

# Support Engineering

MEETING THE CHALLENGE OF GLOBAL LOGISTICS AND SUPPORT FOR LARGE POWER TRANSMISSION PROJECTS

“The key to supplying and supporting large, operationally critical power transmission equipment on a global basis is a combination of experience, planning and having the right people available on-site virtually anywhere in the world,” says Neil Wright, managing director of Wichita Clutch.

Wichita is part of the Altra Industrial Motion group, which manufactures and supplies a large range of industrial clutches, brakes, couplings and geared motors. As such it can provide valuable insight into how to deliver and support these sometimes huge and usually operationally critical items of plant equipment.

Wright, who is also the managing director of Twiflex Limited, comments on where to locate stock; if point of manufacture matters; what to consider when shipping; and how to manage commissioning and local support. “There are several criteria which come into play when supplying large items of power transmission equipment

are applications where Wichita clutches can be found.”

When you manufacture a niche product, the knowledge and machines required to design and manufacture each item, often to a custom specification, have to be concentrated in a limited number of locations. “This means that we have to be highly proficient with our distribution and delivery network, which is why we have a department dedicated to world-wide logistics and have done so for over 50 years. Paperwork requirements vary wildly depending on final destination, so it is essential for us to have continuity in that department, to learn the most effective ways of doing business and to continue to build-up our cache of local knowledge,” adds Wright.

“When handling paperwork, communication and coordinating after sales support on a global basis it is essential to have local sales offices in every major country that we sell to. It has been a strategic focus for Altra to have a global network of sales offices across North America, South America, Europe and Asia and therefore it

is likely that direct after sales support, from a local speaking national, is never far away.

“For commissioning we predominantly use our own people to complete or oversee a build; we have teams that are trained to handle our products and can travel to most locations in the world. We also have international support engineers that can be deployed locally on all the major continents. We find that having our own people on-site means that we can work more

efficiently and any questions can be answered and issues addressed immediately.”

When selling smaller, more standardized or commodity based items of power transmission equipment, in-country distribution partners and third party sales support make perfect sense. However, when you are dealing with high-value capital pieces of equipment, where each application is different in some way, then there are too many variables to leave the task to someone who isn’t a total specialist. A good way to illustrate how the organization accommodates both sales and ongoing support is to look at a typical example:

Wichita recently designed, manufactured and delivered a large 42" Wichita MSV series marine clutch for a dredging ship. “We have supplied several large clutches to dredging ships before, so there was a degree of accumulated knowledge within the company on this type of application. This one, however, was larger than anything we had produced before,” Wright said.

The clutch couples a three-speed gearbox to a large on-board pump, which is used to provide suction to a trailing hopper that takes-up the river or sea bed and stores it in the ship’s hold. It then changes its operation and is used to empty the hold, either to build-up banks or disperse the material. “Our direct customer is the gearbox manufacturer, so we first started



on a global basis. The ability to both deliver and provide effective technical support for a large item of plant equipment, anywhere in the world, is critical to success. The performance of a supplier on an ongoing basis is also crucial to maintaining a positive working relationship and helping to achieve the customer’s objectives, whether that is to lay a cable across the Atlantic, commission an oil rig, produce steel or even make an island – all of which

to speak to them about the design and specification of the entire application. In this instance this was the largest version of this arrangement ever produced so it involved us designing a bespoke clutch to meet the specifications of this project. Whether a project is large or small, most products with this type of large power transmission system are custom manufactured to a greater or lesser degree; though often based on an existing design. Proper consultation is absolutely essential and, if we are designing to a specification, then it is always best if we can be involved in forming that specification," Wright said.

Being involved in the design process from the outset is a good example of how the organization works around producing a large piece of custom PT equipment. "We know that we have to be able to provide engineering input from an early stage and commit engineering and design resources to the project before we even start planning the design of the clutch itself. This carries a large overhead, as does maintaining our own logistics teams and commissioning engineers, but it also ensures we are profitable by avoiding the pitfalls of misspecification and out of sequence deliveries."

Once the design and specification process is complete, the company then designs and manufactures the clutch. In the case of the dredger mentioned above, the gearbox assembly will be supplied to the shipyard for integration into the ship, which means supplying essentially a collection of parts to the shipyard. "We will provide an engineer/project manager to oversee

the assembly and construction of the clutch and then observe the sea trials to make absolutely sure the equipment is performing as expected," Wright added. "To many companies this may look like overkill, but there are so many variables in a bespoke build of this scale that we find being on-site means we can react to any potential issues as, or even before, they arise. This helps to minimize any potential problems and ensures the project stays on track for our customer. We also go through a thorough check and sign-off process to make sure we are satisfied that the application is working to its operating parameters."

