MOTION DRIVES

POWER TRANSMISSION & INDUSTRIAL MOTION MAGAZINE

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Power Transmission *for* **Agriculture & Food Production**

+ Rickard Gustafson
SKF

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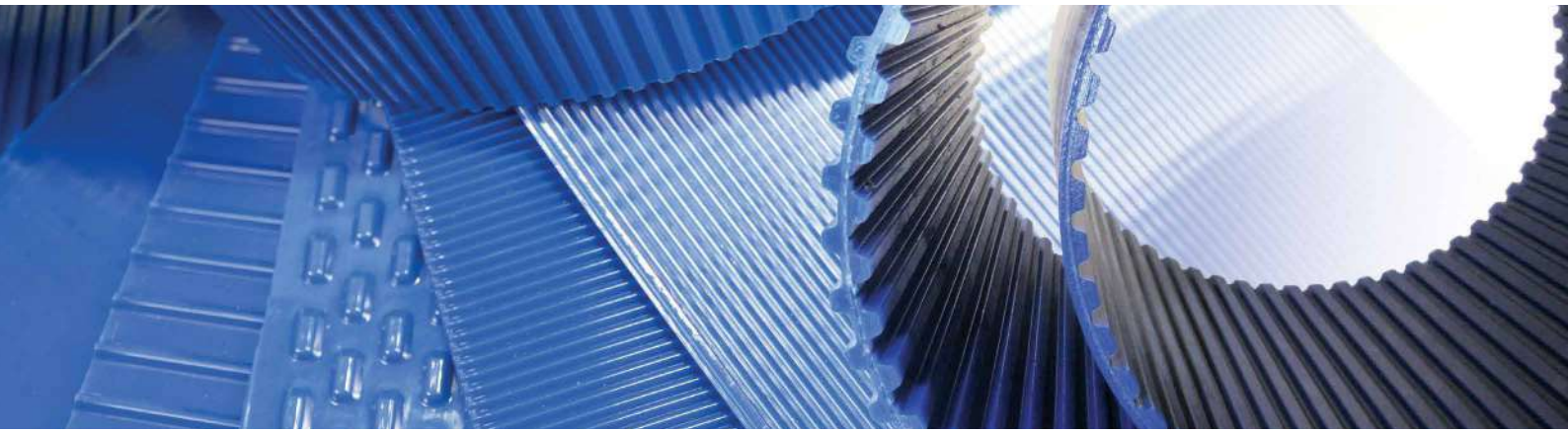

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Stage is set for PT/MC buyer & supplier meetings 2022

Mike Brandt
Editor-in-Chief

This new edition of Motion+Drives Magazine begins 2022 covering PT/MC solutions that are helping to fuel modern civilization. Featuring agriculture and food production, we venture into an industry requiring clean, food safe equipment that delivers maximum productivity, efficiency, and reliability.

In this issue, we detail one of the most exciting new announcements for the global PT/MC community; the launch of iMotion Events (www.imotion.events). This incredibly versatile industrial motion hybrid event format is certain to open many opportunities for those looking to connect both virtually and in-person. Encompassing a full year, exclusive buyer and supplier matchmaking meetings will link thousands of industry peers across five different industries.

Further, explore global food production trends, and learn how PT/MC solution providers are responding to new challenges. Understand how pandemic driven changes are leading to increased demand and how consumer buying is shaping food manufacturing. Finally, it is our distinct pleasure to share an exclusive interview with one of the most prominent and influential new leaders within the bearing industry. The new CEO and President of SKF, Rickard Gustafson candidly shares his experience, perspectives, and future outlook.

What's in Motion...

What's in motion for the PT/MC industry. Digital and technological innovations for the agricultural environment; drones for precision agri projects, smart technology, and environmental detection solutions for the automated future. Furthermore, a range of sustainable, high quality products in the fields of belting, conveying, bearings, and seals. All this and more can be found in this new edition of Motion + Drives Magazine.

I hope that you will enjoy it.

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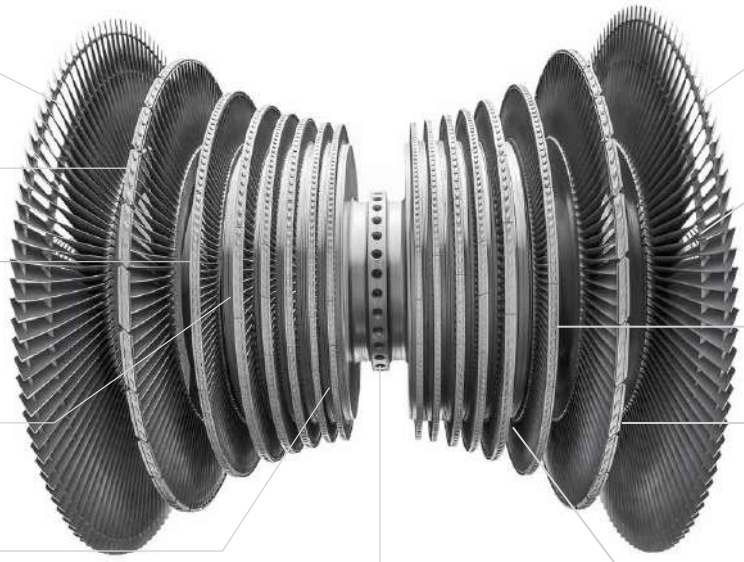

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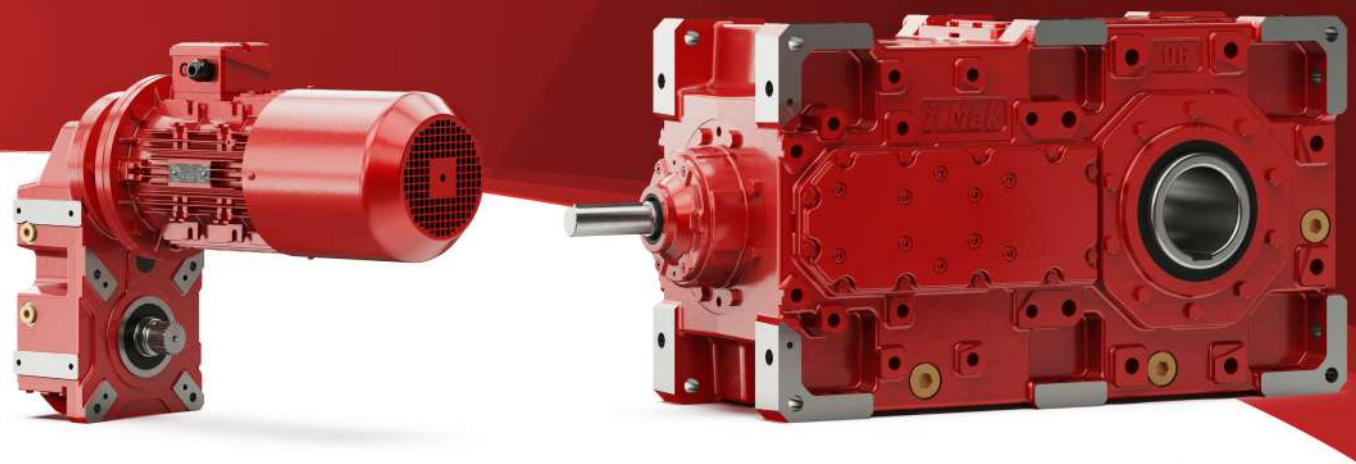

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CONTENT

08+

Food Production

KHS supports beverage producer UCB with implementing its ambitious sustainability goals

14+

Agriculture

Precise Environment Detection for Agricultural Machines

18+

Agriculte & Food Production

PT Applications from Agriculture to Food Manufacturing

24+

Interview

SKF Enters a New Era with Rickard Gistafson

30+

Industrial Technology

smart technology to make everyday life safe, convenient, and sustainable

36+

Food & Beverage

Eco-Friendly, Food-Grade, Anti-Rust Coated Bearings for Food & Beverage Industry

40+

Belts & Belting

Timing Belts from Habasit: Hygiene all along the line for the food industry

44+

Drives & Motors

Digitalization in Drive Technology

46+

Food Production

NSK Life-Lube® bearings drive cost-saving improvements in food plants

50+

Software

Simple Exchange of Gearbox Data with REXS

54+

Business

Lean Accounting for the Industry

60+

Agriculture

Use of Bearings in Drones for Precision Agriculture Projects

Event

62+

68+

Agriculture Machinery

A lifeline for farming machinery with new cassette seal

+ PET line // On UCB's PET line water and soda pop are filled into four different sizes of bottle – here the 330-milliliter variant.

– Key role for quality

KHS supports beverage producer UCB from Cameroon in implementing its ambitious sustainability goals

On the booming beer market in Cameroon one local brewery isn't simply out to make a few fast bucks – or francs – but is instead going for sustainability, high-quality products and future-proof technology. This strategy is proving extremely successful and has made the company the market leader in major cities.

+ Packaging section // View of the line's packaging section: in the center is the labeler, with the packer to the right and the conveyors with buffer segments in front of and between the two.

Fast urbanization and a rapidly growing middle class are turning large swathes of the African continent into a dynamic market that holds great potential. With their sales markets in North America and Europe stagnating or declining, this is something international breweries especially are profiting from and where they see new opportunities. Consumption is rising every year by 5%; in 2015 experts from the Deutsche Bank already forecast that by 2025 more than a third of the growth in worldwide beer sales would be attributable to sub-Saharan Africa.

This trend is also evident in Cameroon, whose gross domestic product has more than doubled over the last 15 years. However, it's not just the big international names that are quenching the increasing thirst of the population here. One local business is also in the same top league as the major players: Union Camerounaise de Brasseries (UCB) based in the port of Douala ranks second on the Central African market between two big global breweries. With its traditional King Beer and Kadji Beer and K44 brands UCB is very popular in Cameroon. The company is also heralded as something of a pioneer. A considerable amount has been invested in new technology since 2016: this includes two new returnable glass lines, for example, for which KHS supplied the entire packaging and palletizing sections in 2019 and 2020. Furthermore, in May of 2021 a KHS PET line – UCB's very first– was commissioned for the relatively new segment of soda pop and water. It has a capacity of up to 20,000 bottles per hour and comprises a stretch blow molder/ filler block, labeler, packaging machine and palletizing equipment. At the time of writing UCB is also considering filling its beverages into cans; in keeping with its role as a trailblazer, this would make it the first brewery in Cameroon to operate its own can filling process.

On schedule

The coronavirus pandemic caused a number of delays among sub-suppliers responsible for preceding work, particularly in 2020, that could be largely compensated for as both the packaging and palletizing sections of the second glass line and the new PET line were more or less fully implemented by the KHS subsidiary in Nigeria. This meant that installation and commissioning were completed within the given time frame.

Many other KHS projects currently in progress in Cameroon illustrate that the country is booming and steadily becoming an attractive market for the Dortmund systems supplier. In the past, the French-speaking countries of Africa especially imported a large percentage of their beverages. However, more and more local retailers and bottlers are now asking themselves why they should ship beverages in from Europe when they could bottle them themselves in their own region.

In the following interview, Whalen Kadji, project manager for the Kadji Group and one of the brewery founder's grandsons, gives us an insight into his company's philosophy and sustainability strategy and talks about its cooperation with KHS.

How would you describe UCB's corporate philosophy?

Our company is characterized both by the deep roots

+ Innoket Neo // The KHS Innoket Neo roll-fed labeler dresses the PET bottles on the line with labels.

it has in the culture of Cameroon and by our wish to become better and better. Founded in 1972, we've always put quality before quantity and have thus been able to retain our expertise and individuality. As proud Cameroonians we still stand for perfect craftsmanship in brewing and believe in only using the best ingredients.

Quality seems to be an important factor for your brewery. How do you establish and maintain your high standards of quality?

Our core values are creativity, integrity and courage. Quality also indeed plays a key role for us – in our processes and in our dealings with our partners, both in Cameroon and abroad. With the help of a dedicated system of quality management, with precise planning and strict methods of measurement we achieve top performance at practically every point in the value chain.

What have been the most significant success factors in the almost 50 years of your company?

For us, people have always been the key to our success. Our founder Joseph Kadji Defosso envisaged a company that would become one of the best in its field. Besides this vision he also had the will and determination to achieve this goal. Now, under the leadership of Nicole Kadji Defosso, his daughter, we're constantly on the lookout for first-class employees whose professional attitude and qualifications satisfy the highest standards and who are able to tread in Joseph Kadji's great footsteps.

If we now turn to the bottling of your products, which container segments are most important in Cameroon? And what role does sustainability play in this context?

On our home beer market the returnable glass bottle definitely has the lion's share. Beer can be pasteurized in this type of container, meaning that it keeps longer. What's more, the glass acts as a CO_2 diffusion barrier, thus ensuring long-lasting quality on the shelf. Moreover, bar proprietors and owners of small stores find it of great benefit that the empties are collected from their properties. Finally, for our part we procure our bottles from a local glass factory that can also recycle glass. This therefore means that this is a tried-and-tested and sustainable material for container manufacture on all counts.

Which trends and developments do you see emerging in relation to beverage packaging in Cameroon?

PET has enjoyed a rise in popularity in conjunction with carbonated soft drinks and water for some time now. Unfortunately, we don't yet have a bottle-to-bottle recycling system in Cameroon, however. At the moment plastic bottles are merely pressed, shredded and sent to a PET materials manufacturer. In view of their rapidly increasing

+ Innopack Kisters SP // The line at UCB includes an Innopack Kisters SP, a shrink packer that wraps and bundles the packs in shrink film.

+ Excellent service // A KHS service employee shows UCB operators how to change reels on the Innoket Neo for roll-fed labeling.

use and the subsequent growing amount of plastic waste, the PET recycling process still needs to become established here. Cans and kegs made of aluminum could be an alternative to this material but at present this is still a very small segment, albeit one that's growing. This is based on the premise that these containers are made locally, however. Cameroon needs to catch up here.

Is plastic waste a big issue in your country? What are the state and the economy doing to prevent it?

Plastic and especially PET waste is indeed a big problem. We do have a few state regulations and levies in place but they have very little impact. One major reason for this is, for example, that empty PET bottles are often reused for a totally different purpose, although there are repeated warnings not to do so. For the Kadji Group, which UCB is part of, the protection of the environment has a high priority. We've thus entered into partnership with a number of startups that invest in PET recycling. Among them is a company that makes school bags and pencil cases from recycled PET and another that presses and bundles returned bottles and sends them to recyclers in Europe. We're also planning on

UCB and KHS // Long-term partners UCB and KHS: Benedict Jatto, sales and marketing manager for KHS Machines Nigeria, Alexander Fuchs, managing director of KHS Machines Nigeria and Whalen Kadji, project manager for the Kadji Group, which UCB is part of (from left to right).

building our own recycling plant in the near future. PET is a great opportunity for the African market. After all, we all want to act sustainably.

Why was it necessary to make the most recent investment in your production technology?

With our former, extremely old lines we could neither meet the growing demand nor adhere to production standards. In order to stay competitive and satisfy our customers, we thus had to invest in new plant engineering. We looked for robust, reliable technology that gives us the right product quality at the right time. In opting for KHS we made a very good choice.

