Bearing Supports for Food Processing and Packaging Machines
With their trend-setting bearing solutions for ball screw supports, main spindles, rotary tables and linear guidance systems, INA and FAG have been leaders on the global market for decades. However, in most cases, the bearing components alone are not the decisive factors for these machine subsystems.

Our customers still benefit from a significant increase in efficiency and unique selling points for our “ready-to-mount” products. After all, these compact bearings are put into operation with this basic principle in mind: unpack it, bolt it on, and it’s ready to use. Also, the integration of important functions such as measuring, sealing, lubrication, braking, and so on in the components themselves becomes increasingly important alongside the bearing supports for optimizing the entire production machine system. This approach lives up to our strategy for production machinery called “added competence,” since it centers on the idea of system solutions for the bearing, bearing support position and the complete system. This means that you now have access to a range of products that covers all your production machine applications.

We have added another exceptional partner to our group of companies – IDAM (INA Drives & Mechatronics), since direct drives and mechatronic solutions are increasingly put into operation in production machines. This means that with the bearing components and the right drives, we supply complete systems from a single source to meet all your requirements.

This opens up a wealth of new technical and commercial design scopes for your applications as well as considerable advantages regarding time and process chains. As far as products are concerned, we offer a comprehensive, well-balanced range, precision technology and the highest quality. A global network of engineers, service technicians and sales technicians is available in order to keep up with the pace of your developments, thereby ensuring constant communication between you and us.

We always have the right product for your application. Just ask us about it.
The processes involved in manufacturing foodstuffs must be highly efficient and cost-effective. These processes are usually fully-automated and often take place under extreme operating conditions. This requires a high level of safety and reliability. This means that high-quality machine components designed for continuous operation are essential. Our contribution: robust bearings with corrosion protection and effective seals that are often lubricated for life for reliable operation around the clock. Modern materials and surface coatings, undergoing continuous development work, give our bearings the necessary edge in terms of operating life.

Whether you require radial insert ball bearings, track rollers, slewing rings, our entire range of linear products, catalog bearings or a customized unit, for all these INA and FAG products, your benefit is the focus of our developments.

- Reducing the number of interfaces by integrating functions
- Compact designs
- Freedom from maintenance
- Reliable operating life
- Components and subsystems that are matched precisely to one another

Place your trust in quality and a wide variety of products from one source. We look forward to working with you.
FAG Deep groove ball bearings: World champions in application

Behind the range of ball bearings offered by Schaeffler stands FAG, a brand that can look back over more than 100 years of tradition. The FAG name continues to stand today for precision, quality, reliability and innovation.

Deep groove ball bearings are the most widely used of all rolling bearings. Accordingly, they are often used in food processing and packaging machinery.

Cost-effective and readily available

Deep groove ball bearings are cost-effective, readily available and easy to maintain. We continuously improve and adjust the quality of the bearings to meet the increasing and often varying requirements of industry. High-quality materials and precision-machined surfaces ensure reliability and reduce running noise, even in the case of tilted bearings.

Reliable quality: FAG deep groove ball bearings in a bottle labeling machine (Photo: KRONES)

Standard deep groove ball bearings with steel or plastic cages, with or without seals
A wide variety of volume-produced products and special solutions

FAG deep groove ball bearings are available as volume-produced products in a wide variety of designs, with cages made from sheet steel, polyamide or brass, with various seal types and also from corrosion-resistant steel.

High-performance corrosion-resistant steels and ceramics are available for applications that require extremely corrosion-resistant and wear-resistant bearing supports. This enables media lubrication and even dry running.

Ask about our special bearings!

Modern sealing concepts

Characteristics such as the quality of materials, seal design, the lubricant selected and reliable adherence to tolerances are decisive factors for the operating life of a bearing. Using sealed FAG deep groove ball bearings that are greased for life is the simplest way to ensure success. The grease type and quantity and the seals themselves are perfectly matched to each other. Our recommendations for deep groove ball bearing seals in this sector are RSR or HRS, depending on requirements and the ambient conditions. RSR sealing shields offer a balanced relationship between friction and sealing action and are suitable for damp operating conditions. The HRS seal is a new development. An optimal seal lip geometry and the narrowest tolerances ensure the bearings have a long operating life.