"The alternative to these checks can be far more difficult and costly. If we are called to look at an issue which arises while a ship or rig is in service, then this can involve flying out engineers (and sometimes tools and parts) to remote parts of the world, finding connecting transport and then possibly helicopter flights out to the vessel itself. Of course our operatives are fully-trained for such an eventuality, from basic site safety through to working in offshore environments, but if we can catch a problem prior to deployment then that is obviously preferable. Often we find that the root cause is not connected with the clutch, but our primary concern is to help resolve the problem.

"When required by our customers we can apply a structured problem solving approach, such as '8D,' to resolve problems. Using this process we look to identify, correct and eliminate any recurring problems. It then allows us to establish a permanent corrective action based on analysis of the prob-



lem; focusing on the origin of the problem and determining its root causes. It is this kind of commitment and attention to detail that we find leads to repeat business - you have to be able to trust and rely on your suppliers, after all.

"Large power transmission projects tend to be by their very nature unsuitable for 'catalogue solutions'. Our expertise in such applications allows us to add value to the design process: we work with design engineering departments and help to integrate our CAD models with those of the customer so it is possible to drop them straight into the design. This early partnership saves time and reduces project costs before metal is cut.

"Every company works differently, but when selling and supporting heavy duty clutch and brake products throughout the world, we have developed a model that works for our customers. It is a 'belt and braces' approach, as we would say in the U.K. -applying engineers early in the process, taking care of the logistics internally and providing sales and support engineers throughout the world (covering China, Russia, Europe, Asia and the Americas) to look after projects directly - but it results in us being an efficient, reliable supplier in a market that has little or no margin for error."

**For more information:**

Witchita Clutch  
Phone: (940) 767-2000  
[www.wichitaclutch.com](http://www.wichitaclutch.com)





# Weiss

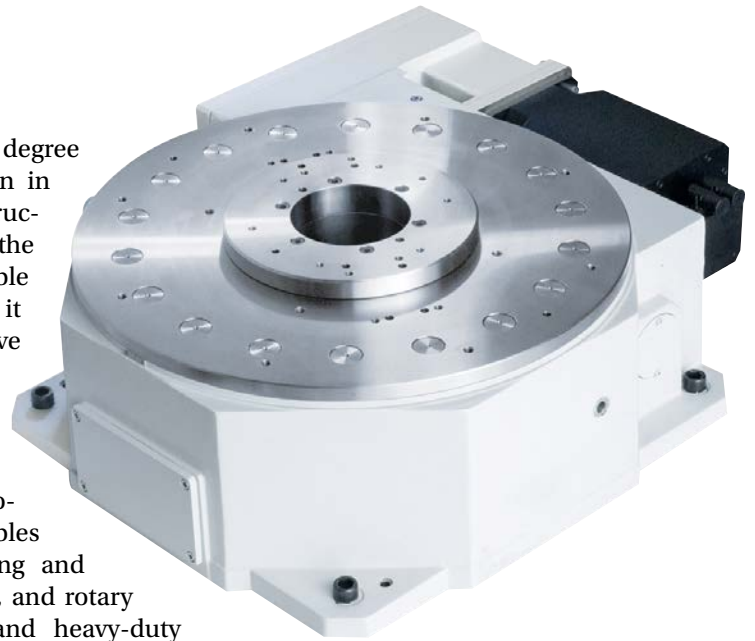
## INDEXING TABLES EXPAND PROCESSING OPTIONS

Since the 1980s, SHL (Böttingen, Germany) has been leveraging industrial robots for its automated grinding, polishing, and deburring systems for the automotive, medical, and processing industries. Typically, heavy duty robots with powerful articulated-arms seem somewhat oversized for the delicate tasks and complex geometries such as polishing roof rails and trim for cars. In-depth consultation with Weiss (Buchen, Germany), and its' subsidiary Weiss North America, Inc. (Willoughby, OH), revealed that a powerful robot coupled with a series of heavy duty rotary indexing tables (TC220/NR750/CR750) would provide an optimal standardized and flexible solution. Ultimately, using grinding and polishing machines swivel-mounted on Weiss' rotary indexing tables vastly expanded the processing options for complex geometries and under-cuts.