What particular challenges did you face regarding economic and ecological sustainability and what results have you achieved?

If you want to stay competitive and cut costs, you have to optimize your use of resources and learn how to produce more intelligently and more sustainably. KHS showed us just which factors pushed our production costs up in the past; accordingly, machine availability was one of the key criteria that prompted us to award the contract to the company from Dortmund. After installing our new glass line our performance increased by 50%, with our CO_2 consumption dropping by almost 40% at the same time. We were even able to halve the amount of product loss.

How would you describe the relationship between UCB and KHS?

We've worked with KHS and its predecessor companies since our founding almost 50 years ago. Although we were only a small business back then, our concerns were always given the greatest attention. Historically speaking, we thus have a very strong relationship. Whereas in the past we usually did business with KHS contacts in France or South Africa, KHS now has a young, dynamic and flexible team in Lagos, Nigeria, with well-trained technicians and engineers. For us, our most recent investments prove that machines are one thing but that having a trusting partnership with access to extensive technical support is at least just as important.

What role does after-sales service play for your company?

A system of technical support with reliable maintenance and service is a crucial aspect for us. KHS already gave us top-quality service many years ago. And today we can also still rely on receiving unlimited assistance at any time of the day or night. The availability of spare parts presents a particular challenge: here, KHS scores on all fronts with its West African service hub in Lagos, Nigeria.

How did the corona crisis affect the installation and commissioning of your new lines?

Managing projects during the pandemic was an enormous challenge. During the first lockdown last year, lots of people were really worried about coming to work or traveling. We were also initially concerned about having engineers come to us from Europe that was much more heavily affected than many parts of Africa. This was further complicated by the fact that PCR tests were hard to come by. There was only one test center in the capital of Yaoundé which is about four hours from us. And even those who managed to get tested still had to quarantine for two weeks. We therefore decided to postpone the entire installation of the glass line until the end of 2020.

What future strategic goals does your company have?

We've been in the beverage industry in Cameroon and Central Africa for almost half a century now. We'll continue to supply high-quality products and act sustainably in the future, too. In maintaining and intensifying relations with our business partners we'll foster growth and at the same time reduce the negative impact of our line of business on the environment. Dealing with Covid-19 has heightened our awareness of the future opportunities open to us across the entire continent.

Family firm – The Kadji Group

In order to pool his diverse range of entrepreneurial activities, back in 1960 Joseph Kadji Defosso founded the Kadji Group. The conglomerate, that today employs around 1,500 people and is still under family ownership, includes companies from a broad spectrum of industrial sectors. Besides the UCB brewery, plastics manufacturer Polyplast is also a member of the group, as is a flour mill (SCC) in the port of Douala. The Kadji Group is also in insurance with Assurances Générales du Cameroun (AGC) and has a real estate company that is responsible for the development and operation of a number of high-rise buildings as well as the famous Kadji Square shopping center. The group also operates in areas such as logistics, transport and the hotel and hospitality industries. Last but not least, the Kadji Defosso Foundation is the group's pillar as far as charity and social actions are concerned, geared towards excellence and giving constant support to communities.

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Precise Environment Detection

– Continental Develops a Left-turn Assist for Agricultural Machines

+ Continental sees environment detection as a decisive topic for the automated future of agriculture.

+ Digital solutions for agricultural environment detection ensure greater safety on the road and more efficiency on the fields

+ Turn assist, panoramic view camera systems and more – Continental customers are already benefiting today from developments for autonomous agricultural machines

+ WiFi cameras equipped with a magnet end the era of restricted fields of view

The technology company sees environment detection as a decisive topic for the automated future of agriculture. "We use our in-depth know-how in passenger cars and trucks as the technological springboard for making agriculture fit for the future. As part of our Off-Highway initiative, we've gone into the agribusiness application field holistically – and we have adapted, further developed and rethought solutions," says Gilles Mabire, Head of the Commercial Vehicles & Aftermarket Business Unit, where Continental bundles electronic and digital products for commercial vehicles and mobile machines. "We are on a direct path towards autonomous agricultural machinery and we're using the knowledge we gain to enable our customers to benefit from our research today. The left-turn assist is a very good example of this."

Focus on human safety

According to the statistics portal statista, there were 55 fatalities in accidents involving agricultural tractors in 2018, and the official road traffic accident statistics of the German Statistical Office tell us that 57% of road deaths in 2018 were caused by accidents on country roads. Industry experts believe that the left-hand turn of agricultural machinery vehicles on public roads is particularly risky. After all, around a third of these vehicles' operating time is spent on these roads – although they were not designed for this purpose, since they often have different dimensions than other road users in terms of length, height and width. Agricultural machines also have wide blind spots and fewer light sources on the vehicle, so their signals are often difficult to see. Other road users must also adapt to their low speeds.

Left-turn assist warns drivers in the event of an emergency

Continental is meeting this challenge with its new left-turn assist: The system warns the agricultural machine's driver of obstacles on the left side of the vehicle by means of an acoustic or optical signal. The system can detect approaching vehicles at a distance of up to 250 meters. This is made possible by radar technology. The system is based on 77 gigahertz technology, which captures the vehicle environment in a significantly higher resolution than before. "Earlier technologies used mirrors and cameras. The radar technology is new to the market for this application and it offers many advantages," says Ulrich Roskoni, Head of Technical Product Design for Special Vehicles in the Continental Independent Aftermarket Business Segment. "Radar sensors enable precise distance control; the sensor can 'look' back and determine the speed of the oncoming vehicles and the distance between them and the agricultural machine."

+ Continental's left-turn assist can detect approaching vehicles at a distance of up to 250 meters and warn the driver.

More advantages: Radar sensors are independent of weather and lighting conditions, the Continental system is easy to install, and it does not overload the driver with information. "The driver doesn't need a monitor; he's only warned in an emergency. This is in line with our Continental philosophy for the human-machine interface, which is to always give the driver only the information he really needs," emphasizes Roskoni.

Turn assists soon with combined radar and camera technology

To develop the left-turn assist, Continental is working together with a major original equipment manufacturer for agricultural machinery. Technologically, the company is relying on proven devices: in this case, it is the right-turn assist for trucks, which will be mandatory for all new EU vehicle types from 2022. "There is currently no product on the market that can compare with the left-turn assist. In addition to the rear and side mirrors used previously, the current products are usually based on camera technology. These systems are limited to certain distances and are not able to warn the driver on their own, so radar is a more appropriate technology in this case. However, camera technology also has its strengths and we're working to merge radar and camera technologies, which would give us even better information," says Roskoni.

This benefits the driver, who cannot have his eyes everywhere and whose field of vision is restricted by the dimensions of his vehicle. In the long term, the camera, radar and lidar sensor types will detect the environment together – completely and redundantly. The information obtained in this way serves as the basis for autonomous machine decisions.

ProViu 360 Surround View system for a clear picture of the field

This sensor fusion, initially of radar and camera information, will also be applied to the digital camera system ProViu 360 in the future. Production of the ProViu 360 is scheduled to start in 2020, and a total of four 1.3 megapixel cameras will be used, giving the driver a bird's eye view of his machine. This enables the system to deliver sharper images in HD resolution, displayed on a 10-inch HD touch display. The next step will then see ProViu 360 becoming intelligent. Markers, icons and texts will be placed on the camera image as augmented reality.

+ The second generation of the intelligent ProViu 360 surround view system will provide the driver with a panoramic bird's eye view of the machine in HD resolution on a touch display.

WiFi and magnet: Retrofitting cameras without cable clutter

The magnetically fixed and wireless WLAN cameras that Continental is currently developing are of particular interest for retrofitting agricultural machinery. Due to their small, 7-centimeter diameter, these round cameras with fisheye lenses can be mounted in previously impossible or too complicated locations – on the shovel of a wheel loader, for example, or on the back of a trailer. With its protection class IP69K, the camera is more or less immune against external influences and its batteries are inductively charged without any exposed contacts. The painted surface of the vehicle is protected by the camera's rubber jacket. The neodymium magnet and an acceleration sensor ensure enormous flexibility. The magnet can be attached to metallic surfaces and withstands all rough usage – but at the same time it ensures that the cameras can be easily dismantled and placed elsewhere. Thanks to the acceleration sensor, the image aligns itself automatically, but the operator still has the freedom to pan or zoom the image thanks to the 12 megapixel resolution of the image sensor. Drivers who are familiar with their own usage scenarios can also attach holders to the important spots on their machine. With a short connection to the next live cable, charging is automated, and thanks to an RFID chip, the camera immediately recognizes which machine it has been attached to, and the field of view is automatically adjusted.

+ The magnetically fixed and wireless WLAN cameras that Continental is currently developing are of particular interest for retrofitting.

PT Applications
from **Agriculture to Food Manufacturing**

In today's world of nearly 8 billion people, food production looks very different than it did in the recent past, and many immediate changes are directly correlated to the Covid-19 pandemic. From growth to harvest, to packaging and transport, food producers depend on reliable PT applications to meet changing consumer needs and growing population demands.

Currently, there is a greater importance on the efficiency of global agriculture and food production. According to the Food and Agriculture Organization of the United Nations, the Covid-19 pandemic may have pushed an additional 83-132 million people into chronic hunger in 2020 alone.1

Increased demand, material shortages, and rapidly changing consumer behaviors have driven food production to the maximum. There is now an intensified focus on healthier, immune-boosting food options, cleanliness, and bulk foods purchased for at home meal preparation. Additionally, crippled supply chains have created a strengthened desire to source locally, a concept that parallels re-shoring efforts taking place in other industries.

While the homogeneous link between agriculture and food manufacturing is on full display in the wake of the pandemic, global food producers are accustomed to constant increases in demand, acclimation to societal trends, and meeting higher food safety standards.

Some 50 years ago, the global population numbered 3.8 billion, and today that figure has more than doubled.2. In 2019, global crop production yielded a staggering 9.4 billion tons, an increase of more than 53% from the year 2000. Within the same time period, production of vegetable oils more than doubled, and at 337 million tons, meat production rose 44%.3

In conjunction with heightened demand, sustainability has been an imperative element. The UN general assembly released the 2030 Agenda for Sustainable (Global) Development, and to no surprise, food production is at the heart of the plan.4 An emphasis on sustainable production requires PT solution providers to supply high performance, energy efficient products that reduce environmental footprints, while simultaneously meeting performance requirements.

Farms that use heavy machinery for production are embracing autonomous electric vehicles and robotics, alongside the evolving changes within transportation. Processing facilities are implementing new material requirements that need minimal servicing, including improvements to stainless steel components, composite and epoxy coated PT systems, motors, controls, and gearing.5 Conveyer solutions are moving to operate without lubrication, and many more innovations are on the horizon.

With continuous population growth and richer diets, the food you eat today can follow a supply chain for thousands of miles, and the emergence of biotechnology has led to significant investment by the private sector. Growth in food engineering and agricultural R&D are creating more options for consumers.6 It can be expected that alongside the implications of the Covid-19 pandemic, food demand will continue to rise, sustainable production will remain at the forefront, in turn increasing the need for new innovative PT solutions that support production.

As agriculture and food manufacturing intersects every corner of the globe, buyer and supplier connections are an integral part of the future. To help meet the spike in recent demand and promote healthy growth, iMotion Events is organizing the Agriculture & Food Production matchmaking meetings. On April 13-15, Power Transmission and Motion Control professionals will connect globally, through a carefully designed hybrid event structure that aims to maximize both online and in person matchmaking opportunities.

Resources

1. *FAO organization: www.fao.org/sdg-progress-report/2021/en*
2. *World bank: data.worldbank.org/indicator/SP.POP.TOTL*
3. *FAO: www.fao.org/3/cb4477en/online/cb4477en.html#chapter-2*
4. *United Nations: www.un.org/ga/search/view_doc.asp?symbol=A/70/L.1&Lang=E*
5. *RegalRexnord: www.regalrexnord.com/tools-resources/ip69k-washdown-solutions/5-ways-food-beverage-manufacturing-has-changed*
6. *FAO Organization: www.fao.org/3/md883E/md883E.pdf*

see page 62

Rickard Gustafson
CEO and President at SKF

SKF® Enters a New Era *with* Rickard Gustafson

Bearing industry leader, SKF, recently welcomed Mr. Rickard Gustafson to the position of CEO and President. The BearingNews editorial team had the distinct pleasure of sitting down with Mr. Gustafson to candidly discuss his new role. In this exclusive interview, readers are provided a unique opportunity to hear directly from one of the industry's most prominent new leaders.

Mr. Gustafson brings a breadth of professional experience to SKF. Having held previous leadership roles within several well-known organizations, he is most notably recognized for his decade long tenure as CEO of SAS. Now, with a keen understanding of the bearing industry, Rickard Gustafson weighs in on current trends, objectives, and future insights, with particular attention dedicated to the utilization of technology, the importance of sustainability, and finally, the capacity to navigate today's rapidly evolving world.

> For scope 1 and 2, we will be net zero by 2030,
> and as of today, some of our facilities are already net zero.
> For Scope 3 are aiming for net zero by 2050.

Q: First of all, we would like to congratulate you on your new position at SKF. Can you tell us more about your background? Who is Rickard Gustafson?

It's my pleasure to be a part of this very iconic company, SKF, a company with such a global footprint. I have an engineering background, (a long time ago) I graduated in 1989 from the University of Technology in Linköping Sweden. I joined what is now known as Accenture for 7 years, back then it was Anderson Consulting. Following this role, I spent 10 years with GE and GE capital in various positions, and eventually I became the CEO of a property and casualty insurance business here in Scandinavia called Codan/Trygg Hansa where I spent 7 years running that company. I was recruited to lead the flag carrier here, Scandinavian Airlines, SAS, and I did that for 10 years. And since June 1st I'm here at SKF, so I'm delighted. It's a new industry for me and a new company.

Q: You are remembered for your sustainability initiatives at SAS, which became the starting point for a new era in the entire aviation industry. May we expect a similar trend and change within the bearing and power transmission industries?

I do hope so, I think within any industry we all need to do everything we can to transform our businesses towards a more sustainable future, and I will be keen to do whatever I can to ensure that SKF is perceived as a leader within our industry and think there are number of things we are already doing. We have set very ambitious targets for ourselves. For scope 1 and 2, we will be net zero by 2030, and as of today, some of our facilities are already net zero. Such as the one here in Gothenburg for example. For Scope 3 are aiming for net zero by 2050 and the reason why we need a longer time is because we need to transform the steel industry so that we can source green steel and that is going to take a bit longer. So those are things that we do. But our products, they also serve our customers well in order to help them to transform their businesses towards a more sustainable future.

Because the whole idea of the bearing is to increase energy efficiency and reduce friction, it's a natural thing for us to support our customers. And we do that through innovation. I'm excited about the activities we have now for remanufacturing of bearings to create a circle, rather than a constantly re-buy and re-make. You can actually re-manufacture the bearings, I think that's exciting. I also think it's exciting to see our leading technologies in some industries such as magnetic bearings, which will be vital for hydrogen conversion. Hydrogen will require a lot of compression, and

magnetic bearings fit very well into high-speed rotation which will be required in compression. So, there are a number of things we do both internally and then of course to help our customers by using our products to become even more sustainable. So long answer to your question, but the short answer is yes, you should expect the same.

