Blickle®

Competence in polyurethane

we innovate mobility

Blickle®

Contents

We work for you. And with you.
Blickle – a company in motion.

1

We have been one of the three leading manufacturers of wheels and castors worldwide for decades because of our reliability, commitment to innovation and focus on the customer.

Blickle is committed to outstanding quality, high availability, reliable deliveries and maintaining a global presence. Our highly motivated employees develop the perfect products for a wide range of applications. The main tools at their disposal are good ideas, a creative spirit, many years of experience and a high level of expertise in material and manufacturing technology.

The customer is our top priority. We stay in constant communication with our users to ensure that all of our individual solutions and our unique standard range of wheels and castors meet their requirements. This experience, combined with our own "Made in Germany" manufacturing facilities, guarantee one thing: "we innovate mobility".

- more than 1,000 employees worldwide, over 750 of which are based at the headquarters in Rosenfeld, Germany
- 18 Blickle sales subsidiaries in Europe, North America, Asia and Australia
- Sales partners and representative offices in over 120 countries worldwide
- DIN EN ISO 9001, DIN EN ISO 14001 and DIN EN ISO 50001 certified

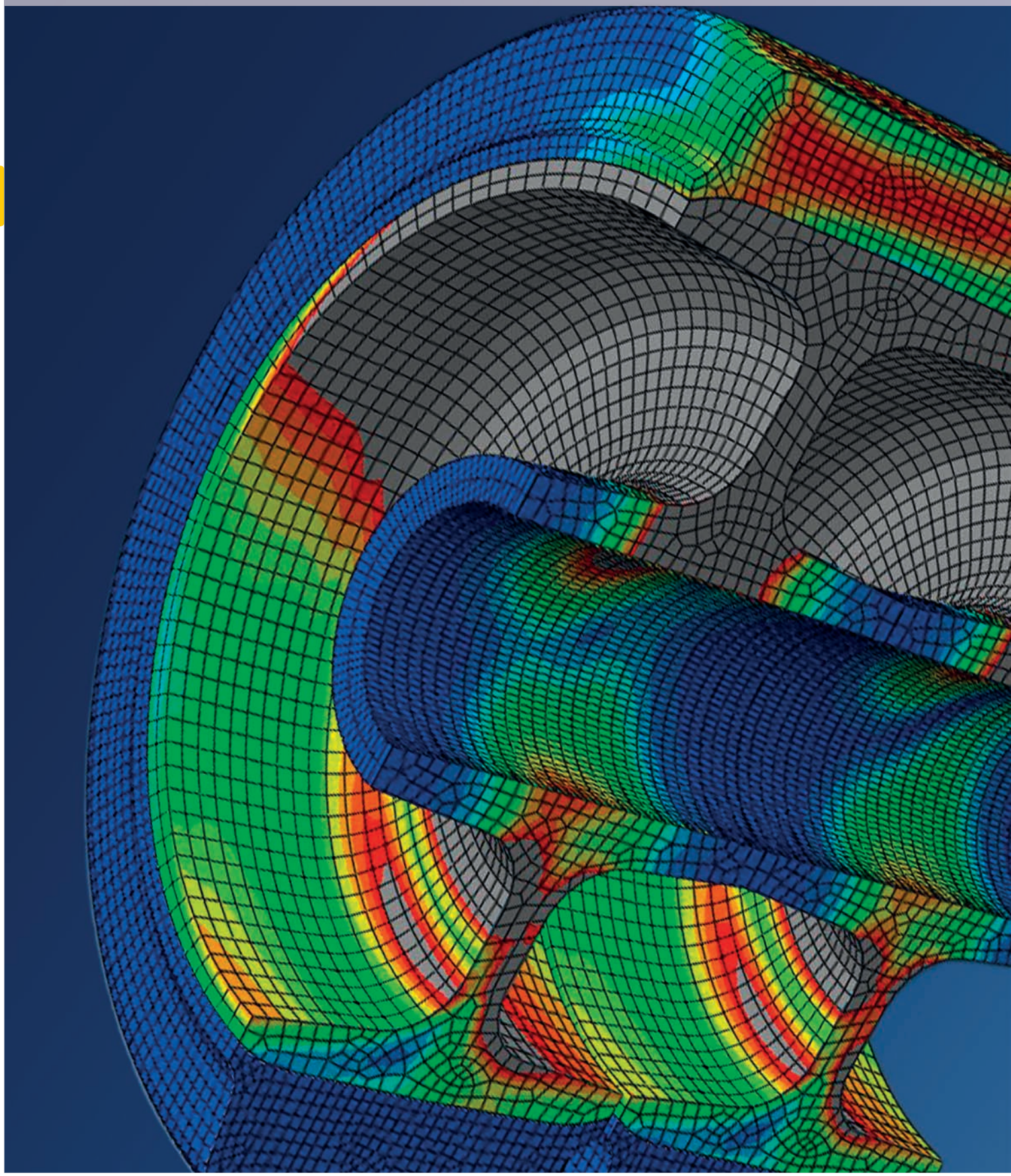
As a family company, Blickle values continuity. Dr. Sarah Blickle-Fenner and David Blickle are the third generation of the family to be involved in the company, along with Reinhold and Denise Blickle.