SHL consulted with Wolfgang Lehnert, technical sales agent at Weiss for the project. "We have a wide range of rotary indexing tables that enable the development of standardized swivelling and positioning units. Using the same dimensions and load data, we offered both fixed-position and user-programmable tables, both with and without their own drive as required. This means we were able to offer SHL

not only a high degree of standardization in design and construction, but also the greatest possible flexibility when it comes to the drive and control system," Lehnert said.

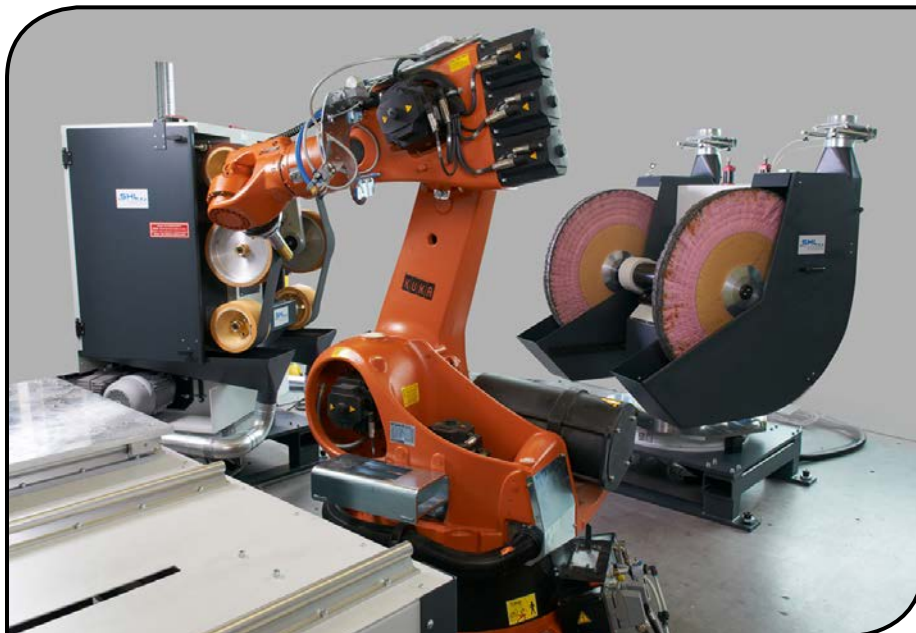
Notably, SHL selected the rotary indexing tables for their swiveling and positioning units, and rotary indexing rings and heavy-duty tables for special solutions without drives. The lightweight design has both of the smaller SHL grinding and polishing machines mounted to a fixed-position Weiss TC220 rotary indexing table. The table rotates in 15-degree steps and swivels the machine a maximum of 90 degrees from the central axis. For the heavy grinding and polishing machines, Oberkampf stated his choice of the user-programmable Weiss NR750 rotary indexing ring, "Our customers want more design freedom with larger installations," he said. SHL also increased use of the Weiss rotary indexing tables for special machines and feeding systems. One such case is the polishing robot, in which a user-



programmable Weiss CR750 heavy-duty table takes care of changing the workpiece carrier.

Weiss' consulting service wasn't just limited to selecting the right rotary index tables. According to Oberkampf, "The Weiss team also supported us in selecting the drive - even though we often order the tables without one." The drive and control system are selected in accordance with the customer's requirements, which means that lots of different motors are used. In some cases, the rotary indexing table is even controlled by the robotic control system as an additional robot axis. According to Lehnert, "Whatever their particular specifications may be, it goes without saying that the end customer expects the system as a whole to be perfectly calibrated. That's why we provided SHL with in-depth consulting at every development step—going beyond just the individual components from the catalog."

The first step is to define the size of the rotary indexing table in line with the specified volumes and dimensions in the concept phase. As soon as detailed construction data and information on the desired drive are available, they contact the drive manufacturer in order to find the optimal motor size and transmission ratio for the application and the table used. Lehnert noted that, "The only way to ensure that the whole system works smoothly is if the



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We've been pretty good at Forest City Gear this year. The Holiday Season finally gives us a chance to pause and give thanks for the many gifts we've received throughout the year. Great customers...a skilled and dedicated family of employees...the continued joy that comes from doing good work in the industry we love...and much more. We look forward to working with you to fulfill your wish list in 2014.

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- ✓ *Successful Landing of Mars Curiosity Rover*
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- ✓ *Find new and exciting gear production opportunities around the world*
- ✓ *The continued health and well-being of our many employees, customers, friends and family*

Fred 'Santa' Young



drive manufacturer, SHL, and Weiss actually get together and work in close cooperation."

