TRADE MAGAZINE of the LFD GROUP

LFD MAGAZINE INTRALOGISTICS

VERSATILE LOGISTICS AREAS

OUR MAIN TOPICS

Roller technology - individual solutions

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Plastic wheels in great variety

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Transport rollers “Made in Europe” for crates & boxes

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Conveyor roller bearing from specialists

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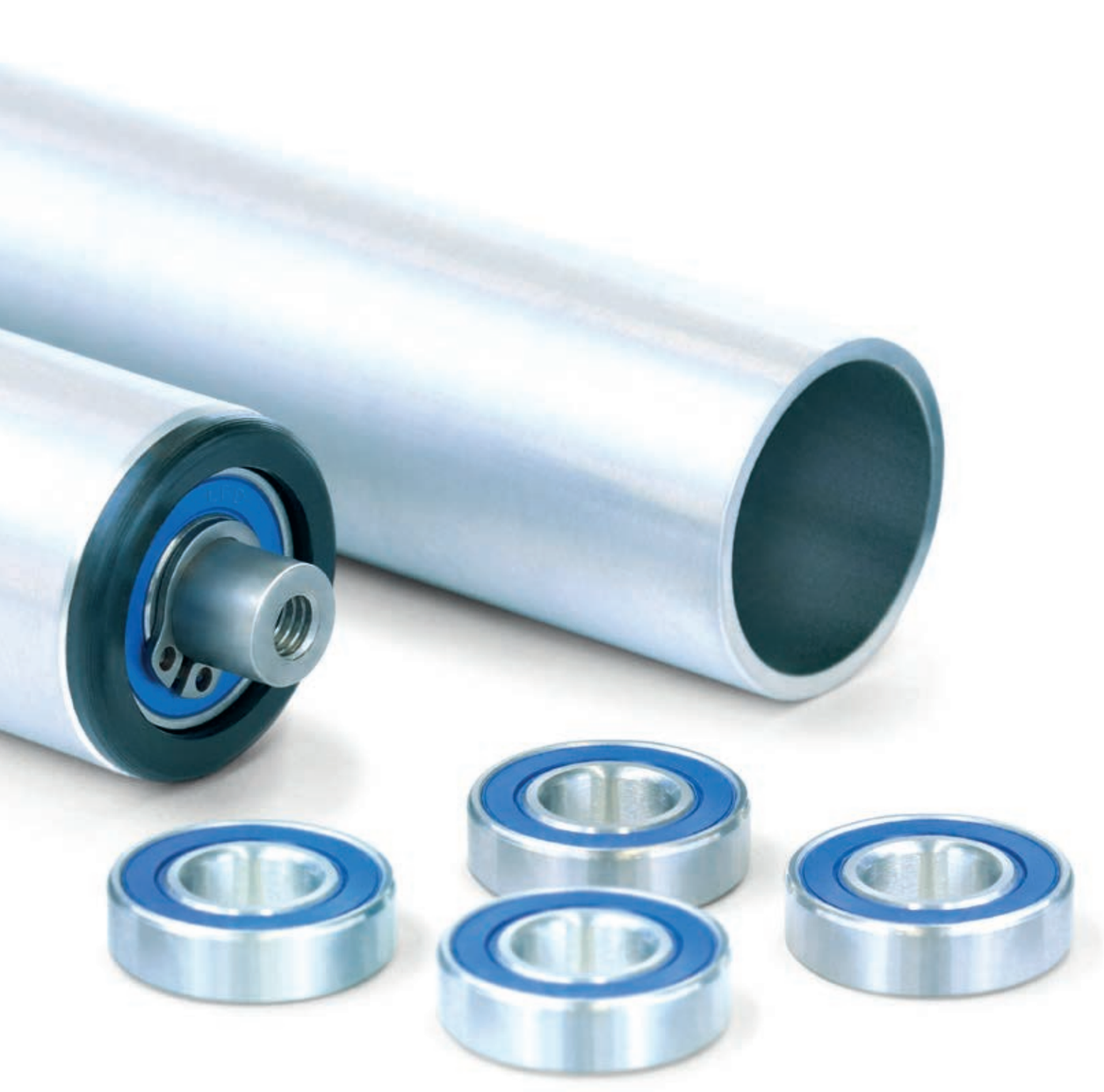

BEARINGS LFD

SIMPLY WELL-ENERGINEERED

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INTRA LOGISTICS AND CONVEYOR TECHNOLOGY

THE PHYSICAL AND VIRTUAL NETWORKING

Veit Loeffler, Managing director of the LFD Group

There is a commonality with this topic: It is about the automation of the processes that keep all products in a flow. Here, the intra logistics play a vital part: It transports, sorts, transfers in and out, buffers and stows.

For this, each manufacturer has their own product portfolio with optimal transport solutions of the load carriers. In the course of this, the economical throughputs and smooth processes are of primary importance.

However, smooth processes are only possible when in particular the utilised bearings work flawlessly. The bearings should be competitively priced, but at the same be of high quality and they should be able to meet the most diverse demands. Because LFD is able to do precisely this, the slogan “simply installed everywhere” is very fitting.

LFD cooperates with different universities and develops joint solutions. This also includes materials examinations and performance tests.

With our own service life testers, we are able to manufacture and document the optimal bearing for each use.

An additional partner is the Fraunhofer Institute for Material Flow and Logistics IML, which is viewed as the prime address in holistic logistics research.

With its external knowledge and the LFD-own research and development at its German location, we offer our customers the respectively best solution at a cost-effective price. Irrespective whether in refrigerated warehouses with temperatures of -35 °C, in drying areas of +100 °C, whether storage with the lowest starting torque or high-speed requirements: We have the right bearing for all applications. Moreover, we are able meet the requirements of the workplace ordinance in regard to noise protection due to our low-noise bearings.

All of our products are fitted with a batch code, which facilitates the documentation of the comprehensive traceability. Simultaneously, the batch code is also connected to the automatic quality control of each delivery and the individual measuring parameters are stored for this.

As a result, LFD fulfils the latest requirements and is a reliable companion of the most diverse logistics providers and applications.

Veit Loeffler
Managing director of the LFD Group

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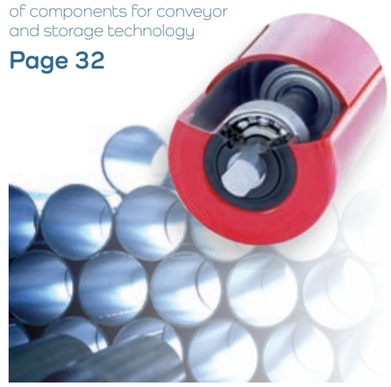

LFD PRODUCT TESTING

LFD GROUP: As soon as a new container is delivered from the company's own plants to the works premises of the LFD Group in Dortmund, this docks at one of the 23 gates of the modern dynamic storage facility and is unloaded.

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LFD QUALITY ASSURANCE

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

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POWER. PRECISION. FLEXIBILITY.

TRAPOROL: Continuous innovation of products and solutions as a decisive factor of intra logistics

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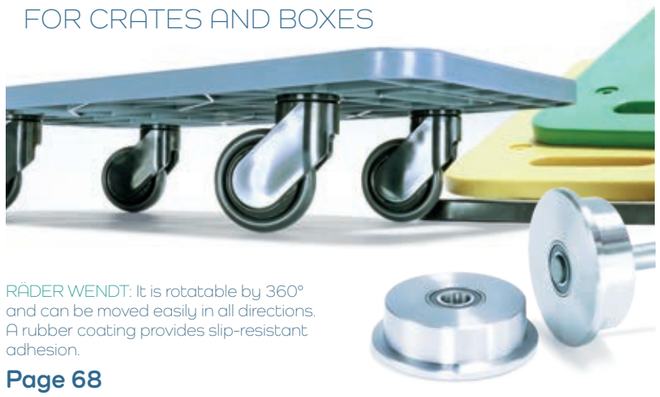
TRANSPORT ROLLERS
MADE IN EUROPE
FOR CRATES AND BOXES



RÄDER WENDT: It is rotatable by 360° and can be moved easily in all directions. A rubber coating provides slip-resistant adhesion.

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CONVEYOR ROLLER BEARINGS
FROM SPECIALISTS

MARKES: In reverse drawing, die stamping and plastics engineering, MARKES produces both simple as well as complex solutions for conveyor technology

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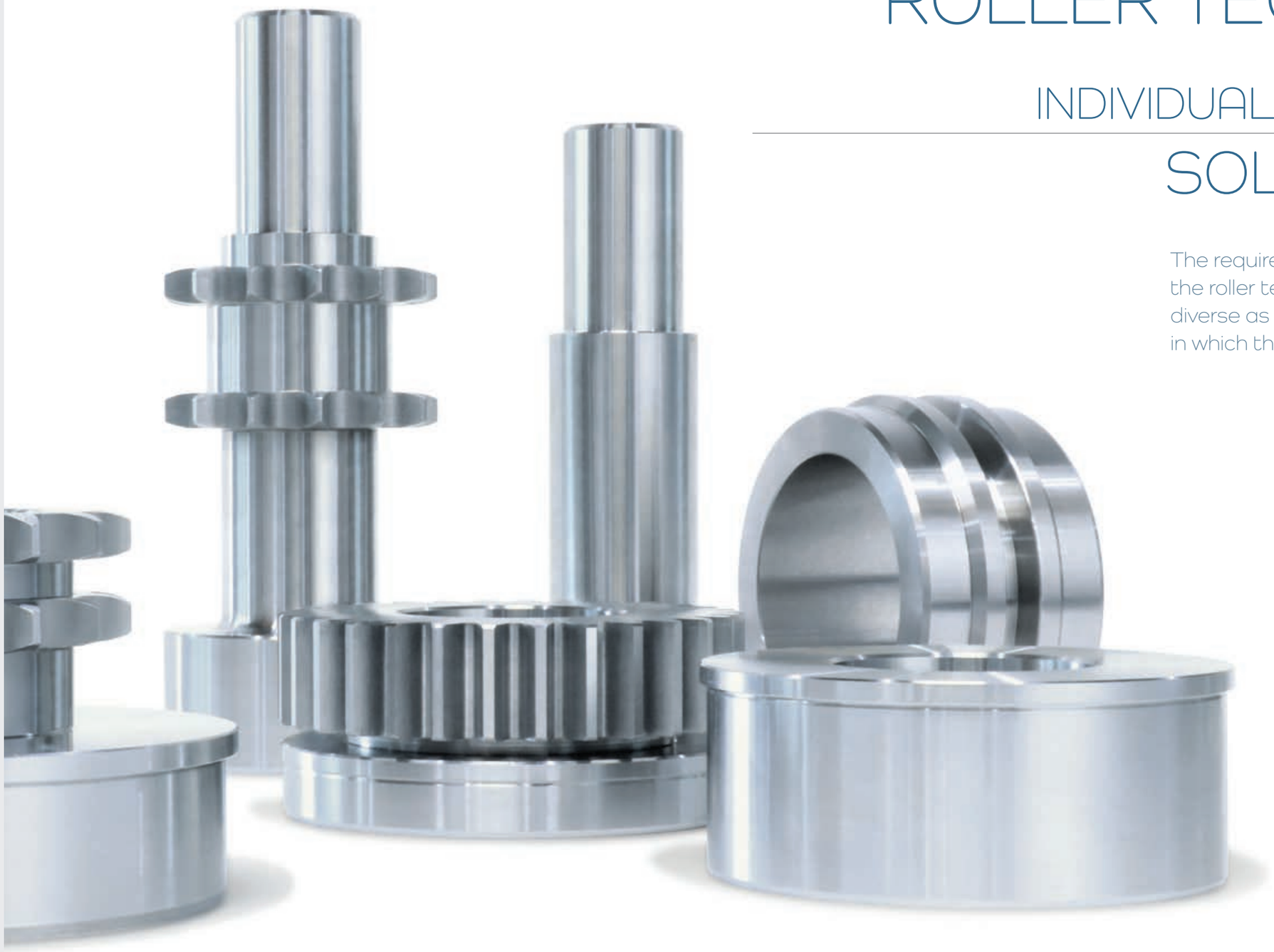


ROLLER TECHNOLOGY

INDIVIDUAL SOLUTIONS

The requirements in regard to the roller technology are as diverse as the industry sectors, in which they are used.

The transported goods differ in regard to size, weight and surface quality and furthermore in regard to the quantity, which is to be transported.

The engineers of ROS RollenTechnik in Kastl develop the suitable technical solutions for all of these conditions and specific challenges. Expert knowledge of conveyor roller production comes into effect in all areas where interruption-free, efficient and low-maintenance conveyor technology and a smooth transport of parcel goods and material plays a central role in the internal flow of goods.

In-house planning

Thanks to in-house planning and made-to-measure production, the company delivers a variety of roller systems for transport goods to a multitude of industry sectors. This includes the mining industry, iron and steel industry, mechanical engineering & vehicle industry, chemical industry, consumer goods industry as well as the recycling and waste industry.

UNINTERRUPTED FLOW OF GOODS

Individual requirements for the roller construction

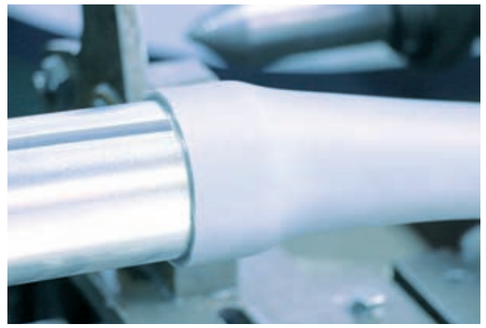
Here, each field of application is faced with very specific challenges in regard to the conveyor system, which ensures the interruption-free flow of goods:

Strict safety requirements in the chemical industry, highest precision in the pharmaceutical industry, high degree of robustness and stability in the steel industry, maximum range of different goods in the consumer goods industry.

However, common to all is a maximum degree of reliability, durability and perfect functionality of the roller technology.

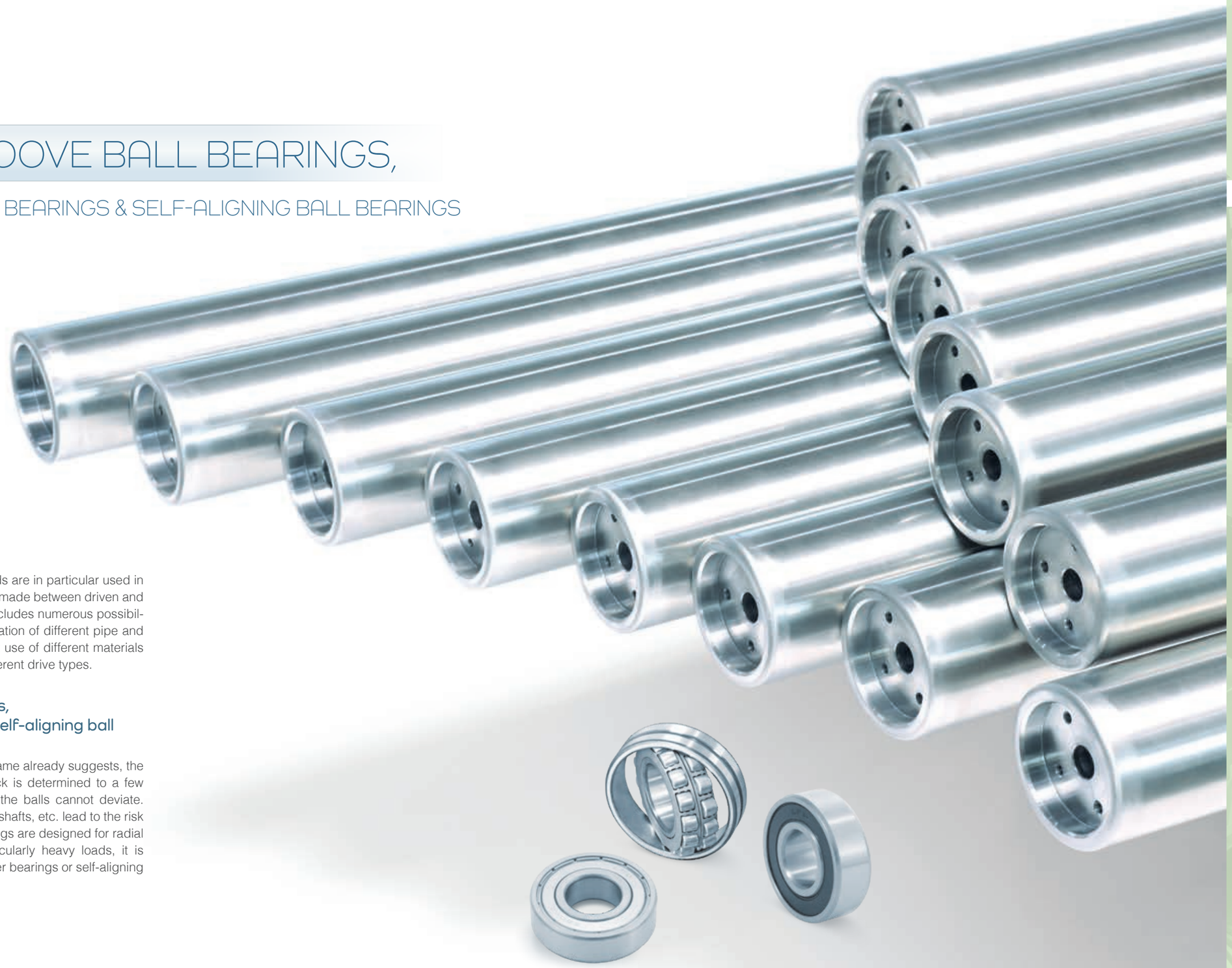
Complete roller conveyors

Complete roller conveyors from the businesssegment of ROS FörderTechnik are used on standardized in-house transport requirements in the supply and removal area of machines and systems. The product range includes non-driven and drivenroller conveyors, project-related special solutions as well as accumulation roller conveyors (with accumulation coupler in the roller) and curved roller conveyors. Roller conveyors for light, moderate and heavy loads are offered.



