Enabling High-Quality Surfaces and Premium Aesthetics
Meet the Challenges of Future Mobility

Customized innovation for high performance and premium aesthetics

Trinseo is a leading global partner for the automotive industry. Our rigid and soft-touch plastics are optimized for lightweight construction, enabling low VOC levels, best-in-class scratch and heat resistance, long-term durability allowing for high design flexibility, excellent haptics, and high-end aesthetics.

Spread over 25 countries, our nearly 2,200 employees at 16 manufacturing sites and 11 R&D facilities around the world are ready to quickly respond to our customers’ needs. We are focused on the opportunities and challenges of today’s and future mobility, such as autonomous driving, car connectivity, or increased personalization of vehicles. OEMs and suppliers trust our deep expertise and broad variety of innovative materials for automotive applications, particularly for a functional and aesthetic interior experience.

The development of four brand-new TPE series including sixteen adhesion-modified grades for overmolding applications is a prime example for our way of customized innovation. Our new MEGOL™ AUTO TPS-SEBS products offer optimized adhesion to Trinseo’s MAGNUM™ ABS Resins and PULSE™ PC/ABS Resins for overmolding applications enabling high-quality surfaces and premium aesthetics.
Trinseo Fast Facts

A strong track record – a bold direction

Trinseo (NYSE: TSE) is a global materials solutions provider and manufacturer of plastics, latex binders, and synthetic rubber. We are focused on delivering innovative and sustainable solutions to help our customers create products that touch lives every day – products that are intrinsic to how we live our lives – across a wide range of end-markets, including automotive, consumer electronics, appliances, medical devices, lighting, electrical, carpet, paper and board, building and construction, and tires.

Global resources

Trinseo delivers an unmatched combination of global reach, operational excellence, expertise, leading intellectual property, world-scale assets, and global R&D presence.
Global Consistency. Steady Growth.

**MAGNUM™ goes China**

Since 2017, Trinseo’s production plant in Zhangjiagang, China, has been proudly serving our Asia Pacific customers with MAGNUM™ ABS Resins manufactured with Trinseo’s proprietary mass polymerization technology.

Our high-quality ABS resins have a long and very successful history in automotive applications for all OEMs in North America and Europe. The new production of MAGNUM™ ABS Resins in China reinforces Trinseo’s long-term commitment to having local production of our global products in all major regions for the automotive business.

Trinseo ABS Resins produced in China:

- MAGNUM™ 3416SC
- MAGNUM™ 3616
- MAGNUM™ 3325 MT
- MAGNUM™ 3904

**A partner for rigid and soft-touch plastics solutions**

With the acquisition of API Applicazioni Plastiche Industriali S.p.A. in Mussolente, Italy, we expanded our products portfolio to include soft-touch polymers. In addition to our well known rigid plastics, we also manufacture and provide a broad range of customized TPE and TPU products and EVA-based compounds.

You can benefit from successful long-term experience in powering applications with soft-touch polymer materials and technological expertise providing flexible solutions for a broad range of automotive components.
Form the Future – The Next Level of High-end Automotive Applications

Providing components for today’s and future automotive applications is increasingly challenging, particularly with regard to the evolving transition to electrical and autonomously driving vehicles. Car manufacturers are facing higher consumer pressure to improve the quality of their vehicles. Consumers demand high performance and an excellent look and feel for all automotive components. Interior and exterior designs require not only inviting aesthetics but also more safety, comfort, and digital connectivity always focused on lighter part weight and improved cost efficiency.

Meeting Increased Consumer Needs

Our performance plastics MAGNUM™ ABS Resins, PULSE™ PC/ABS Resins, ENLITE™ PP-LGF, and VELVEX™ Reinforced Elastomers are developed to proactively meet the key requirements of an ever-evolving market. In addition, our soft-touch plastics MEGOL™ TPE-SEBS Compounds, APIGO™ TPO Compounds, TIVILON™ TPV Compounds, APIOLON™ 52 TPU Polymers and Compounds, and APIZERO™ EVA-based Compounds provide optimized features and great benefits for an advanced driving experience.
Solutions for Today’s and Future Mobility

We provide innovative materials for painted and unpainted high-end aesthetic parts with less weight. Focused on your success, our materials enable cost reduction and optimal performance of your applications.

Daimler C-Class – Internal door handle – ABS
MAGNUM™ 3325 MT (unpainted)

Renault – Liftgate component – PP-LGF
ENLITE™ PP-LGF Structural Polymer

AUDI A8 – Door panel – ABS
MAGNUM™ 3G16

BMW i3 – Door sill – PC/ABS
PULSE™ GX50

Audi A6/A7 – Door pocket – Reinforced Elastomer
VELVEX™ 3/290 ESU

Ford Fusion – Door trims – ABS
MAGNUM™ 3325 MT
High-quality Materials for Premium Automotive Applications

Rigid Plastic Solutions

**MAGNUM™ ABS Resins**
Outstanding consistency and purity

Our MAGNUM™ ABS Resins include a wide range of injection molding, blow molding, and extrusion grades. Manufactured by continuous mass polymerization, they offer low base color, high thermal stability, low moisture pickup, superior lot-to-lot consistency, and a purer polymer due to lower levels of process additives. As a result, our ABS products allow for easy coloring or plating, cost-efficient processing, and a superior surface quality.

**PULSE™ Engineering Resins**
Premium applications at reduced costs

We hold a leading position in the PC/ABS markets in Europe and North America. PULSE™ Engineering Resins combine PC and ABS with an ideal mix of mechanical, thermal, and rheological properties for use in both high-performance interior and exterior applications. PULSE™ Engineering Resins provide strong technical features, such as low density, low emissions (VOC), and high impact strength.

**VELVEX™ Reinforced Elastomers**
Luxurious durable solutions

VELVEX™ Reinforced Elastomers are thermoplastics based on elastomer technology with glass reinforcement offering good processability, superior scratch resistance, low gloss as well as high stability and strength. They close the gap between the need to balance both technical as well aesthetic performance – at affordable costs.

**INSPIRE™ Polypropylene Solutions**
Reducing weight and cost

The extensive product line of INSPIRE™ Polypropylene Solutions have been developed for interior and exterior automotive applications. INSPIRE™ offers a wide range of technical and aesthetic performance specifications, enabling reduced weight and cost, high UV light stabilization, excellent scratch resistance, and low gloss level. It is also available for painted or unpainted applications and for components with thin wall thickness.

**ENLITE™ Structural Polymers**
For innovative lightweight solutions

ENLITE™ Polypropylene Long Glass Fiber (PP-LGF) systems and ENLITE™ ABS Long Glass Fiber (LGF) Alloys offer robust, affordable lightweight solutions. Ideal for specific areas where process constraints are limiting, these polymers can replace aluminum or steel. ENLITE™ Structural Polymers allow for the same glass concentrate to be diluted as needed to achieve the required glass content and material properties for different types of applications.

Soft-Touch Plastic Solutions

**MEGOL™ TPS-SEBS Compounds**
The MEGOL™ family of TPE compounds offers the ideal combination of the elasticity and look and feel of rubber in combination with the low processing costs of thermoplastics. MEGOL™ TPS-SEBS Compounds provide a wide range of optimum cold and hot elasticity, UV and age resistance, low emissions and low fogging, a large processing window, great looking, excellent soft-touch properties, and a good compression set.

**APIGO™ TPO Compounds**
APIGO™ materials consist of polyolefin-based compounds modified with elastomers and were created to meet market demands for light products that are highly resistant to low temperatures. APIGO™ TPOs are alternatives to flexible PVC wherever halogen-free materials are required.