Although the drive is not explicitly included in the scope of delivery, Weiss supports the customer in selecting the suitable motor size and transmission ratio in cooperation with the drive supplier. The aim is always to achieve an optimally calibrated complete system. Finally, the SHL robot heaves an enormous polishing unit over the workpieces that the heavy duty rotary indexing tables from Weiss replaces with a fresh batch once processing is complete. To date, more than 1,100 SHL robotic grinding and polishing systems have been implemented worldwide.

**For more information:**

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## Nexen

EXPANDS ECLIPSE SERVO MOTOR BRAKE LINE

Nexen Group, Inc. has launched an expansion of their Eclipse line to offer more than 140 variations of spring-engaged, air-released servomotor brakes for a wider range of servomotors. Eclipse brakes offer four times the torque of internal servomotor brakes, and offer at least 20-50 percent more torque than competitive brakes, providing greatly enhanced holding power for demanding applications. The Eclipse line offers flanges ranging from 57 mm (2.25 in) to 265 mm (10.43 in) square and shaft diameters from 6.35 mm (0.25 in) up to 48 mm (1.89 in). Nexen offers their expanded range of low-inertia brakes for all major servomotor models up to 20 hp.

“The Nexen servomotor brake design



is elegantly simple, sturdy and sound,” said Ed Brooks, senior technical sales representative, Nexen Group Inc. “This flange-mounted brake is confidently applied by engineers in most industries and out-performs all competitive brakes. This is a product that is easy to apply and performs beyond expectations.”

The new models offer advantages to a more diverse range of industrial applications including packaging machinery, food production, machine tools, conveying systems, CNC machining centers, automotive production equipment, and woodworking. The holding power and positioning accuracy of Eclipse brakes also complement Nexen Roller Pinion System (RPS) systems.

Other features of Nexen Eclipse servomotor brakes include: hightorque (2–125 N-m), NEMA 23, 34, and 42 frame sizes, high torsional rigidity, long facing life,



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true zero backlash for accurate positioning and speeds up to 10,000 rpm. Eclipse brakes are designed to provide responsive and reliable dynamic stopping and holding power for many different industrial applications, can withstand repeated E-stops, and are able to hold loads in place during servo motor change-outs. Eclipse brakes use no power, generate no heat while engaged or disengaged, and require no maintenance.

**For more information:**

Nexen Group Inc.  
Phone: (651) 484-5900  
[www.nexengroup.com](http://www.nexengroup.com)

## Stober Drives

EXTENDS PHQ SERIES

Stober Drives, Inc., a high-efficiency gearbox manufacturer in Maysville, Ky., has added two additional sizes to its Servo-Fit PHQ gear unit line. The new sizes are smaller, adding a more diverse range of case sizes. When compared with standard PH gear units, the PHQ allows for higher torque while still providing low backlash and smoothness of operation. The new sizes of the PHQ series include the PHQ4 and PHQ5, which expand the offering to seven case sizes ranging from PHQ4 to PHQ11. The PHQ4 and PHQ5 are available in single- and double-stage, with ratios ranging from 5.5:1 to 55:1.

These gear heads are capable of 430 N-m of acceleration torque. The PHQ7 thru PHQ11 are available in double- and triple-stage, with ratios ranging from 22:1 up to 600:1, and up to 22,000 N-m of acceleration torque. While smaller sizes are now available, all PHQ units utilize a high-torque, four-planet design. This design allows torque to be distributed over four planet gears instead of three. This results in an increase in output torque and torsional rigidity.

“This design enables extreme requirements to be met efficiently and effectively,” said Adam Mellenkamp, product manager at Stober Drives. “Applications in machine tool manufacturing, material handling, robotics sectors, and many other areas can use PHQ.” The PHQ is particularly well-suited for robotics, general automa-

tion, food packaging, injection molding for plastics, and tube-bending industries. With a backlash rating of three arc minutes, the PHQ is ideal for applications requiring low backlash. For applications requiring even lower backlash, the PHQA version is capable of having backlash as low as 1 arc per minute.