LFD DEEP GROOVE BALL BEARINGS,

SPHERICAL ROLLER BEARINGS & SELF-ALIGNING BALL BEARINGS



Support rollers

Support rollers for light to moderate loads are in particular used in the parcel goods sector. A distinction is made between driven and non-driven support rollers. The range includes numerous possibilities for variation. Selection and combination of different pipe and axle variants are just as possible as the use of different materials during support roller applications or different drive types.

LFD deep groove ball bearings, spherical roller bearings and self-aligning ball bearings

On deep groove ball bearings, as the name already suggests, the balls run in a groove. The bearing track is determined to a few thousands of a millimetre, from which the balls cannot deviate. Only slanted positions, out-of-true, bent shafts, etc. lead to the risk of bearing damage. Because ball bearings are designed for radial loads. Therefore, in the event of particularly heavy loads, it is recommended to use LFD spherical roller bearings or self-aligning ball bearings.

The latest engineering standards must be taken into account during the development and production, furthermore a high degree of reliability and a long service life of the LFD bearings under the most challenging operating and environmental conditions must be ensured. Additionally, the worldwide use of the conveyor systems requires taking a variety of standards into account such as UNI, ISO, Afnor, Cema and BS standards.

Support rollers with LFD bearings enable the implementation of a varied range of conveyor and storage systems. They are matched in regard to dimensioning and material quality (e.g. the type of the surface structure) exactly to the requirements of the conveyer task and the respectively conveyed material. As a result, roller systems made by ROS RollenTechnik can be designed for nearly every intended purpose. In the course of this, various roller types and bearings are used. System failures can lead to high costs and for this reason must be avoided as much as possible. Rollers selected optimally for the application with use-optimised bearings effectively support this objective and can additionally decrease the maintenance effort involved.

GEOMETRIC

STANDARD PARTS

Heavy load support rollers

Heavy load support rollers for moderate to high loads are used in both the parcel goods sector as well as with bulk material. The main differentiation is performed here according to inboard and outboard heavy load support rollers.

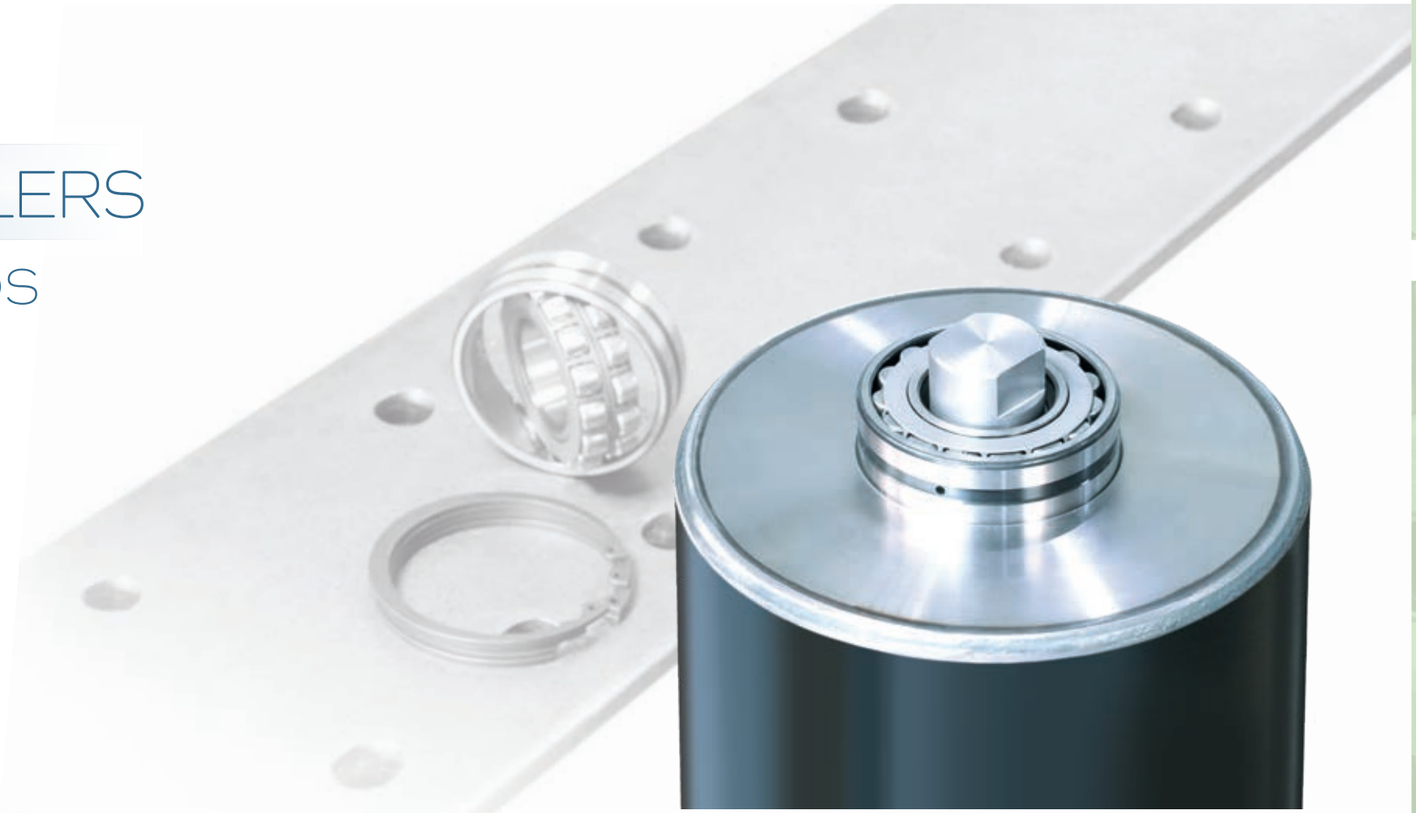
With inboard heavy load support rollers, in addition to LFD precision deep groove ball bearings, LFD self-aligning ball bearings and LFD spherical roller bearings are used. Again, driven support rollers can be used here. Furthermore, the selection of different pipe and axle variants is possible.

SPECIAL SUPPORT ROLLERS

FOR HEAVY LOADS

Special support rollers

Special support rollers are matched to the individual needs and requirements of our customers. The intended purpose of the roller among others has an influence on the material selection, coating and hardening process and on specific geometric shapes of the roller body. Special support rollers represent a variation of support rollers and heavy load support rollers.

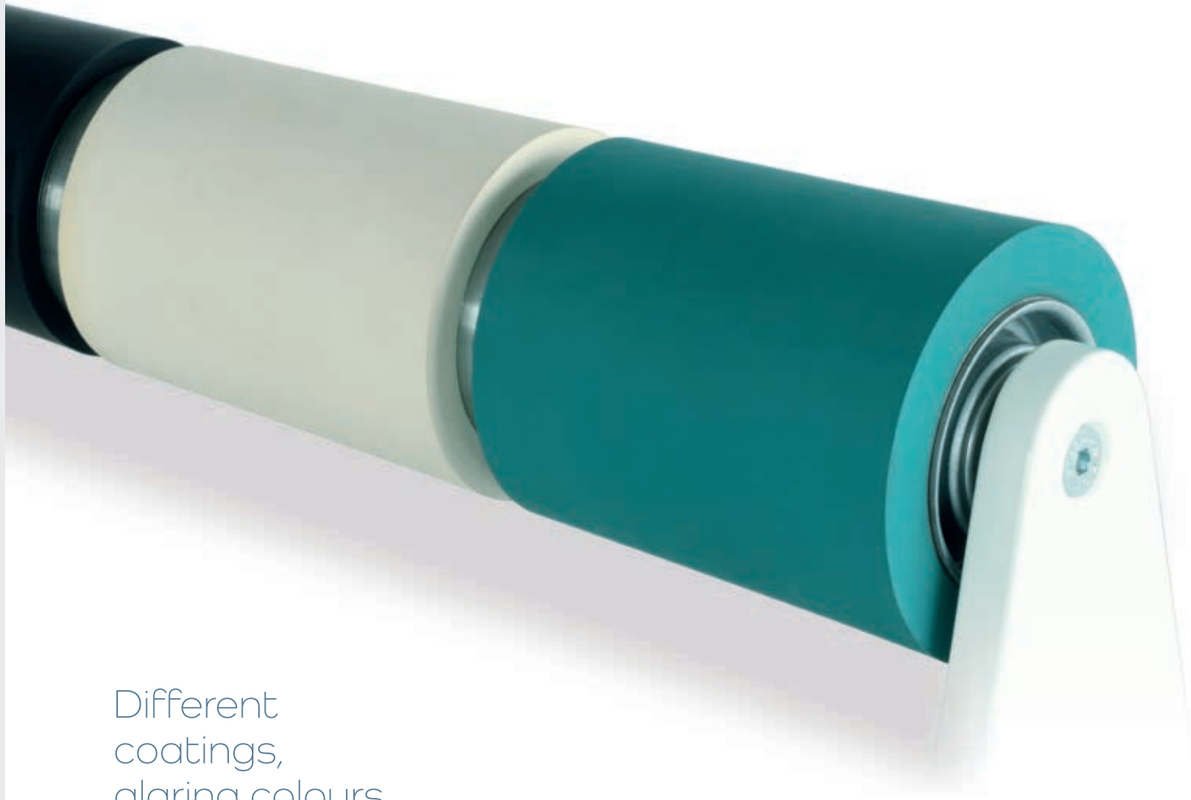


Sealing systems protect bearings in support rollers

Special sealing systems with support rollers are well suited for the protection against environmental influences such as dust loads, contamination, water contact and high temperature loads, in particular at locations where high temperature differences occur between day and night. The chosen lubricating greases are sufficient for operating temperatures ranging from -40 °C to +100 °C. In the event of higher temperatures, special bearings, greases and seals should be used. However, in this case, the grease is less of a topic for the bearing manufacturer. The manufacturers of conveyer systems will perform the greasing of the open bearings during the installation of the support rollers in a manner that suits the future operating conditions themselves. Conveyor systems, which are intendedfor the transportation of aggressive substances, are usually fitted with plastic support rollers. In salt mining, the chemical industry and the fertilizer industry for example require such rollers just as conveyor systems used on sea and in ports. These rollers have a high resistance against humidity or water and also against aggressive environmental conditions and/or materials.

COLOURFUL

ROLLER WORLD



Different coatings, glaring colours

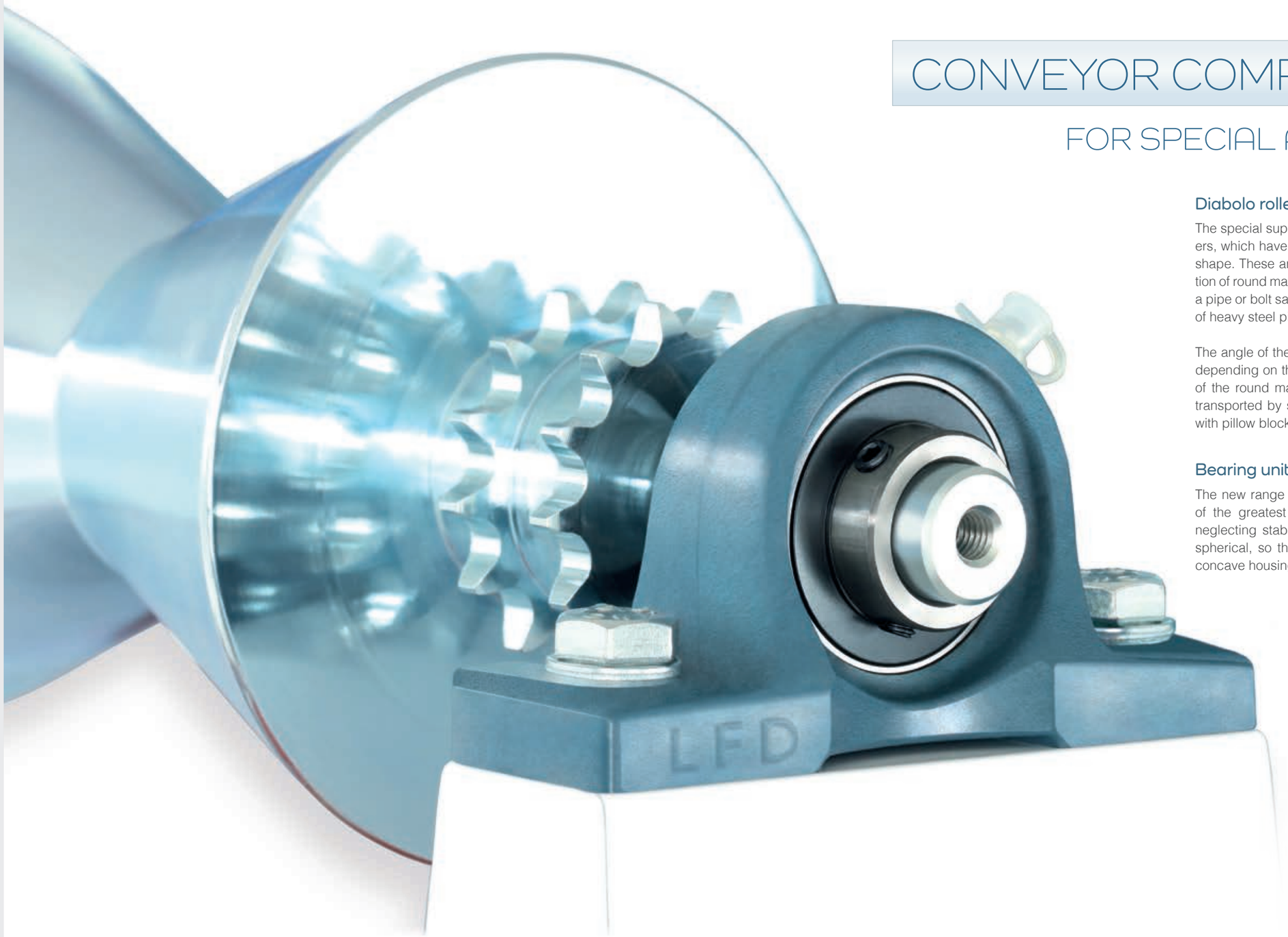
The versatility of ROS RollenTechnik is also shown in the various coatings. Even glaring colours, matching the specific corporate design of a company, are conceivable in corresponding quantities. Possible are support rollers wrapped with PVC cover tubes for the gentle transport, e.g. in the furniture industry. For the reduction of noise and to protect the conveyed material, support rollers can be produced with rounded hot vulcanization (rubber, NBR) in different colours and in individual layer thickness. Furthermore, flocked rollers in various colours and flocking properties are featured in the product portfolio.

LFD bearings:

Energy-efficient, low noise and powerful

The selection of the right bearings provides a contribution to the marked noise reduction just as a – suitable for the specific application – branded lubricant. A significant task of the lubricant lies in reducing or preventing the metallic friction of the bearing components utilising the separating film of lubricant. Not least as a result of this, the implemented bearings are able to run energy-efficiently, with low noise and still powerful.

Quality management according to German standards is a matter of course for all production sectors of the LFD Group. As a result, LFD bearings are extraordinarily loadable even under extremely harsh conditions. LFD ensures these requirements with its own laboratory equipment and test benches.



CONVEYOR COMPONENTS

FOR SPECIAL APPLICATIONS

Diabolo rollers

The special support rollers also include the diabolo rollers, which have this designation due to their geometric shape. These are primarily used during the transportation of round material. This can for example be a feed for a pipe or bolt saw system, which facilitates the handling of heavy steel pipes or rolled round steel.

The angle of the roller can be produced independently depending on the requirement or according to the size of the round material. Due to the weight that is to be transported by such rollers, these are usually installed with pillow block bearing units.

