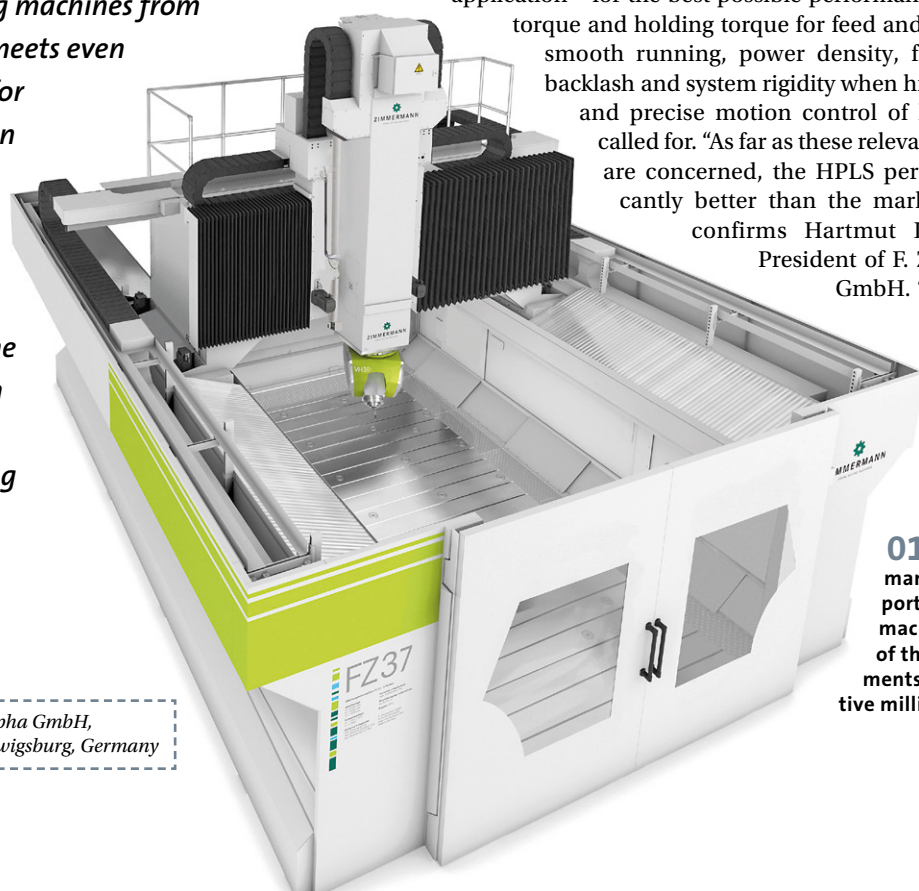




# HPLS: Precision, power density and stiffness for linear motion control

*Linear motion control as a high-end system solution – that just about sums up Wittenstein alpha's High Performance Linear System HPLS. In the newest FZ37 generation of portal milling machines from F. Zimmermann GmbH, it meets even the strictest requirements for smooth yet dynamic motion control, high acceleration and speeds in any axis, with modular and easy installation, maximum integration regardless of the axial length and maximum system rigidity for high precision, high speed cutting (HSC).*

The HPLS is a rack-and-pinion system comprised of an ultra low-backlash planetary gearhead in the RP+ series with a welded, helical-toothed pinion and a precision manufactured rack. All its components come from one source and interact optimally in any application – for the best possible performance in terms of torque and holding torque for feed and acceleration, smooth running, power density, freedom from backlash and system rigidity when highly dynamic and precise motion control of linear axes is called for. “As far as these relevant parameters are concerned, the HPLS performs significantly better than the market standard”, confirms Hartmut Kälberer, the President of F. Zimmermann GmbH. “What’s more,



**01** Zimmermann's new FZ37 portal milling machine meets all of the requirements for innovative milling solutions

Author: Guido Brenner, Wittenstein alpha GmbH, Manager Sales Office South-West, Ludwigsburg, Germany



the systems can be designed very flexibly to match the axial lengths. At the same time, both the gearhead and the rack incorporate special design features such as slots integrated in the gearhead flange or racks with a highly precise and ergonomic eccentric mounting system, so that they are much easier to install than conventional drive solutions of a similar kind."

## HPLS for complex milling solutions

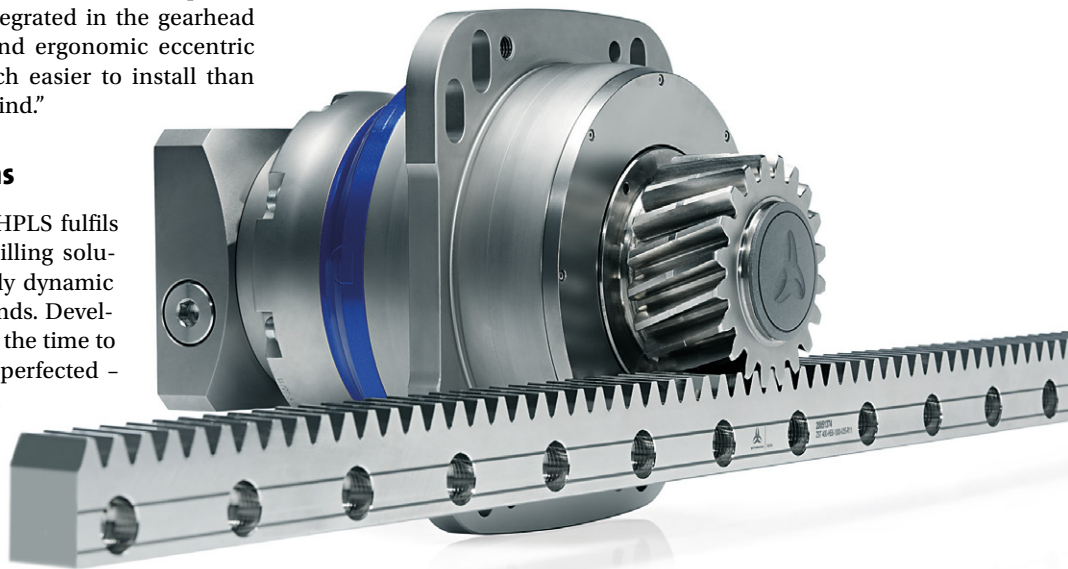
As a result of these characteristics, the HPLS fulfils several basic conditions for complex milling solutions. Their evolution has been especially dynamic and coupled to steadily increasing demands. Development cycles are shorter than ever, as is the time to market. Prototypes – preferably already perfected – have to be realized more and more rapidly. "Speed, dimensional accuracy and surface finishes of a very high quality are typical expectations for milling solutions along with versatility and flexibility", Kälberer explains. "Our newest generation of portal milling machines is capable of cutting not only light alloys, plastics and composite materials but also steel and cast iron. That's why the machines used to manufacture high volume parts in the automotive, aerospace and toolmaking industries or the railway and energy sectors tend to have a large work area. High dynamics and maximum system rigidity are equally vital."

