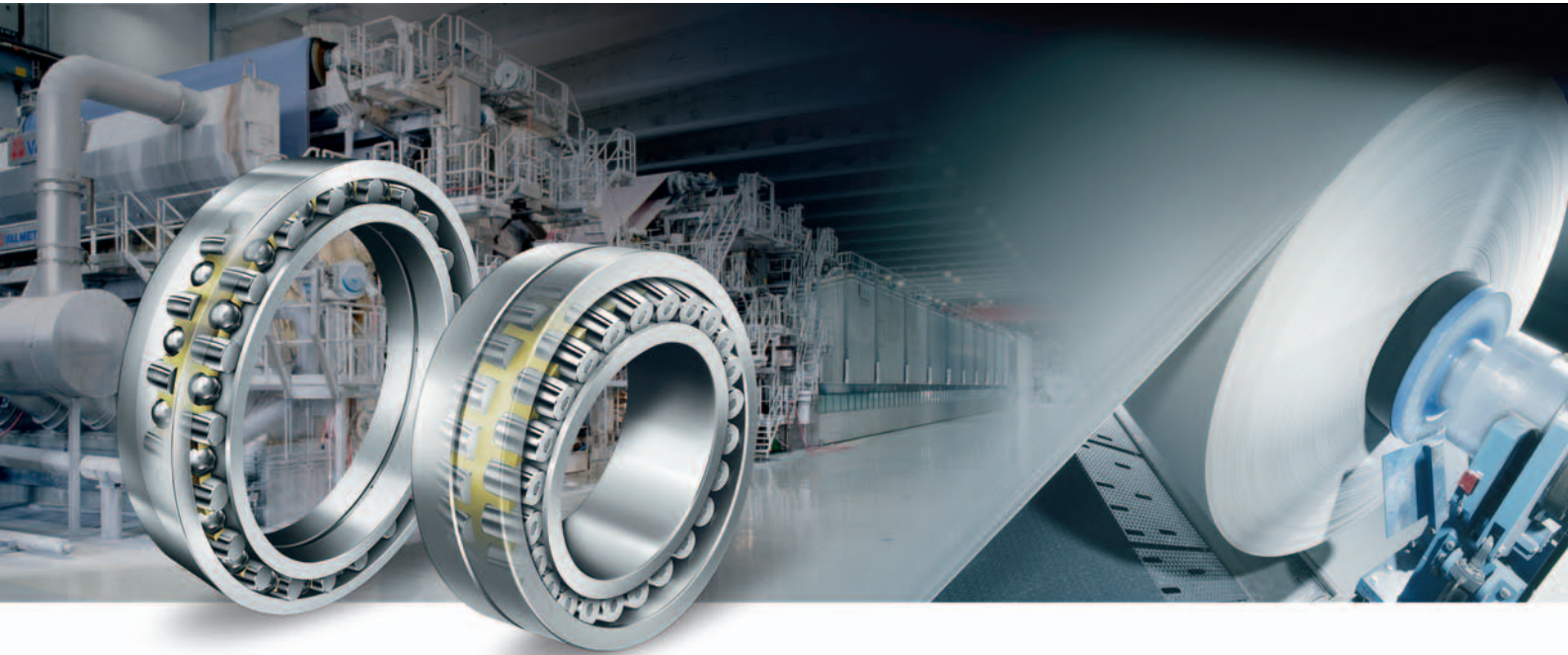




**FAG**



# Optimal Paper Production

Full-service bearing technology

**SCHAEFFLER GROUP**  
INDUSTRIAL



## Expertise through knowledge and experience

FAG Kugelfischer is a pioneer in the rolling bearing industry. In 1883, Friedrich Fischer designed a ball grinding machine. This idea is regarded as the historic beginning of the rolling bearing industry. INA's success story began in 1949 with the development of the needle roller and cage assembly by Dr. Georg Schaeffler, an ingenious idea that helped the needleroller bearing achieve an industrial breakthrough.

