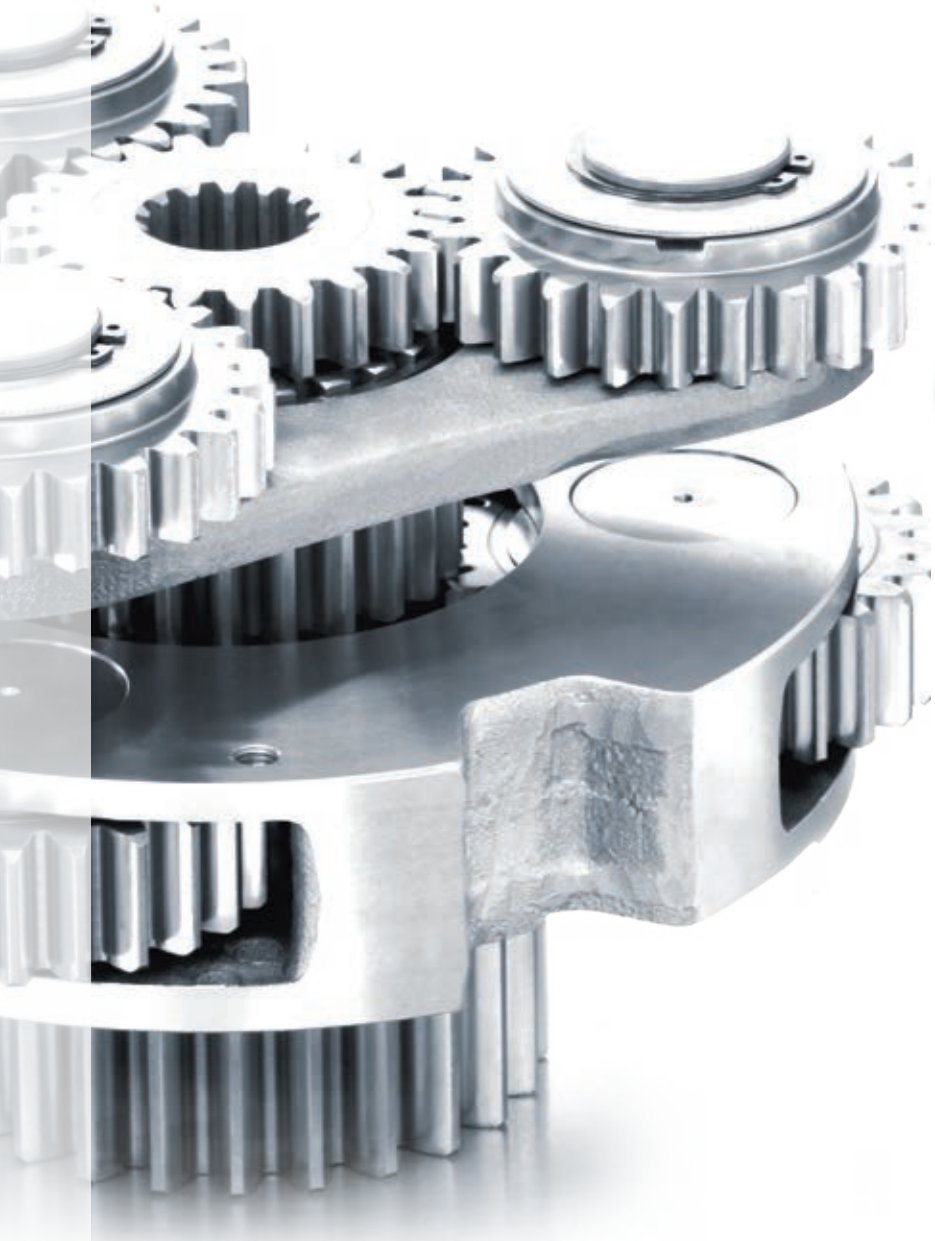
TRADE MAGAZINE OF THE LFD GROUP

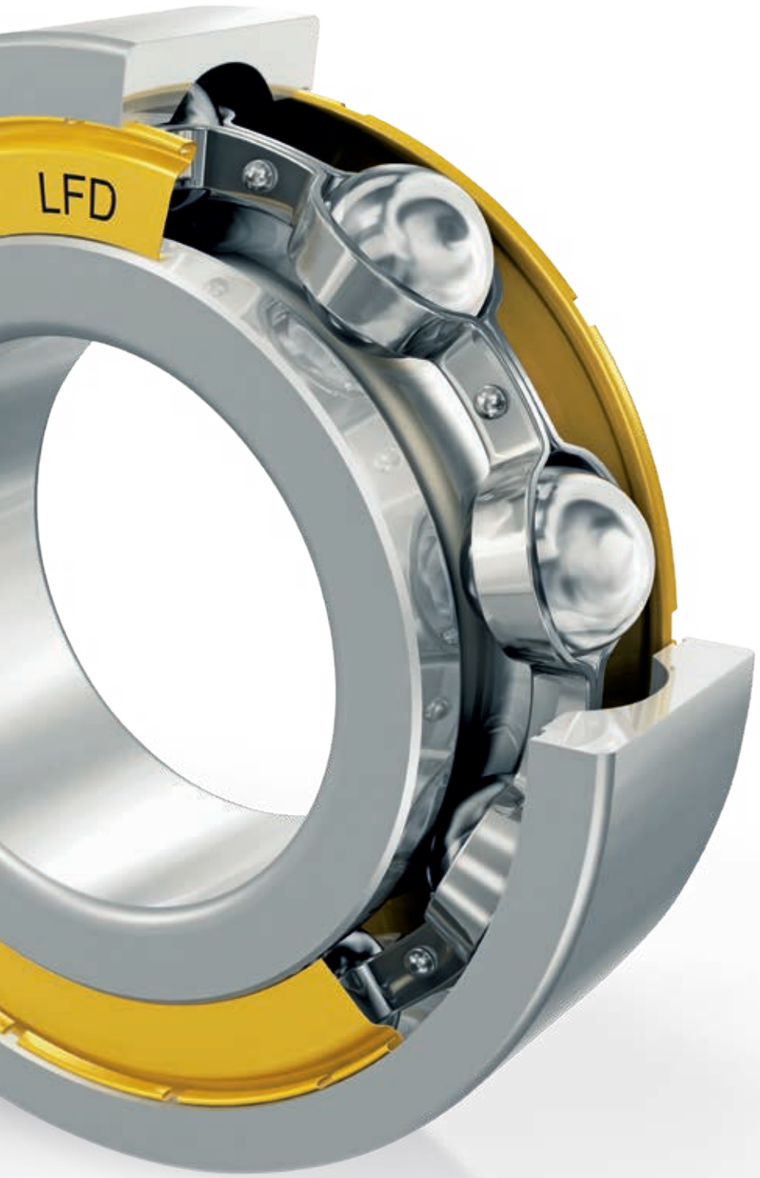
LFD DRIVE TECHNOLOGY

THAT INSPIRES



THIS IS WHY IT RUNS SMOOTHLY!

OUR MAIN TOPICS



SIMPLY WELL-ENGINEERED

LFD

DIVERSE IN REGARD TO DRIVE TECHNOLOGY

Veit Loeffler, Managing director of the LFD Group

Drive technology usually pertains to rotational movement, irrespective whether in regard to wheels, axles or gear wheels. However, the key question is not what turns, but instead around what everything rotates.

The answer is simple: It all rotates around LFD bearings of various types: Ball bearings and taper roller bearings are the most common bearings in drive technology. The term “bearings” is simply an umbrella term for all bearing types.

The LFD Group has been successful on the market for more than four decades and has established itself with the production of bearings from its own automated production. It has been proven in various tests that with its products, LFD is on equal footing with other leading manufacturers and furthermore offers a very good price-performance ratio. In the last years, LFD has been able to score with highly reliable and quick supply capability.

For this reason, LFD is diverse in the sector of drive engineering and in close cooperation with its customers take the strict, varying requirements of the respectively also very diverse applications into account. The laboratory equipment that is technically at the current level and the check and test benches manufactured specifically for LFD in close cooperation with technical universities permit providing the customer with the necessary safety for the approvals for the own applications. The LFD engineers also support the respective testing environments at the customer on-site. In this manner, new partnerships are steadily formed, which strengthen in the course of the years.

Learn more about these partnerships in drive technology and the most diverse applications.

Veit Loeffler,
Managing director of the LFD Group

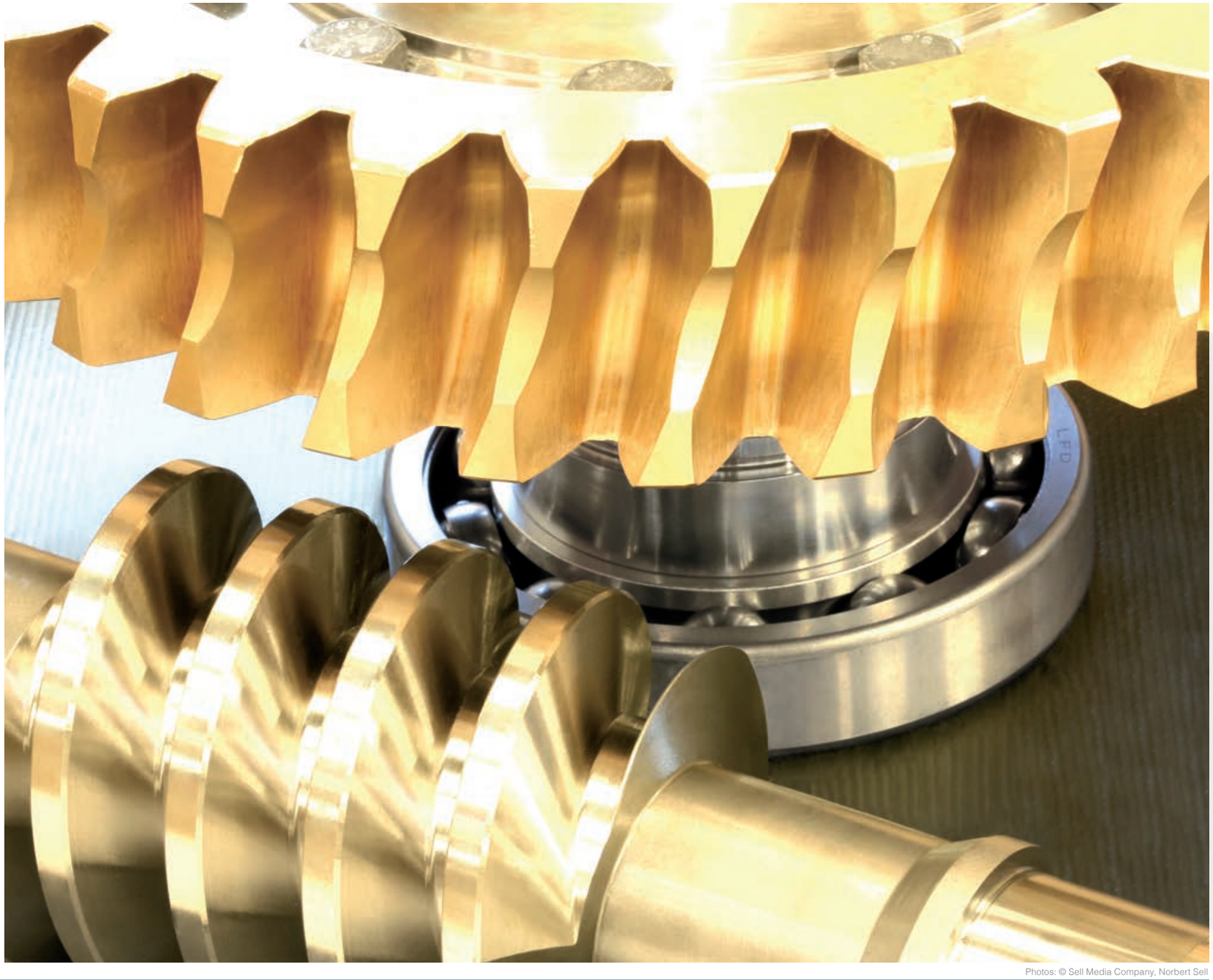
TABLE OF CONTENTS

LFD HEADQUARTERS Germany
Giselherstraße 9 – D 44319 DORTMUND
Phone + 49 231 977 250 – Fax + 49 231 977 252 50
Email info@LFD.eu – Internet **www.LFD.eu**

