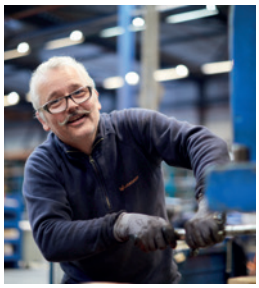
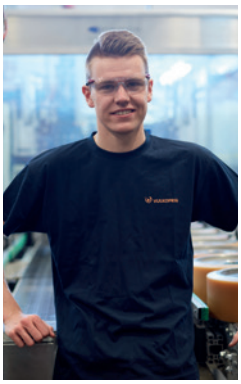
Best of Vulkoprin

55 YEARS
VULKOPRIN
QUALITY IN MOTION











Passion for polyurethanes

For 55 years now, Vulkoprin has been designing and producing a full range of polyurethanes that meet the requirements of the most demanding technical applications. For the production of high-quality wheels, guiding rollers, tyres and technical moulded parts, Vulkoprin uses only the finest raw materials and can rely on a passionate team of experienced people. Read the story of our Wheel Team.

55 years wheel team

‘60s

1964 Start up Vulkoprin
1964 Vulkollan® licence

‘70s

1972 Move to Herderstraat in Tielt
1973 Start up Vulkoprin Deutschland in Minden

‘80s

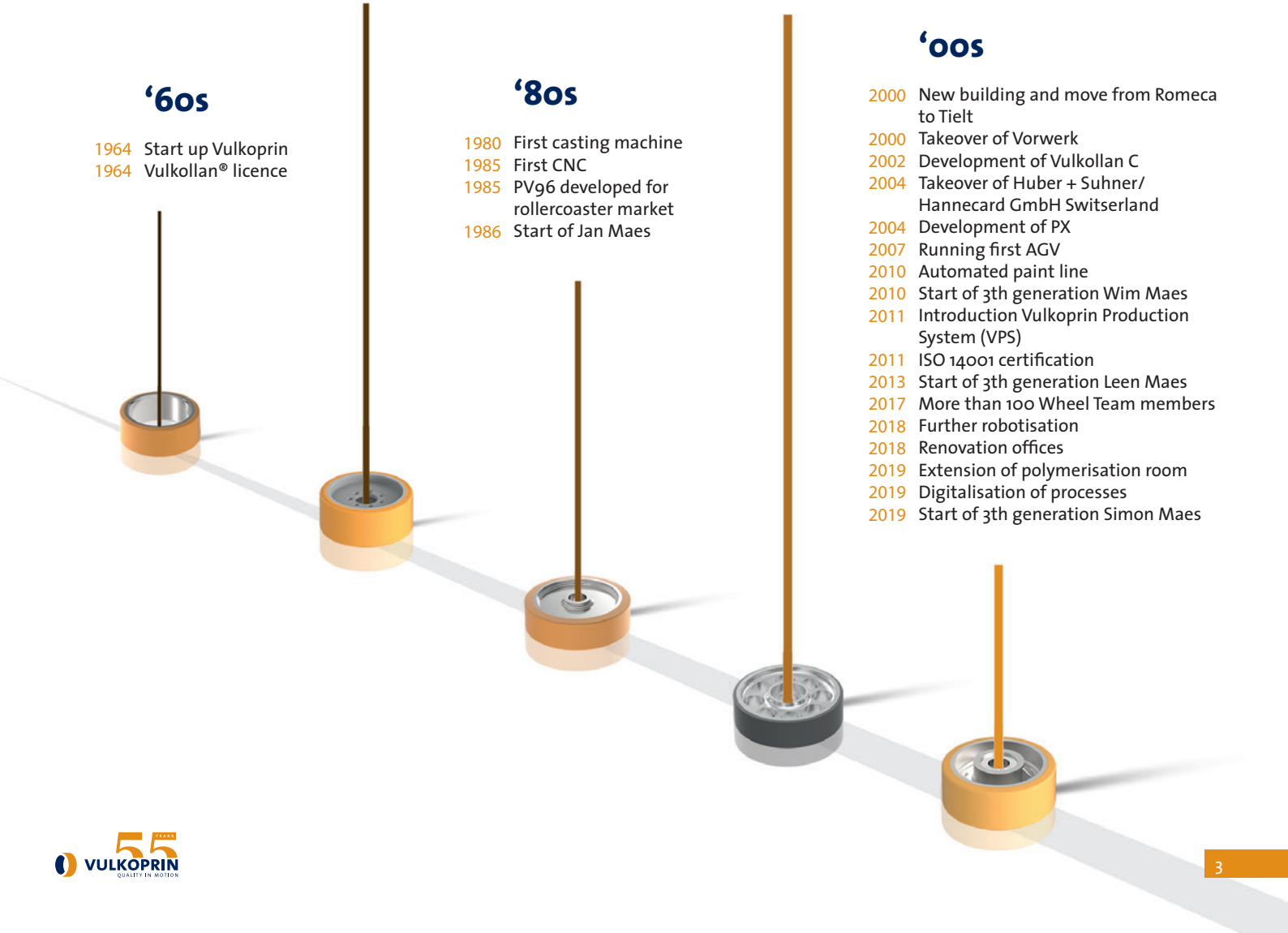
1980 First casting machine
1985 First CNC
1985 PV96 developed for rollercoaster market
1986 Start of Jan Maes

‘90s

1990 Start of Bert Maes
1990 Introduction of CAD
1994 Takeover of Romeca
1994 2nd production line
1995 First welding robot
1995 First ISO 9001 certificate
1996 Move to 3D CAD

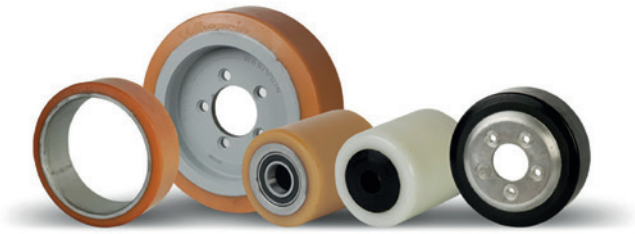
‘00s

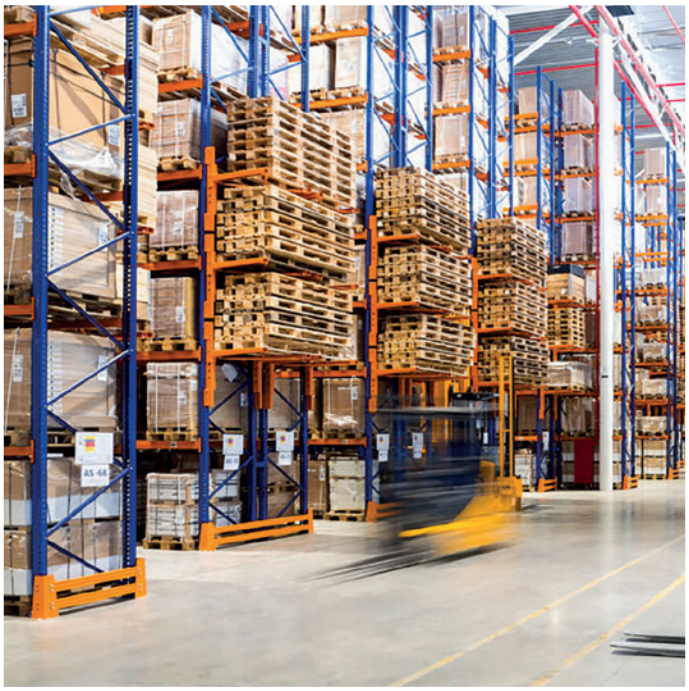
2000 New building and move from Romeca to Tielt
2000 Takeover of Vorwerk
2002 Development of Vulkollan C
2004 Takeover of Huber + Suhner/ Hannecard GmbH Switserland
2004 Development of PX
2007 Running first AGV
2010 Automated paint line
2010 Start of 3th generation Wim Maes
2011 Introduction Vulkoprin Production System (VPS)
2011 ISO 14001 certification
2013 Start of 3th generation Leen Maes
2017 More than 100 Wheel Team members
2018 Further robotisation
2018 Renovation offices
2019 Extension of polymerisation room
2019 Digitalisation of processes
2019 Start of 3th generation Simon Maes



Material handling industry

Polyurethanes featuring high loading capacity, low rolling resistance, low permanent set and high tear strength over a broad temperature range. Vulkoprin designs and manufactures a complete range of NDI drive and load wheels for **forklifts, AGVs (Automated Guide Vehicles), stacker cranes, shuttles and heavy-load transporters**. Automated processes and optimal polymerisation guarantee zero bond failures and wheels of the highest quality. Single source responsibility is guaranteed from the selection of the materials for the wheel right through till final assembly.



