A large, abstract graphic in shades of blue, consisting of many overlapping, curved, parallel lines that create a sense of depth and movement, resembling a close-up of a woven material or a textured surface. The graphic is partially cut off by the top and right edges of the page.

OUR HIGH-PERFORMANCE THERMOPLASTICS
ADDITIVES AND SOLUTIONS
ADDED VALUE FOR YOUR POLYMERS

Welcome to **Our Global Thermoplastics Additives Business**

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With this brochure, we are providing you with an overview of our extensive high-performance additives and solutions for thermoplastics. Our diverse additive portfolio is based on five well-established brands and their respective technologies, with additives suited for a wide variety of applications and materials. Our markets include the automotive industry, the electric and electronics sectors as well as construction and packaging.



As a globally leading additives manufacturer, we are focused on creating added value for our customers regardless of their location. By structuring our organization in line with markets and applications, we deliver specialist expertise to our customers and provide support around the globe. This also allows us to tailor solutions to special requirements. Thanks to this close collaboration, BYK is in a position to detect new market trends early, and to develop innovative answers accordingly.



We invite you to take a closer look at how our thermoplastics additives and related services benefit customers in different markets around the world, and to discover how we can support your business as well.

Yours

Ted Williams
Business Line Manager
Plastics Additives

Dan Berg
Global Head End Use
Thermoplastics Transportation

Jörg Garlinsky
Global Head End Use
Thermoplastics Industrial

Customer Value at All Levels

Thermoplastic materials enjoy a variety of applications worldwide, from the automotive industry to electrical and electronic products and appliances, from the construction business to film and packaging.

In this growing and highly diverse market, we follow a single mission: to create value for our customers, producers, converters, compounders, masterbatchers, and recyclers alike. With five extremely versatile brands, our portfolio offers the broadest range of processing and performance additives for thermoplastics in the industry. It is distinguished by consistently high quality, and improves all levels of the plastics value chain.

Our processing products help reduce complexity in material handling by making it easier to incorporate additives and therefore boost production efficiency.

Our performance additives improve material properties, such as scratch resistance, flame retardancy, thermal stability, UV stability, and nucleation, thereby enhancing the overall product quality. All our brands are suited for a wide range of thermoplastic materials, including polyolefins and engineering plastics.

Innovative Technologies for Additive Systems

Products include single-component solutions as well as multi-component blends, comprising up to ten additives. We also offer customized solutions, tailored in our thermoplastics labs, to answer the specific demands of our customers. These systems are based on our innovative compounding, skin-core, and compacting technologies, which make the additives concentrates particularly easy to handle during compounding processes. Moreover, these technologies allow for highly loaded additive concentrates.

Global Teams and End Use Specialists

BYK takes an industry-specific approach in order to best serve customers. Our global thermoplastics additives business consists of two global end use teams, Thermoplastics Industrial and Thermoplastics Transportation. Each is made up of market, application, lab, and sales specialists, and both act worldwide. This organization ensures optimal customer support. What's more, it guarantees that we apply our know-how and expertise ultra-efficiently, and it helps our customers to meet their customers' demands.



Our Five Thermoplastics Brands

BYK-MAX

Solutions to optimize processing, and solutions to improve material properties, e.g. flame retardancy UV stability etc.

BYK

Classic solutions for wetting & dispersing, air release, rheology & viscosity

SCONA

Adhesion promoters, compatibilizers, and coupling agents

POLYAD

Tailored solutions for special demands

RECYCLOBYK

Formulations to increase the quality of recyclates

Thermoplastics Industrial: Added Value for Many Industries

Our global end use team Thermoplastics Industrial serves a broad range of industries and provides extensive performance solutions. Applications include cables, film, food packaging, structural components, and many more. Despite the diversity, our additives share some common characteristics: they are safe to handle, easy to dose, and display consistently high quality.

Thermal Stabilization

Engineering plastics based on polyamides need to show a number of properties, including heat resistance, when used as structural components in the electrical and the automotive industry. In polyamides and polypropylenes, the highest thermal demands can be achieved using our BYK-MAX HS additives. BYK-MAX HS 4312 provides exceptional resistance to automotive fluids.

Flame Retardancy

Flame retardancy is a significant field of application for our performance additives. Our BYK-MAX FR products offer a wide range of flame retardants, while some of our BYK-MAX CT additives provide flame retardants synergists for different polymer applications. Also included are highly efficient halogen-free additives to reach the V0 levels in polyolefin products and UL standard 94 V0 in polyamides.