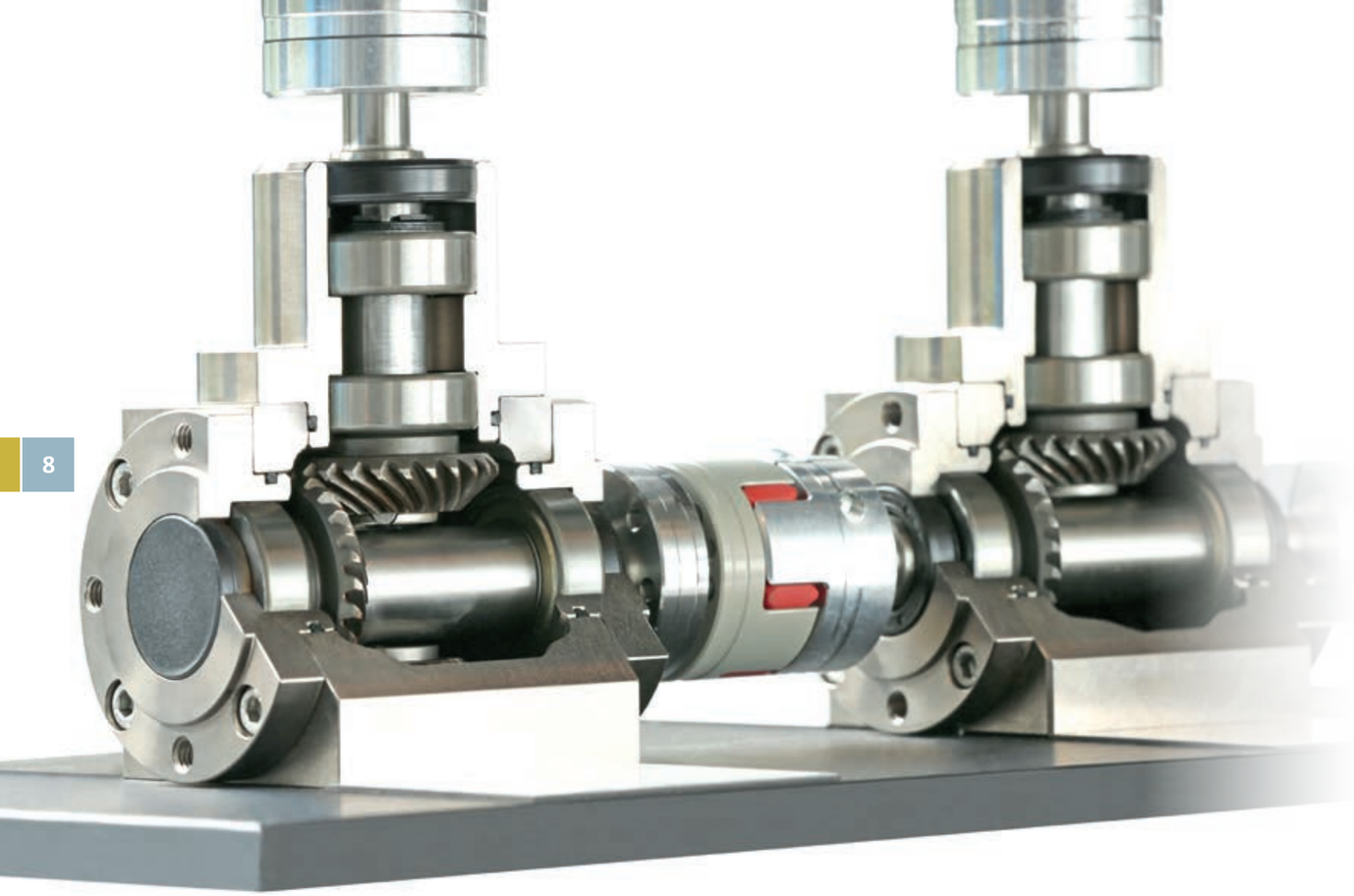
Image credit, title, table of contents and back cover: SELL MEDIA COMPANY - Norbert Sell

QUALITY GEARBOXES MADE IN GERMANY

As a medium-sized manufacturer of gearboxes, ATEK Antriebstechnik looks back at more than 75 years of tradition. For more than 30 years, the product range has been focused on single-stage bevel gearboxes that ATEK develops and assembles itself and sells in the entire world. The modularly designed product range mainly encompasses bevel and worm gearboxes as well as the servo model line that can be combined with modern servomotors.



Photos: © Sell Media Company, Norbert Sell



Bevel gearboxes

The bevel gearboxes are characterised by a compact construction, a large power spectrum and a multitude of possible gear ratios and gear ratio reductions.

As a result, application-specific drive solutions for special machines or series products are offered for general mechanical engineering.

Bevel gearboxes of various types, which divert the direction of a rotational motion by 90° – and when desired also modify the rotational speed and the torque – are offered in a comprehensive product catalogue with all necessary technical specifications:

Miniature bevel gearboxes, bevel gearboxes, stainless steel gearboxes (HDV hygiene-design gearboxes), **worm gearboxes** and **precision servo gearboxes** (optimized for the fitting of servomotors).

Right-angle planetary gearboxes

The new ATEK right-angle planetary gearbox BPCE combines the properties of the renowned, compact, spiral-toothed and low noise ATEK bevel gearbox with those of a planetary gearbox.

The spiral-toothed bevel gear stage provides a low noise and compact power transmission at an angle, with its high power density, the planetary gearbox enables high torque values and high ratios in the most confined of spaces. The combination impresses with high torsional stiffness and low backlash.

The drive flange of the right-angle planetary gearbox is freely configurable and can be adapted to the motor as required. To provide a maximum degree of flexibility and easy maintenance, the right-angle planetary gearboxes are low-maintenance, feature life-time lubrication and have been optimized for the assembly in all installation positions. Four construction sizes and four construction types with each 18 gear ratios are available.

MODULARLY

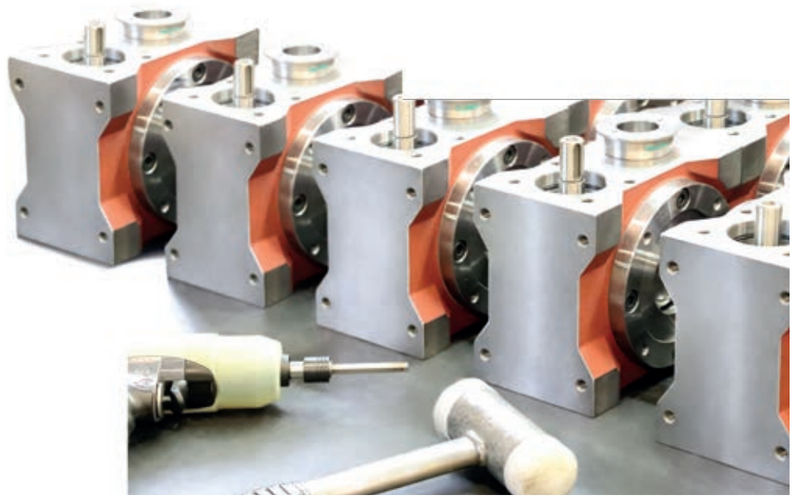
CONSTRUCTED DRIVES

Degree of efficiency

The degree of efficiency [η] represents the ratio of extracted and input power. As a result of the interaction of highly developed and precise individual components, the gearbox manufacturer ATEK is able to realise degrees of efficiency of 95-97% in their gearboxes.

Lubricants

ATEK gearboxes are filled with synthetic oils from the factory. Optionally, especially for the use in machinery intended for the food and pharmaceutical industry, the gearbox can be delivered with NOTOX lubricants, which comply with the requirements in accordance with NSF H-1. No oil change is necessary during the service life of the gearbox.



DRIVE SOLUTIONS
WITH KNOW-HOW

The service life of the bearings can be increased by a factor of 1.5 when an oil change is performed after the first 500 operating hours and then every 5,000 operating hours.

Gearbox specifications and design

With correct use, the service life of all gearbox elements is greater than 15,000 hours.

Noise emission

The noise emission depends on a multitude of factors. For example the gearbox size, the rotational speed, direction of rotation, lubrication, installation position and the quality of the installed deep groove ball bearings. ATEK has been installing the particularly low noise LFD EMQ deep groove ball bearings for many years. LFD has developed an EMQ variant for special requirements and applications. The fully automatic production process of the LFD EMQ deep groove ball bearings contribute to the ensuring of an extremely low noise level.

Photos: © Sell Media Company, Norbert Sell

Test bench confirms excellent values

The structure-borne noise diagnostics is a recognised analysis procedure and is used for the state monitoring of rotating bearings. With light axial preload, a fixed outer ring and a rotational speed of 1,800 rpm, the LFD deep groove ball bearings are measured using in-house test benches at determined frequency bands between 50 Hz - 10,000 Hz. In the analysis, the frequencies summarised in the low band as “long waves” provide insight into the geometrical trueness and in the high band as “short waves” on the surface roughness. The noise emission with LFD EMQ deep groove ball bearings has been extremely reduced in regard to the application in gearboxes and electric motors. This requires an excellent surface finish and the high geometrical trueness.

BALL BEARINGS IN SORTING PLANTS

In modern sorting plants for online retail, articles in incomprehensible quantities for millions of active customers must be prepared for dispatch.

Photos: © Vanderlande Industries GmbH, Kugellager © Sell Media Company, Norbert Sell

Likewise, returns and complaints must be handled. In so-called bag sorting systems, hundreds of thousands of small LFD ball bearings are in use, which reliably transport goods. In close cooperation with the customer, products modified by LFD are created, which are optimally suited for this use.

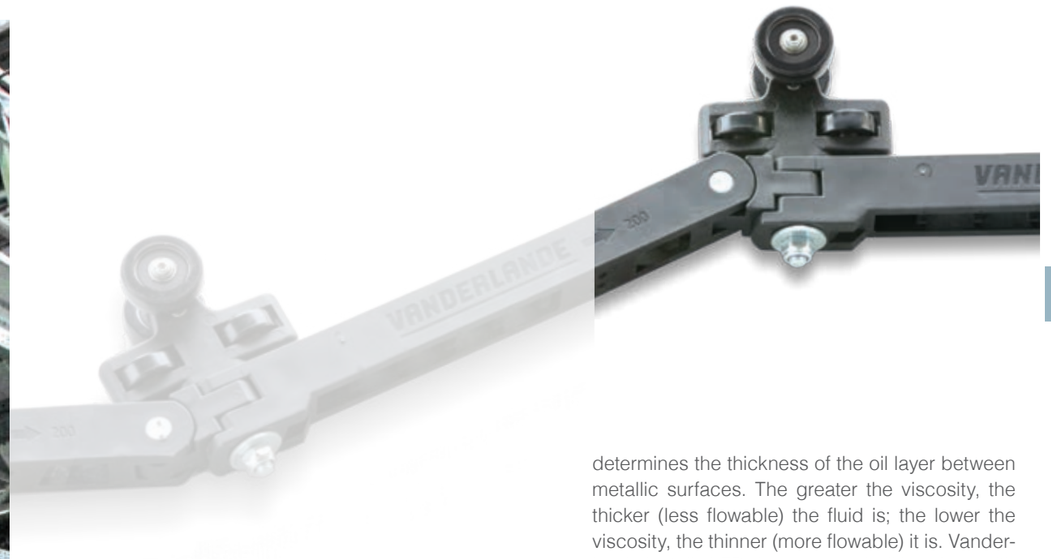
Development of warehouse automation technology

In October 2014, Smatec GmbH was acquired by Vanderlande. The German company (based in Bielefeld) has more than 30 years of experience in the development of warehouse automation technology and concepts. The know-how and expert knowledge of both the former Smatec owner and founder, Ralf Schneuing, as well as that of his experienced team have been secured.

Photos: left © Vanderlande Industries GmbH, right © Sell Media Company, Norbert Sell

Vanderlande bag sorting systems in use worldwide

It is the objective of large online portals for E-commerce to continue a profitable course of growth, gain market share and to strengthen the own competitive position. To achieve this, such E-commerce platforms rely on the technology by Vanderlande. With thousands of brands, hundreds of thousands of articles and millions of customers, the connection of brands, partners and customers in various countries is facilitated. To be closer to the customer in different regions and to keep delivery times short, new automated logistics centres are established continuously. As a long-time partner and market leader in the area of E-commerce, the system integrator Vanderlande, who is active worldwide, was tasked with the planning and implementation of new bag sorting systems.



Optimal start-up behaviour

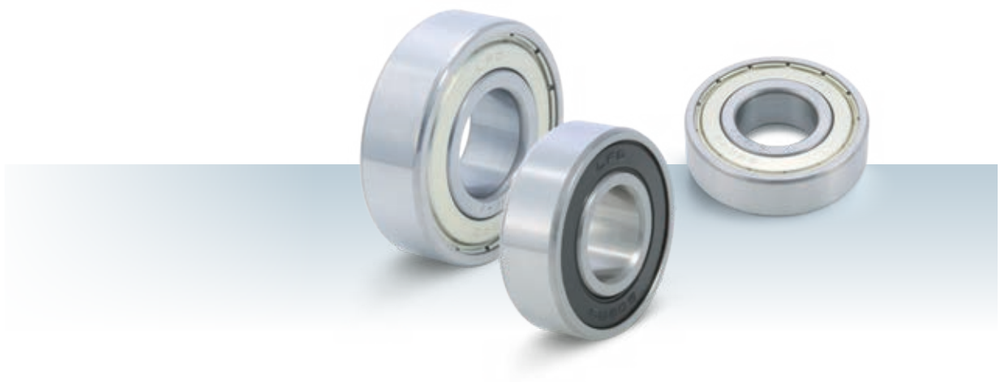
For the LFD deep groove ball bearings to function smoothly and durably in such a system, it is mandatory that a stable film of lubricant is created between the race and the ball.

