

# MOTION DRIVES

POWER TRANSMISSION & INDUSTRIAL MOTION MAGAZINE



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*Automation*  
**& Manufacturing  
Technologies**



Dr. Johannes T. Grobe  
KHS Group

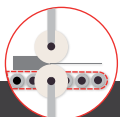


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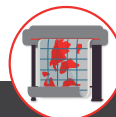
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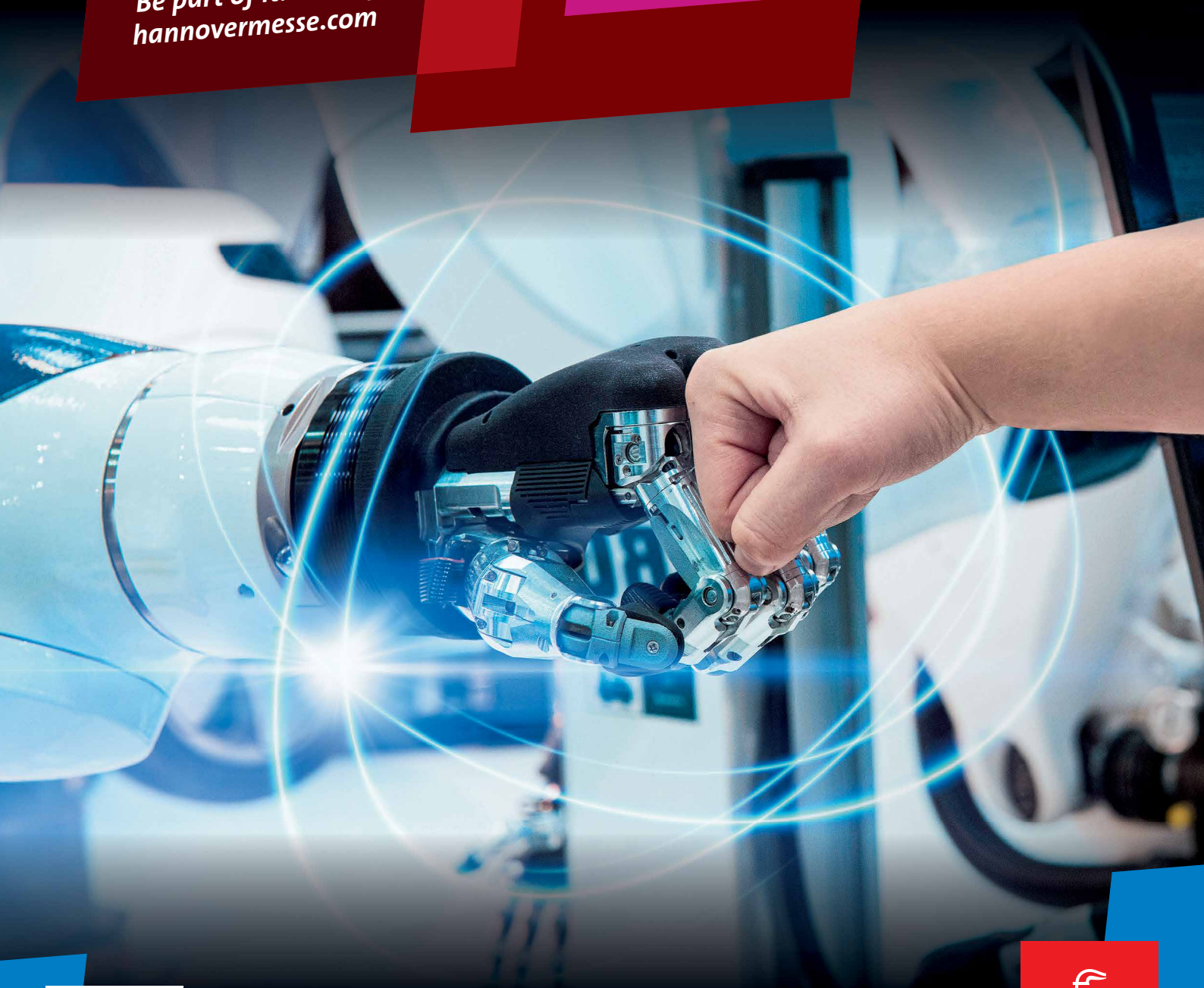


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# Additive Manufacturing Technologies help re-imagine production of Industrial Components



**Mike Brandt**  
Editor-in-Chief

This new edition of Motion + Drives Magazine enters an intriguing new technological domain that is driving positive change within manufacturing and distribution. First, rather than replacing traditional processes, 3D printing, and additive technologies are complementing existing manufacturing methods. This extremely powerful yet intricate approach to processing aims to change the way parts are produced.

Next, understand the foundation of automated warehouses. Global warehousing has been undergoing a period of immense change due to recent surges in online ordering. Read how automation is becoming fundamental in maximizing reliability and productivity.

Further in this issue, innovative solutions are rapidly shaping our day to day lives, and data centric ecosystems are helping to build an

intelligent world. Systems designed to support evolving technologies are ensuring reliable data transfers for greater efficiency.

## What's in Motion...

What's in motion for the PT industry. Learn details about key companies, trends, and advanced product solutions specifically for high-power density motors, collars, couplings, and timing belts. Read about new energy efficient drive systems, state-of-the-art repair tooling, and AI infused remanufacturing strategies. 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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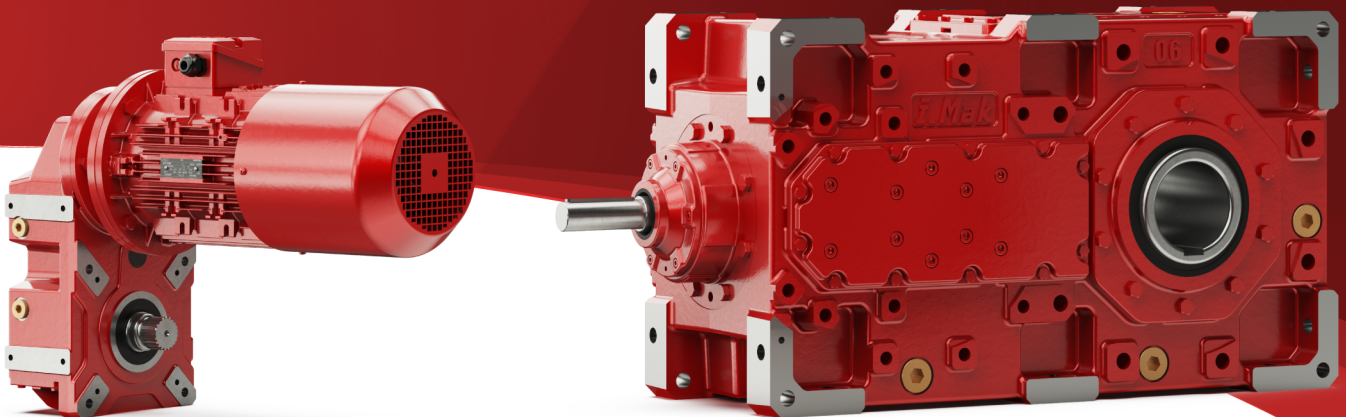


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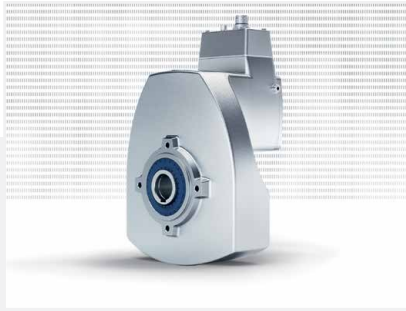
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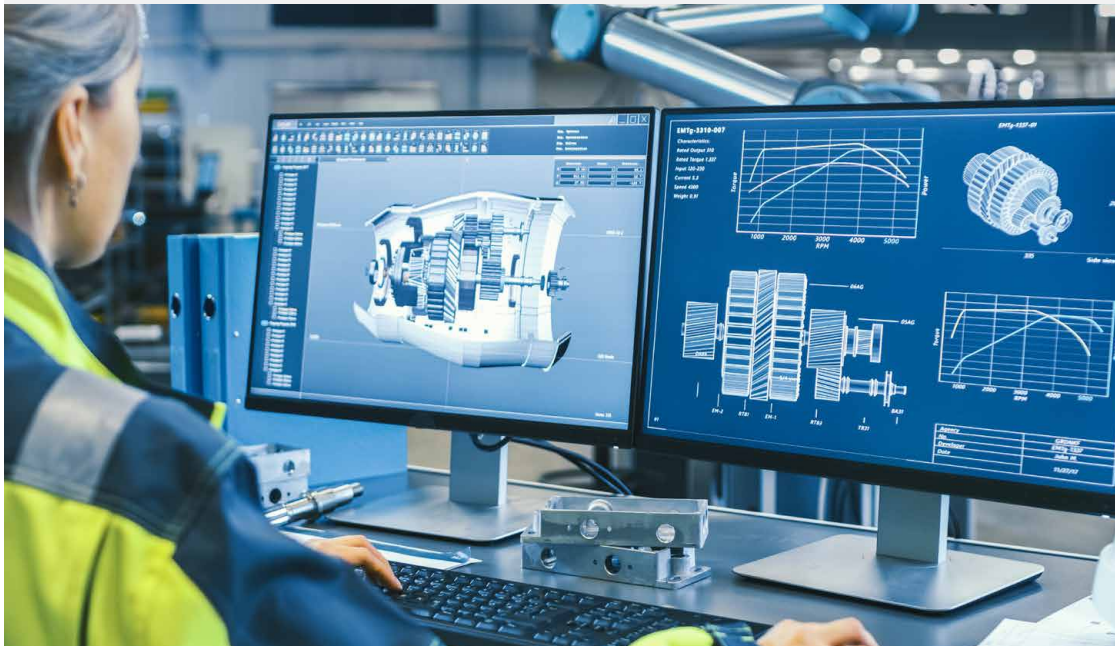
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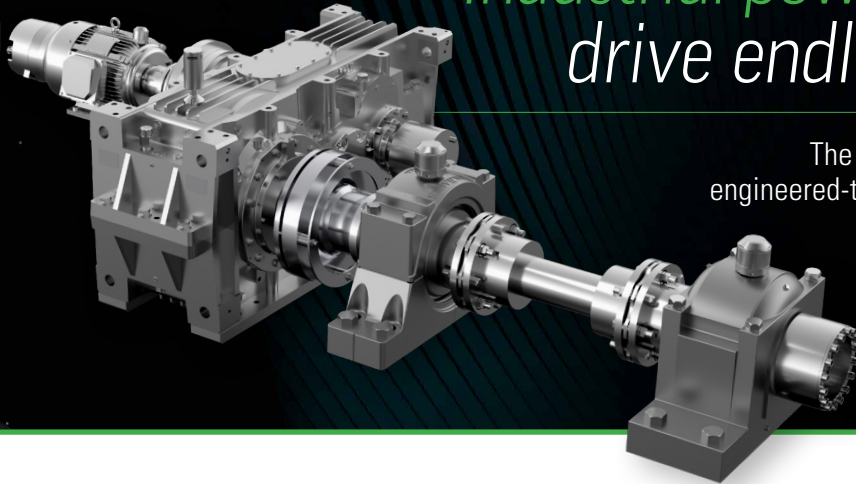
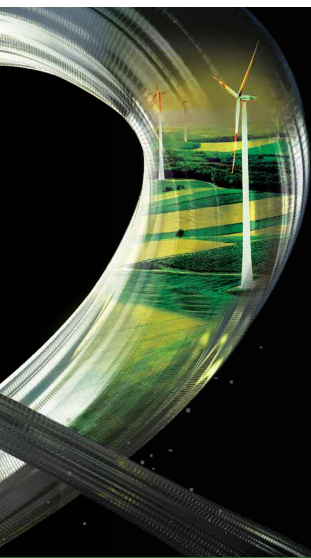


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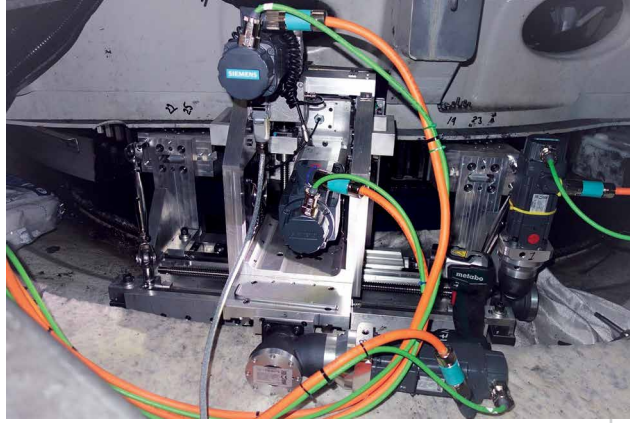


## — New yaw ring repair method **makes wind turbine lifetime extension viable**

+ + + + +

- + Patented system makes yaw ring repairs economically feasible
- + Danish company CNC Onsite's method can extend wind turbine life
- + Repair versus replacement represents a significant CO2 reduction
- + New tool is portable, compact and separable to allow in-situ uptower repairs





A new invention for repairing yaw rings in-situ is expected to make a major contribution to extending the lifespan of wind turbines. Developed by Danish machining expert CNC Onsite, the patented system means the yaw ring does not need to be replaced, eliminating the expensive, time-consuming and potentially detrimental disassembly of the rotor and nacelle.

A crucial component in securing maximum power production from a wind turbine, the yaw ring, also called a "yaw gear rim", is complex to replace. Yaw ring replacement costs are so high that broken or worn teeth can leave operators of older wind turbines with little choice other than scrapping them.

"This inspired us to develop a repair method as an alternative," Søren Kellenberger, Sales Director, CNC Onsite.

"We can now offer a repair service for both onshore and offshore at a fraction of the cost of replacing the entire yaw ring, and that makes it viable to keep perfectly good wind turbines operating for longer," he added.

#### **Patented portable precision tool**

The CNC Onsite method employs a portable precision machining tool to repair any broken or worn yaw ring teeth. Operated by a specialist engineer, the tool applies the patented method, working at extremely fine tolerances, to remove and reinsert machined teeth. The patent for the system covers the milling process by which the damaged teeth are excised, and the bed created for the new part, as well as its particular insertion method.

"The process we apply when creating new yaw ring teeth for a wind turbine is similar in principle to a new dental crown that is first copied precisely then fitted by a dentist using precision tools,"

Kellenberger said. "The aim is the same, and it should last for a long time."

The machining tool has been designed to break down into component parts with a low weight that allows them to be transported in the tower elevator to the work area. After reassembly in the nacelle, the compact tool can be operated in the confined working space around the yaw ring.

#### **Not weather dependent**

The repairs are carried out inside the wind turbine tower so can be completed irrespective of weather conditions.

"As long as it is safe to travel to and access the wind turbine, we can carry out the repairs. So there are far fewer days when we cannot work. This is also good for both work schedules and costings," Kellenberger explained.

#### **Scale of the problem**

Mounted at the top of the wind turbine tower, the toothed yaw ring is a gear that engages with motors mounted on the nacelle to align the rotor blades with the wind. CNC Onsite estimates that turbines on some 5 to 10 percent of wind farms will experience damage to their yaw ring teeth during their service life. Typical causes include unpredictable wind events or uneven loads sustained over time.

Replacing the yaw ring requires the entire nacelle to be detached using a crane and specialist labour – a process that is expensive for onshore turbines and perhaps uneconomic for offshore. Across the lifetime of a wind turbine, maintenance can represent up to a quarter of all costs incurred, and decisions such as choosing a cost-effective yaw ring repair versus replacement are set to become an important trend.



## CO2 savings

The system developed by CNC Onsite can usually carry out yaw ring repairs within a few days. This not only reduces downtime, but results in significant CO2 savings too.

"We're eliminating the need for manufacturing a new yaw ring and above all the huge logistical effort required to transport a yaw ring to the site, deploy cranes, which is particularly tricky offshore, and replace it," Kellenberger said.

"Such an operation requires a significant number of people and a lot of equipment with all the associated CO2 emissions. With our repair method, this is no longer required," he added.

"The fact that whenever you take down the nacelle there is a potential risk of damage to it and especially to the blades which is another factor that cannot be ignored," Kellenberger concluded.

The yaw ring repair service offered by CNC Onsite has already been used on a range of turbines in wind parks, both offshore and onshore, since it entered the market in 2019 following many months of endurance tests, proving that the replaced teeth are robust over time.

## The patented process and technical details

The CNC Onsite's patented method consists of three steps:

- + Milling away the damaged yaw ring teeth
- + Cool down the replacement yaw ring segment
- + Mount and fix the new segment in place

The company's milling machine tool, which is also patented and is designed to be attached to the yaw ring, is a full CNC (Computer Numerical Control) machine, producing the required very precise milling in the limited space.

The milling machine is split into three assemblies for easy transport to and up the wind turbine.

## Milling process and pocket design

The machining tool is mounted to and aligned with the wind turbine's yaw ring and is preprogrammed with all relevant parameters like dimensions of yaw ring and teeth.

Once mounted to the yaw, the milling machine automatically identifies and cuts out the damaged area precisely, creating a pocket for the replacement teeth. The milling machine is designed to work sideways - part of the patent - on either inward or outward-facing yaw teeth, not from above as often there is often not enough room within the tight nacelle area.

The machined pocket has precise dimensions that fits the exact size of the new segment to be inserted. The shape of the pocket is designed to hold the replacement part in place through grooves and ridges.

The pocket structure also includes threaded holes, which are used to fix the new part in the next step of the process. Additionally, several raised ridges are created in the pocket which allows the new segment, equipped with corresponding indents, to be inserted like a jigsaw puzzle. This mechanical design improves the mechanical strength and will help prevent displacement of the replacement teeth, both axially and tangentially.



### Cooling pre-produced part

The new segment due to be inserted into the pocket is first cooled down to marginally reduce its size, aiding the fitting process. Once re-expanded in the pocket, this further adds to the mechanical strength of the repaired structure.

### Slotting and fixing new part

The new part is slotted into the pocket by the technician who then fixes it in place, using bolts in the threaded holes, created during the milling process.

The new pre-produced yaw ring part is produced in advance by CNC Onsite. The parts match the profile of the yaw ring for that particular wind turbine brand

### Precise machining tool

CNC Onsite's machine has extremely fine tolerances of a few hundredths of a millimeter. This is a huge advantage as it allows the new part to be fitted with great precision, which ensures longevity and reliability.

If required, CNC Onsite can repair all teeth on a single yaw ring. Compared to more conventional methods

like welding and grinding, no heat is introduced to the yaw ring, meaning that there is no risk of changes in material properties, as well as being intrinsically safer by avoiding "hot works" in a confined space.

A successful weld repair depends strongly on the experience and skills of the welder whereas with the CNC Onsite method, the machining is done automatically, and the teeth are prefabricated to high tolerances. The result is a repair with an expected lifetime of 10 years.

### About CNC Onsite

Headquartered in Vejle in Denmark, CNC Onsite designs and delivers high precision mobile machining for wind turbines including offshore foundations. Machinery built by CNC Onsite are designed to be flexible using its proprietary "building blocks" approach, which means machinery can be built to match a range of tasks. CNC Onsite serves the onshore and offshore wind energy sector delivering as standard solutions: machining of large diameter steel flanges and blade root ends; specialized repair services covering yaw ring, inserts in blade root, rotor lock, generator shaft, bearing housing and threaded holes. Removal and replacement of worn and broken bolts round off the offering. website: [www.cnconsite.dk](http://www.cnconsite.dk)

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# Reliability & Productivity: The Foundation of Automated Warehouses



The logistics and warehousing industry has been undergoing a period of immense change, most notably in recent months due to the coronavirus pandemic. Demand for online deliveries has gone skyward, and retailers have had to adapt rapidly. Customers are shopping online all over the world and automation is becoming fundamental to the warehousing and logistics industry - particularly for online retail products sold in volume.

## **What type of automation is used in warehouses?**

Automated warehouses are efficient, fast, flexible and reliable. They allow for improved warehousing, goods distribution, and optimum material flow. An automated warehouse uses a few key pieces of technology, such as an automated storage and retrieval system, which consists of a variety of computer-controlled systems for automatically placing and retrieving loads from defined storage locations. Central to these systems are the components that guide and transfer a component around the system. Whether it's a linear actuator to vertically retrieve a part from high racking or a ring system to rotate an autonomous picking robot, linear and rotary products play a key part.