Bearing unit LFD-ONE

The new range of bearing units LFD-ONE is the result of the greatest possible weight optimization, without neglecting stability and strength. The outer races are spherical, so that the bearing can be adjusted in the concave housing.

PLASTIC WHEELS

IN A WIDE VARIETY

Colourful product development
with innovative competence
and great expertise

The need for different plastic wheels both by industry as well as by consumers is nearly unmanageable. Here, not only load capacity and running characteristics play an important role, but also the design. The toy industry alone demands a variety of colourful wheels, which not only offer functionality, but also act as design objects in the overall product. Many wheels are closely attuned to the colours of the corporate design of a specific company, others, for example in the care sector, must be especially quiet, low-maintenance, clean and discreet.

STRICT REQUIREMENTS FOR WHEELS

Device wheels

The device wheels made by MP-Plast have been developed to support devices and equipment with a load from 40 kg to 350 kg. They are suited for the movement on flat surfaces, where silent and easy movement is an essential requirement. The wheel was designed with a classically beautiful styling and in itself is a design element, without focussing on the product, which it carries. All device wheels are manufactured in different sizes and in a large selection of material compositions, which all have their own good properties.

Reliable and robust wheel series

More than 30 years of experience in the production, development and construction of plastic wheels in a multitude of variants and other plastic products are featured by the family business MP-Plast in Ribe in Denmark.

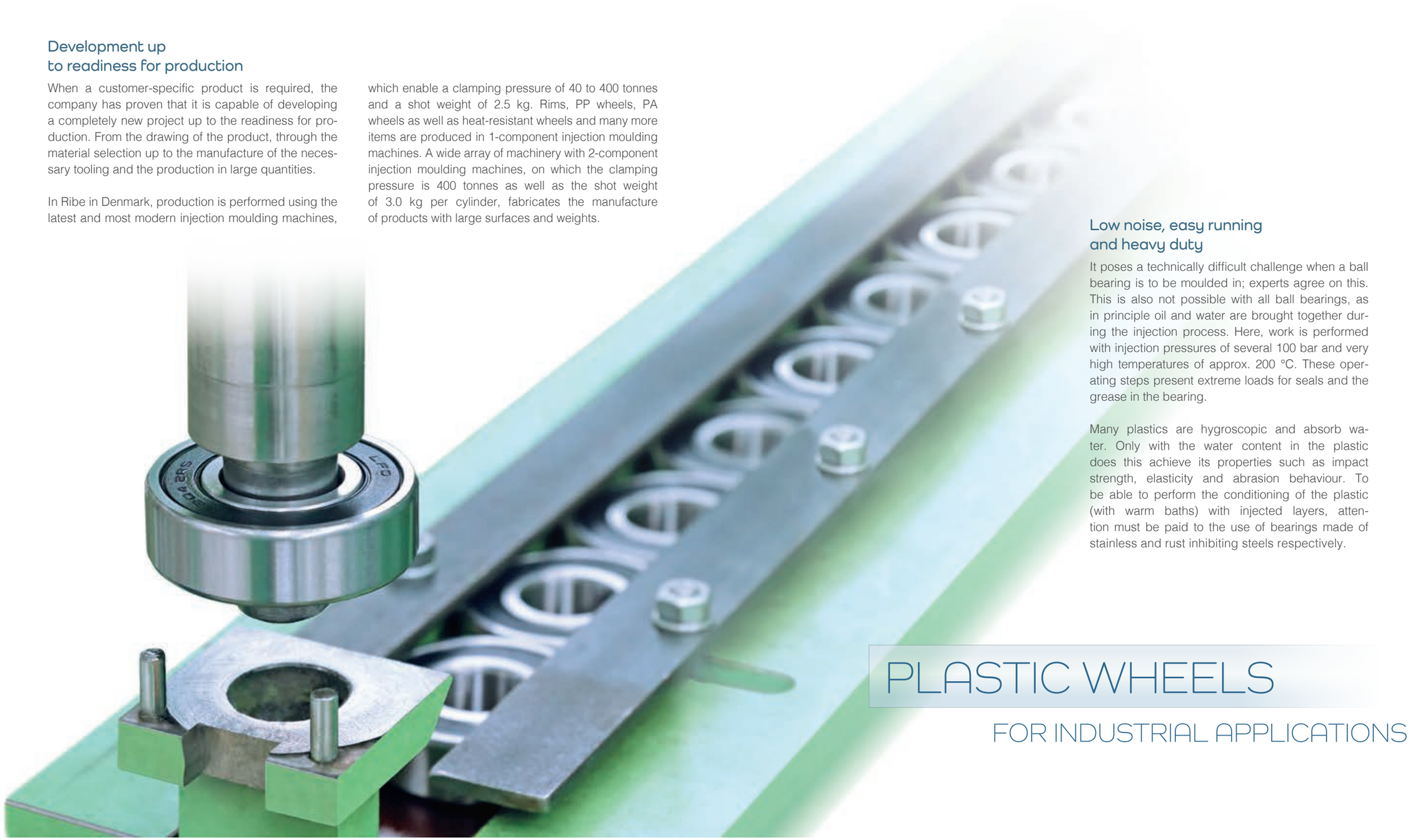
Due to comprehensive innovative competence, in the course of the years, the managing director Max Petermann developed different wheel programmes, which were developed with his extensive expertise and market knowledge. Therefore, for generations, the name Petermann has been synonymous with high quality and product development in the plastics industry. With remarkable own creativity and many own patented developments, the company provides reliable and robust wheel series, which are characterised by an attractive design, a large selection of colours, good quality and optimal functionality.

In many cases, a wide standard product range makes it possible to find precisely the right wheel for the respective application, which will meet all requirements.

Development up to readiness for production

When a customer-specific product is required, the company has proven that it is capable of developing a completely new project up to the readiness for production. From the drawing of the product, through the material selection up to the manufacture of the necessary tooling and the production in large quantities.

In Ribe in Denmark, production is performed using the latest and most modern injection moulding machines, which enable a clamping pressure of 40 to 400 tonnes and a shot weight of 2.5 kg. Rims, PP wheels, PA wheels as well as heat-resistant wheels and many more items are produced in 1-component injection moulding machines. A wide array of machinery with 2-component injection moulding machines, on which the clamping pressure is 400 tonnes as well as the shot weight of 3.0 kg per cylinder, fabricates the manufacture of products with large surfaces and weights.



Low noise, easy running and heavy duty

It poses a technically difficult challenge when a ball bearing is to be moulded in; experts agree on this. This is also not possible with all ball bearings, as in principle oil and water are brought together during the injection process. Here, work is performed with injection pressures of several 100 bar and very high temperatures of approx. 200 °C. These operating steps present extreme loads for seals and the grease in the bearing.

Many plastics are hygroscopic and absorb water. Only with the water content in the plastic does this achieve its properties such as impact strength, elasticity and abrasion behaviour. To be able to perform the conditioning of the plastic (with warm baths) with injected layers, attention must be paid to the use of bearings made of stainless and rust inhibiting steels respectively.

PLASTIC WHEELS

FOR INDUSTRIAL APPLICATIONS

EASY TRANSPORT DUE TO

REDUCED ROLLING RESISTANCE

However, a conditioning of the injected bearing is also possible in an unspectacular manner, by simply putting the bearing that has been encased into interim storage for a certain period. In the course of this, the hygroscopic plastic will absorb the moisture on its own and in this manner will also obtain its necessary properties.

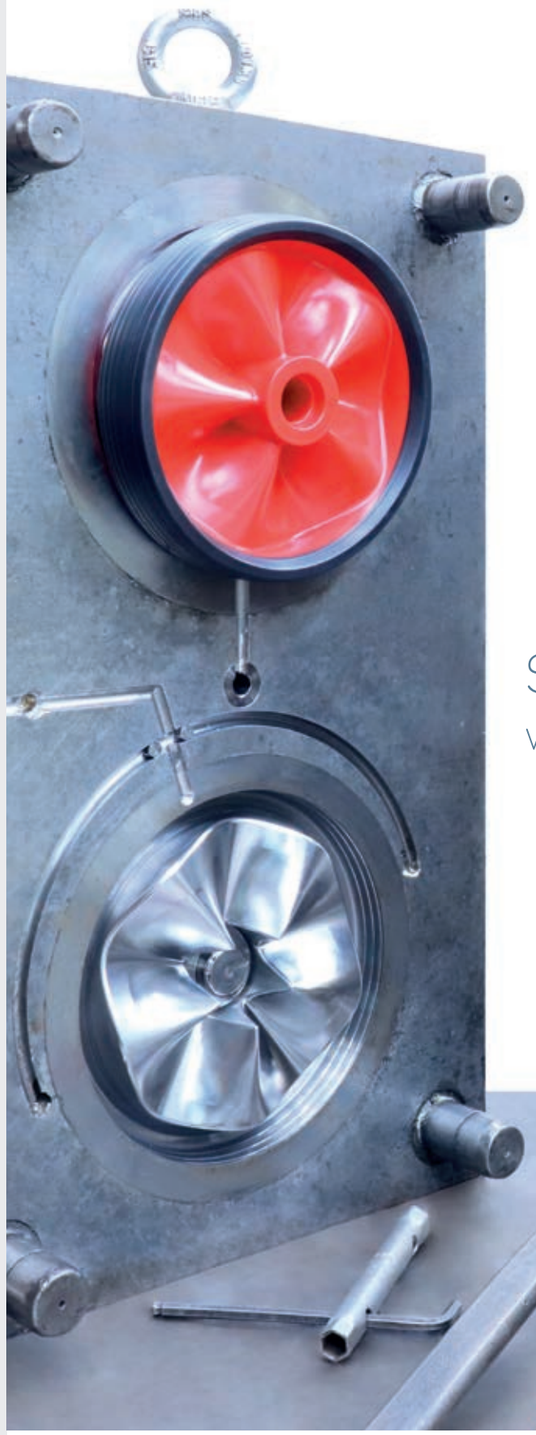
The only sensible alternative is to inject the plastic rings on their own, to press in the ball bearing separately and subsequently to secure it mechanically. In this manner, the manufacturer in the roller and wheel industry also has a greater choice in the selection of the bearing, the greases and the plastics.

A precondition of course is that all other requirements in regard to the bearing are met. Incidentally, in safety-relevant areas, LFD bearings are encased in fire-protected plastics, as other normal plastics are highly combustible. A decisive factor in regard to the use of the ball bearings in wheels are therefore not only the construction, but especially the quality of all involved components.

Rubber rollers

The rubber wheel is the latest member of the MP-Plast wheel series and due to its simple and modern design has been well-accepted by industrial customers, which has led to a very positive demand situation.

The wheel is a truly good alternative to a solid rubber wheel and stands out with a considerable price advantage. The rubber wheels are smooth, low noise and provide exceptional operating comfort. Simultaneously, it complies with all REACH requirements.



Rims

In the course of the years, a robust and dynamic range of plastic rims was developed. MP-Plast offers plastic rims in a variety of sizes, as a result that they fit on 4, 6 or 8 inch pneumatic tyres.

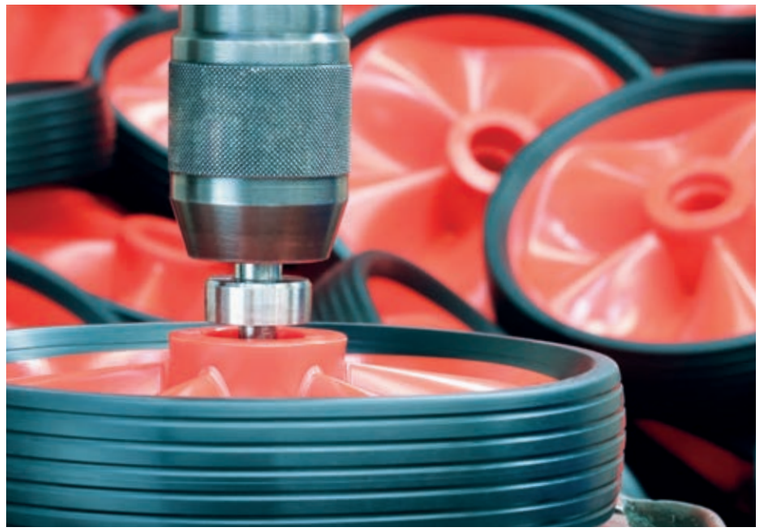
It is due to the dynamics of this plastic rim, in particular the 71 x 35 model, which make it especially competitive. Here, different covers have been developed in such a manner that the customer can achieve the desired hub length, which makes the rim very versatile in its function.

Strong functionality
with all environmental and working conditions

A hub length of 73 mm up to 100 mm is possible. Furthermore, the Ø dimension can also be modified.

LFD ball bearings encapsulated in plastic

An additional area of application for LFD deep groove ball bearings encapsulated in plastic lies with manufacturers of nursing and hospital bed rollers or doctor's surgery equipment as well as of medical equipment.



Here, LFD has improved its PX design for even more guidance stability with rollers and wheels.

Due to the optimal construction selection of the ring geometries and the available rolling elements, it is achieved that the deep groove ball bearings produced in accordance with the PX design, only allow extremely small tilt angles. As a result, the wheel is guided in a stable manner and is no longer affected substantially by the installation conditions as it would be with standard bearings.

The PX design ensures the guide accuracy with low-friction wheels. Due to the optimal construction selection of the ring geometries and the available rolling elements, it is achieved that the deep groove ball bearings produced in accordance with the PX design, only allow extremely small tilt angles and as a result a wheel runs with guide stability.

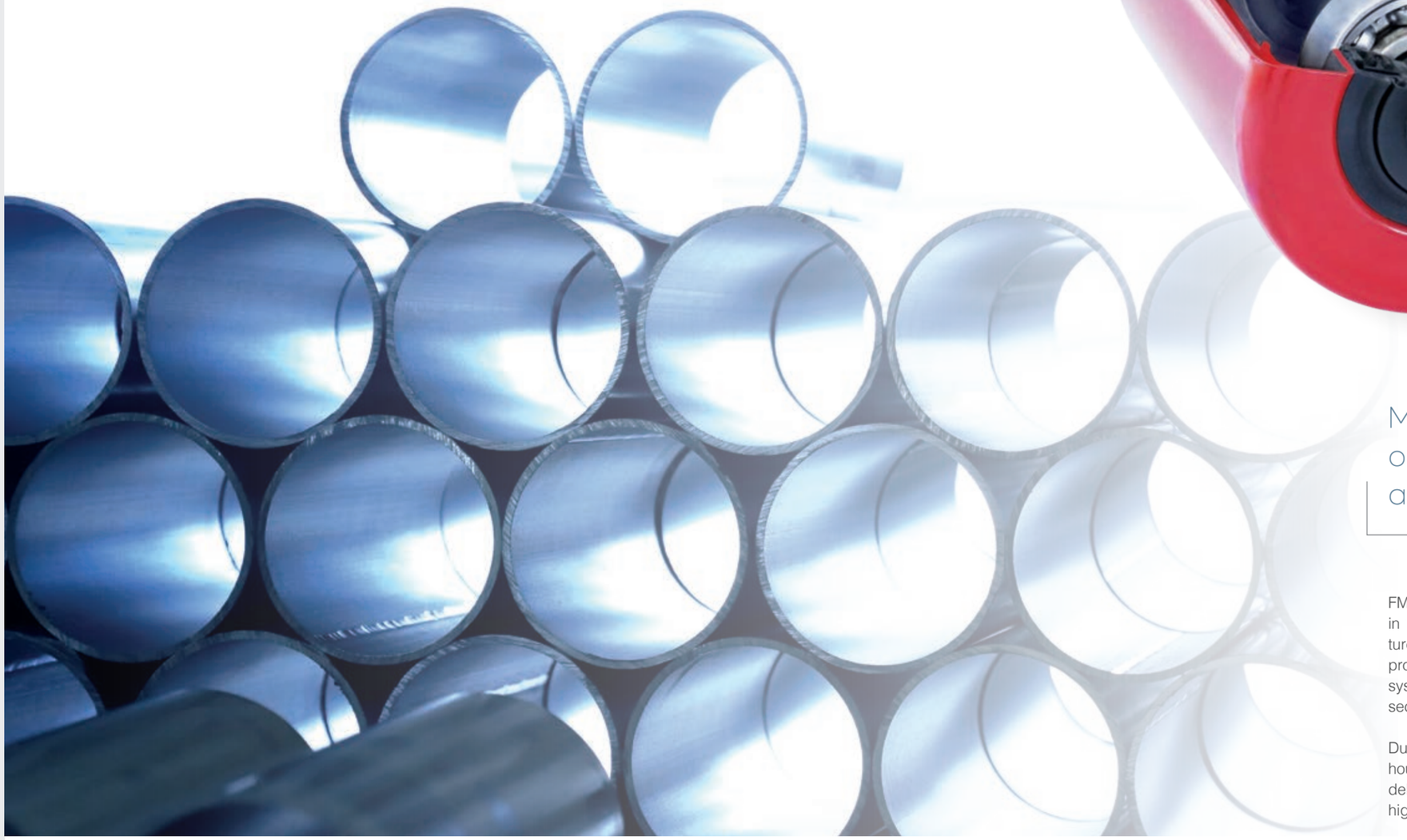
Widely dispersed areas of application

The requirements are especially strict with manufacturers of nursing and hospital bed rollers as well as on medical equipment: Because in addition to high corrosion protection requirements, specific requirements are also set in regard to the smooth running behaviour. These wheels usually are made of deep groove ball bearings encapsulated in plastic.