## HPLS for optimum performance in milling machines

Zimmermann's new FZ37 portal milling machine meets all the requirements for innovative milling solutions. At their home office in Neuhausen auf den Fildern, not far from Stuttgart in south-west Germany, Zimmermann designs, develops and manufactures high-end portal milling machines for the most diverse industrial applications. For more than a decade now, the company has trusted in rack and pinion systems from Wittenstein alpha. "Our customers value Zimmermann as a partner with a high level of expertise: apart from the actual milling machines, our portfolio also includes automation systems, intelligent clamping technology, additional tools, extraction systems", Kälberer adds. The FZ37 series is distinguished by excellent dynamics and removal rates, surface finishes of the highest possible quality, outstanding dimensional accuracy and work areas made to measure. These areas can be truly enormous: "The machine supports working ranges of up to 40 metres in the X axis, 6 in the Y axis and 3 in the Z axis – which in extreme cases can mean an incredible 720 metres cubed", reports Marcus Lengerer, Marketing Manager at Zimmermann. "The FZ37 allows 5-sided multi-axis machining within the work area, so that even very complex shapes can be milled from a block of material in just a short time." From delicate precision machining to surface machining over a large area, thanks to the HPLS, this linear motion control system meets every one of the portal milling machine's performance requirements, such as speeds up to 60 m/min or 5 m/s<sup>2</sup> acceleration.

## HPLS rack-and-pinion drives enable decisive improvements

Integrating the HPLS in the X, Y and Z axes of the FZ37 enables decisive improvements compared to the predecessor series. The RP+ high performance planetary gearhead, for instance, is a rotary component with high torsional and tilting rigidity and a stiff connection to the machine that reduces the position error to a minimum. In combination with the rack's remarkable precision this results in an extremely stiff machine structure and hence very high



**02** The HPLS rack-and-pinion system is comprised of an ultra-low-backlash planetary gearhead with a welded, helical-toothed pinion and a precision manufactured rack

system rigidity over the entire axial length of the FZ37. The optimized KV factor permits high speeds and acceleration in all axes during high speed cutting (HSC) operations. The machine's true-to-path motion system also ensures extreme precision: with a volumetric accuracy of up to 55 µm the FZ37 satisfies even the highest demands for surface quality and precision. The RP+ gearhead for the Z axis is designed to completely absorb all forces acting on it. "That's why we were able to build the machine without hydraulic weight compensation", says Kälberer. "The FZ37 needs fewer parts because we dispensed with the hydraulics. It's easier to control and much more straightforward to install and maintain. Furthermore, the better efficiency means ongoing energy costs are significantly lower than with either the hydraulic concept or alternative solutions with a linear motor." The drive design with the modular HPLS rack-and-pinion system simultaneously has the advantage that there are no restrictions on the length of the machine and its axes and that even large strokes are not a problem. "That not only avoids the limitations inherent to ball screws; it also facilitates a rapid and technically feasible response to specialized customer requirements regarding the axial lengths." Kälberer comments.

Photographs: Wittenstein AG

[www.wittenstein-alpha.com](http://www.wittenstein-alpha.com)

## About Wittenstein

The Wittenstein Group is an expert in mastering the continued development of all the relevant technologies of mechatronic drive technology. They have united eight strong fields of business under one roof. Amongst other things they develop, produce and sell high-precision planetary gearheads, complete, complete electro-mechanical drive systems, as well as AC servo systems and motors. Their fields of application include robots, machine tools, medical technology as well as aerospace.





## Maximum speed and energy efficiency with hybrid design

*First in Turkey, in the field of Plastic Injections, Tisse and Kollmorgen have together developed an electric-hydraulic Hybrid Machine. The Hybrid Machine can manufacture difficult and sensitive products at high speeds; its power and quality eliminate problems like ejection errors and high quantity of wastage. It also increases the production rate and provides energy efficiency up to 35-40% compared to the competition.*

### About Kollmorgen

Kollmorgen is a leading provider of integrated automation and drive systems along with corresponding components for machine builders all over the world. With more than 70 years of Motion Control Design and application experience and profound knowledge of constructing standard and special solutions, Kollmorgen supplies solutions time and again that stand out in terms of performance, quality, reliability, and ease of use. As a result customers can achieve a market advantage which is beyond question.



The eS-Drive450 Tisse is the result of the cooperation between Kollmorgen engineering and Tisse Plastic Injection Molding Machines Company. It is the first hybrid plastic injection molding machine, whose injection part includes an electric system and a hydraulic system comprised of clamping and conveying as well as an ejection unit. The hybrid design provides speed and energy saving in the manufacturing process. The entire software of the machine was written by Kollmorgen, in house, from scratch. The injection part of the hybrid machine consists of 2 servo motors, whereas clamping, conveying and ejection parts form the hydraulic system. However, because the pump of the hydraulic system is driven using servo motor, the machine may be called a full electric hybrid.

The reason why servo motors were used in the injection part was to provide crucial acceleration and sensitive pressure balance, making it easy and quick for the liquid plastic to be injected in to the mold. Speed is of great importance especially for molding thin-walled packaging products. For instance, because products, such as the lids of yoghurt pots cool very quickly, the process is required to be completed immediately.

Seref Karaoglan, project manager of Kollmorgen Turkey, speaks about the machine performance: "We often witness that manufacturers have difficulty in manufacturing such products. We designed the hybrid not only to provide energy efficiency but also to increase speed. People think it is not easy to manufacture such machine because, for instance, we apply 10 different speed stages and 10 different pressure stages in accordance with the type of mold in order to make a movement of 90mm. It is really not easy to do this just with any servo motors but we used Kollmorgen's S600 drives and PDMM controllers."



Omer Sengelen, Production Manager of Tisse Machine, summarized their position in the sector: "We are endeavoring to add remarkable features even to typical machines. Actually, we quit manufacturing injection molding machines in 2000. In 2008, however, we noticed that there was a need for blow molding machines and we started manufacturing again. With the expertise and high product quality that we developed through our partnership with Elsim Kollmorgen, we have become capable with very high-level injection molding machinery."

Clamping systems in normal injection molding machines are usually problematic. The injection molding might be fast but the clamping is the negative side. The compression ratio is less, but they cause great expenses at high speed. The clamping part in hydraulic injection machines is always as per specifications, but complaints about the injection speed predominate. Their maximum speed is between 100mm/h and 200mm/s. This hybrid machine has the best side of those 2 systems. While it enables the clamping and other parts of the machine which require power to run fast, it is also able to reach a speed of 300mm/h by getting the injection system to work with servo motors. In addition to these advantages, it provides energy saving in the pump of the hydraulic system by using servo motors.

