

**We create
chemistry
that makes
enablers
love plastics.**

Plastic additives
for the automotive industry

 **BASF**
We create chemistry

Pushing back the boundaries of plastics

Success in plastics depends not least on having the right plastic additives. That is why it's important to choose a partner who not only has all the products you need, but can work with you to develop innovative new solutions.

BASF lets you create entirely new additives applications. We are a partner you can rely on to work with you, far into the future. We pioneered the plastics industry in its earliest days and are dedicated to helping our customers achieve sustainable worldwide success in the future. Creating better products. Pioneering new possibilities. And with the vision to shape the future of plastics.

BASF supplies the global plastics industry with an extensive range of additives and colorants. Our long experience in stabilization and protection, comprehensive technical support and innovation empower plastics producers to come up with the right solutions throughout the value chain.



We create chemistry that makes enablers love plastics.

Smart solutions to the challenges of the future

However the plastic processing industry develops in the coming years, you can rely on us deliver the plastic additives solutions you need. After all, working with our customers to enable new additives applications and innovative solutions has been part of our DNA for many decades. So today, no one is better placed to enable you to successfully achieve your goals.



We create chemistry that makes pioneers love plastics.

Innovating the future together

Our pioneering spirit and your need for ever-more innovative solutions will drive the development of next-generation plastic additives for tomorrow's world. Exploring new possibilities. Seeking out more sustainable, high-performance products. The future of plastic additives is in our heads.



We create chemistry that makes originals love plastics.

All the knowledge you need for your future success

Since the birth of the modern plastics industry back in the 1950s, BASF has been leading the way in plastic additives. Many of our innovations have gone on to become industry standards and benchmarks. Today, our long experience, expertise and unceasing passion for discovery mean you can rely on us to deliver the solutions you will need tomorrow.



We create chemistry that makes global challenges love plastics.

Your partner, across the globe

As globalization increases, new opportunities are certain to follow. But wherever your plastics business takes you and whatever additives solutions you need, you'll find BASF is already there. Waiting to support you with local knowledge and solutions customized to meet the needs of your new market. So we can create chemistry together.



We create chemistry that makes builders love plastics.

The power of curiosity, ambition and expertise

Tomorrow's plastics processing industry will need people with all of these qualities, builders who can deliver the cutting edge solutions that the future demands. With our global reach, innovation leadership, wide product portfolio and uncompromising commitment to product quality, BASF can help you make it happen.



We create chemistry that makes partners love plastics.

Together, we can achieve tomorrow's solutions

We in the Plastic Additives business have been working in close partnership with our customers for many decades. Developing new ideas with them, responding to their changing needs, creating new solutions. So you can rest assured that we will be here to support your business in achieving the sustainable, innovative solutions you need to grow in the future.



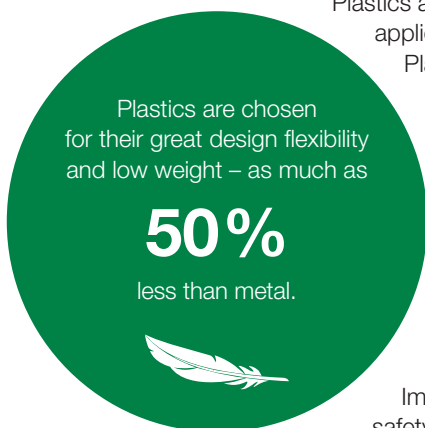
We create chemistry that makes visionaries love plastics.

Working together to maximize sustainability

The future of plastics will rely on our shared vision to make the industry truly sustainable with plastic additives. Continuously anticipating new market trends in the emerging economies. Setting new standards in resource conservation, production efficiency and environmental responsibility. Together, we can shape a bright future for plastics.

Plastics move into pole position

30 years ago, just 5 % of a vehicle's total weight was made up of plastics. Today, that figure is around 20 % and is expected to exceed 25 % in the near future. Versatility, a wide range of properties and low weight give plastics excellent potential for new developments in the automotive industry today. The steady performance improvements of plastic resins and compounds has made it possible for more and more automotive applications to be custom designed in plastics.



Plastics are used in interior, exterior and under the hood applications. The largest application is the interior area.