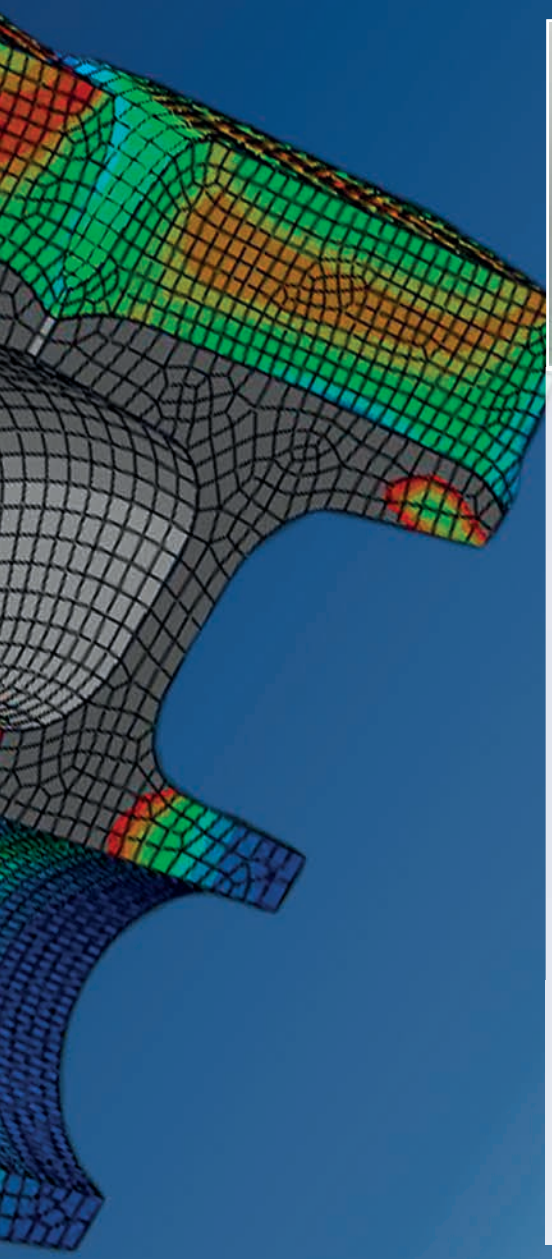
1

Our headquarters are in Rosenfeld, Germany. This demonstrates our commitment to quality and to products “Made in Germany”.

Our expertise.

Research and development in polyurethane.



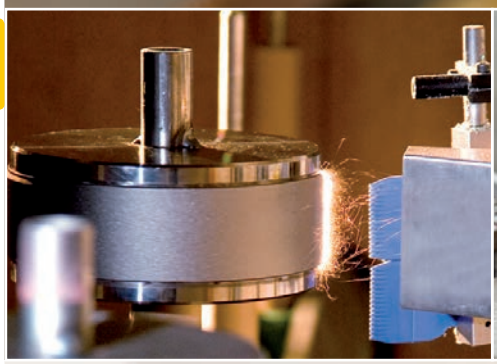


Extensive expertise in material development and continuous research into new polyurethane tread materials.

The formula of the polyurethane material and how it is processed are the most important factors affecting the quality of the end product. They have a significant impact on tread and tyre hardness, rebound resilience, abrasion, load capacity, rolling resistance and flexibility at low temperatures. That's why Blickle has become a polyurethane expert over the last few decades. Blickle developers improve existing formulas and designs on a daily basis in cooperation with renowned scientific institutes whilst using state-of-the-art methods to get new ideas moving. In addition to the individual properties of the different polyurethane elastomers, their adhesion to the wheel centre is also a very important quality feature. For this reason, Blickle tests wheels and their treads extensively during the development phase. This ensures a consistently high level of quality. In addition to state-of-the-art methods like linear and non-linear FEA calculations, the engineers in the test laboratory have numerous test facilities at their disposal. This is one of the reasons why Blickle became the first German wheel and castor manufacturer to be certified according to DIN EN ISO 9001 in 1994.

Our expertise.
Manufacturing of polyurethane wheels.

2



To produce high-quality polyurethane, you need the right formula and the correct processing techniques. That is why Blickle has worked hard to become a materials specialist.

