Trinseo Material Solutions for Automotive

Our innovative portfolio of automotive rigid and soft-touch plastics enables the production of lightweight applications – from interior trim to exterior moldings – for all demands of today’s and future mobility. Trinseo’s products are especially developed for high-quality appearance and premium haptics over time, supporting increased end-customer satisfaction and higher resale value.

We are Trinseo

A Strong Track Record, a Bold Direction

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 every day – products that are intrinsic to how we live our lives – across a wide range of end markets, including automotive, consumer, home appliances, medical devices, lighting, electrical, carpet, paper and board, building and construction, and more.

Global Resources, Local Production

Trinseo is a technology leader and innovator in performance plastics solutions. Our manufacturing, Research & Development (R&D), and testing facilities located strategically across the globe allow us to collaborate, develop, and manufacture seamlessly across regions.

Rigid Plastics for Automotive Applications

<table>
<thead>
<tr>
<th>Product Line</th>
<th>Market Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAGNUM™ ABS Resins</td>
<td>Interior, Exterior</td>
</tr>
<tr>
<td>PULSE™ PC/ABS Resins</td>
<td>Interior, Exterior</td>
</tr>
<tr>
<td>ENLITE™ Structural Polymers</td>
<td>Semi-structural</td>
</tr>
<tr>
<td>INSPIRE™ Polypropylene</td>
<td>Interior, Exterior</td>
</tr>
<tr>
<td>VELVEX™ Reinforced Elastomers</td>
<td>Interior</td>
</tr>
</tbody>
</table>

TPE Portfolio for Automotive Applications

<table>
<thead>
<tr>
<th>Product Line</th>
<th>Market Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEGOL™ TPS-SEBS Compounds</td>
<td>Interior, Exterior, Chassis, Under the hood</td>
</tr>
<tr>
<td>APIGO™ TPO Compounds</td>
<td>Interior, Exterior</td>
</tr>
<tr>
<td>TIVILON™ TPV Compounds</td>
<td>Interior, Exterior, Chassis, Under the hood</td>
</tr>
<tr>
<td>APILON™ 52 TPU Polymers and Compounds</td>
<td>Interior, Exterior, Under the hood</td>
</tr>
<tr>
<td>APIZERO™ EVA-based Compounds</td>
<td>Chassis</td>
</tr>
</tbody>
</table>

Enlite™ PP LGF

Innovative long glass fiber thermoplastics for reduced weight and part costs

Innovative long glass fiber thermoplastics for reduced weight and part costs

Our Automotive Solutions Clusters

- Electrification
- Lightweighting
- Assisted & Autonomous
- Car-Sharing Interiors

Trinseo Automotive

ENLITE™ PP LGF

Innovative long glass fiber thermoplastics for reduced weight and part costs

Copyright © Trinseo (2020) All rights reserved. Form No. 851-03401. Printed in China.

Trinseo’s long glass fiber reinforced structural polymers

ENLITE™ PP LGF allow for up to 20 percent savings in part weight and offer significant cost-saving potential when used as a creat alternative. Whenever stiffness, dimensional stability, and thermal resistance are important, the system-based approach of the ENLITE™ Structural Polymers product family provides maximum flexibility.

Ideal for specific areas where process constraints are limiting, our advanced ENLITE™ PP LGF solutions can replace aluminum and enable lightweight semi-structural parts — also with unpainted Class A surfaces where this is a requirement.

NEW: ENLITE™ LGF 1604 – 60% PP LGF Concentrate
NEW: ENLITE™ LGF 1602 – (DLGF 9621) 60% PP LGF Concentrate
NEW: ENLITE™ PP LGF

Processing advantages and better dimensional stability

When compared to PP SGF, ENLITE™ PP LGF provides enhanced creep performance for better dimensional stability. It offers a robust, cost-effective lightweight solution for structural applications. Tests showed that the loose fiber content and high viscosity of the ENLITE™ PP LGF system allow for great manufacturing flexibility. PP and LGF concentrates can be blended directly at the injection machine to achieve the blend ratio required for your application.