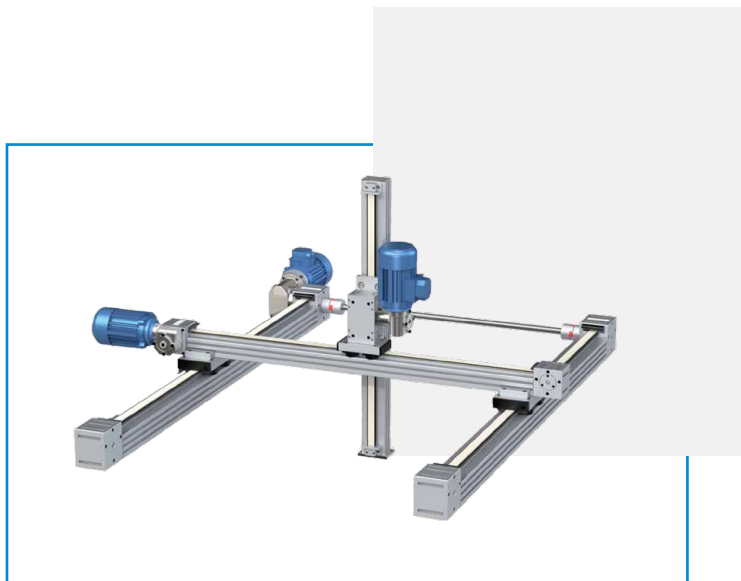
## **Automated Storage Systems; think vertical**

As with nearly every industry, space is a premium and a key benefit of an automated warehouse is its utilisation of space. Only a small footprint is needed as space

is used in a vertical capacity, with high rackings going up to the ceiling. Whereas pick and place operators are limited by their height to reach products un-aided, automated storage and retrieval systems are limited only by the size of the system designed, thereby increasing the storage capacity. Whether it's a rack driven system transporting boxes vertically or a robot climbing shelves to collect orders, space maximisation is easily achieved.

Indeed, one of the global leading online retailers use HepcoMotion's DLS4 belt driven linear actuators to vertically transfer products through a food filling station. Comprising belt-driven linear modules, an AC motor/inverter package and a range of compact planetary gearboxes for use with servomotors, Hepco's DLS4 saves hours in design and specifying time. Here, a belt driven carriage unit vertically transports boxes up to a height of 4 metres to transfer a product, and then back down again. This process is repeated up to 300 times an hour. Working with food items and a required operating temperature of between -5° to





+40°, this is a challenging environment requiring a corrosion resistant actuator; Hepco's corrosion resistant DLS4 (CRDLS4) was specified. A high duty application, with longevity of utmost importance, Hepco is able to provide an impressive 10 year life span for this application.

This system required a height of 4m, but any desired height can be achieved with the DLS4s. Hepco's DLS4 are supplied in sections in any length to 8m as standard, and can be butted together to the required height. Any size warehouse space can therefore be accommodated, ensuring space is maximised. The system can also easily grow in a modular way – a key benefit to ensure future-proofing.

#### **Automated Storage Systems; think modular**

Traditional static warehouse solutions can struggle to cope with the changing needs of the industry. Scalability, adaptability and flexibility are at the very core of Dublin-based Eiratech Robotics, innovators of a mobile goods-to-person robotics automation platform. In the Eiratech warehouse environment, autonomously guided vehicles (Eirabots), operated via a wireless network, bring racks containing the required product to the picking station where the product is picked and packed. Minimal infrastructure is required; the system can be easily installed, extended and moved.

At the centre of the system (quite literally!) is Hepco's heavy duty ring guide. The HD ring is used on the turntable of the robot to rotate the robot in different directions. Specified to handle millions of rotations in its lifetime and the ability to work with axial loads up to 700kg, the ring also has to manage radial and moment loads in order to accelerate and decelerate a top-heavy rack. A slewing ring could not be used as an open centre was needed to enable a camera to read a barcode placed on the underside of the payloads. Having worked together before, HepcoMotion was the first choice for Eiratech. A custom HepcoMotion HD ring was used, with a bespoke outer gear. Maximising efficiency and improving accuracy, Eiratech offers an enticing automated solution for warehouses.

#### **Reliably reliable**

With the focus on speed and consistency to achieve quick orders, reliability of components is crucial. The introduction of so-called dark factories, run entirely by robots with no need for artificial light or human presence further compounds the need for reliable systems. Unplanned downtime can be a manufacturer's worst nightmare, potentially causing a backlog of products that can cost the company thousands. If a customer places an order with a next day delivery expectation, being just a day late is extremely damaging to the company.



HepcoMotion's proven V guide technology is consistently used for this very reason; reliability. Used across a broad range of industries and applications from harsh, dirty environments, to clean room environments and everything in between, HepcoMotion's durable products provide a long system life. Celebrating its 50th anniversary this year, Hepco has a strong heritage built on a wealth of experience. Reliability has been proven time and time again with over half a century of applications. A further benefit is that spare parts are available for old systems - even those bought 50 years ago - providing much-needed longevity to investments.

### **Keep downtime down**

Consumers now expect their online purchases to be delivered faster than ever before, which means those responsible for shipping and delivery need to operate around the clock. As such, many warehousing operations operate a 24/7 schedule. Minimising downtime is therefore key. Systems that can deliver continuous operation, without the need to be regularly stopped for routine maintenance such as re-lubrication, are highly valued by designers and production engineers the world over. Hepco's V guide system has far longer re-lubrication intervals than ball rails for example, which means less frequent maintenance and less downtime required to keep them running. More so, even in the event of no lubrication, the V guide system will not fail catastrophically if it ends up running dry. Whilst this will

reduce the system life, it is a useful feature that provides essential peace of mind in case a re-lubrication interval is delayed or overlooked for any reason.

With regards to bearing maintenance, speed is again key. When Hepco products show signs of wear, the process is simple and does not impinge too much on production time. The eccentric adjustment facility of the V bearings can be used to quickly and simply remove any play that has occurred. Moreover, when the V bearings reach the end of their calculated life, they can be replaced individually, and not as an entire set, saving both time and money.

Coronavirus has caused behavioural shifts in consumer habits that has strong implications for the warehousing sector. The rise of online shopping has undoubtedly fuelled growth, placing new demands on the warehousing sector with a greater focus on efficiency and productivity. Automation is a crucial component in the future of this industry, providing an agile and effective response to logistical challenges. With over 42 major product lines with thousands of individual components, Hepco's range of products can meet practically any warehousing requirement. Designed to offer high reliability to facilitate maximum productivity, HepcoMotion's range of products are well-placed to serve this demanding, high duty industry.

## — Additive manufacturing *of the* Industrial Component

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When talking about manufacturing, various methods can be grouped into the three big families of methods: Subtractive manufacturing (e.g. machining), formative (e.g. molding) and finally **additive manufacturing**: this last one involves adding material in layers, in order to create the final product.





Some of the main benefits of additive, especially when compared to subtractive and formative manufacturing, can be:

- + **Customization:** components can be highly customized in an economically viable way and with low turnaround times.
- + **New and complex designs & flexibility:**  
The potential to create complex structures without impact on the cost to manufacture is a trademark benefit of 3D printing. Without the limitations injection molding or CNC machining, users are able to create intricate designs that do not depend on tooling suppliers or MOQ
- + **Cost and time savings:** as mentioned, though elimination of molds, additional equipment and tools that are both expensive and require some lead-times to be manufactured and delivered. Also, any design change can be done almost in a click and the new edited batch of parts can be good to go in days or a week, instead of weeks or months.

Obviously, even among different 3D Printer providers, the **selection** of the right technology is one the main drivers for success: in order to manufacture very

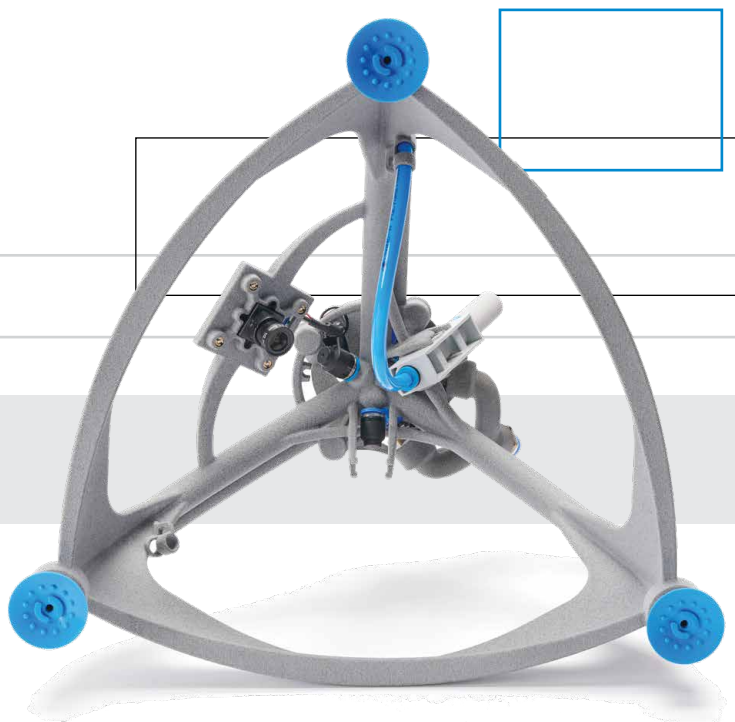
large parts, like end-of-arm-tooling or big jigs and fixtures, the technology with the sufficient capacity must be sought out. And a similar consideration must be done regarding very small parts that need very high dimensional accuracy, like small needle bearing cages, where the margin of error must be minimum. Not all technologies will be up to the task!

If the focus is on **final parts** with a need for high **quality** and **precision**, or components that will be used consistently, a powder bed technology might work better, because it allows lower margins of error, and most importantly **flexibility** in terms of **productivity**.

That is because powder bed technologies allow as many parts as can fit on the same surface to be placed into the building area, and the print job (per layer) will take the same time as only printing one. Moreover, parts can be **stacked** one over the other inside the build unit and the user can control at what distance, **monitoring heat** and **temperature**, everything can be set based on specific requirements or needs. Finally, managing to stack parts without filling the unit to the top will reduce the hours needed to print the job.



+ image: ThinkTec3D





What most of HP 3D Printing's users do after installing the technology in their facilities, is to look at parts which were designed for CNC Machining or Inject Moulding and try to switch those designs to 3D. But, of course, parts designed for traditional manufacturing technologies will have shapes and properties that are different from what one would come up with if it were to directly design a part for additive. So, at that point, parts' designs are normally made **hollow**, or **lattice structures** are introduced, which are both very effective methods in reducing material usage and, consequentially, weight of the parts as well as the cost.

But as users get more comfortable with 3D printing technologies, what happens is a more intricate approach towards design. A typical upgrade from traditional design to additive is **part consolidation**: when an assembly of parts is re-designed in a single component, which allows savings in terms of assembly times and costs for the tooling, and is a very effective way to reduce the risk of liquid or air leakage. Any junction from a component that is supposed to be fluid tight can be dangerous for the performance of the part: by transitioning to one component this is obviously not a concern anymore.

And as they become experts in the technology that they use, parts start being directly and specifically designed for 3D. Not adapted, but **re-imagined** starting from design to final series production.

But 3D Printing does not stop at the end of the printing phase: to complete the manufacturing process, there are several **post-processing** options. When considering HP Multi Jet Fusion Technology,

parts that come out of the printer need to be cleaned through sand blasting or any option that will remove the excess unused powder still attached to them, reaching a clean, rough-surfaced, grey part. Then, depending on requirements, there are different options:

- + Enhancing scratch and colour resistance for frequently handled parts through dying and graphite blasting;
- + Applying a gloss finishing through the technology of chemical polishing;
- + Customizing with any graphical pattern that will not shrink, will be weatherproof and will eliminate cutting edges through the process of hydrographics;
- + Protecting parts against corrosion, improving electrical conductivity, reducing friction or preparing a surface for better paint adhesion with electroplating.

And many more.

In conclusion, when talking about 3D Printing and additive manufacturing, it is important to mention how this method is only extremely powerful when paired up with the right material, the right technology and the right partnership; nevertheless, its objective isn't to replace other technologies outright, but to **complement the traditional processes** and is going to **change the way that we produce**. Therefore, it is crucial to be aware of the different additive technologies on the market and become familiar enough with them to actually take advantage of the benefits they enable.

# Prevent premature bearing failure with simatec maintenance products



**14%**

Contamination  
from outside

**16%**

**Improper installation**

→ Prevent premature bearing failure with simatool tools and simatherm induction heaters

**Causes of bearing failure**

**36%**

**Incorrect lubrication**

→ Continuous lubrication with simalube ensure a longer lifetime of the bearing

**34%**

Wear and tear

**More information on p.73**



- **High power density motors create new opportunities for machine builders**

+ + + + +



- **High Dynamic Performance (HDP) motors have been upgraded to offer even higher power density and a broader scope for machinery applications**
- **Motors are offered as part of a complete package with variable speed drives (VSDs) for precise control and maneuvering capabilities**

ABB has upgraded its extensive range of High Dynamic Performance (HDP) induction motors. This creates new opportunities for machine-building OEMs seeking motor and drive solutions with excellent dynamic response and high power density. The motors are typically used in plastic and rubber extrusion, injection molding, winders, lifting, conveyors, test benches and machine tools.

The upgraded HDP motor range enables ABB to offer machine builders frame sizes between 80 and 400, and output capacities up to 2 megawatts (MW) – as well as alternative variants such as high-speed and water-cooled motors. The motors are designed for use with a VSD and ABB can provide matching motor and VSD packages across the frame-size range.

“ABB is well known for its optimized motor and VSD packages that provide precise motor control and maneuvering capabilities in a wide variety of general industrial applications,” said Marcus Westerlund, Product Manager, Special Motors at ABB. “The HDP motors now bring the same advantages to machine builders who need the extra boost in power provided by a high-torque design and exceptional power density.”

### **High power density benefits both retrofits and new build machinery**

Machine builders can capitalize on the high power density of HDP motors in two ways. They can retrofit an existing machine with a more powerful replacement motor to boost performance; or they could select a more compact, yet equally powerful motor when designing a new machine to reduce its footprint.

### **Low inertia and high overload capacity**

HDP motors are designed to enable fast motion control and high maneuvering precision due to their low inertia and high overload capacity. Low-inertia motors are ideal for applications requiring fast changes in rotational direction to enable, for example, faster back-and-forth machine motion.

### **Easy installation**

ABB has prioritized ease of installation as an integral element of the HDP design. That makes it easy to install a replacement HDP motor into an existing machine without excessive engineering work. Furthermore, ABB has considered simplicity in everything from accessible connection points to installation of accessories, such as cooling fans, encoders and brakes, whether from ABB or a third party.

### **Customization**

The upgraded HDP motor range includes all the commonly-requested frame sizes and technology variants such as water-cooled, high-speed and megawatt-class alternatives to allow ABB to meet most machine-building requirements without extended delivery times. Should the standard design not meet a machine builder’s specific needs then it can be customized.

HDP motors are compliant with the IEC 60034 standard and suitable for unrestricted global use. Worldwide technical support is provided to OEMs and end users through ABB’s global services organization.

*To learn more about ABB’s high dynamic performance motors: <https://new.abb.com/motors-generators/iec-low-voltage-motors/high-dynamic-performance-motors>*



- **A smarter second life for industrial bearings**





SKF is finding ways to make remanufacturing even more cost effective and environmentally sustainable.





Remanufacturing is a fundamental pillar of the circular economy and it has since long been part of SKF's offering to its industrial customers. When industrial bearings are removed from a machine during repairs or routine overhauls, they can be sent to a specialist SKF Services Centre to be disassembled, inspected, and restored to operational condition.

Compared with the production of a new bearing, remanufacturing uses less material, consumes less energy, and generates less carbon emissions. A remanufactured bearing reduces the carbon footprint compared to a new one by up to 90%.

### Transforming remanufacturing

Like any other industrial process, remanufacturing has its own costs and environmental impact. Bearings must be shipped from the end user to a dedicated facility, and the operations used to restore the bearing require energy and materials. The choices about when, where, and how to remanufacture a bearing can have a significant effect on the economic and environmental benefits of the process.

Such choices can be tricky to get right. For example, waiting too long before sending a bearing for remanufacturing means excessive wear or damage, which might make the remanufacturing impractical. Acting too early generates unnecessary costs and emissions. Once a bearing reaches the SKF facility, the company's remanufacturing engineers must choose the most cost-effective and energy-efficient remanufacturing steps to restore the performance of the bearing. Those critical decisions are usually made relying on the skill and judgement of end-user maintenance specialists, SKF's application engineers and remanufacturing experts.



A major R&D program currently running at SKF aims to transform remanufacturing planning and execution bringing new insights into bearing performance, improved analytical rigour, and incorporating the power of artificial intelligence (AI) to the process.

### Choosing efficiency

SKF REPaIR (Rotating Equipment Performance aided by Innovative Remanufacturing) is a multi-pronged R&D effort that looks at the complete remanufacturing value chain. Innovation begins at the customer plant, with an automated machine vision system that can evaluate bearing damage using digital photographs. The system uses AI, in the form of a deep neural network image recognition algorithm, which has been trained to detect and classify specific damages in bearings.

## AiVision-FM Model alpha-1



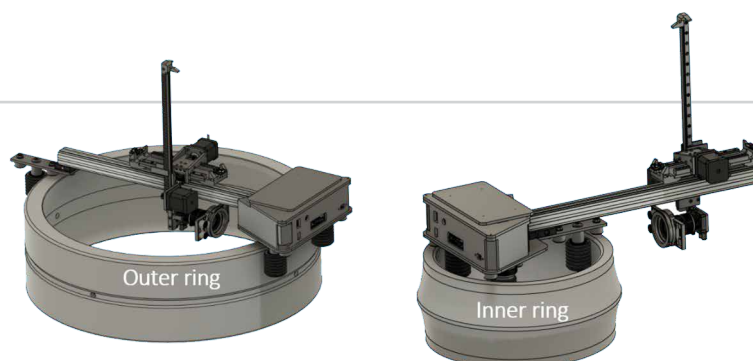
to assess the health of the bearing material. But historically, the main way to confirm that the material is in good condition has been to look at the sub-surface structure through a microscope, a process that requires cutting the bearing.

The team is also exploring the use of novel non-destructive techniques to analyse the state of the material below the surface of the bearing. "The ultimate life of a bearing is determined by the fatigue life of the sub-surface material, but most bearings fail much earlier due to surface damage", says Hannes Leopoldseder, Business Unit Manager Industrial Services Centre at SKF. "Remanufacturing restores that surface, so the user can benefit from the full potential life of the bearing." Non-destructive methods could allow the true remaining useful life of a bearing to be quantified for the first time

Unlike older machine vision approaches, SKF's AI vision system has been designed to operate in real-world conditions, where images may be obtained on the factory floor or in the field and tight control over lighting and composition are impossible. The system can identify the bearing surface even if the image is captured in suboptimal conditions.

SKF's system is in the future expected to provide an initial "go/no-go" evaluation of a bearing which would indicate to the customer whether the component is suitable for remanufacturing or not. In the latter case, it is probably more cost-efficient to responsibly recycle the bearing locally. This new AI vision system is explained in detail in a recent EVOLUTION article "The future of bearing failure analysis is here" (<https://evolution.skf.com/the-future-of-bearing-failure-analysis-is-here/>).

Once a bearing is selected for remanufacturing and transported to the nearest SKF Services Centre, it is disassembled and cleaned ready for detailed inspection. Here, the REPaIR team is developing a new opto-mechanical inspection device based on machine learning technology. The images generated by this device will be processed by an AI system, which has been trained to identify and classify common bearing defects. Ultimately, the highly consistent images generated by the device will allow the AI tool to generate a comprehensive report on the condition of the bearing, including recommendations on the most appropriate sequence of remanufacturing steps. Remanufacturing inspection could offer the opportunity





## **"Light-touch" remanufacturing**

SKF strive to find the most efficient processes for their remanufacturing, the ones that favour a lean and light touch approach over multi-step routes that characterise 'heavy' remanufacturing. To this end, the REPAlR team is running an extensive test program to compare the operating life of damaged bearings at different reprocessing levels.