With our two strong product brands INA and FAG, we currently have a high-performance range of rolling bearings as well as products and services of unsurpassed quality due to the joint research and development of both brands.

INA and FAG have consolidated their bearing technology and services for customers in the paper and cellulose industries in the Pulp & Paper sector within the Industrial division.

As a result of their cooperation over many decades with reputable paper machine manufacturers as well as with maintenance and production departments, the Pulp & Paper sector has gained a great deal of expertise. Paper mills all over the world have benefited from the quality of customized solutions that are reliable and efficient and achieve ever increasing production speeds.

### Pulp & Paper has more to offer

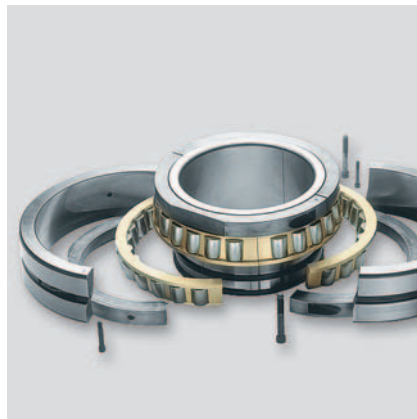
- Expert support by experienced engineers
- Services for all rolling bearing products and applications
- Efficient product support and development
- Higher cost-effectiveness and operational security with X-life
- Optimized bearing, material and seal combinations
- Specially designed products for various operating conditions
- General and customer-specific training programs
- Binding quality and environmental policy worldwide (ISO 9000/QS 9000, ISO/TS 16949:2002, ISO 14001)
- BEARINX® calculation software for the best possible product selection
- Comprehensive product range of peripheral equipment for paper machines and for auxiliary equipment.



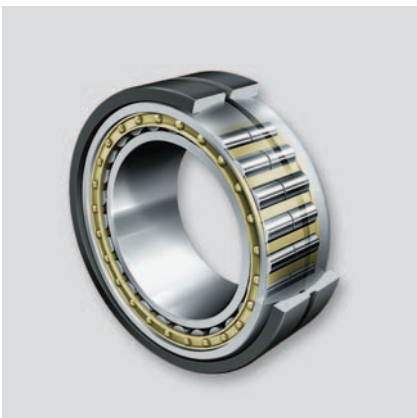
## Complete solutions and service from one source



- Coatings that offer corrosion protection (Corrotect®) or for improving the wear and friction behavior (e. g. Triondur®)



- Spherical roller bearing E1 with superior load-carrying capacity, low operating temperature and very high operating life
- Double split spherical roller bearings for quick bearing replacement in hard-to-reach locations



- Self-aligning or conventional cylindrical roller bearings for easy length adjustment
- Hybrid deep groove ball bearings (steel/ceramic) with very long operating life for spreader rolls





- Three ring bearing with very high load carrying capacity
- ASSR bearing (Anti Slippage Spherical Rolling Bearing) for preventing slippage in CD-profile control rolls