Well-thought out right down to the last detail: The HRS seal is the winner in the category "Seal integrity under exposure to water"
Modern housing units are often so similar, it is hard to tell them apart. The same rolling bearing steel or cast iron, similar cages and housing designs, series according to DIN or JIS standards, and so on. However, the differences are apparent upon closer inspection.

Robust and cost-effective: Radial insert ball bearings and ...  

![Image](image1.png)

Safe for use with foodstuffs and protected against corrosion: Plastic flanged housings in a waffle conveyor belt system (photo from TMF Belting Systems B.V.).

The advantages at a glance:
- A concentric seal contact surface means that the sealing action and operating life are considerably improved
- Mechanical protection due to outer caps that extend towards the center of the bearing
- Zinc-plated inner and outer caps
- Seal lips for standard applications as well as for operation in high and low temperatures
- Rolled in sheet steel seals for fixed seal seating and easy relubrication

Durable and protected against corrosion by corrosion-resistant steel and Corrotect® N

Radial insert ball bearings made from corrosion-resistant high-alloy rolling bearing steel are available where high demands are placed on corrosion protection. These are essential if it is anticipated that the bearings will come into contact with foodstuffs.

As a cost-effective alternative to bearings made of corrosion-resistant steels, radial insert ball bearings are available with the Corrotect® N special coating. You can find more information in the section “Coatings” on page 20.

Flexible and effective: Location methods

You can choose between five location methods for INA radial insert ball bearings.
... housing units made of cast iron, sheet steel, plastic

The standard methods are those using eccentric locking collars or grub screws that enable the bearings to be mounted quickly and cost-effectively.

**Versatile and cost-effective:**

**INA housing units**

Radial insert ball bearings made of corrosion-resistant steel in various types can be combined with:

a) Plummer block housings
   - made of solid cast iron or
   - sheet steel – particularly cost-effective and light, painted or coated with Corrotect® N

b) Flanged housings
   - in two-bolt or four-bolt designs
   - made of plastic – where high demands are placed on hygiene and corrosion protection.

We can supply you with the correct housing unit for practically every application. The benefits for you are clear:

- particularly economical – without engineering compromises
- easy to fit
- robust and reliable
- shaft misalignment is prevented by the self-alignment facility.

*Suitable for use with foodstuffs: Corrosion-resistant radial insert ball bearings with plunger block and flanged housings made of plastic*
Higher operational safety due to technical superiority

INA track rollers with an optimized outer surface are significantly superior to conventional components. The Hertzian pressure at the contact point is always lower than conventional track rollers – with or without tilting. This reduces wear of the mating track.

Track rollers as an economic factor
Due to their many technical advantages, our track rollers generate an added economic benefit for machine operators, for example in bottling plants. They require little space and operate reliably with low wear. They seldom require relubrication thanks to their large grease reservoirs and particularly effective seals. The user benefits from reduced maintenance requirements and lower costs.

Perfecting existing products in order to increase their benefit for users is one of the demands Schaeffler places on itself.
as an engineering partner to its customers. Significantly increased operating reliability and a longer operating life were the objectives of a further stage in development of yoke type and stud type track rollers based on needle bearings. The result: redesigned thrust and sealing rings made of wear-resistant plastic.

**High-tech concepts**

We can offer you the right product even for extreme operating conditions such as high humidity and constant exposure to water. Our special Corrotect® coating can be applied to track rollers during manufacture. Or perhaps you’d be interested in one of our high-tech track roller concepts based on the high-performance corrosion-resistant steel Cronitect®?