**TIVILON™ TPV Compounds**
TIVILON™ is a family of TPE products based on dynamically Vulcanized Thermoplastic Elastomers (TPVs). It provides high elasticity at low and high temperatures, excellent compression set, UV resistance and high melt flow. TIVILON™ is particularly well-suited to bonding with other materials for co-molding and co-extrusion with polyolefins and their compounds.

**APILON™ TPUs**

**APIZERO™ EVA-based Compounds**
APIZERO™ products are crosslinkable and expandable products based on EVA (ethyl-vinyl acetate) for injection molding. APIZERO™ grades were developed to meet the market need for materials to produce light and sustainable applications. It can successfully compete with conventional products such as two-component polyurethane.
MEGOL™ AUTO TPS-SEBS Compounds

16 New TPE Grades for Overmolding

High Performance and Exceptional Surface Quality

Meeting the increasing demand for an advanced automotive interior experience is a key target of Trinseo Automotive. Only the right surface technology and optimized surface materials allow for perfect surface aesthetics, haptics, and functional performance of an automotive component. Therefore, customized innovation has been our approach for the development of MEGOL™ AUTO TPS-SEBS Compounds – our brand-new series of TPEs including 16 adhesion-optimized grades.

The new product series MEGOL™ AUTO AD-S, AD-C, AD-M, and AD-G provide improved adhesion to Trinseo’s MAGNUM™ ABS, PULSE™ PC/ABS, and other polar substrates. We developed our new soft-touch TPEs focused on excellent processability and strong adhesion in overmolding applications. Our 16 new grades enable high-quality surface appearance, including surface homogeneity, and good scratch resistance.

Adhesion is best achieved when polymers are modified to application-specific needs creating tailor-made solutions.

Modification in compounding and/or polymerization process of the TPE

Increase of the TPE’s compatibility with the target substrate

Achieve better overmolding performance and application quality.

MEGOL™ AUTO TPS-SEBS Compounds

Typical Characteristics of Our New Adhesion-optimized TPS-SEBS Compounds

Good to excellent aesthetics/haptics

Gloss range from matte to glossy

Good scratch resistance

Easy demolding and wide processing window

Wide range of hardness for each series

MEGOL™ AUTO TPS-SEBS Compounds

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<th>Test standard</th>
<th>Unit</th>
<th>Hardness</th>
<th>MFI (g/10min)</th>
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Adhesion-modified TPE Solutions for Overmolding

For overmolding, Trinseo ABS and PC/ABS as well as our broad range of adhesion-modified TPEs provide significant synergy without the use of primers, adhesion promoters or surface treatment. This allows for an enhanced interior experience.

Main Features:
- Optimized emission
- Excellent colorability and durability
- Good UV resistance

Main Benefits:
- Improved aesthetics
- High-quality haptics
- Increased performance

Optimization for overmolding

In our Specialized Overmolding Center (SOC), we measure the adhesion between soft and rigid components in accordance with the VDI 2019 testing method standard. We played an active part in co-developing these standards.

Using our state-of-the-art equipment, we can determine the adhesion of overmolded materials in relation to the main injection molding variables, such as:
- Material temperature
- Mold temperature
- Injection speed
- Injection pressure/post pressure

VDI 2019 Peel Test Setup

- Tensile Testing Machine
- Fixture
- TPE
- Thermoplastic
- Flexible Fixture
- Rigid Fixture

VDI 2019 Classification codes

The first character describes the TPE residue on the rigid substrate after the peel test.

- A: No TPE residue on hard component
- B: (1-50%) TPE residue on hard component
- C: (50-99%) TPE residue on hard component
- D: Sample destruction, soft component torn off (> 15 mm)

The second character (if present) indicates whether the TPE strip breaks during peeling at any point along the peel path.

- A/D: No TPE residue on hard component; TPE strip will tear off
- B/D: (1-50%) TPE residue on hard component; TPE strip will tear off
- C/D: (50-99%) TPE residue on hard component; TPE strip will tear off

A
B
C
D

Pattern A
Pattern B
Pattern C
Pattern D

Pattern A/D
Pattern B/D
Pattern C/D
Fast Facts

MAGNUM™ 3325 MT ABS Resin
MAGNUM™ 3416SC ABS Resin
PULSE™ GX50 PC/ABS Engineering Resin
PULSE™ GX70 PC/ABS Engineering Resin
PULSE™ GX90 PC/ABS Engineering Resin
PULSE™ 2000EZ PC/ABS Engineering Resin
MEGOL™ TPS-SEBS Compounds
APIGO™ TPO Compounds
TIVILON™ TPV Compounds
APIILON™ 52 TPU Polymers and Compounds
APIZERO™ EVA-based, crosslinkable, and expandable TPE compounds
MAGNUM™ 3325 MT ABS Resin

**APPLICATIONS**
Matt/unpainted interior automotive applications, mid consoles, pillars, door liners, glove boxes

MAGNUM™ 3325 MT is a medium-heat ABS. Its inherent low gloss combined with a high flow makes it specifically suitable for unpainted interior automotive applications. MAGNUM™ 3325 MT can thereby help you to save up to 50% of the part costs. It is globally available and locally produced in major car production regions.

**Benefits**

- Low gloss allowing paintless, visible applications
- Low density resulting in lighter and cost-optimized parts
- Easy flow, reduced scrap, and faster cycle times, while enabling thin-wall part design for mass reduction
- High-impact strength even at low temperature
- Medium heat resistance optimized for the majority of automotive interior components
- Consistent natural white color produces high-quality part appearance when used with color concentrates (self-coloring) or Trinseo Color Masterbatch Technology
- Low odor & VOC to meet all global automotive OEM specifications

**Properties**

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**OEM specifications:**

- Chrysler MS-08-191 Type A CPN1497 Color: Black
- Chrysler MS-08-191 Type A CPN1174 Color: Color Watch
- Ford ESB-M/4D/8E/A
- Ford WSS-M/4D/843-C1
- GM GM/PABS 013
- GM GPSW/1132P-ABS-T2 Color: Natural
MAGNUM™ 3416SC
ABS Resin

MAGNUM™ 3416SC is the reference high-heat ABS in the automotive industry. It is universally suitable for all interior and exterior applications. It is approved at all major OEMs. MAGNUM™ 3416SC is globally available and locally produced in major car production regions.

Benefits

→ Lot-to-lot consistency allowing for optimal machine parameter settings from the start
→ Self-coloring enabling improvement of costs by using less pigment and lowering your logistic costs
→ Low VOC allowing better interior air quality in the light of increasing regulatory and OEM constraints
→ Heat stability over a wide range of processing temperatures: enhanced part design freedom

Properties

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OEM specifications:

→ BMW GS 93016
   Color: Natural
→ Daimler DBL 5404-B2
→ Ford WSS-M/MD690-B1
→ GM GMW/53572P-ABS-12
   Color: Natural
→ Honda HSM-B3-G
→ JLR STJLR 51.353
→ JLR STJLR 51.3229
→ JLR STJLR 51.3262
   Color: Natural
→ PSA Peugeot-Citroën ABS-0019
→ PSA Peugeot-Citroën ABS-0021
→ RNPO AS32-1
→ Volkswagen TL 527 A
→ Volkswagen TL 527 B

APPLICATIONS
Matt/unpainted interior automotive applications, mid consoles, pillars, door liners, glove boxes
PULSETM GX50
PC/ABS Engineering Resin

**APPLICATIONS**
Mid/floor consoles, lower instrument panel components, door panel trims, pillars, storage components (such as load floor and glove box)

**Benefits**
- Low gloss allowing paintless, visible applications
- Low density resulting in lighter and cost-optimized parts
- Easy flow, reduced scrap, and faster cycle times, while enabling thin-wall part design for mass reduction
- High-impact strength even at low temperature
- Heat resistance optimized for the majority of automotive interior components
- Low odor & VOC to meet all global automotive OEM specifications
- Consistent natural white color enables high-quality part appearance when used with color concentrates (self-coloring) or Trinseo Color Masterbatch Technology

**Properties**

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PULSETM GX50 is an easy-flow, medium-heat, PC/ABS resin delivering optimized performance for automotive interior component applications.