The areas of application of these specific precision wheels and rollers with PX design bearings are widely dispersed: In addition to hospital beds, they are utilised in shopping trolleys, wheel-chairs, prams, warehouse carts, office furniture, office chairs, furniture in general, in luggage transport and many other appli-cations.

SOLUTIONS

TAILOR-MADE



Manufacture and distribution of components for conveyor and bearing technology

FMG Förderelemente Mecklenburg GmbH was founded in 1991 and is a company specialised in the manufacture and distribution of components for conveyor and product storage technology. Whether for machinery and system constructors or system operator of all industry sectors in all parts of Europe:

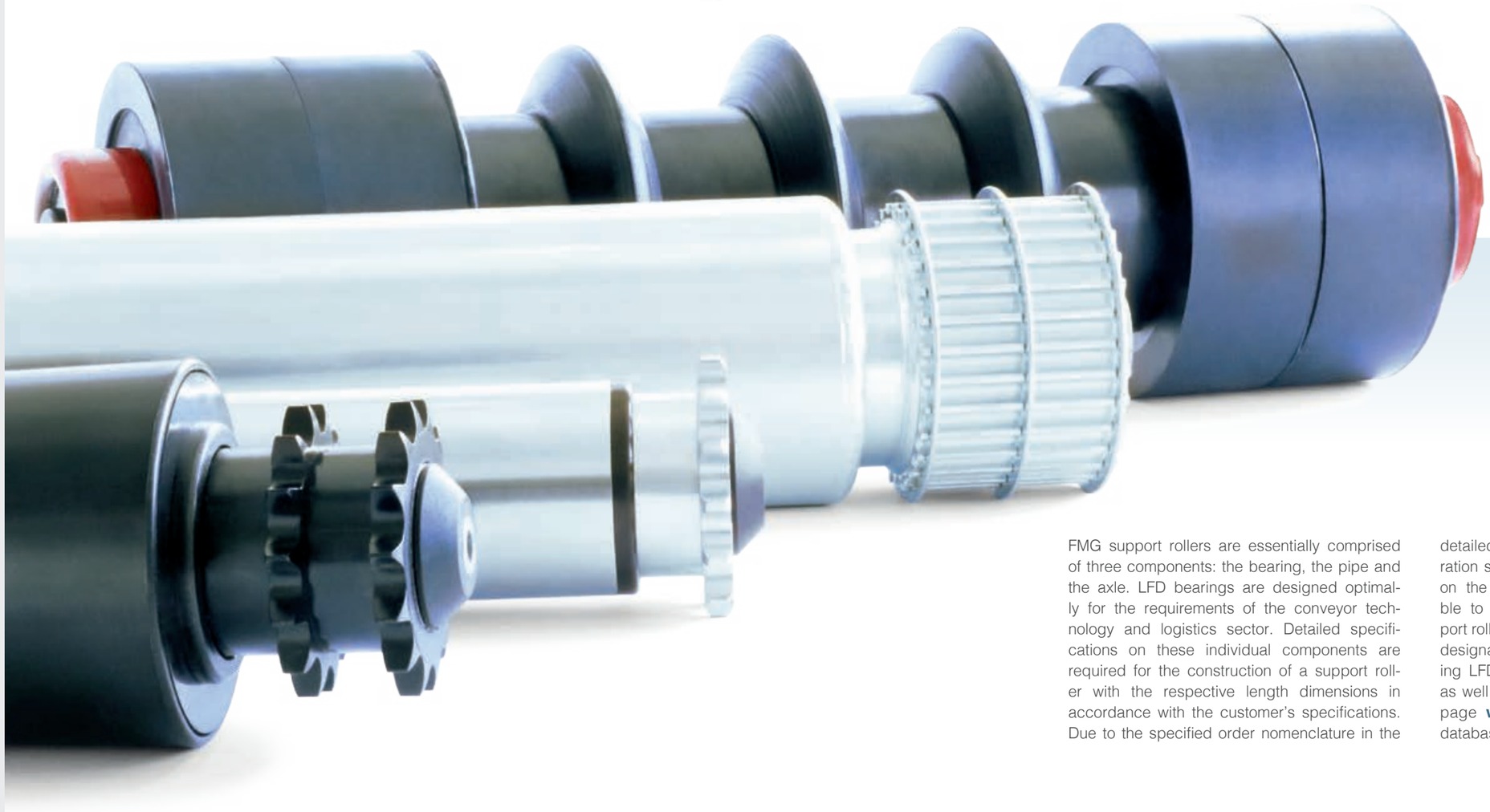
Due to the high degree of vertical integration of the in-house production, tailor-made solutions for all needs are delivered with convincing flexibility and a consistently high product quality.

Rollers for conveyor and storage technology

FMG develops and manufactures individual conveyor technology and storage technology elements, which are characterised by the high quality and long service life of the support rollers. Unique and pioneering products are created under consideration of the specific customer requirements.

The product portfolio includes both standard rollers, which are manufactured in accordance with the corresponding DIN standard as well as special orders for customer-specific requirements and area of application.

ROLLER SOLUTIONS IN MANY VARIANTS



FMG support rollers are essentially comprised of three components: the bearing, the pipe and the axle. LFD bearings are designed optimally for the requirements of the conveyor technology and logistics sector. Detailed specifications on these individual components are required for the construction of a support roller with the respective length dimensions in accordance with the customer's specifications. Due to the specified order nomenclature in the detailed FMG catalogue and the online configuration software, which can be loaded and used on the manufacturer's homepage, it is possible to describe an accurately delimited support roller. This is supplemented with the precise designation of the type range of the matching LFD bearings. This applies to both driven as well as non-driven rollers. On its own homepage **www.LFD.eu**, LFD offers a complete database.

PRODUCTION

ACCORDING TO DIN STANDARDS

Noteworthy during the construction

The company supports customers with advice as many points must already be observed during the construction.

In the framework of the construction, the following is advisable...

- Pay attention to axle parallelism.
- Pay attention to the same roller level.
- In regard to profiles, pay attention to the parallelism of the roller conveyor profiles.
- Do not use accumulation rollers alternating with non-driven support rollers.
- Take environmental influences (dust, moisture, temperature, acids, bases, etc.) into account.
- In regard to the running properties, pay attention to different roller resistance of the bearings (sealing, lubrication).
- Pay attention to pipe tolerances, take the standards into account (DIN EN 10220, DIN EN ISO 1127).
- Pay attention to the maximum roller length with plastic pipes (pipe loads) and temperatures.
- Pay attention to the maximum pipe length with steel pipes (pipe loads).
- Take the discharge variants into account in the event of electrostatic charging.
- During the roller distribution, pay attention to the axle distances according to the conveyed material.
- To ensure smooth transportation, plan at least 3 rollers below the conveyed material at all times.
- The measuring chain must be taken into account in the event of driven support rollers with accumulation or fixed drive in the press fit between the installation length (EL) and the roller length (RL) using the table value, to prevent the drifting apart of the support rollers.

The following must be taken into account in the framework of the construction:

- Tooth type – rack-and-pinion gearing only with tangential drive
- Welded support rollers – weld seams can be larger than the pipe diameter
- Connections – press fit of sprockets only with continuous transport
- High temperatures – plastic components of the support rollers are not suitable for higher temperatures
- Adjustable accumulation rollers – in the event of uneven running surfaces and light weights
- Drive – note and observe the tolerances in the event of chain drive and toothed belt
- Pay attention to the failing load of chains
- Level running surfaces – not all rollers will support the load in the event of uneven running surfaces
- Position the motor as centred as possible

Reliable radial load capacity

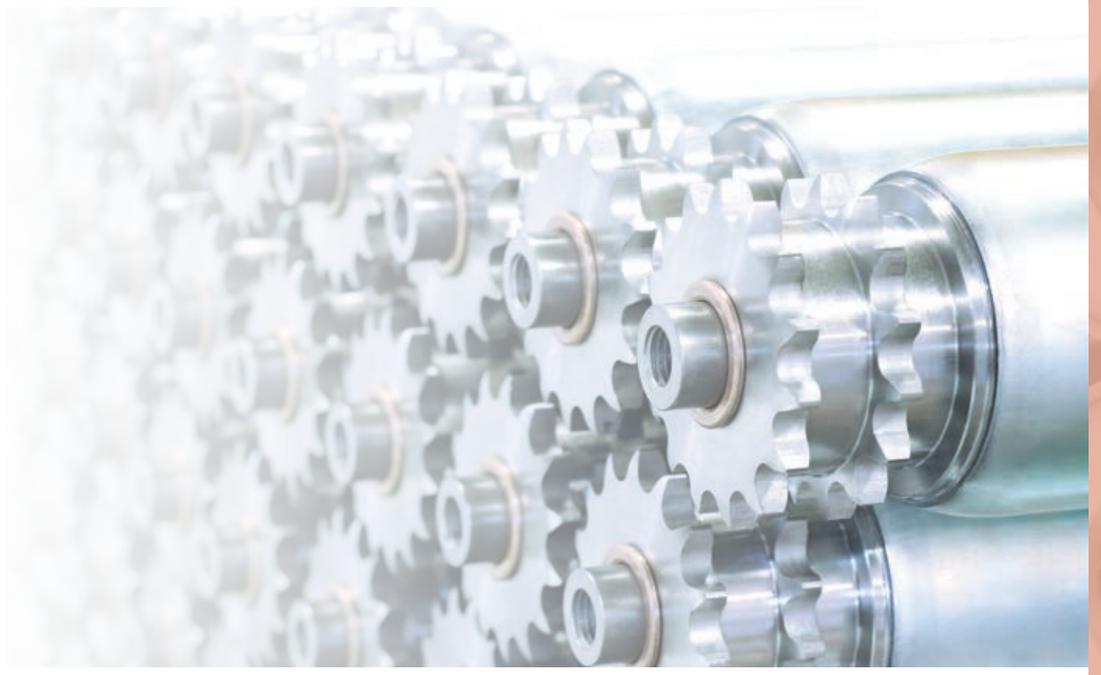
Generally, LFD deep groove ball bearings are the safechoice. When more inexpensive LFD deep groove ball bearings are used in lieu of LFD spherical roller bearings in borderline cases with particularly heavy goods, it should always be examined precisely whether the installed ball bearings are suitable in regard to design, performance and load in the respective application. As is known, different bearings also fit in the different housings. When rollers have a deflection capacity, then the reliable radial load capacity of the deep groove ball bearings or spherical roller bearings is a deciding factor. 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, in the event of especially heavy loads, a consensus must be reached on what the respective bearing must be able to absorb and by which factor the axle may deflect. Here, spherical roller bearings are able to absorb significantly larger deflections without damage being inflicted on the conveyor line. For average loads, usually the LFD standard deep groove ball bearings are the right choice, both for cost reasons as well as for the goods to be conveyed and the durability of the conveyor elements.

LFD labyrinth seals with V groove

LFD has implemented the labyrinth with the special inner race form in the so-called V groove. A friction seal can engage in the V-shaped recess or the contour of the sealing lip follows with the gap to the V groove. This non-friction variant, which is still very efficient is called the RZ seal. This is for example used in rollers of gravity conveyors in parcel distribution centres worldwide, on which even with only a slight incline, goods can be conveyed without the application of great force. RZ seals are useful in all applications in which performance losses due to seals are undesired and the expected degree of contamination is not significant.

LFD BEARINGS

APPLICATION-OPTIMISED



Comprehensive support roller portfolio for various industry sectors

Bulk material

- Idler rollers
- Belt guide rollers
- Buffer ring rollers
- Support ring rollers
- Belt stations
- Driving drums
- Deflection drums

Parcel goods

- Non-driven support rollers
- Driven support rollers
- Conical support rollers
- Buffer ring rollers
- Support ring rollers
- Small conveyor rollers
- Multi-directional rollers
- Roller tracks

Additional components for conveyor and storage technology

A suitable powerful sealing system for the reliable and efficient use of the FMG rollers is offered for all areas of application. The product range is supplemented by plastic rings, support rings and buffer rings, which FMG equips the support rollers with according to the customer's wishes before delivery. A large selection of different ring sizes and properties fulfils the entire range of the customer requirements.

LONG SERVICE LIFE

UNDER CONTINUOUS LOAD

Extensive machinery

Additional CNC lathes, automatic welding machines with corresponding extraction and welding power sources, automatic thread-cutting machines and steel washing machines enable an extensive vertical integration of manufacture during the production of the conveyor elements.

Online configurator

When no further details are provided in the catalogue or the online configurator of the company on the bearings or drives, then as standard, 2Z sealed deep groove ball bearings are installed.

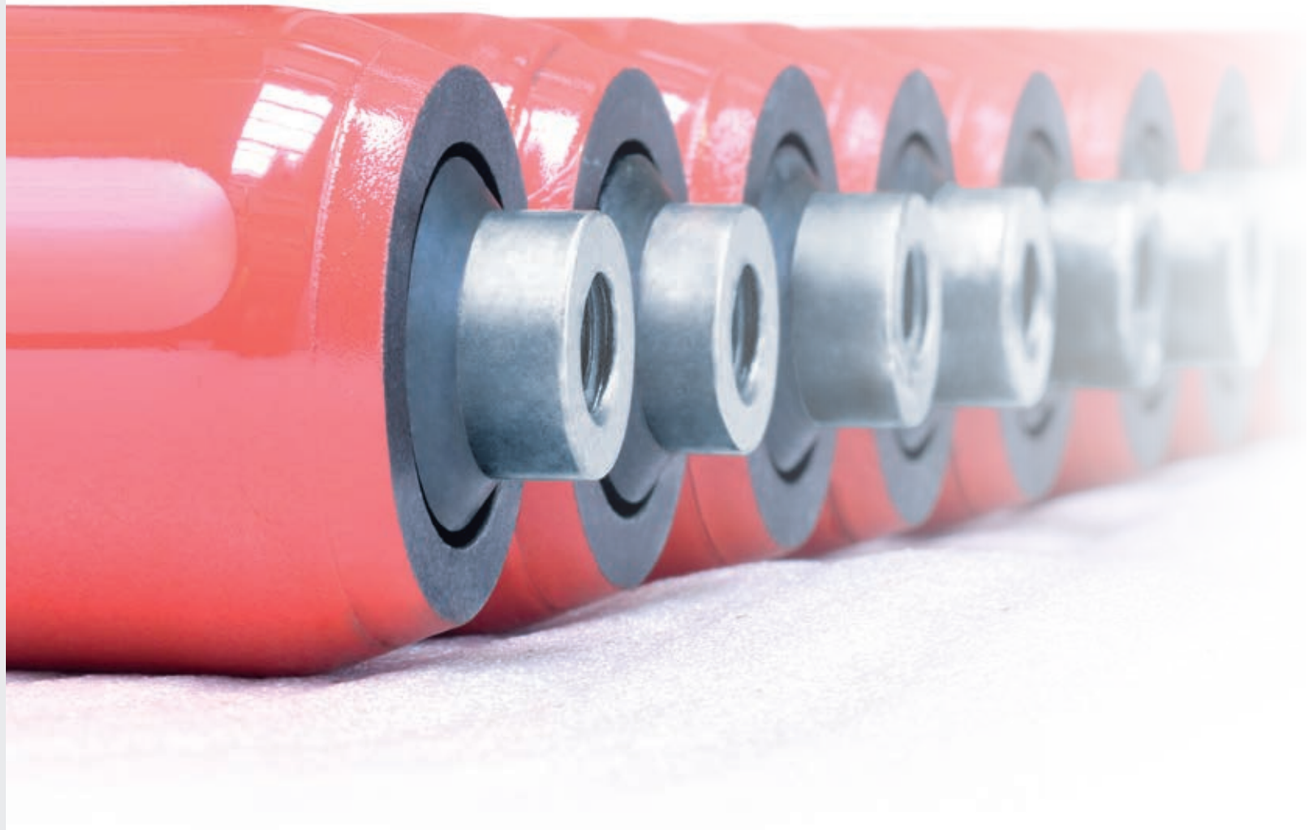
When bearings or drives are to be produced in specific ball bearing qualities or the steel bearing holders or drives should be made of a material type other than steel, then this must be performed following the respective type range.