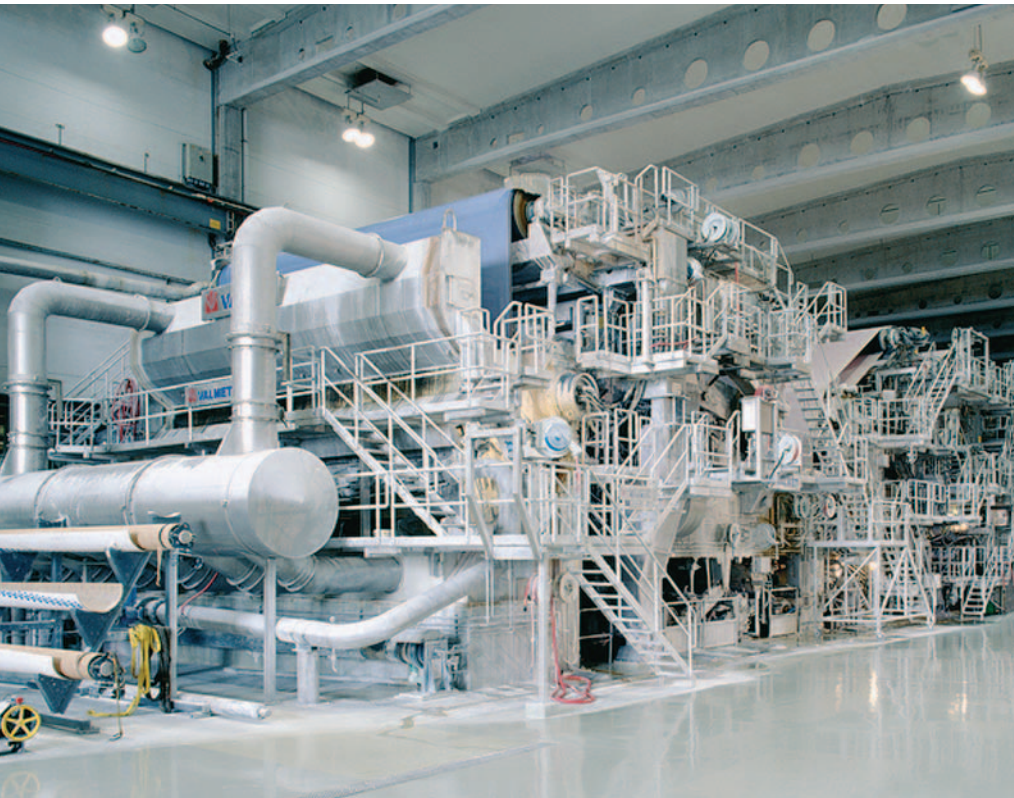


- Roller and ball type profiled rail units for tensioning rolls and regulating rolls
- Maintenance-free spherical plain bearings with ELGOGLIDE® for anti-deflection rolls

- Product and service training
- Condition-oriented maintenance
- Monitoring and remote diagnosis
- Spare parts management
- Maintenance contracts, all inclusive or individualized



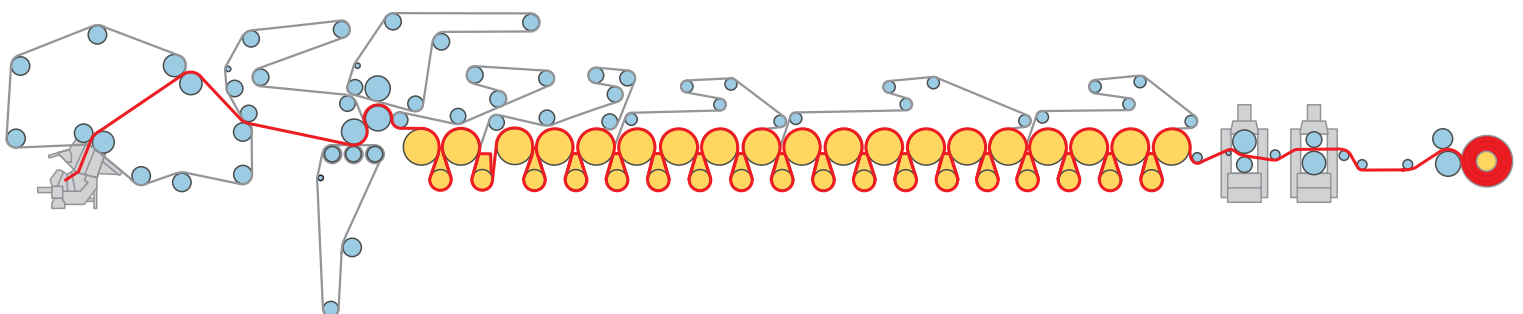
## Designed specifically for smooth pulp and paper production



Paper lines have to operate without failures and problems, ideally round the clock 365 days a year. Paper webs that are 2,000 meters long and over 10 meters wide are produced from cellulose pulp or wastepaper within one minute, depending on the machine used.