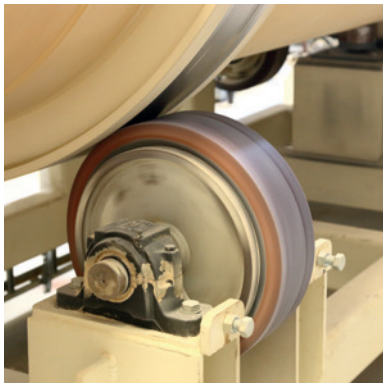


Machinery industry

Reliable performance and a maximum life span are the main differentiators of Vulkoprin wheels in machine design. Optimal mechanical properties, reduction of vibrations, wear resistance and chemical protection are only some of the elements of the dedicated wheel assemblies tailored to individual customer needs. In-house engineering & testing makes Vulkoprin the ideal partner for any OEM. Vulkoprin is e.g. a global expert in wheels for tunnel boring machines (see photo). Other applications are showcased on page 10.

Theme park industry

Reliable partner for amusement parks and ride manufacturers. The use of top-quality materials such as Vulkollan and Printhane-X™ withstanding high loads, high speeds, abrasion and deformation guarantees high safety, less standstill and less maintenance. Maximal fun for visitors thanks to a perfect combination of low rolling resistance, high loading capacity and minimal heat build-up. Quality assurance is our top priority. Standard incoming and outgoing inspection procedures along with individual wheel marking for traceability, guarantee the safety of the Vulkoprin amusement ride wheels. As a manufacturer, Vulkoprin can offer specialized technical advice and support.



Maintenance & repair

One-stop shopping for various standard and custom-made wheel solutions.
Stock of leading brand apparatus wheels and light-duty castors.
Extensive range of wheels in different materials. Stable and uniform product range that guarantees both technical and long-term consistency.

Technical parts

High-quality polyurethanes are also used to design and produce high wear-resistant materials as a solution for automotive assembly lines, such as positioning elements, bit protection for compressed air tools for point protection and manipulators. Elastic material for couplings, moulding cushions for pressing and bending activities. Shock absorbers sheets for cleaning machines, conveyor belts, snow-plough blade protectors and linings in sand-blast cabins. Also semi-finished articles such as round, square, rectangular and tubular bars ready to be sawn, drilled, turned or milled on normal metalworking machines. All possible applications can be designed and customised. Examples are scrapers, slide pads, concrete mixers or separating elements for the concrete industry (see photo).

Products

Discover a wide range of wheel- and technical parts solutions. Vulkoprin can deliver worldwide standard and customised wheels. Select your product category on our website (www.vulkoprin.be/products) and download the online catalogue to view a table of products. An interactive website with multiple search attributes is also available. The Vulkoprin CAD Service allows you to integrate our standard products into your design and construction process. At Trace parts (www.traceparts.com/vulkoprin), multiple drawings in 2D/3D are available for FREE download.

Forklift wheels

Drive wheels and guiding rollers

Customised solutions

Wheel rebonding service

Wheels for rollercoasters

Industrial & heavy-duty wheels & castors – polyurethane & Vulkollan®

Industrial & heavy-duty wheels & castors - polyamid

Industrial & heavy-duty wheels & castors - rubber

Stainless steel & heat-resistant castors

Apparatus and furniture castors

Glass transport rollers and ball castors

Technical parts

Applications

For superior all-weather performance, our water- & oil-resistant wheels feature anti-corrosion protection. Shock-absorbing wheels reduce drum vibrations to a minimum and provide many years of proven performance in the food and waste industry. Optimal mechanical properties and a proven bonding agent are reflected in Vulkoprin's heavy-load wheels, thus guaranteeing reliable performance and a maximum life span. Wheels made from a higher Shore hardness in steel-welded, heavy-duty castors offer minimal rolling resistance combined with an extremely high loading capacity, e.g. in docking platforms. The wheels used in industrial lifts, elevators and escalators provide shock-absorbing (cable) guidance and an extremely high wear resistance. Custom-made wheels made from Vulkollan® reduce vibrations in chunking on conveyors and carrousels. We offer customised wheels made from Vulkollan® for chain conveying, e.g. for potato harvesters. As a Vulkoprin brand, Romeca is patent holder of the first ball castor designed expressly for horizontal glass transport and has been a market leader in this niche for many years. Vulkoprin also offers Vulkollan® glass & transport rollers for wear-resistant and non-marking glass applications.

stacker cranes

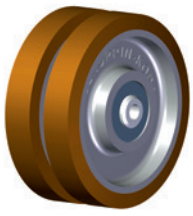
Fast-moving stacker cranes equipped with drive- and guide wheels made of Vulkollan®.

water treatment

Water treatment equipment runs on drive wheels made of Vulkollan® with anticorrosion protection.

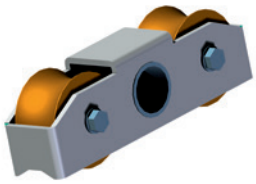
industrial gates

Custom-made groove wheels for industrial gates.



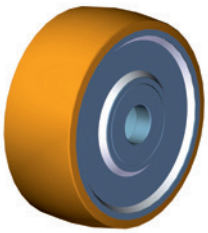
industrial lifts

Easy assembly with concave guide rollers for fitting steel cable in industrial elevators.



heavy load transport

Handling of extreme loads with wheels made of Vulkollan®.

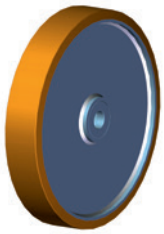


rollercoasters

Leading manufacturer in Europe for high-speed rollercoaster wheels.

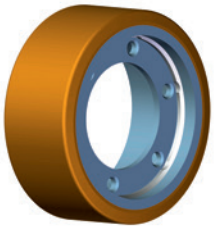
lift trucks

Heavy-load, 4-way sideloader in the glass industry with wheels from 0 - 1100 mm.



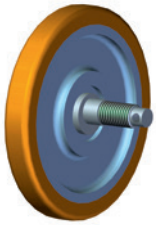
automated guided vehicles

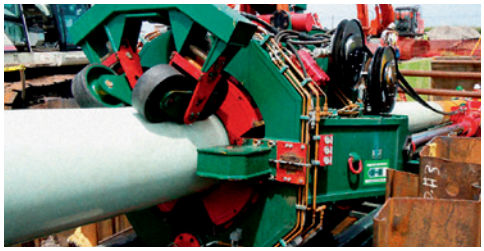
Drive wheels for AGV.



elevators

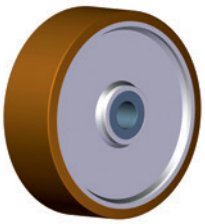
Guide rollers made of Vulkollan® with an excentric shaft for elevators.





tunnel drilling

Heavy-load guiding wheels for tunneling and pipelines.

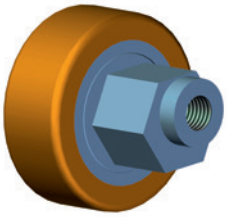


filter installations

Tilting pan filters use antihydrolysis wheels made of Vulkollan® for phosphate washing.

baggage handling

Baggage handling with precision guide rollers in airports.

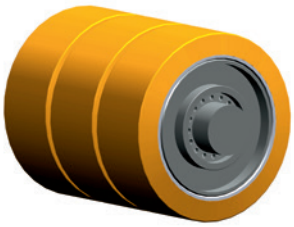


screening drums

Rotating screening drum with heavy-load drive wheels made of Vulkollan®.

cooling drums

Cooling drum with drive wheels made of Vulkollan® in cast iron manufacturing.

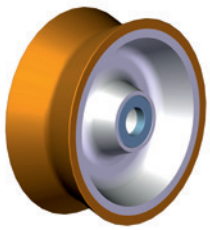


potato harvesting

Wheels made of Vulkollan® for chain conveying in potato harvesting.

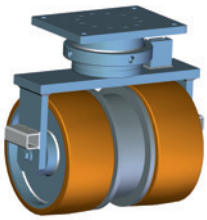
harbour cranes

Concave-shaped guide wheels for cables in harbour cranes.



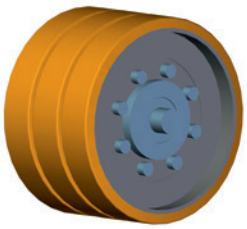
docking station

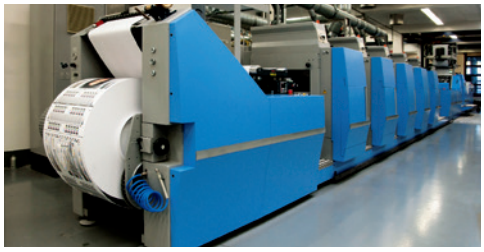
Triple swivel castors for docking systems in airports.



tumblers

Tumblers with drive wheels made of Vulkollan® in the meat industry.



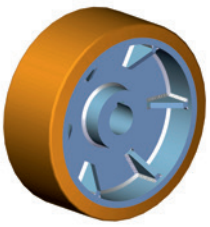


graphic printing

Adaptable swivel castors for print finishing equipment.

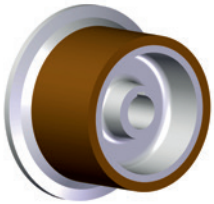
waste treatment

Steel welded wheelcentre made of Vulkollan® for waste sorting equipment.



automotive solutions

Skid rollers made of Vulkollan® for automotive conveying systems.



