PolyOne

Case Study
GLS Thermoplastic Elastomers

Next-Generation Running Shoe Adapts With TPEs

Collaboration between a design-driven OEM and PolyOne produces a breakthrough running shoe that adjusts its cushioning to the runner and the run.

GLS™

Situation

A keen observer will readily spot Brooks performance footwear at the front of the pack in most running events, from amateur to professional. High-profile runners such as Olympic athlete Brian Sell wear Brooks shoes exclusively. One of the reasons Brooks garners loyalty from its fans is the company's devotion to creating innovative gear that keeps its customers running longer, farther, faster and injury-free.

With that aim in mind, Brooks began a project to develop a truly adaptable cushioning system for its 2010 line of footwear. The design team wanted to create a technology for running shoes that would better respond to individual runners and their weights, gaits, running surfaces, pressures and speeds with varying levels of cushioning to improve comfort. At the same time, this system would also feature an energy return midsole that adds spring to the runner's step.

While other OEMs in the industry had developed electro-mechanical systems to adapt cushioning stiffness, many runners reported the shoes felt clunky and were not entirely effective.

Brooks wanted to design a better way. Reaction times had to be fast, because runner foot strikes clock in at 40-50 milliseconds from heel to toe. They wanted a molecular solution, one that came from the midsole material and would meet these stringent performance requirements.

The PolyOne Difference

Using a materials-based approach, the design team selected thermoplastic elastomers (TPEs) because they offered excellent energy absorption and energy return properties. The team turned to PolyOne's GLS Thermoplastic Elastomers, a business within the Specialty Engineered Materials Group and a global leader in high-performance, custom-formulated TPEs, to develop a specialty solution that would work together with a proprietary Brooks TPE blend used in the midsole.

The PolyOne team created a customized GLS compound that matched the performance of the midsole material to the Brooks TPE blend so that each component would work in concert to deliver custom cushioning with optimum energy absorption and return.

"Synergy in concert was the key to success in this application," says Derek Campbell, Brooks Future Concepts Manager. "These components and materials have been carefully designed and engineered to work together properly, and have been optimized for geometry, thickness, flexibility and performance."

Delivering a Value-Added Solution

The Glycerin® 8, introduced in January 2010, is the first shoe to feature Brooks® DNA, the new adaptive cushioning technology that resulted from collaboration with PolyOne. Within a month of its release, the shoe was featured as the "Editor's Choice" in Runner's World magazine's Spring 2010 Shoe Guide.

According to Campbell, the value of Brooks relationship with PolyOne can be measured in several ways. "First and foremost, we can now offer shoes with a cushioning system that instantaneously adapts to a runner's unique biomechanics, weight, pace, gait, and surface," he says. "This is a feature that no one else can offer, giving us a clear competitive advantage. And not only does it adapt, but our tests indicate that it cushions better than previous versions."

By switching to TPEs, Brooks is also reducing the usual number of materials and steps needed to make the midsole, thereby saving energy and improving the sustainability of its manufacturing.

"Sustainability is important to us at Brooks, so cutting down on processing steps and energy is a huge plus," Campbell says. In addition, the switch from a combination of thermoplastic and thermoset materials to thermoplastics allows Brooks to regrind post-industrial scrap and reuse it, increasing sustainability even further.

Competitive advantage: First and only running shoes on the market with a material-based, adaptive cushioning system that adjusts to each individual runner's physiology and running conditions. Spring 2010 national account retail bookings of the Glycerin® 8 are up over 40% versus those for the Glycerin® 7 in 2009.

Performance improvement: At highest energy impacts, based on 7-9 mph for a large runner, Brooks testing shows the TPE-based system provides a 30% to 50% improvement in cushioning over traditional systems.

Energy savings and sustainability: Former cushioning systems required two processes: blow molding and gel injection. Switching to PolyOne TPEs enabled Brooks to reduce the manufacturing steps to a single injection molding process, for a 30-40% reduction in energy and a more sustainable operation. This lower energy requirement can be expected to deliver savings of $80,000 to $100,000 annually.

Brooks Sports, Inc. is a leading running company that designs and markets a line of performance footwear, apparel, and accessories in more than 40 countries worldwide. A subsidiary of Berkshire Hathaway Inc., Brooks was founded in 1914 and is headquartered in Bothell, Wash., near Seattle. The company's mission is to inspire everyone to run and be active by creating innovative gear that keeps them running longer, farther, and faster. Visit www.brooksrunning.com for more information, and follow frequent brand updates on Twitter (@brooksrunning) and Facebook (Brooks Sports).

Product choices often vary by region due to differences in regulatory and agency requirements, availability and other key factors. Please contact your nearest sales office for assistance in choosing the right solution for your locale.

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