Q: What will be your strategy for a profitable growth and sustainable development for SKF in the coming years?

We have initiated a rather comprehensive strategic review process that is not yet completed. We aim to announce in the beginning of 2022. Basically, what we

have done is that we are taking a very holistic view on our business, looking into the big mega transport, how they will impact our customers and thereby us longer term. We are scrutinizing our portfolio looking into the profitability and potential in all parts of our portfolio, and based on this, we will articulate a strategy going forward. Even though I can't go into many details, I think some key components that will be part of that. We do see some industry segments that are likely to grow very rapidly in the years to come. And of course, we want to be there. And most of them are linked in some shape or form to the ongoing transformation to a more sustainable future. Wind, rail, electric vehicles and so forth. So, we are going to play there.

I think it's also going to be a lot about ensuring that we connect digitally, the entire supply chain. I think that is going to be key to come close to our customers and even closer to the customer needs, and we understand that. And the journey that we started a few years ago and the trends that we see that would, what we call "region for region". You need to have a manufacturing footprint so that you're fairly close to your customers in different regions, and that will be part of our journey going forward. So again, I need to ask for your patience, you will get a more comprehensive story from us in early February next year, but we do see a number of exciting opportunities for SKF going forward.

> The buzz word digitization will become a reality.

Q: What are currently the biggest challenges for manufacturing industries?

Short term is obvious, the challenge we foresee related to logistics, related to cost inflation, we have experience in raw materials, now its energy costs that are going up. Costs for logistics are extremely challenging and now we are starting to see the cost for labor is increasing across different regions. So, those tactical things, and our ability to actually deliver to our customers, it's something that we are wrestling with every day, but hopefully those are short term issues. Longer term, there are a few key things that we need to get right, one that I mentioned is to transform the footprint, so we have the right footprint in each region. And it's not just to build the manufacturing capacity in the different regions, but we need to build very robust supply chains in all regions, so you can source your entire supply chain in a robust and effective way in those regions that you plan to operate. This is a massive work that will be undertaken in the years to come from most industrial companies to rebuild some of those capacities.

Q: Do you foresee that the reshoring of manufacturing will speed up back in Europe, the US, or other regions?

Broadly across the board, but depending on your starting point, it might look a bit different. For us, we have a long history and a rather large footprint in Europe that also supports other regions, so for us, our European challenge will be rather how do we automate, and how do we consolidate our capacity in Europe. In other regions, such as Asia or North America, we focus partly on consolidation, but it's more about building new capacity to replace some of the capacity that is being sourced from Europe to be sourced more locally. The journey will look bit different depending on your starting point.

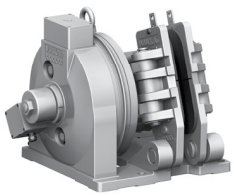
Q: New technological innovations are creating, more than ever before, fully integrated systems, with various benefits such as production automation, energy saving, and machine learning. How do you see this trend evolving in the coming years? How will this shape the future of manufacturing?

I do see that this will significantly change a traditional manufacturing company. Today, when you walk into a facility that has been upgraded to the latest technology it's a completely automated environment, highly robotized, it's hard to distinguish a traditional blue-collar job from a white-collar job. They blur because those colleagues of ours that man those production lines, are primarily monitoring the whole digital flow and also making adjustments, digital adjustment to the equipment, rather than working at the machines themselves. That's the starting point. Going forward, I think we are going to see much more sensors coming into this, we capture a lot of data, in the whole manufacturing footprint. How we leverage that data is going to be important for predictive maintenance, for quality enhancement, and so forth, that's going to be key.

Related to sustainability, traceability is going to be key over time. The end product needs to be marked so that you can fully understand and have an audit tract on the footprint (CO_2) of that component all the way from the steel that went into it how it was manufactured when it was manufactured, in what batch and so forth. Again, that is going to be one thing. And that whole thing I mentioned about remanufacturing is going to be bigger, how we are going to integrate some of those loops. Again, when we have sensors out with our customers, we should be able to, in a much smarter way, provide predictive maintenance, so we can do the re-manufacturing when they have their planned stops in their own production lines for their maintenance, so we can avoid un-planned stops or breaks in our customers production environment. So again, the buzz word digitization will become a reality, not just a buzz word. But truly how we use data, and integrate that through our value chains and in our production lines going forward will be important.

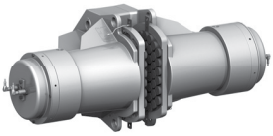
AN AERIAL VIEW CAN MAKE EVERYTHING LOOK SMALLER – **OR OUR SYSTEM SOLUTIONS EVEN BIGGER.**

FLUID COUPLINGS
Power rating up to
3.700 kW

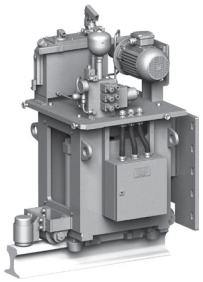


E-MAGNETIC BRAKES
Braking Torque up to
12.450 Nm

E-HYDRAULIC BRAKES
Braking torque up to
29.900 Nm



HYDRAULIC BRAKES
Braking torque up to
400.000 Nm



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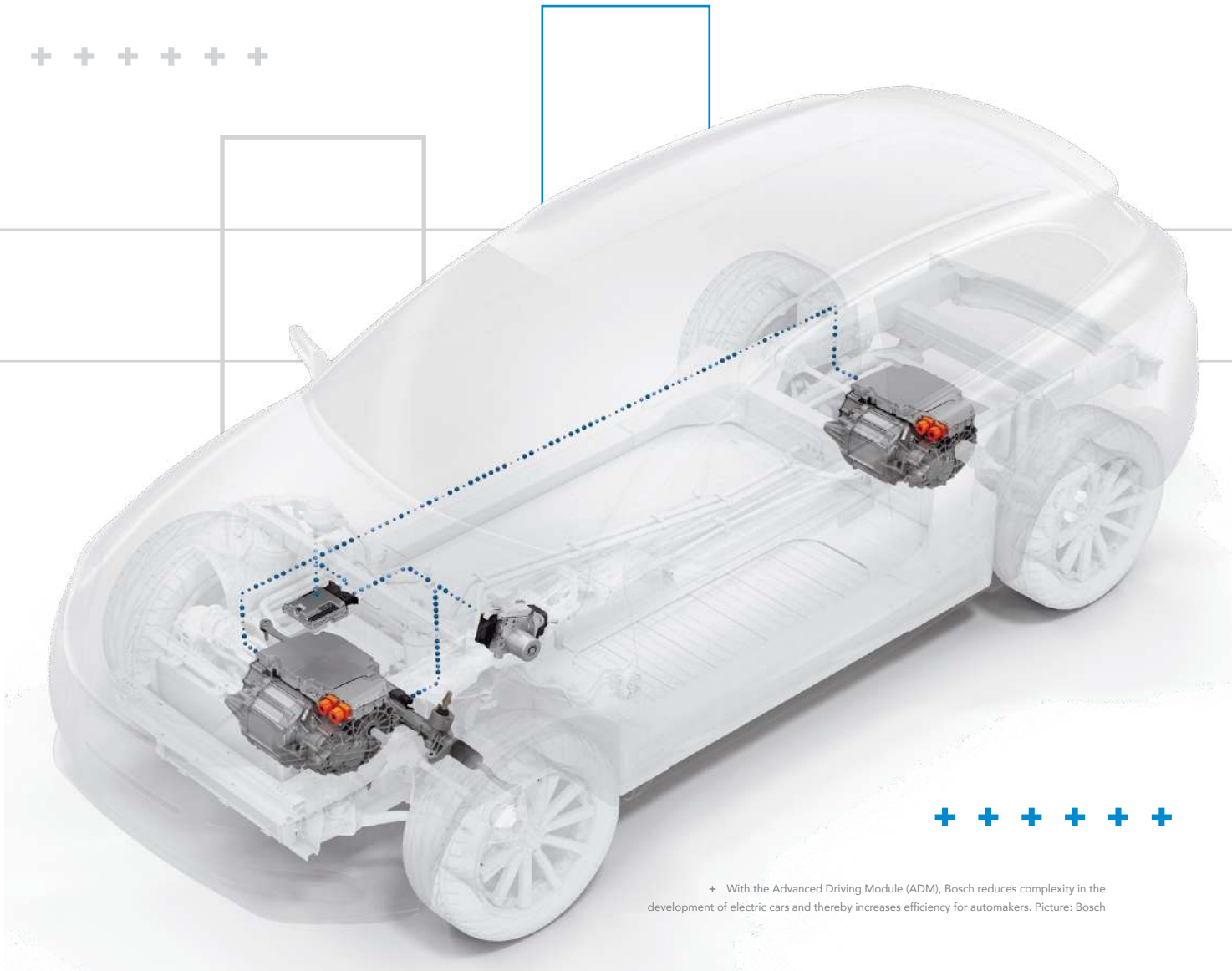
BOSCH at CES 2022: smart technology to make everyday life safe, convenient, and sustainable



+ With the Advanced Driving Module (ADM), Bosch reduces complexity in the development of electric cars and thereby increases efficiency for automakers. Picture: Bosch

A Bosch must-see

Bosch show car: The future of mobility is automated, connected, electrified, and personalized. In the future, more and more vehicles will be electrically powered. They will increasingly be connected with other road users and their surroundings, and provide personalized, cloud-based services for their occupants such as wrong-way driver alerts or road condition updates. The show car will demonstrate Bosch systems expertise and extensive know-how in software and hardware. For example, Bosch is developing central computers for the electronics architecture of the future. These vehicle computers will be used for assisted and automated driving, controlling vehicle motion, as well as for cockpit functions and body electronics. Over-the-air updates will keep cars' functions constantly up to date.

Virtual visor – the transparent digital sun visor: Conventional sun visors shield car drivers from dazzling light. But folding them down often also blocks significant areas of a driver's field of vision. Bosch has solved this problem with a new, transparent LCD solution that replaces opaque visors. The virtual visor is connected to the interior monitoring camera, which detects the position of the driver's eyes. Using AI-based intelligent algorithms, the virtual visor analyzes this information and darkens only the portion of the windshield through which the sun or other light sources would dazzle the driver. The rest remains transparent, leaving the driver's view of the road unobstructed.

SoundSee – intelligent ears for the ISS: Although barely bigger than a lunch box, Bosch's SoundSee is brimming with start-of-the-art artificial intelligence (AI). SoundSee can be found on the ISS (international space station). Installed on board Astrobee, NASA's autonomous free-flying robot, SoundSee's integrated microphones pick up ambient noise in space. Using AI, the Bosch technology then analyzes the audio data in order to detect potential anomalies and to flag areas requiring maintenance work. SoundSee was developed together with Astrobotic as part of a NASA research partnership.

Software-based solutions for the mobility of today and tomorrow

Solutions for the software-defined vehicle: Software is playing an increasingly central role in automotive engineering. After all, future connectivity, automation, and personalization functions will more than ever be brought about by software. Even now, Bosch annually puts more than 200 million control units running its proprietary software into vehicles worldwide. To achieve this, the company can draw on profound software, electronics, and systems expertise, and use this to develop application-specific vehicle software and the hardware to match for automotive applications of all kinds, from driver assistance and infotainment to the powertrain. Bosch plans to pool the development of application-independent basic software and middleware, as well as cloud-based software modules for over-the-air software updates, at its wholly owned subsidiary ETAS.

Advanced driving module – pre-integrated components for electric cars: To make the development of electric cars less complex, and thus improve efficiency for automakers, Bosch offers pre-integrated modules such as its ADM advanced driving module. The ADM combines powertrain, brakes, and steering to form an integrated unit that automakers can incorporate faster and more cost-effectively into their vehicles. In addition, simplified interfaces and a standard software architecture ensure the best possible communication between the components,and provide the basis for new features.

+ The Technician Process Assistant (TPA) helps technicians with improved accuracy and efficiency for service and repairs on the ever more complex vehicles of today. Picture: Bosch

TPA technician process assistant – a digital handyman: The TPA technician process assistant is part of a connected after-sales ecosystem in which humans and machines exchange data as needed to efficiently repair and maintain vehicles. The system, which is continuously learning and evolving, is a hands-free, platform-agnostic solution that works with tablet, PC, and wearables. With the help of AI, moreover, a knowledge base has been created on the basis of information taken from traditional servicing operations. If more expertise is needed, a connection can be set up between an expert and the "eyes and ears" of the technician working on the vehicle. This helps improve accuracy and efficiency when servicing and repairing today's ever more complex vehicles.

+ Nevonex helps farmers by providing the necessary expert knowledge in the form of digitalized services, and allows these third-party services to be used in all makes of agricultural machinery – for example, to automate machine settings or optimize crop-planting processes. Picture: Bosch

Nevonex – connecting agriculture: Agriculture currently faces the challenge of securing food production in a changing climate. Here, Nevonex can help farmers by providing the necessary expert knowledge in the form of digitalized services. Nevonex allows these third-party services to be used in all makes of agricultural machinery – for example, to automate machine settings or optimize crop-planting processes. Bosch's research here focuses on harnessing data from these processes to optimize subsequent process steps. The aim is to use edge computing to make robust, AI-based services available for farmers.

A breath of fresh air – Bosch solution for better urban air quality: To improve air quality in cities, at airports and train stations, and in business parks, Bosch offers innovative solutions that precisely record and simulate emissions. Bosch air-quality monitors provide precise readings for nitrogen oxides, particulates, humidity, and temperature – in other words, important information for gauging local air quality. The data is then uploaded to the cloud and evaluated. Knowing precisely what pollutants are in the air, where they are, and where they are spreading to allows countermeasures to be taken quickly, for better air at all times.

Smart solutions that improve convenience and security in the home

Bosch heating and cooling solutions for a perfect climate in the home: Thanks to state-of-the-art inverter technology, the highly efficient Climate 5000 3.0 ductless mini-split air-source heat-pump system offers ample heating and cooling capacity. This heat pump is suitable for most residential buildings due to its ability to heat efficiently, even in frigid outdoor temperatures. The Climate 5000 3.0 features improved energy efficiency and humidity control, creating a comfortable indoor climate. In addition, its built-in air filtration system purifies the air and reduces volatile organic compounds (VOCs) and other harmful gases and odors. Bosch is also launching the Inverter Ducted Split (IDS) Premium Connected heat-pump system on the market.
This solution offers high efficiency and particularly innovative connected features. Using a wireless internet connection and an IoT platform means that installers and homeowners can register it in the app. It also makes installation and troubleshooting easy. With the EasyAir app, installers and homeowners can access data remotely, allowing them to monitor energy consumption and appliance status.

Connected thermostats – smart and simple heating control: With its BCC50 and BCC100 connected thermostats, Bosch offers a simple and smart all-in-one control for heating, air-conditioning, and ventilation systems. Users can program their own heating and cooling schedules, for example. The controls are set directly on the thermostat, by using the Bosch Connected Control app, or by voice command.

