

# DRIVE

THE JOURNAL FOR COUPLING TECHNOLOGY

**HOT TOPIC:**  
Vision of the future:  
autonomous industrial robots





Jörg Stang, Sales Manager

## Focus on Automation

Dear readers,

Robots are superior to humans in many respects – they can withstand temperatures ranging from -40 to +300 degrees Celsius, for example. But like humans they can suffer considerable damage if they are not protected in the event of a high-speed accident. They don't wear safety belts, they have protective couplings instead, which can also easily withstand the above-mentioned temperatures. So, it's fortunate that robots can take work off human hands under such extreme conditions and that humans are able to protect these robots by using couplings.

Couplings are very adaptable, they can be built to operate in practically any conditions. Be it "in miniature" for medical technology applications, to cope with ultra-high loads in steel plants or as lightweights in pumps and compressors. In this edition of DRIVE, we would like to introduce you to a number of remarkable applications that represent the **V** for versatility in our DRIVE Strategy.

But we are also "spilling the beans" again and reporting on our current events. Internally we met up for the International Sales Meeting and discussed the challenges in the market. Our customers were able to meet with us, for example, at the aaa show in Leipzig – or will be able to do so next year at Hannover Messe. Will you be there? We look forward to seeing you!

I wish you an inspiring read.

A handwritten signature in black ink, appearing to read 'Jörg Stang', written in a cursive style.

Jörg Stang

Contents & Editorial  
**2-3**

Products & Innovations  
**4-6**  
Vision of the future:  
autonomous industrial robots

Products & Innovations  
**7**  
BK vs. SCL

Products & Innovations  
**8-10**  
Steel plants:  
increasing plant availability  
/ Diet for pumps and compressors

Products & Innovations  
**11**  
Miniature couplings in  
dental technology use

R+W News  
**12-13**  
/ 6th International Sales Meeting  
/ Off to Leipzig  
/ New Kai Kupplung video

R+W News  
**14-15**  
/ Welcome to the Digilounge  
/ R+W at a glance!  
/ Poppe + Potthoff reaches 90



## Vision of the future: autonomous industrial robots

The vehicle manufacturing industry was one of the very first sectors to go the robotics route early and on a large scale, in order to exploit the opportunities provided by advanced automation to the fullest.

But robot applications are helping to reduce cycle times throughout the mechanical engineering sector – and are doing so to a maximum degree of repeatable accuracy. Humans no longer have to handle heavy loads or hazardous materials, because these tasks can be delegated on the spot to robots.

Robots can be used for a wide range of handling tasks where assembly line operators meet automation. They are operating in an increasingly flexible and autonomous way, meaning the production line of the future will be able to react in smart, independent fashion to modified circumstances. However, this requires seamlessly interlinked production facilities and systems, which can compute and control all the parameters needed for any reconfiguration. Networked systems automatically include all relevant factors like needs, retooling periods, logistics or staff availability in these computations. This will enable plant availability to be enhanced to a maximum in the future.

### Handling automation: gripper systems

These days robots already take on a diverse range of handling tasks, like the accurate conveying and positioning of components on the production line. Specific drive solutions and gripper systems are required for this purpose. Speed and acceleration are the most important handling automation parameters. Many industries utilize high-speed articulated robots, the compact design and large radius of movement of which provide maximum power density on a small footprint. They are therefore appealing to a wide range of automation functions, because they allow for the programming and control of up to six axes. At operating speeds of more than 7.2 m/s within a repeat accuracy tolerance range of up to  $\pm 0.02$  mm, they are considered to be reliable “workhorses”.

Delivering such performance depends not least on exact torque transmission. Zero-backlash, torsionally rigid metal bellows couplings are suitable for >>

use in precision servomotors featuring highly dynamic axes. Metal bellows correct mounting-related shaft misalignments with a low restoring force. The BK model range is best suited to this application on account of its compact, low-maintenance design and smooth operation. They are available in both radially and axially mountable versions and designed for torques of up to 10,000 Newton meters.

R+W's robust BKS metal bellows couplings provide exact torque transmission, even in extreme conditions. They can cope with temperatures ranging from minus 40 to plus 300 degrees Celsius, even the presence of moisture and aggressive substances. In addition to the sophisticated standard range with clamping hubs, there is also a special robot mounting flange version to guarantee maximum compatibility.