OEM specifications:
- BMW G5 93016
- Daimler DBL 5404 R3
- GM GMW15587P-ABS+TC-T1
- GM GMW15587P - T1, T4
- PSA FTM 620008
- Honda HSM-C4-G (EU)
- Volvo STD 1212, 86
- Tesla TM-1003 10/20
- Volkswagen T1 522 31
PULSE™ GX70
PC/ABS Engineering Resin

APPLICATIONS
Mid/floor consoles, instrument panel components,
door panel trims, pillars, storage components (such as load floors and glove boxes)

PULSE™ GX70 is a high-heat PC/ABS resin delivering optimized performance for automotive interior component applications.

Benefits
- Low gloss allowing paintless, visible applications
- Low density resulting in lighter and cost-optimized parts
- Easy flow, reduced scrap, and faster cycle times, while enabling thin-wall part design for mass reduction
- High-impact strength even at low temperature
- Medium heat resistance optimized for the majority of automotive interior components
- Consistent natural white color produces high-quality part appearance when used with color concentrates (self-coloring) or Trinseo Color Masterbatch Technology
- Low odor & VOC to meet all global automotive OEM specifications

Properties

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OEM specifications:
- Daimler DBL5404.28
- Ford WSS-M-073D4-A1
- GM GMW3558P-ABS+PC-T2
- GM GMW3558P-ABS+PC-T5
- JLR STLR.51.353
- JLR STLR.51.5229
- JLR STLR.51.5262
- PSA Peugeot-Citroën FTM62003
- Tesla TM-100370/20
- Volkswagen TL 522 31-A
- Volvo STD1212.86
# PULSE™ GX90
## PC/ABS Engineering Resin

**APPLICATIONS**
Mid/floor consoles, instrument panel components, door panel trims, pillars, storage components (such as load floors and glove boxes)

**OEM specifications:**
- Volkswagen TL S22 31-8
- Daimler DBS 5404.29
- Ford WSS-M9455B5-1
- GM GMW 355B3P-ABS+PC-T
- Color: Natural
- Volvo STD 1212.86

**Properties**

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PULSE™ GX90 is a super low temperature ductile, high heat, low gloss PC/ABS resin delivering optimized performance for automotive interior component applications.

**Benefits**
- Outstanding high-impact strength even at low temperature
- High heat resistance for demanding automotive interior components
- Consistent natural white color produces high quality part appearance when used with color concentrates (self-coloring) or Trinseo Color Masterbatch Technology
- Low odor & VOC to meet all global automotive OEM specifications
**PULSE™ 2000EZ**

**PC/ABS Engineering Resin**

PULSE™ 2000EZ is a high-heat PC/ABS resin delivering optimized performance for automotive interior component applications.

### Applications

- Mid/floor consoles, instrument panel components, door panel trims, pillars, storage components (such as load floors and glove boxes)

### Benefits

- Easy flow, reduced scrap, and faster cycle times, while enabling thin wall part design for mass reduction
- High-impact strength even at low temperature
- High heat resistance for demanding automotive interior components
- Consistent natural white color produces high quality part appearance when used with color concentrates (self coloring) or Trinseo Color Masterbatch Technology
- Low odor & VOC to meet all global automotive OEM specifications

### Properties

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### OEM specifications:

- Toyota TSM 5526G-2
- 3M T1-0009-S762-1
- BMW GS 93016
- Chrysler MS-OB-195 CFP2967
- Chrysler MS-OB-195 CFPN3159
- Chrysler MS-OB-195 CFPN3401
- Chrysler MS-OB-195 CFPN3408
- Chrysler MS-OB-195 CFPN4098
- Chrysler MS-OB-195 CFPN506
- Daimler DBL 5404-28
- Daimler DBL 5404-29
- Ford WSS-M4D558S-C1
- GM GMW3558P-ABS+PC-T3
- GM GMW3558P-ABS+PC-T6
- RNPO AS33
- Tesla TM-1003 10/20
- Volkswagen T1, S22 31
- Volkswagen T1, S22 31-A
- Volkswagen T1, S22 31-B
HIGH-QUALITY SURFACES AND PREMIUM AESTHETICS

MEGOL™
TPS-SEBS Compounds

The MEGOL™ family of TPE compounds offers the ideal combination of the elasticity and look and feel of rubber with the low processing costs of thermoplastics. Typically based on SEBS, the MEGOL™ range offers optimum cold and hot elasticity, UV and age resistance, low emissions and low fogging as well as a large processing window.

Grades for overmolding and co-extrusion with technopolymers (PP, PE, ABS, SAN, PPMA, PC, PET, PA6, PA66, TPU, POM, etc).

MEGOL™ provides great looking, excellent soft-touch properties, and a good compression set.

Typical characteristics:

→ Remarkable range of hardness (S ShA – ShD) and elastic modulus
→ Excellent resistance to ageing (UV, ozone and weathering)
→ Almost white base color allows very wide color range
→ Excellent performance at low temperatures (Tg = -50°C)
→ High temperature resistance (120°C)
→ Chemical resistance to acids, detergents, bases and aqueous solutions

Specific grades have special characteristics:

→ High temperature resistance and low compression set (MEGOL™ HT)
→ Suitable for co-molding and co-extrusion (MEGOL™ SV) for hard/soft compositions, also to non-polyolefinic substrates to which conventional MEGOL™ is compatible
→ Calendering grades (MEGOL™ TA)
→ Types for automotive interior with low emissions and high scratch resistance
APIGO™ products were created to meet market demands for light products that are highly resistant to low temperatures. We have continually improved the APIGO™ grades, which have been very successful over the years and are excellent alternatives to flexible PVC wherever halogen-free materials are required.

APIGO™ materials are polyolefin-based compounds modified with elastomers. We developed these products to meet the market requirements for alloys with rigidity lower than conventional polypropylene but with customized characteristics for specific applications.

**Typical characteristics:**

- Large range of hardnesses (30 ShA–60 ShD) and elastic modulus
- Excellent performance at low temperatures
- Chemical resistance to acids and bases
- Co-molding to polyolefinic substrates
- Extrusion and injection molding transformation
TIVILON™
TPV Compounds

TIVILON™ is a family of TPE products based on dynamically Vulcanized Thermoplastic Elastomers (TPVs). It provides high elasticity at low and high temperatures, excellent compression set, UV resistance and high melt flow.

TIVILON™ is particularly well-suited to bonding with other materials for co-molding and co-extrusion with polyolefins and their compounds. The improved processability of the TIVILON™ range means that it is easier to transform both for molding and extrusion as compared to traditional TPV products. The creation of customized grades highlights other impressive features of this product such as its resistance to scratches and solvents, its performance when exposed to fire, its increased thermo-resistance and the ability to produce it in a wide range of colors.

Typical characteristics:

→ Large range of hardnesses (30 ShA–60 ShD)
→ High temperature resistance
→ Excellent compression set
→ Chemical resistance to acids and bases
→ Oil resistance better than MEGOL™ and APIGO™
→ Co-molding to polyolefinic substrates
→ Extrusion and injection molding transformation
APILON™ 52
TPU Polymers and Compounds

APILON™ 52 is a line of thermoplastic polyurethanes with excellent mechanical properties, high elasticity and superior resistance to low temperatures. They are very durable and suitable for applications where a high level of resistance to abrasion, oils and fats is necessary and can be customized to suit specific application requirements.