Intelligent oven – cooking with a voice assistant: What temperature? Direct heat or steam? Finding the right setting can be tricky. But whether it's a quick supper or fine dining, an intelligent Bosch oven will do the trick. The voice assistant Alexa is standing by with advice, and will not only recommend the best oven setting, but also switch the oven on if required – all you have to do is ask.

Recipes inspired by a digital look inside the fridge: No idea what to eat? Fridge always full of leftovers? That's now a thing of the past. Now food can be entered into a digital fridge inventory – manually, by synchronizing with the Home Connect shopping list, or via a camera in the fridge. The Home Connect app will then know exactly what's in the fridge and provide recipe ideas based on the provisions available. A surefire recipe for new ways to treat your taste buds, as well as for less food waste.

Bosch Cookit – all-around culinary talent: Cookit offers a whole new dimension of flexibility in the kitchen. Whether guided cooking, automatic programs, or manual cooking, the multifunctional food processor with cooking function has the right level of support for everyone. And now it has become even more flexible: the new "My Recipe" function allows Cookit to save personal recipes. The recipe, with all ingredients, quantities, temperatures, and special tips, is entered in the Home Connect app, which then relays it to the Cookit. The food processor with cooking function will then guide the user through the preparation steps as often as required.

Spexor – protecting what you love: This mobile security assistant is an intelligent all-in-one appliance that provides constant, ubiquitous protection. It detects break-ins and hazardous gases, measures room-air quality, and sounds the alarm if it gets too hot or too cold. If spexor's integrated sensors detect anomalies in the monitored environment, it sends a notification straight to the user's smartphone. The multisensor appliance is wireless and can be used wherever there is at least a cellular connection.

Bosch sensors – unshakeable, untiring, and incredibly flexible

BME688 – monitors air quality and protects forests: Whether at home, in the office, or outdoors – to satisfy the need for clean air, Bosch Sensortec has developed the BME688. This innovative MEMS sensor is the world's most compact four-in-one air-quality sensor featuring artificial intelligence, and is capable of measuring gas, humidity, temperature, and atmospheric pressure simultaneously. It is suitable for a range of applications, such as sending a warning when foodstuffs expire or the early detection of forest fires. In collaboration with Dryad Networks, BME688 sensors have been combined with an IoT network to detect forest fires early. Fewer forest fires mean significantly lower CO2 emissions. In this way, Bosch is helping to mitigate global warming.

BHI260AP – revolutionizing fitness tracking: Squats, sit-ups, kettlebell training: the list of fitness exercises is nearly endless. However, many fitness trackers and smart watches can track only a limited number of activities, and the variety of apparatus types as well as users' different movement styles, physiques, and fitness levels mean that they cannot always reliably recognize the exercises being done. To solve this problem, Bosch Sensortec has developed the BHI260AP – a novel, self-learning motion sensor that gives wearables and hearables artificial intelligence. The sensor recognizes and responds automatically to many different movements and can learn any new fitness activity based on regularly repeated routines.

BMP384 – resistant to water, chemicals, and dust: Wearables, home appliances, and industrial applications often have to cope with tough conditions. Up to now, however, many barometric pressure sensors have not been very robust or resistant to fluids, and therefore could not always be installed in watertight products. With Bosch Sensortec's BMP384, it's a different story. This barometric pressure sensor is as compact as it is robust. At CES, Bosch Sensortec is also debuting a new ultra-precise pressure sensor that can also be used for indoor navigation and location.

Bosch IoT solutions for the connected city and for more data security

From a single source – application store for video analytic apps: The world's first open application store for video analytics apps allows surveillance cameras to be flexibly equipped with new AI-assisted functions. In just a few minutes, applications for detecting things such as face masks, smoke, fire, and flooding or for evaluating flows of traffic and visitors can be installed on compatible cameras. Developed by the Bosch subsidiary Azena, more than 100 apps are already available for more than 40 use cases – with new ones joining them every month.

Smart video cameras for greater road safety: Thanks to a new deep-learning video analytic software, the new Inteox cameras with object classification can be used in areas such as traffic monitoring. Even in heavy traffic, they can recognize precise details of vehicles faster. AI helps to detect unforeseen, undesired, or future situations more quickly, more intuitively, and more reliably.

Using artificial intelligence to ward off hackers: The Bosch AI shield is a security product featuring artificial intelligence. It protects against external attacks by AI-assisted systems. One way it provides this protection is through a vulnerability analysis. The solution comprises an SaaS (software as a service) tool and user interface, and has been designed so that developers can use and scale it for a variety of applications. The AI model in the appliances or the cloud protects IP, brands, and investments, and in this way creates trust in digitalization.

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Performance for a longer life.

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New Spherical Roller Bearing Units
& New Stainless Ball Bearing Units
with innovative new designs
from JAPAN

ZEN™ Launches its New AISI 420 Stainless Steel AC+ Bearings, a New Eco-Friendly, Food-Grade, Anti-Rust Coated Range, for the Food & Beverage Industry.

ZEN continues to bolster its strong international reputation with the announcement of its echo-friendly, food-grade, anti-rust coated bearings, AISI 420 Stainless Steel AC+. Currently applied within the food and beverage industry, the new FDA certified, corrosion resistant bearings, vastly outperform stainless steel bearings and improve cost efficiency. Downloadable testing results are available.

Headquartered in Dusseldorf, Germany, The ZEN Group, led by Yago Zens, is the largest manufacturer of stainless-steel bearings in the world. The group maintains global recognition for quality standards, earning them the ISO 9001 certification; the highest standard achievable for quality management in their industry. Today, ZEN continues their dedication to quality achievements, unveiling a safe and effective coating for stainless steel bearings.

ZEN's corrosion resistant coated bearing design for food-grade safety standards, is non-toxic and environmentally friendly, making it multi-dimensional in its usage. Importantly, salt spray testing performed to DIN standards, indicate that the advanced RoHS compliant bearings last twice as long as standard stainless-steel bearings, improving cost efficiency by reducing the expense of bearing replacement and downtime.

While the application is currently being used to improve stainless steel insert, and pop bearings within the food and beverage industry, all industry applications that require enhanced corrosion resistance can benefit from ZEN's advanced products. Simultaneously, the launch coincides with a global incentive to implement echo-friendly solutions aimed at protecting the environment.

The ZEN group is currently shipping direct from their manufacturing facilities in China to customers throughout the world. Outside of the EU, product is being shipped non-stop from China to; the U.S., Canada, India, Australia, Mexico, Brazil, and Korea. The strategy has created vast price advantages for global customers, while simultaneously shortening lead times. With 48 official sell points, ZEN has developed the capability to ship to any location on Earth and plans to expand its resources further.

+ AISI 420 stainless steel AC+ after 120h of salt spray test.

+ AISI 420 & AISI 440 Stainless Steel after 120h of salt spray test.

ZEN FOOD AND BEVERAGE SAFE

Comparing Stainless Bearings to Stainless Bearings with the new AC+ surface treatment

In environments like the food and beverage industry where bearings have to withstand constant washing with high-pressure water or chemicals, avoiding corrosion is decisive. This condition is one of the most common causes of bearing failure and in severe cases, can cause early fatigue failures.

Thinking carefully about the requirements of our intended application and making the correct decision when choosing lubrication, sealing and bearing materials, will help us to prevent corrosion and therefore, to increase productivity, to prevent unplanned downtime and lower the total costs of operations.

As regards the choice of bearing materials, although stainless steel is really effective in preventing corrosion, for high demand industries like food and beverage is, going one step further to prevent corrosion is necessary. With this in mind, the ZEN Group has launched a new range of FDA and RoHS compliant corrosion-resistant coated bearing within its beverage and food safe bearing product line.

According to Yago Zens, who has been the CEO of ZEN Bearings for over 20 years, the salt spray test is one of the most recognized and efficient methods for the evaluation of the corrosion resistance of bearings materials, this being the one, they perform at the ZEN Quality Control Centre in orderto give the best advice to its customers.

To test and show us the corrosion resistance of these bearings, Mr Yago Zens exposed three samples of different types of stainless steel bearings to a 120 hours salt spray test including the new AISI 420 AC+.

The three samples tested were as follows:
A = AISI 420 stainless steel.
B = AISI 420 stainless steel AC+
C = AISI 440 stainless steel.

The Salt Spray Test is an accelerated corrosion test that produces a corrosive attack on the tested samples to predict their corrosion resistance.

The appearance of corrosion products (oxides) is evaluated after a period of time. Test duration depends on the corrosion resistance of the material the more corrosion resistant the material is, the longer the period in testing without showing signs of corrosion.The standard testing period for ball bearings is 120 hours. As we can see, after 120 hours of testing, the AISI 420 stainless steel AC+ has remained virtually untouched by corrosion. There is no rust mark on the inner and outer ring of the bearing, only some rust spots on the oil groove.

So, although stainless steel has excellent anti-corrosion properties, them can vary in each of its grades. For this reason, to count on the advice of experts that can assure us the quality and features of their bearings, as the ZEN Bearings team does, is a key factor when achieving the best performance on the final products.

Founded in 1993 the ZEN Group, is a manufacturer of bearings according to German DIN quality standards for a wide range of industrial applications. From their three production plants in China, their products are distributed globally through their strong distribution network.

Quality is what defines them better. It is a mindset for all members of their team and it's integrated through each step of their manufacturing process, from the sourcing of their raw materials right through to the aftercare once the product has been delivered.

Its ISO 9001 certified quality control centre is a key piece in this process. This facility covers more than 5.000 squares meters, featuring state-of-the-art testing equipment and a great team of highly-qualified inspectors who are working every day to ensure a high level of quality.

If you want to know more about the test results, they are available to download on our web. Also, if you have any further questions the ZEN team would be happy to hear from you at sales.uk@zen.biz.

For more information about the ZEN Group visit www.zen.biz.

	12H	24H	48H
AISI 420 stainless steel AC+			

	12H	24H	48H
AISI 420			

	12H	24H	48H
AISI 440			

Salt Spray Test report for ZEN Food & Beverage Safe (FBS) Bearings

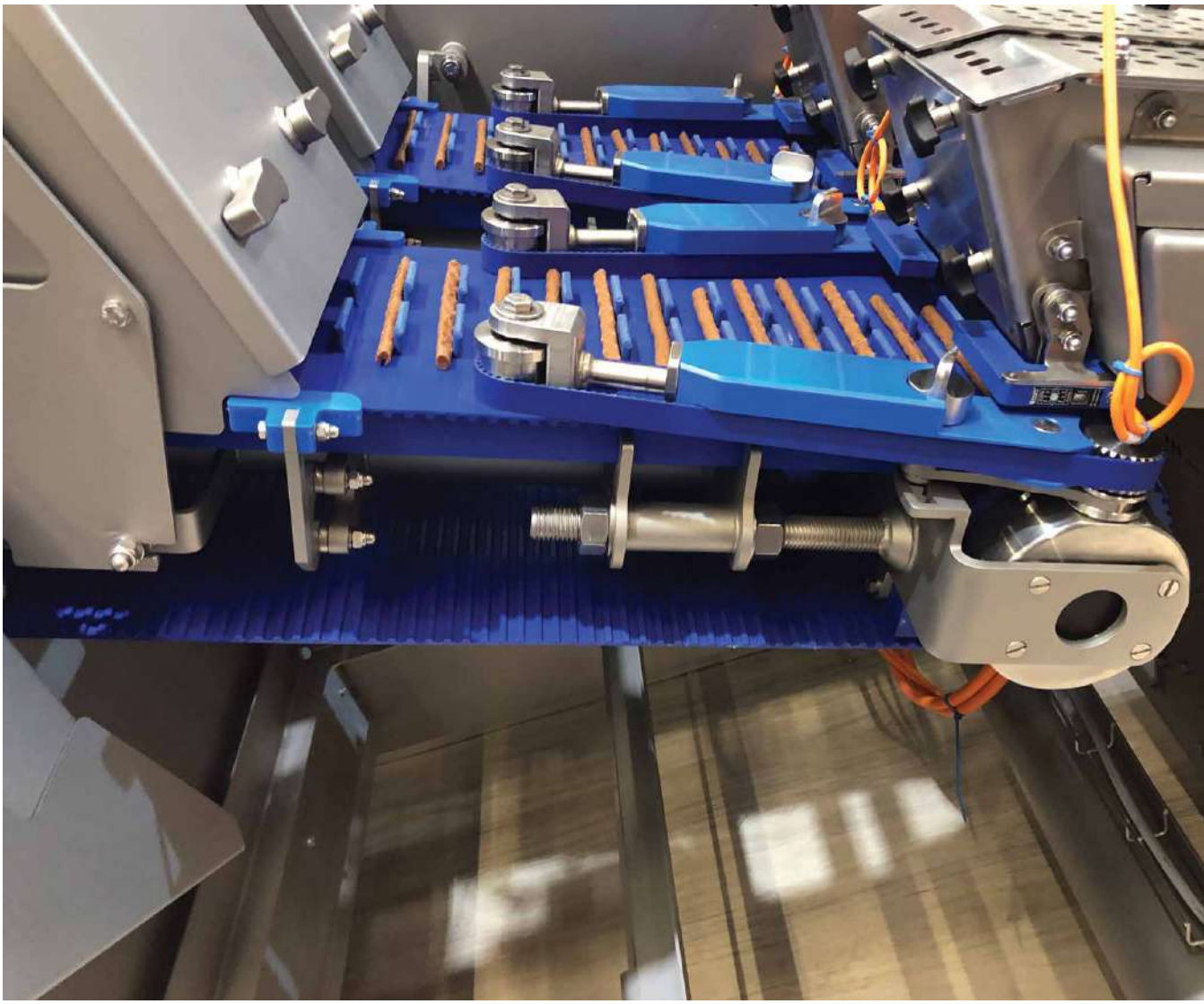
Criteria	GB/T 10125-1997
Sample solution	50g / l±5g / l NaCl
Application temperature	(35±2) °C
Ph	6.5~7.2
Spray volume	1~2ml / 80cm² / h
Test Duration	120 hours

Sample	Ref	Result
Bearing	AISI 420 stainless steel AC+	**No rust mark on the inner and outer ring, only some rust spots on the oil groove**
	AISI 420	**Traces of rust on the inner and outer rings**
	AISI 440	**The inner and outer rings have serious rust marks**

72H	96H	120H
		

72H	96H	120H
		

72H	96H	120H
		



+ Precise synchronization with the highest hygienic standard

– HabaSYNC®
Timing Belts from Habasit:
Hygiene all along the line for the food industry

habasit

All industrial conveying applications demand high productivity, efficiency and reliability. Many require exact product placement. But the food industry faces an extra challenge: how to achieve this while meeting increasingly strict hygiene regulations on food contact surfaces (often also extended to food packaging lines).

