

A sustainable choice

The fabrics used to manufacture tires can offer a wide range of benefits, and the choice is evolving as the industry moves toward a more sustainable future

by Karl Vadaszffy



Above: Cord fabrics reinforce tires, increasing performance and safety

Right: Arnaud Closson, the COO of Indorama Mobility Group

Part of Indorama Ventures Limited (IVL), Indorama Mobility Group (IMG) specializes in automotive and industrial fiber applications, and was formed following the successive acquisitions of a number of tire reinforcement market leaders and pioneers over the past five years.

The company is fully integrated into the tire textile value chain, specializing in polymers and yarns, and their conversion into the final cords and fabrics that are required by tire manufacturers. IMG has a global presence: more than 5,000 employees work at 16 sites in nine countries; there are manufacturing locations in Europe, Asia and North America; and it has a full tire-reinforcement portfolio based on polyester, polyamide, rayon, aramid and hybrids.

According to COO Arnaud Closson, the company's tire cord fabrics help to reinforce tires, bolstering performance and safety, two key areas from which the industry demands excellence. "They have to offer a high level of load-carrying and breaking strength, which is required to withstand the deformation of the tire in each usage," he explains. "There has to be a very good adhesion between the textile and rubber to maximize the reliability and performance of the tire. When it comes to the cap-ply, a higher level of modulus and restraining force is required to avoid the deformation of the tire at high speed. In addition, the

fatigue resistance of the carcass material for the lasting performance of the tire is vital."

Sustainable strategy

The company's strategy, which focuses on delivering sustainable solutions, can be divided into four pillars.

The first is lifecycle impact reduction, where IMG's products improve the lifespan of manufacturers' tires. For example, EcoTec is extra-high-tenacity PET for lightweight tires, and Stanylenka is a thermal stability PA 4.6 solution that enables lower weight cap-ply and reduced rolling resistance.

The second pillar is reducing the eco-impact of the company's products and processes. IMG is currently investigating RF-free dip for interfacial adhesion. "The dip is the interface between the textile and the rubber," explains Closson. "It is currently made out of resorcinol and formaldehyde [RF], but there are questions about its future usage, especially in Europe. We are looking to replace those chemicals with more sustainable choices."

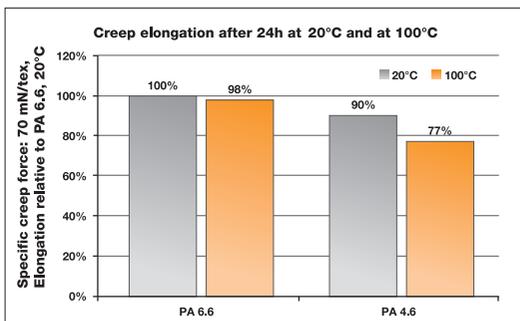
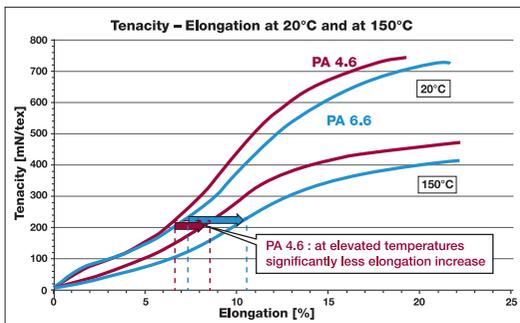
Third is innovation of renewable raw materials: “We are developing bio-based polymers, such as viscose and bio-sourced carbon fiber, and bio-derived polyamide high-tenacity yarn, Enka Nylon BIO and bio-HMLS-PET,” says Closson. “This is because automotive players are asking for more renewable raw materials in the value chain.”

As part of a large chemical company, IMG can leverage the innovation capabilities and integrated value chain of IVL in developing such new raw materials. Closson argues that these materials should provide improved performance in the end application, and be designed to fulfill the circular economy requirements – namely reuse, recycling and being biodegradable.

This links to the final pillar of the company’s sustainable outlook – its circular economy in recycling. As such, IMG has made major investments over the past two years in polyester recycling capabilities. Furthermore, R&D is currently focusing on developing recycled polyester HMLS tire reinforcements.

Challenges in innovation

An increased focus on sustainability and environmental friendliness, of course, brings with it challenges. Closson says the automotive value chain dictates that suppliers are required to requalify materials, which might slow down the adoption of new materials while favoring drop-in solutions. “As a tire reinforcement solution provider, we are aware that the magnitude of the impact contributed by textile reinforcement is not as significant as other tire components, such as rubber compound change, so it may require the use of alternative or new materials to deliver a greater impact. This will require significant investment in research and innovation.”



“Fulfilling the requirements of this very demanding industry is about listening to its members”



Above: IMG aims to continually develop new materials and solutions, in line with its four-pronged innovation strategy

Below left: Tenacity - Elongation of PA 6.6 and PA 4.6 at 20°C and 150°C

Bottom left: Creep elongation of PA 6.6 and PA 4.6 yarns at 20°C and 100°C

As Closson says, there may be multiple solutions to develop the best ecosystems going forward. One such trend is the move toward the reduction of private car ownership while increasing carsharing. “This will probably result in fewer vehicles, but with an increased utilization rate and increased frequency of tire change. This will certainly drive the need for increased material durability, which we are currently developing.”

When it comes to EVs, Closson believes the change in the engine does not necessarily mean a revolutionary impact on the tire, but he recognizes that future urban EVs might have some new requirements for the tire and therefore for the type of material being used. “For instance,” he says, “lower rolling resistance to extend the range of the vehicle. Some new materials may need to be developed to enable that.”

Autonomous vehicles bring their own challenges for the future, because, says Closson, “Drivers will be less aware of the car, but more dependent on tire performance and durability, so there will be the increased need for runflat or puncture-resistant tires.”

Noise reduction, too, will be a must: “When you remove the noise of the engine, the noise generation from tires will be more prominent, so there might be the need for a new tire design or new materials used.”

Although the main requirements of tire makers are the same globally, Closson expects there to always be regional requirements. He explains that Europe’s tire labeling system – which governs rolling resistance, wet grip and noise – gives a reference for tire performance differentiation, which in turn provides opportunities for raw materials suppliers to add value through elements such as weight reduction and noise reduction.

“And in the USA, there is typically a greater focus on safety,” he adds. “In Europe, the focus on performance is more stringent.”

In response to such regional requirements, IMG customizes its products for different areas, but it must also consider the specific requirements of individual manufacturers. “Fulfilling the requirements of this very demanding industry is about listening to its members, developing the right solutions, and fine-tuning them according to both regional and manufacturer needs.”

Indorama Mobility Group plans to continue to grow and remain a major player in the tire, automotive safety and automotive components (interiors and composites) sectors. “We will continue to drive product innovation to enable customers to manufacture new tire designs, fulfilling the latest industry trends,” Closson concludes. “Last but not least, we aim to be at the forefront of sustainable products and processes.” **tire**

Ecolife, Stanylanka and Enka Nylon Bio are brand names used by the Indorama Mobility Group companies worldwide