Used in conjunction with ceramic balls, even the most difficult applications with media lubrication up to dry running can be controlled. The significantly increased protection against corrosion compared with conventional corrosion-resistant rolling bearing steels provides the user with considerable economic benefits. You should also talk to us if you are looking for a solution where the wear resistance of the outer surface of the track roller and the mating track have been considerably improved.

You will find more information in the sections Materials and Coatings starting on page 18. Speaking to us personally is even more effective – contact us to arrange a consultation with our specialists.
High performance, straight down the line: From linear guidance systems...

INA linear technology stands for a wide variety of high quality products – tried and tested and full of interesting ideas. We can offer the best technical and most cost-effective solution for every application.

INA monorail guidance systems – a modular concept full of good ideas

Four-row linear recirculating ball bearing and guideway assemblies KUVE-B and series RUE-E linear recirculating roller bearing and guideway assemblies are among our classic products. Both systems, whether with balls or rollers, are based on a modular concept and are highly functionally integrated. Users have very little maintenance to carry out thanks to the lubricant reservoirs integrated directly on the raceways and/or a valve function for ensuring the supply of lubricant irrespective of position.

We have a wide range of components and accessories for our recirculating guidance systems, such as:

- Various carriage geometries
- Braking and clamping elements
- A large selection of guideways (standard, for screw mounting from below, with teeth, with covering strips, etc.)
- Integrated measuring systems for ball bearing and guideway assemblies
- Damping carriages for linear recirculating roller bearing and guideway assemblies

We recommend our service kit for monorail guidance systems especially for the food processing and packaging industry. This is a finely-matched sealing and lubrication concept for taking account of all ambient conditions. It contains components such as front and additional wipers, sealing strips, long-term lubrica-
tion units and a series of relubrication components. These accessories protect the running system of the guideways against contamination, ensure lubricant is provided when required and give long relubrication intervals.

The I-D-E-A-S concept: Keeping the customer in mind

Literally no other manufacturer can supply all the components for standardized or customer-specific system solutions for automation in manufacturing. Our systems specialists have access to one of the world’s most-comprehensive ranges of linear and rotary rolling bearing products. They provide a large variety of mechanical and mechatronic components as well as Schaeffler’s entire range of replacement part and after-sales services.

Three options for system solutions

Manufacturing system solutions is one of our Linear Technology sector’s core areas of expertise. During this process, we provide support to our customers and sales partners with their requirements, even with very complex tasks.

1. Mechanical systems
This includes the complete range of services related to our catalog products such as linear modules and linear tables.

2. Mechatronic systems
We combine linear actuators and linear tables with perfectly-matched power transmission technology such as motors, gearboxes, control systems and sensors.

3. Individual system solutions
In close collaboration with our customers we develop the best possible individual system solution for them – adapted specifically to their needs and the requirements of the task involved.

INA linear recirculating roller bearing and guideway assemblies in a packing and palletizing robot mean that the required precision at high loads as well as long-term process reliability are ensured for the machine manufacturer (Photo: KRONES)
It’s not always small bearings that are required in food processing and packaging machines. Consider the example of a filling plant. The load carrying capacity of large slewing rings is required for the secure bearing supports of the product fillers, star wheel transfer units or rinsers for cleaning bottles. Total reliability in damp and aggressive operating conditions is also required here. We can meet these very high demands with our comprehensive range of slewing rings. The choice is yours – four point contact bearings or crossed roller bearings, heavy or light series, with internal or external teeth, sealed, and so on. Our range extends from “small” to “large”, up to 4 meters in diameter. This means we also have the right bearing for the largest machinery in the industry! We would be only too happy to help you select the solution you require.

And if your idea can’t be put into practice with a standard bearing from our range, then we can develop a special solution with you.

Both in the case of standardized or customized products, one thing is guaranteed. You will receive a high-quality product from Schaeffler – reliable, precise and economical.
The correct lubricant for every application

A well thought-out design and precision manufacturing are behind every high-quality rolling bearing. However, lubrication plays an important role in determining the reliability and operating life of a bearing. Selecting a suitable grease, the effect of the additives, cleanliness in terms of contaminants and compliance with the specified lubrication intervals help to determine the quality of the system. We can also recommend the right grease for every application as part of our service. Regardless of whether this is for initial greasing or relubrication during maintenance.