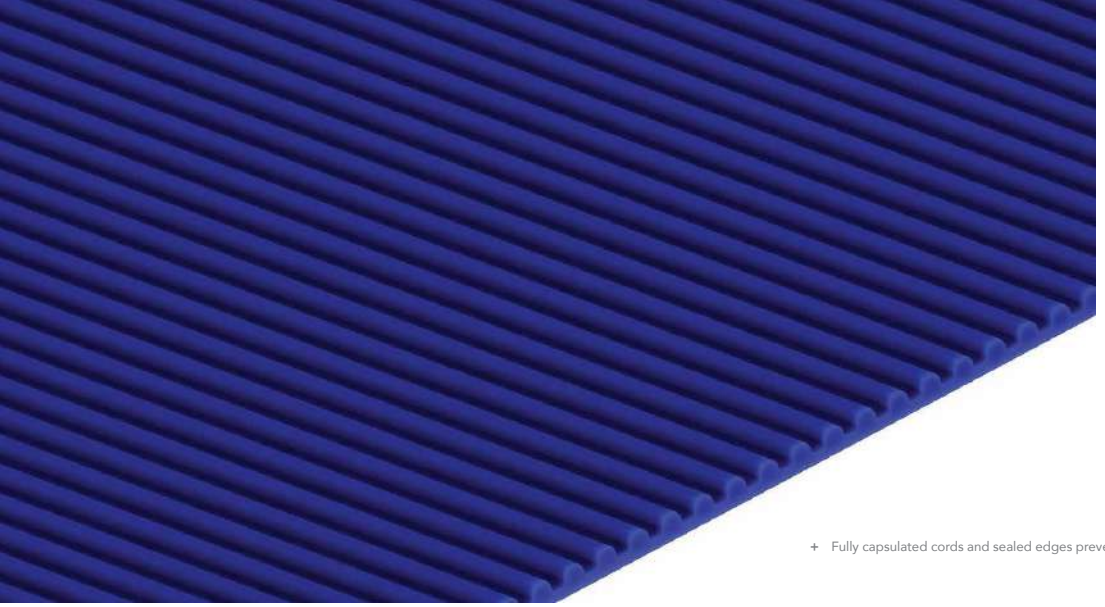
Perfect hygiene, fast and easy sanitation

One of the toughest challenges impacting food lines is ensuring they are truly clean. Any crevices or exposed cords are potential microbial growth areas. Habasit's food industry timing belt range includes belts with sealed edges and closed flights that fully encapsulate their aramid or stainless steel cords, eliminating water ingress and bacterial contamination to deliver perfect hygiene. All our food-safe HabaSYNC® timing belts comply with FDA and EU regulations, and withstand regular sanitation by scrapers, brushes, hot water, steam, and normal cleaning chemicals.

Not only do our belts offer fast and easy sanitation, they also deliver high productivity and efficiency; reduced waste; long service-life; and no elongation, for lower maintenance and downtimes. The range includes open-end, endless flex, wide, and cast timing belts, with customization just a consultation away.

Tailored solutions for food and beverage conveying and processing

Belting is available for many areas, from meat and poultry to fish and seafood, fruit and vegetables, beverages, bakery, and confectionary. As each has its particular challenges, our solutions come equipped with corresponding features, like resistance to hydrolysis, heat, oil, fat, and chemicals; good flexibility at low temperatures; antimicrobial qualities; easy-clean properties, and minimized sanitation and cleaning times, saving water and other costs.



+ Fully capsulated cords and sealed edges prevent contamination and microbial growth

Unique belt features for perfect hygiene during automated production

HabaSYNC food grade timing belts are available in several color options: transparent, blue, and the first ever black polyurethane belt for food conveying, which is fully compatible with inspection cameras. Our solutions are essential components of any automated production, inspection, or packaging lines.

To reduce friction and protect pulleys against wear at high speed, Habasit's foodgrade, white polyester fabric for the belt tooth side offers a unique solution that improves the performance and longevity of conveyors.

For applications involving wet foods or humidity that need high hydrolysis resistance, Habasit uniquely offers polyether-polyurethane belts. This is just one option among several for applications where water, cleaning chemicals and high temperatures pose challenges.

Widest timing belts available

HabaSYNC food-approved 600 mm wide timing belts are four times wider than other open-end belts on the market. These homogenous, monolithic belts are impervious to water and bacteria, so can be 100% sanitized. Long available in T10 and H pitches, our new 5M pitch wide timing belts with closed flights offer a unique solution for very compact belt conveyors. Equally distributed tensile members strengthen the belts and prevent elongation.

Why would you need such a wide belt? Just ask the pizza producer seeking a high productivity, food-safe solution delivering accurate positioning and processing on a compact conveyor system with small pulleys. And all this on a fully sealed belt with superior chemical and water resistance, ensuring a longer belt lifetime.

If you need a wide timing belt with a pitch other than T10, H, or 5M, we offer clean, homogenous, longitudinally joined narrower belts for most common pitches, theoretically up to any width.

Extensive customization options – including unique hole option

Food processing applications often require special features, ranging from holes and slots, to false teeth and cleats. Uniquely, HabaSYNC flex timing belts can be fabricated so that holes can be made without cutting any cords.

To ensure we meet every need, our fabrication capabilities include over 30 foodapproved covers with different surface structures and properties, e.g. to reduce or increase friction, deliver different damping properties, or support good release.

Food-safe welded cleats are another option, available in every shape and size. For example, we created cleats with specially rounded tips (using injection molding) for a sausage producer, to avoid sharp cleat edges damaging sausage skins during processing.

Contact us

Habasit has the right solution for every conveying and positioning task in numerous industries. Our portfolio of food industry solutions offers a one-stop-shop for timing belts, fabric belts, plastic modular belts and beyond, plus services from advice to onsite installation.

Check out our online catalogue:
www.habasit.com/en/Download-center

HAPPY 2023

Yes, we are not mistaken. Of cource we wish you a fantastic 2022! But we also look ahead to support your business in the years to come.

Are you ready to transform your company, and to catch the New opportunities?

- Company Acquisitions
- Partnerships Joint-Ventures
- Company Sales
- Company Restructuring
- IPO
- Financial & Legal Due Diligence
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+ Fast, efficient and comprehensive evaluation of analogue and digital data by the intelligent PLC in the NORD drive technology forms the basis for condition monitoring and predictive maintenance. Image: NORD DRIVESYSTEMS

– Digitalisation in drive technology:

Customer added value from drive dataSaving Transmission Belt System

How intelligent drives from NORD DRIVESYSTEMS improve availability

+ + + + + +

Predictive maintenance is the systematic continuation of condition maintenance with the aim of proactively maintaining machinery and equipment and detecting changes, reducing downtimes and increasing the efficiency of the entire plant. A status-oriented maintenance replaces the traditional time-based maintenance.

Especially for drive systems in demanding production environments where industrial gear unit installations are usually used in sensitive applications and their failure can cause severe damage, for example in intralogistics, the food industry or the heavy duty sector, condition monitoring supplements the triad of gear unit, electric motor and frequency inverter with improved safety and reliability. This is where condition monitoring for predictive maintenance comes into play: Based on intelligent algorithms and software in an IIoT environment, the networked drive units can collect their condition data in the inverter's own PLC and pre-process it together with data of connected sensors and actuators. The result of the pre-processing or the complete data can be optionally transmitted to an edge device. There, data of all subsystems is managed and evaluated. It is then available as pre-selected and edited smart data for further use and clear visualisation.

Data analysis instead of just data reading

A concrete application example is the sensorless determination of the optimum oil change time based on the oil temperature. This is based on the fact that the oil temperature is a key factor for oil ageing in gear units. This information in combination with available gear unit parameters and specific operational parameters make it possible to precisely calculate the oil change time. A physical temperature sensor is not required. The pre-processing of drive data takes place in the NORD frequency inverter's integrated PLC that is used as an evaluation unit. The customer can access the calculated data via all common interfaces.

The right PLC software architecture for each solution

The drive equipment can be optionally extended and adjusted to the respective automation task. Customers can select what tasks (drive monitoring, drive control, process control) they want to directly shift into the drive. In smaller production areas, this scalability offers the possibility to gain first experiences before reorganising the plant. There are three configuration levels available. At the first level, the drive unit PLC only performs the drive monitoring. The drive parameters are pre-processed in the PLC and communicated to the higher level control system that is responsible for drive and process control. At the medium level, the PLC integrates the drive control and also runs drive-related functions. At the higher configuration level, the inverter PLC completely replaces the higher level control system. Apart from the communication to a control unit, a local data management without internet connection can optionally apply the data.

+ NSK's Life-Lube® bearing units are ideal for many food plant applications, including cutting lines. Photo: alterfalter/Shutterstock

NSK Life-Lube® bearings drive cost-saving improvements in food plants

NSK's Life-Lube® bearing units are proving increasingly popular in the food and beverage industry, and with good reason. These advanced bearings combine the corrosion-resistant properties of Silver-Lube® housings with the excellent sealing and lubricating properties of Molded-Oil inserts. Life-Lube® units are specifically for use in sectors where contact with water and process fluids is unavoidable, and where excellent chemical resistance and long lubrication life are primary requirements. By taking advantage of the benefits available, food and beverage plants can tap into considerable savings from reduced downtime and maintenance costs.

Astute design engineering means Life-Lube® bearing units (comprising a housing and bearing insert) are adept at withstanding the often harsh operating conditions of food and beverage plants, while simultaneously preventing any contamination of the processing environment to meet strict hygiene regulations.

Corrosion resistance

Primary among the design considerations is the unit's housing material: thermoplastic polyester (PBT), which is highly resistant to corrosion. In conjunction with Molded-Oil bearing inserts and nitrile rubber seals, this design guarantees good chemical resistance and long service life.

In particular, the polymer housing not only eliminates any risk of contamination from painted or coated surfaces, but its smooth finish prevents dirt adhesion and reduces wash-down time. Complementing the housing is the stainless steel insert, which delivers improved corrosion resistance for wet environments. Moreover, the Molded-Oil insert cavity contains a lifetime of lubricating oil and polyolefin resin that means no re-lubrication is required for the lifetime of the product.

Another important feature for the food and beverage industry is the flinger seal, which prevents the ingress of bacteria and protects the Molded-Oil filled cavity. There is also no potential for lubricant leaks.

+ A cutaway section of an NSK's Life-Lube® bearing unit, showing the stainless steel insert and Molded-Oil lubrication. Photo: NSK

Bacteria-free

NSK has taken great care to ensure the design of its Life-Lube® bearing units are free of crevices and 'bug traps' that could harbour mould or bacteria. As a result, the bearings are ideal for food manufacturing environments that involve dust (dry or wet), water (spray or submerged) and wet abrasive contamination, as well as temperatures up to 80°C. Life-Lube® bearing units are also suitable for use in some starch-based environments, as well as those involving low temperatures, down to -18°C.

The suitability of Life-Lube® bearing units for food applications is vast, encompassing tasks that include primary (cutting and mixing), secondary (moulding), conveying, inspection, heating and packaging processes, while beverage applications include bottle moulding, filling, sealing, inspection and packing. In these operating environments, Life-Lube® will resist excessive moisture, washdown chemicals and contamination, all while operating at continuous high speeds if required. The speed factor is maximal dn = 12 x 104 (dn =bore diameter in mm x speed in rpm).

Substantial savings

A major snack food producer is among those now taking advantage of Life-Lube® bearing units. Previously, the company was experiencing frequent bearing failures on its cutter line, so it requested the assistance of NSK to help reveal the root cause.

NSK analysed the failed bearings and reviewed the application as part of its AIP Added Value Programme. By following a process map survey of the site, it was evident that extensive grease washout had been taking place following production line washdowns. To help keep the line running and avoid costly unplanned downtime, the plant was replacing the bearings every six weeks as part of preventative planned maintenance, but failures would often occur beforehand.

NSK engineers recommended replacing the existing bearings with Life-Lube® housed units, commencing a trial on one production line. One year later, the units were still performing well with no failures, delivering substantial annual cost savings in maintenance labour, replacement bearings and lost production time. Due to this success, the food plant is currently adopting Life-Lube® bearing units on its two other production lines.

Today, the plant enjoys many other benefits of Life-Lube® bearing units, which include a spherical housing seat and spherical outer ring that allows for any initial *misalignment on mounting, and the availability of various locking methods as standard to ensure close-fit shaft mounting. In addition, quiet and efficient running comes courtesy of super-finished raceways.*

This success story is one of an increasing number across the food and beverage industry, where plants are discovering that the combination of thermoplastic housing, special nitrile rubber seals, stainless-steel bearing material and Molded-Oil lubricant makes the Life-Lube® range ideal for wet and/or contaminated environments.

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"Clean Metal" takes lubrication-free plain bearings to the next level. Copper alloy is sintered onto a steel back and impregnated with fluorine-based polymer to achieve a low coefficient of friction. Despite its simple structure, various materials with focus on low friction, high load or fast rotation are available and can be selected according to desired application. Clean Metal is compliant with recent environmental regulations and contributes to a sustainable future.

IATF 16949
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RoHS RoHS2 ELV

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We support the sustainable development goals “Responsibility Consumption and Production” and “Climate Action” recommended by the United Nations.

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Simple Exchange of **Gearbox Data with REXS**

The new version 1.4 of the REXS standard creates a common, comprehensive, and open description for gearbox structures.

In modern gearbox development processes, many tasks have been digitalized using simulation tools. This leads to gearbox models being created in many different software applications. Although these tools work with the same data (number of teeth, center distance, etc.), they are generally not compatible with each other. The result: time-consuming manual data entry and a high risk of running simulations with outdated data.

> REXS 1.4 creates a common, comprehensive, and open description for transmission structures.
>
> ***Dr. Moritz Keuthen**, Head of Modeling and Simulation at FVA GmbH*

The Reusable Engineering EXchange Standard (REXS) offers a solution to these problems. REXS is a freely accessible parametric data model which enables all involved tools to exchange data. Models no longer need to be generated in each of the individual tools, which minimizes both data exchange errors and the amount of effort required for creating models in the various CAE tools.

REXS 1.4 was published on 1 November, 2021. This new version supports the exchange of additional model data between programs, making it possible to represent new component types and create automatic workflows across various simulation tools. REXS 1.4 is an important step toward independence from manufacturer-specific data formats.