Blickle polyurethane wheels are **based** on high-quality steel, cast iron, aluminium or nylon wheel centres. These are sandblasted and laser treated using computerised systems to achieve a roughened and 100 percent clean surface. This ensures that the tread adheres securely to the wheel centre. It also protects the environment by removing the need for large quantities of solvents or caustic agents.
The primer forms **the connection** between the wheel centre and the tread. This is applied evenly by fully automatic systems and creates a highly stable chemical bond between the two components. One important step in the process is the activation of the primer. That's why the wheel centre is heated before casting to ensure optimum adhesion.
The polyurethane tread is cast using digitally monitored machines in a low-pressure casting process. Precise quantities of additives such as colour pigments or antistatic agents are added to suit the formula. The casting process is monitored continuously by pressure and temperature sensors. Once the preheated casting moulds are filled, they are conveyed into the casting furnace and then annealing furnaces. The wheels are post-cured over several cycles at a defined temperature and humidity level, which ensures the optimum cross-linking of all components in the polyurethane.
The finishing process after the wheels have cured includes the automatic and careful removal of the excess cast material and a 100 percent adhesion test of all finished wheels.

Polyurethane materials.
Overview of treads.

Treads for every application.
Extrathane®, Softhane®, Besthane®, Besthane® Soft, Vulkollan®.

Blickle has developed four different types of polyurethane, tailor-made for various applications. The Extrathane®, Softhane®, Besthane® and Besthane® Soft treads are the result of decades of experience and expertise. This range is rounded off by wheels made of the equally high-quality polyurethane material Vulkollan®. With this selection of materials, Blickle's standard range provides the right solution for almost every application and requirement. The range also includes special polyurethanes for high dynamic and mechanical loads as well as conductive and rolling resistance-optimised designs. All treads provide a consistently high level of quality, wear resistance and durability.

Polyurethane product range:
- load wheels, drive wheels, swivel and fixed castors, guide rollers, stacker wheels, pallet truck rollers and spring-loaded castors
- tread made of reaction-injected polyurethane elastomer from 75 to 96 Shore A
- wheels in sizes from 25 to 1,000 millimetres in diameter
- load capacity up to 100 tons per wheel

Made of VULKOLLAN®

Blickle Extrathane®

- hard reaction-injected polyurethane-elastomer based on polyesterpolyol, diisocyanate and diol
- combines many advantages (e.g. high load capacity, floor surface preservation, operational comfort), and therefore is suitable for many applications
- low rolling resistance
- resistant against many aggressive substances, but not against hot water and hot, humid air
- antistatic version available
- **commonly used for:** Intralogistics, mechanical and systems engineering, mobile devices and equipment

Blickle Softhane®

- soft reaction-injected polyurethane-elastomer based on polyesterpolyol, diisocyanate and diol
- particularly thick and elastic tread
- very high floor surface preservation and smooth rolling performance
- low rolling resistance
- resistant against many aggressive substances, but not against hot water and hot, humid air
- antistatic version available
- **commonly used for:** Intralogistics, mobile devices and equipment

Polyurethane materials.
Overview of treads.

Blickle Besthane®

- hard reaction-injected polyurethane-elastomer based on polyetherpolyol, diisocyanate and diol
- very low rolling resistance and easy manoeuvrability
- high dynamic load capacity
- hydrolysis resistant and also resistant to many aggressive substances
- **commonly used for:** Automated guided vehicles, conveyor technology, mechanical and systems engineering, hygiene

ergonomic product
tested and recommended by IGR Institut für Gesundheit und Ergonomie
www.igr-ev.de

Blickle Besthane® Soft

- soft reaction-injected polyurethane-elastomer based on polyetherpolyol, diisocyanate and diol
- particularly thick and elastic tread
- very high floor surface preservation and smooth rolling performance
- very low rolling resistance
- high dynamic load capacity
- hydrolysis resistant and also resistant to many aggressive substances
- **commonly used for:** Intralogistics, Automated guided vehicles, conveyor technology, mechanical and systems engineering, hygiene

ergonomic product
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Made of VULKOLLAN®

- hard reaction-injected polyurethane-elastomer based on polyesterpolyol, diisocyanate and diol
- low rolling resistance
- high dynamic load capacity
- resistant against many aggressive substances, but not against hot water and hot, humid air
- **commonly used for:** Automated guided vehicles, conveyor technology, mechanical and systems engineering

Blickle®

Polyurethane materials.
Facts & figures at a glance.