For PE products used in film and fiber, our BYK-MAX FR 4144 additive combines flame retardancy with other properties, such as UV stability, resulting in a longer service life of the final product.

To help our customers comply with the most stringent fire standards for cable formulations, we provide easy-to-disperse flame retardant synergists, which add a further benefit to the compounds. The phyllosilicate-based fillers boost the mechanical properties of the materials, especially tensile strength and elongation at break.

Processing Additives

Our broad range of processing additives improves processes and products alike. Products in the BYK-MAX portfolio help reduce friction between the polymer melt and the internal metal surfaces of processing equipment, without negatively affecting the mechanical properties of the end product.

In extrusion processes and in solid masterbatches, the BYK-P and BYK-MAX P additives provide excellent wetting of pigments and fillers, and less compacting plus low melt viscosity. This leads to improved particle dispersion and lower filter pressure value (FPV). As a result, the throughput increases. Contrary to expectations, the finished part's mechanical qualities benefit, too.

UV Stabilization

To prevent plastic film based on PE turning brittle quickly, film producers employ UV stabilizers. However, their handling is complicated due to the dusty or sticky nature of these substances. Our BYK-MAX LS concentrates provide a highly effective alternative to improve the life cycle of plastic film, fibers, and other extruded items. Thanks to their excellent feeding characteristics, the granules or pellets can be dosed accurately and reliably. More importantly, they support a uniform and reproducible manufacturing process. We also offer grades, such as the BYK-MAX LS 4122, that are suited for food applications.

Nucleation

To produce transparent materials, our BYK-MAX NU products provide perfect nucleating and/or clarifying properties for PE and PP. Some additives, such as BYK-MAX NU 4230, comply with EU, U.S., and Japanese food regulations and are therefore suited for food contact applications. The pellets can be applied in film extrusion, thermoforming, and injection and blow molding processes. They increase both the crystallization rate and the number of spherulites. As a result, they step up molding and extrusion productivity and improve both stiffness and heat deflection temperature. With more controlled shrinkage and less warpage, the overall product quality benefits.



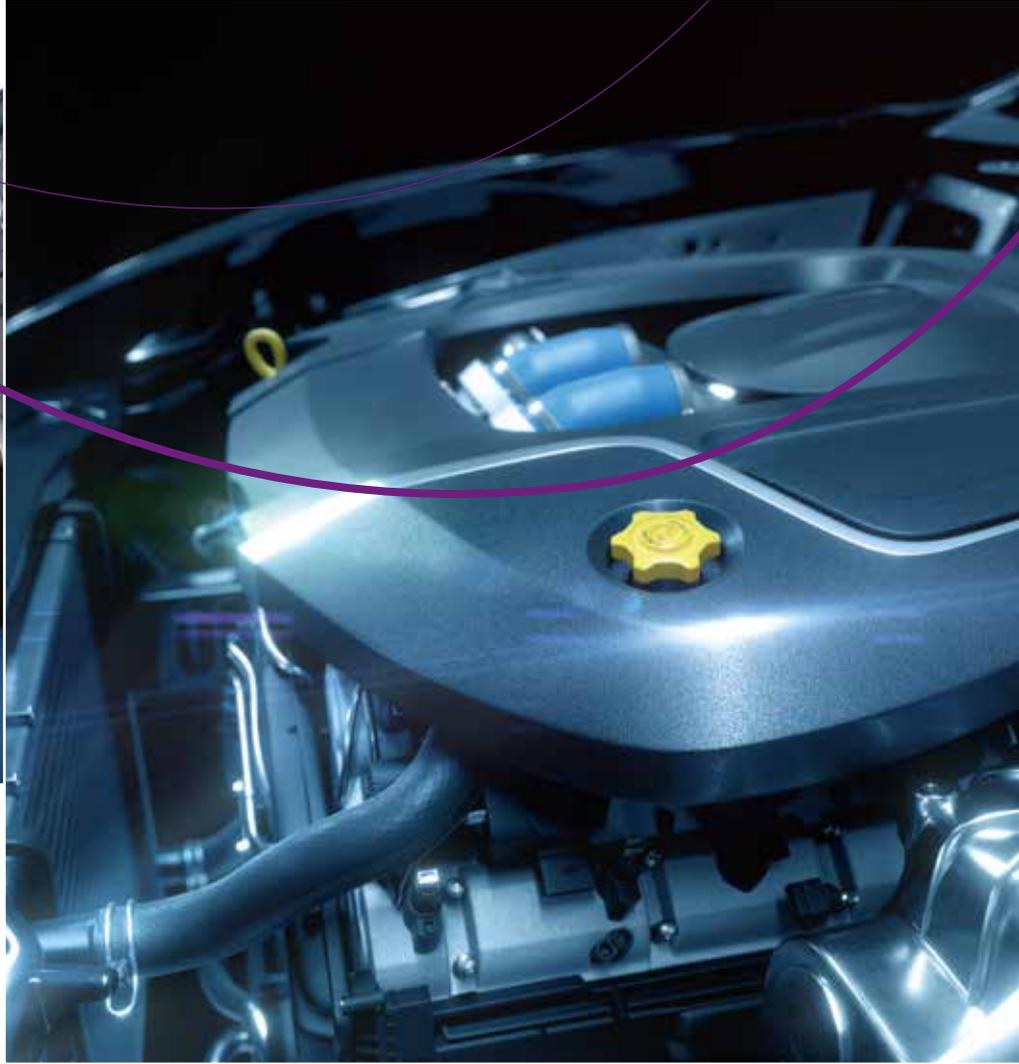
Thermoplastics Transportation: Adding Value to Automotive Applications