Project manager of Kollmorgen Turkey, Seref Karaoglan says, "The reason why electric machines are liked is that they are energy efficient unlike AC motors, in the hydraulic part of old machines, that keep cycling even while the machine is off and consume energy even if you do nothing."

## Special valve technology

Regeneration is provided through the special valve used in the hydraulic system of the machine. Suppose that the grease taken from the tank and injected into the system, supplies 100 units of energy in the classical systems. Thanks to this valve, the grease coming out of the system is re-injected into the system, instead of transferring it into the tank. Thus, you obtain extra power up to 60%. According to Seref Karaoglan, you get extra speed as well as extra power, and "It is like the generator of a car charging the accumulator. We could have used standard valves for the clamping parts because we had acceleration in the injection part. But thanks to this special valve, we use the clamping system as if it is electrically operated, and increase the speed thanks to regeneration."

## Parallel power through two different motors

Another stellar feature of the machine is that 2 different motors are used in the

**02** Ömer Sengelen,  
Production Manager—  
Tisse Machine

injection process, getting parallel power through each other. The motors are connected by very special screws that run synchronously. These screws enable the motors to cycle with high-precision in less than 1/10 mm, and they provide stable running even at high speed.

## Efficient communication system

The speed doubles because the injection nozzle in the machine is pushed and pulled by twin motors. Seref Karaoglan says, "Kollmorgen communication systems allow the synchronous work of two motors on the same mechanical system but running independently. If one of the motors runs at a speed slower than 1/10 mm, it might damage the screws, which are very special and expensive. The communication time and synchronization of the motors takes less than 1 m/s.

## High-Tech braking

The motors used in the machine are quite heavy and powerful. "We took all kinds of measurements in the event of any communication problems between each other. 6.5 kW of braking resistance is used in the system because the flywheel effect comes out while the screws and balls gain acceleration." Seref Karaoglan also points out that it gets really difficult to control the speed and says, "The products we use here are those developed by Kollmorgen and include plates providing stepped braking. It would have been impossible for me to succeed in this project with standard braking resistances."

## Special pump software

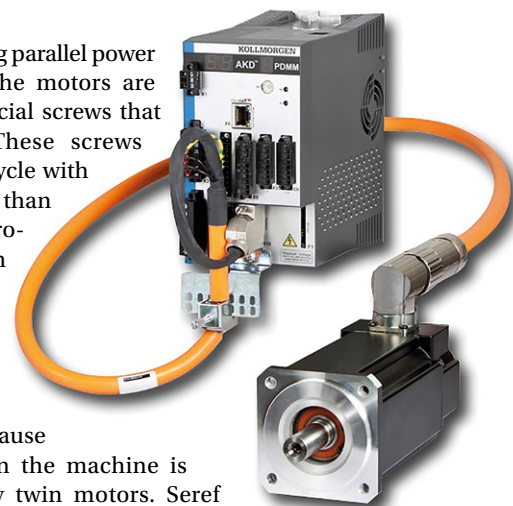
There are 2 important elements in grease-powered systems: Speed and Pressure. The software developed for this machine, ensures the desired pressure at the desired speed. Seref Karaoglan says, "We can use 10 different PQ distances. We are also using this advantage on the clamping system. Thanks to the servo motored pump software, we reach the desired speed within 150-200ms and despite this speed, we provide the desired pressure on an error band of 2 or 3 bars."

## Top notch engineering

Kollmorgen's machine automation solution brings highly integrated and intuitive software programming platform, top of the range movement components and extraordinary co-operated engineering services in order to create highly differentiated machines and more profitable business organizations. It has been proven that Kollmorgen Automation Suite™ accelerates the development process, raises the machine manufacturing, reduces wastage and increases hardware efficiency (OEE).

Photographs: Fotolia teaser, Kollmorgen

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**01** Kollmorgen  
AKD Servodrive





# A motor bridge module in the control system of harvesters







**01** Motor bridge ESX-MBC

**Authors:** Hans Wiedemann, Marketing Manager,  
Sensor-Technik Wiedemann GmbH

Dietmar Caspers, Account Manager Krone, Sensor-Technik  
Wiedemann GmbH

*The company Bernard Krone GmbH is amongst the leading manufacturers worldwide in agricultural technology. With the development of the BIG X 480 and the BIG X 580 they have set new standards for forage harvesters in this performance class. With 489 or 585 horse power, these modern agricultural machines fulfill a variety of applications, including harvesting maize plants for biogas or animal feed. In order to reliably execute various working functions, from the hydraulics through the drivetrain, right up to the chopping drum drive, the new forage harvesters are equipped with more than 20 interconnected control units. A large proportion of these units are connected to a central control unit, which enables automated coordination of working functions, and ensures safe operation. Slave modules, such as the ESX-MBC motor bridge, which have been developed in collaboration with Sensor-Technik Wiedemann (STW), fulfill dedicated tasks in as directed by an ESX master control unit.*

**T**he BiG X forage harvester family by Krone employs a complex control concept. Several bus systems connect the different control units and I/O units, and each bus system represents the respective functional domains such as the “motor bus” or Isobus. In order to communicate via the bus segments, individual control units also act as gateways. In such cases, only the specific data actually required there for the control tasks are transferred to the next bus segment. As a result, unnecessary data flow is prevented and the performance of the overall system is improved. The motor bridge module ESX-MBC, which acts as an I/O slave under the name KMB in the Krone BiG X 480 and 580, is assigned to the “Aux Bus” together with the ESX control unit. Both the ESX-MBC and the ESX control unit have been developed by STW in accordance with Krone’s requirements.



## The motor bridge module

As a slave module, the ESX-MBC has a CAN bus interface. The CAN bus is used as a physical bus system for communication between the control unit and the ESX-MBC motor bridge modules using 29 bit-identifiers and provides transmissions speeds of up to 1 Mbit/s. As a superordinate protocol, SAE J1939, which is often used in commercial vehicles, is used here for the exchange of diagnostics and control data. The SAE J1939 protocol implemented by STW on the ESX-MBC supports both standardized and proprietary Parameter Group Numbers (PGN) and Suspected Parameter Numbers (SPN). It is processed on the 32-bit controller STM32F205 of the ESX-MBC. This controller has 128 kByte SRAM and 1 Mbyte flash memory, and therefore provides space for further functions which have been implemented by STW. The ESX-MBC receives commands from the ESX control unit for the adjustment of the four PWM half bridges which form the central function of the motor bridge module.