Polyurethane material	 Blickle Extrathane®	 Blickle Softhane®	 Blickle Besthane®	 Blickle Besthane® Soft	 Vulkollan®
Technical data					
Hardness	92 Shore A	75 Shore A	92 Shore A	75 Shore A	92 Shore A
Abrasion resistance	40 mm^3	45 mm^3	40 mm^3	50 mm^3	40 mm^3
Rebound resilience	42 %	57 %	65 %	75 %	52 %
Rolling resistance	0,9 %	1,0 %	0,7 %	0,8 %	0,9 %
Tensile strength	48 N/mm^2	44 N/mm^2	46 N/mm^2	40 N/mm^2	50 N/mm^2
Breaking elongation	510 %	520 %	650 %	700 %	615 %
Maximum speed	16 km/h	16 km/h	25 km/h	25 km/h	25 km/h
Application					
High loads	■■■	■■□	■■■	■■□	■■■
Dynamic load capacity (high load at high speed)	■■□	■■□	■■■	■■□	■■■
Continuous use	■■□	■■□	■■■	■■■	■■■
Operational comfort/floor surface preservation	■■□	■■■	■■□	■■■	■■□
Long immobile periods under heavy loads (see compression set)	■■□	■■□	■■■	■■■	■■□
Flexibility at low temperatures	■□□	■□□	■■□	■■□	■□□
Resistance to chemical substances and UV radiation	■■■	■■■	■■■	■■■	■■□
Hydrolysis resistance	–	–	✔	✔	–
Antistatic versions	✔	✔	–	–	–

■■■ very good ■■ good ■ limited – no ✔ yes

Made of VULKOLLAN® VULKOLLAN® is a registered trademark of Covestro Group

Hardness (DIN 53505 / ISO 868):
Hardness has a relevant impact on the smooth rolling performance and operational comfort of a wheel. A soft tread also has a positive effect on ground pressure.

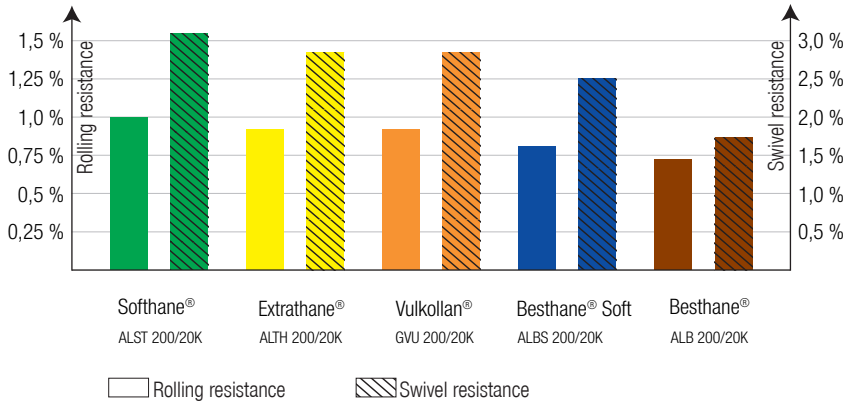
Rebound resilience (DIN 53512 / ISO 4662):
Rebound resilience indicates how much energy is lost through internal friction during the compression/rebound process. The higher the value, the lower the losses and the lower the rolling resistance.

Compression set (DIN 53517 / ISO 815):
Compression set is a measure of the flattening of a wheel under load when it is immobile for a long period.

Resistance to hydrolysis:
Many polyurethanes are not resistant to hydrolysis and are attacked and damaged by water and high levels of air humidity. In order to simulate these conditions, Blickle wheels are exposed to temperatures between Arctic cold and tropical heat and tested in a special climatic chamber.

Flexibility at low temperatures:
The rigidity and hardness of polyurethanes at temperatures below -10 °C increase erratically. The elasticity of the material is greatly reduced at these temperatures. Cold elastic polyurethanes remain elastic and felixble down to -30 °C.

Comparison of the rolling and swivel resistance of different polyurethane wheels (wheel Ø 200 mm)



Rolling resistance is the force required to keep a wheel in uniform motion. It is influenced by wheel diameter, tread geometry, tread hardness, rebound resilience, the wheel bearing and the ground.
Swivel resistance is the resistance required to align swivel castors in the direction of travel. These values refer to tests performed with items in new condition under laboratory conditions with a load of 300 kilograms and an identical swivel bracket.