We thoroughly test the technical performance of all lubricants that we use for the initial greasing of our products. You will find a selection of greases for initial lubrication suitable for your sector in the table below.

Whether you require food grade, media resistance, anti-wear and anti-corrosion protection, you will find the right grease for any application in the Arcanol range.

Not every grease is the same: We lubricate our bearings to meet the precise requirements of your application.
Direct drives from the Schaeffler subsidiary IDAM (INA Drives and Mechatronics) are state-of-the-art and offer the right solution for every application. These virtually wear-free drives have the following advantages: high speed variability, excellent dynamics and rigidity, and as a result, tracking accuracy, high final speeds, high accelerating and stopping capability as well as the highest positioning and repeat accuracy. We offer linear, rotary and two-coordinate direct drives in a wide range of sizes and capacities as well as all the electronic assemblies required for operation.

**Linear motors**

Our compact L1 series of motors is especially suitable for handling systems and for transporting small and medium sized masses. They fulfill high requirements in precision and dynamics.
Our ironless UPL series of printed motors make a convincing case thanks to their high cost effectiveness and energy efficiency. UPL linear motors are extremely well suited to applications in which excellent path and positioning accuracy, outstanding dynamics, the shortest possible response times, and a compact design are key. They are available in lengths of 34 mm to 258 mm and with a force range of 10 N to 240 N. They can achieve speeds of up to 10 m/s at 120 VDC intermediate circuit voltage.

**Torque motors**

IDAM torque motors are ideal for applications that require high torque and smooth running behavior. Slotted high-torque synchronous motors designed as internal and external rotors are characterized by efficient power generation, maximum power density, high acceleration capability and high final speeds. These power packs are contact-free and operate without wear and friction.

**System solutions**

The strength of our “added competence” approach is particularly apparent with our system solutions. By forming development partnerships with our customers and through continuous interdisciplinary cooperation within Schaeffler, we can provide high-performance customer-specific system solutions. This is how we produce innovative mechatronic solutions that provide you with completely new concepts. A system comprising a bearing and motor, ready-to-install, perfectly matched and all from one source.

Linear direct drive system LDDS-077 for vertical applications in the packaging and beverage industry: highly dynamic and low wear
Generating customer benefit is one of the guiding principles of Industrial Aftermarket (IAM), which is responsible for the replacement parts and service business at Schaeffler. This is because we offer our customers sustainable solutions for assembly and maintenance after they have purchased a product. Our customers can increase the operating life and performance of their production machinery with our extremely wide range of products and services. All Schaeffler’s product manufacturing and service processes are thoroughly tested and safeguarded by means of a quality management system that is certified to ISO 9001.

Fast service for mounting
Our HEATER induction heating devices make light work of bearing mounting. For example, HEATER10 can be used to heat both miniature bearings with a diameter of 10 mm and large-size bearings weighing 10 kilograms.

Schaeffler offers heating devices for volume fitting work of complete bearings, inner rings and rotationally symmetrical steel parts such as labyrinth rings, roll couplings and centering rings weighing up to 1200 kilograms.
Effective lubrication with Arcanol greases

17 different Arcanol greases cover almost every imaginable application, since each of these greases has been specifically designed and tested. These greases have been developed by experienced Schaeffler application engineers and are manufactured by the best manufacturers on the market. What’s more, Arcanol greases are subject to 100% quality inspections.

In demand: FOOD2 grease

Greases used in the food industry must fulfill particularly stringent criteria. In this sector, FOOD2, a grease tested by NSF International is often used for ball and roller bearings. FOOD2 is harmless if it comes into contact with foodstuffs.