APILON™ 52 is divided into polyester-based and polyether-based series with a scale of hardnesses from 40 Shore A to 75 Shore D and are available in a range of formulations based on the performance required. The range includes:

→ Plasticized APILON™ S2 – with optimum flexibility even at low temperatures, medium-low range of hardnesses and easy processability.

→ Modified APILON™ S2 – as polymeric alloys of soft materials ideal for co- and overmolding or extrusion, where a rubberier haptic and grippy surface is required while maintaining the high mechanical performance.

→ Special APILON™ S2 is a customized formula with properties designed to meet the needs of specific applications (e.g. increased resistance to hydrolysis, microbes and aging).

→ Bio-based grades, both ether and ester, with the same mechanical properties and durability of traditional grades, and a high content of renewable resources (up to 70%)

Automotive customers can use APILON™ S2 products for applications such as scratch-resistant interior surfaces, gaskets, abrasion-resistant tubes and cables, bellows, impact protections, etc. Modified APILON™ S2 grades (because of their optimum bonding properties with various structural techno-polymers) are used as the soft component in items that are constructed from a combination of materials with different hardnesses. They fit wherever the desired effect is to combine the superior durability of TPU with the appearance and haptics of rubber.

Typical characteristics:

→ Large range of hardnesses (30 ShA–60 ShD)
→ High temperature resistance
→ Good compression set
→ Chemical resistance to acids and bases Better oil resistance as compared to MEGOL™ and APIGO™
→ Co-molding to polyolefinic substrates
→ Extrusion and injection molding transformation
→ Excellent abrasion resistance
APIZERO™
EVA-based, Crosslinkable, and Expandable TPE Compounds

Our APIZERO™ products are crosslinkable and expandable products based on EVA (ethyl-vinyl acetate) for injection molding. We developed APIZERO™ to meet the market needs for materials to produce light and sustainable applications. APIZERO™ products can successfully compete with conventional products such as two-component polyurethane.

Some typical applications in the automotive field are expandable plugs and acoustic insulation in the chassis.

Typical characteristics:

- Lightweight
- Abrasion resistance
- Resistance to high and low temperatures
- Excellent aesthetic qualities
- Suitable for injection molding
Together with tier 1 supplier IAC we developed a customized solution for the center seat of the General Motors truck and SUV platform featuring our ABS resin. MAGNUM™ 3325 MT delivered the required demands in matters of lot-to-lot consistency and appearance.

Seat module with high-quality appearance

IAC wanted to achieve high quality appearance and meet GM’s stringent performance requirements for durability and dimensional stability, at the same time. IAC produces twelve ABS components for the center seat assembly, most of which are molded-in-color (not painted) blended with color concentrates at the molding machine. They require a consistent natural color ABS resin with excellent processability to continuously achieve high quality part color match, low gloss appearance, and dimensional stability. Trinseo’s ABS MAGNUM™ 3325 MT natural resin delivers all of these requirements lot after lot. Therefore, IAC chose MAGNUM™ 3325 MT ABS as the primary material for the center seat module parts.

MAGNUM™ 3325 MT ABS provides a high quality, low gloss part surface for unpainted interior applications, while ensuring durability with excellent impact and scratch resistance. The resin meets the requirements of most OEMs’ ABS medium heat interior part and material specifications, including GM GMW15572-ABS-T2.

Multiple IAC plant locations in the USA, Canada and Mexico currently use several MAGNUM™ ABS grades in many different OEM vehicle interior part applications. IAC trusts in Trinseo’s proven ability to deliver consistently high quality material on time, with excellent technical support and customer service, anywhere in the world they need it to produce world-class automotive interior parts and assemblies.
Mid console for Porsche Panamera
MAGNUM™ 3416SC

The production of the Porsche Panamera mid console became more cost efficient as a result of our material and support. Tier 1 Dräxlmaier was able to significantly reduce costs by switching from die-casting to MAGNUM™ 3416SC.

Metal solution replaced by MAGNUM™ 3416SC

Porsche’s luxurious four-door sedan is produced in a classical edition and an Executive edition, the latter provides a slightly longer wheelbase. Dräxlmaier, the German tier 1 for the Panamera 4 with SOP in January 2017, therefore manufactures two variations of the mid console additionally including a cup-holder application.

The mid console requires a material that combines optimum heat resistance and high stiffness with best mechanical properties in case of flexural stress and spontaneous strain. Initially, tier 1 Dräxlmaier planned to manufacture the part with magnesium die casting.

The right material for high-quality performance at reduced costs

In a classical magnesium die-casting process, the complex part contours must be deburred before they can be processed further for the component assembly. Trinseo suggested to switch to a MAGNUM™ ABS grade. The reason for this advice: using MAGNUM™ 3416SC, the supplier was able to eliminate die casting and therefore deburring, which significantly reduces manufacturing costs.

We recommended MAGNUM™ 3416SC, which offers high quality standards and guarantees best process handling. Its lot-to-lot consistency allows for optimal machine parameter settings. High heat stability over a wide range of processing temperatures enabled the required part design freedom. The self-coloring MAGNUM™ 3416SC lets you use less pigment and helps lower logistic costs, resulting in additional cost-saving opportunities.
Garnish and Spoiler for Toyota C-HR
MAGNUM™ 3416SC

We provided our reference high-heat ABS MAGNUM™ 3416SC for various exterior applications in the new Toyota C-HR and helped to solve painting challenges.

MAGNUM™ 3416SC powers Toyota’s new crossover model

We are proud that MAGNUM™ 3416SC is part of Toyota’s step into the growing crossover segment. The Toyota C-HR (launched 2017) is the first hybrid-powered vehicle built by Toyota Motors Manufacturing Turkey (TMMT), and the first Toyota passenger car to be manufactured based on the Toyota New Global Architecture (TNGA) outside of Japan.

The crossover’s styling by Toyota’s California design studio is very near to the design of a concept car previously presented. The dynamic look of the C-HR is seen as a novelty compared to Toyota’s usual car designs.

MAGNUM™ 3416SC ABS Resin is the material of choice for four exterior applications in the new Toyota C-HR such as the B-pillar trims, the upper part of the rooftail spoiler, the outer garnish of the liftgate above the license plate, and the mini spoiler on top of this garnish. The parts are produced by Farplas in Turkey in a light gray color using a local 3% masterbatch. The upper part of the skeletal rooftail spoiler is injection-molded by TMMT in Sakarya, Turkey, using MAGNUM™ 3416SC and Trinseo’s black masterbatch Styrenic CC 2% 39058. Finally, all the parts are painted by TMMT.

Immediate support for painting challenges

MAGNUM™ 3416SC enables the required part design freedom for even complex applications thanks to its high heat stability over a wide range of processing temperatures. Our product offers high quality standards and guarantees best process handling. MAGNUM™ 3416SC is also renowned for its excellent paintability as well as for easy self-coloring properties.

In autumn 2016, Toyota contacted Trinseo for support in performing root cause analysis for problems which occurred with painting the garnish and spoiler applications made from MAGNUM™ 3416SC. While the mini spoilers achieved a reject rate of only 5%, the reported scrap rates for the outer garnish and the rooftail spoiler part were much higher.

TMMT’s first suggestion was the butadiene component in the ABS to be the root cause for the problem. In certain areas of the metallic painted part some darker-colored spots close to the injection gate appeared, so-called blooming. In contrast to metallic colors, no defects appeared after painting the same applications with non-metallic standard colors.