The perfect wheel choice

Wheel & Castor

A wheel is made out of a tread tyre, rim and wheel bearing. It's that simple. A wheel becomes a castor by installing the wheel in a housing. Depending on the type of housing, the result is a swivel castor or a fixed castor. The swivel castors can be rotated thru' 360° by using a ball bearing-mounted swivel bearing, ensuring good manoeuvrability. The fixed castors, in contrast, cannot rotate and are fixed in place, and ensure good directional stability. In most cases, 2 swivel castors and 2 fixed castors are affixed.

Bearing

Plain bearing
Simple, largely maintenance-free bearing. Shock- and impact resistant. Suitable for use in damp environments. For low-speed devices (max. 4 km/h) and for short distances.

Ball bearing
Sturdy, hardwearing, largely maintenance-free bearings. Low bearing friction. Shock- and impact resistant. Permanent lubrication. The most frequently used bearings for low-speed devices (max. 4 km/h). Smoother rolling compared to plain bearings.

Precision ball bearing
For speeds of up to 20 km/h and heavier loads. Low rolling resistance when in use.

The choice of wheel and castor primarily depends on:

1. The loadbearing capacity required
How much does a wheel/castor has to carry?
The loading capacity of a castor can be calculated using the following rule of thumb:

loading capacity = inherent weight + max. load / 3

It is divided by 3 because on uneven flooring, even an item of equipment with 4 castors will only have 3 castors in contact with the floor, and these 3 then carry the full weight.

This is a very general way to determine the loadbearing capacity. Ask your supplier for a detailed calculation.

The loading capacities specified in our product range for wheels and castors apply for speeds of up to 4 km/h and an ambient temperature of 10°C to 60°C.

2. The floor conditions
Is the floor rough or smooth? Is the floor covered in tiles, concrete, or is it heavy-duty industrial flooring?
In general, on smooth industry floors, you can use harder wheels (thin tread) while, on rough industry floors, soft wheels (thick tread) are better performing.
Choose non-marking castors if you wish to avoid leaving rubber tread marks. If there are ground sills, extra loadbearing capacity must be factored in.
Choose wheels with plain bearings and a stainless steel housing in food production areas or on wet surfaces.

3. The frequency of use
Is the equipment moved only on occasion, or all the time?

4. Environmental factors (temperature, including temperature fluctuations, chemicals, moisture and hygiene requirements)
Every site of use involves specific requirements. Moisture, cold, heat, temperature fluctuations, electrical conductivity and chemicals all affect the durability, rolling properties or the smoothness of motion.

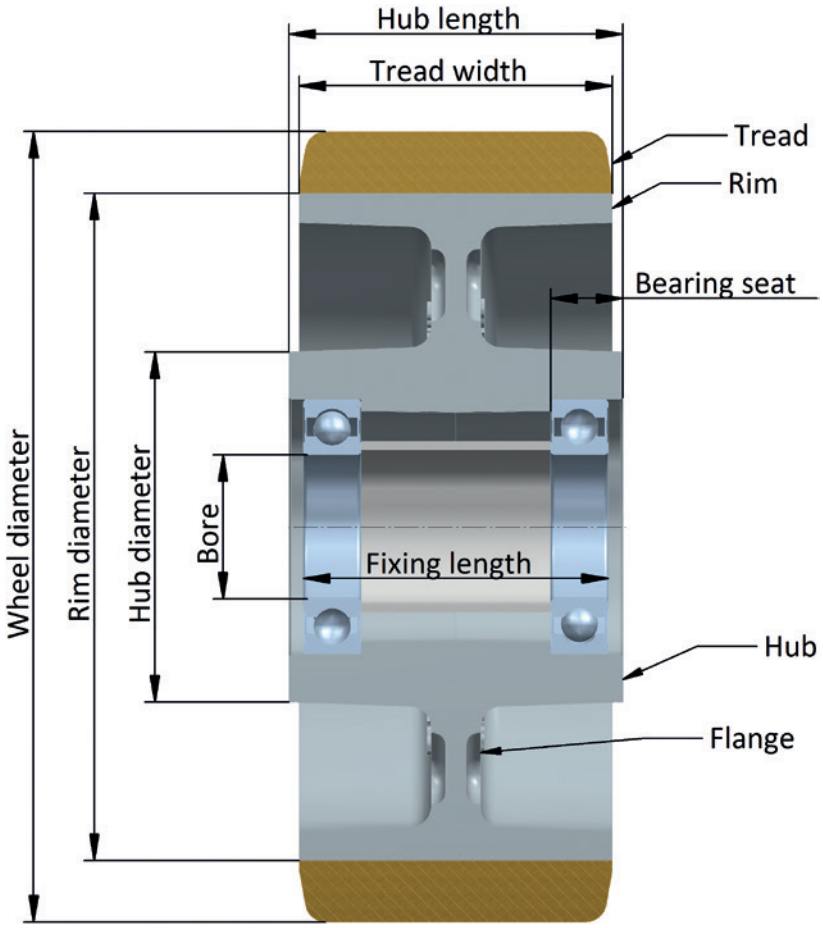
5. Comfort
You can also choose the required level of comfort and smoothness. The material of the wheels determines the rolling properties and ride comfort.

- Solid rubber rolls smoothly and silently. The strength and load capacity are limited however.
- Polyamide is shock- and impact resistant, chemically resistant and hard-wearing. On the other hand it is a non-elastic material.
- Polyurethane is extremely wear resistant, noise absorbing and has excellent rolling properties thanks to its elasticity.

6. Specific dimensions such as wheel diameter, overall height and hub length, or plate sizes and assembly hole spacing for castors
See photos on page 15, 16, 17 and the symbols on page 18.

Wheel definitions

The oldest wheel found in archeological excavations was discovered in what was Mesopotamia and is believed to be over 5,500 years old. It was not used for transportation, though, but rather as a potter's wheel. The combination of the wheel and axle made possible early forms of transportation, which became more sophisticated over time with the development of other technologies. The wheel is not like the telephone or the light bulb, a breakthrough invention that can be credited to a single (or even several) inventors. There is archaeological evidence of wheels dating back to at least 5,500 years ago, but no one knows exactly who invented them. Wheeled vehicles appeared later in various areas across the Middle East and eastern Europe. The invention of the wheelbarrow—a one-wheeled cart used to transport goods and raw materials—is usually credited to the ancient Greeks. However, earlier evidence of wheeled carts has been found in Europe and China. The wheel made the transportation of goods much faster and more efficient, especially when affixed to horse-drawn chariots and carts. ... Tens of thousands of other inventions require wheels to function, ranging from water wheels that power mills to gears and cogs that allowed even ancient cultures to create complex machines. Today Vulkoprin is developing and producing wheels and castors for industrial use, offering thé optimal wheel for every application. The use of superior materials and more than 55 years of experience guarantee e.g. high loading capacities while preserving expensive industrial floors or tracks.



Wheel diameter
Outer diameter of the wheel.

Tread width
Width of the wheel measured on the tread material.

Bore diameter
Internal diameter of the wheel, this determines on which axle diameter the wheel fits.

Hub length
Width of the hub of the wheel. Can be smaller, bigger or the same as the tread width.

Fixing lenght
Width of the bearing assembly (includes bearings, flange joints, thread guards,...).

Hub diameter
Outside diameter of the hub.

Rim diameter
Outside diameter of the wheel center (without the tread).

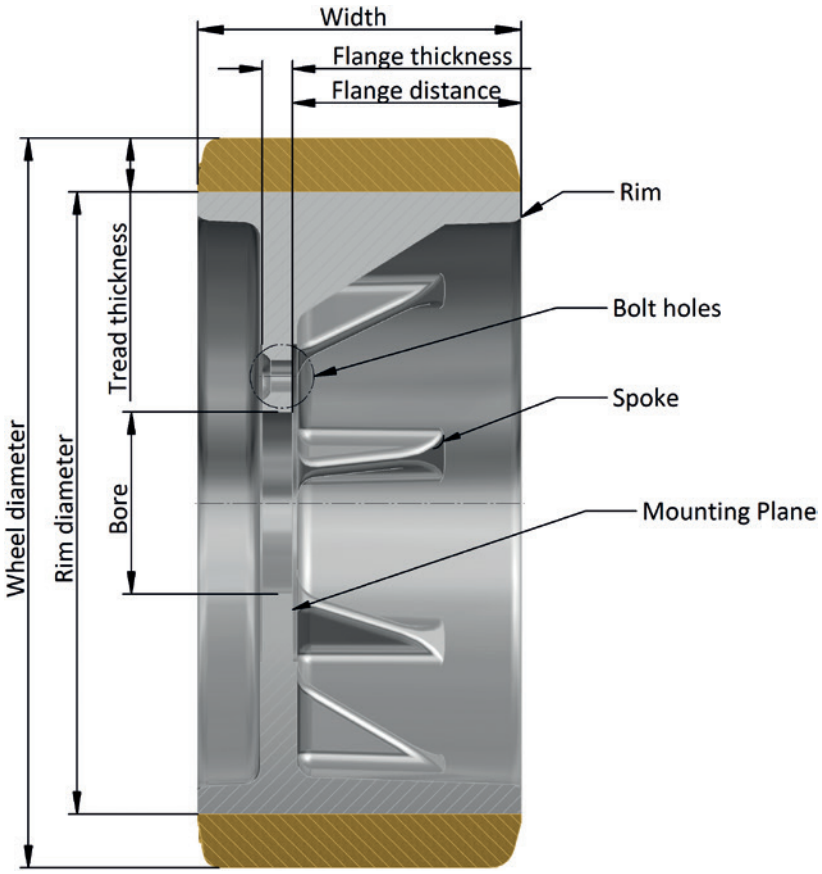
Overall height
The total vertical distance from the floor to the top of the mounting plate/base of the castor stem.

