REPORT

VULKOPRIN 55th ANNIVERSARY AT SEPEM 2019

VULKOLLAN® IS THE BENCHMARK MATERIAL IN WHEEL MANUFACTURE

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 moulding pieces, Vulkoprin uses only the finest materials, such as Vulkollan®, Printhane®, Easyroll® rubber, polyamide, steel and aluminium.

From 19 February to 21 February, Vulkoprin will be presenting at LogiMAT 2019 Stuttgart its portfolio of high-quality wheel solutions for the Material Handling Industry. The perfect combination of high elasticity and stable hardness over a very wide temperature range results in wheels with a low rolling resistance and a high load-carrying capacity. In addition, the product range was expanded with specific solutions to widely differing applications, such as Printhane-X, which has proven its excellence already in the amusement park sector or the heavy-duty Vulkollan® wheels and castors for applications in tunnel boring machines. Lastly, a brand-new test facility was put into use for real-time simulations.

55 YEARS OF PROVEN PERFORMANCE…

For over five decades, Belgian-based family business Vulkoprin has designed and manufactured high performing quality wheels, castors, rollers and tyres using the best materials available, such as Vulkollan®, Printhane®, Easyroll® rubber and nylon. Today, Vulkoprin wheels and castors can be found all over the globe in all kinds of dynamic applications. Whether you are in the material handling, machinery, glass or amusement park industry, Vulkoprin designs and manufactures the wheel you've been looking for!

INNOVATING TOGETHER WITH OUR CUSTOMERS

The fully-integrated, state-of-the-art production unit allows us to produce individual items or in high volumes. In this way Vulkoprin can act very flexibly to convert changing market demands into new products. Tailored solutions are developed together with customers from diverse industries. This is Vulkoprin's definition of innovation", says Didier Nulens, Sales & Marketing Manager at Vulkoprin.

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" said co-owner and CEO Jan Maes. "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 of the core till the 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."

VULKOLLAN®'S UNIQUE PROPERTIES

"The wheel solutions we manufacture must withstand extreme loads and temperatures, high speeds, abrasion, wear and deformation" says Production Manager and co-owner Bert Maes. That's why Vulkoprin developed a full range of top-quality polyurethanes, led by Vulkollan®. Vulkollan® has, in recent decades, emerged as the benchmark material for heavy-duty wheels and castors.

So far, no other type of polyurethane has managed to offer the same outstanding mix of properties over a very wide temperature range. "With the 'Printhane Polyurethanes', Vulkoprin has managed, for certain applications, to accentuate specific properties, like the Printhane-X 95 that was developed specifically for fast-travelling roller coasters, or the 'Printhane GRIP', for increased grip in drive systems", said Bert Maes.

NO COMPROMISING

In order to achieve polyurethanes of the highest quality, no compromises are allowed. At Vulkoprin besides a lean management process, a digital steered polymerization ensures the optimal curing times and automated adhesion processing is leveraging the tear strength properties of Vulkollan®.

Abrasion

Vulkollan® comes in different grades. But they all share one of Vulkollan®'s most distinct attributes, namely its excellent resistance to abrasion. Vulkollan®'s abrasion resistance exceeds that of all elastic plastics. In wet conditions, Vulkollan®'s abrasion resistance even exceeds that of steel! Like all other properties of elastomers, the abrasion resistance of Vulkollan® also depends on the operating temperature; the optimal values are obtained up to operating temperatures of 80°C. When this is taken into account, Vulkollan®'s excellent abrasion resistance can be used, to best effect, in the design and manufacture of flexible couplings, drive- and steering wheels for forklift trucks, protectors in blast cabinets, wearing plates for concrete pavers, etc.

Hardness

Vulkoprin manufactures Vulkollan® in different hardnesses, ranging from 75 to 95 Shore A. Thanks to this wide hardness range, Vulkollan® can be found in a broad array of technical applications, spanning the full spectrum between rubbers and thermoplastics. For example, Vulkollan® – with a hardness of 92 Shore A – has become the benchmark material for wheels for internal transport, like those used on electric forklifts and stackers. A winning combination of rigidity and elasticity guarantees wheels with a high load-carrying capacity and a low rolling resistance. The excellent mechanical properties of Vulkollan® ensure a very low 'total cost of ownership' (TCO).