Generally such lubricating greases are comprised of approx. 80% of lubricating oil, approx. 5% to 10% of thickener and approx. 10% to 15% of additives. The thickener used in the most common types of ball bearing greases is lithium soap grease. This forms a sponge-like framework that encloses the oil droplets. Whether a lubricant film can establish itself depends on the bearing construction, the rotation speed, however in particular on the viscosity of the lubricant. The viscosity ratio at operating temperature is used as the measure for the effectiveness of the lubrication. It reflects the ratio of the actual kinematic viscosity to the viscosity, which is required for a sufficient lubrication. The viscosity (thickness) of a lubricant determines the thickness of the oil layer between metallic surfaces. The greater the viscosity, the thicker (less flowable) the fluid is; the lower the viscosity, the thinner (more flowable) it is. Vanderlande installs LFD deep groove ball bearings with a lubricant with very low viscosity. As a result, the optimal start-up behaviour of the bags is ensured.

Heart of the order fulfilment system

The bag system is the heart of the order fulfilment system in the logistics centre. It is the AIRTRAX Pocket by Vanderlande, which was first presented on the LogiMAT trade fair. This powerful state-of-the-art unit among others impresses with future-oriented features: Use of modern, proven materials, very low number of components as well as redundant technology/function. The bag sorting system AIRTRAX Pocket is part of the reliable and innovative AIRTRAX product line by Vanderlande, which in a highly frequent environment with large goods volumes efficiently transports, sorts, sequences and stores along larger distances and with changing heights.

Secure workflow
from loading to the packing station



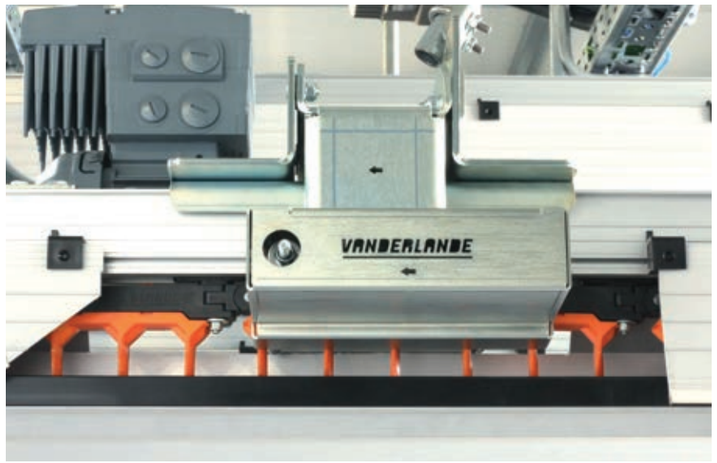
The pocket system is scalable and as a result is highly flexible when handling quickly expanding and dynamic product portfolios, irrespective whether this is in regard to fashion (including hanging articles of clothing), jewellery, multimedia or other articles. The handling of returns has never been performed with this degree of efficiency, as the returned articles are processed immediately and made available automatically for new customers.

AIRTRAX is the first concept on the market with a one hundred percent friction drive and as a result, in comparison with traditional chain drives, runs without interruption and with little mechanical systems as well as control, even in the event of the bridging of larger distances. For example, with the utilised plastic chain links, nothing must be tensioned, which facilitates larger maintenance intervals. These chains do not have to be oiled or greased, as a result unprotected goods are not soiled. In this manner, dealers and consumers receive clean goods as expected at a continuously high quality level, as no stains or other flaws can occur. Vanderlande sets standards with such exciting and future-oriented projects and successfully continues partnerships with large portals.

Bag systems

They are controlled via the RFID transponder of the roller adapter to which it is mounted. The bag itself is comprised of polyester fabric, which is reinforced with a plastic panel in the lower section. Special plastic frames provide an improved function during loading and unloading, reduce the volume level of the system and fulfil the following features: They preserve the form of the bags and at the dispatch and packing positions a large insertion opening is created by lifting the frame.

Simple and secure workflow from loading to the packing station – the operator at the loading station removes individual parts from the provided containers or boxes, moves them along the scanner with a movement of their hand and throws them in a shaft. Now the goods are in the bag, in each case only one part. From this point on, all further steps occur automatically, e.g. the buffering or the multi-stage sequence sorting.



Photos: © Sell Media Company, Norbert Sell

SPARE PARTS CONCEPTS FOR BIG PLAYERS!

Bearings operate at concealed places in the most diverse types of machines. There, they ensure mobility with as little resistance as possible. This can most easily be observed in companies that are responsible for the manufacture or maintenance of mobile work machines.

KRAEMER Baumaschinen is an authorised, licensed dealer of construction equipment made by the manufacturers Doosan and Weycor. The company supports the machines with its own spare parts store and its own master workshop throughout the entire life cycle and assists the construction sector and industry as a reliable dealer with its workshop.

It will not run without LFD bearings

As a dealer of construction equipment, specialist workshop and the knowledge from the spare part business, the company offers a wide range of services in regard to construction equipment. Without bearings, but also without spherical plain bearings, practically nothing will move with these heavy machines. For this reason, especially in regard to the spare parts provision, the experienced service company relies on LFD as a reliable partner in the bearing sector.

LFD BEARINGS ARE OPTIMIZED FOR THE INDIVIDUAL APPLICATION OF THE CUSTOMER AND IMPRESS WITH HIGH ENDURANCE AND LOADING CAPACITIES

Photo: © Sell Media Company, Norbert Sell

High endurance and loading capacities

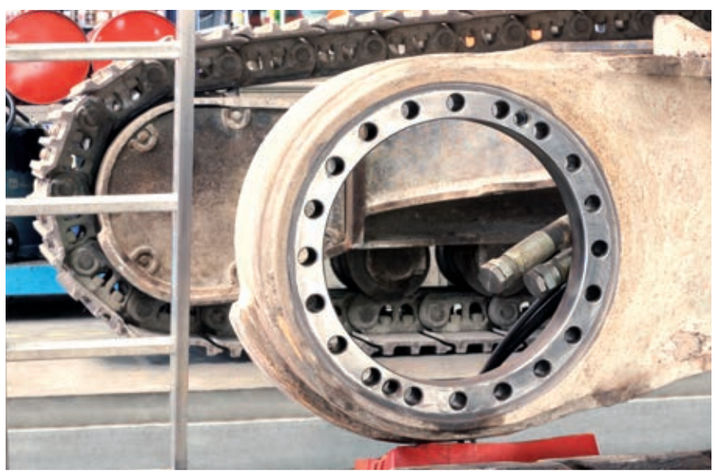
LFD bearings are optimized for the individual application of the customer and impress with high endurance and loading capacities, also during extremely hard conditions such as those experienced by construction equipment and with other industrial applications.

Durable bearings enable heavy machines to achieve extraordinary mobility with a high degree of productivity, reliability and efficiency with a reliable power development and superlative efficiency in the most diverse applications.

High requirements are set for the loading capacity of the individual bearing components such as races, cages and balls. LFD meets these with the selection of particularly pure steels with an oxygen content that is as low as possible.

LFD has solutions for every need

The manufacturer LFD, based in Dortmund, produces bearings fully automated on machine-controlled production lines. This safeguards the required consistent high quality according to German standards.



Photos: © Sell Media Company, Norbert Sell

The spare part business of KRAEMER Baumaschinen offers solutions and parts for the complete customer need, practically for a timely repair in accordance with the current value of the respective construction equipment. The delivery programme covers spare parts, wear parts and maintenance parts for various machine manufacturers and types. A reliable supplier network with strong partners forms the basis for quick supply. KRAEMER Baumaschinen offers the quality of an original equipment manufacturer at a very good price-performance ratio.

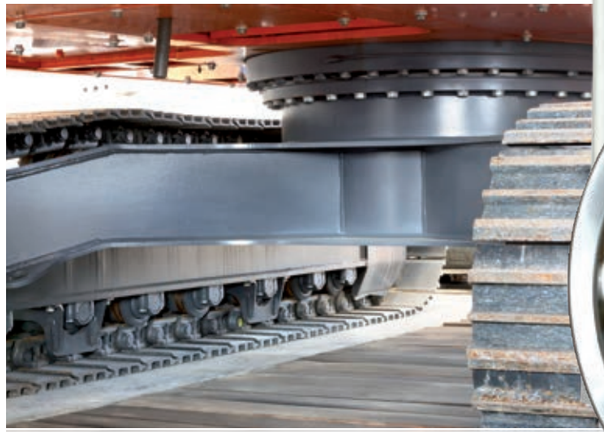
The delivery programme covers spare parts, wear parts and maintenance parts for various machine manufacturers and types.

...FOR BIG PLAYERS!

LFD – A reliable partner

Exactly this is what the LFD Group offers in the sector of antifriction and spherical plain bearings and for this reason has been a reliable partner for many years. A flexible production structure and the most modern measurement technology enables the LFD Group to address customer requests directly. In close cooperation, the company develops solutions and products for its customers for the drive technology with a long service life, corrosion resistance, smooth running, maintenance-free operation and energy efficiency, which can be adapted to the respective requirements.

For verification, optimization and new developments, the LFD Group has expanded its own development laboratory with the latest measurement technology of renowned manufacturers.



Photos: © Sell Media Company, Norbert Sell

GET RACING – THE ROLL-OUT OF THE FS218

Photos: © Sell Media Company, Norbert Sell

GET racing is the student racing team of the Technical University of Dortmund and the contact point for all petrol heads. Every year, the team constructs a single seater racing car, which is driven at various Formula Student events in Europe.

A multitude of members plan, construct and manufacture the racing car under their own direction and in the course of this experiences the development process of a dream. With more than 30 members from various faculties and study programmes, GET racing does not only create new things, but also shares team-building joint activities outside of the workshops during their leisure time.

In 2018, the team consisted of more than 30 students, who are mainly enrolled in engineering sciences such mechanical engineering or electrical engineering. But in the meanwhile many students from other faculties such as economy have become part of the team.

LFD is a gold sponsor

As a gold sponsor, LFD is a consultant of the GET racing team and works closely together with the development team. The established bearing manufacturer from Dortmund is renowned for ball and antifriction bearings of the highest quality as well as the in-house manufacture according to German standards.

This demand is safeguarded by in-house, ISO-certified production lines, the most modern laboratory technology as well as several in-house inspection and testing benches, as a result of which new developments and optimizations of applications can be implemented in a flexible manner.

A multitude of areas of application

LFD bearings are installed throughout the entire vehicle. Irrespective whether in the drive train to the differential bearing, in the steering box on the pinion shaft or in the throttle valve. The suitable bearings are used for each specific application.

Special meaning for the chassis

Most of the bearings made available by LFD are installed in the chassis. Here, maintenance-free spherical plain bearings are used for the wheel suspension and must meet strict requirements. In particular, the topic of bearing play is a very important aspect as this is stipulated by the regulations and is verified by the technical inspection. The respective inspectors check the bearings closely and make sure that the racing car will be able to withstand all disciplines and in particular also long-distance races of 22 km. In the event that the spherical plain bearings or wheel bearings have a certain amount of play, then it is possible that it will not be approved for the dynamic disciplines.

Photo: © Sell Media Company, Norbert Sell

Photo: © Get racing Dortmund e.V.

Photo: © Sell Media Company, Norbert Sell

Wheel bearing is critical

An additional very important assembly unit is the wheel bearing as a rotating connection between the wheel hub and the hub carrier. Just as with the wheel suspension, no play may occur in these areas. At the same time, the requirements are even more specific here. The bearing must absorb high wheel loads and simultaneously be very small and light in order to reduce the unsprung mass. This is very important for the chassis and the overall handling properties of the vehicle. Using a wheel bearing developed in cooperation with LFD, the racing team has been able to tackle this problem precisely. LFD will continue to support the team following the successful roll-out of the new FS218.

Sharing of knowledge

In addition to bearings, LFD supports the GET racing team with a great deal of knowledge on the topic of antifriction bearings, which are obtained directly from this manufacturer. At several meetings, the calculations of the wheel bearings were verified and notes and proposals were made for a possible optimization. Topics such as the selection of the correct lubricant and its effect on the antifriction bearings as well as tolerances play an important part. This knowledge can then be presented by the students during their design presentations at the events.

Technical inspection

Before each event, the vehicle is subjected to a technical inspection. In the course of this so-called “scrutineering”, the construction of the racing car and all parts are checked for their conformity with the regulations. After scrutineering has been passed, the car is placed on the tilt table. Here, the vehicle is tilted by 45°, during which no liquids may run out. Thereupon, the vehicle is tilted to 60°, during which it may neither tip over nor may anything be released.

FORMULA STUDENT

With the new FS218, just like every year, participation in international competition has been planned. Thus, Formula Student is an international construction competition for students, which is strongly modelled on the American Formula SAE™.