### **Production reliability results in a high level of plant availability**

Rapid dynamics during ongoing production processes can result in overload damage to drive line components, for instance as a result of blockages caused by faulty components. At high rotational speeds an overload can cause considerable damage within a fraction of a second – with far-reaching consequences for the interlinked automated system. In these cases a production stoppage not only causes the acute problem of plant downtime, but can also entail expensive and protracted repairs.

High speed servo motors in particular should be protected and protected from by safety couplings which



Zero backlash precision safety couplings like the SK series protect against damage and reduce downtime. These torque limiters can be made with various modes of operation, depending on the application requirements.

limit torque quickly and precisely. From experience, it's worth installing them prior to the first incident, because a mechanical safety coupling disconnects the drive train from the power flow within a few milliseconds, before an expensive crash occurs. R+W's SK range of maintenance-free safety couplings are designed for torques ranging from 0.1 to 2800 Newton meters. The clutch components are made of high strength tempered steel, and the disengagement torque is continuously adjustable. The combination with a metal bellows coupling provides the ideal high performance package of precise torque transmission, compensation for shaft misalignment, as well as overload protection. This results in greater plant availability and in a higher level of throughput. Using the right couplings can therefore be an important step on the road to long-term competitiveness.

High torsional stiffness

Low moment of inertia

Smooth operation

Precision output rotation

Zero backlash

# BK



# VS.



# SCL

High torsional stiffness, low inertia,  
backlash-free

Higher flexibility

Modular design

Easy handling and assembly

Tolerant of higher heat

Resistant to corrosion

## Steel plants: increasing plant availability

As a continuous process steel production is dependent on plants and components with a low probability of malfunction. That's why, for example, roller conveyor drive systems have to date frequently been fitted with torsionally flexible couplings. However, given that these are susceptible to wear and tear, torsionally rigid disc pack couplings represent an interesting alternative.

The main characteristic of torsionally flexible couplings is that they damp vibration and torque spikes. Elastic materials serve as compensating elements and pass on a smoother form of motion to the downstream components. Special rubber compounds and polyurethane components are used for this purpose.

### High amounts of torque harbor particular challenges

Where dynamic applications are involved, increasing torque enlarges the coupling's angle of twist considerably – as much as several angular degrees. The rotation angle is therefore not transmitted precisely from the input to the output of the coupling. That's why elastic couplings are subject to a certain amount of wear. Over a longer period, aging and embrittlement of the plastic or rubber components as well as frequent relative motion between the plastic components and the coupling hubs leads to wear and tear. Regular checks and punctual replacement of plastic components are therefore essential. The maintenance requirement should always be factored in accordingly when torsionally flexible couplings are used. This is because a damaged coupling poses the risk of costly downtime.

### Precision correction, undamped vibration

Torsionally rigid couplings represent a second category, characterized by a high level of stiffness in rotation. This is achieved either with a positive locking drive, such as is found in gear couplings, or by flex packs, which are used in disc couplings. R+W disc pack couplings transmit torque (350 to 24,000 Newton meters) via flexible disc packs, which are connected to the hubs and intermediate component by means of pure friction. This prevents micro motion between the discs, screws, and hubs, and increases the stiffness of the entire coupling. >>





LP2 Disc pack coupling:  
for a complete dual  
flex connection



LP1 Disc pack coupling:  
single flex for supporting  
intermediate shafts



LP3 Disc pack coupling:  
dual flex with high  
strength clamping



LP4 Disc pack coupling:  
single flex with high  
strength clamping



LPA Disc pack coupling:  
with drop-out spacer and  
guard rings API 610 and  
671 compliant



LPZ Disc pack coupling:  
for compact dual flex systems

Disc couplings are also wear and maintenance free. Compact gear couplings on the other hand require regular maintenance and provide low backlash instead of zero backlash transmission.