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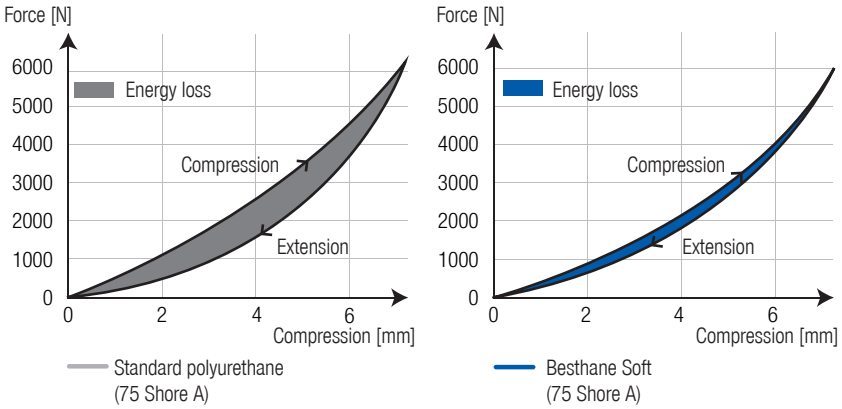
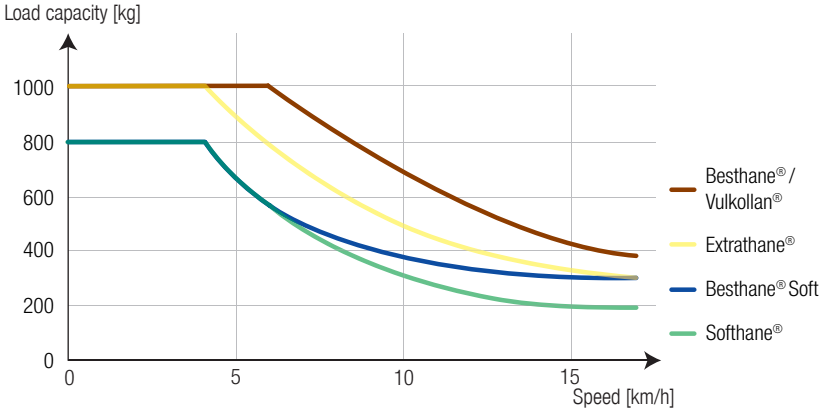
Effect of tread elasticity on rolling resistance (wheel Ø 200 mm)



In contrast to conventional polyurethane wheels of the same hardness, Besthane® Soft wheels have a significantly higher rebound resilience, which is why the energy loss (hysteresis) during the rolling of the wheel is significantly lower (reduction of around 30 percent). Due to the reduced energy loss of the wheel, Blickle polyurethane wheels have very low rolling resistance.

Effect of speed on load capacity (wheel Ø 200 mm)



The load capacity of the tread materials decreases at higher speeds as they get hotter. The higher the rebound resilience of a material, the less the tread heats up during dynamic operation. In addition to heating, the hardness of the tread, compressive strength and ground conditions have an influence on dynamic load capacity.

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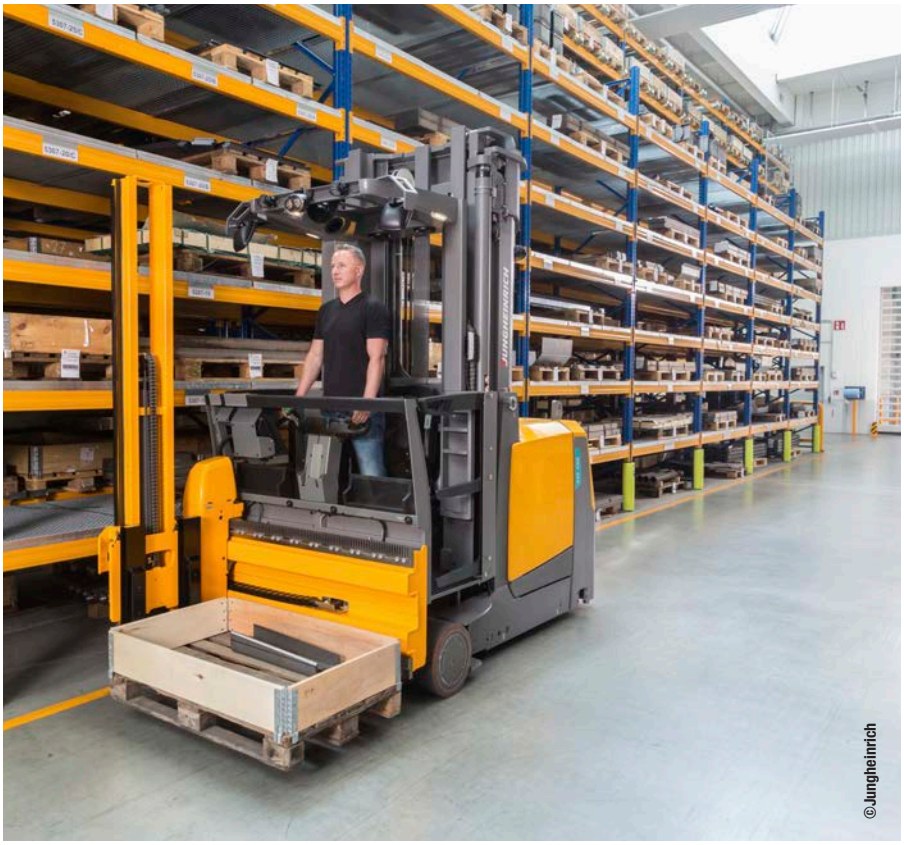
Applications.
Intralogistics.