The Formula SAE™ was started in 1981 by the Society of Automotive Engineers (SAE) in the USA as a university competition. Since then, there have been offshoots in twelve different countries. Mostly they have very similar rules, enabling the teams to participate in several events with their vehicles.

LFD: THE PATH TO INDUSTRY 4.0

PROJECT SCHEDULE BEGINNING OF 2019 – END OF 2020

Scientific studies have verified the great potential benefits of Industry 4.0.

LFD has also closely delved into this topic and has elaborated a specific road map. This road map with the working title “LFD21” is an innovative strategy paper, which will raise all company divisions to a new level. This extensive project is to start at the beginning of 2019, all necessary work and software modifications will have been completed by the end of 2020.

New ERP SYSTEM – Customer management

A new ERP system will relieve the employees from monitoring and routine tasks by means of automated workflows and in this manner create more space for customer support. Digitally received data will in future solely be processed further digitally. Many companies have already switched over to invoice dispatch via PDF. As a result, in future, incoming invoices will be read in automatically. A workflow running in the background will independently perform the balancing with the order.

When no deviations are found, the incoming invoice will be registered automatically. Likewise, when an EDI connection to the customer does not already exist, then the customer order will be scanned by OCR software and to a large extent will be adopted in the ERP system in an automated manner. Customers are automatically informed of framework contracts that are about to expire and most importantly are notified in a timely manner. An algorithm will support the procurement during the determination of the optimal order time. And with the hand-over of the goods to the forwarding agent, the customer will receive an e-mail generated by the system containing the tracking number.

Photos: © Sell Media Company, Norbert Sell

NEW FULLY AUTOMATED WAREHOUSE PLANNED

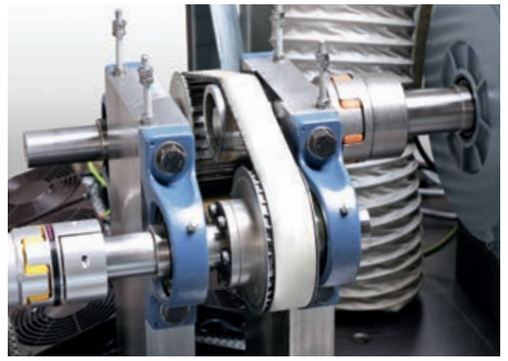
Should the city of Dortmund grant the required permit on time, then LFD will build a facility with a size of approx. 7,000 m² and a height of 22 metres on an additional plot of land. An office building is already present at this location. With this facility, a fully automated warehouse with a max. capacity of 18,000 pallets on several levels will be created. This would more than double the in-house capacity of the current head office at the Giselherstraße in Dortmund and therefore would be a long-term perspective.

Advantages of INDUSTRY 4.0 for production and logistics

LFD will furthermore implement the advantages of INDUSTRY 4.0 both in the production as well as the entire logistics. Fundamental for the desired increase in efficiency with the smart networking of the flow of materials and goods is the smooth function of the utilised mechanical engineering elements.

The interaction of people, machines, systems, logistics and products that can communicate and cooperate with each other will relieve the people and help in achieving the desired increase in efficiency. An additional important advantage is the transparency of information. With the smart networking everyone will gain access to information.

The challenge lies in the technical standards or norms that are critical for the communication between man and machine or between the machines, which are still missing in part. Here, individually, a large number of adaptations are required. For this reason, LFD is working together with a large number of specialists, of which some are even customers. Because to achieve smooth automation, a good bearing is required, preferably made by LFD.



Photos: © Sell Media Company, Norbert Sell

Photo: Initial screen © Sell Media Company, Norbert Sell, all other © NDW

LFD BEARINGS IN CONTROLLABLE ROLLERS

PLUG AND PLAY – DRIVE ROLLER SOLUTIONS

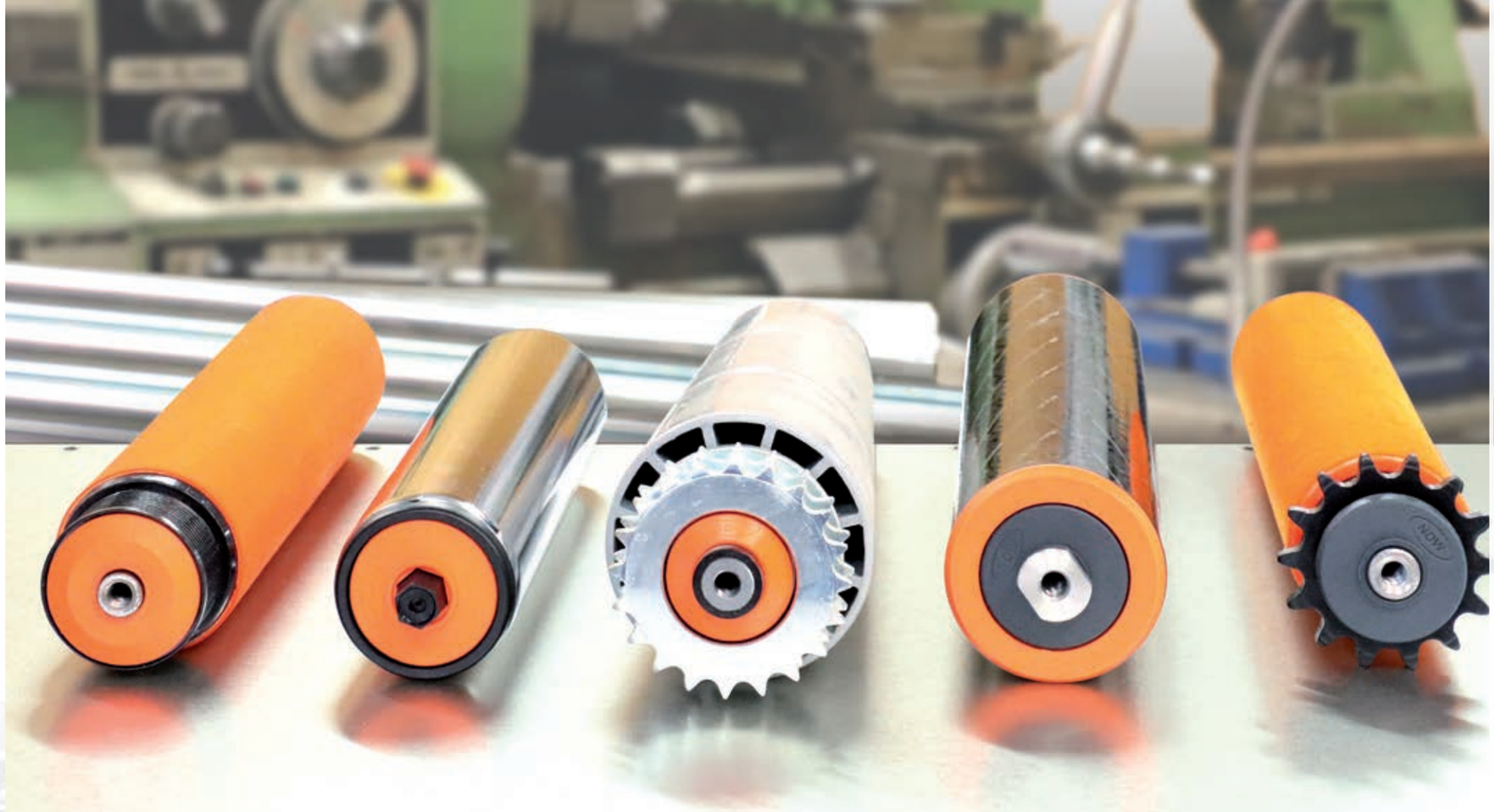
A mere three years ago, NDW began the development of drive rollers solutions to simplify the use of motor rollers and to make the control of a complete conveyor system less inexpensive and easier. The LFD Group delivered the special EMQ bearings for this, which are used due to the particularly effective minimisation of friction losses in the controllable rollers of various types.

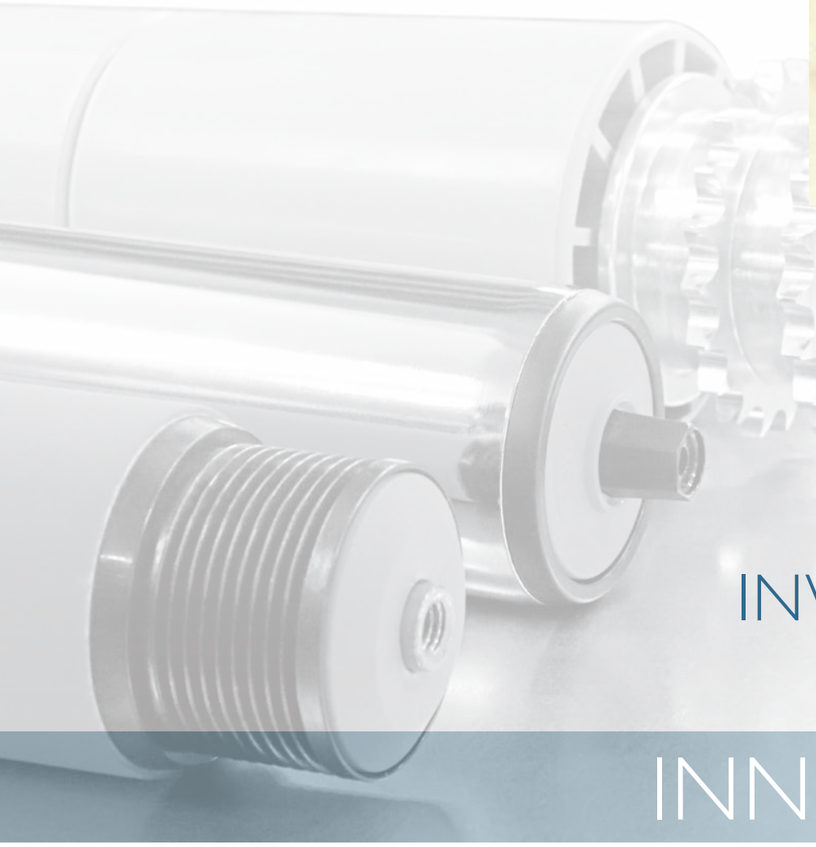
As a result of the development work, the innovative company brought the first four self-developed drive control units to the market in 2018. This product line (Budget, Basic, Basic+ 24V and Basic+ 230V) can be used both for simple conveyor systems as well as for the control of more complex systems. In this regard, the Basic+ 230V controller is the only one available on the market that can be operated without a transformer. As a result it can control and drive up to 20 individual motors without a new power supply.

New technology has been established

As a result of the combination of a powerful, brushless motor roller (50DRX and 60DRX), NDW has established a new technology, which is excellently suited for the handling of light to medium-heavy products with a weight of up to 300 kg.

In close partnership with the floWItech Förderelemente GmbH based in Marienmünster, Germany, differently durable load-bearing rollers and drums are manufactured in the own production line and high-quality LFD bearings are cleanly pressed in. Currently a new production plant, NDW Germany, is being planned and exspected to start production at Marienmünster. It will take over the current load-bearing roller production of floWItech.





INVESTMENTS IN DIGITAL INNOVATIONS

Wireless configuration of the systems

The partnership establishes new possibilities in the area of the control of conveyor systems. The products are ideal for plug-and-play solutions and have the ability of communicating bi-directionally with each other. A major advantage is the use of the integrated power supply (Basic+ 230V). This negates the need for using a transformer. The control which has been developed completely in-house accumulating the motor rollers and combining them as desired with the use of PLC. Furthermore, the utilised software can be expanded and adapted without difficulty to the control of additional system technology.

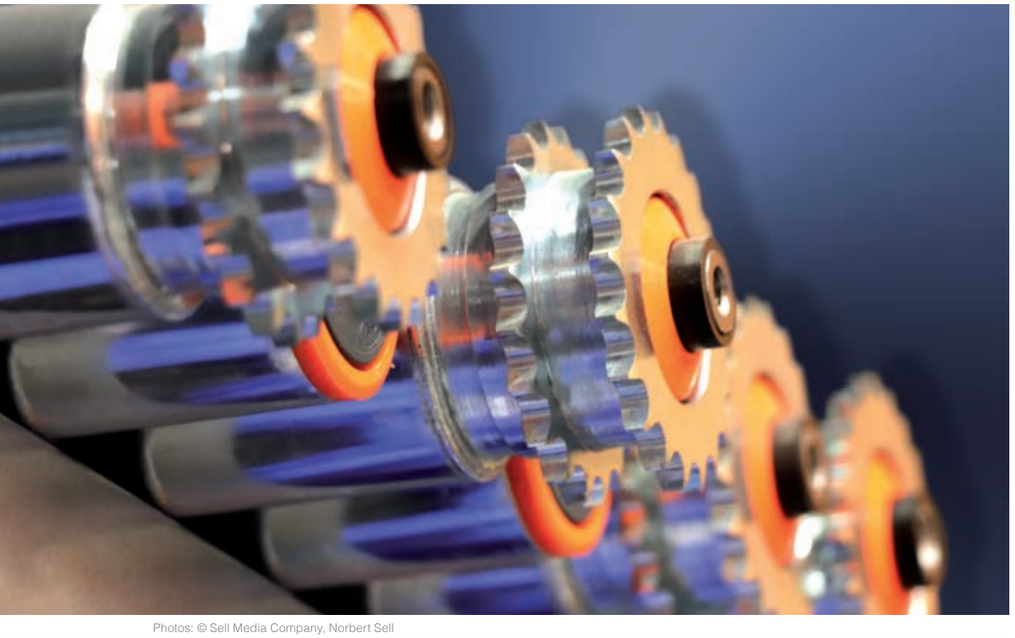
An additional major advantage is the wireless configurability of the drive regulators (Basic, Basic+ 24V, Basic+ 230V) with the NDW Connect App. Due to the IP67 rating of the controller (Basic+ 24V, Basic+ 230V) and the removal of the transformer (Basic+ 230V), the new solutions are also excellently suited for the use in the food industry.