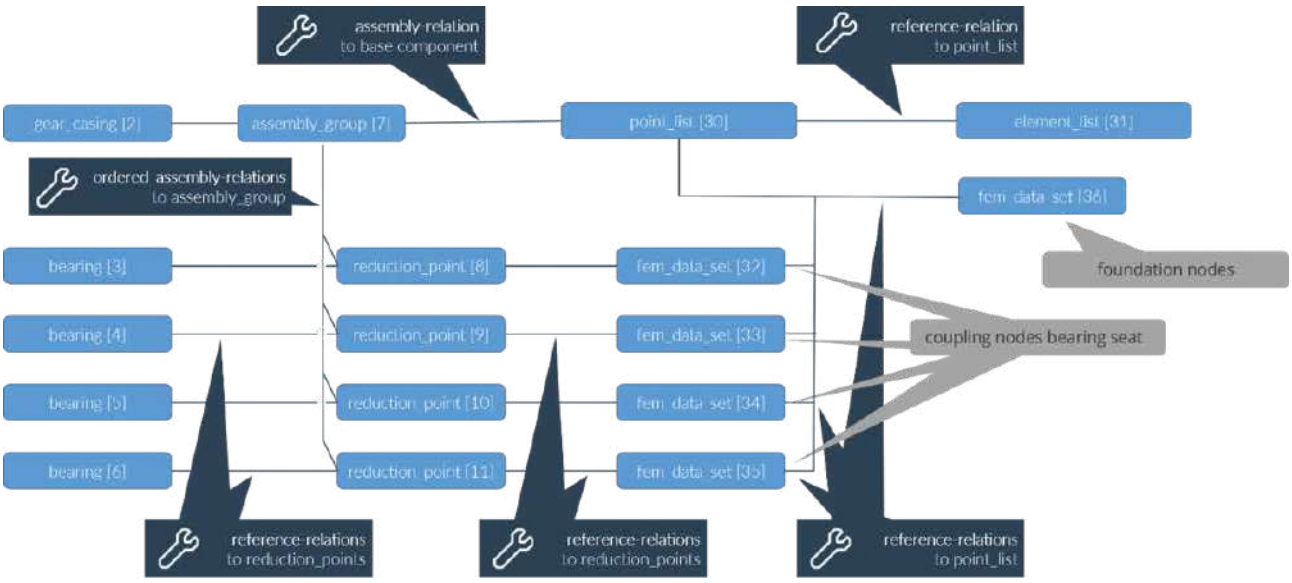
The release includes the following new functions:

- Generic representation of point clouds for FE mesh modeling
- Modeling of the geometry and load carrying capacity of shaft-hub connections
- Introduction of a component which enables the analysis of load carrying capacity according to FKM for various machine elements
- Base64 encoding option

The REXS standard - gearbox development's digital twin

The standard REXS interface has been developed since 2017 on behalf of FVA (Forschungsvereinigung Antriebstechnik e.V., the Research Association for Drive Technology) under the CC-BY-SA-4.0 license. Leading research institutes such as TU Dresden IMM, RWTH Aachen WZL, and TU Munich FZG, as well as leading drive technology companies such as Schaeffler AG and ZF, are involved in the development. REXS has been developed with the common goal of exchanging and enriching data along the value chain to create a complete digital twin of a drive.

> REXS is a real step toward new business models based on digital services, and can be used as a standardized data container for digital twins.
>
> ***Stephan Evert,*** *Head of Bearing Analysis Tools Development in the R&D Bearing division of Schaeffler Technologies AG & Co KG*



+ Figure 1: Modeling of FE meshes independent of proprietary interfaces

What's new in REXS 1.4?

Generic representation of point clouds

One of the most important new developments is the generic representation of point clouds. One possible use case for point clouds is FE meshes. FE meshes typically consist of node points and an allocation of which nodes are connected to each other.

In REXS, FE nodes are represented by a point list, and the element structure is represented by an element list. The point list includes the unique ID's and coordinates of the nodes. The FE element types (e.g., 20 node hex element), the element structure, and the element IDs are stored in the element list.

The modeling approach differentiates between the points, element structures, and the data (e.g.,stresses). This differentiation makes it possible to represent a variety of data on the same mesh.

Other use cases for the new structures include transferring tooth geometries, 3D load distributions of various gears, and tooth root data.

Description of shaft-hub connections

REXS has also been extended to include the general description of shaft-hub connections. The main focus is on geometric descriptions and defining standard load capacity attributes.

The following methods are available:

Machine element	Geometry	Load carrying capacity
Interference fits	-	DIN 7190, DIN 743
Feather key connections	DIN 6885	DIN 6892, DIN 743
Involute splines	DIN 5480	-

+ Table 1: Available descriptions for shaft-hub connections

Load capacity analysis according to FKM The FKM

Guideline includes verification of structural durability according to the current state of research. In contrast to DIN 743, the FKM Guideline can be used for any component, and with nominal or locally-solved stresses. Modeling in REXS is performed using a so-called FKM evaluation point, which is associated with existing components via an assembly relation. Components can be associated with notches, shaft-hub connections, and FE assemblies.

BASE64 encoding

BASE64 encoding has become the standard for efficiently transporting large amounts of data. Libraries for encoding and decoding are available for various programming languages. As of version 1.4, REXS can encode Base64 data. This can reduce file size by up to 75% and write and read times by up to 80%.

REXS in commercial and in-house software tools

REXS is already used by a large number of CAE tools.

The FVA-Workbench simulation software supports import and export of all REXS versions. With the release of the FVA-Workbench version 7.0, REXS 1.4 is also supported.

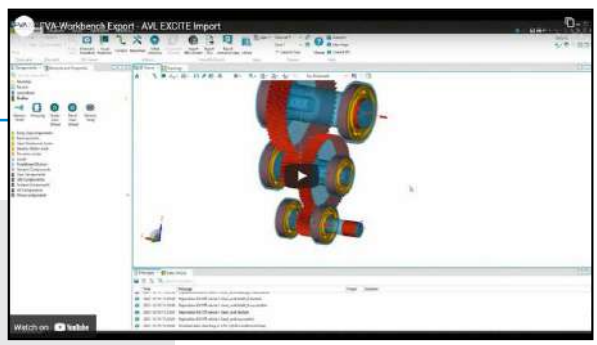
> With REXS 1.4, the FVA-Workbench is a data donor for digital twins in drive system development.
>
> ***Norbert Haefke,*** *Managing Director of FVA GmbH*

The REXS interface is not only used in commercial calculation programs. Drive manufacturers such as ZF Friedrichshafen AG are also basing their in-house calculation landscape on the open standard for automated calculations.

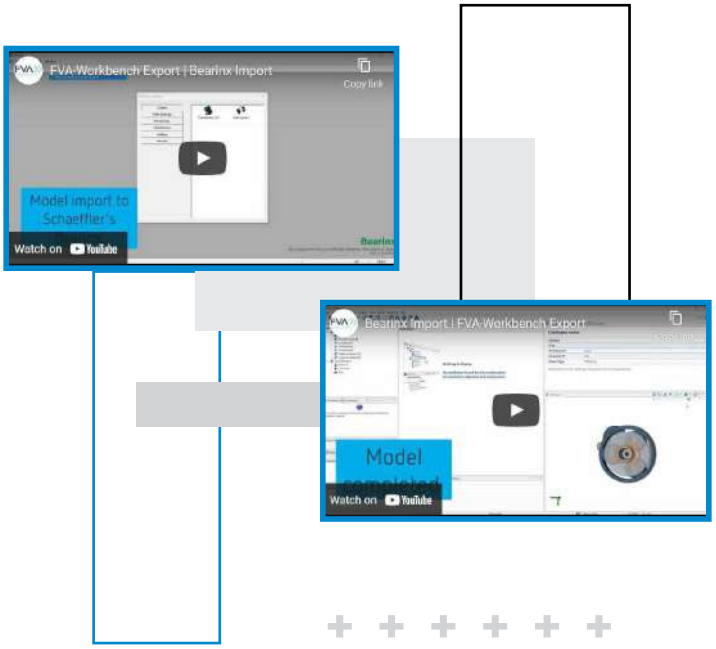
> REXS enables us to uniformly describe and process drivetrains and components from multiple internal tools. This also creates synergies for us; for example, with the FVA-Workbench.
>
> ***Klemens Humm,*** *Head of Gear Development, ZF Friedrichshafen AG*

Exchanging data between software tools

The following videos are impressive demonstrations of how the standard can be used to exchange gear data between calculation programs. All geometric data is included when transferring data between the FVA-Workbench and AVL EXCITE™. Calculations can continue directly in the new program without specifying the same data over again.



The requirements of the rolling bearing manufacturer Schaeffler AG played a decisive role in shaping REXS. Furthermore, Schaeffler's internal calculation software Bearinx also supports REXS as a data interface. REXS enables the simple exchange of Schaeffler models with customers for further processing in Bearinx.



For a simple introduction to REXS, sample datasets for version 1.4 are available at www.rexs.info. The free tool can also be used to validate exported datasets. This is an easy way to verify conformity with the specification and ensure that the REXS files can also be used in other programs.

Key takeaways:

- With the release of version 1.4, REXS creates a comprehensive data model for almost all gearbox development processes.
- The geometry and load capacity of shaft-hub connections can now be modeled.
- With generic point clouds, FE meshes can now also be transferred in the REXS data format.
- With the new option to encode interface files using Base64, large arrays and matrices can be transferred quickly and easily in accordance with the specification.
- The industry-driven development process ensures that new use cases for REXS are always represented.

Lean Accounting for the Industry

The companies that have embraced the lean manufacturing approach to cancel the "muda" and maximize the value of their business processes have also the task of creating a Lean Management System, different from the traditional reporting system, built in a proper version to measure and address improvements in order to guide the company towards financial and economic success.

The creation of value for the customer, at the basis of lean concepts, leads to a growth in turnover; the improvement of the resource's productivity (technological, financial and human), leads to cost reduction. The combination for these two factors generates an increase in profits as the Lean System matures. **It is therefore necessary to develop an adequate management system that is able to incentivize the creation and maintenance of flow, continuous improvement, problem solving and value creation.**

The traditional management system

In many manufacturing companies, standard costs are still the main source of information tor analyze operational processes and take decisions. However this type of information is dangerous for lean companies because standard costs work well in the environment in which they are conceived, that is, mass production. For this reason, one of the first objectives of a lean management system is precisely to eliminate standard costs from all decision-making processes.

In lean systems we rely on performance measurement systems and visual signals to manage and control operational flows and little reliance is placed on ERP (Enterprise Resources Planning, that is corporate information system). In fact the ESP systems are typically designed for traditional production processes, including the need of several useless registrations which will generate useless information and reports, all of which can be classified as sources of waste. For example, think of the operational efficiency measurements (OEE, **Overall Equipment Effectiveness**) of each manufacturing process machine, based on the **push** concept that each of them must be on – i.e. they must produce - for as long as the company is open. In a value stream approach, however, we realize that is not necessary to measure this efficiency for each machine but only for the **value stream bottleneck** and, eventually, for the very few critical machines.

A traditional company measures the waste elimination in terms of manpower hours saved: multiplying the hourly cost of labor by the hours of labor saved, the savings generated by the improvement intervention are obtained. In this way, it is often claimed that savings have been made, even if, in fact, the manpower is not really reduced and the costs actually incurred by the company do not change because the relative fractional savings will turn into new forms of waste. What is missing in this vision is the "flow's focus", that is the main step to reach the real productivity improvements.

For most of traditional manufacturing companies the value of inventories is calculated though standard costs: they are in turn determined by keeping the rates updated, allocating all production costs to the product and constantly comparing the current cost with the standard one, then analyzing the unavoidable variances and trying to explain their causes and to set corrective actions to correct such differences. Sales prices are also determined on the basis of such standard costs.

In a traditional system, corporate economic-financial measurements are based on comparing the current trend with the budget: a monthly expenditure budget is created, current expenditure is measured against the budget and the differences are explained. This leads to think the factory as cost centers having the ultimate aim of reducing costs as much as possible.

The measurement of deviations respect to planning is based on the ability to absorb fixed costs and on the analysis of variances. In the production reporting system the operational standards of performance - which include bill of materials, work cycles, labor cost and fixed costs – are defined. The actual production and use of resources reporting generates a series of variances with respect to standards. In such a system the company aims to absorb fixed costs as much as possible while maintaining a rate of variance with respect to the standard as favorable as possible.

Investments opportunities are assessed on the basis of the single machine/operation efficiency and on the fixed costs absorption, also in this case without an overview of the whole process. Furthermore the process of hiring new staff is based on payroll and head counting. Therefore, the new hires are justified by reasons of increased efficiency or absorption of fixed costs: in this way, the company MRP (Material Requirement Planning) plays an important role because it is able to determine the total manpower requirements on the base of sales forecast and available production capacity.

The final result is a **complex management system, with many cost and profit centers** and a considerable difficulty in tracking the movements of material code from one individual cost center to the next one. **The organization is therefore committed to maintain a complex management system which provides little or zero added value.**

Value stream, the importance

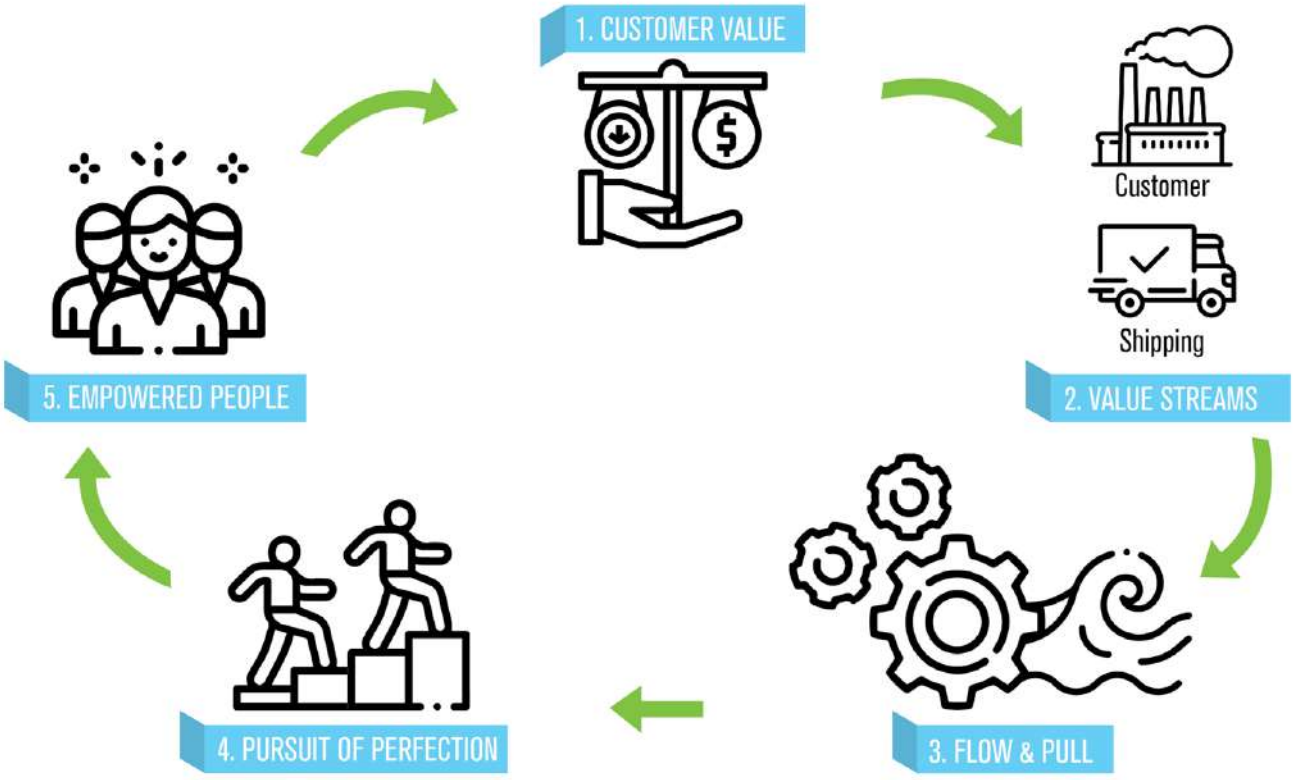
The number one goal of a lean strategy is to provide value to customers and market. From an accounting point of view, therefore, **it is of fundamental importance to be able to measure how each operation is effective in generating value for the customer,** whenever the latter has interaction with the company.