4



Companies around the world are facing new challenges such as the development of new technologies. This is especially true for companies in the intralogistics industry. Blickle wheels and castors are used in many processes to ensure that the material flow within a company is efficient, safe and reliable. Typical applications include forklift trucks, rack feeders, conveyor systems, tugger trains, transport trolleys, floor rollers and sorting systems.
The demands placed on wheels and castors are extremely diverse, as logistical procedures vary greatly depending on the industry and production process. In principle, however, factors such as maximum reliability, floor surface preservation, operational comfort and ergonomics play an essential role. Wheels and castors with Blickle polyurethane treads meet these requirements worldwide.
Wheels with Softhane® and Besthane® Soft treads are ideally suited for applications where operational comfort, good support for the transported goods and significant noise reduction are required.

Applications.

Automated guided vehicles.

Industry 4.0, the megatrend of recent years, is the central topic when it comes to autonomous driving or automated guided vehicles (AGV). Multiple automated guided vehicles are frequently combined with a central control system to form a complete driverless transport system. These are used to transport both small and large carriers and facilitate automated logistics processes with a high level of efficiency and safety. This places the highest demands on wheels and castors in the smallest possible spaces. For example, the load capacity of a single automated guided vehicle can range from a few kilograms to several tons. Standard castors do not provide the high level of operational performance required as the units are often used in continuous operation. These operating conditions often require wheel tread designs that are specially optimised for AGV applications as well as wheel bearings designed for continuous operation.
Blickle offers a wide range of special solutions for every application in this field, from particularly compact swivel castors to wheels with special bearings and special tread geometries through to electromagnetically braked heavy-duty castors.

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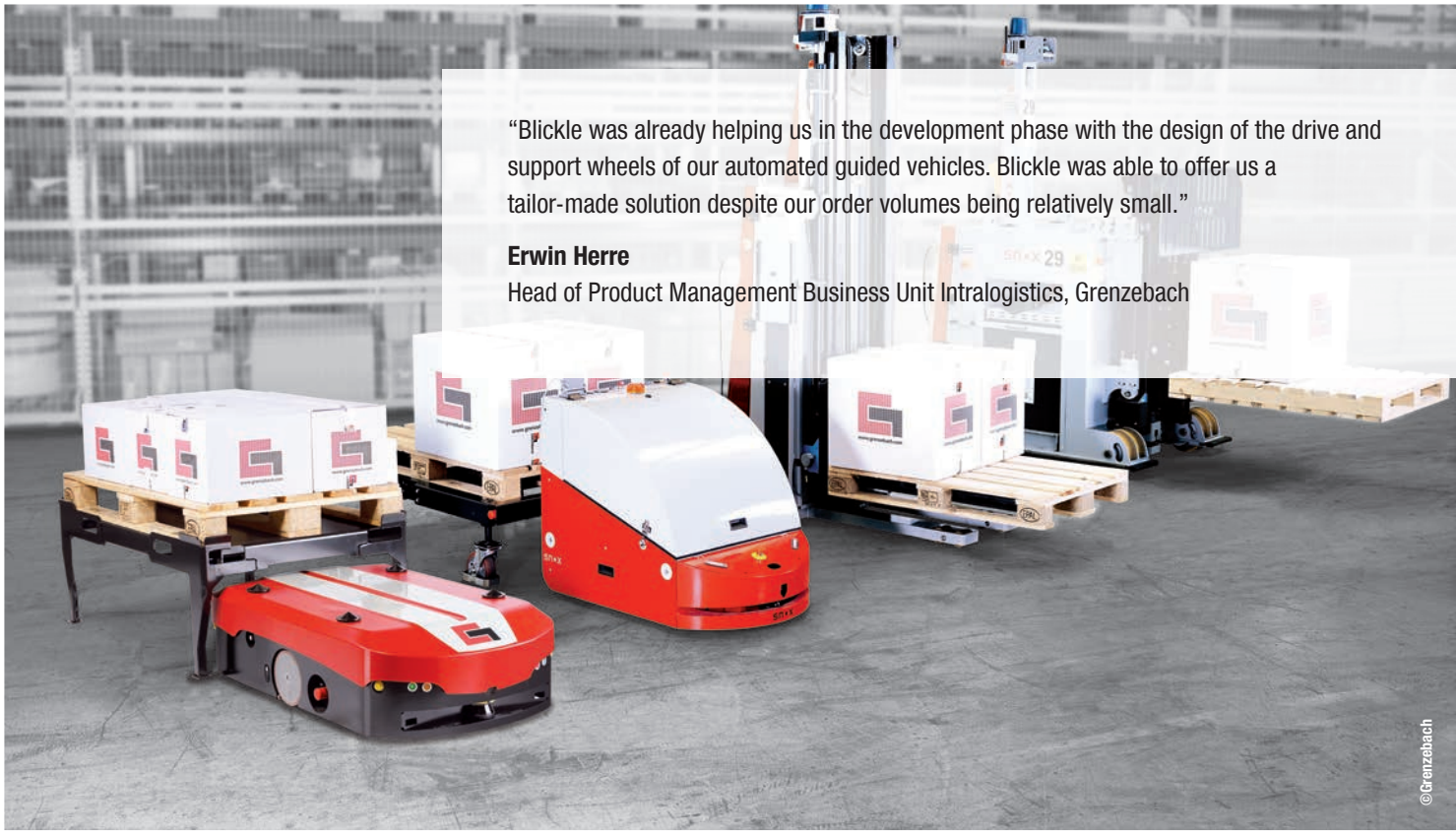
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"Blickle was already helping us in the development phase with the design of the drive and support wheels of our automated guided vehicles. Blickle was able to offer us a tailor-made solution despite our order volumes being relatively small."