Bearing
Machine element that constrains relative movement to the desired motion and reduces friction between moving parts.

Clamping busch
Machine element to transfer power of a motor to the wheel without need for a press.

Keyway
Machined groove running the length of the bore, to transfer power of a motor to the wheel.

Plain bore
Hole in the wheel where an axle can be pressed through.



Wheel with a cast iron or steelwelded centre and elastic, firmly bonded tyre in VULKOLLAN® 92° Shore A.
Available with H7 bore and keyway.

Options: tapered bushing, keyway P9, without keyway, stop screw, grooves on tread, electrically conductive, corrosion resistant treatment of the wheel centre, hydrolysis resistant treatment of the tyre.

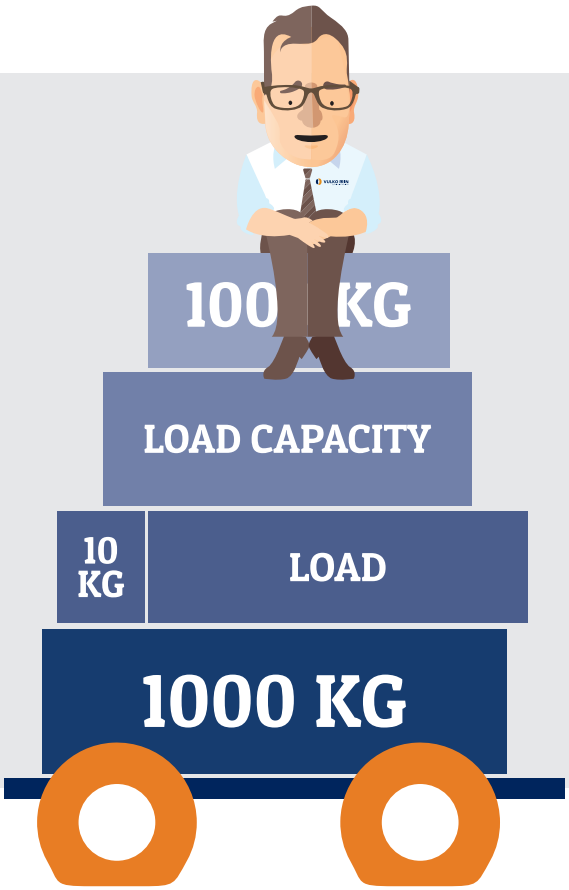
Alternative Shore hardnesses available on request for more traction or load capacity.

Applications: conveyors, drive units, drums, wastewater treatment,...

Attributes

	Overall height
	Diameter central bolt hole (metric)
	Coverage expander fitting
	Dimension centre (diameter x width)
GG	Cast iron wheelcentre
SG	Steel welded wheelcentre
	Outside diameter of pallet roller / cylindrical tyre
	Width of pallet roller
	Bearing seat
	Inner diameter of cylindrical tyre
	Width of cylindrical tyre
	Inner diameter of cylindrical, teeth-fitting tyre
	Type of tread
	Electrically conductive
	Outside diameter of conical tyre
	Width of conical tyre
	Center and side split degree
	Inside diameter of conical tyre
	OEM part N°
	Inch dimensions
FL	Flat tread
GL	Profiled tread
km	Symmetric
ks	Asymmetric
	Item reference
	Swivel castor
	Swivel castor with brake (item ref.)
	Fixed castor (item ref.)
	Wheel on H7-bore (item ref.)
	Wheel on H7-bore + keyway (item ref.)
	Wheel diameter
	Tread width
	Bore
	Plain bearing
	Roller bearing
	Cone ball bearing
	Precision ball bearing
	Hub length
	Ext. bearing distance / assembly length
	Hub diameter
	Loading capacity at 4 km/h
	Loading capacity at 12 km/h
	Top plate size
	Bolt hole spacing
	Diameter bolt hole (metric)
	Swivel radius

TechCorner



1 Loading capacity

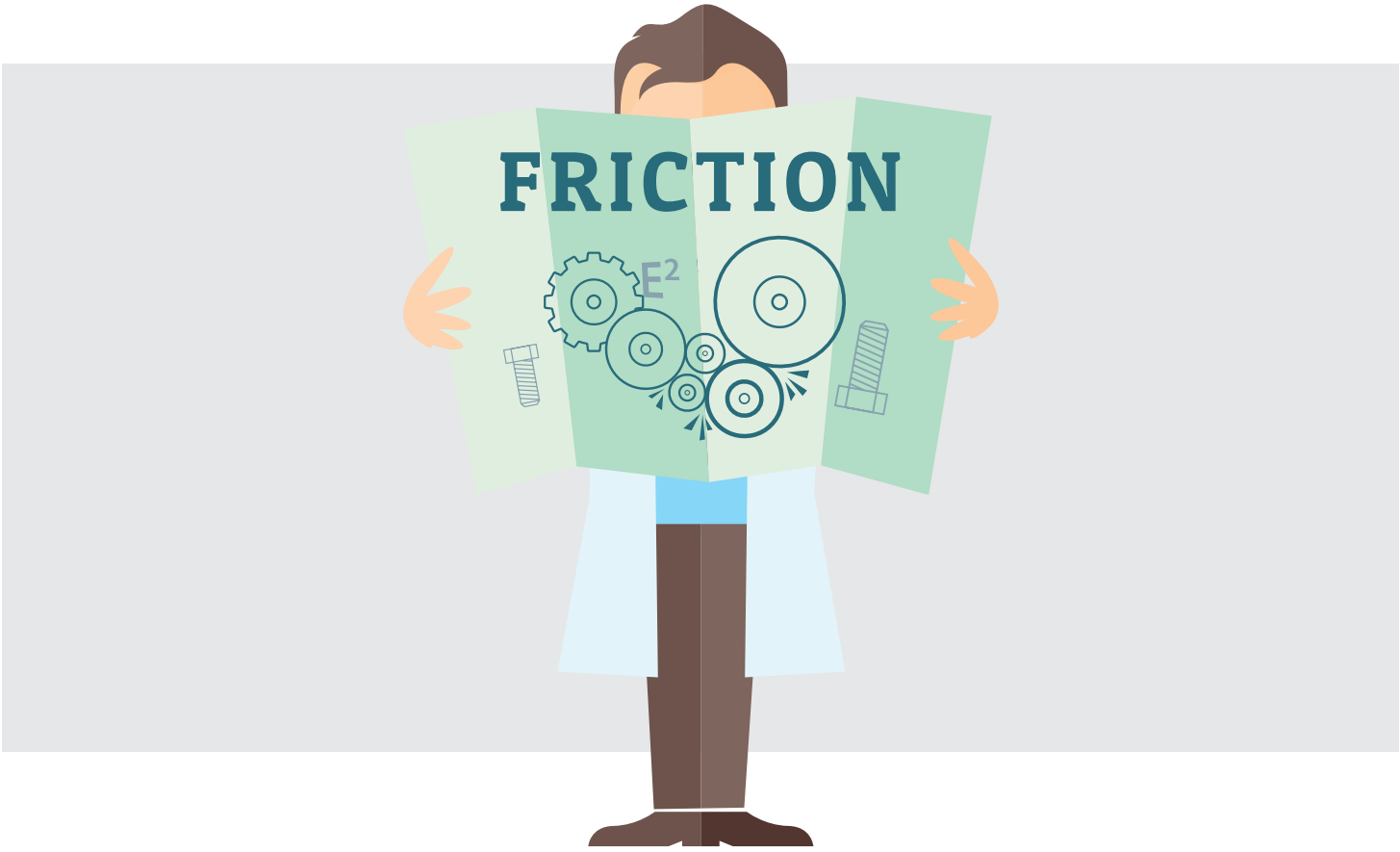
One of the key parameters when determining the right wheel is the loading capacity. What might at first appear to be a simple parameter does, in practice, pose some challenges. For industrial wheels, the loading capacity is, by definition, specified at speeds of 4 up to 16 km/h. It is the manufacturer's responsibility to determine the loading capacity, based on the above-mentioned factors. Vulkoprin has a lot of experience and is equipped with a modern test bench to carry out simulations and tests. Consult the 'Vulkoprin Wheel' team for an accurate analysis of the loading capacity.