The four PWM half bridges, with PWM frequencies of up to 20 kHz, are assigned in two groups and can be combined to create two full bridges. Each half bridge has a 10 A output and electric motors or actuators up to approx. 200 Watt can be controlled. The outputs are short-circuit proof and capable of diagnostics, so that their status can be reported via the CAN bus to the ESX control unit. 2 half bridges and a 4A digital output respectively are connected to a power supply path, which can be switched off via an additional

solid state safety relay. In each power supply path, current and voltage measurement is provided and an overload / overvoltage detection is included.

As an ESX-MBC also executes different tasks at different positions of the chopper, the module has an identification input. Through connection with resistors of different sizes, the software allocates the module its own "Source" address. Based on the source address the ESX control unit recognizes the task of the module and provides according instructions. Furthermore, the ESX-MBC has a 200 mA digital output which is also short-circuit proof and capable of diagnostics. In a range of 5 V to 12 V, a fixed voltage output adjustable via software supplies the sensors. Four multifunction inputs can be freely configured via commands as digital, speed, voltage or current inputs. Finally, a temperature measurement is available for the controller and the complete ESX-MBC. These functions of the ESX-MBC module are also addressable via the J1939 protocol.

The great strength of this module lies in the combination of intelligence and switching large currents. The possibility of flexibly using the ESX-MBC for different functions with the same hard- and software design, and continuously communicating status permits a high level of freedom in the system design and simplifies logistics. The module complies with the standards of the agricultural machine, construction machine and the automotive industries, which include especially shock and vibration resistance. The ESX-MBC provides sealing against water and dust according to IP67, is designed for a temperature range from -40°C to +85°C and has a connector suitable for mobile applications, ensuring uncomplicated installation.

The ESX-MBC extends the number of I/Os available, realising savings through less cabling for sensors and actuators. For example, the motor bridge is used in order to fulfill the specifications of the individual federal states regarding differing axle loads for road networks: The forage harvesters BiG X 480 and 580 can also be designed as 3-axle vehicles. In operation in the field, the third axle is not required and is hydraulically lifted. The control of the valves is also managed via the ESX-MBC.

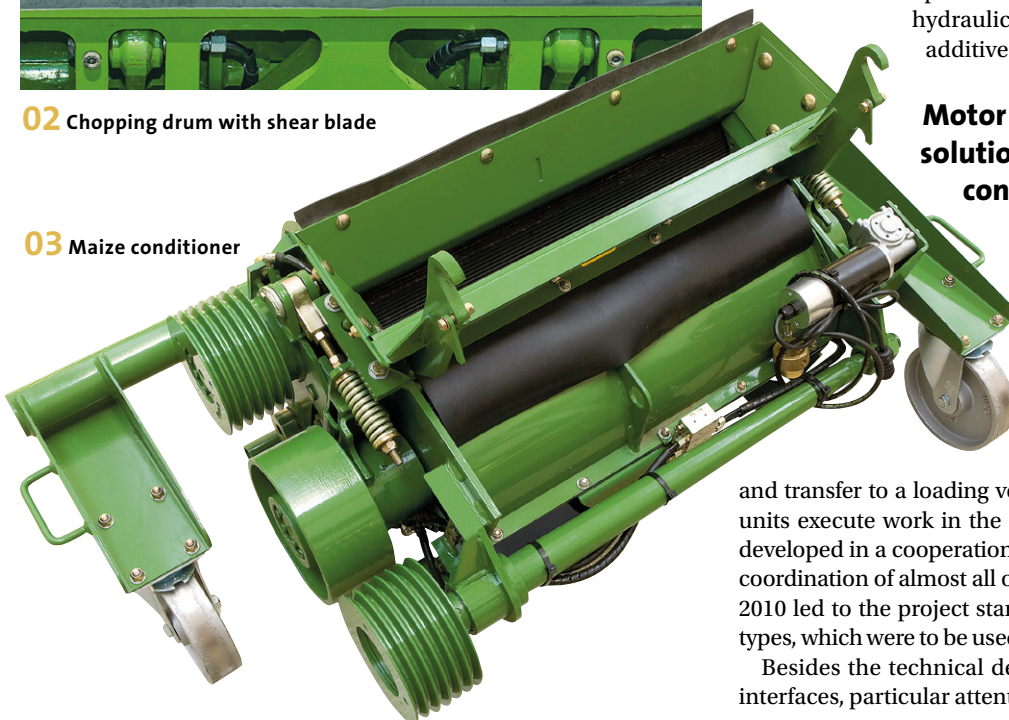
Furthermore, the ESX-MBC is used for the regulation of clockwise and anti-clockwise rotation of the electric motors. These ensure the perfect adjustment of the shear blade of the cutter drum, which leads to high-quality chopping lengths and cutting quality of the crop. Thanks to the decentralized design using the ESX-MBC,

further options are also realizable, for example additional hydraulic functions or the control of the silage additive systems.



**02** Chopping drum with shear blade

**03** Maize conditioner



## Motor bridges as part of a complete solution / functions of the central control unit

The ESX-MBC is only one part of a far larger control system and this module is not the only new development. A new, higher performance central computer was also required for the extended requirements of the newly developed forage harvesters. The vehicles execute complex tasks such as collection of the crops and processing and transfer to a loading vehicle. For this purpose, up to 20 control units execute work in the systems. The KMC 200, which has been developed in a cooperation between Krone and STW, takes over the coordination of almost all of these control units. The concept idea in 2010 led to the project start with strict planning for the first prototypes, which were to be used and tested during the corn harvest 2011.

Besides the technical demands on performance capability and interfaces, particular attention was placed on robustness, reliability



## About STW GmbH

Sensor-Technik Wiedemann GmbH, an internationally active company provides services and products in utilization of new technical possibilities in Automation, e-mobility and networking. The company develops and produces a wide range of products in control and automation systems, measurement technology, telematics and machine connectivity and electrification of drive lines and auxiliary drives. The company is based in Kaufbeuren, Germany and has annual turnover of € 50 million and employs 440 people.



and scalability. As specialists for solutions for mobile machines, STW had already established the ESX-3XL on the market. During discussions held between specialists of both companies, it was quickly determined that the ESX-3XL already provided an ideal hardware platform which could be adapted to the exact requirements of Krone by means of just a few modifications. Amongst other things, these adaptations regarded the interfaces for NAMUR sensors and two 10A half bridge outputs. Additionally, an outward and return line to all sensors and actuators is now provided. Thanks to its concept, which already provides a memory protection mechanism, and thanks to its design, development process and corresponding documentation and tests, the control unit ESX-3XL was already certified acc. SIL2 (IEC61508) and PLd (ISO 13849). As this project concerns a safety-relevant application, this represented an extremely valuable prerequisite for the tractor, agricultural and forestry machine standard ISO 25119.

