TEIJIN

Human Chemistry, Human Solutions

Endumax®: A special film that raises performance

Commercially available since 2012, Teijin Aramid's Endumax® is a thin, ultra-strong film made from a special type of Ultra High Molecular Weight Polyethylene (UHMWPE). It can deliver a huge range of performance improvements to an exceptionally wide range of applications, including ballistic protection, airfreight containers, laminated sails, ropes and cables, and loudspeakers. With more application areas being actively explored, Endumax® looks set to continue delivering high performance to products around the world.

From Emmen to products around the world

Developed and patented by Teijin Aramid to meet manufacturing demands for superior strength, safety, light weight, and durability, Endumax® is a high-performance UHMWPE material. Produced in Emmen, the Netherlands, its unique physical and chemical structure makes it 11 times stronger than steel weight for weight, and highly resistant to abrasion, chemicals and UV light, while delivering a very high modulus (i.e., it is very rigid). Endumax® is available in different formats and sizes, and can be adjusted according to specific customers' requirements. What's more, Endumax® is an environmentally friendly and solvent-free material that can easily be recycled. Manufacturers around the world use

EnduMax®

Endumax® in a very wide range of applications, from ballistic protection to airfreight containers to laminated sails and robotics.

A special production process for a special product

Since it was first manufactured in 2012, Endumax® has been made in a straightforward and sustainable process. First of all, UHMWPE (Ultra High Molecular Weight Polyethylene) powder is compacted into a sheet. This sheet is then rolled and stretched until it reaches the right thickness (between 45 and 60µm). By doing this, the long polymer chains of the UHMWPE are aligned, giving Endumax® its excellent mechanical properties. The result is an Endumax® film of 133mm width that, in a next production step, can be used for manufacturing ballistic protection uni-directionals or can be split to create narrow films of various widths. The Endumax® manufacturing process is rounded off with an intensive quality control check.

A unique combination of special properties…

Because of its unique manufacturing process, Endumax® offers a very special combination of high-performance chemical and physical properties. In particular, Endumax® has a very high modulus, especially for a material that has such low density, making it ideal for applications that require a high responsiveness and direct contact between payload and operator. Furthermore, Endumax® is not weakened by exposure to ultraviolet light and sunlight, enabling a wider range of design opportunities. Prolonged exposure even at temperatures of 70°C does no harm to the properties of Endumax®, and it can resist a wide range of chemicals including 10% Sodium Hydroxide, 10% Sulfuric acid, and water.

…And there's more to come!

Because Endumax® is produced as a film rather than as a filament, it is easy to add a wide range of customized surface treatments by applying a thin film. These surface treatments include different color variations, pressure-sensitive adhesives, thermoplastic layers, and scratch-resistant layers. Manufacturers often approach the Endumax team to develop and co-create new Endumax®-based products for niche applications. In fact, together with Teijin Aramid's R&D experts, the Endumax team is actively exploring new market opportunities and potential new application areas. In particular, the marine and offshore equipment industry often requires materials that deliver high modulus and superior strength, as well as improved durability.

Besides developing new applications for various industries, the Endumax team is also adding new products to its portfolio. Recently, for example, a new product was introduced for customers in the hard ballistic industry: Endumax Shield XF33®, which offers considerably improved protection at higher threat levels. Over the coming period, the Endumax R&D team will continue to add further new improvements. Keep an eye out for what's next for Endumax®!

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