A highlight: Our lubricator with eight individually controllable outlets

Our compact small lubrication system, FAG CONCEPT8, provides optimum lubrication for your machines. A wide range of monitoring functions, such as the quick check function that is unique worldwide, ensure a reliable supply of the lubrication points. The special feature of this multi-point lubrication system is that the pump bodies can be individually controlled. Our CONCEPT8 device allows you to use eight individual lubricators, which not only cuts purchasing costs, but also increases machine availability due to the reliability of this system.

You will find a comprehensive overview of all products and services in our IS1 main catalog.

Mounting Toolbox: Take a look over the shoulder of our mounting personnel

To provide fast assistance, Schaeffler has bundled valuable knowledge about mounting and dismounting rolling bearings in its Mounting Toolbox. Videos show aspects which require special attention when mounting, lubricating or adjusting bearings. Use our virtual workshop to receive information at the click of a button!

http://mounting-toolbox.schaeffler.com
Corrosion-resistant special steels, high-performance plastics, ceramics – we combine these materials with each other in order to achieve the best possible bearing properties. The purpose determines the material. And you determine the purpose!

**Plastics**
The high-performance plastic PEEK is a modern material in the rolling bearing industry. Its effective media resistance in particular makes it invaluable for demanding bearing applications in the foodstuffs sector. However, it is not only the plastic itself that influences the properties of the bearing. The type and quantities of fillers such as glass fiber, graphite or PTFE also play an important role. We specify the “right” combination of all components separately for each application. This ensures that the bearing cage or the plastic tire of a yoke type track roller are all matched to the purpose in the best possible way. Use our expertise to find the best solution regarding dry running characteristics, mechanical stability or media resistance for your application.

**Ceramic**
Ceramic is the supermaterial for rolling bearings since it is light and durable. Bearings with ceramic balls (hybrid bearings) have significant advantages since the bearings demonstrate considerably longer operating life, can achieve higher speeds, have lower bearing temperatures and require less lubrication.
High-performance corrosion-resistant steels

The advantages offered by ceramic balls become particularly significant when used in conjunction with our new high-performance corrosion-resistant steels. The starting point for our developments in this area was a vision. This vision was to create a rolling bearing that no longer requires lubricant, is not affected by media such as water and cleaning agents, can cope with an atmosphere saturated with hydrogen peroxide and can even operate reliably and for a long time under dry running conditions.

With Cronidur and Cronitect®, we have come a great deal closer to realizing this vision. Due to the finely embedded nitrogen in the material matrix, these materials are far superior to conventional corrosion-resistant rolling bearing steels (e.g. 440C) in terms of corrosion resistance, fatigue life and wear resistance.

Comparison of the media resistance of various steels

<table>
<thead>
<tr>
<th>Name of material</th>
<th>100Cr6</th>
<th>X46Cr13</th>
<th>X90CrMoV18</th>
<th>440C</th>
<th>Cronitect®</th>
<th>Cronidur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitability for use as rolling bearing steel</td>
<td>++</td>
<td>–</td>
<td>+</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Medium 20 °C</td>
<td>Conc. in %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salt water</td>
<td>4</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Hydrochloric acid HCl</td>
<td>0.1</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>– ++</td>
</tr>
<tr>
<td>Sulfuric acid H₂SO₄</td>
<td>10</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Nitric acid HNO₃</td>
<td>5</td>
<td>–</td>
<td>++</td>
<td>++</td>
<td>–</td>
<td>++</td>
</tr>
<tr>
<td>Phosphoric acid H₃PO₄</td>
<td>10</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>++</td>
</tr>
<tr>
<td>Citric acid C₆H₈O₇</td>
<td>25</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>++</td>
</tr>
<tr>
<td>Sulfurous acid H₄SO₃</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>++</td>
</tr>
</tbody>
</table>

**++** resistant  **+** moderately resistant  **–** hardly suitable  **– –** not resistant
So that standard components operate for long periods and with high operational reliability in extreme operating conditions, Schaeffler has developed several coatings for such requirements. These coatings influence the run-in behavior and emergency running characteristics and optimize the corrosion protection as well as the wear and friction behavior. In addition, we have an entire range of coatings that offer protection against abrasion, lubricant starvation, false brinelling, aggressive media or the passage of electrical current.