The high-standard quality and production guidelines at STW were also regarded as positive. Mr. Horstmann, Electronics Manager at Krone, was also convinced by the overall impression made by STW during a visit: "It was particularly important for Krone to find a company in STW which, besides high technical competence, was also partnership orientated and thought and acted long-term. STW knows our market and has been successfully active here for over 30 years, and therefore we decided on STW as our development and production partner for the new control unit KMC 200 and the associated motor bridge modules".

After Krone had decided on collaboration with STW in 2010, four companies subsequently worked under the leadership of Krone on the realization of this project. Besides the adaptation of the hardware, the adaptation of the BIOS for the 32-bit TriCore controller on the ESX control unit also fell to STW, which then eventually received the name KMC 200. In order to meet the performance and real-time requirements, the programming was executed in the language "C++". At Krone, up to ten developers were ultimately involved in this project. Besides Krone and STW, partners included HighTec as provider of the certified operating system PXROS, and Brunel GmbH as development service provider. Close collaboration was essential in order to be able to correctly integrate the many control unit functions. "Today, we control chopper machines, grinding devices, feed units, attachments, ejection sections, corn conditioners and silage additive systems using the KMC – to name but a few! Meter readings are also recorded, and fill levels and filters monitored", explains Mr. Horstmann. An important component of the development process is also the test cycle, in which firstly the individual software modules, which represent the different functions, are tested. Subsequently, a test of the application on the control units is conducted in an automated hardware and software integration test. Finally, a system test on the complete software is carried out on a machine. This is accompanied by the EMC trials in the test laboratory and the trials on test machines in real field applications.

After the prototype phase and deployment during the corn harvest 2011, it was possible to complete the development of the KMC 200 prior to the Agritechnica 2013. Here the first presentation and series launch of the BiG X 480 and Big X 580 took place, in which, besides the KMC 200, also up to four ESX-MBC motor bridge modules are employed. Markus Müller, Project Manager at STW, was responsible for both developments from the outset: "At STW, we especially value the excellent cooperation with the Krone team. This helped enormously in the process during which two products of this complexity were brought into series use in a relatively short period."

## The first milestone

This development is not yet complete, as long-term utilization is planned in further machines, but the first large milestone has been achieved. As a result of the concept which includes the distribution of tasks in the system architecture, re-usability of the components at hardware and software level is achieved. The use of the KMC 200 as a central control unit and the ESX-MBC motor bridge modules as dedicated and yet flexible slave modules, have already proven to be successful developments. Less than two years after the series launch of the BiG X forage harvester, STW received the Supplier Award from Krone as best supplier in the Electronics category.

Lead photo: Bernard Krone GmbH, Photographs 1-3 STW GmbH

[www.sensor-technik.de/en](http://www.sensor-technik.de/en)  
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# Return-suction filtration in a self-propelled harvester



*Argo-Hytos, the first filter manufacturer to launch a new, revolutionary filter system with the return-suction filter on the market. Since then, this filter concept for mobile machines has become a standard in many applications, because it provides far-reaching functional improvements and lowers the system and maintenance costs.*



**T**he reasons for the success of the return-suction filter concept can be explained as follows (**Figure 1**)

The hydraulic system e.g. a beet harvester typically consists of:

- **Hydrostatic drive (1):** A variable pump in the closed circuit, connected to the hydraulic motor at the axle that ensures locomotion.
- **Working hydraulics (2):** Fixed or variable pumps that supply the users in the open or closed circuit.
- **Steering system (3):** A variable pump in the open circuit supplies the steering system.

## Filter selection

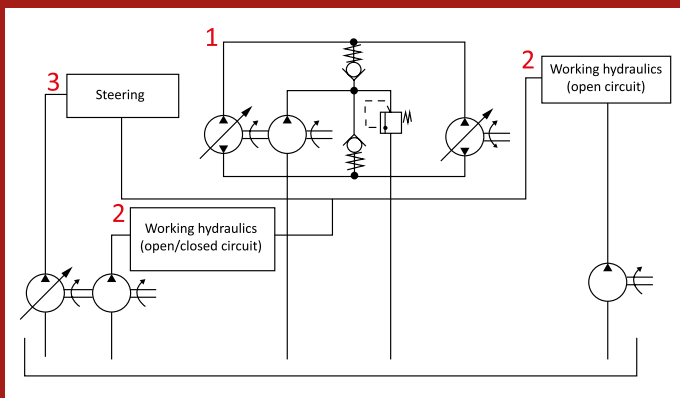
Filters in the hydraulic circuit guarantee function and / or wear protection. Thus one differentiates between protective filters (function protection = coarse hydraulic filters / strainers) and working filters (wear protection = fine hydraulic filters).

## About Argo-Hytos

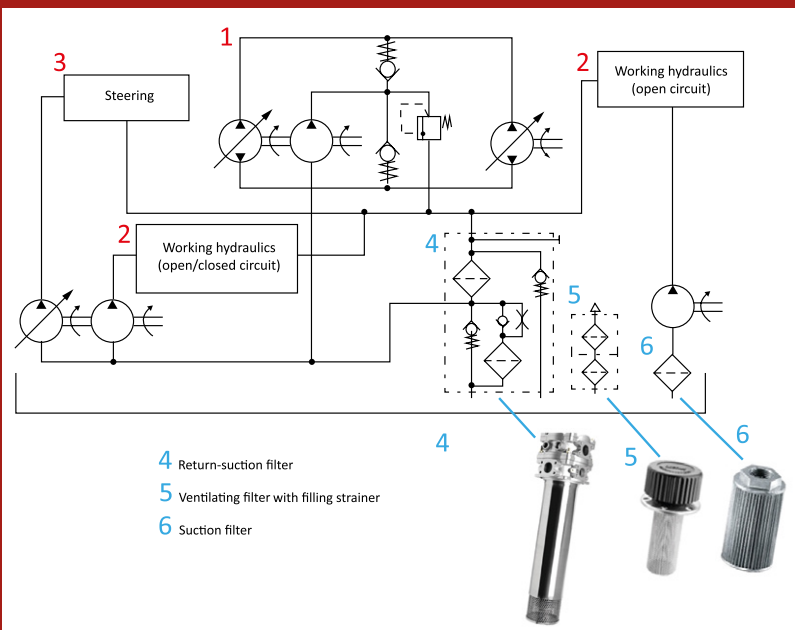
Argo-Hytos has an established international network of production and distribution companies. The company offers customer-oriented added value and expertise at the customers' location. As a medium-sized family business with more than 1300 employees Argo-Hytos has more than 65 years of experience in Fluid & Motion Control and Filtration technology in mobile and industrial hydraulics. Especially in the mobile hydraulics sector Argo-Hytos has developed into one of the innovation leaders. With production companies in Germany, Czech Republic, India and China as well as numerous own distribution and assembly companies the Argo-Hytos Group is active worldwide.