#### Disc pack couplings deliver process reliability

As a robust industrial coupling the disc pack coupling has proven successful in a wide range of applications, particularly in steel plants. Mirko Fries from the Sales Team North East recommends an LP-range disc pack coupling as an effective, well-engineered solution. "The friction-lock connection between the hubs and the disc packs on the LP range, for example, enables full torque to be transmitted, even in reversing operations. This range is absolutely nonwearing and maintenance-free. That means lower costs and inputs at a higher, more reliable level of plant availability."

LP series couplings are available in sizes ranging from 350 to 24,000 Newton meters in both single flex and dual flex versions. The difference is that the single flex version can compensate for axial and angular misalignment, but is stiff in shear, which enables it to support intermediate loads, while the dual flex version can also compensate for lateral misalignment. Shafts and hubs can be connected using a keyway or a friction-lock clamping hub. The coupling can be customized for almost any specific application. "At R+W there is an experienced team of engineers and technicians that provides advice and support to help customers select the right coupling. We are aware of the potential challenges and come up with the most effective and safest coupling solutions", Mirko Fries explains.

## Diet for pumps and compressors

Reducing the weight of installed components is one of the key challenges facing all industries that use pumps and compressors.

R+W provides a lightweight coupling made of very smartly designed plastics for the gigantic pumps and filtration facilities at one of the world's largest water treatment plants in the US state of Utah. These components and systems are important aspects and guarantors of a continuous, trouble-free supply of fresh water to the inhabitants of Las Vegas. One benefit of using these couplings was that the plant operators were able to dispense with heavy, expensive materials like stainless steel for connecting pumps to electric motors. A welcome side effect is that using these materials can at the same time rule out the possibility of the treated drinking water becoming contaminated.



LP2-model disc pack couplings can be supplied with customized intermediate sections.

# Miniature couplings in dental technology use

R+W couplings are also used in dental practices – for example by orthodontists.

High-precision miniature couplings in dispensing systems help to ensure that tooth impression compounds get the right mix. This is critical because both components need to be mixed in exact proportions to ensure that the compound can reproduce a perfect impression in the shortest possible time.

These dispensers are usually small table-top devices, inside of which high-precision miniature components like servomotors and tiny spindles accurately dispense the materials to be mixed. Since the housings are made of plastic, high-precision intermediate flanges cannot be attached here to ensure accurately aligned shafts between motor and spindle. A high-precision miniature bellows coupling is used as a compensator. This connecting element is capable of correcting any of the three types of shaft misalignment that may occur. The twist angle of a torsionally rigid miniature metal bellows coupling is less than 0.05 degrees at its rated torque load. This enables servomotors to be connected accurately to miniature ball screw spindles with zero backlash. The coupling's high degree of torsional rigidity ensures that both the components needed are dispensed in exactly the mixing ratio required.

Miniature couplings are also used in denture presses. Motors in such devices usually have high torque to deliver a high pressing force. Furthermore, the housing is only made of thin-walled plastic. The vibration generated during the pressing procedure needs to be damped. In this case R+W met the user's requirements by providing a compact elastomer coupling. As far as this application was concerned, the focus was on zero backlash and the right choice of elastomer spider element for the coupling.



## Miniature Couplings Portfolio

R+W miniature couplings are available in a torque capacity range of 0.01 to 10 Newton meters, with an available bore diameter range of 1 to 28 millimeters. The trend is clearly toward products that are as compact and high-performance as possible. R+W's diverse offering of miniature products includes polyamide micro couplings (FK), miniature metal bellows couplings (MK), miniature versions of its SERVOMAX elastomer couplings (EK), small safety couplings (SK/ES), and finally a large number of non-standard and fully customized solutions. In one extreme example, R+W can supply couplings balanced to run at speeds well over 100,000 rpm.



The MK2 miniature metal bellows coupling

# 6th International Sales Meeting

## Shot and goal!

R+W's International Sales Meeting takes place every four years and is timed to coincide with the start of the FIFA World Cup. Sales executives from all over the world met up from June 14 to 16, 2018 to learn more about the latest developments at R+W in a relaxed atmosphere. Even the meeting venue was an invitation to relax. The Seehotel Niedernberg consists not of a single building, but rather has the layout of a Franconian village, featuring half-timbered buildings with a village square, and is ideally located directly on a scenic lake shore. This makes it an ideal place to relax and be creative, and provides an optimum foundation

for inspirational workshops. In addition to marketing, sales and technology presentations and workshops, a guest speaker came along to say a few words - Joey Kelly spoke about "No Limits - How do I achieve my goal?" The musician and extreme athlete spoke about the subject of success from many perspectives and also spent the subsequent coffee break in lively conversation with the R+W crew. After that, members of the team got to compete at table soccer, before a communal Russian barbecue, and of course the World Cup match of the day (Portugal v. Spain) rounded off the evening agenda.