A Trinseo team of experts immediately supported Farplas in Turkey and initiated a testing program during trials, which included the testing of various molding conditions:

→ Molding with high and low injection speed
→ High melt temperature to improve the material flow
→ Different sequential gating to check whether the problem remains in the same location
→ No sequential gating (risk of weld lines) to check whether the problem remains
→ Flaming process prior to painting
→ Annealing process prior to painting

The Trinseo team, under technical lead Simon Van Hille, managed to propose a robust solution to Farplas that ensured continued production of the garnish and spoiler applications.
Door Modules for Audi A8
MAGNUM™ 3616

Our high-heat ABS resin MAGNUM™ 3616 met the high requirements for a door component in the new Audi A8.

Optimum combination of outstanding features

“Audi particularly appreciates MAGNUM™ 3616 because of its optimum combination of impact resistance over a wide range of temperatures, the heat performance, and the very good adhesion properties for class A surface applications like gluing foils and leather,” Thomas Heck, our Application Development Manager says. “These features were the main driver for Audi to select MAGNUM™ 3616 for the new Audi premium class sedan’s door modules. Our ABS resin outperformed a dozen competing materials in comparative tests.”

MAGNUM™ 3616 has enjoyed an excellent reputation in the automotive industry for years. OEMs and suppliers know it as a high-performance and reliable product. Our customer Audi enjoyed many positive experiences with both MAGNUM™ 3616 and its sister resin MAGNUM™ 3416SC in earlier projects in Europe. As a result, our high-heat ABS resin was also the material of choice for the new Audi A8.

Striving for an improvement in the interior experience

The door modules in Audi’s A8 sedans are completely covered by materials such as aluminum, foil, leather, or textile, enabling a highly aesthetic, luxurious class A interior. MAGNUM™ 3616 masters this challenge not only with the above-mentioned combination of high impact resistance, high heat performance, and very good adhesion properties. Claus Hermans, Trinseo Technical Service and Development, explains: “The purity of MAGNUM™ 3616 ensures good adhesion of the covering materials onto the substrate, and the hydrolytical stability makes sure that this adhesion is retained during the life-time of the car in all weather conditions.”

Approved against the VAG-TL527-8 specification, MAGNUM™ 3616 additionally offers a uniquely high-quality standard and excellent lot-to-lot consistency, facilitating the easy setting of machine parameters and allowing very good processing control. “With the high heat resistance over a wide range of temperatures, the very good processability of MAGNUM™ 3616 results in design flexibility,” Claus Hermans continues. “This also enables thin wailing for weight reduction as well as shorter cycle times. Of course, our premium ABS resin offers easy self-coloring and therefore enables less pigment to be used, bringing the benefit of reduced logistics costs.”

Global support focused on customer’s success

In combination with our products, Trinseo’s technical expertise and the consistent customer-focused support from both our team and our distributors form the basis for mutual trust and long-term successful cooperation. There is also global evidence of this, such as the recent support for the OEM to produce interior trunk trim for its Q5 model in Mexico, where Trinseo provided fast and adequate help during the already ongoing SOP.

Another example of our customer-focused approach for global resources and local production is the opening of a new plant with a MAGNUM™ ABS production line in Zhangjiagang, China (November 2017). MAGNUM™ 3616 will be produced in the same high quality as in our other plants worldwide. This reinforces our capacity to provide a consistently high quality of materials around the world.
Pillars for Daimler E-Class
PULSETM GX50 and MAGNUMTM 3325 MT

The supplier Montaplast chose PULSETM GX50 and MAGNUMTM 3325 MT for the molding of the pillars of the Daimler E-Class due to their excellent performance in automotive interior applications.

Continuing collaboration
Trinseo had collaborated with the German supplier Montaplast before when they worked on an earlier model of the Daimler E-Class. Therefore, both Montaplast and Daimler had already had a positive experience with our services and products.

Because of that, Trinseo was the first choice for Montaplast when they had been nominated to mold the pillars for Daimler’s new E-Class (W213). They decided to run tests with our PC/ABS resin PULSETM GX50 and the ABS resin MAGNUMTM 3325 MT. These grades are well-known at Daimler, since they already enhance the Daimler C-Class (W205).

Decisive arguments for our materials
As an easy-flow, low-density PC/ABS resin, PULSETM GX50 is optimized for interior component applications. Its low-gloss appearance allows for a paintless visible application, while its easy flow also enables thin-wall design, which is essential for weight reduction and cost efficiency.

MAGNUMTM 3325 MT is globally approved against Daimler specifications. The ABS convinced the OEM with its low-gloss performance, its reliability as a general-purpose material and with worldwide availability.

4% weight saving due to PULSETM GX50
The validation process resulted in an approval for both PULSETM GX50 and MAGNUMTM 3325 MT in Europe. During the validation for the European Daimler E-Class, Trinseo provided all necessary support, including the offering of factory-colored material for larger volumes.

In total, the cooperation achieved outstanding results: replacing the former material with PULSETM GX50 enabled 4% part weight reduction!
HIGH-QUALITY SURFACES AND PREMIUM AESTHETICS

Interior components for BMW i3 PULSE™ GX50

A case study on the collaborative creation of a breakthrough PC/ABS solution with low-gloss surface characteristics for automotive interiors.

Abstract

With PULSE™ GX50, Trinseo Automotive has introduced an optimized PC/ABS product. This new product is suitable for most interior applications due to its high impact strength at low temperatures combined with good resistance to heat distortion. Furthermore, the PC content was reduced, thus making PC/ABS components not only lighter in weight but also more economical to produce. Along with its low density, the product’s easy processability also contributes to creating low-weight parts with optimized wall thickness. More importantly, a unique feature for these PC/ABS blends is the integrated low-gloss surface characteristics, which means the usual painting step for PC/ABS components can be eliminated. This approach has been successfully demonstrated for the first time for numerous interior components in the new BMW i3 Series. BMW chose unpainted PC/ABS from Trinseo for the following visible components in their i3 series: A-pillar trim, trunk sill, glove box, inner panel, side panels, front panel, rear panel, trim part, arm rest, doorsill, rear seat trim.

Introduction

Trinseo Automotive already has a strong position in the automotive market with its PULSE™ PC/ABS resins. The main attributes of these high-performance resins are their high heat resistance and low temperature ductility. PC/ABS is typically selected as the material of choice for interior components in premium segment cars. Being an amorphous polymer, it facilitates a high-quality interior design through excellent dimensional stability and good post-operation performance. In addition, the high strength and ductility over a broad temperature range guarantees that it meets the most stringent part performance requirements, including airbag deployment and crash exposure. Typical applications include instrument panel retainers, knee bolsters, glove boxes and center- and mid-consoles in premium segment cars. These injection-molded parts are often covered with paint, foam and skin, decorative cloth or laminates.

The continuous drive to reduce costs has resulted in consumers demanding easier flowing, lower-density and lower-cost resins. Such lower-viscosity resins provide the opportunity for manufacturing cost optimization. Since most PC/ABS interior parts are painted because of the typical high-gloss appearance associated with the use of PC/ABS, it is clear that opportunities to eliminate the paint step will also be of interest.

The abovementioned market demands were taken into consideration for developing a next-generation PC/ABS formulation for automotive interior components.
Polymer science in PC/ABS as a basis for PULSE™ GX50

The immiscible PC/ABS polymer blend is a very successful thermoplastic material for engineering because of its high heat resistance and synergistic low-temperature toughness. The heat resistance and toughness attributes are primarily a result of the polycarbonate (PC) phase. However, the PC itself has a relatively high viscosity, which can be improved to some extent by reducing the molecular weight. As shown in Figure 1, ABS is an effective flow promoter for the PC/ABS blend due to its shear thinning behavior at the high shear levels typical for an injection-molding process. The rubber in the ABS is the essential component for providing outstanding high-impact performance at low temperatures. This unique characteristic toughness performs better than PC and ABS components separately. The rubber morphology of ABS resins produced via mass polymerization in particular has been proven to provide best-in-class ductility at low temperatures in PC/ABS blends.