Advanced PP dilution results: High flow and low VOC emissions

Our new dilution PP for ENLITE™ PP LGF provides very easy flow for thin wall design resulting in lighter part weight. In addition, it meets customer’s requirements for low emissions and odors.

Table: Injection Pressure (bar)

<table>
<thead>
<tr>
<th>Resin</th>
<th>LGF 8000</th>
<th>LGF 7940LE / LGF 9411 LGF 9621 + 33.3 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGF 8100</td>
<td>106</td>
<td>108</td>
</tr>
<tr>
<td>LGF 8000</td>
<td>172</td>
<td>172</td>
</tr>
<tr>
<td>LGF 7940LE</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>LGF 9411</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>LGF 9621 + 33.3 %</td>
<td>28</td>
<td>28</td>
</tr>
</tbody>
</table>

NEW generation ENLITE™ PP LGF for aesthetic surfaces

In a companion with current LGF40, the new generation of LGF40 and LGF60 solutions offer superior aesthetics along with improved physical properties, better flow, and lower emissions.

Lightweight Liftgate Design with ENLITE™ PP LGF

We collaborated with a global OEM for the development and production of a thermoplastic liftgate. We introduced the polypropylene long glass fiber material system ENLITE™ Structural Polymers, and helped to optimize the part construction, tool design, and injection-molding processing conditions.

Our customer’s main objectives were: weight saving, styling freedom, easy recycling, and optimum function integration. A solution just like the liftgate meets high standards for visual appeal and function as well as for visibility, accommodates many body elements (hinges, lock mechanisms, electrical wiring), impact resistance, and durability are critical factors, since the application 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.

Based on positive experience with a previous project, the semi-structural liftgate component was outfitted with our all-thermoplastic solution using PP TF and PP LGF. We achieved not only a significant weight reduction but also a cost reduction of 10 percent, which is also possible for other applications (e.g., trim panel doors, seat parts, door module carrier plates, hood and front-end carrier).

Using ENLITE™ PP LGF, our customer was able to not only reduce the part weight for optimal fuel efficiency and cost-benefit for the VOI codes, but also to promote easier recyclability without disassembly of the application by increasing the long glass fiber content, the robustness and stiffness of the injected parts could be enhanced.

Key benefits of PP LGF for semi-structural applications:

- Weight reduction of up to 20% (vs. steel)
- Cost efficiencies (reduced material/extrusion/ application costs)
- Dimensional stability (allowing low GTI)
- 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 re-melting and re-processing

Key results of the liftgate development:

- Low density resulting in higher and cost-optimized parts
- Easy to VOC to invert all global automotive OEM specifications
- Low gloss allowing panties, visible applications
- Easy to reduce scrap, and faster cycle times
- Thin-wall part design for mass reduction
- Medium heat resistance optimal for the majority of automotive exterior components
- Consistent natural white color produces high-quality part appearance when used with color concentrates (Self-coloring) or Trinseo Color Masterbatch Technology

Processing advantages and better dimensional stability

When compared to PP LGF, ENLITE™ PP LGF provides enhanced creep performance for better dimensional stability. It offers a robust, cost-effective lightweight solution for structural applications. Tests showed that the loose fiber content and high viscosity of the ENLITE™ PP LGF system allow for great manufacturing flexibility. PP and LGF concentrates can be blended directly at the injection machine to achieve the blend ratio required for your application.

Advanced PP dilution results: High flow and low VOC emissions

Our new dilution PP for ENLITE™ PP LGF provides very easy flow for thin wall design resulting in lighter part weight. In addition, it meets customer’s requirements for low emissions and odors.