**Unbeaten in the fight against corrosion – Corrotect® special coating**

Corrotect® offers the best anti-corrosion protection of all Schaeffler’s special coatings. Corrotect® is an extremely thin, corrosion-resistant cathodic layer that is applied using electroplating methods. Under load, this layer is rolled into the surface and partially worn away. It protects rolling bearings and the running surfaces of seals against corrosion for long periods of time. The coating is resistant to condensation water and contaminated water.
Tribological coating systems

Durotect® CK (Protect A) is a columnar thin layer chromium plating. The structured surface of the chromium layer increases the surface hardness and provides effective wear protection. The column-like geometry of the layer has a positive effect on the build up of oil pressure, forms lubricant pockets and therefore prevents lubricant starvation under extreme operating conditions.

Durotect® CK+ (Protect B) is a suitable alternative if additional anti-corrosion protection is required. A top layer of chromium mixed oxide is applied in addition to the thin layer chromium plating Durotect® CK. This assists the lubricant and offers effective protection against corrosion under high operating temperatures and aggressive operating conditions. Durotect® CK+ for example, is resistant to various chlorides, oils, sulfur compounds and weak acidic media.

Extreme wear resistance with Triondur®

Triondur® coatings systems have up to 80% lower friction coefficients compared with dry steel-steel contacts. The coating offers durable protection in cases of high tribomechanical stresses, lubricant starvation and dry running.

Track rollers protected by Triondur® coating offer high operational reliability. This extremely hard PVD/PA-CVD coating, which is only a few µm thick, effectively protects stud type track rollers and cam plates against wear.

Authorized for use in direct contact with foodstuffs: Durotect® CK protects against wear

Durotect® CK+ is effective against heavy corrosion and high wear

After a 24-hour salt spray test: A bearing coated with Corrotect® compared with an untreated bearing

Triondur® protects against severe wear during sliding stress or insufficient lubrication
Calculated safety with BEARINX®

Even the best product is worthless if it is incorrectly used. So you should draw on the experience and expertise of our engineers in bearing design and calculation.

For example, by using the BEARINX® calculation program, rolling bearings can be analyzed in detail – right down to a single rolling contact. It is possible to experiment with the influence of various measurables and operating conditions during various optimization steps. The results show how the bearing support is stressed under the various load conditions. The program enables the bearings to be dimensioned according to the application. During simulation, the optimum design for the application can be determined easily and cost-effectively by changing the position, type and size of the bearing.

Schaeffler’s calculation service is rounded out by FEM analyses, dynamic simulations or measurements at the customers’ premises.
Network of Engineering

Global customer proximity

Schaeffler has a worldwide network of 16 research and development centers

Schaeffler worldwide: Facts and figures

- 76,000 employees worldwide, around 6,000 of which in R & D
- Well-established in-house research facilities
- Around 40 R & D locations, 16 of which are R & D centers
- More than 1850 patent applications annually: Schaeffler is thus one of the top 4 of Germany’s most innovative companies in 2012 (acc. to the DPMA, March 2013)
- Very close network of distributors: Consultation, products and services – direct and local

With a product range consisting of around 40,000 catalog products as well as numerous special designs, Schaeffler has the widest product range in the industrial sector and is one of the world’s most renowned and reliable partners to industry.

Our Production Machinery business unit regularly publishes information about innovative bearing solutions for machine tools, printing machinery, textile machines as well as for food processing and packaging machines in its sector magazine called “added competence”. The current issue in seven languages is available for download here:

www.schaeffler.com/machine-tools
Further information

Bearing Supports for Food Processing and Packaging Machines
www.schaeffler.com/packaging-machinery

Services offered by Industrial Aftermarket
www.schaeffler.com/services

System solutions for linear axes
www.schaeffler.com/systemsolutions

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