Find more at:
https://www.vulkoprin.be/en/techcorner/

2 Driving force

The driving force of a wheel is achieved by applying the torque of a motor, via a drive train, to the wheel axle. This driving force now has to be transferred to the 'track'. This could be the floor, a rail or a drum. To be able to transfer the driving force we need sufficient grip.

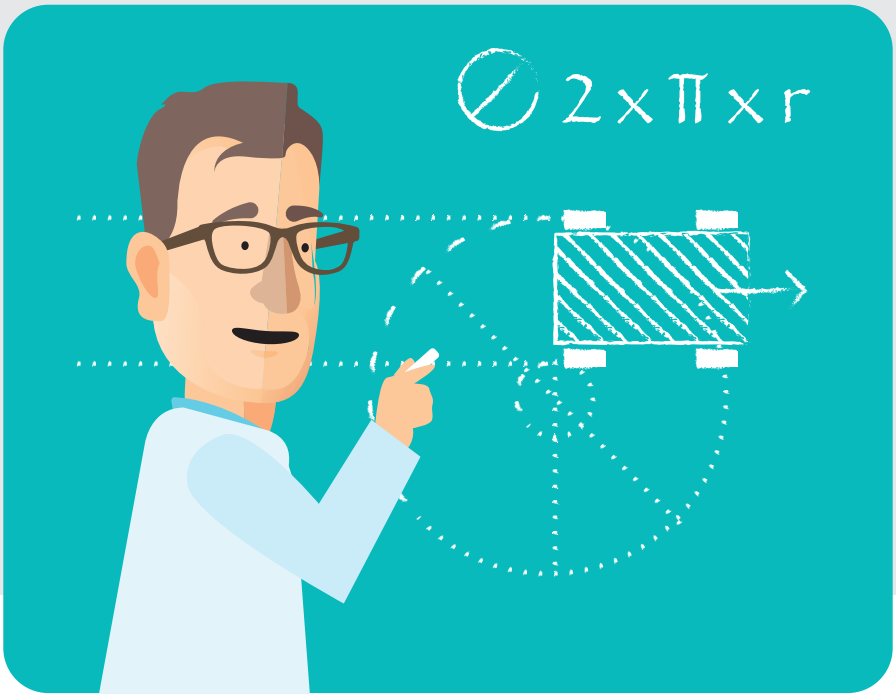
Find more at:
https://www.vulkoprin.be/en/techcorner/



3 Friction

The friction coefficient between the wheel and the 'track' will determine how much grip we can generate. The friction coefficient is determined by two phenomena in which the viscoelastic characteristics of an elastomer are very important.
A viscoelastic material is modelled by a parallel spring-damper combination, where the spring is responsible for the elasticity and the damper for the hysteresis losses.

Find more at:
https://www.vulkoprin.be/en/techcorner/

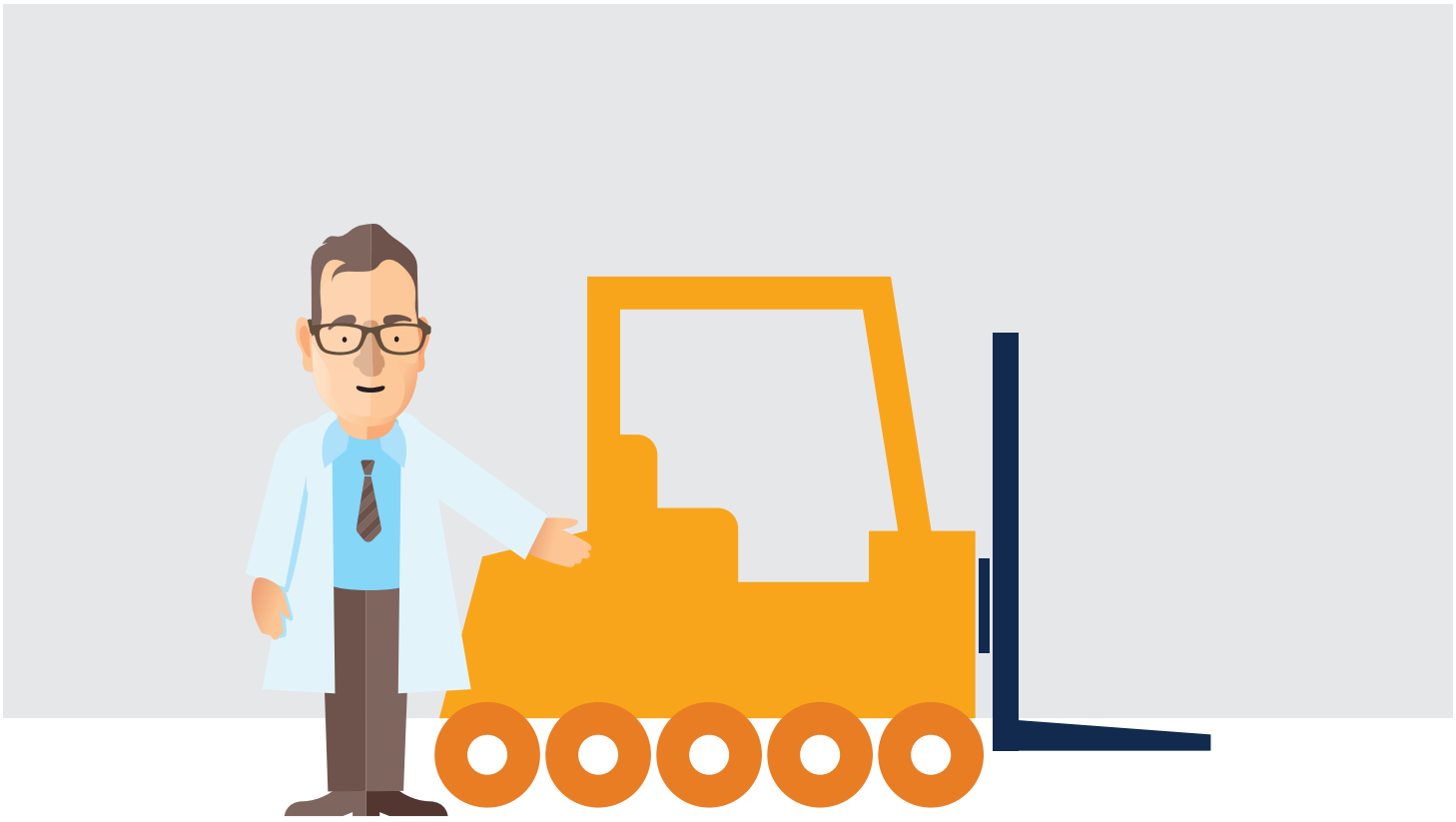


4 Driving force in practice

Now that we better understand the complexity of driving, braking and steering, we can apply this to the composition of the wheel that delivers the necessary performances. We are also confronted with some contradictions here, which makes compromises inevitable.

We have learned that an elastomer with high hysteresis losses generates a good grip. On the other hand, these same hysteresis losses generate an increase in temperature and rolling resistance of the wheel, directly impacting the performance, wear and life span.

Find more at:
https://www.vulkoprin.be/en/techcorner/the-driving-force-a-wheel-in-practice/