Our global end use team Thermoplastics Transportation is a reliable partner for automotive applications. Our additives are employed in thermoformed and molded interior, exterior and under-the-hood applications (PA6, PA6.6), in insulations for electrical parts, as well as for underbody and control consoles. The broad and multifarious range of solutions includes coupling agents, process additives, thermal and UV stabilizers, plus high-performance mineral fillers and emulsions for fiber sizings.



Coupling Agents

Fiber-reinforced thermoplastic compounds are in increasingly high demand as lightweight materials. They are used as structural components for internal and external applications in the automotive industry. Our innovative high-performance SCONA coupling agents enhance mechanical properties of PP compounds reinforced with carbon, glass, or natural fibers. In particular, they improve elastic modulus, tensile strength, and heat deflection. With their high proportion of bound maleic acid anhydrides, our SCONA products achieve efficient bonding of fibers and permit low additive dosages. Ultimately, this leads to extremely economic formulations.



High-Performance Mineral Fillers

Fillers are needed to improve the stiffness of low density PP compounds. Based on our innovative clay-based technology, our unique functional filler provides a premium alternative to standard talc products. Its lower dosing level reduces the weight, and the mixed minerals improve the material's surface properties. As a result, scratches are less visible and not as deep.

Thermal Stabilizers

Almost every car brand in the world relies on our thermal stabilizers. Since our additives help to minimize oxidation processes, they also help to meet the industry's strict requirements regarding thermal aging. Using our products, PA6 remains stable for up to 2,000 hours at 150 °C and GF-PPA compounds remain stable up to 5,000 hours at 180 °C.

One-Pack Solutions

In combination with our thermal stabilizers, our coupling agents also improve the mechanical properties of thermoplastic components. To comply with the extremely strict regulations for the automotive industry worldwide, we recommend our BYK-MAX HS one-pack concentrates. They slow down thermal aging while increasing impact strength as well as thermal and UV stability.