Precision work

The NDW motor rollers have been designed for different applications. For this reason, the motor roller is available both in a variant made of galvanised steel as well as in stainless steel and furthermore in the diameters of ø 50 mm and ø 60 mm. The protection classes are IP21 (Budget), IP54 (Basic) and IP67 (Basic+ 24V, Basic+ 230V).

The motors are available with the EMQ deep groove ball bearings by LFD in three speed levels: 17, 30 and 60 m/min. The motor rollers can be fitted with a rubber, PU or PVC coating. The rollers are equipped with conical plastic elements for bend applications.

A continuous further development of the motors and electronic components ensures the future sustainability in the sector of conveyor technology.



Photos: © Sell Media Company, Norbert Sell

A COMPLEX SYSTEM CONTROL

INDUSTRY 4.0 and NDW Connect

NDW Connect is a new intelligent technology that integrates the conveyor systems in the cloud and enables global support, service and monitoring for everyone and makes it affordable. A dedicated app provides extensive insight in the efficiency of the respective conveyor system. The entire control process is performed in the own WLAN network and in this manner enables global remote maintenance and monitoring.

As a next step in the direction of Industry 4.0, in the near future it will be possible to digitally evaluate operational information such as service life, operating temperature and drive load.

Photos: © Sell Media Company, Norbert Sell

LFD QUALITY ASSURANCE

LABORATORY EQUIPMENT AND TEST BENCHES

With its own bearing test benches, which permit test runs of up to 300% of the capacity, the LFD Group ensures a very high quality standard.

Service life testing

With the test bench WRM 1603, LFD has now, in addition to the already existing test benches, created the possibility of also performing service life testing on small radial bearings. With the variable setting options for rotational speed, force and test temperature, a very wide range of testing conditions can be covered.

Adjustment possibility to real customer applications

In the course of the service life tests, the structure-borne noise values of the bearings are recorded and the test bench is switched off automatically when the set limit values have been reached. The test bench WRM 1603 can be used for the testing of both grease-lubricated enclosed bearings as well as for example open bearings that are operated in the oil sump. Utilising the test temperature that can be adjusted between 40 °C and 80 °C, there is an additional adjustment possibility to real customer applications. Starting with shaft diameters of 8 mm, all bearing types up to a maximum shaft diameter of 30 mm can be tested on the test bench.

Technical specifications WRM 1603

Radial load max.	20,000 N
Nominal speed	2,000 rpm
Speed max.	10,000 rpm
Motor output	3.7 KW
Operating temperature	40 - 90 °C
Bearing dimension d	8 - 35 mm
Bearing dimension D	22 - 62 mm

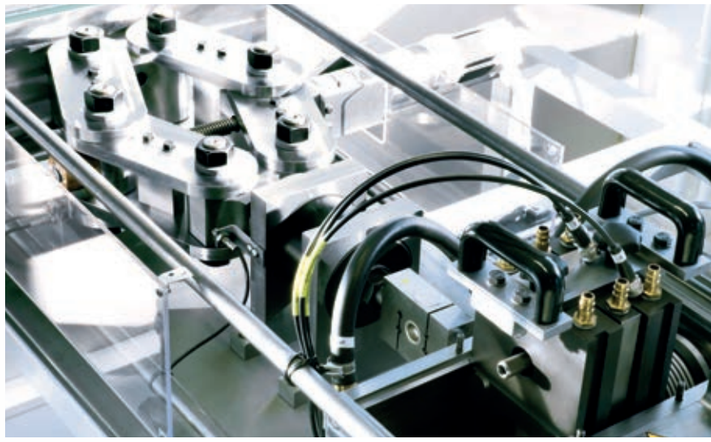
The motor speed can be selected freely between 2,000 rpm and 10,000 rpm and in this manner covers a wide spectrum. Currently, bearing types such as the deep groove ball bearings 608 or 6002, but also 6205, which are installed in sets of four, are in the focus. A special feature of this test bench is in the force application of the radial load.

Radial loads of up to 20,000 N

Radial loads of between 300 N and a maximum of 20,000 N must be applied with the small deep groove ball bearings that are utilised. For this reason, a hydraulic cylinder would be unsuitable for this bandwidth with very low deviations during operation. On the bearing test bench WRM 1603, the precise load of the radial bearings is achieved using a toggle linkage. Using the permanent registration of the force via a load transducer, a step motor adjusts the power of the toggle linkage in a highly precise manner, ensuring that the radial force is kept virtually constant.

Analyses

Comprehensive report files are available during the subsequent bearing analysis, as the current sensor values are stored every two seconds. In addition to the rotational speed, motor output, radial force and temperature, in the recorded structure-borne noise curve additional information is available on the test cycle.



Photos: © Sell Media Company, Norbert Sell

Dust-dry and wet test

The test bench WSF 1704 has been available since mid-2018 for the further development of the enclosed deep groove ball bearings.

The effectiveness of the seals can now be verified in practice in pre-set configurations on environmental influences. Basically, a distinction can be made between dust-dry and wet testing as well as powered inner race or outer ring.

Dust-dry test

During the dust-dry test, a defined amount of “contamination” in the form of foreign particles such as mineral test dust or fine wood chips from a bunker are blown onto the bearings via a pre-portioning.

An optimized air outlet brings the particles directly in the area of the sealing lip. The amount of particles as well as the frequency of the blowing process can be defined freely within limits.

Wet test

During the wet test, the resistance against the ingress of moisture into the bearing is tested. For this, the variants of atomization, water spray or high pressure are available. Using the different types of water exposure, the corresponding environmental conditions are reproduced for the test bench, e.g. cleaning processes on agricultural equipment.

Mud bath test

A combination of both testing types is performed in the mud bath test. This variant is solely performed with a driven outer ring. All other stated tests can also be performed with a driven inner race.

Analyses

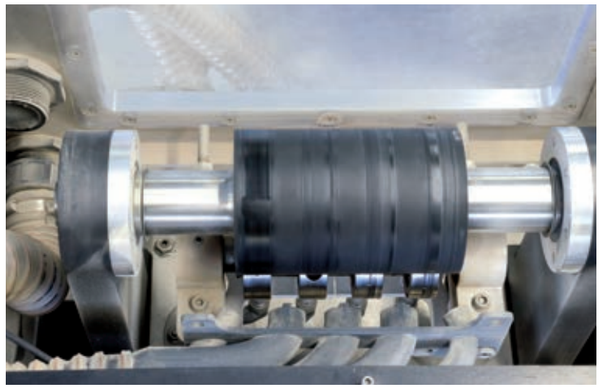
After the end of the test cycle, the effectiveness of the seal is analysed, by for example assessing the amount of particle ingress. Additionally, the documented sensor values are available in a report file for evaluation. Here, for example it can be read out which errors lead to the deactivation of the test cycle.

Technical specifications WSF 1704

Water spray pressure max.	3 bar
Spray water pressure max.	10 bar
High-pressure cleaner, water pressure max.	130 bar
Nominal speed	2,000 rpm
Speed max.	10,000 rpm
Motor output	3.7 KW
Bearing dimension D	22 - 62 mm

SAFEGUARDING

OF THE EFFICIENCY



DRIVE TECHNOLOGY AND GEAR MANUFACTURING

As a result of comprehensive knowledge and many years of experience in the field of drive technology, Wolfgang Schmahl GmbH & Co. KG ensures the production according to state-of-the-art technology and is one of the most innovative manufacturers of gears in Europe.

As a competent partner, the company supplies manufacturers of agricultural and road construction machinery, general machine and system construction as well as the sector of defence technology, marine transmissions, engine manufacturing and wind power.

On the basis of an impressive, flexible and modern fleet of machinery, SCHMAHL meets the expectations that are set to a competent supplier – whether for large components of up to 20 t or small-scale production. It is their objective to continue to invest in the most modern gear machining technology so in future they can continue to offer problem solutions and products at the highest technical level.

Photo: © Sell Media Company, Norbert Sell

FLEXIBLE AND MODERN

GEAR MACHINING TECHNOLOGY

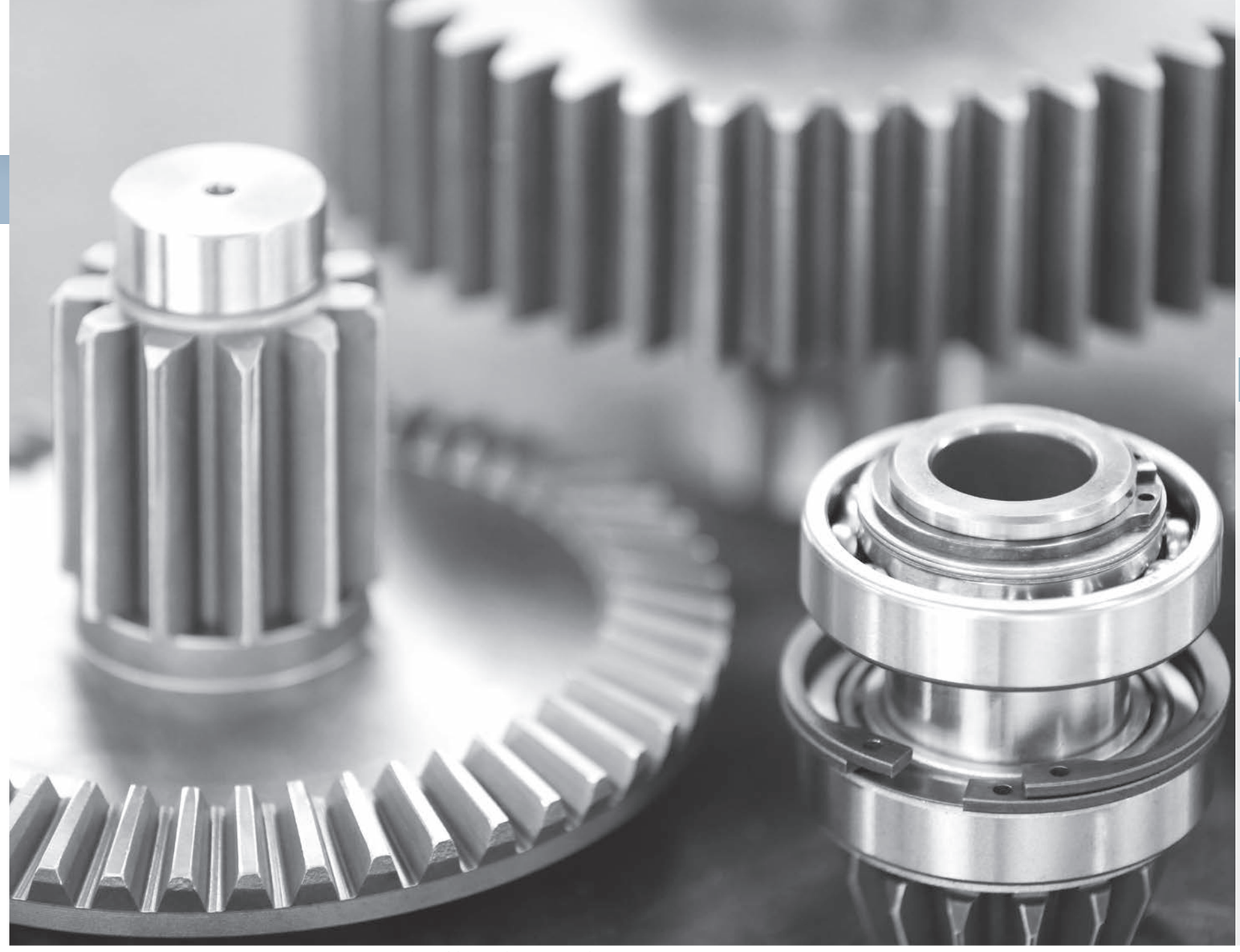
Complete depth of production

As a specialist in regard to the manufacture of gear wheels and gearboxes, from the very start the company has relied on a collaborative dialogue. Its particular strength lies in the development and manufacture of special constructions and specific drive solutions with a complete depth of production. The highest degree of precision and quality during the manufacture of the individual components is ensured from the first cut to the finished part.

Dialogue and 3D simulation

A competent team of experienced engineers develops the optimal, individual solution for the respective customer. With the most advanced 3D simulation programs and gearing calculation software, development and parts costs can be reduced from the very first step. Industry-specific determinations are not made, but instead a strong focus is placed on special solutions, which are not offered in this technical and economical form by series manufacturers.