5 Types of PU treads

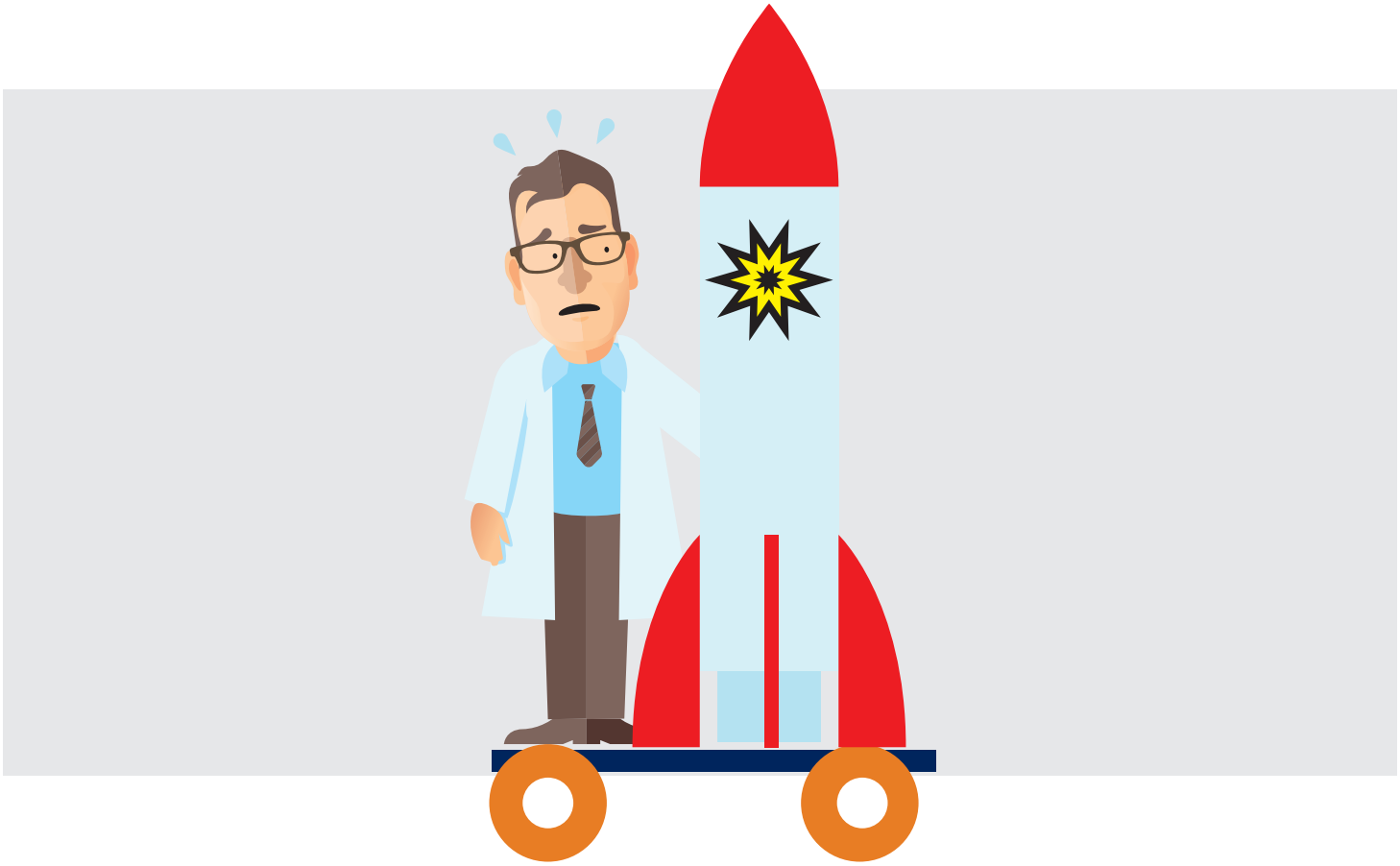
Vulkollan® is a NDI (Naphthalene Diisocyanate)-based polyester polyurethane elastomer. The chemical composition has been laid down by Covestro of Leverkusen. Only Vulkollan® licensees are allowed to process Vulkollan® and on condition that the production process meets strictly imposed quality standards.
Other popular PU-elastomers have MDI (Methylene Diphenyl Diisocyanate) or TDI (Toluene diisocyanate) as a hard segment. There are no clear standards for formulating MDI and – depending on the manufacturer – many variant mixtures are supplied, in different grades.
The molecular composition of NDI is symmetric. This molecular structure affects the physical properties and is also the basis for multiple, superior applications.

Find more at:
https://www.vulkoprin.be/en/techcorner/polyurethane-treads/

6 Ambient temperature

Like all PUR (polyurethanes), Vulkollan® is a poor thermal conductor. Overheating leads, inevitably, to damaged tread or even debonding of the wheel. Factors for needless increase in temperature are extreme speed, a protracted period of operation, overloading, misalignment, large cover thickness, incorrect assembly or ball bearings that are too small. Solutions to this, are a larger and wider wheel diameter, thinner cladding, bigger ball bearings, special types of ball bearing under axial load, a convex tire tread, limit the cover thickness and a higher Shore hardness. The Vulkoprin wheel team can give guidance on this.

Find more at:
https://www.vulkoprin.be/en/techcorner/ambient temperature/



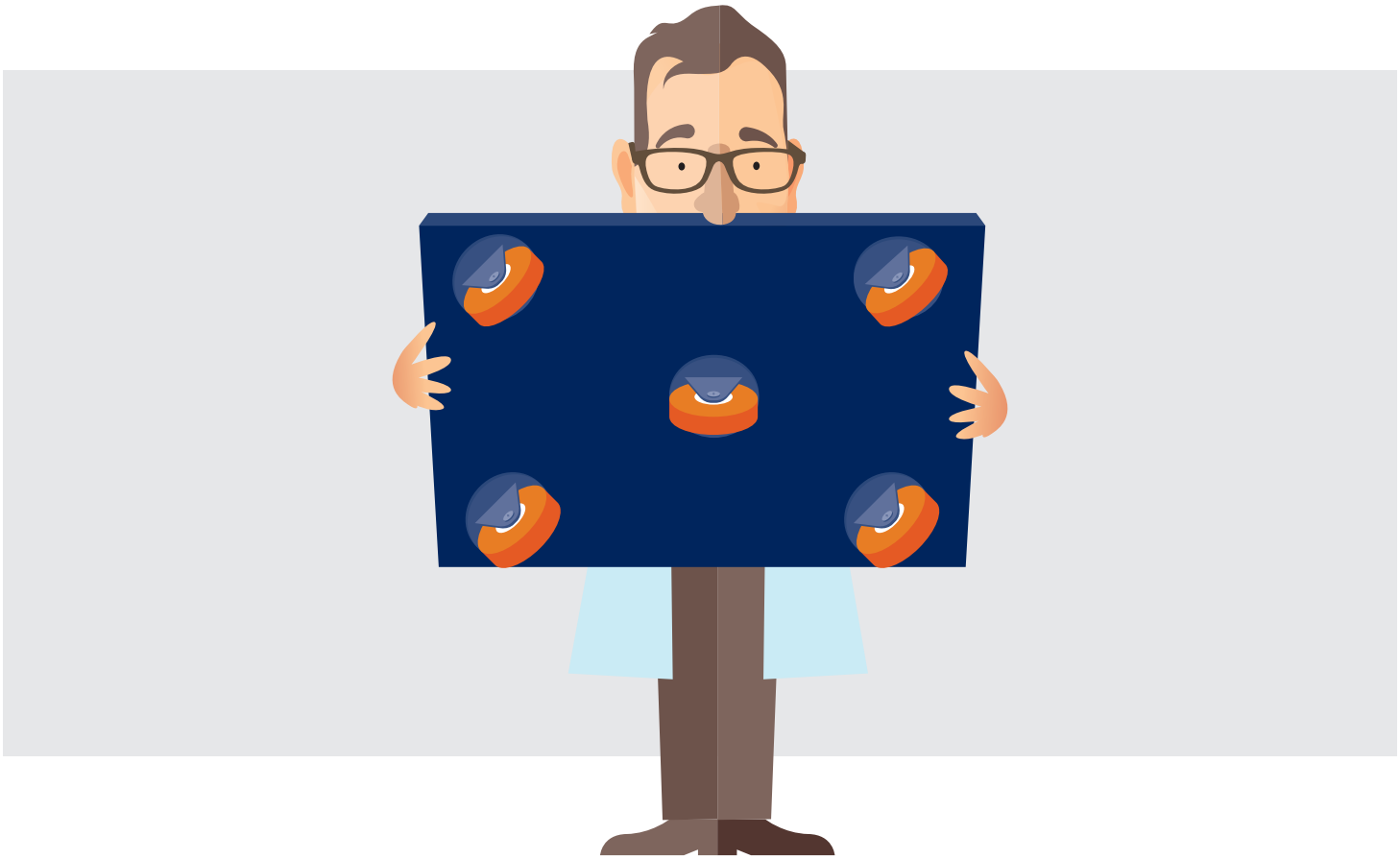
7 Areas with an explosion hazard

Moving appliances can become electrostatically charged due to friction on slipping or by micro-friction when rolling forward. These electrostatic charges can be dangerous to electronic components and give sparks upon a sudden discharge.

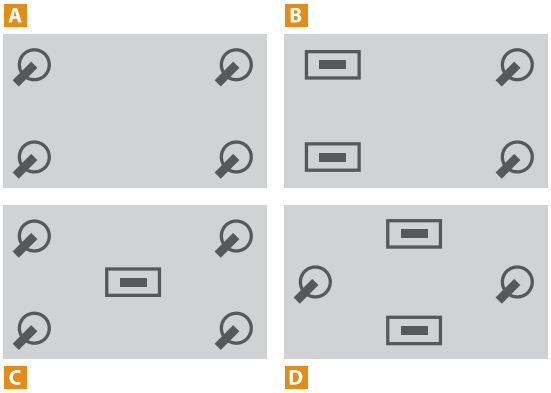
Appliances which are fitted with plastic or rubber wheels are electricaly insulated from the ground because plastics and rubbers are, by nature, good electric insulators.

In fields of application where electrostatic charging should be avoided, some solutions are already available. For example, the mounting of earth straps or wheels that allow the electrostatic charge to dissipate, in any case, to the ground, thus eliminating any voltage difference.

Find more at:
https://www.vulkoprin.be/en/techcorner/explosion hazard/



8 Castor configurations



Swivel castors require some power to position themselves correctly in the driving direction. This can be improved by choosing the right wheel configuration. Here are some examples:

A 4 swivel castors have an exceptional manoeuvrability. The starting resistance is a little higher than in other configurations and it's more difficult to keep the trolley in a straight line.

B 2 swivel- and 2 fixed castors is the most common configuration. It allows accurate steering on long straight runs with a relatively low starting resistance.

C This configuration with a fixed castor in the middle ensures a stable linear motion, centrally pivoting thru' 360°.