This is extremely tough on cylinders, rolls and of course rolling bearings. They have to work smoothly and they have to work well. INA and FAG rolling bearings in paper machines are characterized by excellent design and top quality. In spite of ever increasing speeds,

extreme moisture and high operating temperatures, extending the service life has top priority. Only rolling bearings that can continuously withstand shaft deflections, moisture and high temperatures ensure long-term smooth operation.







these bearings is the result of increased static load ratings, based on improved roller quality and optimized roller geometry. Significantly longer bearing service life is achieved for the same operating conditions. On the other hand, the previous operating life is achieved even if loads increase considerably. In new designs, smaller bearings reach the performance of previous larger bearings. Downsizing helps achieve more cost-efficient bearing supports (smaller design envelope, less friction, less lubricant required, higher speeds).

Lower operating costs are the result of improved bearing kinematics that keep friction and bearing temperatures at a low level, which puts less strain on the lubricant.

### **Spherical roller bearings**

These bearings play a dominant role in paper machines. The Pulp & Paper sector provides a matching product range and excellent options. Typical variants include bearings with cylindrical or tapered bores, with increased radial clearance and running accuracy, with case hardened inner rings, with lubrication holes in the inner rings or split design for timesaving installation in hard-to-reach locations.

### **Improved performance, X-life quality spherical roller bearings E1**

Up to 70% longer basic rating life results from 17% increase in dynamic load ratings. The increased static safety for

### **More cost-effectiveness.**

### **More operational security.**

X-life stands for premium products made by INA and FAG. The surfaces have been significantly improved by advanced manufacturing methods so that under identical loads there is a reduction in the stress conditions present on the rolling elements and raceway. This has the following advantages:

- Reduced friction and lower bearing temperatures
- Reduced strain on the lubricant
- A higher basic dynamic load rating
- An increased basic rating life.

Therefore, the operating life of X-life bearings is considerably longer under the same operating conditions. Alternatively, higher loads can now be applied while maintaining the same rating life values.

X-life bearings enable downsizing and the improved price/performance ratio also increases the overall cost-effectiveness of the bearing support.



## Higher operational reliability through innovative solutions



Complex bearing requirements make it necessary to blaze new trails. Through continuous product support and development, we are able to confront new challenges by offering functionally reliable and efficient solutions.

### Hybrid deep groove ball bearings

Hybrid ball bearings with steel rings and ceramic balls have proven effective for spreader rolls with high speeds. To reduce the rotating masses (ball and cage assembly), only half the number of balls are installed. The risk of slip decreases as a result of the higher load on each ceramic ball. Compared to the conventional steel-steel design, the operating life is two to three times longer.



### Self-aligning cylindrical roller bearings

When drying cylinders are heated, heat expansion causes significant length changes for long cylinders. In addition, misalignment occurs between both bearing positions.

#### The solution:

Self-aligning cylindrical roller bearings. They are most often used in the dry end and frequently replace the previous solution that involved rocker block housings. These housings can still be used. Length changes are easily compensated in the bearing. The spherical sliding surface of a self-aligning plain bearing ring compensates potential deflections or alignment inaccuracies of the cylinders.