Overview of PULSE™ GX50 development criteria

The end result of the development of PULSE™ GX50 is a resin that provides a ductile performance at -30°C in the falling dart test, and improved practical flow of 15% over the well-known PULSE™ A35-105 grade material. In addition, the density of the new product is reduced by ~3%. The heat resistance performance is also reduced with the optimization of the PC content, but it is still able to meet practical heat exposure requirements of 100°C to 110°C. In fact, this temperature range covers requirements for almost all interior parts.

Figure 2 shows the fit of PULSE™ GX50 as a high-ductility material in between HHABS grades and the prevalent PC/ABS grades. These PC/ABS grades traditionally contain over 60% PC, providing heat-resistance properties much greater than the practical needs for most applications. Yet the high PC levels were needed to assure low-temperature ductility.

Another unique feature obtained from the mass ABS-rich formulation is its low-gloss performance. Both the semi-continuous morphology of the blend and the mass ABS rubber morphology provide a unique low-gloss appearance for molded surfaces.

Figure 3 shows the outstanding retention of low-temperature ductility at the high practical flow levels typical for PC/ABS blends.

Figure 4 shows the additional density benefit of the blend with decreasing PC level.

A critical performance characteristic for any new product is its durability in practical use. This can include color stability with UV exposure and resistance to scratching or marring, not to mention being able to retain critical physical properties after long-term aging in severe environmental conditions. PC/ABS can be sensitive to PC molecular-weight breakdown under heat exposure in the molding process and during long heat aging, especially in humid conditions. Developing a new UV-stabilization package in combination with the inherent high stability of the mass ABS used in PULSE™ GX50 UVB has resulted in a very stable product that retains its high impact performance after the environmental cycle tests.
Tooling design support for BMW i3 unpainted visible parts

Non-uniform surface aesthetics for an unpainted part are caused by variations in the surface’s micro-texture. Assuming the polymer composition is fixed for the application, these non-surface aesthetics can be caused by differential reproduction or damage to the micro-texture due to the part’s design, tool construction, the manufacturing process or a combination of the above. Thus specific attention must be paid to all three aspects in order to achieve satisfactory unpainted surface aesthetics (i.e. a smaller yellow segment).

Tool construction

Carefully constructing a mold is the second most important step towards achieving an attractive unpainted injection-molded part. Awareness of tool design requirements for unpainted parts is essential to avoid expensive tooling modifications at a later stage of development. For instance, such characteristics are used to place ejectors, date dials, graphics, etc. on invisible surfaces. In most cases of ejectors, using non-circular shapes allows them to be placed on the part’s edges. On the core side of the part, the surface should be flush across ejectors, sliders, etc., while moving cores need to be well embedded to avoid movement. Gate positioning and/or flow leaders define a weld line’s quality and length. A weld line will be visible if formed by two flow fronts meeting in a frontal manner (as can be seen in Figure 7). In case these flow fronts meet at an angle (see Figure 8), the resulting weld line will be much shorter or possibly disappear entirely.

Part design

The process of constructing a part’s geometry has a decisive impact on the possibility of achieving an outstanding unpainted part. Therefore it is critical that part and tool designers acknowledge that the part will be unpainted and simultaneously understand the part’s visible surfaces. As a result, they can avoid surfaces that angle too steeply, can place ribbing on non-visible surfaces, and apply a styling feature to an opening in order to “camouflage” resulting weld lines as several examples.

Processing

Proper part and tool design will guarantee the molding of an attractive, low gloss part while allowing a broad processing window. The molding process offers few means to overcome defects caused by incorrect part and/or tool design. Better, more uniform surface aesthetics are achieved by using profiled injection, while over-packing is moderately applied to those areas closer to the gates. Weld lines on larger parts can be avoided by using the sequential gating technique. In order to avoid visible switchover marks, valve gate controllers are offered that allow these gates to be opened gradually.

Summary

Producing an excellent unpainted plastic part requires efforts from all contributing parties. Ideally, all parties – OEM, tier-1 supplier, mold maker and material supplier – work together from the very start of the design process. This collaborative approach increases the chances of creating an attractive, unpainted car interior at an approximately zero% lower cost than compared to the equivalent painted part.

The collaboration between Trinseo and BMW on the new i3 is an example of how collaboration can result in true innovation for automotive interior components. The newly developed PULSE™ GX50 provides the desired combination of good low-temperature ductility – one that is maintained after the environmental testing cycles – good UV resistance and low gloss, making it the preferred fit for multiple unpainted components in the BMW i3 interior.
PULSE™ AX50 as Substrate for Parts Made with ColorForm Technology from KraussMaffei

Together with our partners KraussMaffei and Panadur we demonstrated at the K 2016 trade show how PULSE™ AX50 and polyurea enables KraussMaffei to produce lacquered interior trim elements with only one machine using one tool.

Practical example of innovation in lightweight construction

KraussMaffei is a leading manufacturer of injection molding machinery, reaction process machinery and automation. Panadur is acknowledged as a supplier of innovative, functional coatings. Both partners invited us to KraussMaffei’s booth at the K 2016 trade show to produce an automotive interior decorative trim using KraussMaffei’s ColorForm technology together with PULSE™ AX50 and Panadur’s polyurea paint. In the past, the interior trim was produced by an OEM in a traditional 2-stage process. The use of PULSE™ AX50 and polyurea enables KraussMaffei to produce the decorative element more economically and in better quality with one machine using one tool.

PULSE™ AX50 for high-quality and economical interior applications

The positive experience of a German premium OEM with PULSE™ AX50 drew the attention of KraussMaffei and Panadur to our advanced easy flow PC/ABS resin. With very low density and good heat distortion properties, PULSE™ AX50 provides optimum performance features for the production of components in automotive interiors. Trinseo developed its innovative PC/ABS PULSEM™ AX50 resin specifically for the production of high-gloss panel elements that need to withstand impacts while offering an aesthetic, high-quality appearance. The focus of development was on achieving optimum adhesive properties for polyurethane and polyurea paints. PULSEM™ AX50 is ideal for time- and cost-saving multi-component injection molding as used in KraussMaffei’s advanced ColorForm technology.
Two production steps in one machine using the same tool

The innovative production solution allows the surface material to be introduced directly into the cavity of the tool during the injection process. The thermoplastic basic body is coated while it is still in the mold, eliminating the need for painting or coating in what is otherwise a conventional second processing step. This results in less waste as well as in significantly lower material, process and logistic costs for suppliers and OEMs alike.

Perfectly matched characteristics

The outstanding flow characteristics of PULSE™ AX50, demonstrated with a spiral flow of over 55 cm (260°C, 2 mm, 1,800 bar), are the main reason for the excellent processing properties of the material. PULSE™ AX50 not only has excellent flow characteristics but also a very low density of just 1.09 g/ccm (ISO 1183/B). When used in the ColorForm process together with the polyurethane or polyurea surface coating system, a significant reduction in component weight can be achieved. Polyurethane and polyurea are also valued for their low density. It is possible to achieve very thin coatings with these easy-flow paints, enabling thinner walls than is the case with PMMA, which is used in other coating processes. In combination with a PC/ABS or ABS substrate with appropriate fillers, polyurethane and polyurea also enable thin-walled, lightweight parts to be produced without forfeiting rigidity or dimensional stability, even with workpieces with a complex structure.