By testing dozens of bearings to failure on accelerated life-testing rigs, the team aims to unlock opportunities for new "light-touch" remanufacturing strategies. For example, one common form of damage is the result of hard contaminant particles entering a bearing during use. As these particles are trapped between the rolling elements and the raceway, they can be pushed into the surface, causing damage.

This type of damage usually appears as a pit or dent in the surface of the material, creating material displacement. "These situations are of particular interest to us because the traditional remanufacturing approach in this situation would focus on removing the entire pit in the bearing surface. Eliminating that may require the removal of a lot of material," says Sebastien Blachere, R&D scientist at SKF. "Removing only the main stress raisers is much easier, and our early tests have shown that doing this could be all you need to do to restore the full bearing life in some situations."

### **The life after remanufacturing**

The test program will give the REPAlR team a much clearer picture on the effectiveness of the different

remanufacturing strategies. Data generated by the program will also be used as input for new calculation models for bearings that have been remanufactured. "All the elements of the analysis program will help end-users, says Hannes Leopoldseder. "The first question many customers ask is 'how long will a remanufactured bearing last in my application?' With this programme, we want to give them a quantitative comparison between a new bearing and a remanufactured bearing, in order for them to make remanufacturing decisions with confidence."

This new ability to provide to the customer a life estimation after remanufacturing comes from two sources. The first one is a better understanding of the actual operating conditions in the application, for instance offering a more accurate estimation of the level of contamination. The second one is the precise knowledge of the actual conditions (surface and sub-surface) of the bearing parts after remanufacturing. These two sources are then the input of a predictive model based on current SKF high expertise in bearing performance modelling (GBLM Generalized Bearing Life Model).

### **A bridge between R&D and business**

The REPAlR program is then paving the way towards new remanufacturing offers fulfilling high-end customer expectation on planning and performance, together with environmental sustainability. Its ambitious objectives and its promising intermediate findings are the results of a close collaboration between SKF researchers and direct actors of the SKF remanufacturing business. This efficient way to anchor R&D programs into direct business targets is showing excellent results towards SKF costumers and high motivation within the various project teams.

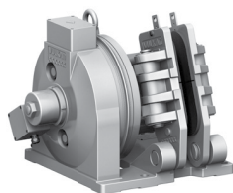




# AN AERIAL VIEW CAN MAKE EVERYTHING LOOK SMALLER – OR OUR SYSTEM SOLUTIONS EVEN BIGGER.



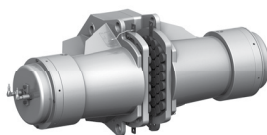
**FLUID COUPLINGS**  
Power rating up to  
3.700 kW



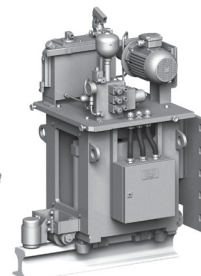
**E-MAGNETIC BRAKES**  
Braking Torque up to  
12.450 Nm



**E-HYDRAULIC BRAKES**  
Braking torque up to  
29.900 Nm



**HYDRAULIC BRAKES**  
Braking torque up to  
400.000 Nm



**RAIL CLAMPS**  
Clamping force up to  
400.000 N

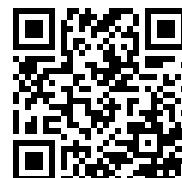


**BACKSTOPS**  
Torque up to  
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[info.vdt@vulkan.com](mailto:info.vdt@vulkan.com)



# Quick clamping shaft collars **for packaging applications**

+ + + + +



+ Ruland offers quick clamping shaft collars in a wide variety of sizes, styles and materials for packaging equipment. Quick clamping shaft collars require no tools for installation, adjustment or removal.





**Ruland quick clamping shaft collars require no tools for installation, adjustment or removal, making them a convenient and efficient choice for a variety of packaging equipment and applications.**

**Designers and operators of packaging machines such as wrappers, bundlers and cartoners benefit from the faster, tool-less adjustment of quick clamping shaft collars.**

Ruland offers two types of quick clamping shaft collars: collars with cam levers and collars with clamping levers. Quick clamping shaft collars with cam lever have an integral lever that sits flush with the outside diameter and is finger actuated. The design features a tension-adjustment screw that can be adjusted to tailor axial holding power to application needs. These collars are one-piece clamp style and require shaft end access to be installed properly. They are best suited for light duty and low rpm applications with frequent change-outs of items like guide rails or other setup fixturing.

Quick clamping shaft collars with clamping lever feature a Ruland manufactured shaft collar combined with an adjustable clamping lever that replaces standard hardware. The final assembly is a shaft collar with a ratcheting handle that can be easily installed, removed or repositioned without tools. They have the benefits of traditional Ruland shaft collars such as not marring the shaft, tight controlled face-to-bore perpendicularity (TIR of  $\leq .002$  inch or 0.05 mm), and a fine burr-free finish, allowing them to be used in a wide variety of packaging applications. These shaft collars with clamping levers are offered in one- and two-piece clamping styles and with outer diameter flats and holes for easier mounting of other components.

Quick clamping shaft collars with cam levers are manufactured from 6061 anodized aluminium bodies and 6063 aluminium handles with bore sizes from ¼ inch to 3 inches and 6 mm to 75 mm. Quick clamping shaft collars with clamping levers are offered in standard materials including 1215 lead-free steel with black oxide or zinc plated finish, 303 and 316 stainless steel, high strength 2024 aluminium,

and engineered plastic. The lever is sourced from JW Winco and features a zinc plated handle with a stainless steel threaded stud and internal components.

All Ruland shaft collars are manufactured from select North American bar stock in Ruland factory in Marlborough, MA, under strict controls using proprietary processes. Full product information, 2D and 3D CAD files, installation videos, and more are available on [ruland.com](http://ruland.com).

### Summary

- Quick clamping shaft collars require no tools for installation, adjustment or removal
- Two types available: with integrated cam lever and with removal clamping lever
- Quick clamping shaft collars with clamping lever are available in a variety of materials and styles to fit a variety of packaging applications
- RoHS3 and REACH compliant
- Carefully made in Ruland's Marlborough, Massachusetts factory and available for immediate delivery

### About Ruland

Ruland Manufacturing Co., Inc. is a privately owned family company founded in 1937. Ruland has carefully and responsibly manufactured high performing shaft collars, rigid couplings, and motion control couplings for the past 40 years. Ruland's product line was recently expanded to include a variety of machine components from select manufacturers that align with Ruland's performance and quality standards.

# Couplings in construction machinery powertrains

+ + + + +

+ Spring coupling from Torsion Control Products

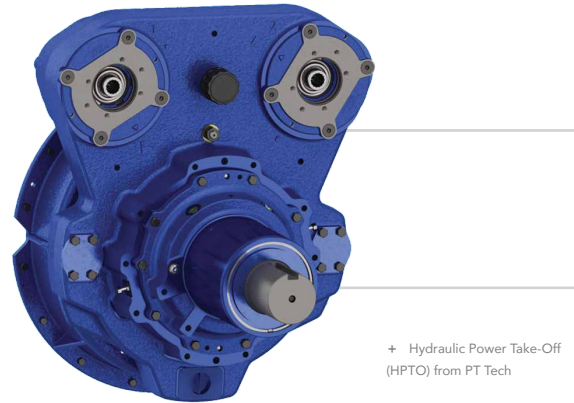


Spring couplings from Torsion Control Products (TCP) are ideal for use in construction machines powered by modern diesel engines. Thanks to their special torsional elasticity, these durable, robust couplings damp the vibration from the powertrain and remain serviceable even under the harshest operating conditions. Torsion Control Products is part of the US manufacturing corporation The Timken Company. Within the organisation of roller bearings specialist Timken, a division was created for further powertrain components, including the Torsion Control Products brand couplings as well as couplings and components from PT Tech und Lovejoy. These are now presented here for use in the powertrains of mobile construction and process machines.

"The variety of different powertrains fitted in construction machines is enormous," says Dr.-Ing. Peter Jaschke, head of Business Development at Torsion Control Products in Werdohl, Sauerland.

"As a rule, the objective of every construction machine manufacture is to develop a long-lasting powertrain that is perfectly compatible with the construction vehicle and its work process, and that functions reliably in the harsh operating conditions. This requires working side by side with a partner which not only knows and can deliver a component, but also develops, manufactures and distributes many different products. This makes it possible to derive added value from the very beginning when developing a powertrain, through professional consultation and the technical implementation of customer requirements."

Using the example of a conceptualised powertrain, Dr. Jaschke presents a few core competencies of the brands cited above. Torsional vibration is certainly generated by the diesel-engine drives in construction machines, but also by many process machines such as the milling drums in road planers, the chipper drum

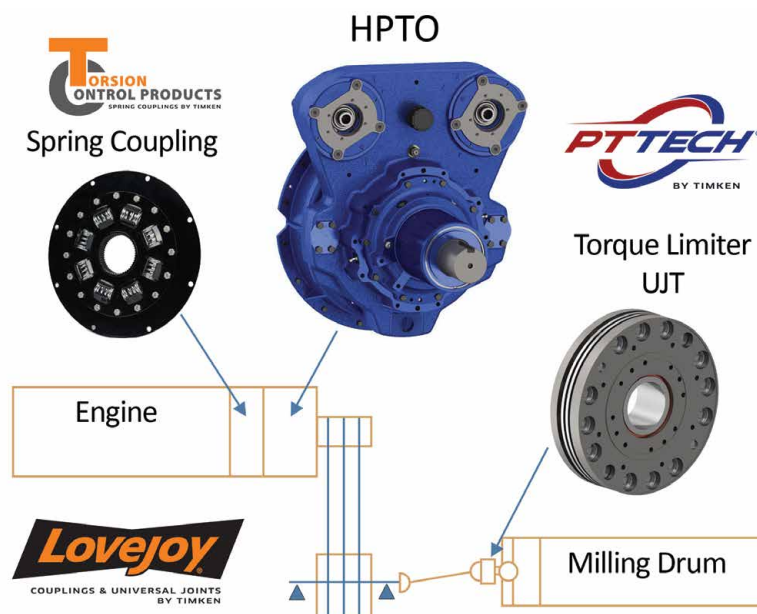


in wood chippers, or even crusher drives. "The aim is to influence these vibrations in such a way that none of the powertrain components suffer any damage. The steel spring couplings from Torsion Control Products are ideal for precisely this purpose." They can be adapted to the specific requirements through a wide range of different configurations. Particularly the spring characteristic and the damping property are important in this context, and an optimised selection is made on the basis of a torsional vibration calculation. The Smart Damping technology is especially effective here in suppressing undesirable transmission chatter.

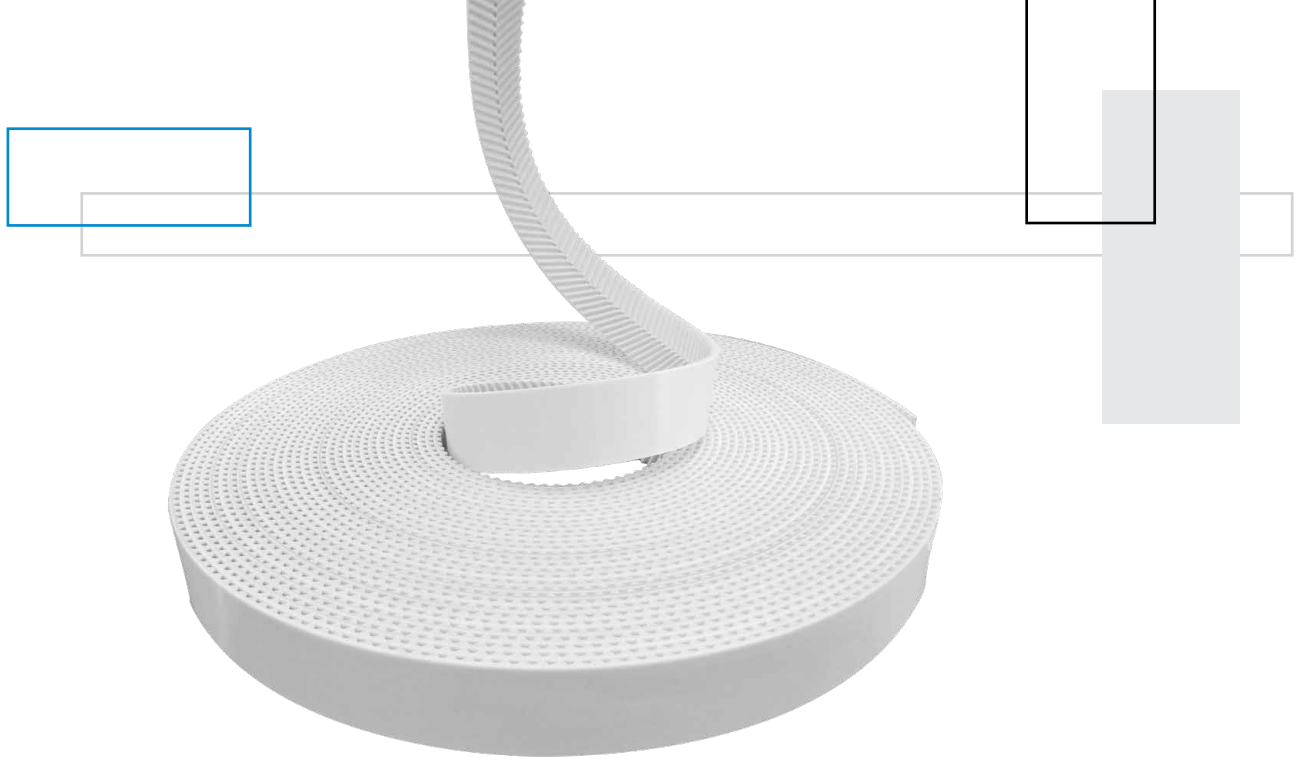
Hydraulic Power Take-Offs (HPTO) from PT Tech engage the power take-off. "Besides the sophisticated design of their vanes, they are also equipped with a specially developed controller, which enables them to accelerate high moments of inertia without causing the vanes to overheat," says Dr. Jaschke. If hydraulic pumps also need to be driven, the HPTOs can also be fitted with up to four additional power take-offs. Special adapters are available to enable the pumps to be connected directly.

If the drive has to be protected from high overloads, Dr. Jaschke recommends torque limiters from PT Tech, or – depending on the specification – shear pin couplings from Lovejoy: "It is most important, particularly in the case of overload couplings, to ensure that they function reliably and protect the powertrain. The torque limiters operate on the basis of spring-loaded friction discs. Presettable spring assemblies allow the pressing forces to be applied extremely precisely over long periods of time, thereby ensuring a even mode of action."

As part of Timken since 2017, Torsion Control Products has been developing, producing and distributing a wide range of torsionally soft couplings for mobile machinery for more than 30 years. The spring coupling series is available in various variants, and covers a torque range from 27 Nm to 27.000 Nm. Besides construction and roadbuilding machinery, typical application areas include agricultural vehicles, transmissions, hydrostatic pump drives, powershift transmissions and hybrid drives in mining machinery and industrial plants.







## – Megadyne Megalinear

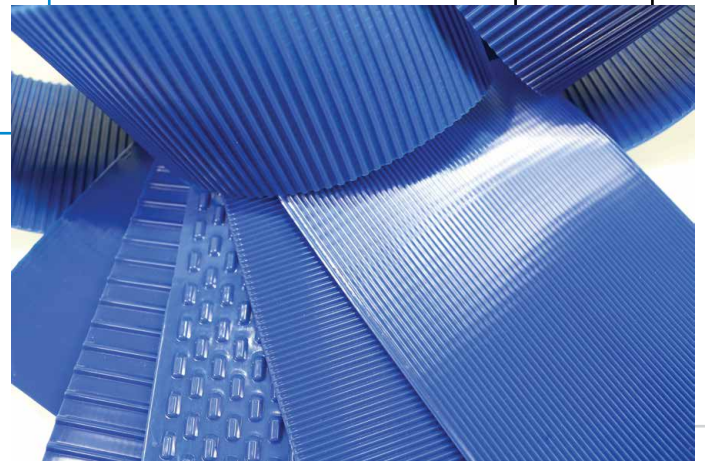
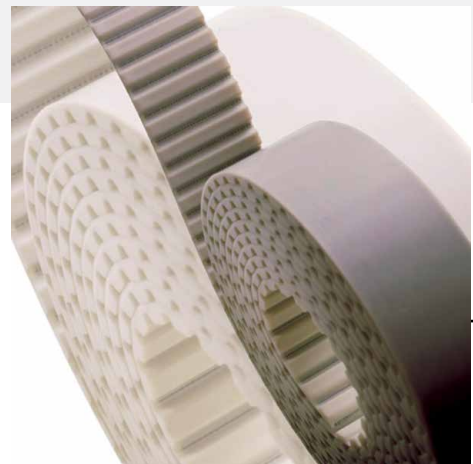
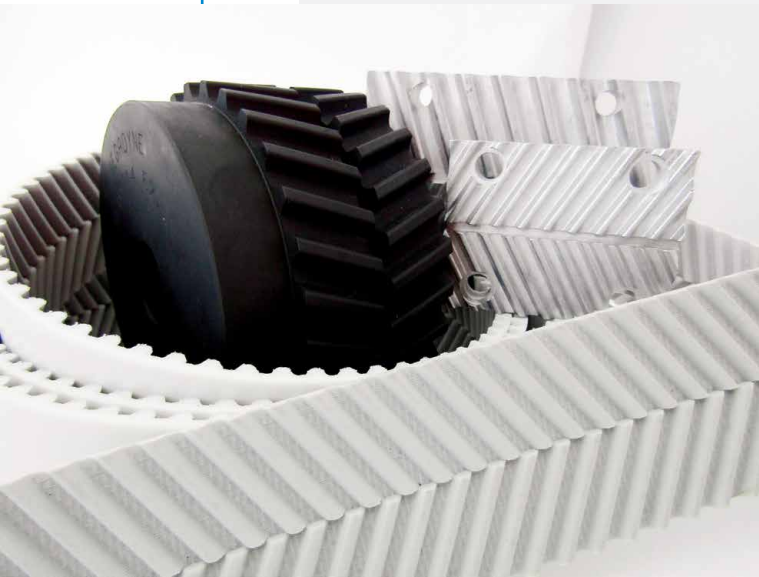
Megalinear open end timing belts are made of thermoplastic polyurethane for superior wear and abrasion resistance. A wide range of different cords (zinc-coated steel, Kevlar, stainless steel, High Performance, High Flexibility) offer exceptional operational characteristics, even under high tractive loads. Normally used in linear motion drives, Megalinear belts can be supplied as open end rolls or as endless jointed belts; they are particularly well suited where positioning accuracy, dimensional stiffness, high linear speed, low noise generation and long maintenance-free cycles are key requirements.



### Endless possibilities

Megalinear belts are high-performance durable belts specifically designed to run quietly and maintenance-free, even in high-force applications. High-strength S and Z parallel zinc-coated steel or Kevlar tension members and a main body of thermoplastic polyurethane characterized

by high levels of wear and impact resistance, help them perform demanding tasks accurately and reliably over a long working life. Their greatest feature is their versatility; with an impressively wide range of component and cover options, Megalinear belts can be tailored to perform optimally on any number of challenging applications.



## Meet the Family...

The Megalinear Family is available in all common profiles: Imperial, Metric, Parabolic and Flat. The range also includes the Megalinear QST, GW, FC and the new Megalinear MEGAC4T™. Megalinear QST is uniquely designed to reduce noise levels generated during high-speed operation, is completely self-tracking and provides high torque capacity. Megalinear GW is a thermoplastic polyurethane belt with high-tension steel zinc-coated cords and featuring high tooth-shear strength for greater transmittable power under continuous high loads. Megalinear FC is a new range introduced specifically for the food processing industry, meeting both FDA and EU food grade standards. Megalinear MEGAC4T™ (Adaptable Cleats For Transport) is perhaps the most versatile belt ever: easily interchangeable profiles allow use in a wide variety of applications, transporting goods of different shapes on a single conveyor system with a minimum of downtime.

## ...in a wide industry applications

Megalinear belts are used in packaging lines, sliding doors and lifts, robotic systems as well as in many other industries: wood, textile, chemical, pharmaceutical, glass, stone and marble, tobacco, paper and carton.