### ASSR bearings

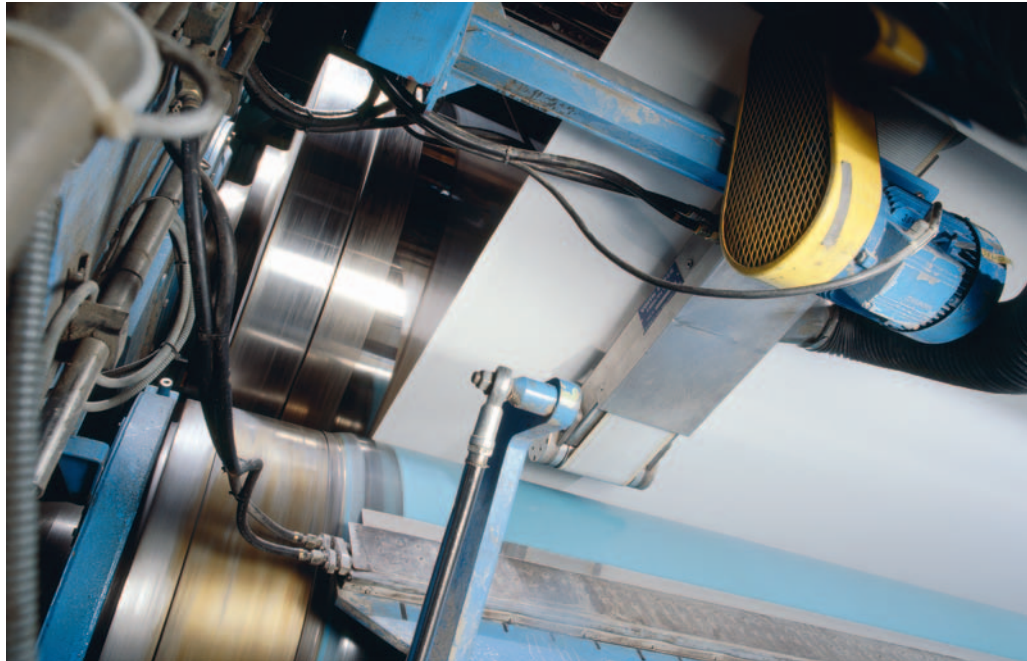
Varying load phases occur in the CD-profile control rolls of calenders in paper machines. During production, the gap between the rolls is closed, which means a certain pressure acts between the two rolls. Both the nip load and the weight of the roll shell are taken up by hydrostatic control elements. This means that only very low loads act on the rolling bearings and there is a risk of slippage, which can lead to premature bearing failure.

**The solution:** ASSR bearings.

Schaeffler developed an innovative bearing concept with a customer for preventing slippage – the ASSR bearing (Anti Slippage Spherical Rolling Bearing).

Our customers benefit from a long bearing life and reduced maintenance expenditure. While standard bearings reach an operating life of about one year because of cracks on the raceway surfaces caused by slippage, the expected operating life of the ASSR bearing is at least ten years without damage caused by slippage.

This means longer rolling bearing operating life, lower maintenance requirements and therefore a higher potential for saving costs.



This “spherical roller bearing” consists primarily of the rings of a standard spherical roller bearing. In each of the two rows of rolling elements, each barrel roller alternates with a ball. In the low-

load phase, the balls ensure slippage-free operation.

The barrel rollers take up the loads in the high-load phase.





### Rolling bearing coatings

Coatings are applied on rolling bearings or components to improve the running-in behavior and dry-running characteristics or to optimize wear and friction behavior. Bearings that have to support high loads in paper machines are coated with a tungsten carbide/carbon layer (Triondur®). This layer is characterized by high hardness and a low friction coefficient. Wear resistance increases, and as a result of the low friction coefficient, adhesive wear in particular is minimized. This offers significant benefits for mixed friction or problems resulting from slip strain.

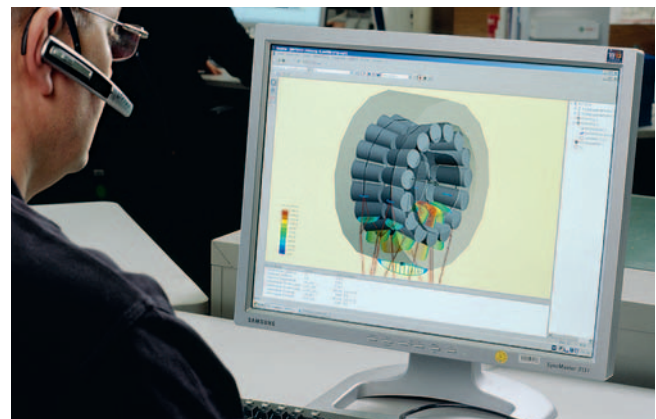
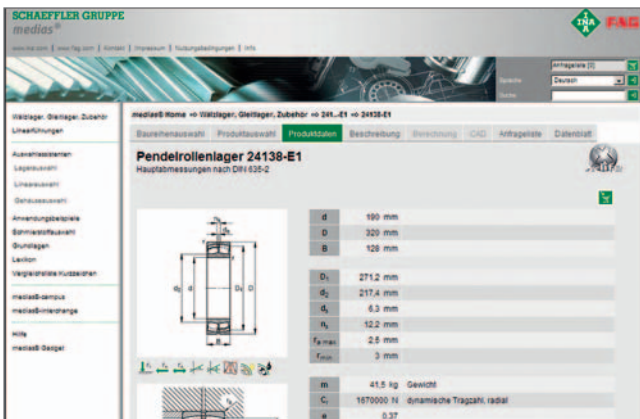
If particularly effective corrosion protection is a priority, Corrotect® electroplated cathodic corrosion protection is used. In the case of heavily loaded bearings, PTFE coatings on the external circumference of the outer ring ensure good sliding behavior with a very low coefficient of friction. This means that bearings coated with this material can be used effectively as non-locating bearings and the axial displacement forces caused by friction remain very low.