With PULSE™ AX50 Trinseo thus makes a significant contribution to the cost-efficient production of aesthetic and functionally advanced automotive plastic applications for its customers.

PULSE™ AX50 provides excellent adhesion results

Adhesion tests were performed with test plaques from PULSE™ AX50 coated with different lacquers in the ColorForm process.

For this, the PositTest method was used. The analysis of the adhesion by recipe formulation proved that PULSE™ AX50 provides very good adhesion performance that meets automotive interior requirements.

The adhesion of polyurea and polyurethane on to PULSE™ AX50 as molded and after climate change, hydrolysis, thermo-oxidative aging, hot light aging, and sun test is retained or improved, and meets the requirements for automotive interior applications.
Roof Trims for BMW PULSETM XT7215

PULSETM XT7215 provided the required low CLTE and high dimensional stability for roof trims for a special version of the new BMW 5 Touring.

A perfect match

Our PULSETM XT-series is well known at BMW and approved against the OEM's specifications. For the new BMW 5 Series Touring we provide PULSETM XT7215 for the lacquered roof pitch trims. BMW's supplier for these parts chose our mineral-filled PC/ABS mainly due to the low CLTE and the high dimensional stability of PULSETM XT7215. The roof trim cover painted in piano black is mounted on a carrier made from 20 percent glass-filled polypropylene that is overmolded with two lips made of TPS.

We could support the supplier in tackling a particular challenge in this project. Originally, it was planned to manufacture the exterior trim part from mineral-filled ABS resin. However, the tier had to switch to a mineral-filled PC/ABS resin in response to BMW's demand for higher heat-resistant properties.

The trim application is intended to be used in a special version of the 5 Series Touring that has no roof railing system. It has a trapezoidal shape and must work well when mounted on a carrier part made from a 20 percent glass-filled PP – including two overmolded lips of TPS – that is fitted to the mounting of the roof rails to cover it. This structural element was already produced, and it defined the presets for the design and production of the trim part for which our material was to be used.

Since the application is firmly attached to the carrier, it cannot move, and its dimensional stability must match that of the frame. The trim must not be allowed to shrink or warp. Therefore, the substrate must provide greater heat resistance than the mineral-filled ABS material originally intended for use.

Many benefits and ready for immediate use

PULSETM XT7215 has proved in many applications that it enables small gaps and a tight fit and finish for exterior applications thanks to its very low CLTE (35 mm/mm °C). It offers high ductility and easy flow allowing for greater design freedom, optimized wall thickness, and better economics. It can be processed even on smaller machines and allows improved cycles times to be achieved. Additionally, it facilitates the fabrication of lighter parts and the optimization of costs because of significant density advantage (density of PULSETM XT7215: 1.25 g/cc).

BMW’s supplier ordered a PULSETM XT7215 material sample and invited us to deliver a presentation about the Trinseo exterior grades portfolio and the case study about the roof rails for the Opel Astra Sports Tourer. Following this, we sent another batch for further tests, which the material successfully passed. It was a supporting fact that PULSETM XT7215 was already approved and listed at BMW (BMW standard GS/nine.lf/three.lf/zero.lf/one.lf/six.lf). Our material not only met all the key requirements, it could also be used immediately without cost-relevant delays.
Door Pockets for Audi A6/A7
VELVEX™ 5250 ESU

Car manufacturers are looking for unpainted solutions in order to reduce costs by avoiding the paint/coating process of visible components. Our high-performance plastic materials meet numerous requirements such as scratch resistance and UV stability, as well as good processability optimized for the best-possible reproduction of the mold texture on the application’s surface for high aesthetics.

Trust in good performance of the material and the Trinseo team

Our customer Audi continuously searches for cost-effective, high-performance raw material solutions to improve the aesthetics, haptics, and functionality of unlacquered surfaces in its platforms’ automotive interior applications. Trinseo’s VELVEX™ Reinforced Elastomer products are ideally suited to Audi’s challenging requirements.

For the new Audi A6/A7, the supplier Samvardhana Motherson Peguform (SMP) needed a cost-effective material solution providing enhanced soft touch and excellent haptics, high scratch resistance and low gloss levels in combination with excellent weatherability. VELVEX™ 5250 ESU meets these high requirements, and our customers already know the benefits of Trinseo’s reinforced elastomer from test moldings. The VELVEX™ grade had been tested using the molds from the door panels of the Audi A3 convertible. The product was developed by Development Leader Norwin van Riel and his team, and it is approved against the Audi specification TL S2705-A.

It was obvious for Audi to contact our team because of the successful testing of the material for the A3. Another reason for the OEM’s decision was the very good collaboration with the Trinseo team on the A3 and many other projects. Additionally, VELVEX™ 5250 ESU provides a significant economic advantage without any loss of quality or performance. First reviews from international car magazines are very positive and praise the outstanding aesthetics and feel of the new A6/A7’s interiors. The media attest that the new Audi models offer high-quality interior materials and an upscale cabin even by luxury-car standards.

VELVEX™ 5250 ESU successfully passed tough tests

SMP, Audi, and our team started the project in 2015 with extensive tests of VELVEX™ 5250 ESU not only under the usual laboratory conditions but also in outdoor tests under tough conditions. Our partners produced test parts using the injection molding tool from the A3 door modules for this purpose. Test workpieces were brought to testing locations in the Kalahari Desert, Southern Africa, and a challenging environment in Arizona, USA. VELVEX™ 5250 ESU successfully passed the 18-month testing phase under extreme weather and environmental conditions.

Scratch test at MVV
Liftgate for Renault Clio and Espace
ENLITE™ PP-LGF Structural Polymers

Through close collaboration over more than five years between Trinseo and Renault, an innovative liftgate concept produced with ENLITE™ PP-LGF Structural Polymers was designed and manufactured.

Long-term collaboration for successful weight reduction

We started with the liftgate for the 4th generation Renault Clio, paving the way for commercialization on the Renault Espace and other vehicles in the near future. The main objectives were weight savings, styling freedom, recycling, and function integration. With the full thermoplastic liftgate solution, Renault not only contributes to weight reduction for optimal fuel efficiency but also responds to waste management recycling guidelines, promoting recyclability without disassembly of the application.

Light material for heavy strains

A complex auto part like the liftgate must meet high standards for visual appeal, have a perfect fit and be able to invisibly accommodate many hidden elements such as hinges, lock mechanisms and electrical wiring. At the same time, impact resistance, expansion, and durability (particularly of the structural support part of the liftgate) are critical factors, since the liftgate is subject to mechanical and climatic forces that can lead to deformation. Still, the liftgate must be able to fulfill its function while remaining stable and watertight.

For the Clio liftgate, the polypropylene long glass fiber material system ENLITE™ Structural Polymers was introduced. By increasing the long glass fiber content the robustness and stiffness of the injection-molded parts could be enhanced. We also helped Renault to optimize the parts construction, the tool design, and the injection-molding machine in pursuit of the goal of a 10% percent thermoplastic liftgate. Renault was already aware of Trinseo’s engineering capabilities from prior projects such as the structural development work we did for the front chassis of the VW Golf, also using PP-LGF.

Future-oriented solutions

The Renault engineering team was encouraged and motivated by the positive “on-the-road” performance reports of the thermoplastic liftgate as well as by the entire experience of working on the Clio project. Therefore, the semi-structural component of the new Espace liftgate was also outfitted with a similar all-thermo-plastic solution using TP and PP-LGF. This way, not only significant weight reduction but also cost-reduction of 10 percent were achievable. It is also possible with other applications: instrument panel carriers, seat pans, door module carrier plates, and front-end carriers to name just a few of the opportunities where our solutions could be used to meet weight-reduction goals.