**For more information:**

Stober Drives, Inc.  
Phone: (800) 711-3588  
[www.stober.com](http://www.stober.com)

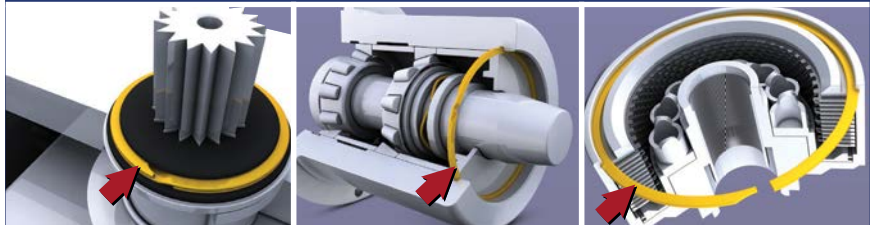


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# Rexnord

MANUFACTURES LARGEST FALK RING GEAR

Rexnord has completed the manufacture of its largest Falk Ring Gear in weight and horsepower—250,000 pounds (113,000 kilograms) and 24,000 horsepower (18 megawatts). In terms of weight and horsepower, the ring gear is also one of the world's largest. This six-part ring gear will be used to refine material in a gold mine in the Southwestern United States. The order was placed in March 2012.

With manufacturing beginning in April 2012, numerous Rexnord associates—almost 100—took part in making this giant gear a reality. “From engineering, through the foundry and the machine shop, Rexnord associates have worked efficiently with the customer to produce a high-quality, high-power gearing solution,” says Dave Olson, director, commercial operations, mill products. “Through this tremendous accomplishment, we are demonstrating our company’s expertise and dedication to the industry.”



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# NVision

REVERSE ENGINEERED TURBINE WITH HANDHELD SCANNER

NVision, Inc. recently reverse engineered the rotor assembly, diffusers and diaphragm of a turbine for a major turbomachinery engineering firm in Texas. The full reverse engineering process only took five weeks, far less than the six months that the engineering company had originally allotted for the project using less sophisticated measurement methods. “Us-

ing our own HandHeld scanner, we were able to measure the parts’ geometry to extremely high levels of accuracy and produce the necessary CAD files. This made it possible for the company to perform simulations to optimize the turbine’s design, substantially improving its energy efficiency,” said Steve Kersen, NVision’s vice president of sales and marketing.

The engineering firm specializes in industrial turbomachinery design and power generation engineering, focusing on steam turbine design and power plant engineering, as well as other turbomachinery such as gas turbines, pumps and compressors. The company was tasked with redesigning a turbine so as to optimize its energy efficiency. However, in order to perform the necessary simulations it needed to have the CAD model of the existing turbine, which was not available. “This was a classic scenario for reverse engineering,” said Kersen. “Lacking the original CAD file, the company needed to create a new one by collecting the turbine geometry at the highest possible level of accuracy and in the shortest amount of time.”

The engineering firm contacted NVision, which sent technicians to the firm’s site where they encountered difficult working conditions. The project area was outdoors without a covered structure, which posed a material concern as sunlight would interfere



with NVision's scanning equipment and both the equipment and technicians would be exposed to the elements. Before scanning could begin, NVision technicians worked to drape black plastic sheeting across the top of the work area to protect their equipment and ensure the accuracy of the scanning. They then proceeded to scan the turbine using NVision's HandHeld scanner.

The NVision HandHeld scanner is a powerful portable scanning device that is capable of capturing 3-D geometry from objects of almost any size or shape. The scanner is attached to a mechanical arm that moves about the object, freeing the user to capture data rapidly with a high degree of resolution and accuracy. As a part is inspected, the scanner generates a point cloud consisting of millions of points each with x,y,z coordinates and i,j,k vectors. Integrated software that comes with the scanner is used to convert the point cloud to an STL polygon and an optional tripod provides complete portability in the field. Intuitive software allows real-time rendering, full model editing, polygon reduction, and data output to all standard 3-D packages.

After completing the scanning, which took several days, NVision processed the data to an STL format. The STL file was converted to native parametric *SolidWorks* CAD format so the company could begin the redesign process. The completed *SolidWorks* rotor assembly CAD model contained over 3,000 blades. Upon examining the rotor and diaphragm models, an engineer at the turbomachinery firm wrote to NVision and stated that their work was "very impressive to say the least" and praised the "diligence and caliber" of the NVision team's work.

Kersen agrees. "The adverse conditions at the work site were extremely challenging. Without our technicians' devoted and professional work ethic, the scanning would not have been possible. The completion of this project is a testament to our staff's dedication to customer satisfaction."