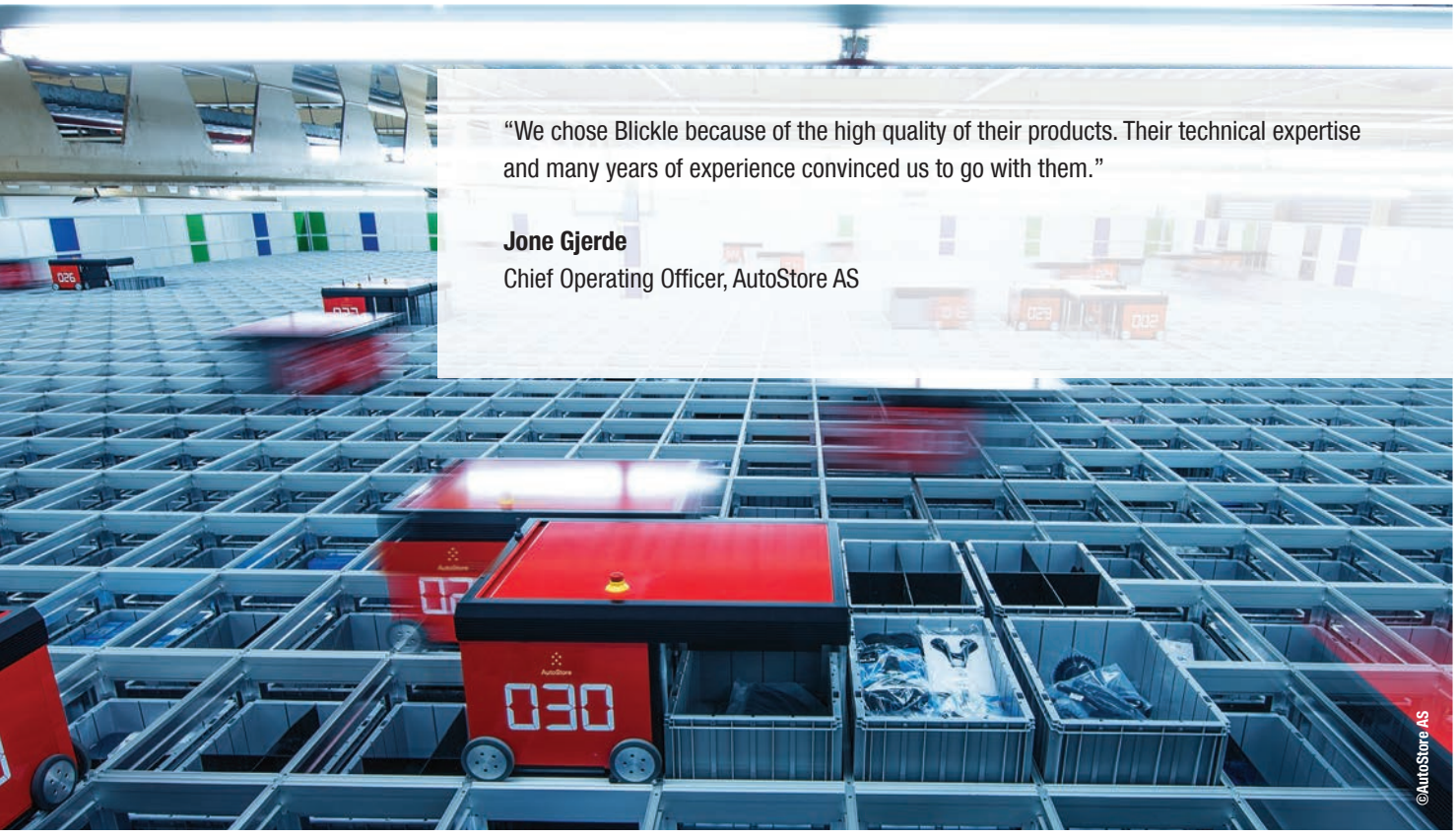
Erwin Herre
Head of Product Management Business Unit Intralogistics, Grenzebach

Applications.