The image on the left shows a central gearbox for wheel loaders, for example such as those used in agricultural applications and the large image shows a disassembled bevel gear stage incl. drive pinion with bearing.



Photos: © Sell Media Company, Norbert Sell

Gearing technology

Perfect small and large-scale production and the assembly of complete gearboxes can be coordinated individually. The latest production machines, in conjunction with many years of experience in the field of gearing technology result in optimal solutions.

Photos: © Sell Media Company, Norbert Sell

Loadable bearings

The precise fabrication competence of the SCHMAHL company in conjunction with the high quality of the utilised LFD bearings ensures a long service life of the gearboxes. Due to a comprehensive product range, LFD supplies EMQ deep groove ball bearings, spherical roller bearings, taper roller bearings and cylindrical roller bearings in different sizes for the various drives.

The foundation for the installed bearings is also provided by the especially high-grade bearing steel, of which the degree of purity is among others a guarantee for the high degree of utilisation, but also for the long service life. As a result, LFD bearings are extraordinarily loadable even under extremely tough conditions.

PERFECT SMALL AND LARGE-SCALE SERIES PRODUCTION

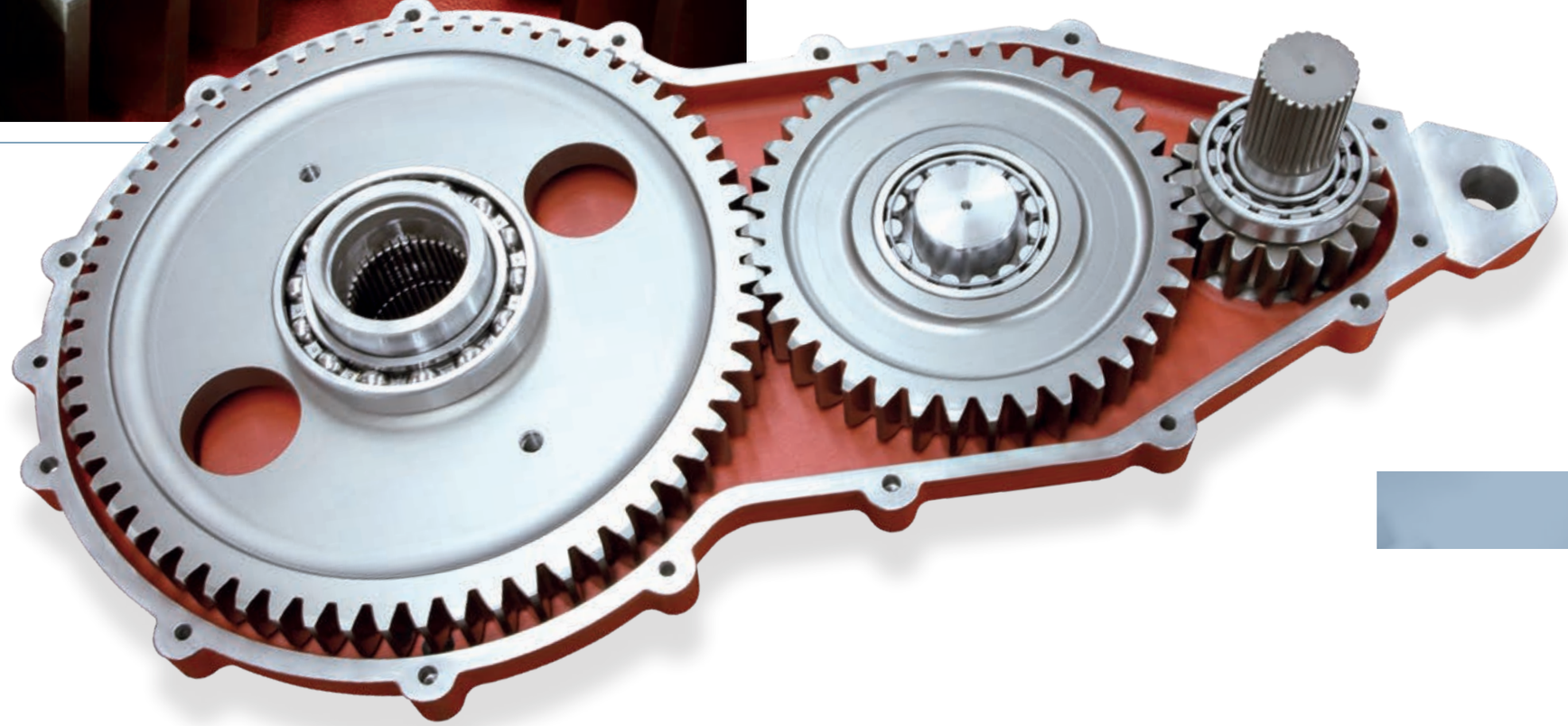
Gear wheels: Straight or helical cut, module 1.5 – 36 max. outer diameter up to 3,500 mm, tooth flank grinding up to quality DIN 3.

Spline shafts/knock-out spindles: With almost all existing profile dimensions according to DIN and SAE.

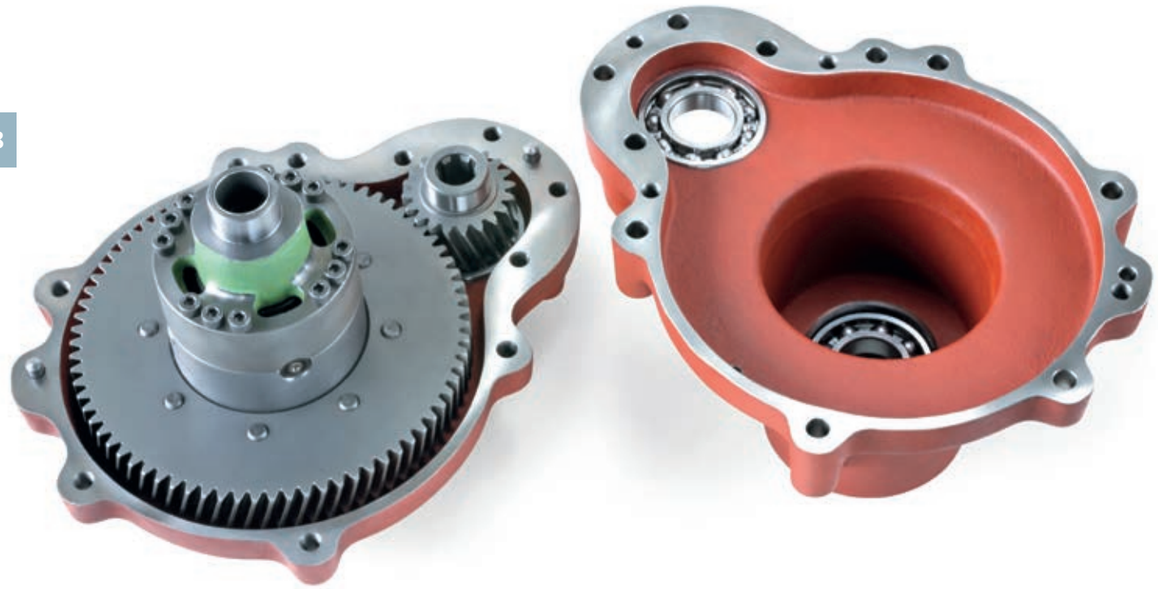
Bevel gears: Straight-cut with spherical tooth flanks, milled on Klingelnberg Sferoid machines, module 2 – 10 max. diameter 450 mm.

Pinion shafts: Max. diameter 250 mm, max. length of 1250 mm, largest possible partition module 16.

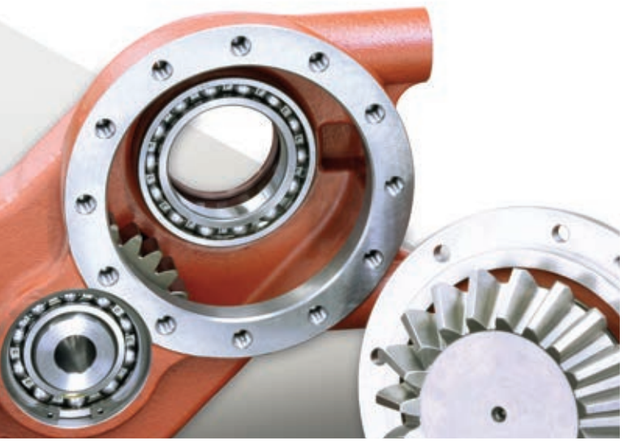
The image below shows a rotor gearbox: A chuck wagon with a rotor gearbox for example collects cut grass and breaks it up immediately, enabling livestock to digest it more easily. With the large gear wheel, the gearbox drives a cutting unit.



GEAR WHEEL MANUFACTURE



The image above shows an axle centre housing with a helical cut spur gear system and differential. Usage: Wheel loaders, small machines that are used in stables, i.e. machines with a particularly narrow track width, enabling them to drive through even very narrow door openings.



Photos: © Sell Media Company, Norbert Sell

LFD: Excellent delivery performance

“The delivery performance of LFD is one of the aspects that I like best. We place framework contracts six months or an entire year in advance. LFD supplies the bearings in its own large warehouse on demand,“ engineer Gerwin Ebbinghaus explains the well-functioning cooperation. In this way, SCHMAHL can work in an order-related manner and call up the necessary batches of bearings exactly according to the production sequence. This is a great advantage as stocking does not have to be performed in the in-house component warehouse.

The measure of all things

The fulfilment of the quality standards is the highest requirement. A certified quality management in accordance with DIN EN ISO 9001:2015 and the continuous qualification of the employees guarantees the highest degree of perfection. Complete documentation of the required material qualities and heat treatment processes are ensured in the in-house materials laboratory. As a leader of measuring technology of the “in process measurements”, the company meets the highest requirements in regard to material, precision and quality.

THIS IS HOW LOGISTICS REALLY STARTS ROLLING

Increasingly diverse goods must be picked individually and on-time in the worldwide flow of goods. A trend that requires efficient logistics with economical materials handling systems. Systems, on which bearings at key points safeguard that everything runs smoothly.

The drum motors made by Interroll serve as efficient drives for conveyor systems and have established themselves with conveyor belts as a simple and compact drive solution. They are mainly developed for the use in belt conveyors and connected conveyor systems and are used in a wide range of sectors.

Interroll systematically relies on high-grade quality of the bearings, as the manufacturer benefits from the reliable service life, the lack of a need for maintenance as well as the robustness of the components. Interroll has tasked an independent institute and a team of bearing experts with the examination and comparison of LFD products. The following was determined: LFD offers high quality that is comparable with the market leaders, however with a considerable price advantage.

Powerful drives for conveyor systems, for example drum motors rely on high-quality bearings.

Photo: © Sell Media Company, Norbert Sell

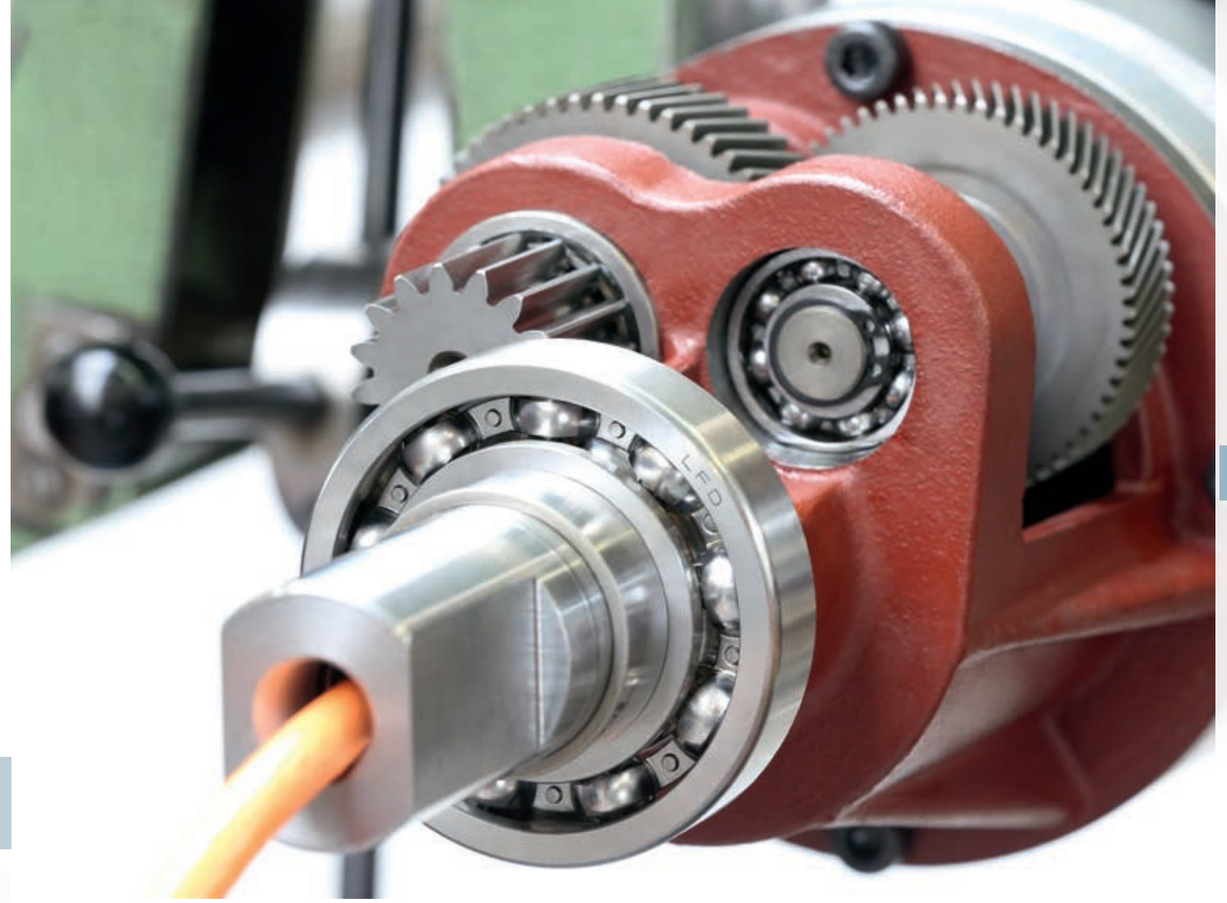
Optimal degree of efficiency

The drum motors made by Interroll are highly energy-efficient with an overall mechanical efficiency of more than 80%: The output of the electric motor is transferred directly to the conveyor system. This means that the mechanical power loss in comparison with geared motors with a secondary transmission is reduced significantly. Due to the high energy yield and the low power loss, the new motors are considered to be the most energy-efficient conveyor belt system that is currently available in the sector of materials handling.