+ Dr. Johannes T. Grobe, CSO for the KHS Group





## Reliable and close to the customer: **KHS presents future-proof line and packaging systems at Anuga FoodTec**

+ + + + +

- + InnoPET BloFill ACF-L block system for aseptic filling
- + Standardized data interchange between IT systems and machines
- + Holistic packaging systems for greater environmental protection

From April 26 to 29 the KHS Group will be presenting its entire portfolio of modern filling technology and environmentally-friendly packaging systems at Anuga FoodTec in Cologne, Germany. With its efficient InnoPET BloFill ACF-L block system the systems provider looks to the future of aseptic filling. A further focus will be on the new standard interfaces for communication between KHS machines and customer IT systems. The turnkey supplier also continues to devote itself to saving on resources and protecting the environment with its holistic packaging systems.

“Efficient and economic filling and packaging processes make great demands of today's lines and machines. The intelligent KHS systems we'll be presenting at this year's Anuga FoodTec satisfy these requirements on all counts.”



+ InnoPET BloFill ACF-L // With the InnoPET BloFill ACF-L stretch blow molder/filler block KHS provides a system solution for sensitive beverages in PET bottles that is especially low on space.

For the filling of sensitive beverages in a hygienic environment the turnkey supplier provides an extensive portfolio of environmentally-friendly systems for various container designs and materials. With the InnoPET BloFill ACF-L stretch blow molder/filler block the Dortmund engineering company presents a further development for sensitive beverages in PET bottles that is especially low on space. The new system scores with a multitude of innovations, one being its new switching valve. This controls the volume of the inflow to the actual filling valve and thus permits a total of four different filling speeds. Bottle volumes both large and small with varying viscosities can be perfectly processed on this machinery – with extremely low foaming an added bonus. The filling process is stored in the product recipes; there is no need for manual conversion. This makes for a reproducible filling quality and improves filling accuracy. The result is a stable output of beverages with different properties, in turn boosting efficiency and the flexibility required to fill a wide assortment of products.

### Reliable data transfer through new standard interfaces

As part of its Basic Line Monitoring process KHS has developed new standard interfaces for line monitoring and order control. The respective modules facilitate communication between KHS machines and beverage producers' IT systems. Furthermore, regular updates and new versions ensure a high, reliable quality of data. With this new standardized approach the systems supplier's and customer's own IT environments can be connected up to the machines even better and even more economically than before. This renders previously required time- and cost-intensive customized harmonization and programming superfluous.

+ Packaging systems // In addition to its modern filling technology and various digital solutions the KHS Group will be exhibiting its entire range of future-proof packaging systems in Cologne.





+ **Innopack CNP** // Cardboard clips or toppers are positioned on cans before a wheel clamps their "claws" under the rim of the can and erects the top.

+ **Innopack series** // Thanks to their modular design Innopack packaging machines from KHS can be converted or retrofitted without any great effort being involved.



### Environmentally-friendly packaging systems

In addition to its modern filling technology and various digital solutions KHS will be putting its broad range of future-proof packaging systems on display in Cologne. "We're consistently working to save on resources and use a higher percentage of recycled materials in place of new ones. Our customers worldwide benefit from our over 40 years of expertise in plastic containers for beverages, liquid food and homecare products," states Grobe. KHS continues to build on its decades of expert knowledge in secondary packaging, too. Film made of up to 100% recyclate can now be used to wrap containers, as can paper or cardboard.

The newly developed Innopack CNP or Carton Nature Packer turns beverage cans into stable packs using toppers or clips made of corrugated cardboard or solid board. Packs of four, six or eight standard and sleek can formats holding between 250 and 580 milliliters can be produced at an output of up to 108,000 containers per hour.

Another packaging alternative is Nature MultiPack. This resource-saving system joins beverage containers together with dots of adhesive to form a stable pack and saves up to 90% in materials by doing away with

the secondary packaging. Nature MultiPack is now also available for the high-performance range, with throughputs of up to 108,000 containers per hour possible when running at overcapacity. Depending on the format, the machine manufactures up to 450 packs of four a minute.

### Simple retrofits on existing packaging machines

Moreover, KHS offers extensions for existing Innopack machines. The new alternative that wraps beverage cans in paper instead of film is one such retrofit, for instance. Customers can opt for more flexibility by switching between film and paper packaging as required or permanently switch to paper.

Johannes T. Grobe and his team are very optimistic about the upcoming Anuga FoodTec trade show. "We're looking forward to finally again being able to present our technologies to the expert community in person – while observing all of the relevant hygiene and protection rules, of course!"

For more information go to: [www.khs.com/en/media](http://www.khs.com/en/media)

“

**We're looking forward to finally again being able to present our technologies to the expert community in person – while observing all of the relevant hygiene and protection rules, of course**

**Dr. Johannes T. Grobe,**

*CSO for the KHS Group of the upcoming Anuga FoodTec trade show in Cologne, Germany.*

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## – Nord Drivesystems *at* **Anuga Foodtec 2022**

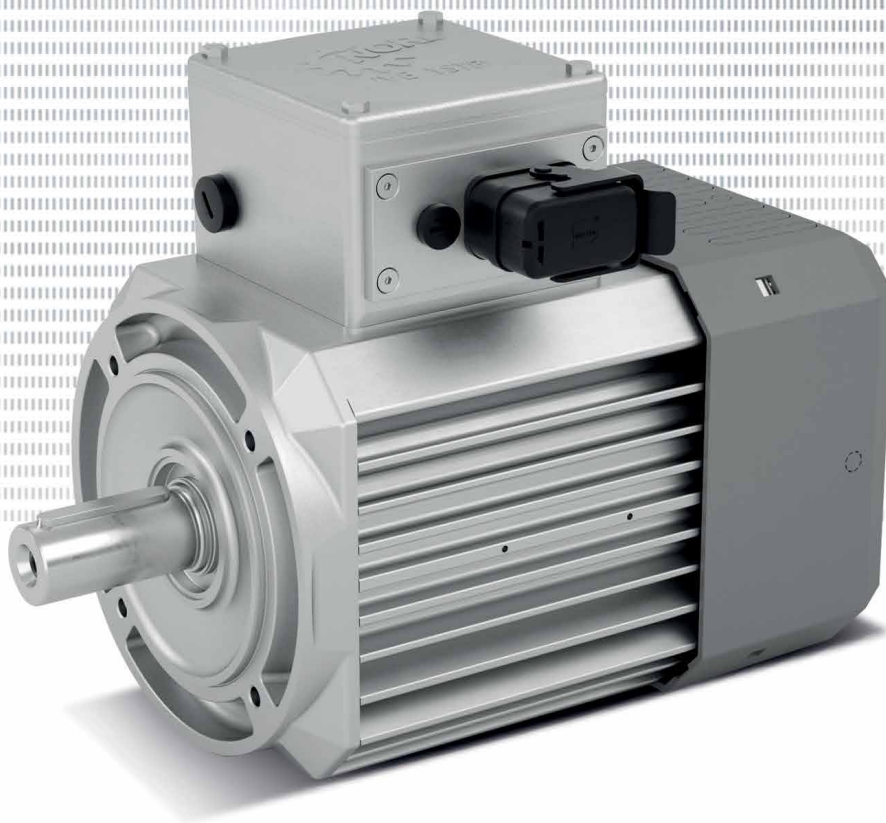
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NORD DRIVESYSTEMS will exhibit at ANUGA FOODTEC. With the IE5+ synchronous motor, the company is setting new standards with regard to energy efficiency of drive systems in the food industry and intralogistics. The high-efficiency IE5+ motor has now been integrated into a singlestage helical gear unit – thus further optimising system efficiency – and is also launched in the next size.

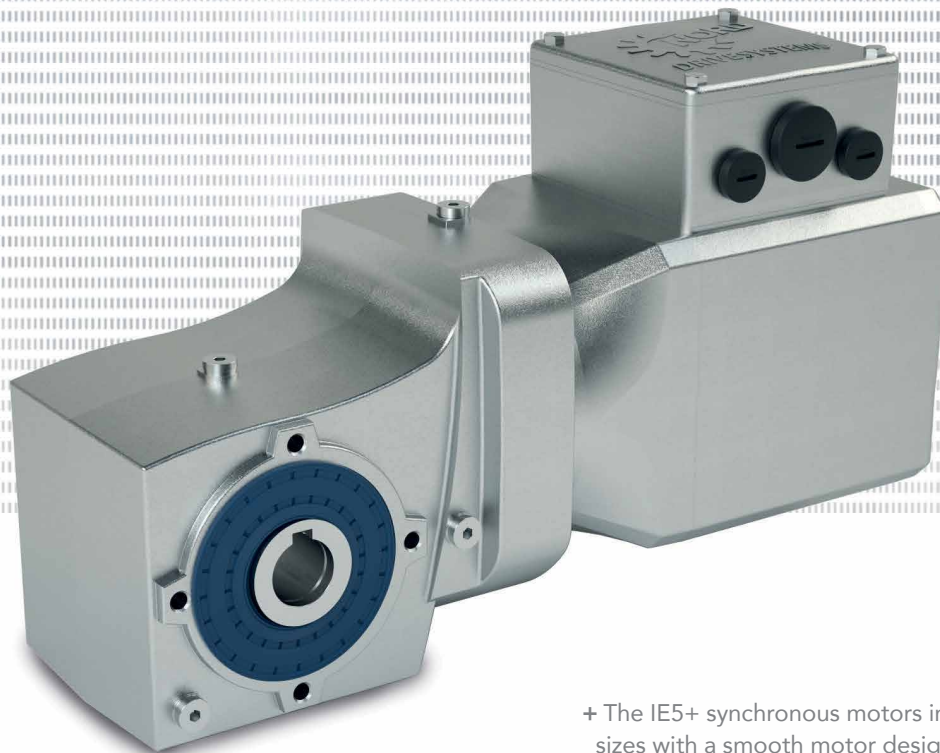
+ By installing the motor and the gear unit in one single housing, DuoDrive is very lightweight and compact, coupled with very high power density.

The new DuoDrive geared motor features high system efficiency and a consistent version reduction paired with a smooth, unventilated and compact design. Elimination of many wearing parts results in lower maintenance. In combination with the simple commissioning of the complete solution via plug-and-play, this results in a significant decrease of the Total Cost of Ownership

(TCO) compared to existing drive systems. DuoDrive is suitable for use in the food industry as well as intralogistics. With the IE5+ synchronous motor, NORD DRIVESYSTEMS is setting new standards again: The new motor is now available in ventilated or smooth surface versions for powers from 1.1 to 4.0 kW with a continuous torque of 6.8 to 18.2 Nm.



+ The new IE5+ synchronous motor is now also available for intralogistics applications in a ventilated version up to a power of 4.0 kW



+ The IE5+ synchronous motors in two sizes with a smooth motor design are ideally suited for wash-down applications in food and pharmaceutical industries

### Consistently taking integration to the next level

DuoDrive is a NORD DRIVESYSTEMS' revolutionary integrated geared motor in hygienic wash-down design where the IE5+ synchronous motor and the single-stage helical gear unit are installed in one single housing. As a system, the very compact DuoDrive concept achieves a significantly higher energy efficiency than the already proven combination of IE5+ synchronous motor and NORDBLOC.1® bevel gear unit. At up to 92%, DuoDrive currently offers one of the highest efficiencies on the market for geared motors in this power class, and achieves its very high systems efficiency even in the partial load range. It is thus future-proof and a real cost reducer. The first available DuoDrive size covers gear unit speed ratios of  $i = 3.24$  to  $i = 16.2$  and is designed for torque ranges of up to 80 Nm and speeds of up to 1,000 min<sup>-1</sup>. As it is easy to clean, corrosion-resistant and wash-down capable, DuoDrive is also ideal for use in hygiene-sensitive and harsh environments, and ensures higher system availability and lower cleaning costs through lower cleaning effort. If required, the motors are provided with a very smooth surface or the nsd tupH surface treatment.

### nsd tupH surface treatment: An alternative to stainless steel

In case of stringent requirements on surface and corrosion protection, nsd tupH surface treatment is the technology of choice. Thanks to a special method, the surface is made corrosion-resistant and harder and makes aluminium behave like stainless steel with regard to corrosion protection. This is not a coating, but a surface treatment that creates a protective layer which is permanently bonded to the substrate material. So nothing can detach or flake off. Damage remains locally restricted and does not spread. The drives are easy to clean and largely resistant to acids and alkalis. It is even possible to use high-pressure cleaners or apply aggressive media. nsd tupH treatment is available for most of the aluminium products in the NORD modular drive system, and ideally suited for hygienically sensitive applications in the food sector.

*You can find NORD DRIVESYSTEMS in Hall 7.1 on stand A030.*



# iMotion meetings

industrial motion hybrid meetings  
for **PT/MC Buyers & Suppliers**

*March - December 2022*

**6**  
Events  
in 2022

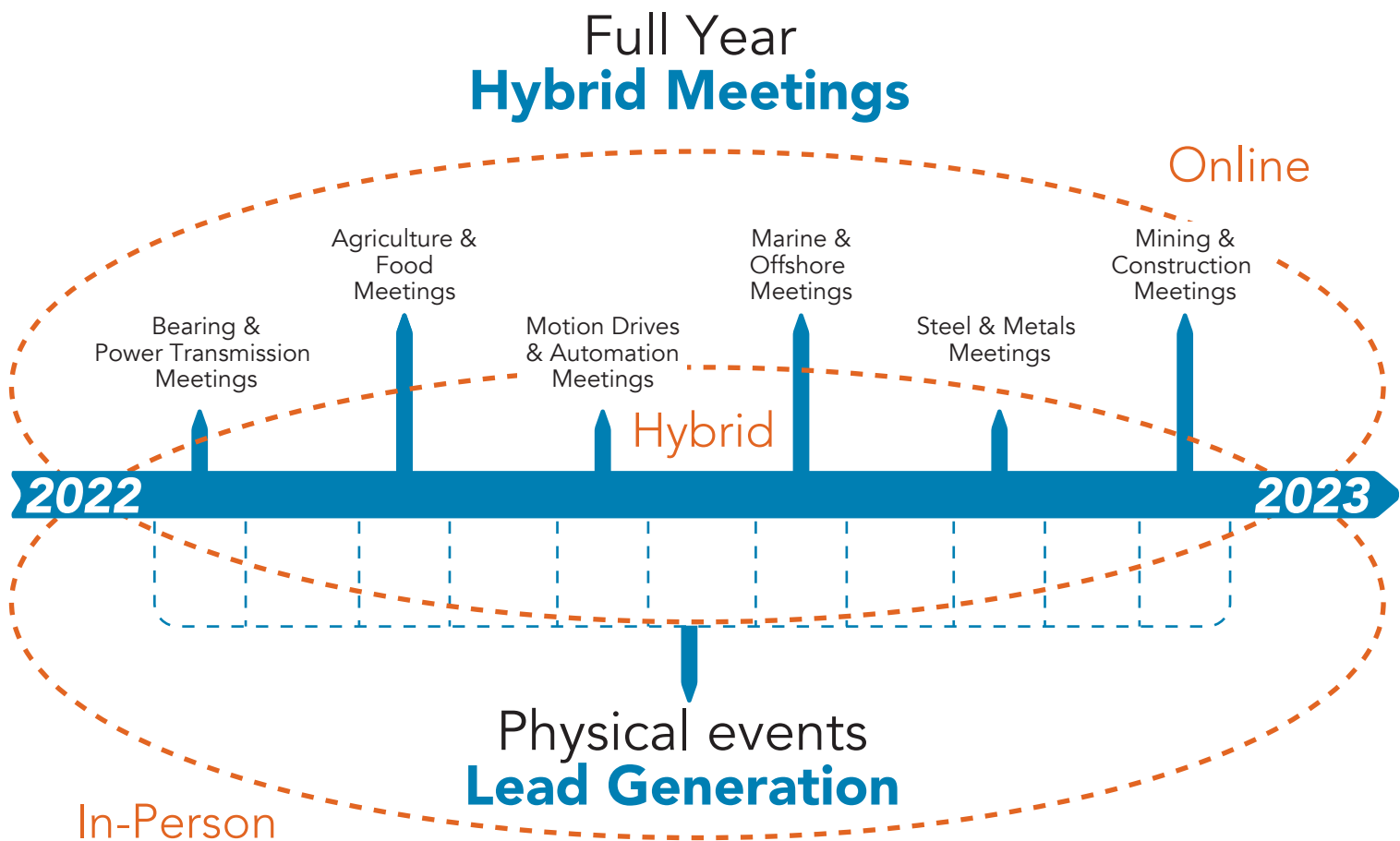


[www.imotion.events](http://www.imotion.events)

# What is Industrial Motion Hybrid Meetings 2022

## Best of the In-Person and Virtual Networking Experience

iMotion Events Hybrid Meetings is a unique event structure that will encompass a full year of virtual meetings across 20+ physical events audience within 15 different industries. Working globally through local teams and activities within the selected events, participants will be able to connect with PT/MC professionals, end-users, manufacturers and distributors worldwide. Operating before, during, and after physical events, the online matchmaking meetings will significantly augment trade show capacity and allow participants to return to virtual portions of their market at their convenience. Overall, iMotion Events Hybrid Meetings is offering a community building strategy with the opportunity to reach visibility among 100,000+ industry peers.





# 6+ Online Events in 2022

The iMotion Events Hybrid Meetings will host 6+ 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



## **Agri Machinery & Food Production Meetings**

23 - 25 May 2022



## **Motion Drives & Automation Meetings**

20 - 22 June 2022



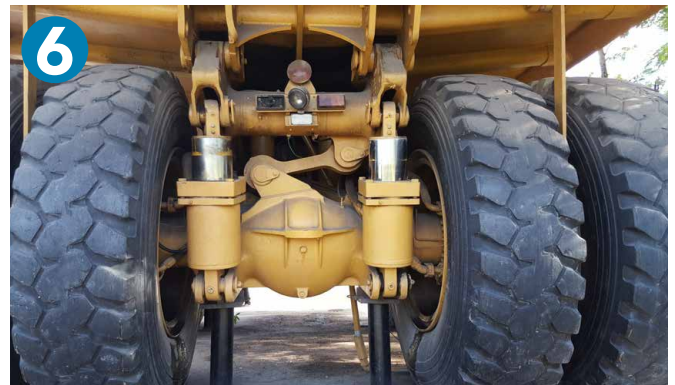
## **Marine & Offshore Meetings**

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



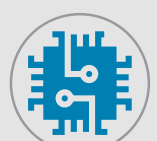
CONTROLS &  
SENSORS



CONVEYOR  
COMPONENTS



COUPLINGS



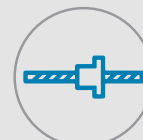
INDUSTRIAL  
ELECTRONICS



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



Lubrication



Mining



Agriculture



Gearboxes



Robotics  
& Automation



Food & Beverage



Distribution



Lifting



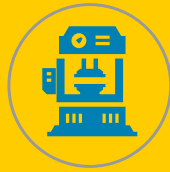
Automotive



Textiles



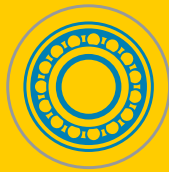
Wind Power



Machinery



Railway



PT Components



Offshore



Engineering



Machine Tools



Off-Highway

## 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](mailto:marketing@imotion.media) for your full-year free access to the online events.

[www.imotion.events](http://www.imotion.events)



# **— VULKAN**

## **How it all Began...**



Founded in 1889, VULKAN started to produce first clutches for lifting machinery, hoists and reverse gearboxes. Fast forward to the 50's, VULKAN set a milestone by producing the first highly flexible torsional coupling. By combining application know-how, cutting-edge technology and professional competence, over the years, VULKAN became synonymous with torsional couplings. It was not until recently that VULKAN started to develop internal technology and know-how either by producing elastomers for its products in-house or diversifying its own business.

Today, VULKAN counts on three major branches, which are VULKAN Couplings (linked to the primary marine market), VULKAN Drive Tech (the industrial unit of the VULKAN Group), and VULKAN Lokring (market leader for braze-free tube connections in refrigeration systems).

VULKAN Drive Tech operates in different industrial markets such as oil & gas, steel mill, energy, bulk material handling and mining to provide high-grade solutions for industrial drive. VULKAN Drive Tech has been setting standards in terms of performance and reliability in the harshest conditions. The horizontal integration of its portfolio creates added value for the customer: torsional flexible and rigid couplings, hydrodynamic couplings, brakes, backstops and resilient mounts are all available from a single source, perfectly integrated and works in tandem as a standard solution as well as individually tailored.