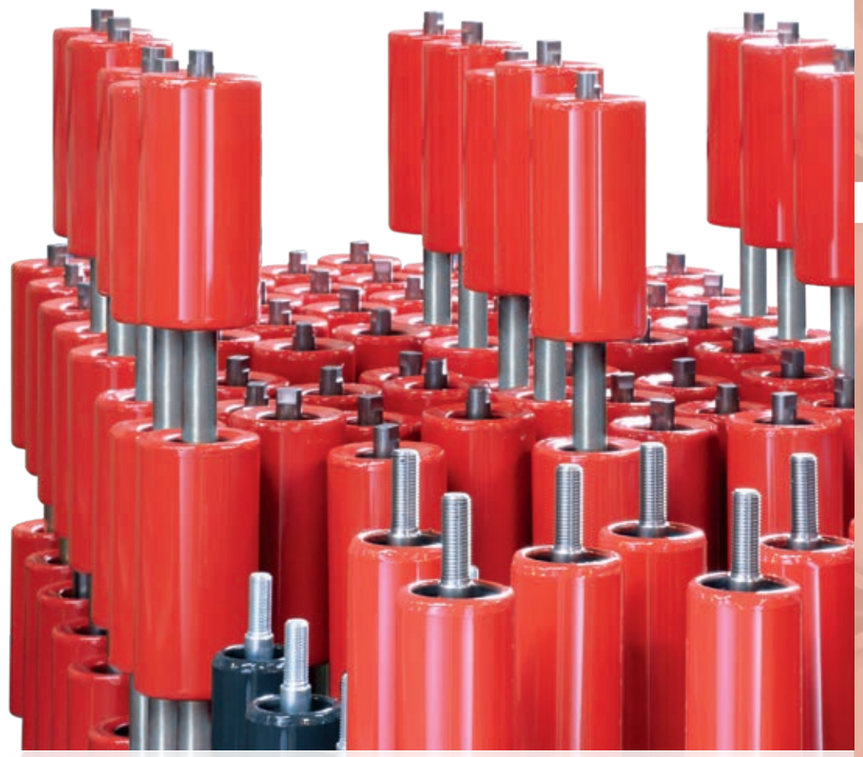
BALL BEARING QUALITIES

DRIVE OR COUNTER-BEARING VARIANTS

Other ball bearing qualities can be:

- 1Z – sealed
- Standard: 2 Z – sealed (standard)
- RS: 2RS – sealed
- D: Ball bearings made of plastic with NIRO balls
- NZZ: 2Z – sealed ball bearing made of NIRO
- NRS: 2 RS – sealed ball bearing made of NIRO
- PR: Spherical roller bearings – cylindrical 2RS sealed
- PKK: Self-aligning ball bearing – conical with clamping sleeves
- PK: Self-aligning ball bearings – cylindrical 2RS sealed
- PRK: Spherical roller bearing – conical with clamping sleeves





Other material types can be:

- Made of steel, uncoated
- I: Made of steel, electro-galvanized
- N: Made of NIRO (V2A)
- N4: Made of NIRO (V4A)
- KS: Made of plastic

Coating services

As standard, FMG support rollers are produced in various RAL colours, which are applied on-site using a two-component paint system. Of course additional coatings can be implemented in-house and in cooperation with specialist partner companies – e.g. electro-galvanizing or rubber coatings. A process innovation was achieved in the framework of a device for the fitting of PVC hoses on steel conveyor rollers.

PRODUCT TESTING

As soon as a new container is delivered from the company's own plants to the works premises of the LFD Group in Dortmund, this docks at one of the 23 gates of the modern dynamic storage facility and is unloaded.

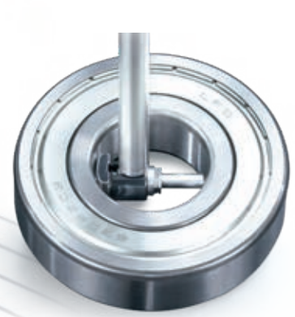
According to EU law, the LFD Group is responsible for all products that it imports into the EU. In this manner, LFD is interpreted as the "quasi manufacturer". Here it makes no difference whether the goods originate from LFD's own in-house production or from audited plants. For this reason, the company performs separate product quality testing in accordance with DIN ISO 2857.

The buying department links each container shipment to a LEBE no. in the ERP software. With this, the information from the production or from the supplier is linked to the future sales documentation so complete traceability can be guaranteed. Using the issued LEBE no, a test plan is generated by the quality control software for each article. A specified amount is removed based on the test plan and the specifications of DIN ISO 2857. During sampling, the first visual inspections are performed. Here, the pallet, box and bearing are examined for visual damage or contamination. Then the sample specimens are taken to the testing laboratory.

The following is also tested:

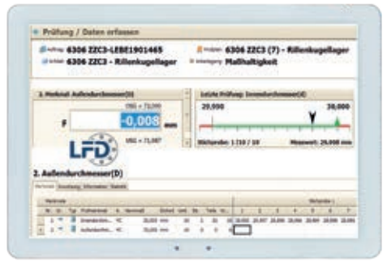
- Outside and inside diameter
- Width of the inner and outer race
- Hardness of the steel of both the inner as well as the outer race (performed according to the Rockwell method)
- Bearing clearance
- Weight
- Rotation
- EMQ bearings (electric motor quality) are additionally subjected to a structure-borne noise measurement (µm/s). There, the respective bearings are tested in the low frequency range for possible out-of-roundness and in the medium and high frequency range for possible damage.

Following the successful test, the goods are stored.



TEST PLANS

FOR EACH BEARING TYPE



Detailed test plans

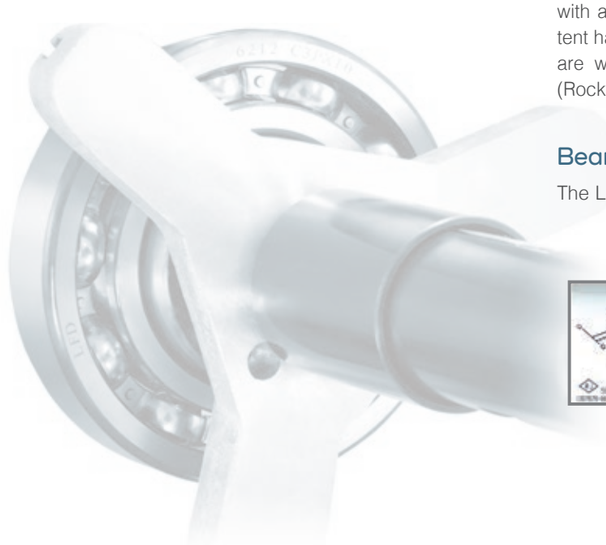
At LFD, all orders including the test plans for all bearing types are stored in the quality control software. Additionally, clearly arrange charts are affixed to the walls in the laboratory for all test processes, which also present the corresponding tolerances for each bearing type.

The test plan specifies the tests that are to be performed. Accordingly, tests are carried out for the dimensions, hardness, bearing clearance, noise, drawing dimensions and many more factors. Each individual bearing is subjected to all tests. The individual results are stored automatically in the quality control software and evaluated according to their AQL key. Additionally, the batch code is stored, which is specified on each single bearing. In this manner, LFD can trace each bearing back to its origin using the batch codes or with the use of the delivery note number. In this manner, information can be queried at any time on the measurement data.

Material suitability

The suitability of materials for bearings results from the manifold requirements set in regard to performance. During the selection, criteria such as loading capacity and resistance to corrosion or temperature are a supporting factor. High requirements are generally set in regard to the loading capacity of the individual bearing components such as races, cages and balls. LFD meets these requirements with the selection of particularly pure steels with an oxygen content that is as low as possible.

Bearing materials:
Effects on the service life



Chromium steels that have been hardened through with approx. 1% carbon and 1.5% chromium content have established themselves worldwide, which are well suited for the hardening to 58-65 HRC (Rockwell hardness scale).

Bearing clearance with support rollers

The LFD bearing design is optimized in regard to the bearing track lubrication in combination with the matching bearing play. Because the maximisation of the service life is directly dependent on the bearing clearance. The aspect of tilting gains in importance with the increasing roller length, as the deflection of the support rollers leads to ever greater tilting in the bearing position. LFD takes these aspects into consideration in its own production.

QUALITY ASSURANCE

Laboratory equipment and test benches

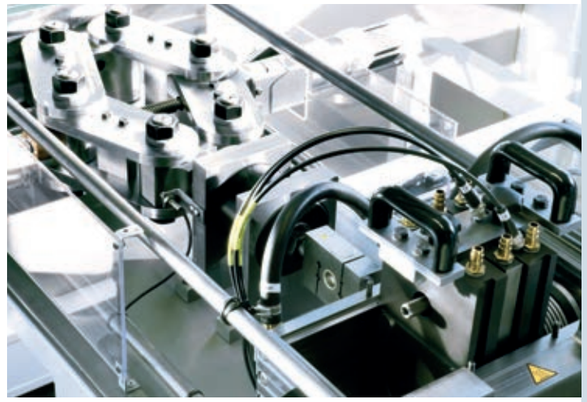
With its in-house bearing test benches, which permit test runs of up to 300% of the capacity, the LFD Group ensures a very high quality standard.

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.



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.

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

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 or outer race.

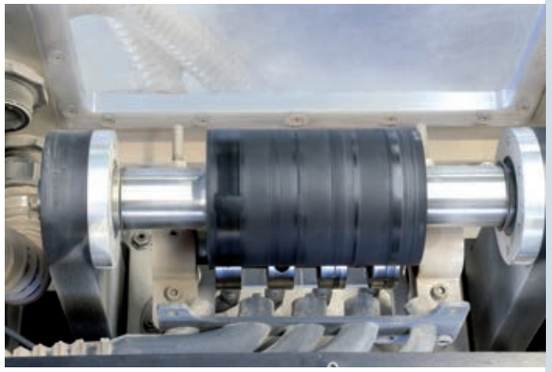
Dust-dry test

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.



SAFEGUARDING

OF THE EFFICIENCY

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 race. 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

POWER. PRECISION.

FLEXIBILITY.

Continuous innovation of products and solutions as a decisive factor of intra logistics

Each modern company must design its in-house transport processes, which are in regard to the movement of material and goods, in a manner that is as efficient and time-saving as possible. From the viewpoint of competitive reasons alonethis is indispensable. An aid in the problem solving by means of intra logistics is the use of belt conveyors with support rollers. They enable both alinear as well as a curved operation. Conical support rollers are used for the implementation of a curve-shaped movement, with the use of which the radii of the curve movement can be varied within certain limits.

IDEAL TRANSPORT SOLUTIONS

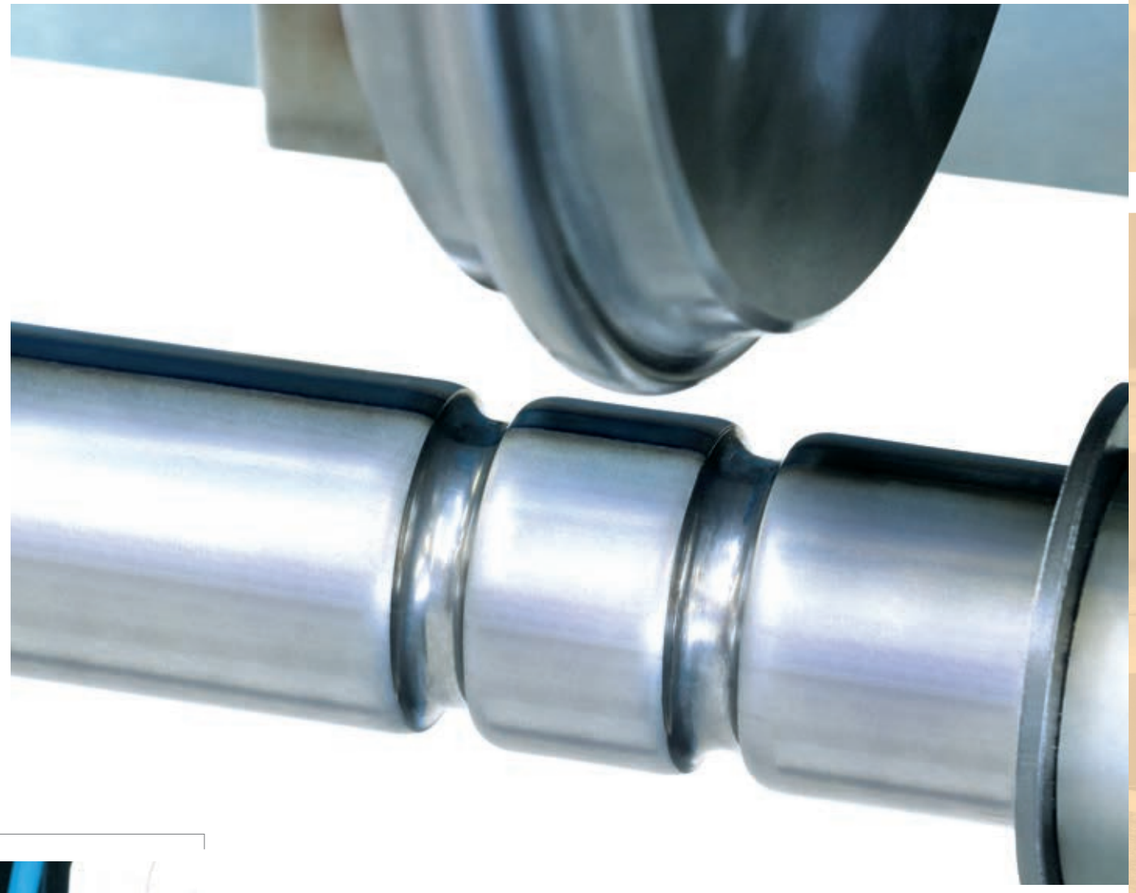
FOR EACH INDUSTRY SECTOR

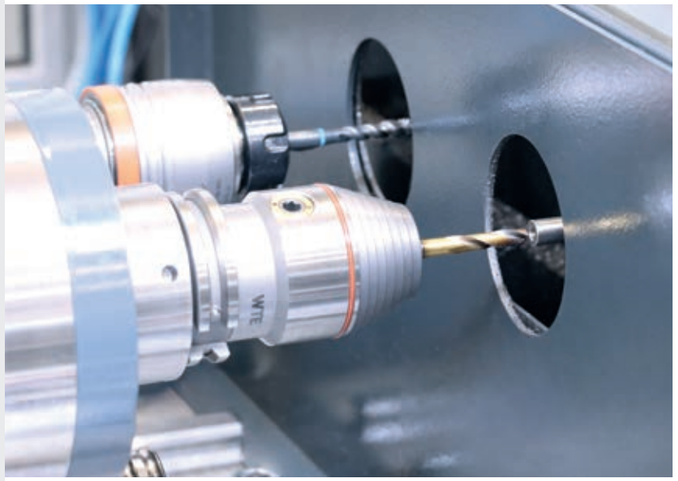
TRAPOROL is a specialist and leading manufacturer of support rollers, motor rollers, expansion elements and accessories for conveyor technology systems. The products with a wide portfolio are utilised in many industry sectors, e.g. in the food industry, automotive industry, chemical and pharmaceuticals industry, in wood processing and furniture industry, packaging industry, printing and paper industry and in the stone industry.

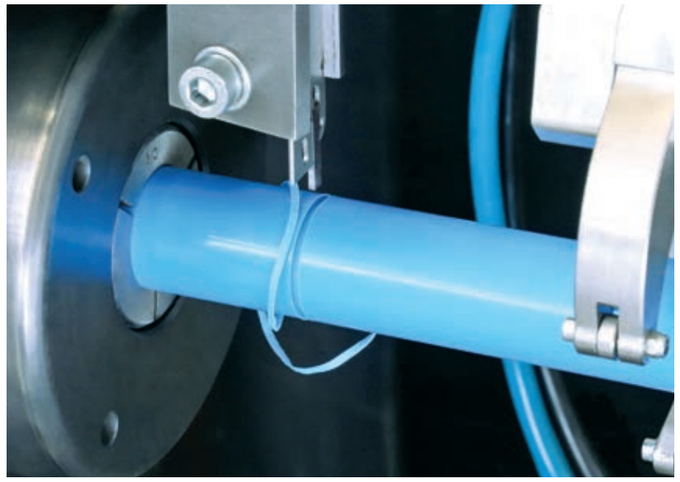
With extensive in-house vertical integration, the standard product range of support rollers and elements of conveyor technology already covers a multitude of customer requirements. As a developer of individual solutions with specific requirements, the company can quickly provide tailor-made products. Long-term experience enables ideal transport solutions for all needs.

Support rollers with ribbing

Support rollers with single or double ribbing from in-house production in combination with a round-section belt result in a roller conveyor for light and moderately heavy conveyed goods. The operation is not only especially safe, efficient and fast, but also almost completely silent. The bearing insert is comprised of a plastic roller base (polypropylene) with plastic seal (polypropylene) and deep groove ball bearings DIN 625, optionally with deburred roller bases. [Deburred roller base = Recommendation for lateral sliding on]







Support rollers for conveyor and goods flow systems

Support rollers from TRAPOROL are a perfect choice for the implementation of conveyor and goods flow systems. In addition to a flawless finish this is also due to a high degree of individualisation of the products in regard to the respective applications. They are adapted precisely to the requirements of the conveyed material and the customer in regard to size, material and surface quality.