EMQ bearings are used in the drum motors that have been especially optimized for the electric motor production, as in the chain of the different components always as little friction losses as possible should occur. Otherwise, losses of output would occur. EMQ bearings made by LFD are especially suited for this and minimise possible friction losses.

EMQ BEARINGS
OF THE LFD GROUP

Photos: © Sell Media Company, Norbert Sell



At Interroll, in close cooperation, the gearbox assemblies, the electric motors as well as the bearings are trimmed for low-friction operation. The manufacturer has been able to achieve this successfully in the pairing with the LFD bearings in EMQ quality, as a result of which the products feature a high quality and a long service life. The motor manufacturer is familiar with the verification mechanisms and also appreciates the systems, the test benches and the modern laboratory facilities of the bearing producer based in Dortmund. Regular reports from LFD on the test sequences and also the performance statistics create mutual trust. In turn, Interroll can reinforce the trust with its own customers, as it is not necessary to discuss series faults of the assemblies and it is exactly known what LFD does.

Continuously variable output

When the customer controls the motor using a frequency inverter, then the velocity can be adjusted in a continuously variable manner – an indispensable property when used at supermarket checkouts. This is realised by fitting the soft starter to the conveyor frame.

In this manner, reliable solutions are created for checkout systems, reverse vending machines and the conveyor components connected to these for the return of returnable or recyclable bottles, cans and beverage crates. Interroll drum motors with LFD bearings are also used in distribution centres – even for very heavy loads such as entire pallets. In this manner, the entire supply chain for supermarkets and the retail trade is supplied in a reliable and sustainable manner. When we click on “buy” on the Internet, precisely these motors, rollers and bearings ensure the quick delivery of the ordered goods. The rollers are also manufactured completely in-house. However, in this regard, Interroll has a core competency in the development of such high-performance thermoplastic materials in its own injection moulding plant in Switzerland.

LFD ENSURES HIGH QUALITY

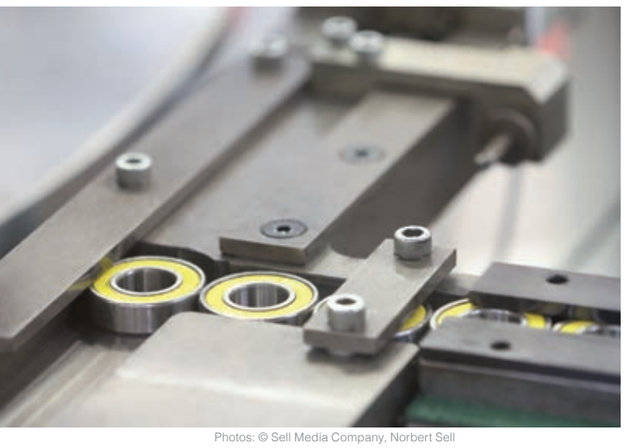
At Interroll solutions, the ball bearings delivered by LFD are pressed directly into the powerful rollers. The fit is precise down to a tenth of a millimetre. The production processes are safeguarded in such a manner that the bearings are always pressed in at exactly the same position. In this manner, a high degree of quality can be ensured.

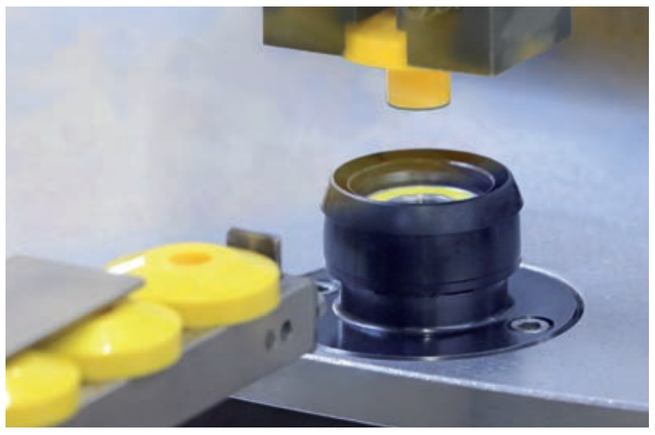
Higher chrome content in the bearing steel

Specific and also very different requirements are set to machines that facilitate the automated processing of foods. Due to its own fully automated manufacture of deep groove ball bearings with quality management in accordance with German standards, LFD has been a partner of roller and drum motor manufacturers for many years. When the installed bearings do not run in a fully encapsulated manner, then they must be made of stainless and acid-resistant steels. Only in this manner will they on the one hand be corrosion-inhibiting and able to resist the intensive water jet or steam cleaning processes and on the other hand acid resistant towards the very aggressive cleaning agents that are utilised.

LFD complies with such stringent requirements with the increase of the chrome content and in this manner will significantly improve the corrosion inhibiting properties. For example, the utilised corrosion-inhibiting steel features a chrome content of around 17% and is well suited for the use as a bearing steel, as it can achieve values of 58 HRC when it is hardened.

Strict requirements for hygiene apply in all areas of the food industry involving the direct contact with the goods. As a result, here only foodstuff-approved lubricants according to the American standard USHD-H1 are used, while in the event of the use of bearings with sealed housings, grease types of the sub-standard H2 may be used. LFD solely works with brand greases, which have already successfully proven their properties under these special operating conditions. Simultaneously, LFD bearings are used here with a specific inner race design and an application-optimized groove, which additionally prevents the direct ingress of water and cleaning agents as a result of the labyrinth effect. As one of the worldwide leading manufacturers in the internal logistics, Interroll has created a conveyor drive that currently is the most hygienic available on the market. The company additionally uses the reliable LFD bearings, which also meet the requirements set in this regard.





Photos: © Sell Media Company, Norbert Sell

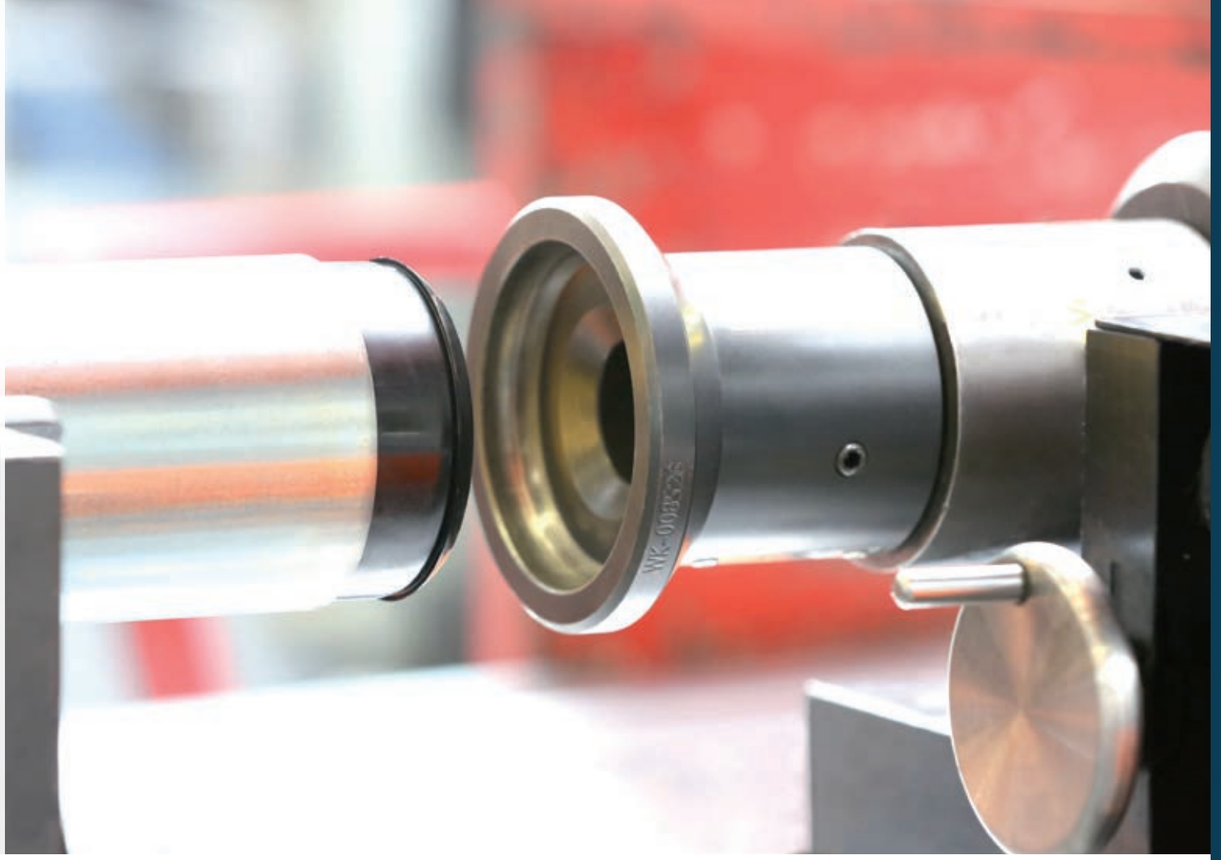


Photo: © Sell Media Company, Norbert Sell

In contrast to conventional geared motors, the drum motor can be cleaned hygienically and disinfected regularly using high water pressure, steam and chemicals. This helps the user in achieving compliance with the highest possible hygiene standards without difficulty.

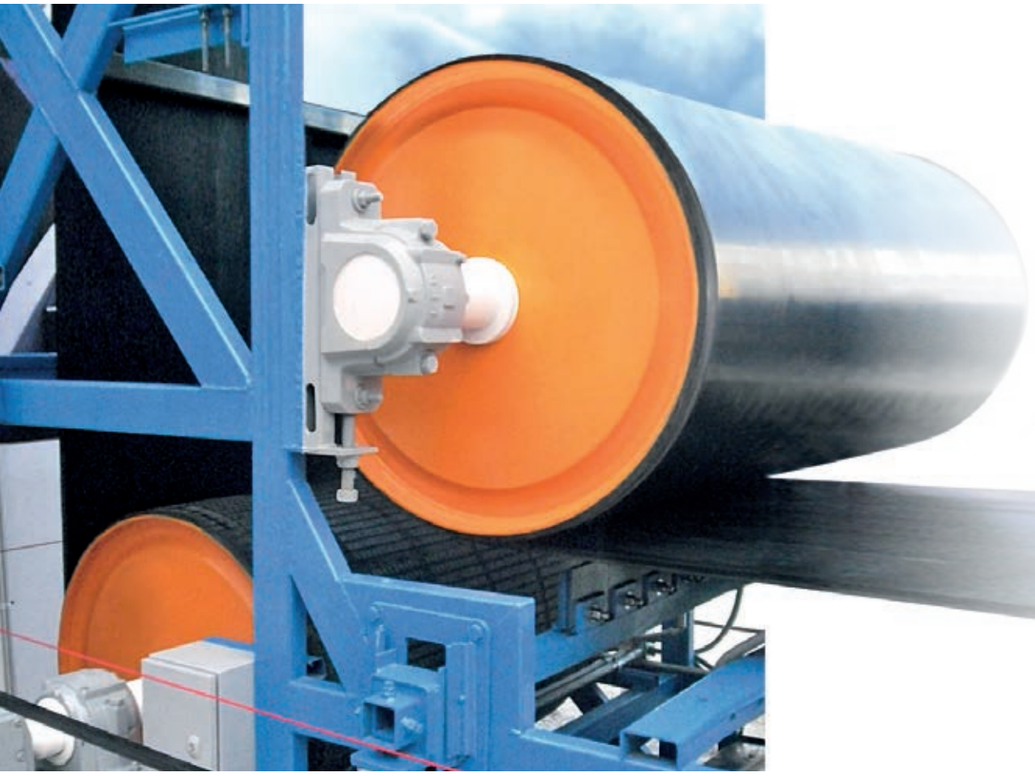
Less required maintenance reduces the operating costs

Minimal maintenance in running operation results in reduced operating costs. For this, the LFD Group provides a sustainable contribution with bearings from its own production. While components must be replaced frequently on a conventional drive, the Interroll drum motor enables continuous operation with fewer time-consuming interruptions. The quality of all components, proven by in-house test processes, guarantees excellent product efficiency and durability. The cooperative partnership of both companies offers considerable benefits for the respective user.