### **Uniting Tradition and Innovation**

Adopting a holistic approach to producing drivelines components for the heavy duty industries, VULKAN Drive Tech is guided by a mission to serve as a system solutions partner, preferably a simple products supplier. As international strategic partner for industrial transmissions accessories, VULKAN Drive Tech is driven by the goal to guarantee the utmost integration for different components in industrial drives, such as couplings, brakes and backstops. At VULKAN Drive Tech, we take care of the design, development, manufacturing, and most importantly, testing of all our products in-house. All product performances published in our technical literature have been calculated and tested in our in-house laboratories on a real 1:1 scale either statically or dynamically.

VULKAN Drive Tech engineering team is focused on guaranteeing that all the products installed on the same drivetrain, can properly perform and correctly interact with one another. This proves to be of great advantage for clients as they can now count on just one partner as the main source of all power transmission components and braking system.

Since preventive maintenance to reduce operational costs is also a mandatory requirement for the industry, VULKAN Drive Tech is engaged in developing innovative products to enable its clients to monitor product performances and operational status in real-time properly. For instance, VULKAN Drive Tech new power supply for electromagnetic brakes V317 can be remotely operated via the VULKAN app "V Connect", to check the main parameters of VULKAN Drive Tech electromagnetic brakes and, if necessary, reprogram the brakes' main functions remotely.

With its innovative offerings, VULKAN Drive Tech successfully optimizes its clients' product performances and reduces associated costs along the way. As a result, it has amassed an exemplary reputation among its clients.

What steers VULKAN Drive Tech ahead of the competition is its relentless pursuit to continuously improve and extend its products portfolio offering with new cutting-edge solutions which can, in the best possible manner, meet the continually evolving and changing requirements of main customers such as OEM and end-users. Furthermore, VULKAN Drive Tech optimizes its sales organization through a global presence of the company with 17 wholly-owned subsidiaries worldwide.

VULKAN Drive Tech guarantees value retention and high customer benefits for its clientele. To this end, it is always a step ahead of the competition. The basis of this is the reliability of the products and optimization of cost-benefit ratio against the backdrop of the high market requirements. Based on customer requirements, VULKAN Drive Tech engineers an integrated system solution consisting of couplings, brakes and backstops, which will fulfil the customers' initial technical and commercial requirement and therefore optimize products performances and associated costs.





## – Garlock GUARDIAN®

*labyrinth seals, the perfect solution for mechanical engineering applications, such as machine tools and milling machines, to avoid bearing oil leakage and debris inclusions.*



Lubricant contamination is a common issue in mechanical engineering applications. Labyrinth seals offer good possibilities to avoid these problems.

A major advantage of labyrinth seals is that they are mostly wear-free and thus particularly durable. They also function safely and reliably: Moisture, dirt and dust get caught in the zigzag labyrinth paths of the seal due to flow resistance. Leaks, which can become a hazard to employees and the environment, are avoided.

The labyrinth profile consists of radial and axial spaces that give a recirculating effect during rotation, resulting in reliable protection. The labyrinth is constructed to give a non-contact seal without wear parts - for long service life and with reduced drag on the shaft.

Machine builders are often on the lookout for a suitable solution for their specific applications. In the process, many aspects must be considered.

To give an example: A company, that develops, designs

and sells 3-spindle Machine Tools was looking for sealing solutions to avoid bearing oil leakage and debris inclusions. They offer over 3 times greater productivity with a single robot and its 3-spindle system ensures much lower running costs, saving on space, energy and specialist intervention. These are unique machines with a high degree of specialization and specific requirements. Garlock GUARDIAN® labyrinth seals have been installed between the housings and their spindles. Bearing oil leakage and debris inclusions were eliminated. The company specified GUARDIAN® in all machines of a special model replacing the original labyrinth seals. The introduction of GUARDIAN® simplified the overall design and related installations. Machine reliability increased reducing the total cost of production.

As a second example, consider the following case: A company, that offers milling solutions designed for the



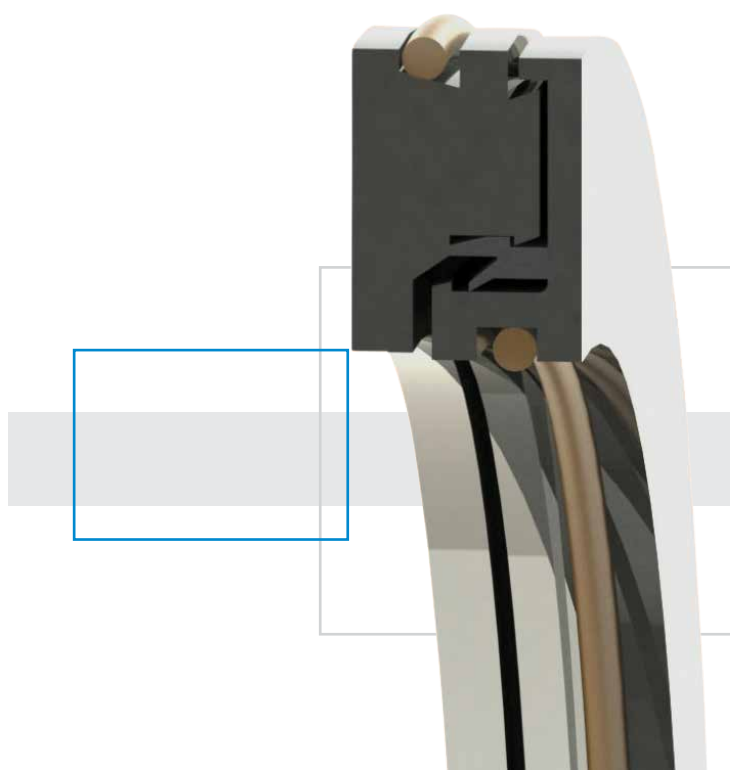
most demanding production environments, such as the power generation, automotive, aerospace, and railway industries, introduced new milling heads in their 5-axis machines and were looking for a specially designed bearing isolator. By offering the widest range of milling solutions on the market, including bed machines, gantry machines, floor type machines and machines with a T-shaped configuration, the demands were high. As it was a 5-axis machine, orientation of the head was constantly changing. Additionally, it is critical that the bearing isolator does not increase temperature in the bearing chamber as this could impact in the performance of the bearings. Garlock GUARDIAN® bearing isolators have been selected for the ability to provide a specially designed isolator, adapted to the customer's new heads and for its great performance after intensive testing. GUARDIAN® protects a high speed 6000 rpm / 80 mm diameter shaft (25 m/s) of their new milling heads, avoiding turbulent air-oil mist flow to get into the grease-lubricated bearings. GUARDIAN® mastered the requirements of the 5-axis machines and their heads and did not increase temperature in the bearing chamber. Prototypes were successfully tested in their test heads for several months. The customer has specified GUARDIAN® for their new head design, which is being introduced in all their new machines.

Garlock GUARDIAN® labyrinth seals are general-purpose seals designed to reduce downtime. The bi-directional seal provides both inlet and outlet protection. GUARDIAN® applications include auxiliary equipment in dirty, dusty, and wet environments. Split GUARDIAN® are fitted without dismantling the equipment. When uptime and mean time between repairs (MTTR) are critical, split seals are the right choice.

### About Garlock

*Garlock, an Enpro Company, is one of the leading international companies in the field of sealing technology and is regarded as a specialist for the sealing of critical and demanding media in innovative mechanical and plant engineering. More than 1,500 employees work for the company worldwide, of which around 240 work in Europe. Garlock is also represented by sales partners and specialist dealers in over 90 countries. Garlock supports a wide range of industries with an integrated range of services. In addition to standard seals, Garlock primarily develops and produces special solutions for customer-specific applications.*

*More information about Garlock solution can be found at [www.garlock.com](http://www.garlock.com) or by contacting [garlockgmbh@garlock.com](mailto:garlockgmbh@garlock.com)*









# The perfect solutions for **Roller Conveyor Manufacturers**



Hutchinson designs and produces customized materials and connected solutions to respond to the needs of its global customers, on land, in the air and at sea. As global leader in vibration control, fluid management, sealing system technologies, and belt drive systems, our Group stands out with a multiple market offering spanning multiple areas of expertise and delivering synergies and value-added. Hutchinson reported revenues of €3.800 billion in 2020 and has more than 40,000 employees in 25 countries. Our ambition is to contribute to safer, more comfortable, and more responsible mobility for the future.

Hutchinson designed the Poly V rubber belt, as a recognized worldwide specialist in rubber Belt Drive Systems. Since 1962, Hutchinson develops and manufactures complete Drive Systems incorporating ribbed belts, linear tensioners, thermoset pulleys, idler rollers.

As a market leader, the company works with the largest OEMs in automotive, appliance, conveying, HVAC, pumps, energy supply, heavy industry, small appliances, food processing, agriculture and gardening, quarrying, mining, and building. In response to industrial customer needs, and as designer of conveyor elastic belt technology,

Hutchinson has developed the Conveyxonic® belt for roller conveyor manufacturers and is a key partner by providing innovative solutions with added value, economical and reliable solutions.

#### **ConveyXonic® rubber belt**

To meet the needs of the roller conveyors manufacturers, Hutchinson has specially developed the Conveyxonic® elastic belt. This belt is now used worldwide by all the roller conveyors manufacturers and millions of Conveyxonic® belts are fitted on thousands of conveyors kilometers each year.



The Conveyxonic® is the «6 in 1» belt capable of transporting loads from 1 to 2 tons, as well as replacing up to six transmission systems used in the conveyor assembly (flat belt, round belt, chain and timing belt, twisted belt, and tangential belt).

The belt's elastic properties allow for at least 30% reduction in costs by using 1 motor for 50 rollers while improving life span and absorption of shocks and vibrations.

The Conveyxonic® is available in two profiles to cover a power range from 55 to 550W and a linear speed from 0.10m/s to 3m/s:

- + The Conveyxonic® PJ «Light loads» easily outperforms round polyurethane belts, with its transmission ratio 4-times higher.
- + The Conveyxonic® PJ «Medium and Heavy loads» can replace a chain drive system.
- + The Conveyxonic® PK belt can be used to replace chains for very heavy loads up to 2 tons.

With the Conveyxonic® belt, you can save at least 30 % on your global roller conveying system cost, reduce inventory costs and cut your budget on maintenance.

It is easy to use, and includes the following features:

- + Universal standard shelf product, automatic or semi-automatic installation
- + Worldwide product line availability
- + Simplified installation thanks to the products elasticity
- + Technical Performances:
- + Power transmission 4 times greater than a round belt
- + Rapid and smooth package flow (up to 3m/s)
- + Antistatic belts compliant with ISO 1813

Benefits:

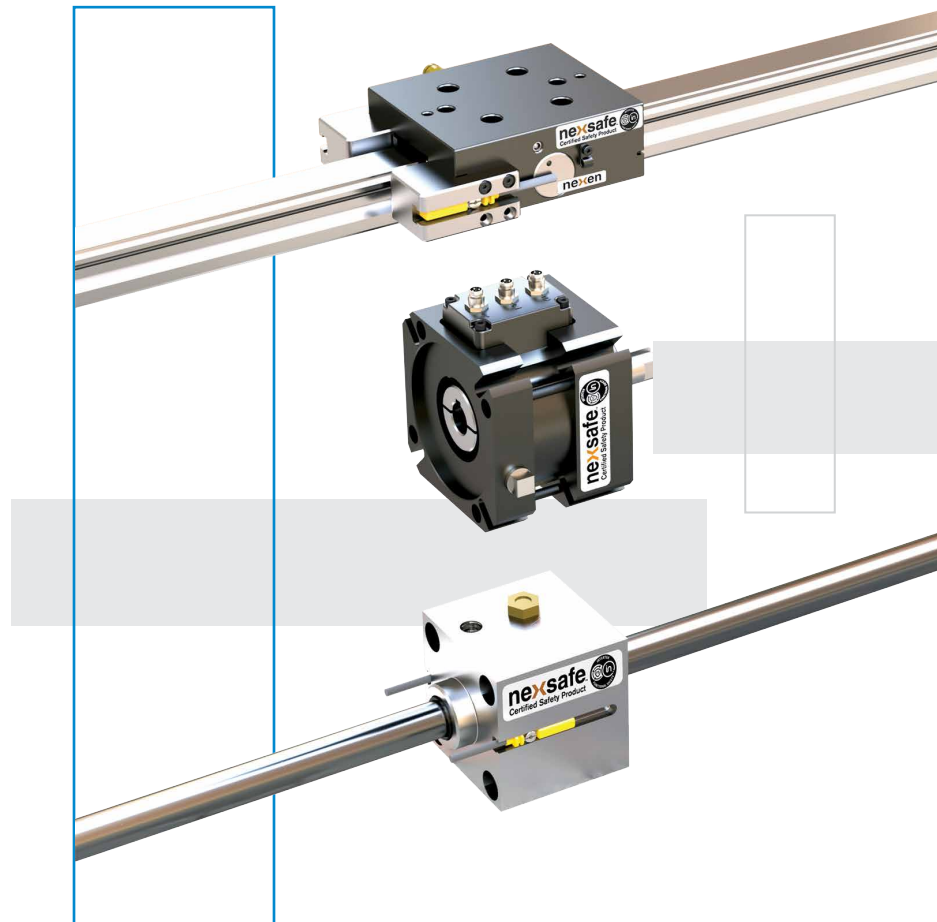
- + Durable and clean
- + Reliable and quiet
- + Guaranteed efficiency and ROI
- + Iso standard 9982
- + Free of maintenance (no grease necessary)

*To help you to define your Conveyxonic® belt for your roller conveyor in a few seconds, Hutchinson has also developed the CONVEYXONIC® WIZARD APP. Do not hesitate to connect to the App and order your Conveyxonic® belts at [www.hutchinsontransmission.com/resource-center/online-calculation-sofware/wizard-conveyxonic](http://www.hutchinsontransmission.com/resource-center/online-calculation-sofware/wizard-conveyxonic) or find Hutchinson products and solutions for all markets on the company website [www.hutchinsontransmission.com](http://www.hutchinsontransmission.com)*

# Making safety a priority: NexSafe brakes with functional safety certification

+ + + + +

Nexen Group, Inc. now offers three of its brakes products with functional safety certification under its NexSafe trademark name. NexSafe functional safety certified rod locks, rail brakes and servomotor brakes can be used for machine operations such as holding, emergency stopping or positioning. They are ideal for applications where safety is a priority.



+ From top to bottom: NexSafe rail brake for installation on profiled guide rails on linear axes; NexSafe servo brake for installation between servomotors and their gearboxes; NexSafe rod lock for installation with or on pneumatic cylinders.

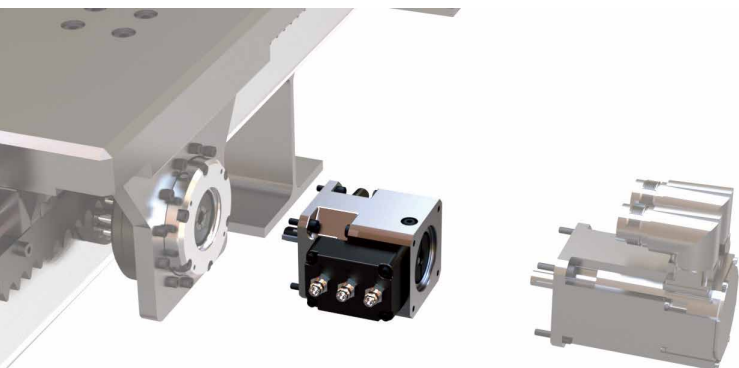


## Functional safety

Functional safety reduces the risk of injury posed by the use of machinery in the face of operator error or mechanical failure. Building functional safety requires the design and fabrication of protective features responding to human errors, hardware failures, operational or environmental stress. ISO 13849-1 is a safety of machinery standard that assists in the design and integration of safety related parts of control systems or machines. This standard includes a system of categorizing the risk a machine poses, and the safety functions to mitigate that risk.

## Certification program for industrial automation

Intertek, a company headquartered in London, provides assurance, inspection, product testing and certification. In July 2020 Intertek launched its Functional Safety Conformity Assessment Program for industrial automated machinery and robotics. The program offers manufacturers design evaluation, testing and certification with the Intertek Functional Safety (FS) Mark to signify compliance with rigorous standards for product safety and performance. The first products in North America to earn the FS Mark are Nexen's NexSafe rail brakes, servomotor brakes and rod locks.



+ The NexSafe servo brake has failsafe mechanical connections with the servomotor and gearbox; patented frustoconical friction-facing structures with tapers on both the outer and inner surfaces for simultaneous engagement with two mating surfaces; and optional sensors for feedback.

## Emergency stopping and holding applications

NexSafe functional safety certified brakes provide a verified, reliable solution that machine builders can depend on. With ISO 13849-1 Functional Safety Certification, NexSafe rod locks, rail brakes and servomotor brakes are ideal for operations such as holding, emergency stopping or positioning. They are an ideal fit for applications where safety is a priority. Optional operating mode sensors further ensure NexSafe products are a fit for safety channels designed for ISO 13849-1 categories B through 4 and performance levels PLa through PLc. In addition, NexSafe brakes are certified to meet IEC 61508, ISO 12100, ISO 13850, and ISO 4414 standards.

## Rail brakes: compatible with most profile guide rails and carriages

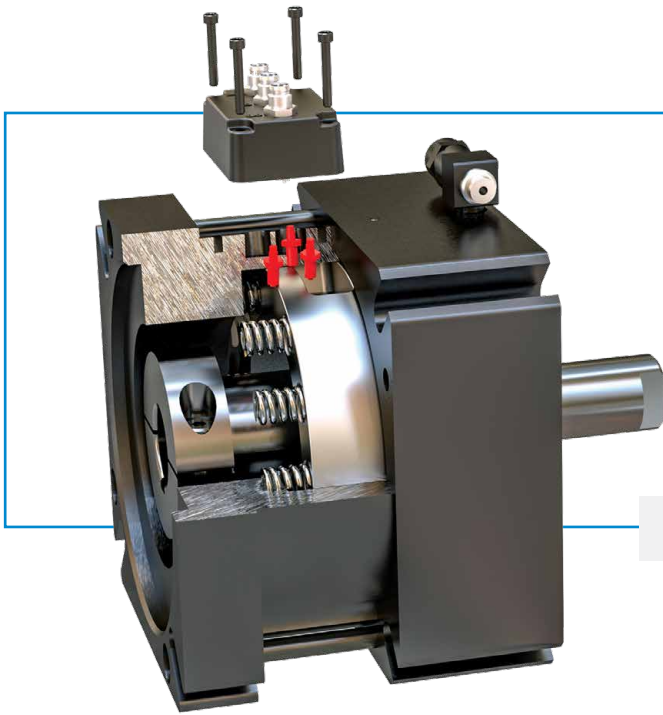
Rail Brakes grip and hold profile guide rails in linear motion systems. The NexSafe rail brake is a compact, powerful brake compatible with most profile guide rails and carriages. Rail brakes can be equipped with sensors to detect engagement and disengagement. Guide rail brakes with mounted sensors are ideal for E-stop and redundant safety braking applications such as gantry axis braking, industrial door open/close locking, medical equipment and hospital beds, primary and secondary packaging, and window and door manufacturing.

## Servomotor brake: powerful high torque brake between servomotor and driven load

Servomotor brakes have been developed for braking on the shaft end of a servomotor or between a motor and gear reducer. The NexSafe servomotor brakes stop the load quickly and enhance safety with bidirectional braking capabilities. Typical applications include the production of automotive parts, cyclical operations, food production (IP67) and packaging, gantry routing, robotics, and semiconductors.

## Rod locks: precision holding with guide rod systems and pneumatic cylinders

Rod locks can operate on round rails, linear rods, round shafts, and linear guide systems, or they can be mounted directly to an NFPA and ISO pneumatic cylinder. They are designed to grip and hold the piston rod of a pneumatic cylinder or a guide rod with extremely low backlash. They meet IP67



+++

+ The NexSafe servo brake shown here can include up to three sensors to monitor the disengagement condition, engagement condition, and wear. This feedback helps the brake satisfies the requirements for functional safety certification and deliver IIoT connectivity.

standards and can be equipped with sensors to detect engagement and disengagement. Rod locks are used for applications that require precise holding, fast engagement, and high cycle rates over millions of cycles such as automotive production, cyclical operations, food production (IP67), gantry routing, and platen presses.