### Three-ring bearings

Three ring bearings are ideal for the high-performance roll drive side in conventional anti-deflection rolls. The rotating center ring is guided on the inside and outside by appropriately designed barrel or cylindrical rollers. The selection and combination of these bearings are based on the requirements. Brass cages are designed in a way that enables them to support the rolling elements securely and ensures optimum oil supply.



## Expert consultation and the right software for your application



### Expert technical consultation

Our Pulp & Paper sector offers technical consultation for all aspects of the life cycle of rotating components as part of TCO (total cost of ownership). Our experts possess an outstanding level of knowledge of bearing technology as well as comprehensive know-how in paper and pulp industry applications. Customers can expect expert consultation and support with bearing design and product selection.

### medias® professional

Our electronic support and selection system *medias® professional* provides information on more than 40,000 standard products for approximately 60 industrial sectors. For INA and FAG bearings, *medias® professional* lets you calculate the modified rating life to DIN/ISO 281. In addition, a comprehensive database simplifies the selection of adequate lubricants. In just a few mouseclicks, you

can access Schaeffler's entire range of products and services for the industrial sector.

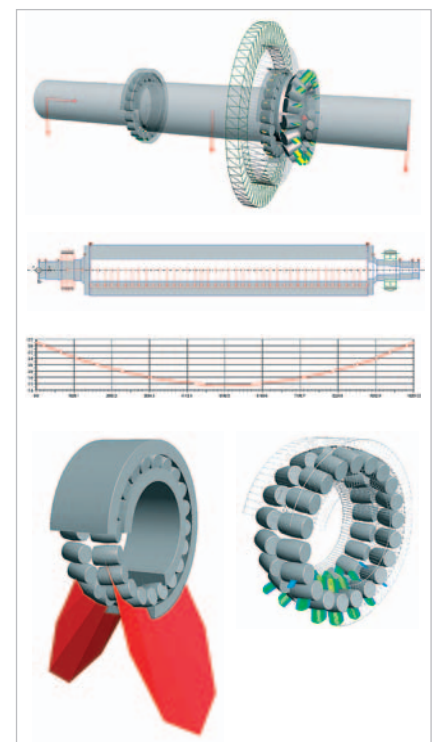
You will find the *medias®* product catalog on the internet at: <http://medias.ina.com>. Here you also have access to *medias® campus* und *medias® interchange*.

Our online training courses at *medias® campus* provide you with the rolling bearing know-how you require in short learning units. *medias® interchange* enables you to find the correct INA and FAG bearings using designations from other manufacturers.

### BEARINX®

BEARINX® can be used to perform detailed analyses on rolling bearings including individual rolling contacts in order to calculate their suitability for each application. Rolling bearing loads in complex machine systems can be calculated, represented and documented by taking

a large number of ambient conditions into account. The same applies for natural frequencies, natural vibration forms, critical speeds and out-of-balance responses for shaft systems.