Likewise it is important to work by value stream, i.e. the set of steps that make up the operational process that goes from the customer order reception until the supply of goods/services to the market. In this sense each value stream (or product/service line) is by itself the business profit center. This means that all financial/ economic and operational metrics must be modified and focused on the value streams performance level, because they are those ones who really create and provide value to final customers.

Such type of approach is opposite to the traditional one for which each business function/operation is a cost center and, in certain cases, also a profit center, thus fragmenting the value chain into multiple parts and making you lose the overview of the flow (both of materials and information).

The number one goal of each value stream is to maximize the time spent in creating value to the costumers. This is achieved by making the demand flow in the quickest possible way within it (minimization of the through-put time and of the lead-time to the market) and by ceaselessly eliminating sources of waste.

The value stream therefore includes both all the value-added activities necessary to transform the raw material into a finished product and all the other activities necessary to support such transformation. This means that the activities carried out by quality, maintenance, engineering, material flow, purchasing and logistics are part of the value stream. Therefore lean companies must incorporate these activities as much as possible into the product



or service lines in order not to inhibit the flow. **The old concept of company departments is itself a form of waste,** entirely generated by a structure organized by functions, each of which is interpreted as a sealed compartment independent from the rest of the company.

Lean performance measures

The heart of a lean business performance measurement is the capability to identify the root causes of problems and take actions to eliminate them. The key point of the matter consists of the actions that company personnel is driven to take by performance measurements, not of the mere reporting for its own sake. After all, a lean management system is such if it allows stable annual productivity increases of order of magnitude of at least 10%, possibly around 20%. This is why lean metrics focus, *for each value stream,* on indicators of flow, productivity, quality, delivery times, cost and lead-time.

Such a measurement system must deal with **the natural instability of market demand** (to be faced with production system based on the pull logic) **and of the cycle times of internal processes** (with their impact on the real company manufacturing capacity). It is for this reason that processes must be designed in order to have self-leveling systems in their DNA, which automatically - and with very short reactions times - tend to adapt the internal flow to that one of external demand. This is possible by assigning only 80% of the theoretical capacity of the value stream to the average market demand, leaving the remaining 20% to be used to cover the natural variations (peaks) of the market as well as the variation of the internal processes.

In a lean management system, all indicators based on an organizational structure by functions will have to be abandoned. The reference key performance indicators are those that are able to measure the effectiveness of the value stream in its whole:

- Flow: the best measure of flow is linked to the process speed (e.g. inventories coverage in days, process through-put times from raw material to the final product); **constantly improving the value flow raises the ability to accept increases in demand without having to increase costs;**
- Quality: realizing and measuring the reduction of the defects along the process helps the flow to have less interruptions and unexpected events, leading to an improvement of the productivity and on-time *deliveries*;
- Delivery: measuring the punctuality of deliveries with respect to the date requested by the costumer (instead of with respect to the confirmed one) is an excellent indicator to collect important information on how to improve the flow of the value *stream*;
- Lead-time: it is an excellent performance measure because it requires looking at the product or service line performance as a whole, rather than focusing on the individual phases that make it up: if customers know that the company's lead time is short, they might reduce their stock levels so generating cash and so they will reduce delivery times to their own *customers*;
- Productivity: defined as the ratio between the output of a process (for example, the production or turnover of the value stream, the number of shipments to customers) and the input (for example the labor hours), the indicators of this family are probably the most important of a lean management system: **achieving constant and substantial improvement of these indicators is the best guarantee of the effectiveness of the lean business processes.**

Lean metrics must be simple, both because they must be measured frequently (on an hourly, daily or weekly basis) and because they must focus on identifying the causes of a low level of performance.

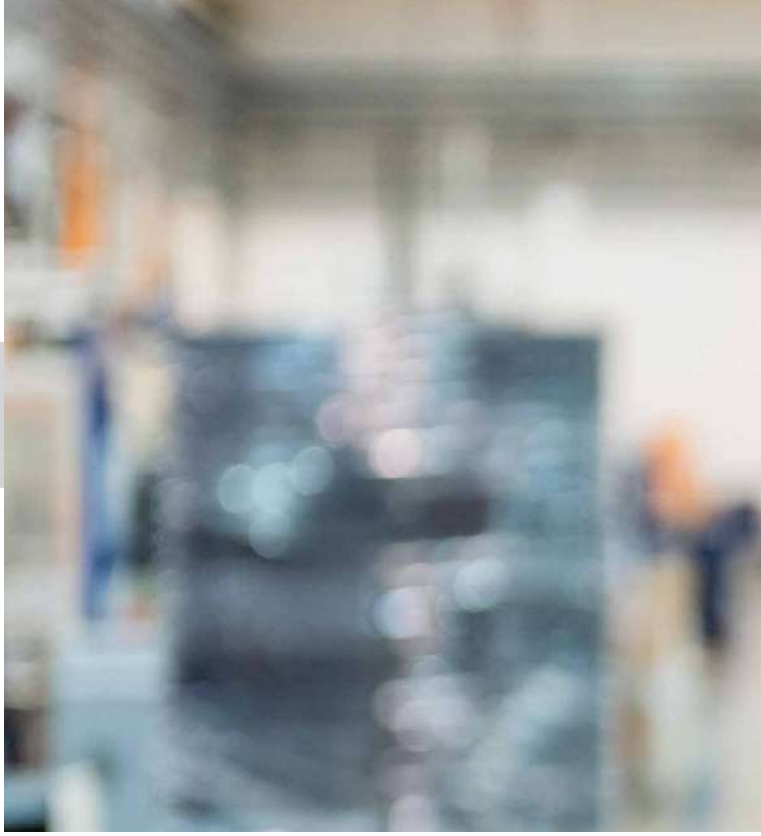
In addition to that, the other fundamental aspect is to report - visibly displayed in a performance scoreboard - each measurement of the individual value stream and of the company as a whole. In a lean company there are no secrets: therefore the scoreboard shows the trend of the measurements with respect to the objectives, a Pareto's diagram to identify the main root causes of the failure to achieve the targets, the status of each one of the improvement actions undertaken to achieve objective and a list on the main undertaken Kaizen events.

Accounting for value stream

The focus of value stream accounting must be shifted to understand the economic and financial impact on one's decision on two fundamental issues:

- How customer demand changes thanks to greater value creation;
- How the spending profile changes based on the improvements achieved in operational and information flows and in the use of production capacity.

Every *Value Stream* is a center of profit. This involves a unique attribution of each product code to the individual product line, with the consequent allocation on it of the turnover of all products codes.



At the same time, the costs allocation process is done directly on the value stream itself: all costs are attributed to the process points in which the expense occurs. Simple cost sharing rules will be defined only for the operations and functions that are shared between multiple value streams. This allows to have an income statement for each value stream, therefore to have clear indications on the profitability of each value chain, on the opportunities for improvement and on the commercial actions to be undertaken.

If the direct materials, direct labor, dedicated value stream machines and all related expenses (for example maintenance, scraps, non-quality, etc.) are simply charged to the specific value stream, the costs that cannot be directly assigned (e.g. the development of new products, sales, marketing, administration, shared machines and plants, etc.) must be managed by defining appropriate sharing parameters for the different types of costs, based on one or more predefined indicators.

The activities of creating new production capacity of the value stream by intervening on the bottleneck and any critical operation will turn into the ability to satisfy a higher market demand (or to satisfy the same demand with the use of fewer resources or to assign part of the capacity in excess to another value stream), thus determining that contribution margin of demand that a traditional approach based on standard costs is unable to grasp.

Investments in a lean management system are evaluated in an overall view, taking into account the total flow of materials and information, considering the reduction of delivery times and/or the improvement of the quality of the entire production cycle: never in a punctual view of the efficiency of the single operation seen as a stand-alone one.

Regarding the human resources, then, a lean management system perceives the company personnel not as a cost center but as a resource that generates value for the customers. The decision to hire new people is based on the same considerations made for investments: a structural increase in production capacity and/or value for the customer.

The final result achieved by the adoption of such a lean management system will be to have a certain number of financial analysts who - instead of being engaged in the office to analyze a complex cost reporting system based on standard costs or other typical mass production practices - will move in gemba in search of performance improvement opportunities, using weekly value stream income statements and measuring the effectiveness of kaizen events launched by the organization and by themselves. In addition, the entire company organization will be able to see the contribution of its own line of products or services to corporate profitability and to grasp the priorities of invention, both operational and strategic, on the way to improvement.

Our solutions

ICT srl (www.ict-advisorydivision.com) has a professional's team able to support the client companies to re-engineer their own processes and management system with a lean perspective, in the aim of improving business performance by Lean Thinking and simplification of the administrative system.

Here are some examples of activities that ICT is able to deal with in these areas:

- Critical review of the value chain through the Value Stream Mapping methodology, within a Gap Analysis activity aimed at identifying areas of improvement, defining a hierarchy of recommended interventions and the related actions plan;
- Reorganization of flows and optimization of the same in a value stream perspective, also by means of enabling technologies as well as through the lean review of ERP and MES systems;
- Re-engineering of the administrative and internal reporting system;
- Creation of a lean system of KPI (Key Performance Indicators) focused to the optimization of the flow and to the creation of value for the customer;
- Staff training in lean techniques, with courses and practical application exercises on real problems. Among the courses offered the following ones are included:
  + Basic principles of Lean Thinking
  + Lean Supply Chain
  + Value Stream Mapping
  + Kanban, Pull System and Continuous Flow
  + Lean ERP & MES

In case of interest or to receive more information on these topics, please get in touch with ICT writing at info@consulting-trading.com or call +39 (0)121 376811.

– Use of Bearings in Drones for Precision Agriculture Projects

– bearing choice is crucial for any type of drone applications –

Not even the agriculture sector can escape the hype of drone technology. The European drones outlook study reports 150,000 agricultural drones will be used across European farms by 2035, undertaking tasks such as soil and field analysis, crop monitoring and spraying.

Here, Chris Johnson, managing director at EZO bearings specialist SMB Bearings, explains the value of agricultural drones and advises on the importance of bearing selection for these devices.

Pressure on the agriculture sector to feed the growing population is rising, leading to agricultural productivity levels increasing by 25 per cent to meet demands. Unfortunately, conventional farming techniques alone will not solve this production problem.

In response, farmers are increasingly employing automation technologies to augment their operations — whether its weed-killing robots, harvesting and picking robots, or autonomous tractors. But, despite the success of these precision technologies there is one key limitation — they are restricted to ground level operations. This is where agricultural drones can play an important role.

Crop monitoring

Crop monitoring by sky using agricultural drones is a great way for farmers to gain effective crop insights and the latest agricultural drones have a wide range of features. Firstly, mapping systems give farmers the power to analyse their crops and gain valuable data to guide decision making. In addition, drone devices can capture clear images of the crops from an aerial view. Three of the most common images that provide insights into crop variability are colour (RGB), near infrared (NIR) and normalized difference vegetation index (NDVI). A feature like NDVI imagery can determine crop health by measuring the index of crop greenness. This allows farmers to track crop growth in-season and make comparisons.

What's more, workers can proactively schedule and target various crop monitoring treatments such as fertiliser applications. These images along with the mapping system, ensure farmers are informed about irrigation, soil, and infestation dilemmas.

Agriculture spraying drones

Not only do crop spraying drones reduce labour-intensive work, but they also curb any risks involved with labourers encountering strong chemicals.

Spraying drones can also target areas deemed inaccessible by ground.

By using the mapping system, farmers can perform aerial spraying on crops that require water or targeted treatment against pesticides. Some systems have a carrying capacity of over ten kilograms, holding tanks, pumps, and spray booms. This means they can cover 4,0000 square meters in ten minutes making spraying drones more efficient than conventional methods. To add to this, spraying drones help to reduce water consumption, and control the quality of the crop-saving time and money.

How to ensure your drone is up to the job

To ensure farmers can profit from the production gain of drone technology, it is important for maintenance engineers to guarantee high quality equipment. Given the cost of drone failure can be extortionate, it is important that high quality components such as EZO precision bearings are used.

One advantage of EZO precision bearings is that they can be used for drone motors with a low vibration and noise level. Shielded EZO bearings are lubricated for life with a low noise, low torque grease, reducing the risk of bearing failure. Agricultural drones are required to operate in extreme weather conditions, so it is crucial to seek advice from a reliable parts supplier like SMB Bearings who can supply the correct bearings for your specific operating environment.

The agriculture sector is depending more and more on automation and robotics to help meet the demands of a growing population. It is vital for farmers to plan ahead, by investing in the right equipment, to guarantee productivity levels are not overstretched. Meanwhile, agricultural drone makers need to team up with the best component suppliers to ensure happy customers and an extended drone service life. More information about EZO bearings can be found at www.smbbearings.com.

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6+ Events in 2022

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6+ Online Events in 2022

The iMotion Events Hybrid Meetings will host six online events, with focus on the power transmission solutions, and in connection with the audience from 20+ physical events. The main online events and matchmaking meetings will be as following:

Bearing & Power Transmission Meetings

21-23 March 2022

Agriculture & Food Meetings

13–15 April 2022

Motion Drives & Automation Meetings

23-25 May 2022

Marine & Offshore Meetings

10-12 October 2022

Steel & Metals Meetings

14-16 November 2022

Mining & Construction Meetings

05-07 December 2022

**Additional online events can be added to the planning during the year.*

Full Year Online Matchmaking

The online matchmaking and event platform of iMotion Events Hybrid Meetings will be available for a whole year during 2022, and accessible with one single account. The platform will feature pre-scheduled meeting, matchmaking, exhibitors area, sponsor presentations, networking, Q&A sessions and many more features…

Connect with 20+ Physical Events Globally

Apart from the online matchmaking and industry events, iMotion Events Hybrid Meetings will conduct a whole list of activities before, during and after 20+ physical events, covering more than 15 different industries where power transmission and industrial motion solutions will be the center of attention.

Why Industrial Motion Hybrid Meetings 2022

The Future of Events and Networking is Hybrid

Hybrid events are here to stay, and it is safe to say these changes are permanent. In order to understand why, it's important to first comprehend the structure of a hybrid event. In a basic format, hybrid events incorporate features from both in-person and online event structures with a shared experience for all participants. The utilization of technical capabilities will allow participants to reach their specific audience on a magnified level, increasing the productivity of events, while also socially engaging face-to-face.

Top 10 Reasons to Join

1. Connect with the global power transmission industry peers for 1 year
2. Pre-schedule meetings with potential leads and partners [in-person or virtual]
3. Market your product in 15+ different industries
4. Present your solutions within 20+ physical events in 2022
5. Organize your customized company event within the community
6. Expand your brand visibility worldwide, in print and digital
7. Find new suppliers
8. Receive monthly international event reports and contacts
9. Keep track of your ROI
10. Reach 100,000+ industry peers

Who Will Attend?