### Functional safety features

Brake features to help achieve high levels of functional safety include multiple engagement springs that default to lock. The friction surfaces are equipped with a proprietary friction facing, tapered on both the inner and outer friction surfaces. Those surfaces apply the braking (locking) force via springs concurrently to both the rotating shaft and brake housing to hold the shaft from rotating, all with zero backlash. To ensure safe emergency stopping and holding, there are up to three operating-mode sensors for feedback. These are essentially inductive proximity sensors to sense three different brake conditions: First, disengagement: the proximity sensor in the brake activates when rated air pressure enters the brake's the piston circuit to essentially pull the friction-facing pair apart, for a disengaged (free-running motor torque) axis condition.

Second, engagement: the proximity sensor in the brake activates when the piston and facing friction-surface pair move into engagement and application of braking (stopping) torque. Third, wear: this proximity sensor in the brake activates when the brake is engaged but the friction facing is worn enough to necessitate replacement.

### Time-tested technology, Industry 4.0 ready

With spring-engaged, air-released functionality, NexSafe devices default to the locked position, making them ideal for holding a load in position or for emergency stopping situations. They can be used in any orientation. Nexen has manufactured thousands of rail brakes, servomotor brakes and rod locks for a wide range of applications. NexSafe builds on that experience, retaining form, fit, and functionality, while seeking enhanced safety. Industry 4.0 is a standard option all on NexSafe devices. More information about Nexen solutions can be found at [www.nexengroup.com](http://www.nexengroup.com)

### About Nexen Group, Inc.:

*Nexen Group, Inc. is a worldwide leader in power transmission, linear and rotary motion, and tension control components. Nexen holds 120 US and international patents. A privately held company, Nexen traces its origins back to 1902. For 50 years, Nexen has been producing industrial brakes, clutches, torque limiters, overload protection devices and control systems for a variety of industrial applications ranging from packing equipment to sawmills and automobile conveyor systems. Nexen's customers span every industry – from multi-national corporations to small businesses – and range from design engineers to plant maintenance. Headquartered in the USA and with its European office based in Wommel, Belgium, Nexen has more 40 sales offices and more than 1,500 distributor outlets worldwide.*

# The Couplings which you can **Fit and Forget**



In its 20-year history, Australian based Thompson Couplings Limited has seen great success with its innovative range of couplings which handle load misalignment and the associated vibration. In stark contrast to the industry-standard method of laser alignment procedures for rotating equipment these couplings with misalignment ability solve many difficult problems involving situations such as soft foot and vibration due to shaft misalignment. Most couplings within the range are **"fit and forget"** requiring no maintenance and take far less time to install and operate compared to traditional shaft couplings.

The Thompson "Alignment eliminator" or TCAE coupling has proven successful with companies such as Pulp & Paper Mills, Steel industries, Gearbox drives and more recently Power Take Off units solving a variety of often difficult installations.

The TCAE range of products can manage misalignment

angles up to a total of 10° and the new V series can operate in vertical applications.

Its distinctive double-jointed hinge mechanism provides the TCAE coupling with high radial and axial flexibility thereby reducing damaging side loads to the supporting drive shafts. As a result, the TCAE is far less damaging to pump seals, bearings and other expensive rotating parts compared to traditional "flexible" couplings when operating with some small degree of shaft misalignment.

In process plants, many pumps are rigidly bound by connected pipework and failures frequently occur with traditional couplings from thermal growth, soft foot and other misalignment forces. By contrast, the TCAE can eliminate these damaging loads by allowing the pump to freely move as the pipework "grows" or as the motor flexes on its mounts.





Tests have been conducted by the Australian group to demonstrate the potential greenhouse emission savings from a reduction in wasted energy compared to traditional “flexible” couplings. The more axially and radially compliant nature of the TCAE coupling means there is significantly less energy wasted when shafts are slightly out of alignment compared to the “stiffer” nature of elastomeric or disc type couplings.

The extensive range of models within the TCAE series can handle un-factored loads of up to 7,000 kW. A carefully developed spreadsheet selection method has also been introduced to allow users to easily choose the appropriate TCAE for their unique application. Since it was first introduced in 2009 the TCAE-R series coupling has become the product of choice for Australia’s largest pulp & paper manufacturers now with hundreds in various process pump applications. Similarly, one of Indonesia’s large paper mills has made the TCAE-R coupling the product of choice for their process pumps and gearbox drives.

The benefits these two companies realise is the **“fit and forget”** nature of the coupling as well as the quick installation and worry-free operation. Furthermore, they are seeing the real cost savings in their maintenance budgets from reduced equipment downtime and quicker time return to line. An Australian manufacturer of open cut gold mining vehicles has recently ordered the thirteenth TCAE-R-2 coupling for the power take off (PTO) drive for a hydraulic pump. Due to the demanding

nature and restricted space available in the engine compartment other shaft couplings were unable to cope with the imposed alignment angle between the diesel engine PTO and the hydraulic pump. According to the design engineer Jake Schliebs *“The TCAE-2 has been a dream – the whole process with working with Thompson couplings has been smooth as butter, so thanks for that – we’ll be in contact in the future for further orders then, since it seems like we’ll have more trucks built before we even need to look at them, cheers”*

Along with the “Regular” TCAE -R series the company has newly released the TCAE-V series range for challenging vertical applications including wastewater process pumps and deep well mining plants. The TCAE-V- series will accommodate up to 5 degrees misalignment angles between the vertically mounted motor and pump.

Another unique product in the company’s line is the Thompson Constant Velocity Joint or TCVJ. Its patented design features a double cardan joint with zero length intermediate shaft and distinctive spherical centering mechanism. This coupling is designed to transmit power at angles up to 20 degrees with the highest efficiency and at true constant velocity. Since its commercialisation in 2005 this product has seen great success as a propulsion shaft coupling in the marine industry. *More information about Thompson Coupling solutions can be found at [www.thompsoncouplings.com](http://www.thompsoncouplings.com).*

# – Flexacier/ Winflex grid coupling

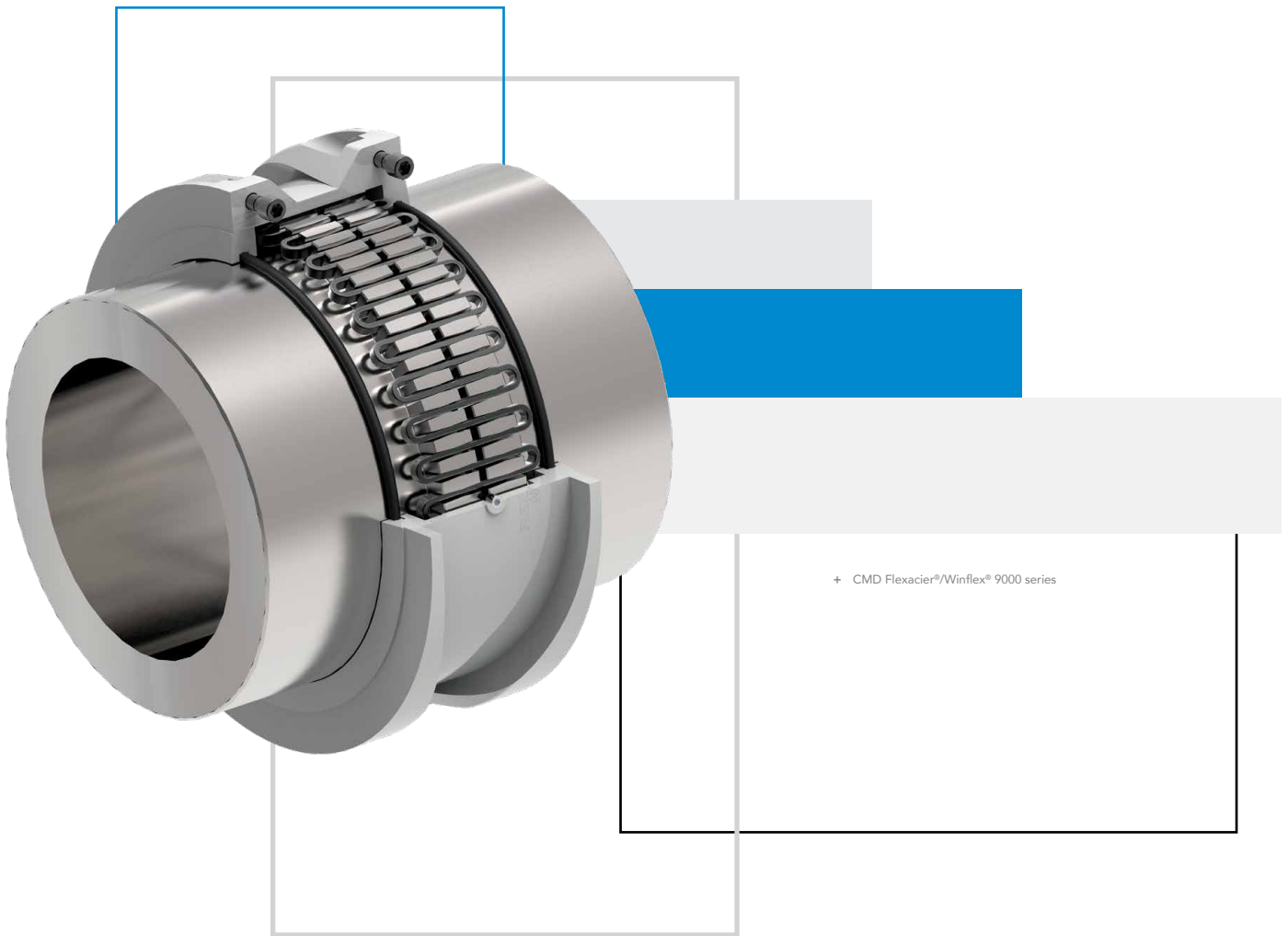
The real  
maintenance  
free & eco-friendly  
coupling!



Today's industries not only rely on investment costs or Capital Costs (CC), but on Total Cost of Ownership (TCO). TCO includes operating & maintenance costs (OMC) in addition to CC. Depending on the period considered, OMC can have a great impact on TCO, therefore reliability & long life of components is vital.

The Flexacier®/Winflex® grid couplings offer this reliability & long life (Flexacier® brand is widely used in french & spanish speaking countries, Winflex® brand is widely used in english & german speaking countries; Flexacier® & Winflex® represent the same grid coupling ranges ) ; its 100% compact metallic design, coping with harsh environment, can reach 40000 hours or 5 years between 2 maintenance operations.

Its unique design with the grid progressive stiffness allows to absorb every peak torque & shocks, observed for instance at motor start, and reduces vibration. A good summary of the Flexacier®/Winflex® coupling is that it has the torque transmission capacity of a gear coupling, with the same flexibility as an elastomeric coupling.



Elastomeric couplings manufacturers often promote the 'maintenance free' ability of these couplings; In fact, these couplings will require frequent maintenance operations (every 6 or 12 months), with an observed life span of 2 years (maximum 3 years in very smooth environments).

The sketch below provides various TCO's depending on coupling technology (observed by distributors in France), based on a 9000 Nm coupling rating. Comparison is made between 4 technologies :

- Elastomeric (Caoutchouc on the sketch)
- Disc ('Lamelles' on the sketch)
- Gear ('Denture' on the sketch)
- Grid ('Ressort' on the sketch)

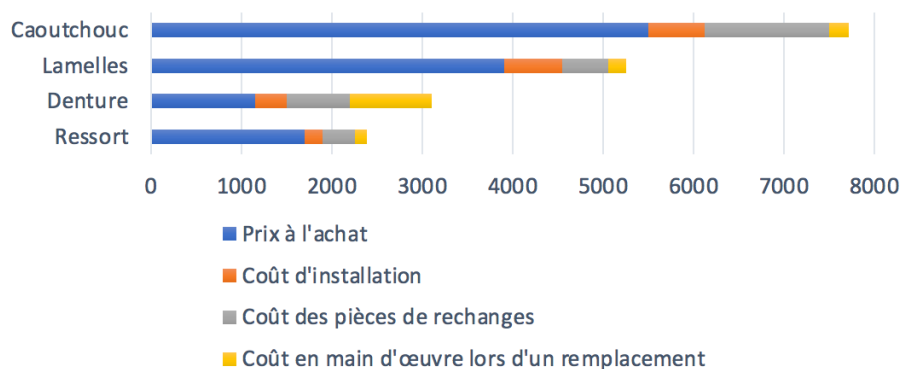
TCO is calculated by adding Capital Cost (CC) ('prix à l'achat', in blue on the sketch), and Operating &

Maintenance Costs (OMC), composed of installation cost ('coût d'installation', in orange on the sketch), spares cost ('coût des pièces de rechanges', in grey on the sketch) and maintenance staff cost ('coût en main d'œuvre lors d'un remplacement', in yellow on the sketch). Additional costs like 'in service' operation costs have not been included, as they are non significant on TCO, and technology has no real impact compared to maintenance strategy implemented by a company, so non pertinent for comparison purpose.

The CC indicated on the sketch are based on costs observed for western couplings manufacturers. More exotic sourcing is available today to reduce the CC, but for long enough periods (over 2 years), OMC will be significant enough to come to the same conclusion: The Flexacier/Winflex coupling has the best result for TCO & is the real 'maintenance free' coupling.



## Coûts d'usage par type de technologie d'accouplements pour un couple de 9000 N.m



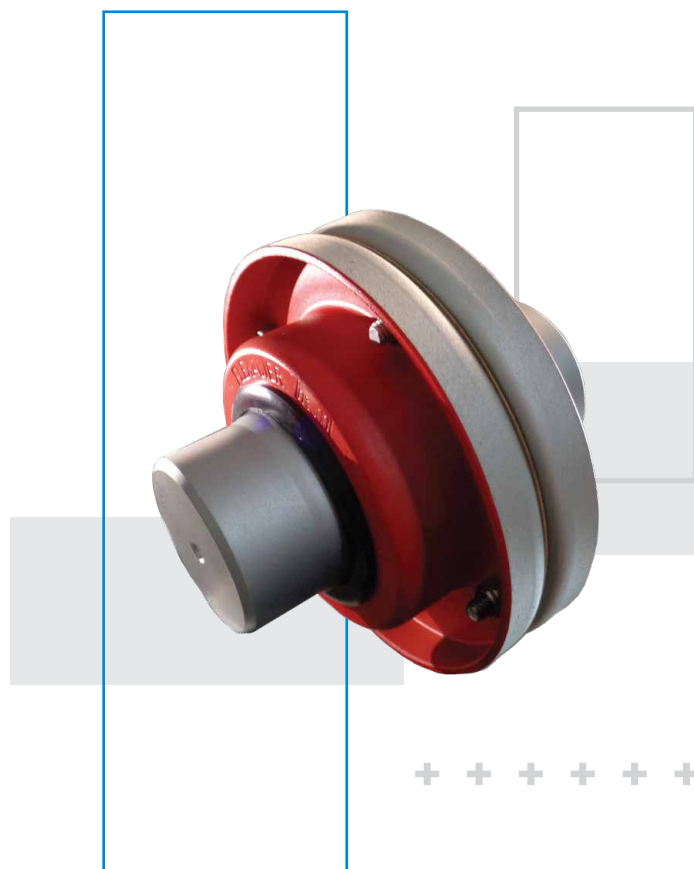
+ OMC comparison for various couplings technology (French distribution)

Another aspect to be considered, is the ability to be 'environmentally friendly'. Companies have more & more concern about their social & environmental impact, thus asking the same from their suppliers.

Being environmentally friendly is directly linked to longevity & reliability, of course, as less maintenance means less spare parts & less energy used. It is also related to recycling & circular economy. Grid couplings are made of metal, 100% recyclable. It uses lubrication of course, so extra care must be taken on sealing (problem is not the lubricant, but the leak), and also lubricant manufacturers make lots of efforts to promote more environmentally friendly greases, sometimes even with ECOLABEL. Worn elastomeric elements might be hardly recyclable.

For instance Grid couplings are now widely accepted for the food & beverage industries, as good alternates to 'non lubricated' couplings, or stainless steel couplings. Anti-corrosion or oxydation coatings, that have long been used for the ports & maritime industries (due to the highly salty & corrosive atmospheres), have proven to be compatible with the particular environment of food & beverage industries (with intense cleansing & washing procedures), with unrivalled torque transmission capacities (compared to elastomeric or stainless steel couplings).

To conclude, the Flexacier®/Winflex® grid coupling, offering unrivalled compromise between torque transmission, reliability & long life, is today the real maintenance free & eco-friendly coupling.



+ CMD Flexacier®/Winflex® coupling  
+ with anti-corrosion protection

# – Precision Spacers for Gearbox Applications

By Mark Bos, Fenner Drives

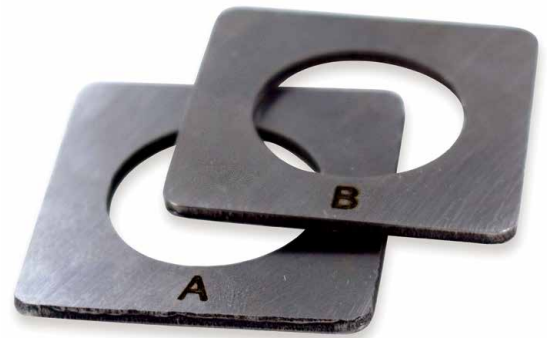


A problem commonly encountered in the manufacturing of gearboxes is filling the last gap in the gear shaft assemblies.

The accumulated tolerances of the many components can result in a range of gaps too wide to be met with a single size spacer. Filling the gap accurately and completely is critical to reliable, long-term operation of the powertrain or gear box.

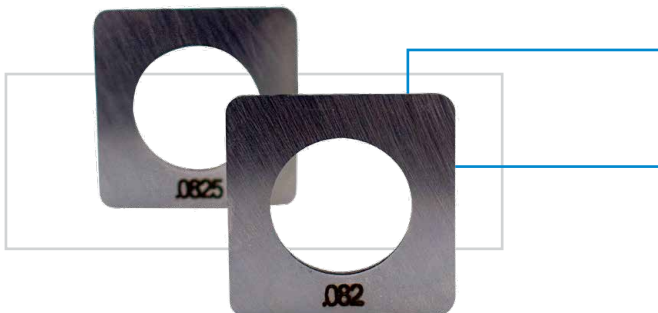
Traditionally the gap is filled with a combination of shims, or the gap is measured, and a thick spacer is ground down to a finished thickness. Both options are time consuming and slow the final assembly rate. They also introduce a significant chance for error.

National Bearings, a product line of Fenner Drives, designs and produces spacers to solve this problem for OEMs and is currently doing so for a major player in the industry. The custom spacers are manufactured in a range of precise thicknesses to fill the last gap with a single spacer, no matter how wide the gap that is produced by the combined components.



Made from stamped steels that are designed for extreme duty applications, spacers can be nearly any shape from a simple round washer to more complex geometries to fit any constraint. They are hardened and ground to precise thickness and flatness tolerances. Finally, the spacers are then laser engraved or color coded for easy and error-proof identification.

The distribution of the gap thickness in gearbox assemblies is usually uneven across the range of component stack ups, with a few specific sizes making up a majority of the usage. Precision ground stampings allow for the cost efficiency of high-volume manufacturing and the wide range of thicknesses usually provided by machining. That way it is possible to order smaller quantities of the infrequently used sizes while taking advantage of the lower pricing of those sizes requiring higher volumes. More technical details are listed below or can be consulted at [www.fennerdrives.com](http://www.fennerdrives.com).