Plastics are used for hard and soft surface parts, including instrument and door panels, consoles, pillars, seating and all kinds of trim.

At the exterior area of cars, plastics are used for bumpers, trims, fenders and tailgates. Under the hood, they are found in engineering applications such as ductings close to the engine block, the turbocharger and other high-performance areas requiring excellent chemical and heat resistance properties.

Improved impact resistance adds to pedestrian impact safety. Plastics are also being increasingly used in glazing and lighting applications. This impressive increase of plastic consumption in automotive applications can be attributed to major advances in polymer development and improvements in plastic stabilizers and colorants.

OEMs are looking for products that enhance the vehicle's durability, visual appeal and comfort to entice buyers while meeting increasingly stricter emissions and fuel consumption regulations. Plastic additives play a major role in meeting these expectations and supporting the future growth of plastics in automotive applications.



What drives the market...

A wide variety of modern trends is affecting developments in the automotive industry.



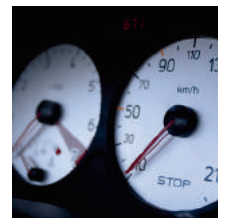
Energy management

Improving energy efficiency and fuel consumption are major drivers in the development of modern cars. Plastics are viable candidates to replace heavier materials like metals and glass, with the final target to reduce the weight of the car.



Regulatory challenges

Concern over environmental pollution and efforts to enhance sustainability are leading to stricter regulations on emission reduction, volatile organic compounds (VOCs) and the end life of vehicles (ELV). Consumers are also requesting odor-free interiors. Plastics contribute through their lighter weight and optimized performance in terms of emissions and odor.



Safety and comfort

With the growing number of vehicles on the road and the increasing social cost of traffic accidents, vehicle safety is a particular focus today. Pedestrian impact regulations are driving new design and material solutions. This is creating new opportunities for plastics implementation in vehicles' front ends, thanks to their outstanding impact resistance and crash emergency absorption.



Design

People are spending more time in their vehicles. They attach high importance not only to comfort, but also to design. New colors and effects are just one area where drivers can express their individuality. Plastics versatility is a major contributor to creating the design freedom required.



Durability and added value

Requirements for cars in their first and second (i.e., resale) life cycles have drastically increased. In addition, long-term comfort and quality aspects are perceived as offering added value. For example, properties such as scratch and mar resistance are gaining in importance.



Efficiency

Cost savings remain a very important driver in the automotive market. OEMs are continually looking for ways to increase output and reduce car development and assembly time – right from the initial concept to the finished vehicle. Plastics versatility allows for new design, processing and assembly processes.

Creating new solutions together

BASF innovates and produces a full range of plastics additives, optimized to meet the special needs of the automotive industry.



Interior

Today's automobile customers are demanding greater functionality, comfort and esthetic appeal. OEMs are reacting to these trends by upgrading specifications for plastic parts. BASF offers a wide range of stabilizers and additives to help virtually any kind of plastic to cope with the new requirements.

Light stability – a key requirement for plastics in automotive applications

Exposure to sunlight, especially at high ambient temperatures, results in loss of mechanical performance and discoloration. BASF provides a wide range of light stabilizers and UV absorbers used in cockpits. BASF's thermal stabilizers protect plastics from oxidation caused by exposure to heat and prevent loss of mechanical properties and esthetics.

Meeting new regulations

Regulatory considerations are increasing the demand for low-emission, low-odor substances. BASF offers a wide range of light stabilizers and thermal stabilizers to cope with the tough demands of plastic interiors.





Durability and resale value – preserved and perceived quality

BASF's Irgasurf® SR anti-scratch additive improves the scratch and mar resistance of interior automobile parts made of PP and TPO, such as instrument and door panels as well as consoles.

BASF's Irgastat® P permanent antistatic and anti-dust agents prevent plastic parts from attracting dust. Light-colored, permanently clean parts like sun visors and overhead compartments contribute to increased perception of comfort and appearance.

BASF's nucleating agent Irgastab® NA helps to reduce cycle time and increase output by supporting thin wall design and weight reduction.