## Services for all rolling bearing products and applications

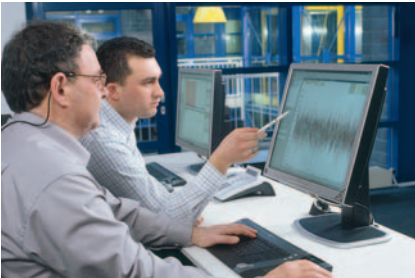
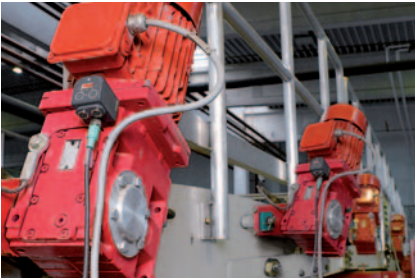
Capital-intensive paper lines require permanent availability, which is provided by top quality equipment and an intelligent lifecycle service that leaves nothing to chance. This in turn calls for reliable products and services for mounting and maintaining the rolling bearings used in pulp and paper applications worldwide.

We accept this challenge and offer a wide range of industrial services to cover all life-cycle phases of rolling bearings.

**INA** **FAG**  
SCHAEFFLER GROUP  
INDUSTRIAL AFTERMARKET

Products					
Services					
Training					
	Mounting	Lubrication	Condition monitoring	Reconditioning of rolling bearings	Maintenance management





The portfolio of maintenance and quality assurance services ranges from installation and system control all the way down to the introduction and implementation of preventative maintenance measures. The reconditioning of rolling bearings, for instance, another service offered by Schaeffler, has short delivery times, contributing significantly to ensuring permanent availability of plant and machinery. A wide range of mounting and alignment tools, gages and lubricants as well as training facilitates maintenance work and helps design efficient work processes.

Thanks to many years of experience and highly-qualified experts, Schaeffler is the expert partner for customer-focused solutions for all aspects of the life cycle of rolling bearings.

**Fast and flexible**

Special monitoring systems for the paper industry detect machine defects at a very early stage. This means unplanned downtimes can be prevented and bearing replacements can be scheduled in advance.

Service experts provide support worldwide for paper production using state-

of-the-art technology, including remote diagnosis via the Internet or GSM. Whenever required, highly-qualified technicians and engineers provide assistance on site. Individualized service agreements, based on customer and machine requirements, ensure the highest possible machine reliability.

We would be happy to provide you with further information.

[www.schaeffler-iam.de](http://www.schaeffler-iam.de)  
[industrial-services@schaeffler.com](mailto:industrial-services@schaeffler.com)



## Success through collective expertise



Fulfilling requirements quickly and efficiently and optimizing processes is an important challenge for us. With innovative products and solutions for all aspects of rolling bearing technology as well as a global network of manufacturing and technical services, we support companies in becoming even more successful. The Smart Performance Program was brought into being in order to fulfill this demanding task. As part of this concept, we support our customers worldwide with the assistance of our Field Service Engineers (FSE). These engineers are highly-qualified experts with excellent market sector knowledge.

FSEs have a comprehensive level of rolling bearing expertise, extensive knowledge of processes and condition monitoring, as well as in the maintenance of plants and machinery. This means that the engineer can assist the customer in

increasing production efficiency and generating competitive advantages. Our customers benefit from the broad spectrum of knowledge of a global company due to the interdisciplinary collaboration of the FSEs within our group of companies without having to speak to several different contacts.

### Customer advantages at a glance

- Access to a wide range of rolling bearing products and services
- Everything from one source despite the wide range available
- Reductions in TCO (total cost of ownership) due to a holistic approach to plant and machinery components for the entire life cycle
- Increased plant availability with reduced maintenance costs
- Prevention of unplanned downtimes by means of proactive maintenance

- Support with purchasing spare parts
- Optimized delivery times due to stock management of sector-specific special bearings.

### Services for the paper industry

- Cost savings by installing FAG X-life spherical roller bearings that have extremely long operating life
- New bearing support concepts for drying cylinders
- Increased machine availability due to permanent condition monitoring of paper machines
- Identification of problems caused by vibration in gearboxes and motors by using modal analysis.

You can find more information about the Smart Performance Program on the homepage

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







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