Key results of the liftgate development:

→ Low gloss allowing paintless, visible applications
→ Low density resulting in lighter and cost-optimized parts
→ Easy flow, reduced scrap, and faster cycle times, while enabling thin-wall part design for mass reduction
→ High-impact strength even at low temperature
→ Medium heat resistance optimized for the majority of automotive interior components
→ Consistent natural white color produces high-quality part appearance when used with color concentrates (self-coloring) or Trinseo Color Masterbatch Technology
→ Low odor & VOC to meet all global automotive OEM specifications

Key benefits of PP-LGF for semi-structural applications:

→ Weight reduction of 15% or more
→ Cost efficiencies – reduced material, production, application costs
→ Dimensional stability – stiffness, low Coefficient of Thermal Expansion (CTE)
→ Durability – impact, scratch and mar, Long Term Thermal Aging strength
→ Appearance – low gloss, UV stability
→ High level of dimensional stability
→ Processing flexibility – Trinseo At-Press Technology
→ Recycling by regrinding and re-processing
Quarter and Fixed Glass Sealing for Hyundai/Kia

MEGOL™ TPS-SEBS Compound

Korean OEM benefits from the performance, versatility and cost-competitiveness of our TPS-SEBS Compounds for exterior quarter glass seals and exterior and interior fixed glass sealings.

Meeting the increasing challenges for automotive glazing and glass sealing

Hyundai and Kia are using our TPE solution MEGOL™ DP2334/70FL1 UVR1 BLACK to produce interior and exterior fixed glass sealings for the 4-door sports sedan Kia K8 (Kia Stinger). The collaboration started for quarter glass seals and mirror triangle sealings, thanks to the support and competence of our Korean distributor Novachem. Subsequently, Trinseo and Novachem were able to expand the business to fixed glass sealings because of our material’s high performance and its cost-competitiveness.

In an ever-evolving market for automotive glazing, OEMs and suppliers must meet consistently increasing customer demands. Glass applications play a vital role in the aerodynamics, aesthetics, and comfort of a vehicle. Today’s automotive glazing fulfills many complex tasks, such as active and passive safety-functions, or integral contribution to the stability of the bodywork (structure-bonded fixed glazing). The demands of tier 1 supplier Sejin and the OEMs on the TPE solution to be used for the quarter and fixed glass application in our project were correspondingly high.

Good processability and price advantage as decisive factors

Hyundai/Kia required a material enabling optimum cohesive adhesion of the TPE soft seal onto PC/ABS and ASA rigid frame in an overmolding application with two components. Since the final parts are used for exterior as well as for interior sealings, compliance with industry standards for exterior weathering resistance was expected. Above all, the material had to offer good processability in combination with a very good surface without sink marks or flow lines, as well as cost-effective, very short cycle times. The TPE solution had to work smoothly in various molds with different geometries.

MEGOL™ DP2334/70FL1 UVR1 BLACK was the perfect match for the challenging requirements, and its price advantage over the competition determined the success of our project. The material meets the Hyundai/Kia material specification MS 210-06 for molded plastics used in general performance of automotive exterior parts.

Our successful TPS-SEBS Compound provides a peeling force greater than or equal to 7N/mm (according VDI 2019 standard), enabling the required cohesive adhesion with the rigid frame made from PC/ABS. At the same time, MEGOL™ DP2334/70FL1 UVR1 BLACK successfully passed the Hyundai/Kia climatic tests. It meets both the requirements of exterior weathering resistance (2500 kJ/sq m exposure with ΔE < 3 as well as the requirements for interior use (e. g. fogging, VOC emissions and odor).

The customer benefits from easy demolding and from the wide processing window. The flow properties offer great flexibility even with complex geometries. It is currently used in eight molds for eight different parts. The material’s good surface appearance and processability allow for a 5 second short cycle time.

MEGOL™ DP2334/70FL1 UVR1 BLACK can be considered to be a material of choice for 2K exterior (and interior) applications on PC/ABS and ASA, where high performance and versatility are required and need to be accompanied by significant price competitiveness without a lack of quality.
Cup Holders for Volkswagen
MEGOL™ TPS-SEBS Compound

VW Golf and Passat benefit from the good scratch resistance and surface appearance as well as the large process window of the SEBS compound MEGOL™ HT1 SS SV/P UVR.

Trust in experienced partners and successful materials

With the acquisition of API S.p.A., Trinseo expanded its rigid plastics materials portfolio to include innovative TPE solutions and the associated technology expertise. Our customer Volkswagen and tier 1 supplier BOS Group rely on the benefits of API’S Styrene-Ethylene-Butylene-Styrene (SEBS) compound MEGOL™ to produce high-quality, soft-touch armrest cup holders. Distributor A. Schulman was able to provide MEGOL™ HT1 SS SV/P UVR Black for the injection molding of the rear armrest cup holders in the current VW models Golf and Passat. The material is approved against the OEM’s specifications VW 50123, VW 50180, and VW 2.8.1. The BOS Group was looking for a soft material for the VW Golf 6 with which they could produce the armrest cup holders in the foldable middle seatback. The TPE solution had to enable a soft bottom for the application, as otherwise passengers would feel uncomfortable touching a hard component in the seatback when the armrest is raised.

Softness and good appearance with cost-effective processing

Important requirements were a strong adhesion onto ABS, good scratch resistance, and a high-quality surface appearance. Naturally, the material had to meet the usual requirements for an automotive interior material, i.e. low emissions (VOC)/odor, and good UV resistance. Besides these aspects, the TPE solution had above all to address serious problems that occurred with a competitor’s material: a very large process window was needed to avoid serious demolding problems with consequent part deformation. Additionally, the competitor’s substrate caused adhesion problems and surface defects commonly known as flow lines and spots.

The most important advantage of MEGOL™ HT1 SS SV/P UVR Black – compared to the competition – is the large process window when manufacturing the cup holder. It allows for shorter cycle times as well as a higher-quality surface appearance and significantly fewer rejected parts.

Features of MEGOL™ HT1 SS SV/P UVR

- Good adhesion on ABS
- High scratch resistance
- Low stiffness
- Low emissions, odor, and fogging
- Good UV resistance

MEGOL™ HT1 SS SV/P UVR BLACK enabled our partner to produce a 2K application fulfilling the desired purpose of the application’s softness not unlike the rest of the back seat. Our solution provided very good adhesion between the TPE soft bottom and the ABS rigid frame (peeling force ≥ 5N/mm according to VDI 2019 standard), good scratch resistance and surface appearance (no flow lines at all), and the – crucially – the very large process window. With the use of our solution our partner could immediately reduce the percentage of discarded workpieces to acceptable standard levels. At the same time, MEGOL™ HT1 SS SV/P UVR BLACK ensures compliance with the OEM’s requirements for fogging (VW PV 3015, < 2mg), for VOC and odor (VW 50180), and UV resistance for automotive interiors (VW PV/303).

The whole MEGOL™ family of TPE compounds offers an optimized combination of the elasticity, look, and feel of rubber with the cost-efficiency of thermoplastics.
Globally Available Knowledge and Expertise

The Trinseo Application Engineering & Design Center (AEDC)

Our AEDC combines specific expertise as well as Computer Assisted Engineering (CAE) to cater for our customers' engineering projects around the world. Our virtual prototyping reduces our customers' project lead-time and financial risks during their application development process.

Utilizing a number of software tools, we offer our customers a broad range of services including structural and process simulation. We are able to define process parameters for materials, provide ideas on applications, demonstrate the projected appearance of the end-products, and provide design or process improvement recommendations.

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