EXCLUSIVE

SPECIAL SOLUTIONS

Development of exclusive special solutions

Even for especially harsh operational environments such as salt mines, it was possible to develop conveyor solutions, which in regard to throughput, robustness and durability are unique.

Even in such conditions, LFD ball bearings can ensure reliable operational performance. LFD had the function/corrosion behaviour tested in a 4-week climatic test. During this test, the ball bearings of both the market leader as well as a rolling bearing manufacture and additionally of LFD were tested. Here, the best results were achieved by the LFD bearings with seal and greasing using Klüber Staburags NBU12K.

The loading capacity of a support roller is of course determined by the respective load values of the utilised components, bearings, pipe and axle.

As a result of the in-house production, short delivery times of original spare parts are possible, of which in the event of the need, contingents can be kept in the warehouse, but additionally due to individual manufacture workplaces can be produced promptly and exactly. But also spare parts for third party systems are produced according to samples or technical drawings.

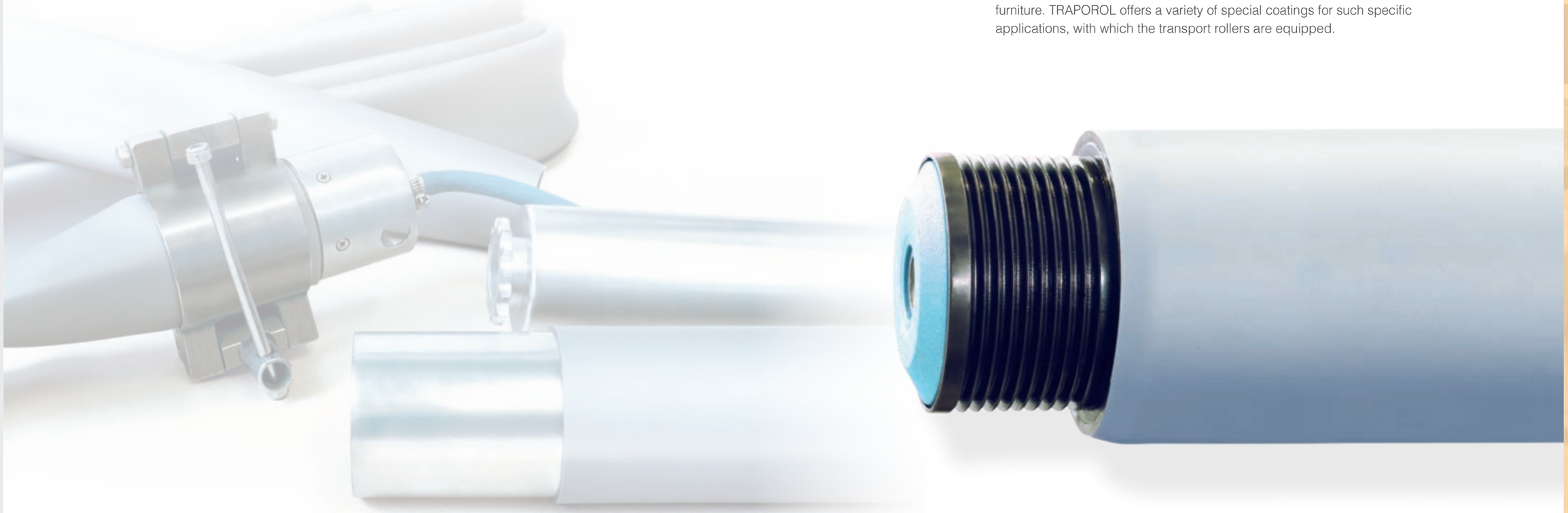
WITH FULL EFFORT

PARTICULAR STABILITY

The specifications for the correct LFD bearings are each listed with the corresponding series in the catalogues. No limits have been set in regard to the technical and creative knowledge. During the entire development process, competent employees are in close contact with the customer to meet all necessary requirements as desired and in particular in achieve an economical implementation.

Individual coatings and surfaces

The true efficiency of a conveyor system lies in the perfect balance of the conveyor elements to the conveyed material. Special roller coatings are required for the safe and quick transportation of especially sensitive components such as high gloss kitchen fronts, but also paper-coated furniture. TRAPOROL offers a variety of special coatings for such specific applications, with which the transport rollers are equipped.



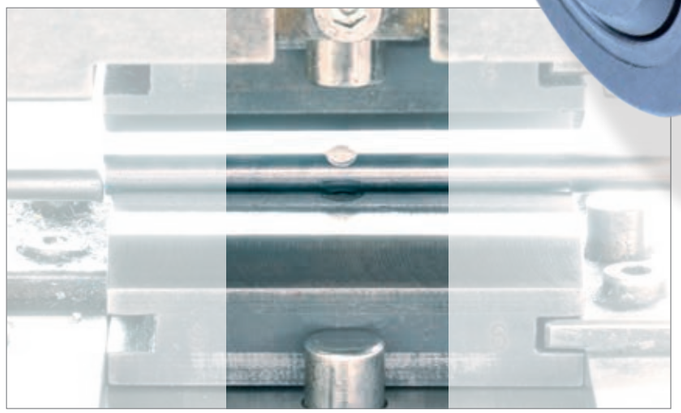
PERFECT EQUIPMENT

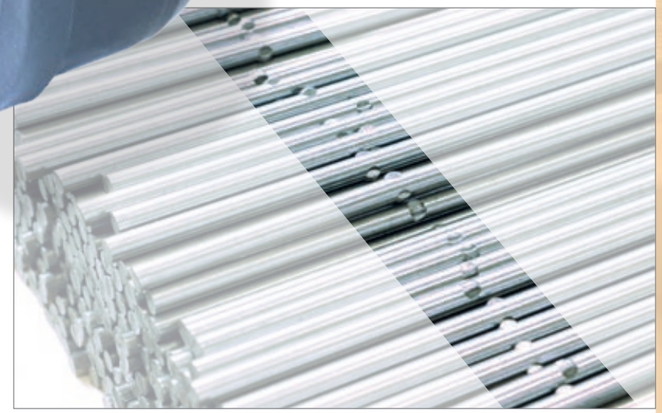
DOWN TO THE DETAIL

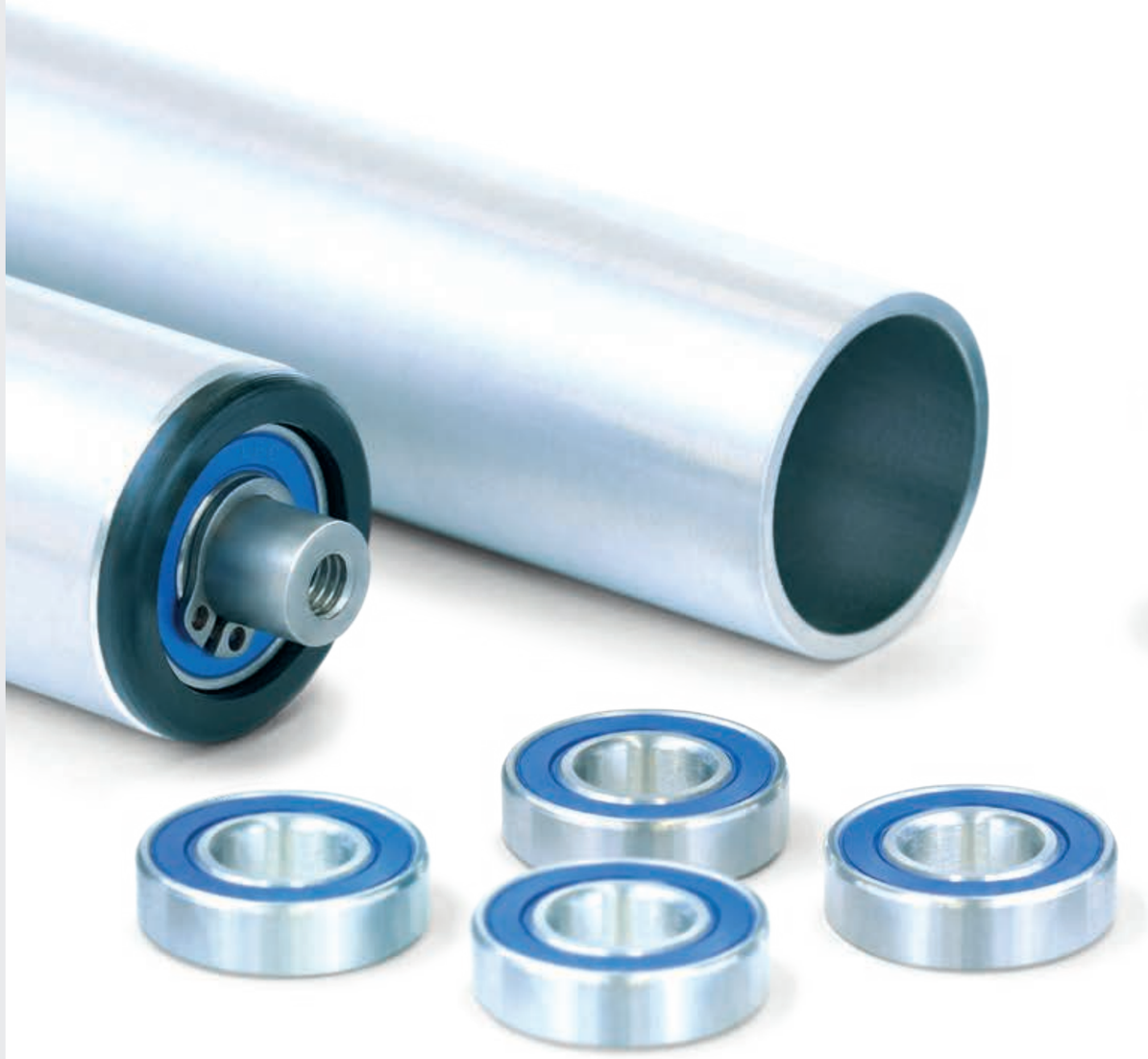
No scratches, abrasions, traces of oil or other damage may be inflicted on the specified goods. Whether made of plastic, fabric or with a surface treatment – the entire range of possibilities for a perfect transportation and the comprehensive protection of the conveyed material is offered. Generally, the support rollers are suitable for heavy conveyed material and high rotational speeds. The bearing insert for example is comprised of a plastic roller base (polycarbonate) with a plastic seal (polypropylene) and an LFD deep groove ball bearing. The bearing insert is also available with a galvanised sheet steel roller base with plastic bearing bushing (polypropylene) and with LFD deep groove ball bearings in accordance with DIN 625.

Drive and conveyor chains made to measure

At TRAPOROL, the customer optionally receives precisely the correct conveyor and drive chains matching the respective transport rollers. Here, each chain has been tailor-made in regard to the material and variant exactly for the required operation purpose. In this manner, the maintenance costs are lowered significantly and the capacity of the respective transport systems is maintained. Whether by the metre or cut to length and enclosed, ready-to-fit: All available chains are produced according to DIN ISO 606 (formerly DIN ISO 8187) and meet the strictest requirements.







AUTOMATION WITH HIGH-QUALITY LFD BALL BEARINGS

in regard to size, material or surface structure of the respective requirements. Here, modern production facilities “Made in Germany” ensure the quick and competent development of even very specific solutions.

Depending on the lifting capacity of the rollers, different requirements apply to the utilised LFD bearings. Average support rollers with an axle diameter of 8 mm to 17 mm are often equipped with LFD deep groove ball bearings, which are fitted with a labyrinth or double labyrinth seal (Z / ZZ / RS / 2RS). The suitable application-specific design of the ball bearings is determined with the consultation of the engineers of LFD-Wälzlager GmbH. The pipe material itself can also be selected in a wide variety of variants and coatings.

Individual conveyor solutions

TRAPOROL GmbH is not only a manufacturer, but also a leading developer of high-quality products and innovative solutions for the sector of conveyor technology accessories. Decades of experience and comprehensive knowledge of the most diverse industry sectors and industries lead to universal problem solutions for all issues of modern goods transfer.

The production is adapted specifically to the respective customer. Individual modules and expansion modules for complete conveyor technology systems are adapted precisely

EFFICIENT PROCESSES

CONTINUOUS QUALITY

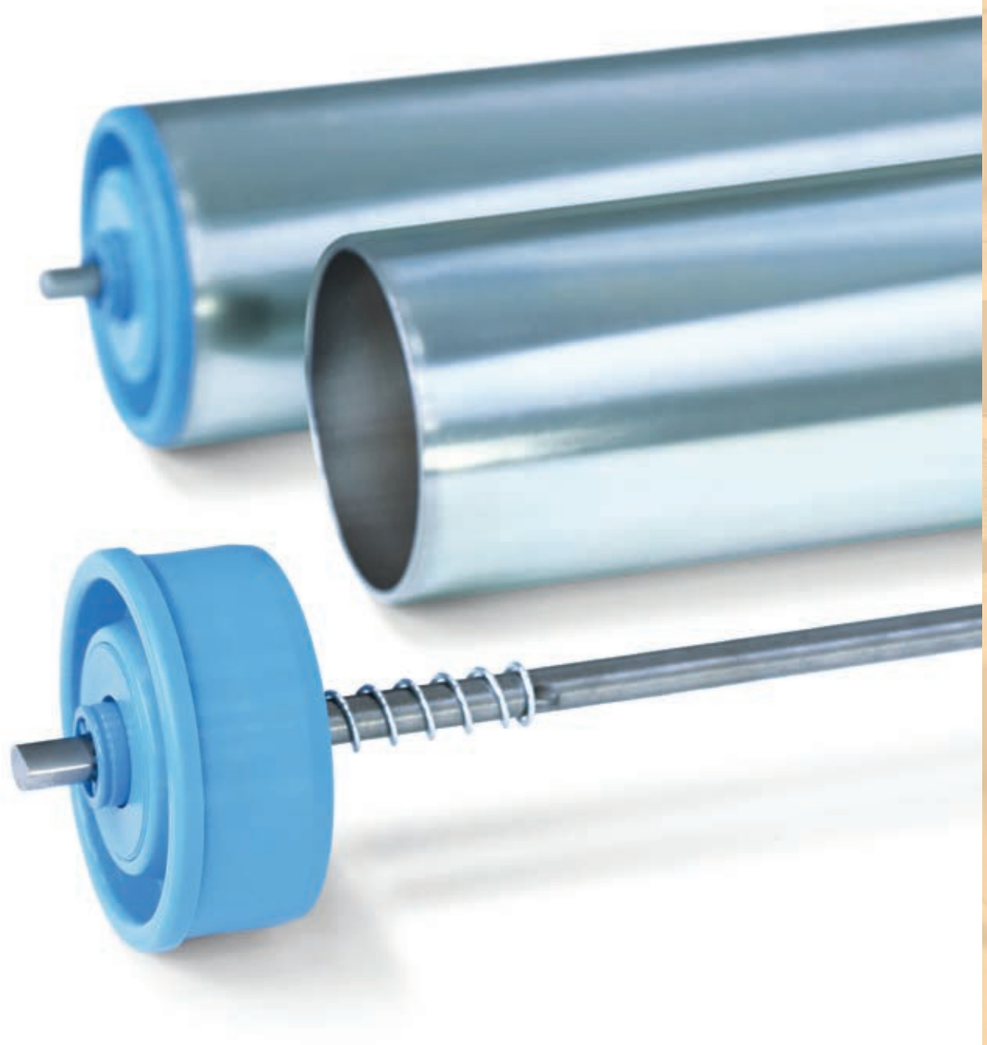
A competent team of engineers, developers and technicians at TRAPOROL continuously improves the quality of the in-house standard components and additionally delivers product innovations that provide clear advantages – in regard to handling, the efficiency of the processes and the reduction of running costs.

Quality management according to German standards is also a matter of course for all production sectors of the LFD Group. For the verification, optimization and for new developments, the LFD Group continuously expands its own development laboratory with the latest measurement technology made by renowned manufacturers and different test benches, which are constructed in close cooperation with notable universities.

Quality, cooperation and certification

Many years of experience as well as the tireless commitment of the employees are reflected in the quality of the products. The collaboration with universities and research institutes, the permanent further training of the employees, the use of modern IT tools (e.g. CAD systems, simulation programs) and last, but not least, the continuous improvement process of the products and processes serve a single goal: Satisfied customers and the smooth operation of the conveyor elements and components.

The certification by the TÜV reflect this quest for quality. TRAPOROL has been certified according to DIN EN ISO 9001 since 2001. Most recently, in June 2018, the company received its new certification for DIN EN ISO 9001:2015.