## Off to Leipzig

In September 2018 Leipzig's motto was once again: all about automation!

For users in the Central Germany region this event is an opportunity to obtain information about the latest automation technology trends from more than 90 exhibitors. The focus of the show is on proven, successful products, ready-to-apply solutions and effective concepts, say the organizers – and that would describe R+W's offering equally well. The aaa puts on an interesting series of presentations and an exhibitors' get-together, which also represents an additional opportunity to network. "We always like coming to Leipzig", says Sales Manager Jörg Stang. "The regional concept engenders an almost informal character. Really intensive discussions and conversations take place here. Visitors want to be provided with advice, they ask plenty of questions and show a great deal of interest." R+W attends several aaa shows a year – in 2018 the sales team was already in Hamburg and Essen.



## Kai Kupplung

### New Video

In his new video Kai Kupplung presents a comparison between torsionally rigid metal bellows couplings and vibration-damping elastomer couplings.

# WELCOME TO THE DIGILOUNGE

In 2019 it will be that time again – we are exhibiting at Hannover Messe! Visit us from April 1 to 5, 2019 in Hannover and see the wide R+W couplings spectrum for yourself. We have again come up with something special to make your exhibition experience a memorable one. A hint – we are becoming even more virtual. We are looking forward to seeing you and to exhibiting at the world's most important industrial trade fair!

## R+W at a glance



DRIVE TECHNOLOGY  
MACHINE CONSTRUCTION

A POPPE + POTTHOFF COMPANY

THE COUPLING.

FOUNDATION

1990

GROUP AFFILIATION 2011

1  
PARENT COMPANY



EMPLOYER  
WITH  
CREATIVE  
FREEDOM



250 EMPLOYEES  
WORLDWIDE

REPRESENTATIVES  
IN MORE THAN **50** COUNTRIES

SUBSIDIARIES IN CHINA, ITALIA, SLOVAKIA, SINGAPORE AND USA



HEAD OFFICE IN  
KLINGENBERG/GERMANY

PRODUCTION



**600,000** COUPLINGS/YEAR



TECHNOLOGY  
LEADER

# Poppe + Potthoff reaches 90

R+W has been owned by the Poppe + Potthoff group of companies since 2011.

The family-owned company was founded in 1928 by Friedrich Poppe and Hermann Potthoff and started out as a manufacturer of cold-drawn precision steel tubing. In the summer of 2018 it celebrated its 90th anniversary. These days things are going very well at P+P. The promise made by the company's founders, "to deliver the best materials and finishes for every application", laid the foundation for the values that characterize this highly specialized metal processing business: precision, innovation, flexibility.

The owner family celebrated the anniversary together with employees and guests at an event with a great atmosphere at the company headquarters in Werther. The workforce also got actively involved – to mark the occasion they made a film about how a "90" made of steel tubing travels around the world. Dr. Christian Potthoff-Sewing, President and CFO of the Poppe + Potthoff Group, was moved: "It is the people that matter."



The tubing plant was turned into a party location



Caroline Lagemann, Peter Potthoff-Sewing, Ursula Potthoff-Sewing, John Erik Lagemann, Dr. Aulima Poon Potthoff-Sewing and Dr. Christian Potthoff-Sewing (from left to right)

## Poppe + Potthoff

Employing 1500 people at 17 locations, today P+P operates in vehicle manufacturing, shipbuilding and machinery manufacturing as well as many other industries in more than 50 countries. Its product portfolio includes precision steel tubing, high-pressure lines, components for gas, petrol, hydrogen and diesel injection systems as well as special-purpose machinery, precision components, stainless steel railings and last but not least the R+W Group's entire range of industrial, safety, special-purpose and precision couplings.





A POPPE + POTTHOFF COMPANY

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