D This is the tilting principle. The 2 fixed castors in the middle have a larger diameter than the swivel castors. This make the trolley balance in the middle. The swivel castors have a steering function and, here too, the trolley pivots thru' 360°.

Materials

Printhane™
vulkoprin elastomer

Is the generic name for all Vulkoprin PU-elastomers developed specifically for extreme fields of application.

NDI-based

Printhane C™
vulkoprin elastomer

("PC" - 93 Shore A)
Is conductive Vulkollan® and meets the standards EN12527 to EN12533, in which the electrical resistance is less than IOA4 Ohm. Is compliant with the ATEX directives. For use in areas with a high fire- and/or explosion risk or risk of electrostatic discharge (ESD).

Printhane X™
vulkoprin elastomer

("PX" - 90, 95, 97 Shore A)
Has been developed specially for applications with high running speeds, which means it is well suited for all amusement park- & rollercoaster applications. PX exhibits low hysteresis losses and therefore little heat build-up.

MDI-based

Printhane B™
vulkoprin elastomer

("PB" - 65 and 75 Shore A)
For applications requiring a tread softer than 80 Shore A. The loading capacity is limited! In the case of PB75: ca. 40% and PB65: ca. 15% compared to Vulkollan® 92 Shore A. Soft elastomers will, in wheel applications, give a better grip.

Printhane R™
vulkoprin elastomer

("PR" - 85 Shore D)
This is a rigid PU for use in applications with thick-walled plastic parts, that have to be impact-resistant, elastic and non-deforming. This material is a great alternative to parts in milled engineering plastics (polyamide, POM, ...). PR has fire¬retarding properties as well (UL94 grade Vo).
PR wheelcentres covered with Vulkollan® or Printhane™ can offer a soluton in some applications where corrosion is a problem. Speeds and loads need to be adjusted to this 'all plastic' combination.

Printhopan

(Printhopan - 59 and 74 Shore D)
Printhopan 59 and 74 Shore D is a high-grade thermoplastic polyurethane (TPU) for the cover of small guide rollers. The cover is only mechanically locked to the ball bearing by some lateral overlap and thermal shrinkage to the outer ring of the ball bearing. These guide rollers offer a near-silent functioning and are a great alternative to a hard thermoplastic guide bearing such as polyamide. Printhopan guide rollers offer a reasonable loading capacity and a resilient ride.

The 8 family members of

covestro VULKOLLAN®

THE ULTIMATE ELASTOMER

Vulkollan® is the benchmark polyurethane elastomer in the market, combining excellent mechanical properties for highest dynamic loadbearing capacity and abrasion resistance. That is why you will find Vulkollan® in the most demanding applications.

Hardness

Formulations from soft to very hard allow Vulkollan® to span the full spectrum between rubbers and thermoplastics. Thanks to this wide range of hardness, Vulkollan® can be found in a broad area of technical applications. Vulkoprin produces Vulkollan® ranging from 75 up to 97 Shore A.

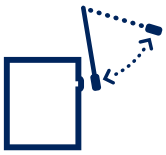
Tensile strength

Vulkollan has very high values for tensile strength. Elongations up to 7 times the original length are needed before rupture of the specimen occurs. Together with high values for tear and tear propagation means Vulkollan® is virtually unequalled for wear and tear in conditions of dry or wet friction.

Damping

Good damping behavior, combined with the other physical properties, makes Vulkollan® the ideal material for anti-vibration elements.

Rebound resilience

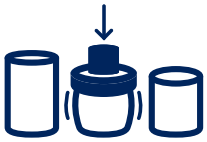


The rebound resilience gives a measure for the elasticity of a material. Vulkollan® shows high and almost constant values over the whole hardness range between 0°C and 120°C. The higher the rebound resilience the less energy is transformed into heat by a deformation.

Chemical resistance

Unlike many other elastomers, Vulkollan® is highly resistant to many chemicals and, in particular, to mineral oils, petrol and benzene.

Compression set



Compression set is the amount by which a compressed elastomeric material fails to return to its original shape when the load is removed. The low compression set of Vulkollan® is a decisive factor behind its successful use for items such as wheels, damping and sealing elements.

Tear strength and tear propagation resistance

Vulkollan® has high values for tear strength and tear propagation resistance. This, together with the high elasticity, offers an exceptional wear resistance in dry and wet conditions.

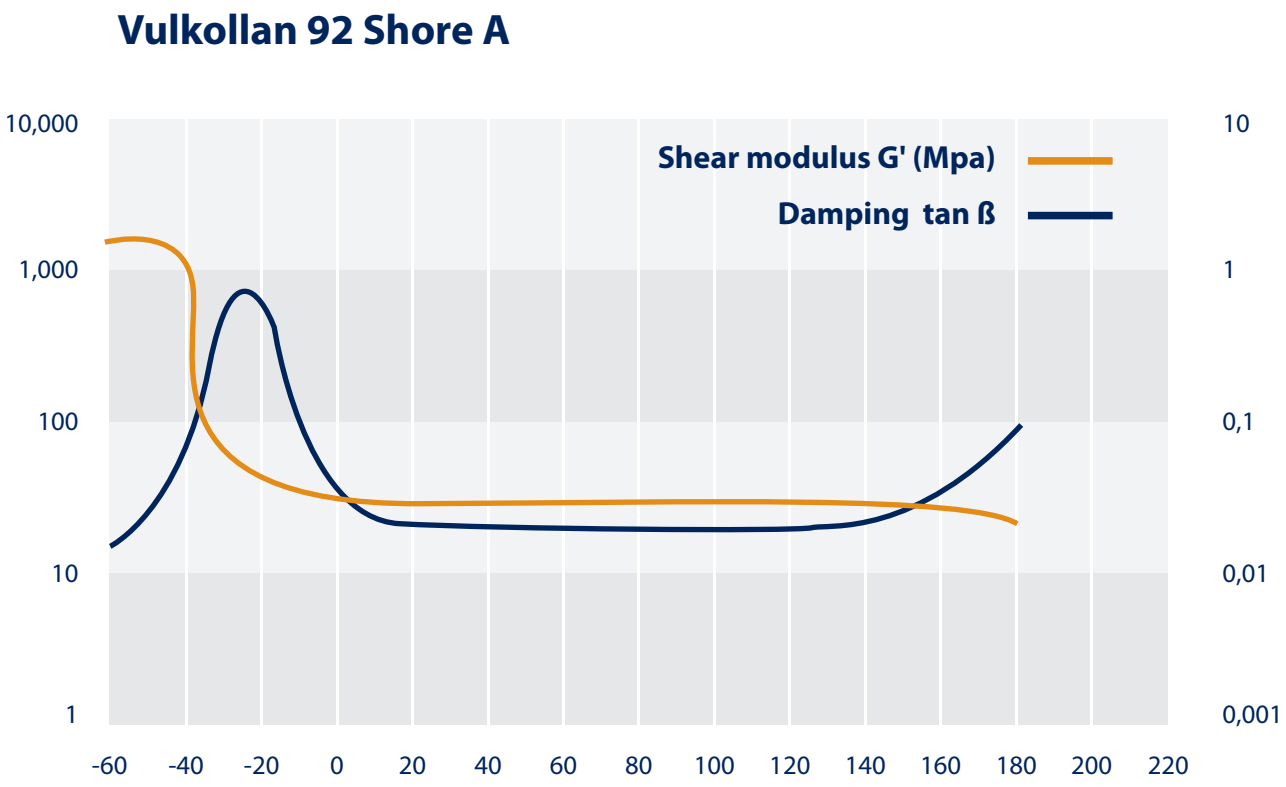
Wear

Vulkollan®'s high resistance to wear ensures a long service life for expensive capital investments even under the harshest abrasive loads.

In a multistage process developed by Covestro, solid Vulkollan® is produced through chemical reactions between polyester polyols of the high-quality Vulkollan® range, Desmodur® 15 and glycols. Desmodur® 15 is the trade name for 1,5-naphthylene di-isocyanate (NDI) from Covestro. The ultra-high-performance elastomer covers a hardness range from approx. 65 Shore A up to 60 Shore D. Vulkollan® can only be manufactured by licensed processors such as VULKOPRIN. They produce wheels and castors to deal with the highest dynamic loads, as well as technical and semi-finished parts.

Cellullar Vulkollan® is produced from Vulkollan® polyols, Desmodur® 15 and water. It covers a density range from approx. 300 up to 850 kg/m3 and combines high volume compressibility with minimal transverse expansion. Cellullar Vulkollan® is used for the manufacture of superior damping elements, such as bumpers, springs and NVH (noise, vibration, harshness) elements.