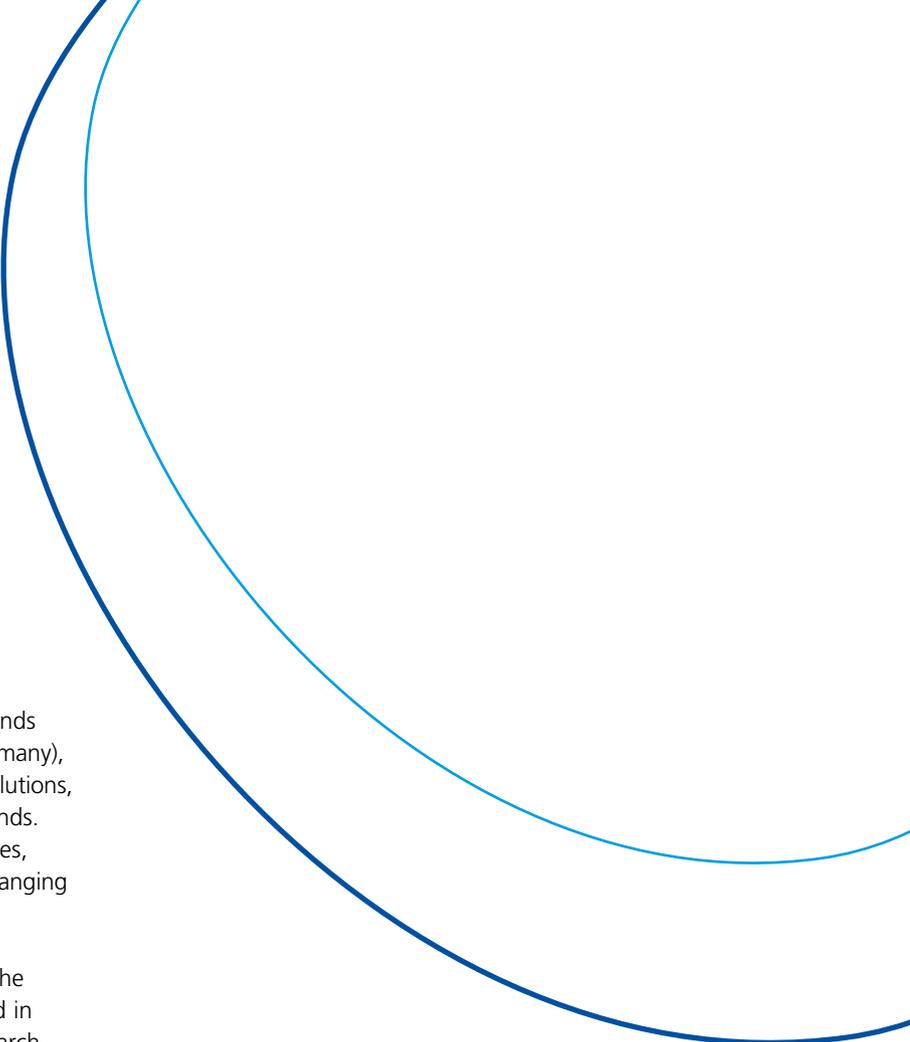
Innovation, Expertise, and Service – on your Doorstep

At BYK, being close to our customers is key to our success. With 16 production sites plus 35 laboratories over five continents, BYK is unrivalled in the industry. Our technical service, which we offer to customers around the world, is unique. Our global presence allows us to deliver our expertise directly to customers.

Hands-on Support

We provide hands-on support in our application labs. Using state-of-the-art equipment, including film extrusion, single and twin extrusion, and injection molding, we replicate our customers' production conditions to run tests of our additives in their applications. The results help identify the formulation best suited to the application, and to define the optimum dosage. This service often saves R&D efforts on our customers' part.

We also collaborate with direct and indirect customers on projects related to specific issues. Through this exchange of know-how and application expertise, we enhance our understanding of markets and industries and prepare ourselves to create solutions for future challenges. We continue to advance our expertise regarding national and international regulatory requirements within different industries, including those related to food contact as well as health and safety.



Solutions for Tomorrow

Assisted by our thermoplastics labs in the Netherlands and Germany, our innovation centers in Wesel (Germany), St. Louis (USA) and in Shanghai (China) focus on solutions, which help our customers address new market trends. Often these trends are related to sustainability issues, energy efficiency, and climate change, as well as changing demographics and digitization.

Currently, we are working on solutions to enable the development of lightweight materials. Plastics used in medicine and healthcare are a further field of research. We are also exploring 3D printing technologies and materials used in autonomous cars. As part of our environmental protection efforts, we are leveraging our recycling expertise and are working on new halogen-free flame retardancy solutions.

Innovation means growth. And in saying so, we put our customers first. Each of our forward-thinking solutions is designed to help them grow in their markets.

Innovation plays a major role at BYK. A fifth of our employees work in jobs related to R&D. We invest eight percent of our annual sales into R&D, new products, and applications, which is more than the average in our industry.



www.byk.com/thermoplastics

BYK USA Inc.

4285 Rider Trail North, Suite 200
 Earth City, MO 63045
 USA
 Tel +1 314 506 3135
 Fax +1 314 506 3202

BYK Additives (Shanghai) Co., Ltd.

Pugong Road 25
 Shanghai Chemical Industry Park (SCIP),
 Fengxian District,
 Shanghai 201507
 China
 Tel +86 21 3749 8888
 Fax +86 21 3749 8899

BYK-Chemie GmbH

P.O. Box 100245
 46462 Wesel
 Germany
 Tel +49 281 670-0
 Fax +49 281 65735

info@byk.com
www.byk.com

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