Chemical resistance

Unlike many other elastomers, Vulkollan® is highly resistant to many chemicals and, in particular, to mineral oils, petrol and benzene. Vulkollan® parts remain virtually unchanged, dimensionally, during long-term contact with oils and petrol, only with benzene do they swell slightly. Since the mechanical properties remain outstanding – even in regular contact with one of these chemicals – many uses have been found for Vulkollan® in hydraulic applications, e.g. in the aviation sector where Vulkollan® is one of the few materials that's resistant to Skydrol.

Damping

At low frequencies, Vulkollan® can absorb up to 20% of the strain energy (a.k.a. elastic

distortion energy) as heat. This means that Vulkollan® has a large damping capacity. At high frequencies, the damping capacity is even higher. The loss factor of a Vulkollan® 80 Shore is, at 100 Hz, ca. 0.13, at 10,000 Hz this increases to ca 0.45. Together with the wide range in hardness, Vulkollan® is therefore eminently suitable for dissipating high bending forces through the chassis at low frequencies, but equally to filter away high-frequency vibrations.

Hydrolysis resistance

All polyester-based polyurethanes – not just Vulkollan® – suffer in hot, damp conditions. The heat and the moisture break the long elastic chains of the polyester polyol into shorter pieces, adversely affecting the polyurethane's properties.
This phenomenon always starts at the surface; it is called hydrolysis. Hydrolysis isn't usually a problem in western Europe, but for applications in industry where heat and moisture are present together, or for applications in regions with a tropical climate, the wear life of the part can be normalised by adding some special additives. The other excellent properties of Vulkollan® are not significantly affected by these additives.

Rebound

Just like all other polyurethane elastomers, Vulkollan® is a viscoelastic material. This means that a Vulkollan® part can be regarded as a combination of a spring and a rebound damper. The lower the influence of the damper, the more flexible the material. Measuring the rebound yields a measure for the elasticity of the material. At room temperature, Vulkollan® gains a respectable score – in all its hardnesses – of about 60%; at 70°C the rebound value rises to 70%. With Vulkollan®, the (elastic) stiffness is unchanged throughout, which can't be said of all PUR-elastomers.
There is a direct correlation between the elasticity of polyurethane and the rolling resistance of a wheel, made of that material. The higher the rebound, the lower the rolling resistance.

Tear resistance

Being an elastomeric material, Vulkollan® has excellent tear resistance. This distinct attribute of Vulkollan®, together with its high elasticity, means that Vulkollan® is virtually unequalled for wear and tear in conditions of dry or wet friction. Only fibre-reinforced plastics have a tear resistance of a comparable level. In machine building, this attribute really comes into its own in scrapers, in straight-edge rules (and the stop block or stop runner for paper cutters), etc. But, in drive wheels too, this attribute stops incisions – that could ultimately break the wheel – from growing in size.

Adhesion

With the right adhesives, Vulkollan® parts bond well to other materials with adequate bond strength for the application concerned. If the requirements for bond strength are stricter, Vulkollan® will also bond perfectly to metal or aluminium during the casting process. For that, the metallic inserts are pretreated accordingly and a mould is needed to make the product. The result is a bond strength that exceeds the tear strength of Vulkollan®. The bonding method used by Vulkoprin ensures – even at high loads and high operating temperatures – a problem-free bond. Thanks to rigorous process inspections and extensive automation, we're able to deliver on quality and performance. Adhesion checks are done weekly on our testing devices to verify this.

Tensile strength / Elongation before rupture

The tensile strength of an elastomer is the tension that occurs in the test piece before rupture. The force required is, by definition, divided by the surface area of the original cross-section.
The elongation before rupture is also determined from the same measurement. With values for the tensile strength of ca 42 MPa and an elongation at break of ca 650% for Vulkollan® 92 Shore A, Vulkollan® scores some very high values. Moreover, these values are fairly constant over the full hardness range. In practice, Vulkollan® is rarely stressed at 100% elongation and this parameter is used rather as a basis for comparison.

Pressure deformation remnants

Elastomers deform under load and will rarely return to their original shape upon removing this load. Most elastomers are pre-loaded with pressure and the permanent deformation under stress is therefore the value that's most often cited. In the case of wheels, this parameter plays a key role. This is because it indicates how susceptible a wheel is to developing 'flat sides', also known as the 'Monday morning sole'. Vulkollan® has low values for permanent deformation, both at low or higher temperatures.
All these properties ensure that Vulkollan® is the benchmark material in wheel manufacture.

Learn more through animated lectures on www.vulkoprin.be/techncorner

VULKOPRIN
QUALITY IN MOTION

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