## Technical Details

- + Typical materials: Bearing steels such as UNS 1050, 1074, 8620, 52100 or corrosion resistant steels including 302/304, 420 or 440C
- + Hardening up to 60 HRC
- + Surface finishes from .8-.2 micrometer RA
- + Thickness, flatness, and parallelism to .003 mm

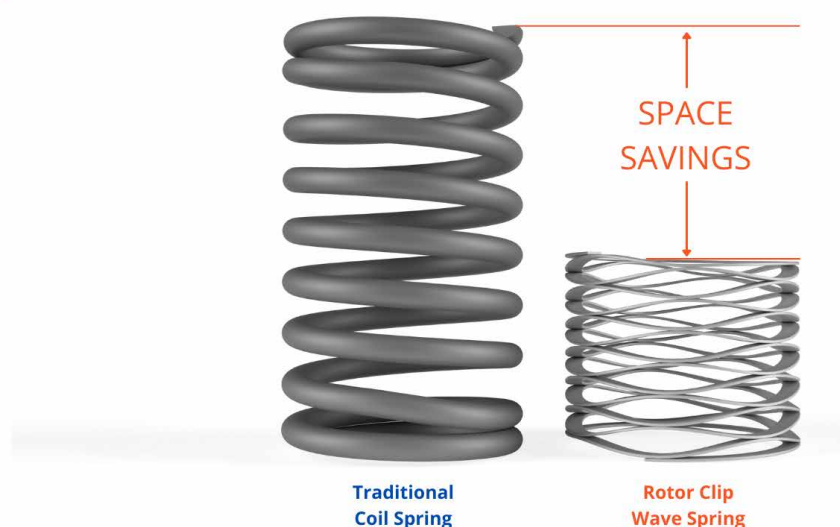
## – The Wave Spring Advantage



When considering a spring element for your technical application, it is worth comparing the familiar and traditional spring options to another innovative spring element, a wave spring. Most engineers have experience with traditional coil or disc springs, whilst wave springs remain somewhat of a mystery. Flat wire wave springs offer the best balance of size and spring force and in many applications, offers considerable advantages over their more traditional and well-known counterparts.







One of the main reasons to specify wave springs is the impressive force-to-work height ratio as they can produce the same or even greater forces as coil springs, whose work heights are up to twice as large. These axial space savings are perhaps the most immediately visible advantages of flat-wire wave springs. In static applications, a wave spring will typically need just 50% of the work height of coil springs to deliver an equivalent force. In dynamic applications, the work height advantage is typically about 30% less than the static applications, but still substantial. Wave springs can also save space in the radial direction compared to using disc or coil springs with larger diameters.

Wave springs can ensure a largely constant force over a large spring travel. Their deflection curves have wider, flatter linear force region than either coil or disc springs. Spring elements typically exhibit both linear and non-linear force behaviors, depending on their deflection. This linear behavior can be graphically shown on the spring's load-deflection curve. In general, the broader and flatter linear region of the curve, the easier it is to hit specific spring force requirements. Wave springs have a clear advantage in this department. They typically have a linear force between 30 and 70% deflections. Both coil and disc spring have much narrower linear force. Predictable spring forces can be a big benefit in many applications.

Another benefit of wave springs complete elimination of torsional loads. Whenever you compress a coil spring to its work height, loads are not just in the axis of compression but also torsional. These torsional loads can cause the pre-loaded component to rotate in use, potentially resulting in excess wear. Torsional

loads can also decrease the spring working load. Whilst many applications can suffer from this rotational wear problem, wave springs don't have this issue. Their wave forms can only compress axially.

Compared to a traditional disc spring, multi-turn wave springs offer far more travel. One multi-turn wave spring can easily replace the assemblies that use multiple disc springs to achieve the necessary travel. Replacing a stacked disc spring assembly with one wave spring can result in both cost and quality benefits. Not only will the single spring cost less to install, but it also reduces the chance of assembly error.

Wave springs can also be used to preload bearings, eliminate axial endplay, and minimize vibration. Applying a permanent thrust load to a bearing assembly is important for secure and successful installation. The bearing preload process extends component lifetime by eliminating unnecessary clearances, creating high stiffness, and reducing noise and vibration.

Unlike stamped produces, which require tooling, wave springs can be customized by changing the parameters of the coiling equipment. This ability allows you to specify custom wave springs without worrying about cost or delays associated with custom tooling. This capability is yet another cost factor weighing in favor of wave springs.

This unique spring element is the clear winners in a wide variety of engineered systems and in applications with high performance requirements.

*For more on wave springs, visit [www.rotorclip.com](http://www.rotorclip.com) or contact [info@rotorclip.com](mailto:info@rotorclip.com)*



## – Customised Solutions in Chains & Transmission Elements

+ + + + +

YUK helps customers developing their projects by offering quality bespoke solutions in conveyor and roller chains, and transmission elements. Since 1964, experience, dedication, development and investment have been the cornerstones of our company. More recently, YUK has been involved in a deep change process, struggling to step up a factory and facilities that meet the expectations of our clients.



### Key-figures:

- + Factory adaptation to Industry 4.0.
- + 14.000 sqm fully automated warehouse (Easy WMS Mecalux System synchronized with our ERP on real time).
- + More than 15.000 references representing over 7 million € stocks.
- + Specifically built-in warehouse for raw material storage, in times when supplies may be at stake.
- + New offices, showroom for customers and training dedicated area for employees.

### Digitalisation:

- + B2B e-commerce platform with real stock: in English/French/Spanish.
- + Implantation of a new CRM software that will help us put the customer at the very centre of the company.
- + Customer and employee training on Teams.

- + Specific training for LinkedIn Sales & development of LinkedIn Marketing.

### Environment protection committed company:

- + Increase of our solar power supply to reduce the use of environmentally harmful energy.
- + Digitalisation process to reduce the use of paper and printing machines and contribute to the safeguard of the environment (Docuware-Project)
- + Facilities for our employees to work in remote mode, to help preserve them from Covid-19 and reduce the impact on the environment, caused by systematic comings and goings from home to the office.

*YUK has a strong commitment to become a major player in the European market. You can contact YUK anytime at [export@yuk.es](mailto:export@yuk.es) or visit the website on [www.yuk.es/en](http://www.yuk.es/en) for more information.*





## – New Premium Roller Chain Developed for the After-Market



A new high precision Roller Chain, called EXL Chain, is now available offering superior quality and durability over standard Roller Chain. The new chain is developed by the Hangzhou Donghua Chain Group which is one of the world's largest chain manufacturers who supply their wide range of chain products world-wide.



*Short pitch precision roller chains EXL (A&B series)*

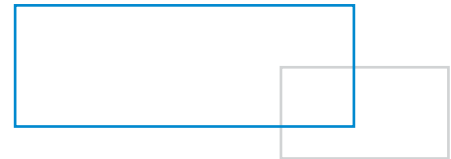
The EXL chain is a premium product positioned within Donghua's new Solution range. The Solution range offers customers a unique solution to problems with chain wear, chain fatigue, corrosion, high speed, lubrication, chain length accuracy and chain strength, whilst being designed for arduous environments.

Aimed specifically for the after-market, EXL Chain is designed, manufactured and tested for unbeatable accuracy and performance in arduous conditions, offering enhanced wear and fatigue resistance and greater precision than their Standard Roller Chain range. By utilising different materials, material treatments and layer



**I'm thrilled to introduce this new Chain and our Stockists are keen to see a new design of chain which offers significant benefits over standard Roller Chain.**

*Bob Wellsbury, Managing Director of Donghua Limited*



technologies, EXL Chain offers the best possible quality/price ratio for all applications.

New hardened, shot-peened wide waist plates deliver increased fatigue strength and a seamless cold forged solid bush and roller give full contact between the pin, bushing and roller for higher durability. Optimised cylindrical parts improve sliding contacts which help increase service life.

The chain also incorporates Donghua's unique Easy Break Technology. This unique feature enables EXL Chain to be cut in the field using Donghua's Plate Extractor tools. A video shows how the Easy Break Technology works and can be viewed at <https://youtu.be/UD6rtBEJrkM>.

Bob Wellsbury, managing director of Donghua Limited, said: "I'm thrilled to introduce this new Chain and our Stockists are keen to see a new design of chain which offers significant benefits over standard Roller Chain."

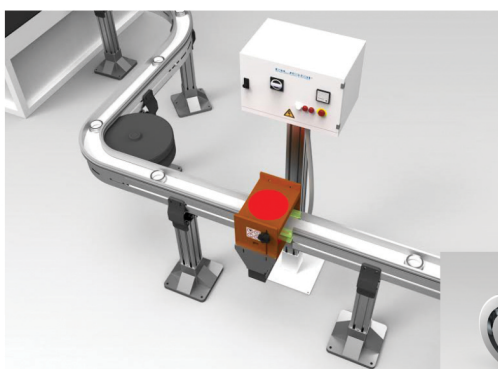
EXL Roller Chain is supplied pre-loaded with 40-50% of the breaking load. Roller Chains can be matched in pairs to close tolerances in Donghua's UK workshop. For chain lengths over 5 metres, the chain can be supplied matched & tagged for fitting in sequence. Pre-lubricated, as standard, using high performance synthetic lubricant ensures high workload performance in arduous and abrasive conditions.

Donghua's EXL Roller Chain is available in standard pack sizes of five metres, reels available on request, and bespoke cut-to-length sizes in British standard 06B to 32B, American standard ANSI 35 to ANSI 160 in simplex and duplex ex-stock. All Donghua Chains are marked with production batch codes for full traceability.

With increased precision, higher wear resistance and greater fatigue resistance, EXL Chain is the new Roller Chain solution of choice.

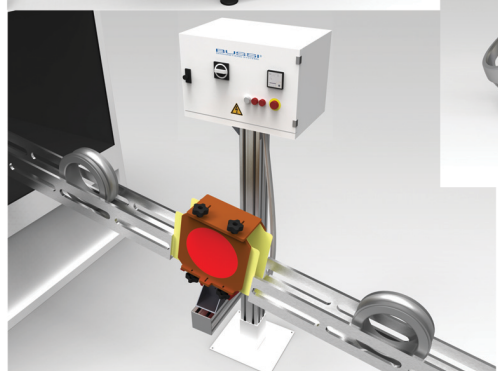
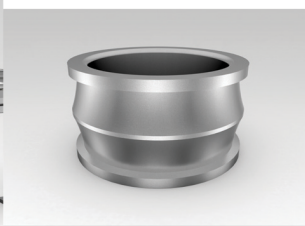
For more information about Donghua's EXL Chain and to download a catalogue, visit: [www.donghua.co.uk/exl-chain](http://www.donghua.co.uk/exl-chain)

## EXTEND BEARING LIFE WITH BUSSI ELECTRONIC DEMAGNETIZERS



During the manufacturing process, the demagnetization, as magnetic pre-washing, is the optimal preparation for the bearing components cleanliness.

Bussi Demagnetizers prevent from friction, limited fluency, early wear and reduced life of the bearings.



DISCOVER OUR SOLUTIONS DEDICATED  
TO THE BEARING INDUSTRY

DISCOVER BUSSI DEMAGNETIZERS  
KEY TECHNICAL ADVANTAGES:

- MINIMUM RESIDUAL MAGNETISM
- MINIMUM ENERGY CONSUMPTION
- HIGH DEMAGNETIZING VALUES  
REPEATABILITY
- EASY PARTS TRANSFER WITH NO  
MAGNETIC RETENTION
- EASY IN PROCESS INTEGRATION  
WITH I/O INTERFACE
- STANDARD A DEDICATED  
SOLUTION DESIGN
- HIGHLY DURABLE INVESTMENT



- **Ready to lift off to the world of maintenance with simalube**  
– *the next level of automatic lubrication*



The simalube IMPULSE connect is the latest generation of the pressure booster from the simalube family. The proven functions of the IMPULSE have been supplemented with the option of connecting the device to a smartphone via Bluetooth®. In connection with the newly developed "simattec world of maintenance" app, the devices can be easily configured and then monitored without having to be directly at the lubrication point. Information such as general status, fill level, lubricant, size, start and change date etc. is displayed to the user and easy to read in the app. It also enables the customer to manage the lubrication points digitally.



Every industry has lubrication points with requirements that can be optimally solved by using the new simalube IMPULSE connect. The initial installation as well as the subsequent monitoring can be carried out quickly and easily thanks to the support provided by the «simattec world of maintenance» app.

Together with the proven functions of the simalube automatic lubricant dispenser and the pressure booster IMPULSE connect, lubrication points are supplied with the required amount of lubricant with the greatest reliability, while at the same time reducing costs.

### Compelling customer benefits

Faster, easier and safer inspection rounds can save costs in the long run. The dispenser's status and error displays can be read directly in the app, and the lubrication points can also be managed in Lubechart via the app. Animated installation and operating instructions assist with a correct installation. Continuous lubrication ensures less wear on the components, which also leads to cost savings. Production downtimes for maintenance and monitoring purposes are eliminated, resulting in higher availability of the production equipment.

Together with the simalube lubricant dispensers in sizes 60, 125 or 250 ml, the simalube IMPULSE connect ensures reliable lubrication at high counter-pressures and in lubrication lines up to four meters long. Regular lubrication triggers supply the lubrication point with 0.5 ml of oil or grease up to

NLGI 2 at a pressure of up to 10 bar. This is gentle on the lubricant, as only the dosing quantity is under pressure. The operating status can be easily monitored with the «simattec world of maintenance» app. The intelligent pressure booster also provides continuous information about the current operating status.

### Simple installation and operation

As soon as the battery pack is inserted and the lubricant dispenser screwed in, the simalube IMPULSE connect is operational. The IMPULSE connect is connected to the «simattec world of maintenance» app via Bluetooth. The runtime, the size of the lubricant dispenser and the lubricant can then be selected and saved in the app. The system then works with the settings selected by the customer. When the lubricant dispenser is changed, the simalube IMPULSE connect remains permanently installed on the lubrication point. Only a new battery pack needs to be inserted before a new simalube lubricant dispenser is screwed on. This way, the connection point remains sealed even when the dispenser is changed and no lubricant runs back. The settings saved in the app remain the same, but can be changed if necessary. The new start date is set automatically after the new battery pack is inserted.

### Versatile and – thanks to reusability – very cost-efficient

The compact design of the simalube IMPULSE connect allows installations in confined spaces and in all positions; even under water. As an IP68 protection



class device, the pressure booster is dustproof, waterproof and suitable for use in a wide range of industries. Equipped with a new battery pack at each refilling, the simalube IMPULSE connect can be used for ten dispensing cycles of simalube 125 ml or for up to three years.

#### «simatec world of maintenance» app

With the «simatec world of maintenance» app, simatec ag has created a platform for easier and more efficient management of lubrication work. The app offers the user the possibility to record lubrication points, to set the necessary parameters for the lubrication and to control or monitor all activities around the lubrication. The simalube IMPULSE connect equipped with Bluetooth® can be configured directly via the app, the current operating status can be viewed from a distance of up to 20 m via the app.

#### Short profile of simatec ag

*simatec is an independent, globally operating family business in Switzerland and has been managed in the second generation by Mischa N. Wyssmann since 2005. Since its foundation in 1983, a motivated team has been developing and producing innovative products for the maintenance of roller bearings under the brand names simatherm, simatool and simalube. At the end of 2007, the simatec inc. subsidiary in Charlotte, NC, USA, and in 2017 simatec gmbh in Pforzheim, Germany, successfully started operations.*

*The simatherm induction heating devices enable rapid heating and the simatool tools facilitate the simple mounting and dismounting of roller bearings and other ring-shaped metal parts. And simalube lubricant dispensers automatically and reliably lubricate machinery and equipment around the globe.*

*With the launch of the simalube grease and oil lubricator, simatec opened up an extremely successful business segment and became one of the leading suppliers on the world market. The foundation for this success was the development of a special drive system: The patented gas producing dry cell enables a clean, safe, maintenance-free and long-term lubrication of bearings. This new technology simplifies complex processes and reduces the maintenance requirements on thousands of machines and systems.*

#### Manufacturer and Distributor

simatec ag, Stadthof 2,  
CH-3380 Wangen a. Aare, Switzerland  
Tel. +41 32 636 50 00, Fax +41 32 636 50 19  
Website: [www.simatec.com](http://www.simatec.com)  
Email: [welcome@simatec.com](mailto:welcome@simatec.com)

*If you have any questions about this article, please contact: Angela Kalousek, Marketing & Communications, simatec ag, Tel: +41 32 636 50 00, [angela.kalousek@simatec.com](mailto:angela.kalousek@simatec.com)*



# — Power Your Conveyor with Optibelt!

Transportation and motion over the last two years is becoming more and more important in various sectors and industries. Logistic systems and logistic centres are growing and the number of packages to be delivered have been increasing tremendously. Consequently, the need for more powerful transportation lines as matter of fact are being reported from our customers and market representatives.

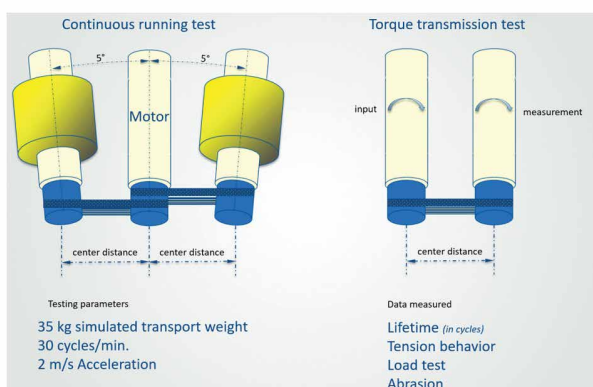
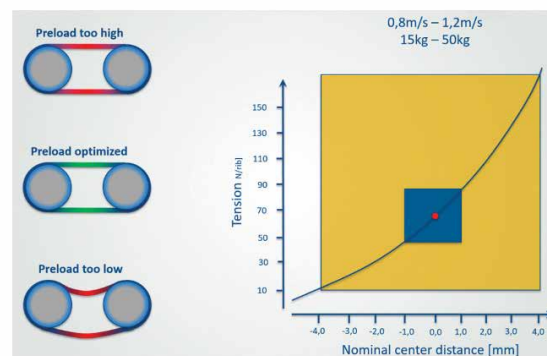


For these specific needs Optibelt have developed the product range Conveyor Power, mainly for roller conveyor systems. Beside V-belts the elastic rib belt is the major drive element.

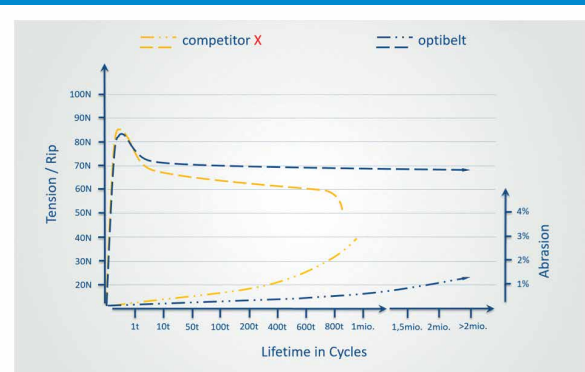
Optibelt Conveyor Power range is dedicated and especially developed for those roller conveyor systems and has advanced features as follows.