Conveyor technology.

4

Blickle guide rollers are used worldwide in systems that transport people or goods (conveyor technology). The applications range from conveyor belts, sorting systems or overhead conveyors to storage and rack feeder systems.
In the field of conveyor technology, Blickle's standard and special solutions offer many ways to meet the often highly specialised requirements of conveyor systems. These can include special climatic conditions, long immobile periods and prolonged continuous operation, special wheel bearings or noise-reducing solutions. Low rolling resistances improve the energy efficiency of systems and help to meet environmental regulations. In order to meet the wide range of requirements for each application, guide rollers must be perfectly adapted to their intended use. With decades of experience, Blickle always finds the right wheel or castor in close cooperation with the customer.



"We chose Blickle because of the high quality of their products. Their technical expertise and many years of experience convinced us to go with them."

Jone Gjerde
Chief Operating Officer, AutoStore AS

Applications.
Mechanical and systems engineering.

Blickle wheels and castors have been used as components in different machines and systems for decades. Blickle designers and developers are therefore faced with the daily challenge of fulfilling special customer requirements and getting machines and systems moving. Blickle configures wheels and castors in all required special versions and dimensions in addition to providing its standard range. As a result, the wheels can be found in applications like machine tools, conveyor systems, production machines and production plants as well as construction equipment.

When it comes to mechanical and systems engineering, the requirements for wheels and castors usually involve high load capacities and maximum safety. Floor surface preservation and suspension also play an important role when transporting heavy goods.
To be able to absorb particularly heavy loads, Blickle offers castor versions with multiple wheels. Products with load capacities of up to 100 tons are available in the standard range.

4

Blickle®

Applications.
Hygiene / medicine / design.

4

Whether mobility in medical or food industry or everywhere, where up to date desing is needed – here the wheels and castors are demanded which meet highest hygienic standards or which harmoniously can be integrated into the endproduct due to their design.

The mostly humid environment in the food industry as well as the frequent cleaning with occasionally aggressive cleaning agents in the medical industry place extreme demands on wheels and castors. Both factors often cause corrosion in the brackets and wheel centres of standard castors. Most standard polyurethanes are affected and therefore get unusable quickly. The result is an increased risk of injury to employees and the contamination of goods or the environment.

With the hydrolysis resistant tread materials Besthane® and Besthane® Soft, Blickle has a wide range of products available for use in food production or medical facilities, including clean room castors.

Applications.

Mobile devices and equipment.

Mobility is an increasingly important topic in professional applications and a requirement for more and more devices nowadays. With mobile equipment, life becomes easier and processes more efficient and flexible. The applications range from transport equipment, sports equipment and beds for emergency services and healthcare to event equipment, shop furnishings, workshop equipment and mobile scaffolding. Wheels and castors are therefore subject to many different requirements; these can be met using castors ranging from simple light duty castors through to complex special solutions. Factors such as quiet and smooth operation, electrical conductivity and good manoeuvrability play a central role.
Thanks to its high-quality polyurethane treads, Blickle succeeds again in finding solutions together with its customers that provide the perfect combination of design, economy, safety and durability.

4

"For us, Blickle is synonymous with wheels and castors. Günzburger Steigtechnik uses solutions which combine high quality, added value and innovation. Blickle is a partner who is committed to these values and incorporates them into their products. This is the foundation of our successful partnership. We are thrilled to have found in Blickle an innovative partner who meets all of our varied requirements."

Ferdinand Munk
Managing Director, Günzburger Steigtechnik

Standard product or a individual configuration?
There is always the perfect solution.

The challenge is called customer requirements. Blickle is creative and invents new solutions every day.

Blickle's aim is to develop the perfect castor and the best possible wheel for every application. Blickle can develop special designs for a customer if they cannot find what they are looking for in the standard range: Blickle's expert teams consist of experienced designers, chemists and test engineers who know how to create perfect products to meet customer requirements.

Blickle can create the ideal wheels for every application by adapting individual process parameters or the formula to optimise the required properties: flexibility over a wide temperature range, high wear resistance, pressure and tear resistance, good resilience, dynamic load capacity, hydrolysis resistance and resistance to weather, oil, grease and solvents. The sophisticated combination of efficient mass produced series and highly flexible, small-scale production abilities allow to develop custom solutions in a quick and cost-effective manner.

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