**For more information:**

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## QA1

EXTENDS BALL JOINT LINE

QA1's Ultimate Ball Joints are now offered with additional stud length options and are available pre-assembled. These ball joints and extended length studs were awarded runner-up in the Performance Racing Product group at the 2013 SEMA Show in November. Available in popular bolt-in, press-in and screw-in styles, QA1's ball joints come pre-assembled with standard and up to 1" longer studs. These longer length ball joints can help to improve the overall geometry of the car by increasing straight line stability and improving roll center and can also help to free up bind, allowing the suspension to operate smoothly through the entire range of travel. QA1's Ultimate Ball Joints feature an innovative and durable design to provide

infinite preload adjustment, break-away torque on these ball joints can be as low as 0 ft. lbs. enabling completely smooth, bind-free operation. Engineered to withstand years of use, QA1's ball joints feature precise ball-to-race conformity that provides an even load distribution for unbeatable wear resistance and increased longevity. With their simple construction and assembly, these ball joints can easily be owner rebuilt, cleaned and inspected, and can even be adjusted while still installed on the vehicle.

### For more information:

QA1  
Phone: (800) 721-7761  
[www.QA1.net](http://www.QA1.net)



## Maxon

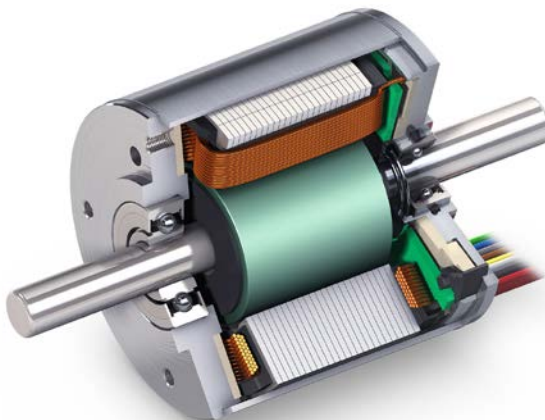
INTRODUCES EC-I MOTOR REDESIGN

In automation and robotics, many applications are characterized by high energy and high torque at the same time. Spatial restrictions also mean that drives must be short, have a long service life and be maintenance-free. The newly redesigned EC-i motors from Maxon Motors offer solutions that fit these requirements perfectly. These brushless DC motors have several key advantages: low inertia, minimal detent, robust bearings and compact construction. The use of high-powered permanent magnets ensures high power density, providing great speed stability under load. These motors are available in 40 mm diameter and in two lengths, namely 26 mm (50 Watt) and 36 mm (70 Watt). The modular system with gearheads, encoders and controllers from the Maxon delivery program offers a large

number of possible combinations. EC-i motors are ideally suited for applications that require maximum drive in a minimum space. Typical areas of application are robotics, industrial automation and security technology.

### For more information:

Maxon Motors  
Phone: (508) 677-0520  
[www.maxonmotorusa.com](http://www.maxonmotorusa.com)



# Emerson

## PROTECTS TURBOMACHINERY DRIVES WITH SHEAR SPACER

The Kop-Flex high-speed shear spacer coupling uses a patented double-tube design, precision machining and bearings, and special metal treatments to help provide predictable shear during torque overloads on turbo drivetrains, allowing safe coast down of systems turning at up to 20,000 rpm. Developed to protect gas-turbine-powered generator drives during electrical faults, the shear spacer is also ideal for drives on compressors, pumps, fans and trains subject to shock torques. The patented shear cartridge uses special bearings between two tubes to maintain concentricity and overall centering after high-speed separation. The double-bearing design, precision grooving, shot peening and a corrosion resistant coating combine to increase fatigue resistance and promote reliable operation over the life of the coupling. The high-speed shear spacers are available in all catalog coupling sizes capable of handling

speeds up to 20,000 rpm and millions of inch-pounds (or Newton-meters) of torque.

The high-speed shear spacer is an improvement over standard shear spacers and shear pins, which can create issues when used above 3,600 rpm due to balancing issues and fret-



ting potential when using pins. "Standard shear spacers are not engineered to survive the unbalance forces that develop when turbo drivetrains hit a torque overload at high speeds (3,600-20,000 rpm)," said Joe Corcoran, manager of global services and training for Emerson's Kop-Flex coupling business. "Coast down from high speed can be unpredictable with a standard shear spacer, and more damage can result. "This design takes the standard shear spacer concept to a whole new level of technology," said Corcoran. "We start with a comprehensive understanding of the material properties of each unique unit, and use metal treatments, testing, precision machining and special bearings to create a custom shear spacer for each application."

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