- + Highest power transmission vs. competitor products
- + More than 10 belts in a line suitable
- + Cold-resistant up to  $-40^{\circ}\text{C}$
- + High Temperature-resistance up to  $80^{\circ}\text{C}$
- + Shock load absorbing
- + Suitable for start / stop cycles
- + High efficiency vs. round belts almost on timing belt level
- + Maintenance-free
- + Suitable for curves
- + Quiet operation
- + Maximum of reliability

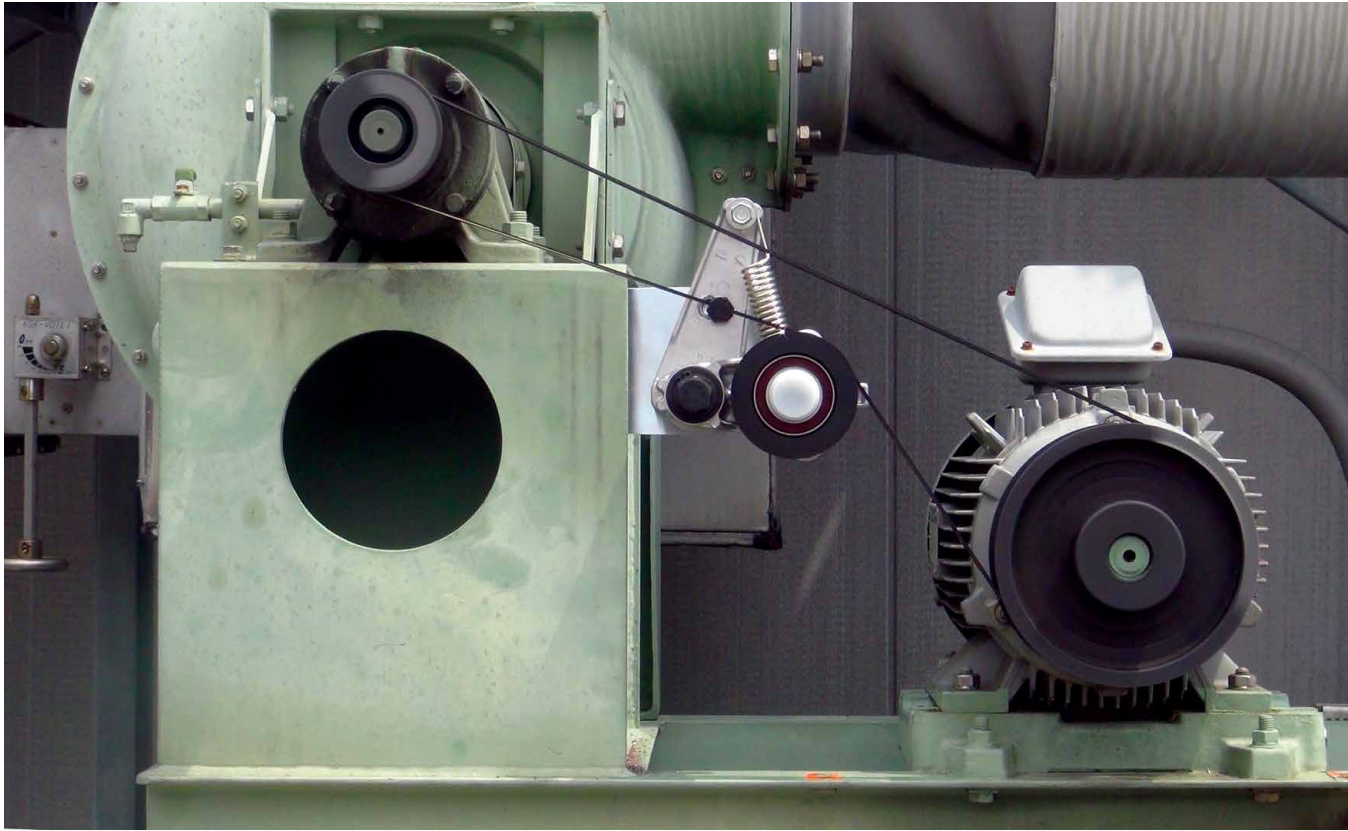
Our Conveyor Power rib belts are produced in tight length tolerances, for optimized operation tension in use (graph below).



Preload force & Usability of the belts added value with Optibelt Conveyor power



For more information about Optibelt solutions check out the home page on [www.optibelt.com](http://www.optibelt.com) or use the App Conveyor Power selector at [www.optibelt.com/en/products/ribbed-belts/optibelt-conveyor-power](http://www.optibelt.com/en/products/ribbed-belts/optibelt-conveyor-power)



## – BANDO's Energy Saving Transmission Belt System

+ + + + +

BANDO is a 115-year-old multinational enterprise based in KOBE, Japan. The company's main products are transmission belts for various kind of industries, automotive, motorcycle engine parts and industrial machines, HVAC, factory related parts/elevators, bank machines, security cameras in the town and printers or photo copiers in your office or in your house.





*BANDO could achieve  
ENERGY SAVING,  
LONG LIFE and  
MAINTENANCE-FREE  
operations.*



BANDO EUROPE has been established in 1978 - since then the company supplied transmission belts to Europe's competitive manufacturers mainly in automotive industries and precision machinery industries. The new challenge is to contribute to solving Europe's advanced and world's most required issues which is to reduce carbon emission and save energy.

BANDO introduced the energy saving transmission belt system called "HFD" which stands for Hyper Flat belt Drive, since the BANDO's engineering team believes that the combination of "FLAT BELT" + "AUTO TENSIONER" is the most efficient transmission belt system for HVAC industry. More than 100,000 units of blowers and 130,000 units

of cooling towers with conventional V-belts are running in Japan. It is estimated that - a possible change of those 230,000 units V-belts into HFD systems - could reduce approximately 60 GWh, which is almost equivalent to the electricity generated by one small size coal fired power plant.

BANDO has released around 7,000 units of HFDs in Japan, China, Korea and Taiwan. On the other hand, in Europe with the world's most advanced area for environmental protection, the company did not promote this advanced technology yet and aims to be the evangelist who will preach around the method how specific applications can reduce 5~7% of energy consumption with transmission belt systems.



HFD has two other features: One of them is the longer lifetime, HFD can achieve 24,000 hours lifetime, while a conventional v-belt's lifetime is around 8000 hours. The second feature is the maintenance-free solution. These days workforce for facility and asset maintenance has been reduced because of declining working population. For a conventional v-belt, three to four times maintenance is required during its 8000 hours lifetime. But HFD doesn't require any maintenance for its 24,000 hours lifetime and contributes to solve several related socio-economic problems.

How can BANDO achieve these major strong features? This is thanks to the patented tensioner pulley and the development process of the belt materials. For cars with an engine, the company offers a transmission belt maintenance solution for over 50,000 km. This thanks to the accessory drive produced for automotive engines; a ribbed belt and auto tensioner which enables the long life and long-term maintenance-free operation. BANDO introduced this advanced technology from the automotive industry into industrial applications. A good example is the comparison of a conventional v-belt and a flat belt. A flat belt is easy to bend, which means an easy installation capability on pulleys. A conventional v-belt needs more energy to be installed on pulleys, which causes the major loss for belt transmission.

BANDO also introduced a flat surface belt and the meander correction pulley. For the high-power motor application, it was not possible to use ribbed belts that have tiny V shape ribs on the surface, because they got destroyed with higher engine power. The company decided therefore to use flat surface belts instead. However, flat belts cannot run straight without any guide or flange. So, the introduction of the "meander correction pulley" which enables belts to run straight was the solution. With these technologies and innovations, BANDO could achieve "Energy Saving", "Long Life" and "Maintenance-Free" operations.

BANDO is looking for the right business partners from the following areas to build a long-terms cooperation.

1. OEM supply for HVAC (blowers, compressors)
2. Maintenance operation professional companies with wide network, especially for HVAC system. (Public facilities, Hospitals, Shopping Malls, and Factory)
3. Major manufacturing companies who have a target or goals for environmental protection or carbon offset.

Feel free to contact [info@bando.de](mailto:info@bando.de) in case you are interested in a partnership with BANDO:





## Build an Intelligent World with Innodisk's AIoT Data-centric Ecosystem

# — Well-prepared to Build an Intelligent World

*Innodisk AIoT Solutions Target EV and Smart City Innodisk*



Innodisk, a leading global provider of industrial flash and memory solutions, reflects on its AIoT wins of last year and outlook for 2022. Even now, in 2022, AIoT is still a buzz that's impossible for business leaders to ignore however many are still not exactly sure how the pieces of the AIoT puzzle fit together or where to start. But the business proposition is clear, with 39.1% annual growth expected over the next five years. To seize the opportunities in the AIoT market, in 2021, Innodisk joined up with its subsidiaries to form an AIoT data-centric ecosystem called the "AIoT All-Round Service" that combines their expertise to provide a fullservice industrial AIoT package.

After a year, Innodisk's recent experience confirms this market trend, with AIoT-related projects doubling each year. A deeper look reveals the primary focus lies in 5G, networking, infrastructure, and automation fields.

Especially with the high-performance industrial-grade storage, memory, and embedded peripherals, as well

as software, Innodisk is now going one step further, integrating these into AIoT technology solutions that withstand heavy vibrations and harsh outdoor environments, such as AI robots and electric vehicles.

AI robots have secured their place as the hands-free delivery method of choice in hotels, hospitals, and airports during the pandemic. These electronic helpers meet contact and social distancing prerogatives while reducing personnel workloads. Innodisk worked together with a hi-technology venture in the smart services sectors to integrate its customized SSDs into their AI robots, ensuring reliable operation.

Electric vehicles place a large strain on electronics, with vibrations and heat exceeding the thresholds of standard equipment. A multinational technology company used Innodisk's wide temperature DRAM modules, industrial-grade flash storage, and its subsidiary Antzer's GPS Tracker for their EV truck. As a result, their retail delivery system benefited from the AI technology while reducing pollutant and noise emissions. Eric Chang, Special Assistant of Innodisk, said, "We're confident that the increase in AIoT applications will continue thriving through 2022, especially for electric vehicles and smart city applications." He further added, "Electric vehicles like buses, trucks, logistics, and fleet management will all see growth. Smart cities are also in focus as more countries invest in technology construction to harness AIoT and smart cities, including intelligent street lamps and surveillance systems." Innodisk is well-prepared for these technological advancements and has set a goal to "Build an Intelligent World".





# - M.E.C.® ProfilBelt: A Zeta Gomma excellence in “customised” belts

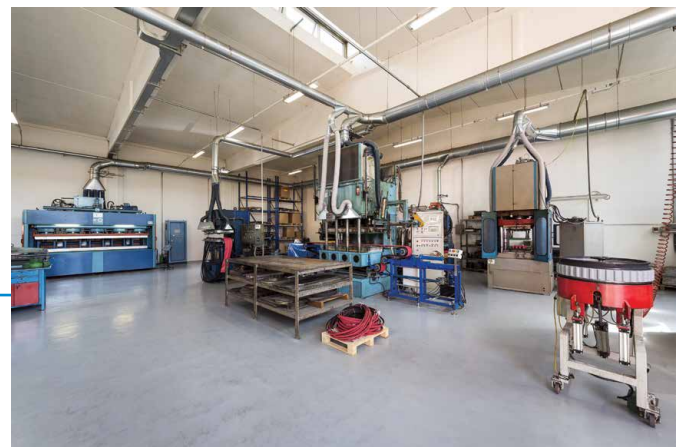


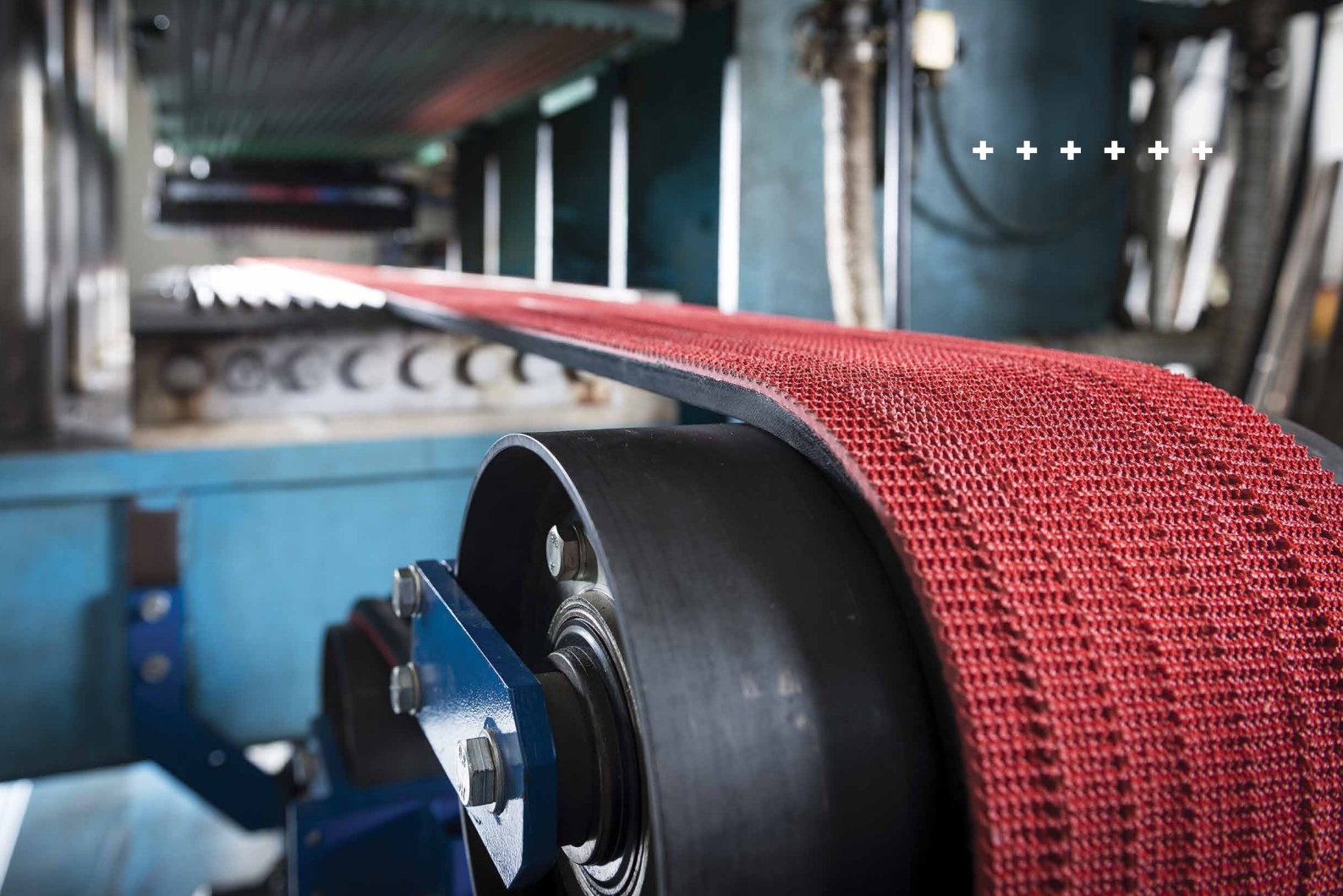
A Zeta Gomma is an international company, established almost 50 years ago in Sassuolo (MO), in the heart of one of Italy's most important industrial areas (for ceramics in particular).

It has a wide range product such as power transmission belts, v-belts, and conveyor belts (in rubber, PVC and PU), as well as thermo-weldable belts, hoses for roller coatings, rubber sheets, moulded products, technical items and equipment for pressing, welding and joining belts. The main features of A Zeta Gomma are the top quality production and the versatility to meet every specific customer need and durability under all conditions of use, even the most severe.

A distinguishing point of A Zeta Gomma's excellence is the M.E.C.® ProfilBelt range, completely customised belts with special rubber coatings.

Thanks to its experience in moulding and a fully equipped internal vulcanising department, A Zeta Gomma is able to create a wide range of coatings in order to adapt the belts to many applications. The coatings differ in terms of the type of rubber, colour and shape, and are perfectly tailored to each customer's requirements.





M.E.C.® ProfilBelt optimise the conveyance of materials on horizontal, sloped, or vertical, and their versatility is due to their production features: endless coatings can be vulcanised with different types of rubber, in different colours and shapes, and with smooth, honeycombed or rhomboidal surfaces which can also be made according to the customer's own specifications. In all conditions of use, M.E.C.® ProfilBelt guarantee maximum strength and reliability, in true A Zeta Gomma style. Particularly for this type of belts the great value to be considered is the free set length, which the M.E.C.® ProfilBelt range ensures at the highest levels, providing a leading service, up with the technological developments of machines in the various applications fields.

The great tensile strength of these high-performance belts is combined with optimal flexibility, to minimise the wear and tear of the machines on which they are used. The belts are customisable in every aspect: from the preliminary consultation to the creation of the design, preparation of the sample and final production, thanks to the know-how of the company's internal technical department. This is possible as a result of the A Zeta Gomma's extensive and comprehensive experience in the vulcanising sector: the company is able to rubber or silicone coatings through truly "endless" vulcanisation, to ensure the highest levels of quality. The hot vulcanised

coating on the belt grants a friction for the maximum grip on the conveyed material. The selection of the raw materials is based on the experience acquired by A Zeta Gomma in its numerous years of belt manufacturing, together with constant input from customers, with whom it has almost daily consultations, leading to continuous improvement of the product.

A Zeta Gomma ensures a large availability of its products thanks to the 20,000 m² of floor space, including commercial headquarters, three production units and one warehouse, with 80,000 items immediately available, in order to ensure high standards of product customisation, industrialisation and distribution. A distinctive feature of A Zeta Gomma is the services it offers to its customers: thanks to the direct in-house production of its own item range, A Zeta Gomma is able to meet all customers' needs, no matter how particular or complex. The services begin with customised design support and are always in line with the customer's requirements and expectations. Thanks to its own specialised staff, A Zeta Gomma is also able to make specific products from drawings supplied by the customer or design them in collaboration with the customer. This ensures that each A Zeta Gomma product offers the highest level of quality, with no margins of error. More information about A Zeta Gomma can be found at [www.azetagomma.com](http://www.azetagomma.com).





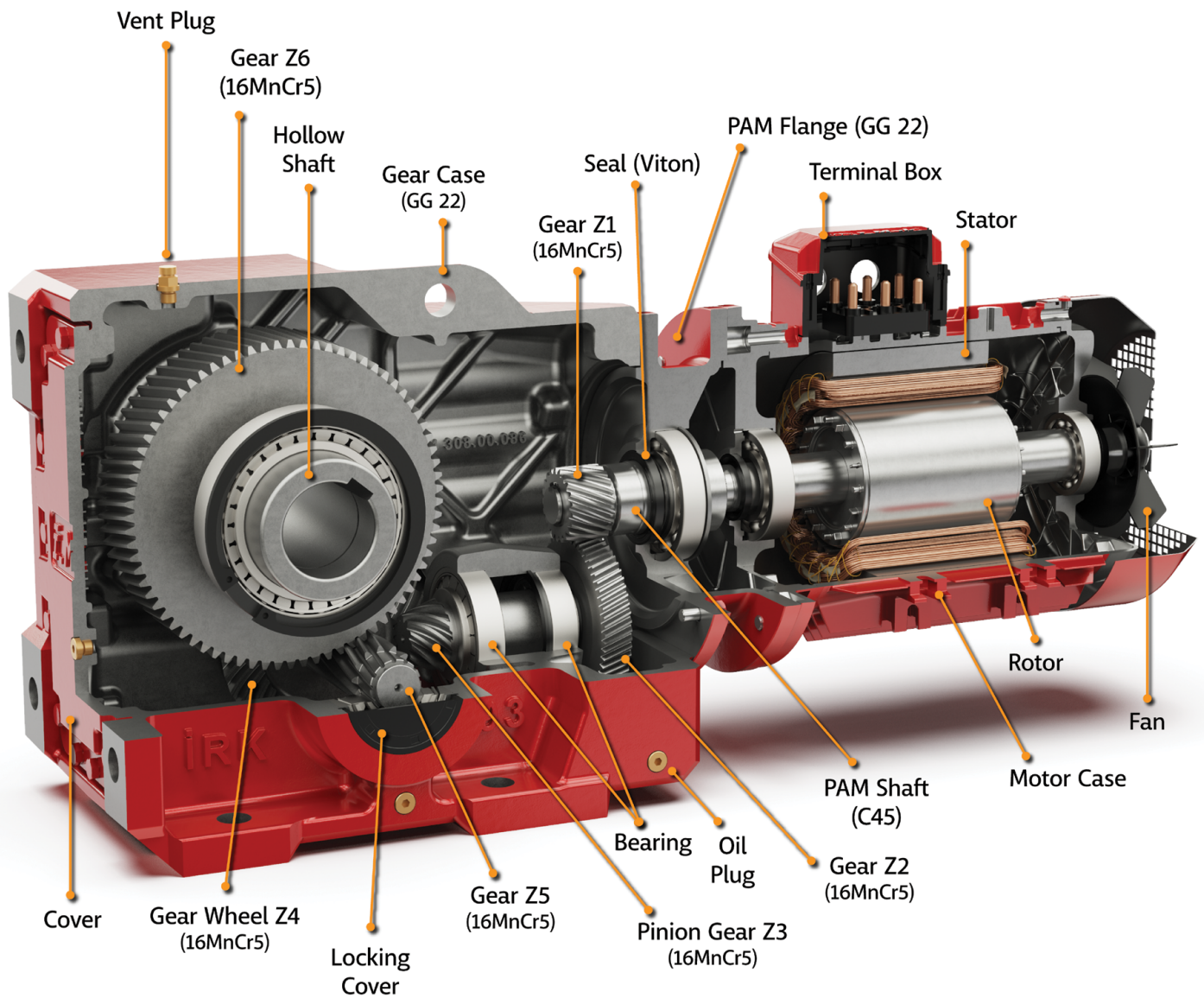
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