TRANSPORT ROLLERS
MADE IN EUROPE

FOR CRATES AND BOXES

Many decades of experience with wheels and rollers, development of application-suitable solutions

High-quality frames made of coloured plastic

RÄDER WENDT GmbH offers a wide variety of wheels and rollers. However, the current bestsellers are the coloured transport rollers made of ABS / PP plastic. They are suitable for crates and boxes (600 x 400 mm) with all-plastic and galvanised steel enclosures. The ABS version was tested by DEKRA for light to heavy loads. All variants are expressly suitable for the food industry and are easy to clean. A maintenance-free product, “Made in Europe”.

Wheels and rollers since 1994

RÄDER WENDT GmbH was founded by Uwe Wendt in 1994. As the managing director in the second generation, Stefan Wendt can fall back on decades of experience with wheels and rollers, experience that benefits both regional as well as national customers in the development of solutions that are tailor-made for the respective application. The warehouse in the industrial area “Tornesch” stores several 10,000 wheels and rollers for customers for immediate delivery. WENDT manufactures wheels and rollers with a lifting capacity ranging from 10 kg to 46,000 kg.

Tyres

The tyres are of crucial importance when selecting the right wheel or roller, because the loading capacity and rolling resistance depend on it. For this reason, the wheels and rollers in WENDT’s catalogue are structured according to the tyres as a main criterion. Significant characteristics of the different tyres are also shown. As an important decision-making aid, the wheel diameter and the loading capacity are in each case specified accordingly.

Determining factors for the selection of wheels and rollers

LFD ball bearings
according to German standards

Loading capacity and optimal smooth running behaviour

There is the matching bearing for each wheel and each roller. LFD ball bearings are therefore designed according to both German as well as international standards and in regard to the most effective use of a specific application.

The customer specifies the framework conditions and is accompanied by the engineers of the LFD Group in regard to the interaction of components up to the optimal product. LFD has developed a specific PX design for ball bearings, which ensure the guide accuracy with low-friction wheels.

Due to the optimal construction selection of the ring geometries and the available rolling elements, it is achieved that the deep groove ball bearings produced in accordance with the PX design only allow extremely small tilt angles and as a result a wheel runs with high guide stability. The requirements are especially high with manufacturers of nursing and hospital bed rollers as well as on medical equipment: Because in addition to high corrosion protection requirements, specific requirements are also set in regard to the smooth running behaviour. These wheels are usually made using deep groove ball bearings encapsulated in plastic.

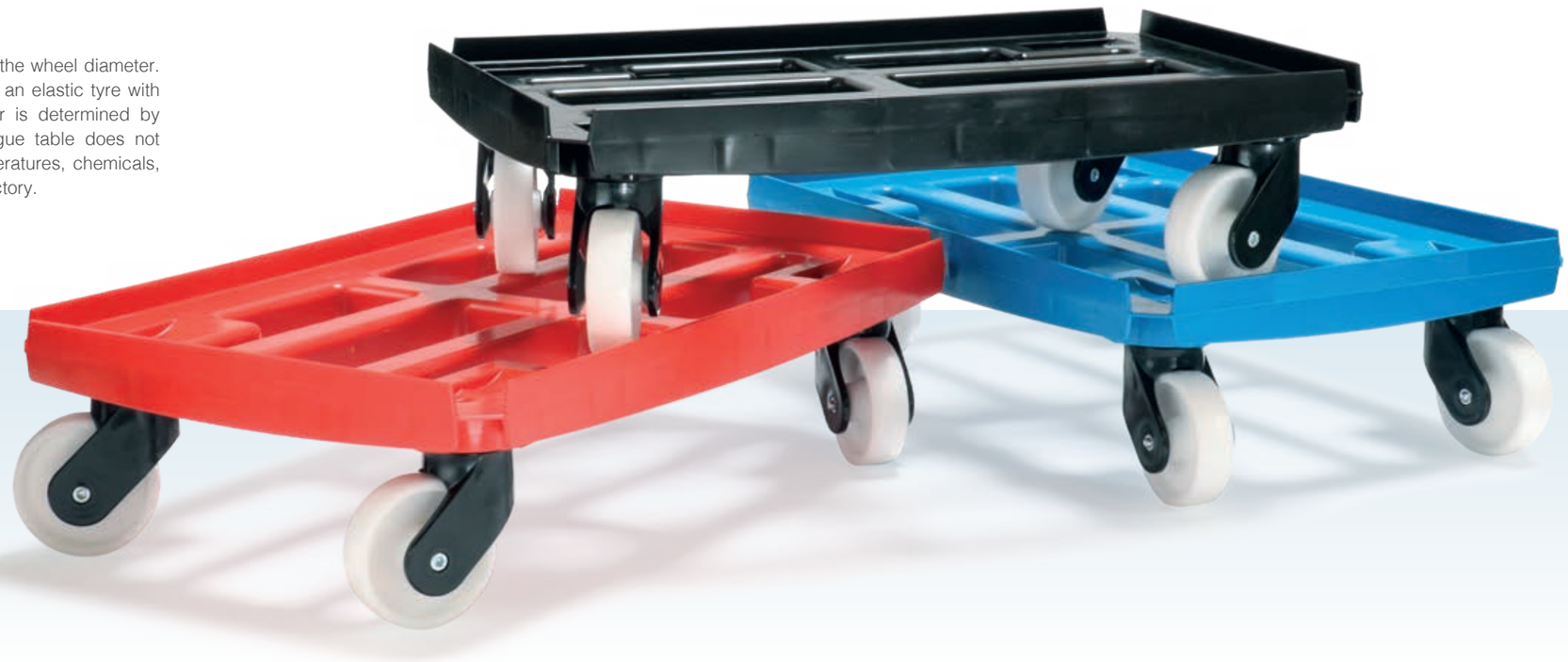
The areas of application of these specific precision rollers with PX design bearings are widely dispersed: In addition to hospital beds, they are utilised in shopping trolleys, wheelchairs, prams, warehouse carts, office furniture, office chairs, furniture in general, in luggage transport and many other applications.

DETERMINE THE OPERATING CONDITIONS

TYRE QUALITY

Quality of the routes

The quality of the routes determines the tyre quality and the wheel diameter. For example, with uneven floors it is advisable to select an elastic tyre with a large diameter. The material of the wheel and roller is determined by environmental influences. In the event that the catalogue table does not provide any statements on the resistance against temperatures, chemicals, etc., accurate information should be obtained from the factory.



Loading capacity

WENDT recommends utilising the following formula for the determination of the loading capacity of the selected wheel assembly: Total weight of the unit (= own weight + payload) divided by 3, as often with uneven floors only three of the four wheels make contact. Additionally, when moving over obstacles, overloading can briefly occur. The loading capacities specified in the catalogue for wheels and rollers are valid for vehicle speeds of up to 4 km/h on level, smooth floors (when running in a straight line) with an ambient temperature of 10° C to 30 °C.

Usage type and duration

The usage type as well as the duration of wheel and roller determine the selection of the bearing. The following distinction must be made with wheel bearings:

Sliding bearing

They offer a simple, largely maintenance-free and shock-resistant bearing. No additional bearing bushings are used with wheels made of polyamide or cast material, as these materials already have good anti-frictional properties.

VERSATILE

TRANSPORT ROLLERS

Roller bearings

They offer a robust, resistant, largely maintenance-free bearing, are the most commonly used bearings for equipment with low speed and have a low rolling resistance.

Bearings by LFD

LFD deep groove ball bearings offer smooth running even with larger loads and speeds for continuous operation. Deep groove ball bearings are mainly used in technically demanding equipment rollers, **LFD taper roller bearings** are used in heavy load wheels for high loads and speeds and **LFD taper roller bearings** are especially suited for the absorption of combined (radial and axial) loads. The bearing of the steering box is oriented in regard to its construction to the loads and requirements of the swivel castors.

Robust PP lattice frame

A transport roller with three boxes 600 x 400 mm, additionally for example a red PP lattice frame and grey 100 mm rubber wheels, are also available as a transport system in a set. Many colours can be implemented on request.

The high-quality frame is comprised of coloured PP plastic (material: polypropylene, first choice – no reclaim material). The open corners are suited for convenient cleaning and can for example be fitted with four sheet steel swivel castors as well as double ball bearings in the clevis. These are galvanised with a wheel diameter of 100 mm and thermoplastic grey rubber wheels in approx. 85° Shore A hardness. The transport rollers with an internal dimension of approx. 610 x 410 mm are suitable for crates with a size of 600 x 400 mm and a capacity of 65 litres. The suitable lattice frame is characterised by excellent stability and offers a lifting capacity of 300 kg. The set for example includes three grey closed plastic boxes (euro containers / PP plastic) with the external dimensions of 600 x 400 x 320 mm and interior dimensions of approx. 565 x 365 x 315 mm are already included. The material is suitable for a temperature range of -20 °C to + 80 °C with a lifting capacity of 40 kg. Simultaneously, it is resistant against mild acids and bases. Two open handles simplify the handling.

COLOURFUL WORLD OF LOGISTICS

Breakaway force and rolling resistance

The breakaway force and the rolling resistance is determined by the force with which a vehicle is moved. These resistance values are dependent on the tyre material, the wheel diameter, the quality of the route, the bearing element and the load. The larger the wheel diameter, the smaller the rolling resistance is. Wheels with polyamide and polyurethane running surfaces achieve the lowest breakaway force and rolling resistance on level floors.

Welded heavy load polyamide rollers

The very diverse portfolio also includes special constructions, such as welded heavy load polyamide rollers. The wheel body is comprised of polyamide with a ball bearing. The running surface is free of grooves with an approx. 70° Shore D hardness and a temperature range of -30 °C to +90 °C. The housing is made of sheet steel, the wheel axle is bolted on. Retainers with double stop are also available.

Heavy load polyurethane wheels

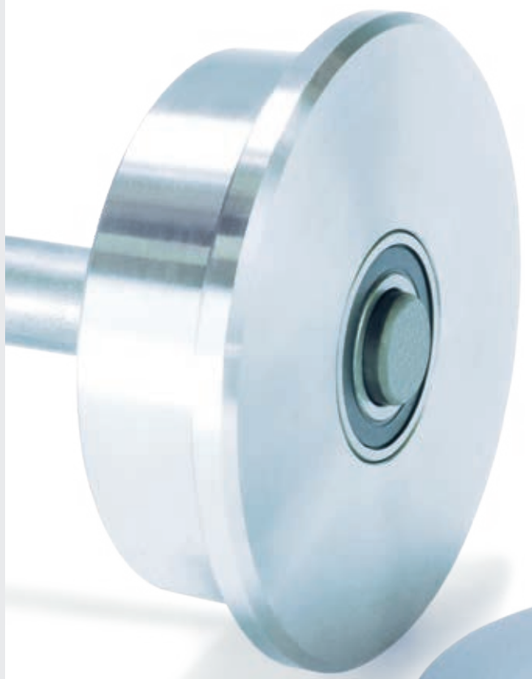
The wheel body is either made of aluminium or cast material, fitted with cast, smooth polyurethane with approx. 95° Shore A hardness and a flexible temperature range of -20 °C to +80 °C. Weight-bearing, sealed LFD ball bearings are installed on both sides.

LFD: clear price advantage

Ball bearings made by LFD are optimised for the respective application and accordingly achieve very high loading and carrying capacity, even under extremely harsh conditions. At the same time, LFD bearings are high-quality products and offer a true alternative with a clear price advantage.

WHEELS AND ROLLERS

WITH HIGH LIFTING CAPACITY

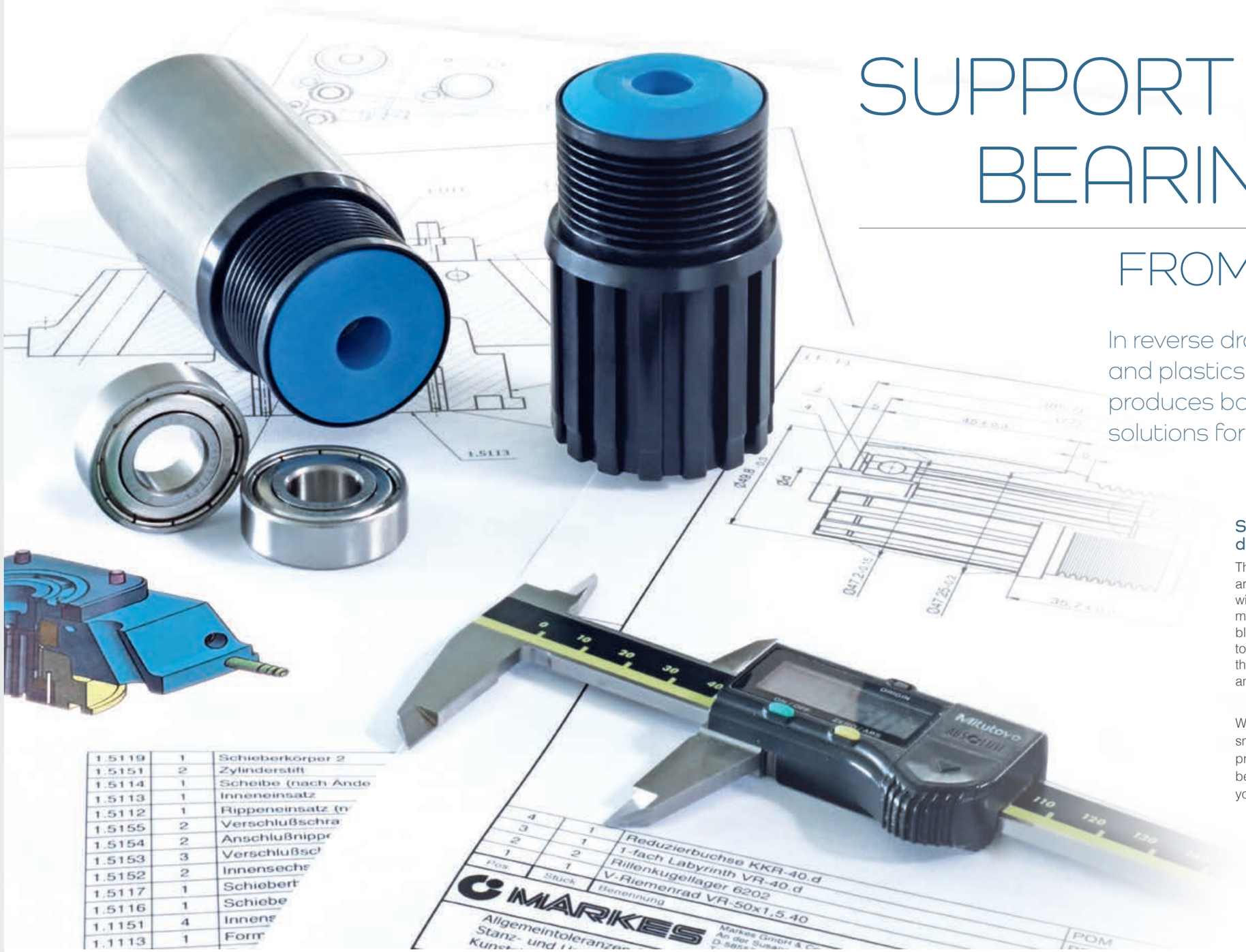


LFD: in-house laboratory and test benches

At the development site in Dortmund, the LFD GROUP has a modern equipped in-house laboratory with high-tech measurement systems at its disposal. Additionally, there are also several service life test benches. There, the same measurement equipment is used as in the in-house production. With this, new developments can be documented quickly and optimizations can be implemented promptly.

Special flanged rim wheels

WENDT offers flanged rim wheels made of both grey cast iron, steel C45 or of comparable quality and a running surface of approx. 180 to 230 HB. The running surfaces are precision turned and rise approx. 3° to the axle. Depending on the axle diameter and the lifting capacity, a suitable and sealedLFD ball bearing must be used in accordance with the requirements. Flanged rim wheels are available on request with a lifting capacity of up to 33,000 kg.



SUPPORT ROLLER BEARINGS

FROM SPECIALISTS

In reverse drawing, die stamping and plastics engineering, MARKES produces both simple as well as complex solutions for conveyor technology

Support roller bearing in different variants

The solid roller bases from in-house production are popular. The MARKES company supplies wide ranges of the roller industry, consults with many decades of experience in regard to suitable material selection, geometry, dimension and tolerance design and offers feasibility studies on the production up to the development of process and cost-optimised products.

Whether support roller bearings, bearing holders, small running rollers or special ball bearings, the product diversity is large. With MARKES, you can be sure that you will receive the article that meets your expectations.

MODERN PRODUCTION ENVIRONMENT

Precise forming technology

Extensive, exemplary machinery produces especially solid and stable bearing holders with own tool forms for among others the bulk goods industry, which for example are simultaneously are holders for reliably durable LFD bearings.

The raw material is inserted automatically directly into the thermoforming machine from large metal reels and then shaped in several steps into the final roller base.

MARKES is one of the few manufacturers that are able to produce these large quantities of bearing holders with an enormous speed and simultaneously of such high quality. Roller manufacturers worldwide are supplied with these stable solutions in large batches.