Table: Injection Pressure (bar)

<table>
<thead>
<tr>
<th>Resin</th>
<th>LGF 8000</th>
<th>LGF 7940LE / LGF 9411 LGF 9621 + 33.3 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGF 8100</td>
<td>106</td>
<td>108</td>
</tr>
<tr>
<td>LGF 8000</td>
<td>172</td>
<td>172</td>
</tr>
<tr>
<td>LGF 7940LE</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>LGF 9411</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>LGF 9621 + 33.3 %</td>
<td>28</td>
<td>28</td>
</tr>
</tbody>
</table>

NEW generation ENLITE™ PP LGF for aesthetic surfaces

In a companion with current LGF40, the new generation of LGF40 and LGF60 solutions offer superior aesthetics along with improved physical properties, better flow, and lower emissions.

Lightweight Liftgate Design with ENLITE™ PP LGF

We collaborated with a global OEM for the development and production of a thermoplastic liftgate. We introduced the polypropylene long glass fiber material system ENLITE™ Structural Polymers, and helped to optimize the part construction, tool design, and injection-molding processing conditions.

Our customer’s main objectives were: weight saving, styling freedom, easy recycling, and optimum function integration. A solution just like the liftgate meets high standards for visual appeal and function as well as for visibility, accommodates many body elements (hinges, lock mechanisms, electrical wiring), impact resistance, and durability are critical factors, since the application 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.

Based on positive experience with a previous project, the semi-structural liftgate component was outfitted with our all-thermoplastic solution using PP TF and PP LGF. We achieved not only a significant weight reduction but also a cost reduction of 10 percent, which is also possible for other applications (e.g., trim panel doors, seat parts, door module carrier plates, hood and front-end carrier).

Using ENLITE™ PP LGF, our customer was able to not only reduce the part weight for optimal fuel efficiency and cost-benefit for the VOI codes, but also to promote easier recyclability without disassembly of the application by increasing the long glass fiber content, the robustness and stiffness of the injected parts could be enhanced.

Key benefits of PP LGF for semi-structural applications:

- Weight reduction of up to 20% (vs. steel)
- Cost efficiencies (reduced material/extrusion/ application costs)
- Dimensional stability (allowing low GTI)
- 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 re-melting and re-processing

Key results of the liftgate development:

- Low density resulting in higher and cost-optimized parts
- Easy to VOC to invert all global automotive OEM specifications
- Low gloss allowing panties, visible applications
- Easy to reduce scrap, and faster cycle times
- Thin-wall part design for mass reduction
- Medium heat resistance optimal for the majority of automotive exterior components
- Consistent natural white color produces high-quality part appearance when used with color concentrates (Self-coloring) or Trinseo Color Masterbatch Technology

Processing advantages and better dimensional stability

When compared to PP LGF, ENLITE™ PP LGF provides enhanced creep performance for better dimensional stability. It offers a robust, cost-effective lightweight solution for structural applications. Tests showed that the loose fiber content and high viscosity of the ENLITE™ PP LGF system allow for great manufacturing flexibility. PP and LGF concentrates can be blended directly at the injection machine to achieve the blend ratio required for your application.

Advanced PP dilution results: High flow and low VOC emissions

Our new dilution PP for ENLITE™ PP LGF provides very easy flow for thin wall design resulting in lighter part weight. In addition, it meets customer’s requirements for low emissions and odors.

Table: Injection Pressure (bar)

<table>
<thead>
<tr>
<th>Resin</th>
<th>LGF 8000</th>
<th>LGF 7940LE / LGF 9411 LGF 9621 + 33.3 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGF 8100</td>
<td>106</td>
<td>108</td>
</tr>
<tr>
<td>LGF 8000</td>
<td>172</td>
<td>172</td>
</tr>
<tr>
<td>LGF 7940LE</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>LGF 9411</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>LGF 9621 + 33.3 %</td>
<td>28</td>
<td>28</td>
</tr>
</tbody>
</table>

NEW generation ENLITE™ PP LGF for aesthetic surfaces

In a companion with current LGF40, the new generation of LGF40 and LGF60 solutions offer superior aesthetics along with improved physical properties, better flow, and lower emissions.