160+ Exhibitors

2,400+ Attendees

35+ Speakers

6+ Events

15+ Industries

60+ Countries

More than 2,400 participants have attended our industrial motion events since 2016, both in-person and online, connecting 160+ exhibitors and 35+ speakers with power transmission and motion control industry peers globally

Exhibitors Profile

- Power Transmission Companies
- Component Manufacturers
- Distributor Companies
- Lubrication Companies
- Equipment Manufacturers
- Industrial Machinery Companies
- Solution Providers
- Engineering Companies
- Associations and Service Organizations


BEARINGS


BELTS & BELT DRIVES


CHAINS & CHAIN DRIVES


CLUTCHES & BRAKES


CONTROLS & SENSORS


CONVEYOR COMPONENTS


COUPLINGS


INDUSTRIAL ELECTRONICS


GEARS & GEARBOXES


FLUID POWER


LINEAR MOTION


MAINTENANCE PRODUCTS


MOTORS

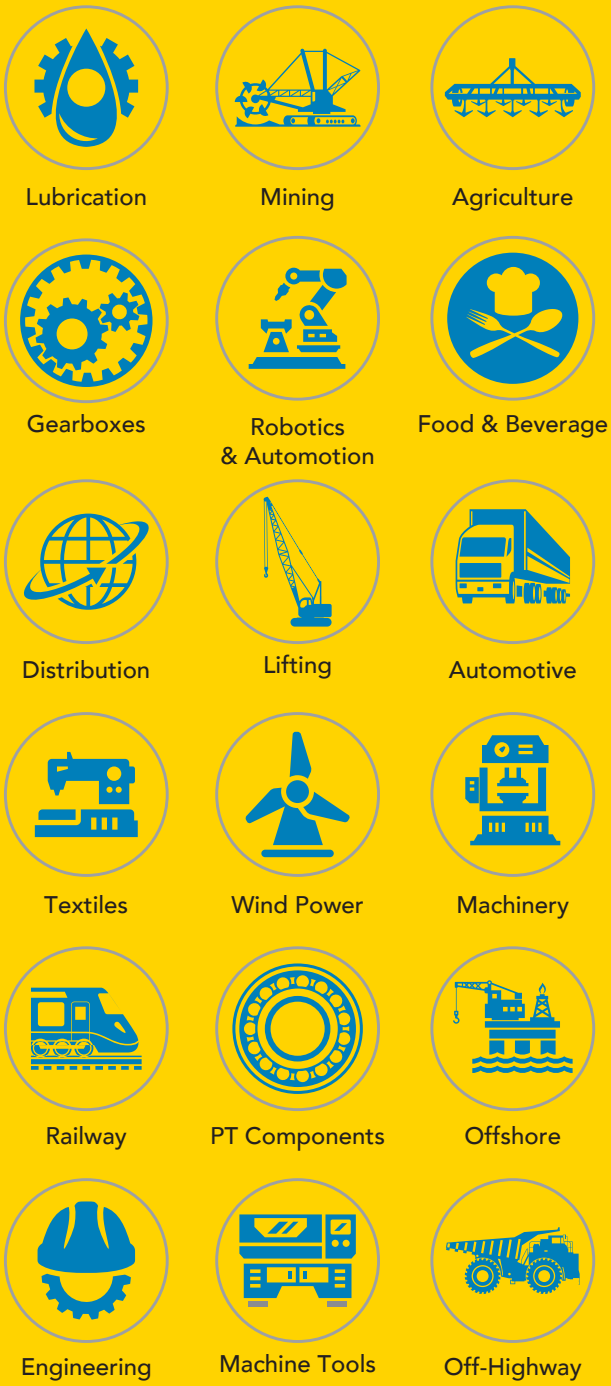

ROBOTICS & AUTOMATION


SEALS


OTHER PRODUCTS

Attendee Profile

- Original Equipment Manufacturers
- Distributors
- Service Providers
- Mechanical Engineers
- Reliability Engineers
- Lubrication Engineers
- Maintenance Engineers
- Machinery Engineers



Job Functions

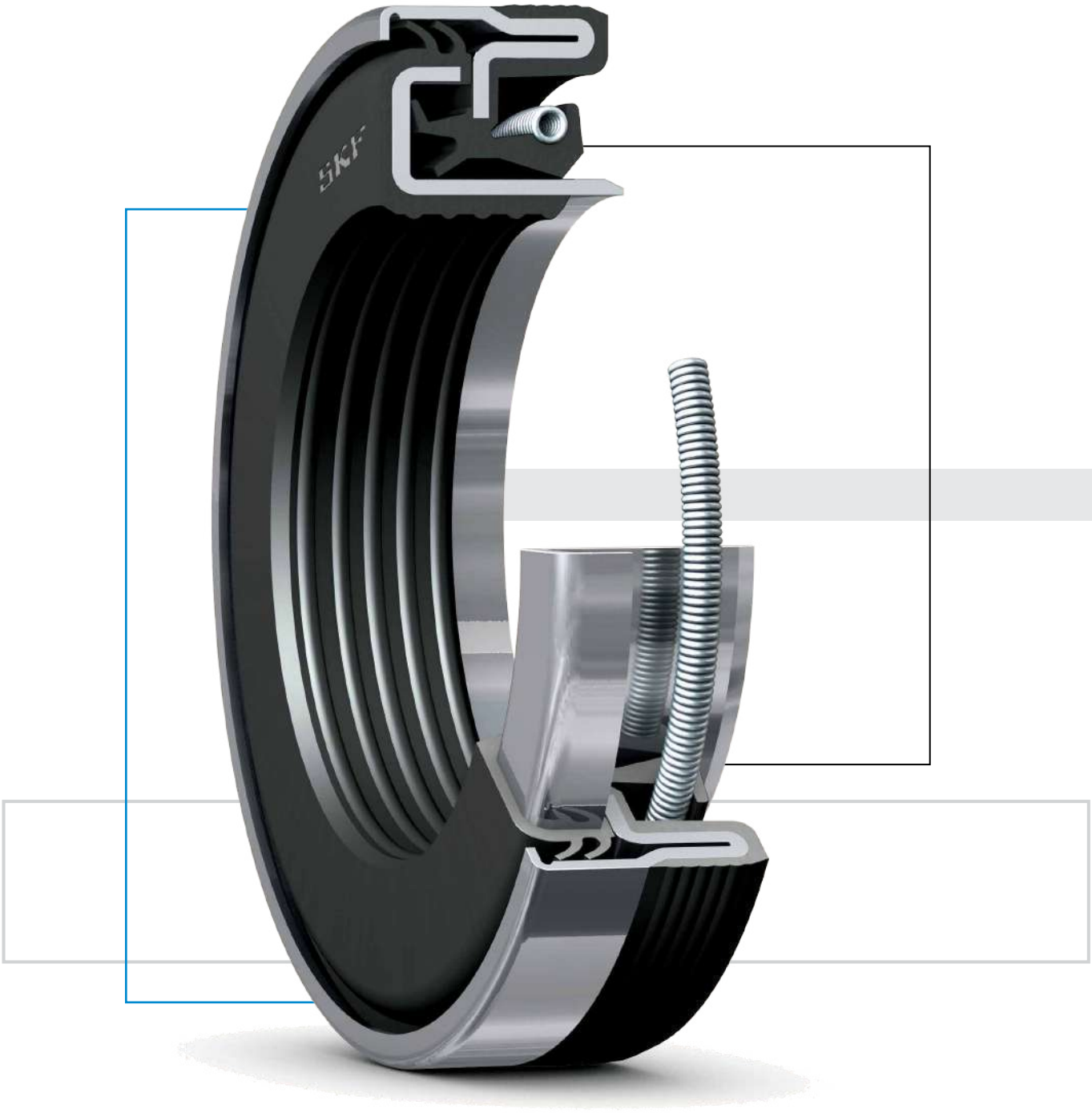
- Design Engineers
- Purchase / Procurement / Sourcing Management
- Technical Teams
- Owner / MD / President
- Sales & Business Development
- Marketing
- Maintenance Engineers
- R&D
- Project Management

Connect with all your industry peers through one-single platform

iMotion Events participation is free of charge for Design Engineers, Sourcing teams, Procurement Professionals and Students.

Contact marketing@imotion.media for your full-year free access to the online events.

www.imotion.events



– A lifeline for farming machinery with new cassette seal

By launching a new design of its cassette seal, SKF has improved the seal performance and extended its service life, helping to prevent failure in agricultural and construction machinery.

SKF has launched its MUD11 cassette seal for wheel ends, to help improve the performance of equipment such as agricultural and construction machinery.

New design features extend the seal's service life, while reducing both friction and dirt ingress. In addition, the MUD11 seal is now available as a stock product, which will make maintenance and replacement more efficient.

"The improvements will help end users to increase productivity while reducing both maintenance and operating costs," says Vinay Joyappa, Global Product Manager at SKF.

MUD11 seals protect wheel-end bearings, to prevent failure in equipment such as tractors and construction vehicles. A typical example is seen at harvesting time, when farming machinery must maintain performance under punishing conditions. Wheel-end bearings in both front and rear axles must withstand heavy loads, plus dusty or dirty conditions, for long periods of time. The MUD11 seal helps to overcome this.

New features of the seal include an optimised multi-lip design, an integrated metal sleeve and the use of SKF developed compound. These refinements have increased its service life by up to 50%, while also reducing seal initial friction by around 20%. This can help OEMs and distributors to extend wheel-end service life and reduce warranty claims. It can also remove the need for expensive shaft machining. As well as excluding contamination more effectively, the new multi-lip design is easier to install than its predecessor. The new seal can be retrofitted into an existing envelope using a two-step assembly.

The seals also offer customers a number of sustainability benefits. These include preventing lubricant loss; extending both bearing lifetime and seal service life; and reducing friction (leading to lower energy consumption).

Being available as a stock item makes MUD11 seals easily available through SKF's distribution network. This helps users to reduce customer inventories, while localised sourcing helps to cut import duties.

SKF's mission is to be the undisputed leader in the bearing business. We do this by offering solutions that reduce friction and CO2 emissions, whilst at the same time increasing machine uptime and performance. Our products and services around the rotating shaft, include bearings, seals, lubrication management, artificial intelligence and wireless condition monitoring.

SKF is represented in more than 130 countries and has around 17,000 distributor locations worldwide. Annual sales in 2020 were SEK 74 852 million and the number of employees was 40,963.

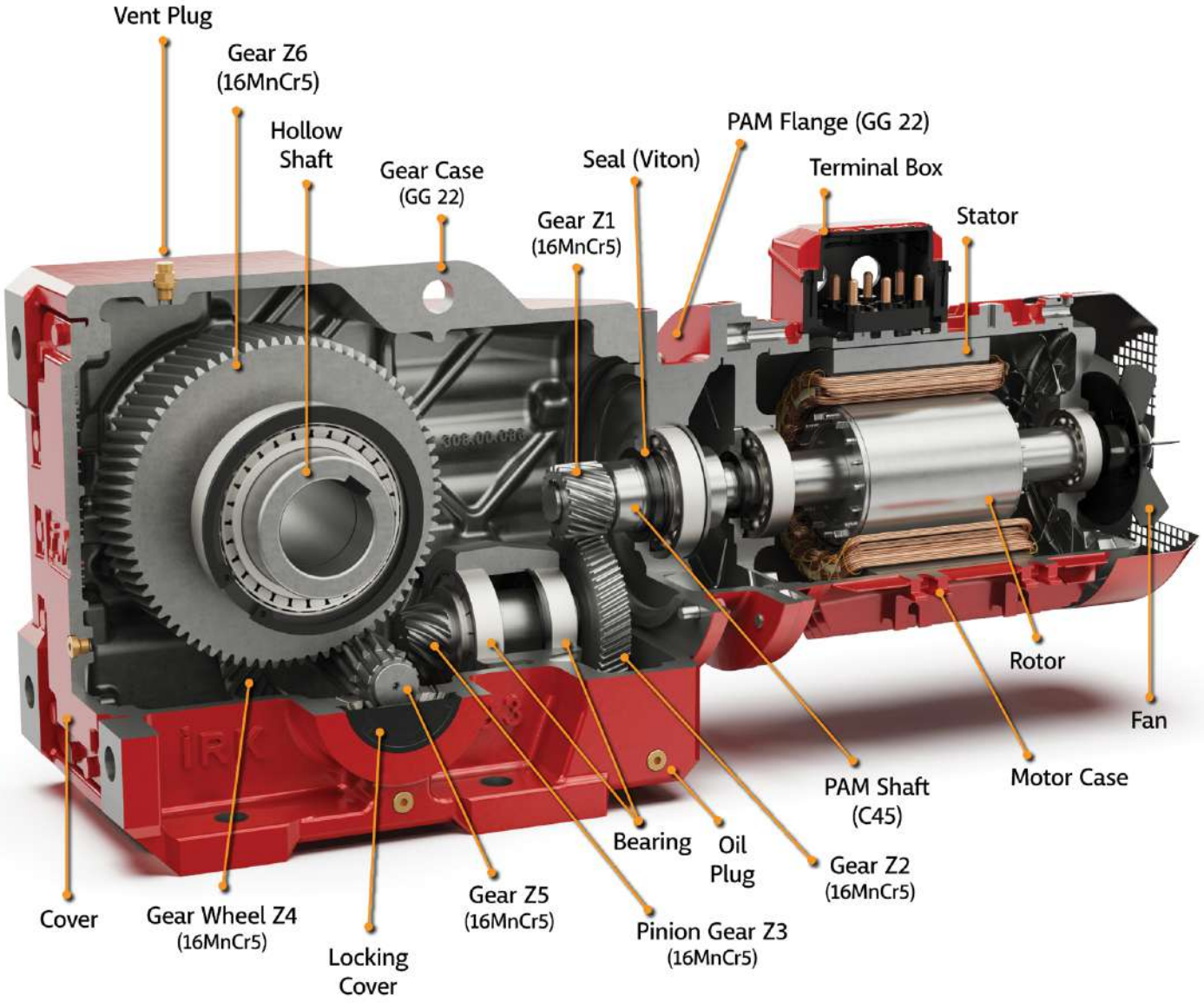
MOTION & CONTROL™
NSK

PRECISELY FORWARD
NSK MOTION SOLUTIONS

From Machine Tool, Injection Molding, Medical & Measuring to General Machinery applications, NSK offers the best technical solutions and a full range of engineering services. Every NSK Linear Guide, Ball Screw, Support Bearing and Super Precision Bearing is tailored to your specific needs. NSK, the only comprehensive engineering service supplier on the market, will take your business a step ahead. Find out more at www.nskeurope-motionsolutions.com.

LINEAR GUIDES | BALL SCREWS | SUPPORT BEARINGS
SUPER PRECISION BEARINGS | ENGINEERING | SERVICES

HELICAL BEVEL GEAR UNITS



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- 10 Different Housing Sizes
- Ratio Range 4 - 21000
- Torque Range 160 Nm - 18000 Nm
- Power Range 0,12 kW - 200 kW

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GEARBOXES AND DRIVES

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industrial motion hybrid meetings
for PT/MC Buyers & Suppliers

March - December 2022

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