Precise plastics engineering

Similarly, the company is specialized in the area of plastic. For more than 50 years, complex injection moulded parts including the corresponding tools are developed and produced according to the customer's specifications. A highly modern production environment safeguards consistent quality and technical production quality with all plastic parts.

PRECISION

FOR ALL REQUIREMENTS

Quality

MARKES produces products at the highest technical level. Integrated production processes from the development through the tool making up to prototyping, series or individual manufacture are controlled and monitored by the in-house MES (manufacturing execution system). Together with a high degree of automation, the foundations are laid to ensure that the customer remains competitive with the products.

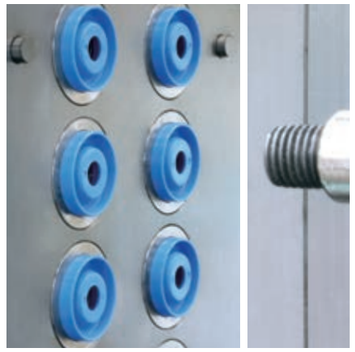
Economical
intra logistics
solutions

Here, MARKES does not only manufacture the individual components, but rather these assemblies are also assembled on-site.

Intra logistics

Hardly any industry sector has such potential for saving and streamlining as intra logistics. Both to the public as well as to many users, the potentials of the internal flow of material and the logistics are often insufficiently known. Intra logistics is the future-oriented term in conveyor technology. Because this industry sector in Germany alone includes thousands of companies – from the manufacturers of lifting equipment and cranes to the producers of forklift trucks and storage technology as well as software developers up to complete system providers.

In gravity conveyor systems and motor-powered conveyor systems of the storage technology ranging from floor conveyor systems, continuous conveyors, order picking and packaging systems to palletising systems, the modern intra logistics solutions provide reliable services.



SUPPORT ROLLERS AND BEARINGS

TEST BENCHES

Test benches for rollers

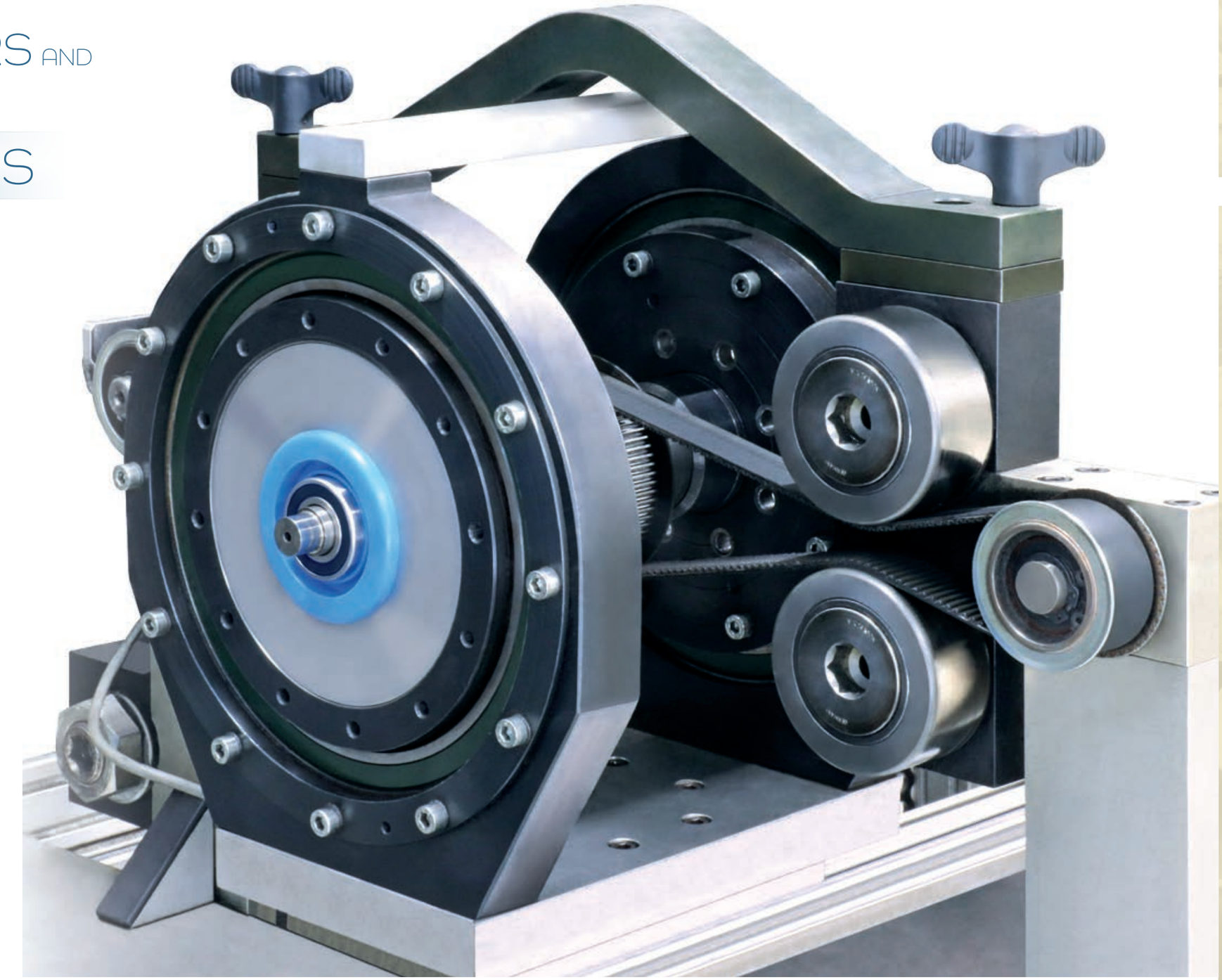
Precaution for the practice in the application: With the test benches made specifically for MARKES, different load cases of the conveyor roller can be simulated according to the specific needs of the customer. In this manner, it is ensured from the outset that the utilised bearings meet the high demands of the customers.

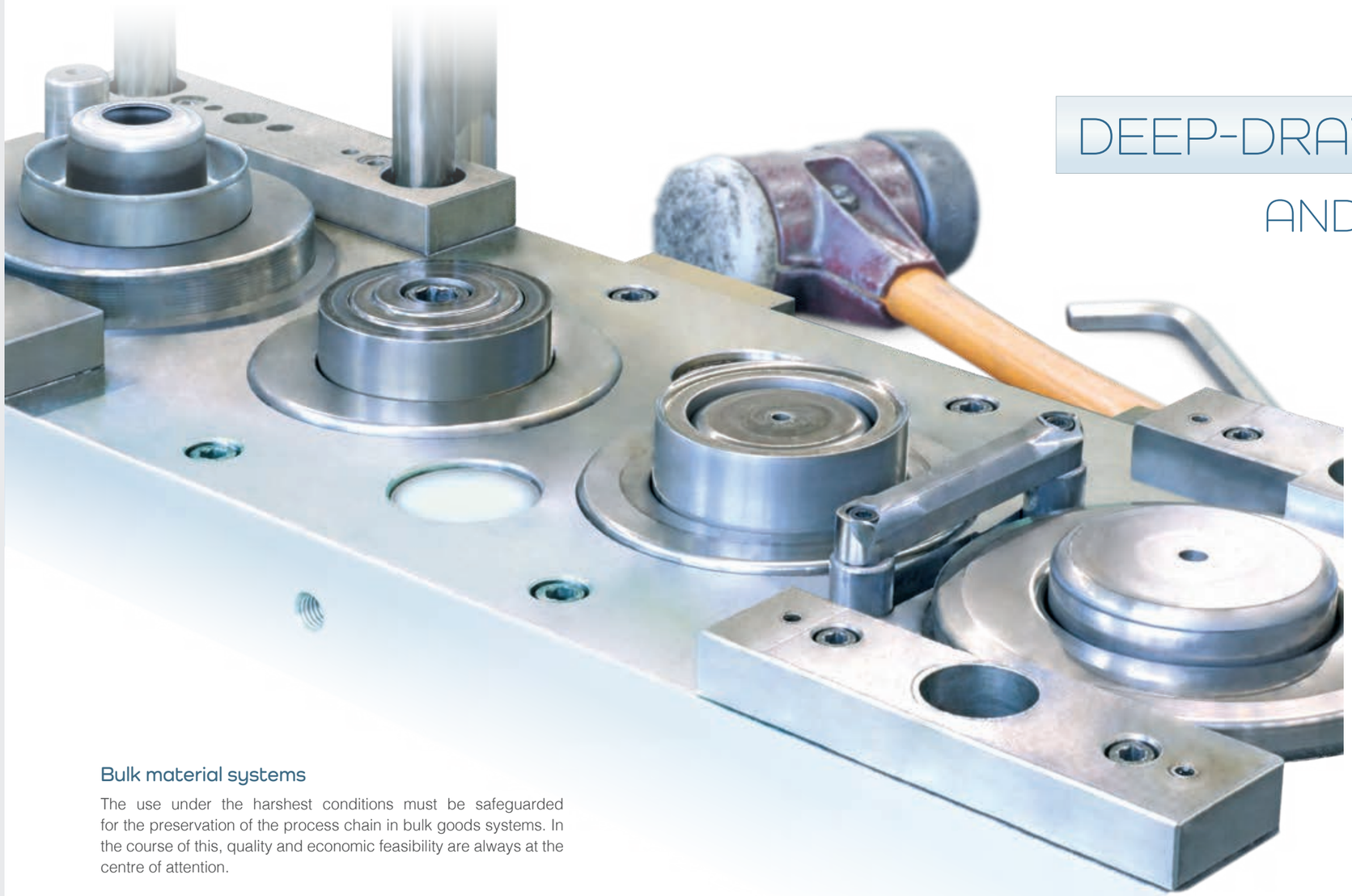
Bearings with excellent technical values

Especially a seemingly insignificant production part such as a ball bearing often determines the efficiency of an entire conveyor system.

With its in-house laboratory equipment and test benches, LFD is able to meet with the highest quality requirements. The structure-borne noise diagnostics is a recognised analysis procedure and is used for the condition monitoring of rotating bearings. With light axial preload, a fixed outer race 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” provide insight into 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. Elementary for this is an excellent surface finish and the high geometrical trueness.





DEEP-DRAWING TECHNOLOGY AND STAMPED PARTS

Experience as a basis for product solutions

Economic quality and precision in deep drawing, reverse drawing and die stamping technology is the result of decades of experience and the reliable industrial production lines.

MARKES provides support to the support roller industry from the idea through the development, the prototyping and tool construction up to the finished end product in the metal forming technology.

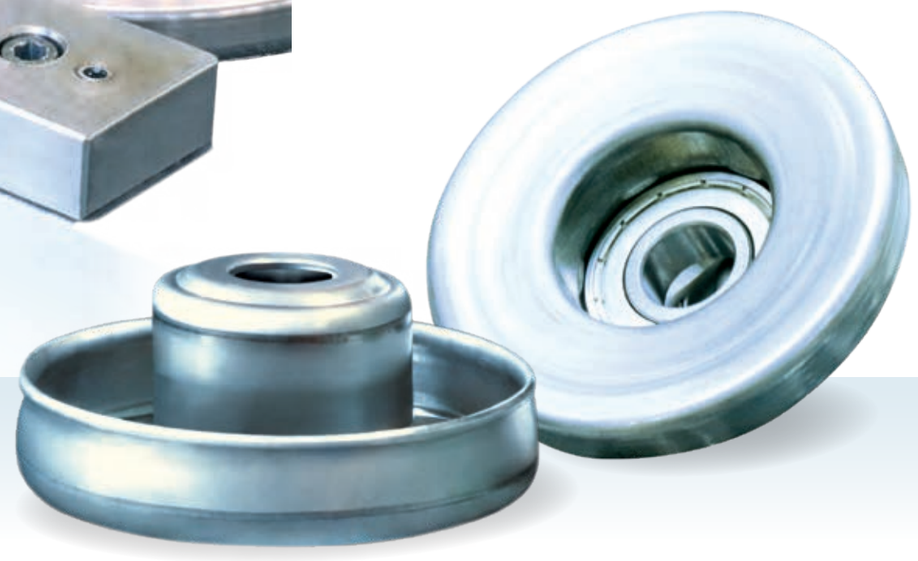
From the standard version to the special production, from single workpieces to entire series: Tailor-made precision solutions are the company's strength.

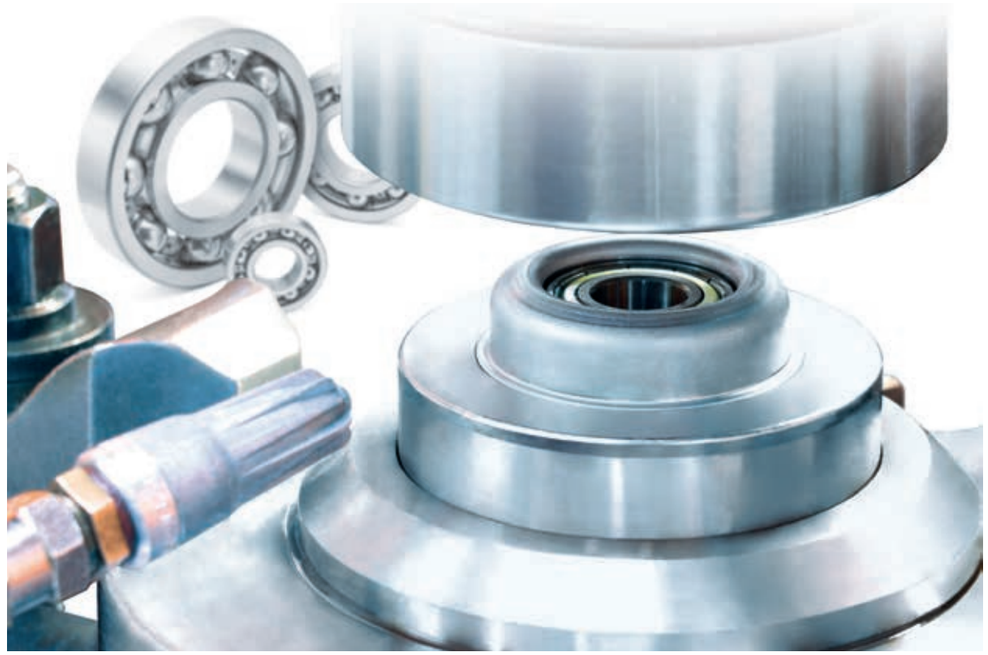
Bulk material systems

The use under the harshest conditions must be safeguarded for the preservation of the process chain in bulk goods systems. In the course of this, quality and economic feasibility are always at the centre of attention.

The company offers a high degree of availability of its spare parts. In addition to the robust bearing holders, MARKES also offers bearing seals for the use in conveyor belt rollers, which can be utilised in support roller stations, bottom belt roller holders, guide stations and belt guide systems. All of this is featured in the extensive portfolio.

A practical example: A conveyor belt with an overall length of 3.4 km and a width of 800 mm conveys a load of approx. 750 tonnes/h with a velocity of 2.9 m/s. Safety and reliability are the most important parameters in such a process.





MASS PRODUCTION

FOR INDUSTRIAL APPLICATIONS

Pressed in LFD deep groove ball bearings

In a separate work process, the matching and sealed LFD deep groove ball bearings are pressed in. For many applications in logistics, the use of high-quality deep groove ball bearings is an economical and reliable solution. Endurance test benches prove the consistent quality of these importantsafety-relevant machine parts. Contrary to ordinary bearings, the ball bearings in support roller engineering are installed under tension. With the use of identical materials in all roller components additional loads as a result of thermal expansion are avoided. In the event of particularly high loads in the bulk goods industry, it should be verified whether spherical roller bearings or self-aligning ball bearings are the better choice as they are able to compensate for each deflection of the rollers with greater success.

Bearings with very good delivery performance

The bearings are distributed worldwide in 20 feet shipping containers to both LFD sales locations as well as directly to the customer. “The factor of time is very important when we want to deliver bearings just-in-time to the assembly lines of our customers”, Veit Loeffler, managing director of the LFD Group, explains. “We have reliable logistics partners for this task. An ever increasing rate our customers work globally and we follow the customers to wherever our products are required. If necessary, an appropriate sales organisation and a warehouse is constructed on-site”, Veit Loeffler describes the possibilities for customers. “Currently, we deliver our bearings to 68 countries. It is the objective of our logistics to create short distances for our customers.” The company is now represented on all continents. In addition to the central warehouse in Germany, the LFD Group also has further storage capacity in France, Italy, the USA, Chile and Shanghai. Additional representative offices and partners facilitate quick response times, ensuring that customers can be offered the fastest possible delivery. During the development and manufacture of all types of bearings, the company from Dortmund focuses precisely on the application of the respective customer.

INTRA LOGISTICS

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THE LFD GROUP

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You can find your corresponding contact partner at:

www.LFD.eu/contacts

SIMPLY WELL-ENGINEERED