**01** Hydraulic circuit without filtration



**02** Simplified presentation of the hydraulic circuit incl. filter concept

What concerns the drive is protecting the filling pump and / or the hydrostat as well as ensuring the oil cleanliness and thus the wear protection are of primary importance. Here a working filter is required. The same applies for the working hydraulics, because here as well, the pump has to be protected and the necessary oil cleanliness has to be ensured. The main focus with steering systems mostly lies on the function protection of the steering unit and this is implemented by a protective filter.

This example shows how and how quickly, based on existing technical solutions, trendsetting products arise with the relevant application know-how and intelligent concepts.

■ **A single return-suction filter (Figure 2 Pos. 4):** It takes over almost all the tasks mentioned above. The filter concept for the entire machine is completed by two more filters from the Argo-Hytos portfolio:

■ **Ventilating filter with filling filter (5):** For ventilation of the hydraulic tank. The filling strainer downstream of the ventilating filter prevents coarse dirt from entering the tank while filling or with re-filling of oil due to maintenance or repair work.

■ **Suction filter (6):** At the suction side, the working hydraulics are not connected to the return-suction filter, but to carry out suction of oil from the tank via a separate and maintenance-free suction filter. In order to maintain the pre-charge pressure of approx. 0.5 bar at the connection of the filling pump, a minimum surplus between return and suction volume is necessary under all operating conditions.

## Production launch

Since all Argo-Hytos filters are developed and manufactured by the company itself, the users can be provided with a lot of information such as e.g. pressure loss characteristics at an early stage. Thus, the suitable version was selected from the catalogue series E 598 / E 998 and installed into a harvester.

This was followed by extensive testing under real conditions. After successful completion of these tests, the preparations for the production launch could be started. To make the new return-suction filter even more advantageous, in this case, a customized filter on the basis of the catalog was generated for the machine manufacturer.

The series E 598 / E 998 features a very high modular connection concept with two stackable connecting plates. For the return and suction side, two connecting plate variants are already available in



**03** The above picture shows the return-suction filter with three connecting plates. All lines could be guided and directly connected to the filter. Just as uncomplicated, a housing ventilation was integrated in the filter cover

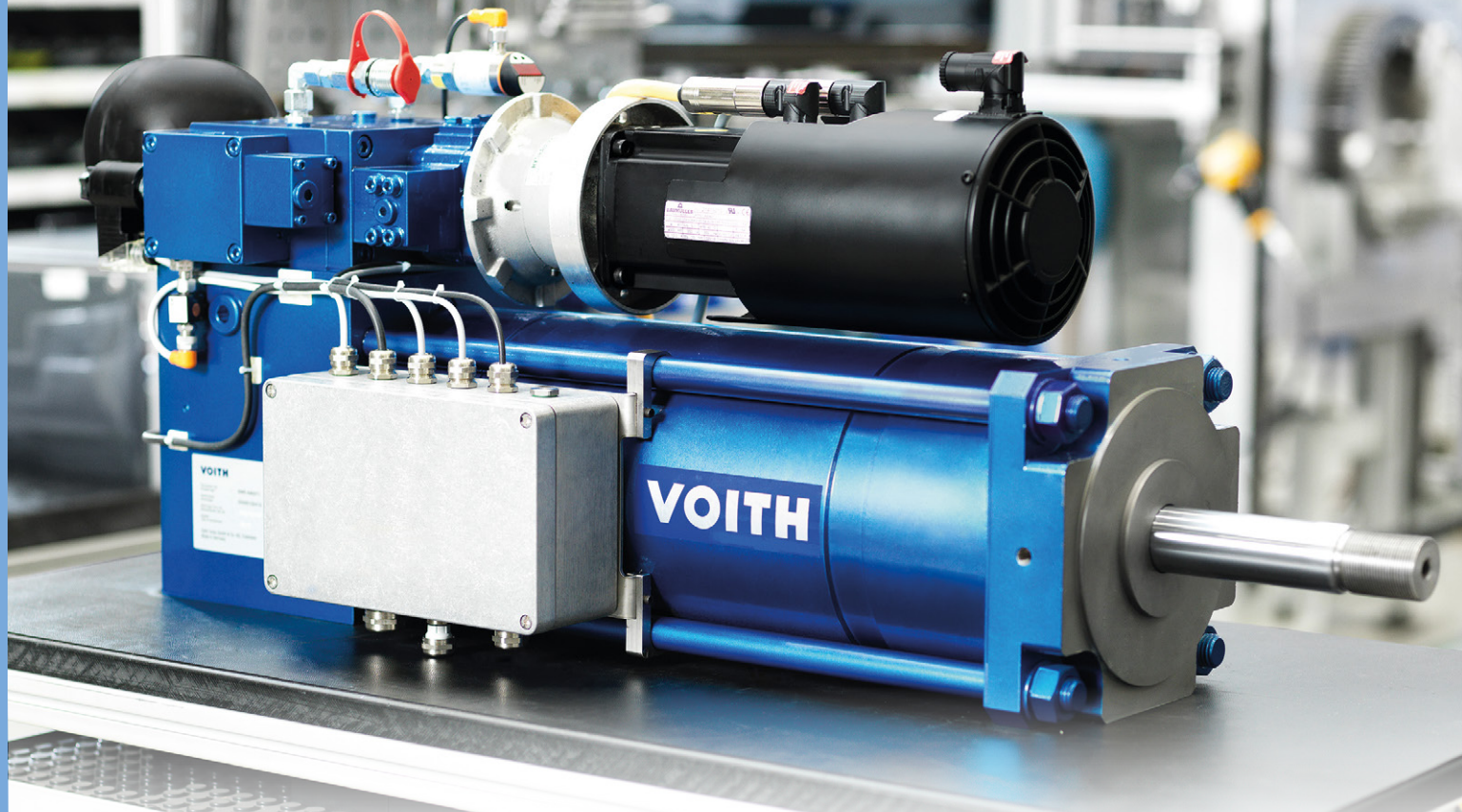
the standard, which can be positioned turned through 90° to each other. Thus, a variety of connection configurations are possible.

Advantages for the user:

- As the filling pump is supplied with pre-charged oil this improves the cold start characteristics of the system
- By eliminating a filter, the system now employs fewer components
- Reduction of spare parts and maintenance costs and overall system costs

Photographs: Argo-Hytos

[www.argo-hytos.com](http://www.argo-hytos.com)



## Self-contained linear actuator with fail-safe function

*The new linear actuator from the German specialist, Voith, with safety features for valve control functions, combines the best of hydraulic and electromechanical technologies. The new Voith SelCon proves to be an excellent solution for applications in the gas and steam turbines.*

The Voith SelCon was primarily designed as a linear actuator with safety function for the valve controls of gas and steam turbines. It combines the advantages of hydraulic and electromechanical solutions. The hydraulics provides high force density and dynamics, the electromechanical side contributes simple, cost-effective system integration. Large effective forces up to 500 kN and 'ATEX' certification allow it to be used on turbines under virtually all conceivable ambient conditions.