Source: Covestro AG Leverkusen



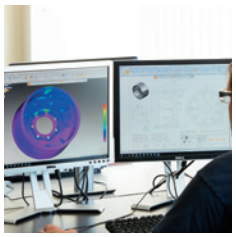
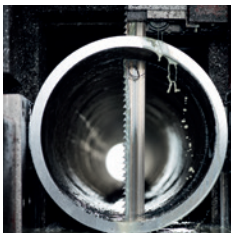
Table

LEGEND | • Basic | •• Good | ••• Recommended

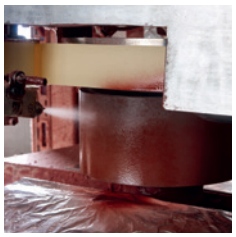
Material	VULKOLLAN				Printhane						
	75	80	90	95	Grip	B65	B75	C	X92	X95	X97
Manual	•••	•••	•••	•••	-	•••	•••	•••	•••	•••	•••
Driven	•	••	•••	••	•••	•	••	•••	•••	••	••
Heavy load	•	•	••	•••	••	•	•	••	••	•••	•••
Long distance	•	•	•••	•••	••	•	•	•••	•••	•••	•••
Uneven floor	••	••	•••	•	••	••	••	•••	•••	•	•
Wet floor	••	••	••	•	•••	••	•••	••	••	•	•
Noise reduction	•••	•••	••	••	••	••	••	••	••	••	•
Rolling resistance	•	••	•••	•••	••	•	••	•••	•••	•••	•••
Non marking	•••	•••	•••	•••	•	•••	•••	•••	•••	•••	•••
Ambient temperature < 0°C	•	•	••	••	••	•	•	•	•••	••	•••
Ambient temperature > 40°C	••	••	••	••	••	•	•	••	•••	•••	•••
Wear	••	•••	•••	•••	••	••	••	••	•••	••	•••
V-max. lifttruck drive wheel m/s	-	12	25	30	25	-	12	25	30	-	-
V-max. lifttruck load Wheel m/s	-	16	30	40	30	-	16	30	40	-	-
Extreme V	•	•	••	••	••	•	•	••	•••	•••	•••
Hydrolysis resistance	•	•	•	•	•	•	•	•	•••	•••	•••
Electrical conductive ISO2878	-	-	-	-	-	-	-	•••	-	-	-

The making of
a state-of-the-art production unit

Customers from different industries can be confident that the entire wheel or wheel assembly was designed and manufactured by Vulkoprin. Precision machines and a high degree of automation guarantee stable production volumes with punctual delivery. The polyurethane division is one of the most modern installations in the sector. Single source responsibility is guaranteed by our in-house supply chain from the selection of the materials right through till final assembly. In addition, Vulkoprin has several moulding lines at its disposal, so that part sizes and formulations can be tailored to a particular client's needs.

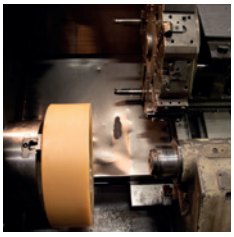


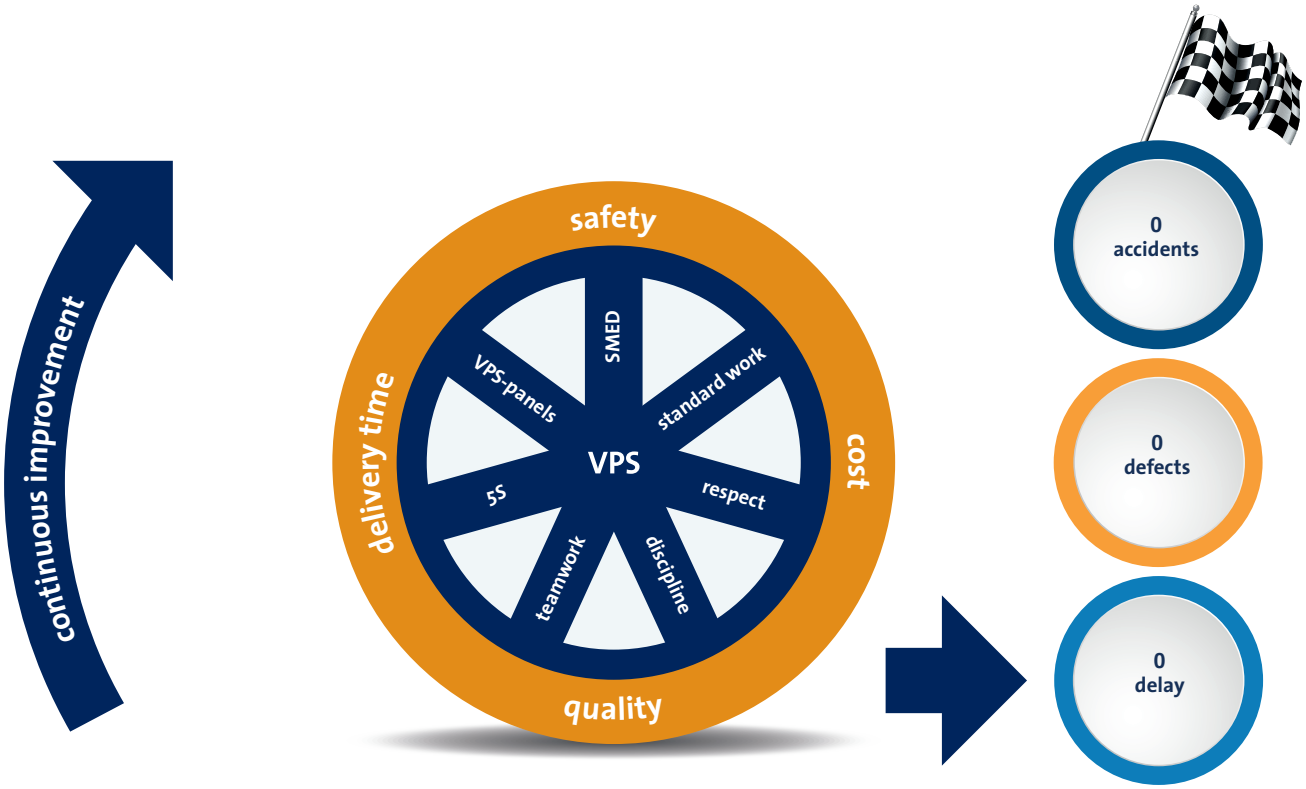








Vulkoprin Production System (VPS)

The Vulkoprin Production System is a daily used system to organise the logistics and manufacture of wheels and castors in the production plant. It is a social-technical system that requires the involvement of all personnel to produce wheels and castors in time and at the lowest cost without compromising the high quality standards, the safety or the environment. The ground rules of zero accidents, zero defects and zero delays are combined in our VPS-wheel.

The highest goals are mentioned in the tire specifications (safety, quality, delivery time and cost), the spokes give the wheel stability while the tools mentioned on the spokes give the system stability. Through continuous improvement the wheel rides towards our goals: zero accidents, zero defects and zero delays. The core values of teamwork, discipline and respect ensure that the wheel keeps spinning and that we succeed in our journey of continuous improvement.

ISO 9001 BUREAU VERITAS Certification

ISO 14001 BUREAU VERITAS Certification

The first ISO 9001 certificate goes all the way back to 1995. Since then, the market, the customers and the Vulkoprin organization have all evolved significantly. Consequently, the processes too are constantly evolving. With the extension of the ISO 9001 certificate until 2021, our ambitions of operating excellence are reaffirmed. Last year already, our environmental management skills were confirmed by extension of the 14001 certificate.

Vulkoprin associates this certification (and the related awards) with core values regarding the well-being of its personnel, corporate social responsibility (CSR), the environment and sustainability:

1. The human being

Because (s)he is the fundamental element of society and constitutes the fundamental unit of change, the human being is key. We believe that his/her willingness to assume responsibility underpins qualitative research and scientific advancement and that their know-how and creativity is the company's biggest strategic tool. We want to appraise our employees' talents and harness them, so as to increase their knowledge and to grow the business.

2. Society

We believe that the business grows best in a free market economy. Through 'ethical entrepreneurship and a sense of public responsibility', the company can shoulder its responsibility towards society and forge a win-win relationship with all stakeholders.

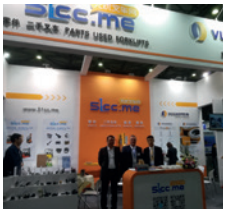
3. The environment

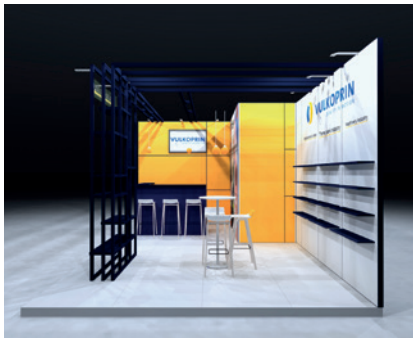
Out of respect for society, of which the company is a part, we are obliged to reconcile our economic activities with the legitimate demands of environmental protection. Issues concerning business activities that have an ecological impact are governed by what is ecologically responsible, technically feasible and financially bearable.

4. The company

Free enterprise as a source of added value offers people the best opportunities for self-realisation and gives them, as employees or shareholders, a fair and competitive remuneration. We should strive for controlled business expansion in order to be successful in the long term.

Meet us worldwide





VULKOPRIN
QUALITY IN MOTION

covestro VULKOLLAN®
THE ULTIMATE ELASTOMER

Printhane™
vulkoprin elastomer

easyroll

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