Recommended BASF additives for interior:

	Unfilled PP	Talc filled PPTPO	TPO skin	TPU, PU skin PA	PA	ABS/ASA, PC/ABS, PC/ASA	PVC skin	PU foam
Light stabilizers	Chimassorb®, Tinuvin®, Uvinul®			Tinuvin®, Uvinul®	Tinuvin®, Chimassorb®	Tinuvin®, Uvinul®	Tinuvin®, Chimassorb®	Irgastab® PUR
Process + thermal stabilizers	Irganox®, Irgafos®, Irgastab®, Chimassorb®			Irganox®, Irgafos®		Irgastab®, Irganox®	Irgastab®, Irganox®	Irgastab® PUR
Antidust agent	Irgastat® P			Irgastat® P	Irgastat® P			
Antiscratch agent	Irgasurf® SR							
Nuclating agent	Irgastab® NA							



Exterior

Exterior plastic parts for bumpers, rocker panels, fenders and tailgates increase impact resistance, improve design options for better styling and reduce air resistance. Plastics also enable various functions to be integrated into a single part, resulting in lower manufacturing and assembly costs.

Resistance to weathering is a crucial requirement for exterior plastic parts. BASF's range of light stabilizers maintains the appearance and mechanical properties of a vehicle by providing protection against degradation.



Recommended BASF additives for exterior:

	PP, Talc filled PP and PP/TPO	TPU
Light stabilizers	Tinuvin®, Chimassorb®, Uvinul®	Tinuvin®, Uvinul®
Stabilizers	Irganox®, Irgafos®, Irgastab®, Chimassorb®	Irganox®, Irgafos®



Under the hood

The demand for weight reduction is leading to the partial or complete replacement of metal parts by plastics. Inter-material replacement by more cost effective plastics is already widespread.

To comply with fuel-saving and CO2 emission targets, manufacturers are developing smaller engines. Plastics used in components like air ducts, air intake manifolds, and radiator and cooling hoses are exposed to higher temperatures as well as to potentially degrading substances like chemicals and fuel. BASF's range of thermal stabilizers and pre-blends help maintain the properties of plastics subjected to higher stress conditions under the hood.

Recommended BASF additives for under the hood applications:

	PP	Filled PP	PA	PBT
Process + thermal stabilizers	Irganox®, Irgafos®		Irganox®, Irganox® B, Irgafos®	Irganox®, Irgafos®

Glazing and lighting

Materials such as polycarbonate are much lighter than glass and allow more freedom of design, especially in view of the growing size and sophisticated shapes of vehicle windows. Today, almost all headlight lenses and covers are made of polycarbonate.

BASF's Tinuvin® and Uvinul® light stabilizers protect head and tail lights, glazing and laminated windows against all sorts of weather conditions that lead to loss of mechanical properties and discoloration of surfaces. In this way, they also increase the safety, durability and appearance of vehicles. BASF colorants have outstanding inherent properties that make them highly suitable for coloring polycarbonate and PMMA, used in all kinds of automotive lighting and glazing applications.

Recommended BASF additives for glazing and lighting:

	PC glazing & head lamps	PVB laminated windows	PMMA rear lamps
Light stabilizers	Tinuvin®, Uvinul®	Tinuvin®	Tinuvin®

BASF competencies in automotive

Additive	Brand	Benefit
Antidust agent	Irgastat® P	Prevents buildup of static charges. Reduces dust buildup.
Antiscratch agent	Irgasurf® SR	Improves scratch and mar resistance of interior parts.
Light stabilizers	Chimassorb®	Extend the lifetime of UV-sensitive plastic applications. Maintain appearance and properties of plastic applications.
	Tinuvin®	
	Uvinul®	
	Irgastab® PUR	
Process + thermal stabilizers	Chimassorb®	Thermal protection and long-term durability.
	Irganox®	Maintain integrity of polymer properties during processing.
	Irgafos®	Low emission and low odor antioxidant for flexible foams
	Irgastab® PUR	

Terminology:

ABS: Acrylonitrile Butadienestyrene

PA: Polyamide

PBT: Polybutylene Terephthalate

PC: Polycarbonate

PMMA: Polymethylmethacrylate

PP: Polypropylene

PU: Polyurethane

PVB: Polyvinylbutyral

PVC: Polyvinylchloride

TPO: Thermoplastic Polyolefin

For more information on BASF plastic additives for automotive applications, please contact your account manager or visit www.plasticadditives.basf.com.



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