The hydraulic system of the SelCon is self-contained. An external hydraulic power pack with oil tank, control block and pipework is completely unnecessary. This reduces procurement costs by up to 35% compared to a conventional solution. In addition, the system has a considerably higher operational reliability. External hydraulic disturbances such as pressure fluctuations, mismatched pipe diameters or negative pressure in the tank line are out of the question.

The position is controlled by means of a servo pump according to the displacement principle. As a result, the actuator has a high degree of energy efficiency and the level of heat introduced into the integrated hydraulic system is low. The energy costs for operating the actuator are up to 50% lower than for classic actuators using conventional valves and a hydraulic power pack. The control through the servo pump provides the same or even better dynamics and control response as comparable electromechanical actuators. This achieves

stable processes with high product quality. The fail-safe function is implemented using an internal return spring. The trip time for the valve controls is typically less than 300 ms. This reduces the danger of direct and consequential damage considerably. The SelCon design is modular and usually compatible with existing hydraulic, electromechanical and pneumatic actuators. Integration into new systems and the modernization of existing systems can be accomplished in a cost-effective manner with minor planning effort.

Various standardized communication interfaces and the use of real-time Ethernet protocols make the SelCon ready for Industry 4.0 (Internet of things) concepts. For example, intelligent process optimization, remote diagnostics and condition monitoring come to mind.

Photograph: Voith GmbH

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

### About Voith

Voith Turbo, a division of Voith GmbH, is a specialist for intelligent drive solutions and systems. Customers from highly diverse industries such as oil and gas, energy, mining and metal processing, mechanical engineering, ship technology, rail and commercial vehicles rely on advanced technologies from Voith Turbo.

Voith sets standards in the energy, oil & gas, paper, raw materials and transportation & automotive sector. Founded in 1867, Voith employs more than 20,000 people, generates €4.3 billion in sales, operates in over 60 countries around the world and is one of the biggest family owned companies in Europe. (Excluding the discontinued Group Division Voith Industrial Services.)



# Product News

## Inductive sensors with an extended measurement range

The new inductive sensors in the AlphaProx product family from Baumer are available in construction sizes of 6.5, M8 and M12. They offer a 50 % increase in measuring range of 3 mm or 6 mm. In this way the sensors can be installed with a greater safety clearance

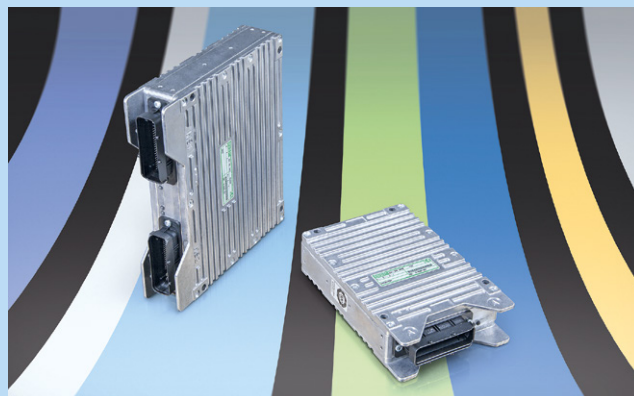


distance to the object and themselves protected from mechanical damages in critical applications e.g. measuring the bending deflection of a saw blade. The component sizes of 6.5 and M8 are only 30 mm long. Based on their short construction sizes this portfolio

offers increased freedom of design in mechanical construction, as the sensors themselves can easily be built into narrow spaces and machine parts which are difficult to access.

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

## Powerlink now runs in STW controls



With the transfer of the real-time Powerlink Open Source Protocol to the ESX-3XL and ESX-3XM central controls as well as with their data management and telemetry module CONNEX-TC3G, STW shows a first possible access to the world of the industrial Ethernet. Powerlink is a real-time capability and hardware independent Open Source Protocol. It makes problem-free entry and conversion to the industrial Ethernet possible in construction machines and farm technology. As a solutions provider in these fields, STW's goal is making new technologies available to its customers. For this reason this Open Source Protocol was transferred to the central controls, which are also configured for applications in safety-driven applications. Both controls distinguish themselves with their modularity and through their support of comfortable development environments for Codesys and the programming language "C", as well as with their availability of well thought-out tool chains.

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

## Passive floating caliper brakes with divided linings

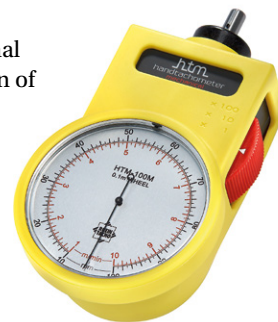
The two-part brake linings in the KTR-Stop XL hydraulic brakes create a high contact ratio. The passive floating caliper brakes are manufactured completely from steel, weight ca. 1,100 kg and create clamping forces of up to 600 kN. The brake linings are available in the material finishes "organic" or "sinter metal". In order to simplify changing the brake linings on the side that is often difficult to reach, KTR secured the linings to the fixed yoke side using magnets. To do this only the screws situated on the side were loosened, the Brake lining mounts are removed and the linings are pulled out to the side.

The adjustment screws built into the brake pistons make quick settings and adjustments possible in high-pressure situations.