EMQ bearings OPTIMIZED FOR ELECTRIC MOTORS

EMQ bearings (“Electric Motor Quality”) are bearings that have been specifically optimized for use in electric motors. In these bearings, internal maximum requirements are set in regard to quality, however, additionally, our own modifications necessary for the specific application have also been implemented. Among others, the results are also reflected in the required low noise emissions of the EMQ bearings.

LFD: SNL BEARING HOUSING – A SUCCESS STORY



Photos: © Sell Media Company, Norbert Sell

In 2014, LFD developed the modified bearing housings of the SNL design ready for the market and this turned into a success story. Because drives require reliably running rollers.

Crucial further developments

In cooperation with the suppliers, the SNL housing was developed further at critical areas. In this regard, firstly the reinforced construction must be pointed out. Competitors implement savings in the material in order to achieve an even more favourable purchase price. Whereas LFD performed a precise analysis of where the bearing housings are installed and under which loads they are operated. In the course of this, the heat removal was optimized, ensuring that the heat that is generated on the bearing is dissipated into the adjacent construction. This increases the service life of the respective bearings. Here, all common gaskets available on the market can be used. Suitable markings on the housing allow the quick, easy and accurate securing of the SNL housing.

SNL bearing housing by LFD at the very top of the rankings

LFD has performed an internal benchmark test and in the course compared housings from other leading manufacturers with the SNL bearing housing made by LFD. LFD did very well in this comparison. However, now this benchmark has been confirmed by a leading authority. For a customer, for the delivery of cement plants, where the loads truly lie at the limit, the LFD bearing housing was clearly shown to be the best bearing housing. This customer has also performed his own benchmark and compared the bearing housings made by leading manufacturers with the products made by LFD. Here, only the housing made by LFD and one other top brand was able to meet the technical requirements. In the direct comparison between both brands, the LFD bearing housing performed even better. What a result!

ROLLER MANUFACTURE
for conveyor lines

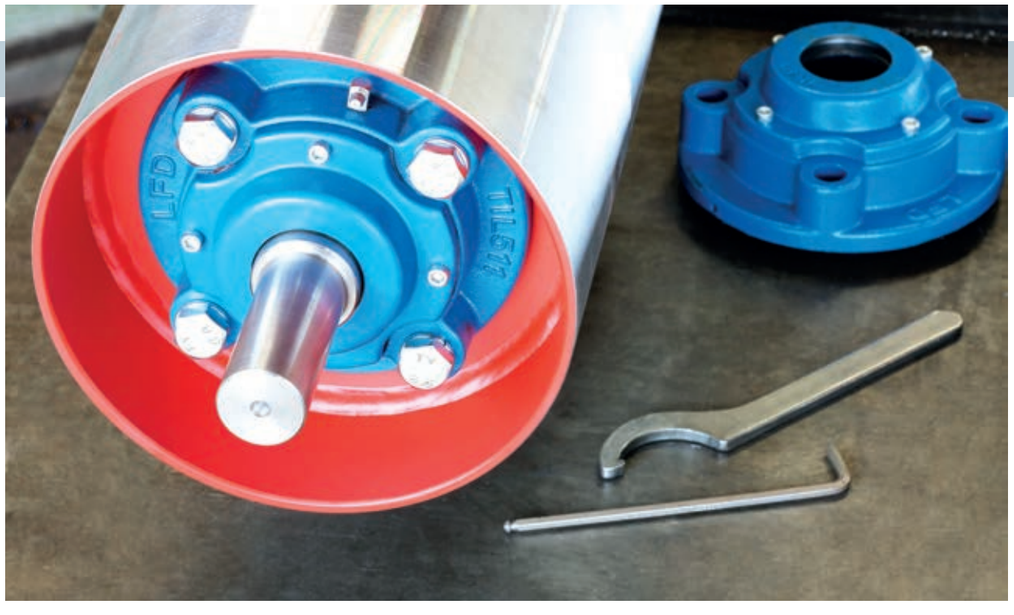
Photos: © Sell Media Company, Norbert Sell

The Bauer Förderelemente company does not view itself in the sector of conveyor technology as an original equipment manufacturer, but rather customers seek out the company when they experience difficulties with mass-produced goods. The core business lies in the provision of spare parts and fabrication of special installations.

The rollers are used in the quarrying of stone and the further processing, recycling, the breaking up of the material, crushing, shredding as well as general conveyor technology, but also used in many other production sequences.

Large market in Norway

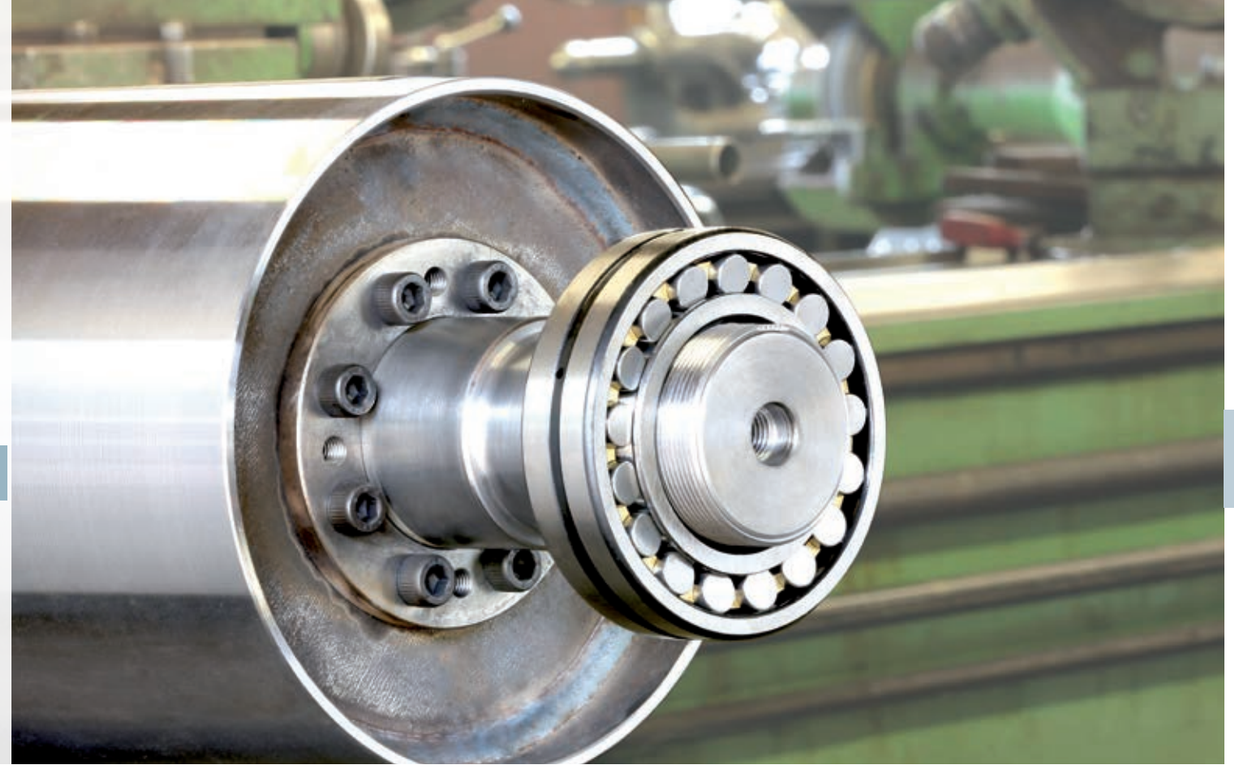
In Norway, the reasons for the high demand for conveyor elements lies in the lack of infrastructure in regard to the road network. In principle, there is also no necessity to develop uninhabited areas at great expense. It is less expensive to work with conveyor lines for the removal of raw materials. Frequently, the quarry is connected directly from the mountains via conveyor belts with a removed fjord. The loading and shipping is performed from there. Rollers made by Bauer are a sought-after product for such systems.



Stable roller construction

What other suppliers already view as a special production or heavy-duty roller, is considered as a standard conveyor element by Bauer: Among others, a higher wall thickness starting from 2.9 mm and an installed stronger bottom as a deep-drawing part. The difference can be shown best when an inexpensive component and a roller from the manufacturer of the Bauer company are cut open, in which the difference in the construction becomes clearly evident. However, the mere comparison in weight shows clearly that this rollers are of a higher quality.

A large fleet of machinery supports the precise manufacture with turret lathes, automatic welders, conventional lathes, horizontal and vertical milling machines, additionally hydraulic presses, enabling the required bearings to be pressed in with a certain preload and to prevent the outer ring from turning later on in the product. These presses deliver an impressive pressure of up to 6 t.



STANDARD AND SPECIAL CARRIER ROLLERS

Reliable radial load capacity

When more inexpensive ball bearings are used in lieu of spherical roller bearings, it should always be examined precisely whether the installed ball bearings are suitable in regard to design, performance and load in the respective application. As is known, different bearings fit in the different housings.

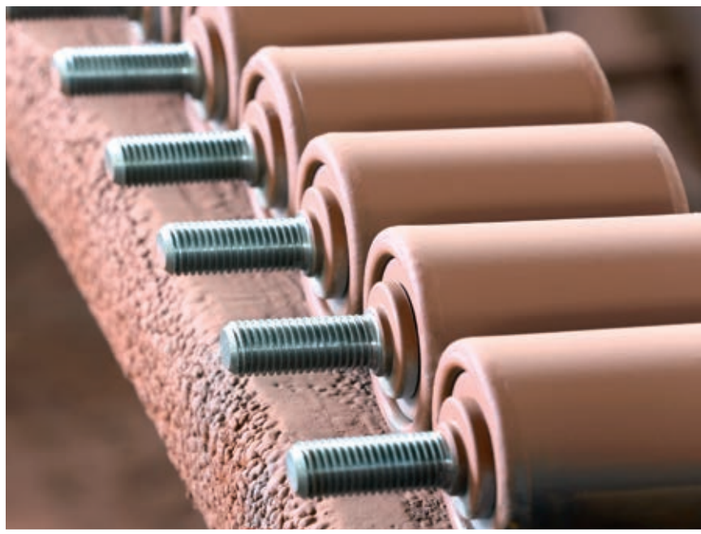
For example, when the bearings of a customer who works with more inexpensive rollers made overseas experiences a roller failure, then usually the bearings are not the weak point. The conveyor system is simply designed incorrectly for the bearings. Because the rollers have a deflection capacity and the reliable radial load capacity is critical for the bearings. LFD ensures these requirements with its own laboratory equipment and test benches. Nevertheless, spherical roller bearings are more flexible than deep groove ball bearings. Therefore, a consensus must be reached on what the respective bearing must absorb and by which factor the axle may deflect.

In the overall production, then a very specific conveyor element is created, which is Made in Germany and is especially designed for sustainability.

LFD spherical roller bearings are a leap in quality

In regard to the purchased components of insert roller bearings, ball bearings or spherical roller bearings, LFD Wälzlager GmbH is active as a supplier of high quality bearings. “For large rollers, there of course is a leap in quality when spherical roller bearings are used instead of ball bearings,” Manuel Bauer explains during the interview. Beforehand, of course repeated exact examinations of the requirements and the cost-benefit factor are performed.

Nevertheless, in regard to pillow block or flange bearings, when it is possible in price, Manuel Bauer recommends installing LFD spherical roller bearings with clamping sleeves. Because these are able to absorb possible deflections. Additionally, the force absorption can be distributed better due to a significantly more durable support point.



Photos: © Sell Media Company, Norbert Sell

DRIVE TECHNOLOGY

LFD HEADQUARTERS
Germany

Giselherstraße 9 - D 44319 DORTMUND
Phone + 49 231 977 250 - Fax + 49 231 977 252 50
Email info@LFD.eu - Internet www.LFD.eu

THE LFD GROUP

The LFD Group is represented on all continents.
In addition to the central warehouse in Germany, the LFD GROUP also has further storage capacity in Italy, the USA, Chile and China. Further world-wide representation ensures quick response and delivery times.

Please see your corresponding contact at:
www.LFD.eu/contacts

SIMPLY WELL-ENGINEERED