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

## ATEX certified mechanical hand-held tachometer

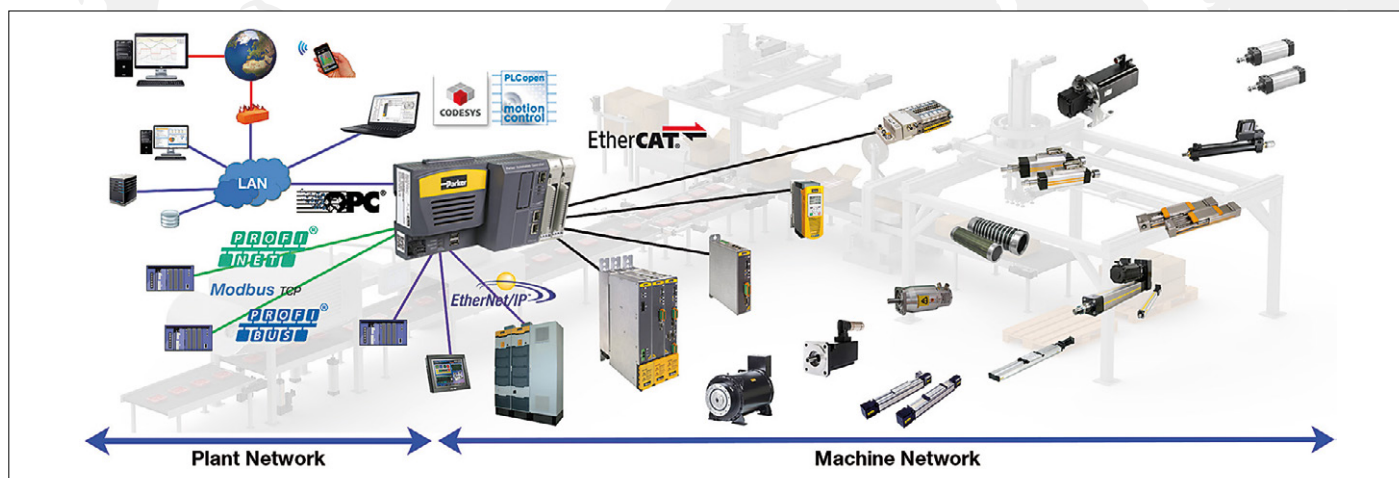
Rheintacho has received a Class I national technical approval for their ATEX version of mechanical hand-held tachometer. Tachometers are often used in fields in which the atmosphere is explosive due to dust particles or gases in it. The HTM was further developed and certified for this and for use in ATEX Zones 1 and 2, and for use in all groups of gases with temperature class T4. The certification approves use for applications in mining. HTM in both the ATEX model as well as also in the standard model measure the number of revolutions (rpm) and surface speeds with the help of special contact adapters. It fulfills the high demands of maintenance and calibration without battery power.



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

# Product News

## Parker Hannifin offers complex controller applications for the plant of the future



With a new automation platform, Parker Hannifin offers consistency from command to actuator level that is required for Industry 4.0 applications. The automation controller PAC (Programmable Automation Controller) and servo drive controller of PSD series are the central modules of a platform designed on open Ethernet communication standard. PAC is a multi-axle motion controller, which connects the properties of a PLC with a

motion control controller, robotics and visualisation. It provides applications without interface management on only one controller platform. Open interfaces allow connection in horizontal communication structures.

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

## Leak testing device for measuring gas pressures

The DPK 60-5 leak testing device from Afriso was conceived for measuring gas pressures as well as for leak tests and load tests on low-pressure gas pipes. The testing set can be used for tightness checks at 150 mbar and load tests at 1 bar, as well as for checking the connection pressure and flow pressure.



Furthermore the testing set can be used for tightness tests and strength tests on drinking water pipes according to ZVSHK (The German Sanitation, Heating and Air Conditioning Association). Amongst other things two manometers and a test valve with quick-action coupling are included in the product delivery, along with a high-precision control valve. The quick-action coupling system allows for adjustment to the respective testing situation.

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

## Pressure reducing valve for proportional control

The SP4P1-B4 pilot-controlled pressure reduction valve from the company Argo-Hytos is a sliding valve with a screw-in method of construction. With this the reduced pressure inside a defined region can be set. The pressure level is proportional to the direct current converter. Its nominal reduced pressure is 30 bar, the nominal volumetric flow rate is 40 l/min.

The hysteresis is given as 5 %, its working life is given as 10 million spiked impulse cycles at nominal pressure. It can be used in a fluid temperature range and an ambient temperature range of from -30 to +100 °C (-22 to 212 °F). Fields of application include hydraulic clutch motors or farm machinery and construction machinery.



[www.argo-hytos.com](http://www.argo-hytos.com)

## Connections and hoses with sizes in inches

For local requirements in the USA and China, Eisele has extended its connections and hoses in Program 14 of their Basicline. The plug-in connections with release sleeves are also manufactured in sizes in inches for their R and NPT threads, as well as their hose connections. There is an appropriate program of hoses for these. For the hoses the emphasis is on Proweld, PU and hydro hoses in the usual sizes of 1/4, 1/2 and 3/8 inch. From January 2016 in the USA all the items in Program 14 should be available to customers in the corresponding sizes in inches.

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





## Quick Reaction to temperature fluctuations



The TS-SNA/SNK-PT100 high-grade steel temperature sensors from Stauff monitor the temperatures of media in hydraulic containers in the measurement range from -40 °C to +150 °C (-104 °F to +302 °F). They are used optionally situated in the bottom hollow screw in optical and opto-electrical liquid level indicators or integrated into the walls of container with adapters. With the PT100 platinum measuring element temperatures can be recorded quickly, precisely and without hysteresis. In this way reactions to temperature fluctuations in containers can be made at once and these can be communicated for example to external oil coolers. This reduces the amount of heat energy to be regulated in the tank, and in this way the thermal performance and cooling lifespan.

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

## ZTR's valve helps improves performance

In the international trade fair, Motek 2015, ZTR Rossmann GmbH presented an innovative product. This valve installed on a pneumatic cylinder can increase force between 15 and 45 % at same pressure or provide savings on air consumption up to 20-40 %. It facilitates the selection of smaller and more favourable cylinder with regard to force applied, because this valve can provide higher force at same pressure. The high air consumption in cylinders with many switching cycles can be reduced significantly, because the pressure can be decreased without making compromises in performance.

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

## Offshore energy chains with new divider systems

In order to move multiple lines and hoses in an energy chain, the divider systems are used in the individual chains to keep the lines in position. Particularly, in offshore applications, in ports or on



ships, there are high forces on the dividers. Igus has developed the new holding clamp divider to offer more safety. They can be positioned precisely and fixed in the chain links. They cannot be removed without destroying the chain link or divider. This also ensures a high security against loss. The divider systems are made of similar anti-abrasive plastics in injection moulding process and the rest of the energy chain links are also made of the same material.

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

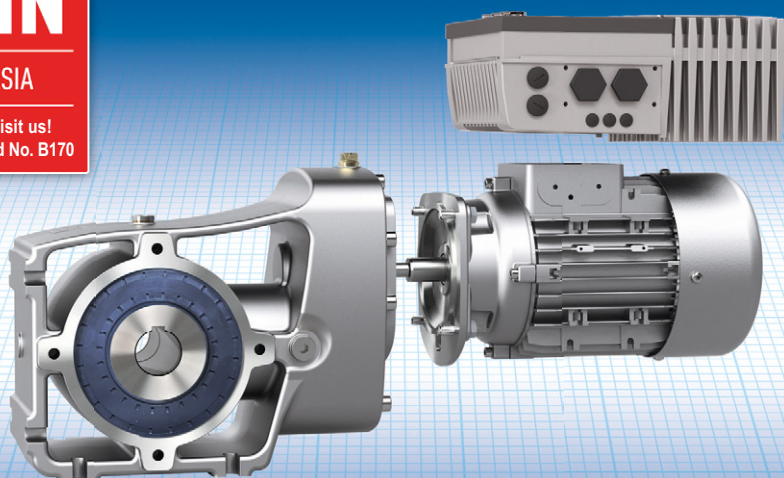
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