LONG FIBER TECHNOLOGIES

PlastiComp Complēt™
Specialty Long Fiber Reinforced Thermoplastic Composites

OnForce™
Long Glass Fiber Reinforced Polypropylene Composites

AVIENT™

BE STRONGER, GET TOUGHER, GO LIGHTER

Optimize stiffness, strength, and toughness to obtain structural performance with lightweight long fiber reinforced thermoplastics.

Long fiber reinforced thermoplastics provide structural performance that can go head-to-head with metals at a fraction of their weight while retaining the processing ease of injection molding.

PlastiComp Complēt™ specialty long fiber reinforced composites and OnForce™ long glass fiber reinforced polypropylene composites utilize carbon, glass, or specialty fibers in a broad range of thermoplastic polymers to optimize material performance to your application requirements.

Pyrolysis removes the matrix polymer of injection-molded specimens to reveal the different internal fiber structure of long glass fiber and short glass fiber parts.

Entanglement of longer fiber filaments allows the long fiber part to retain its molded form, which provides more structural integrity and increased toughness.

Short glass fiber

Injection molded part

Long glass fiber

CAPABILITIES TO BUILD BETTER

Long fiber reinforced composite materials incorporate longer filaments of fiber reinforcement to increase mechanical properties and structural capabilities to higher levels than short fiber formulations.

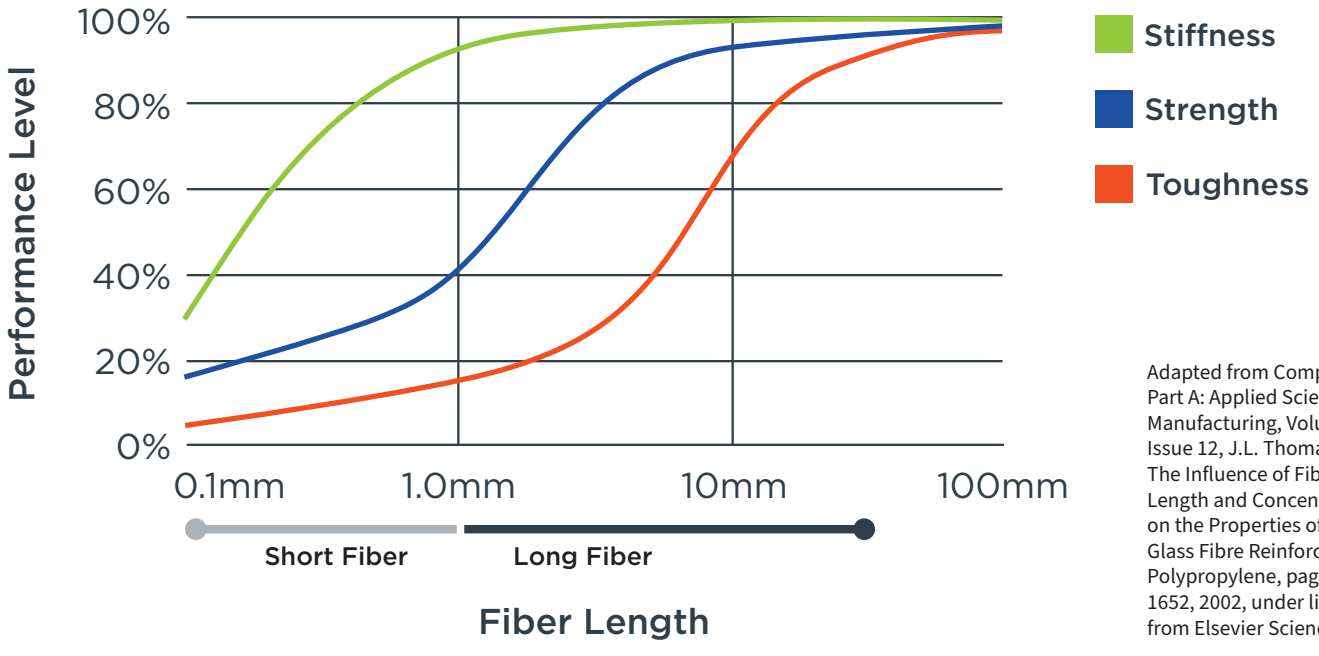
Higher aspect ratio fiber filaments in long fiber composites increase material stiffness and strength, while also boosting toughness.

During injection molding, longer fibers align and intertwine to form an internal skeletal network, enabling a unique set of performance characteristics, including:

- High strength-to-weight ratio which facilitates metal replacement to achieve weight reduction
- Added stiffness and strength to carry loads while resisting creep deformation
- Increased toughness to absorb impact forces without permanent damage
- High cyclical fatigue endurance to resist cracking and crack propagation
- Mechanical performance that is retained across a wide temperature range
- Improved dimensional stability with nearly isotropic properties and low thermal expansion
- Corrosion and chemical resistance

Long fiber composites provide a combination of stiffness, strength, and toughness performance enhancements not available together when using other reinforcing methods, while retaining the single-step processing simplicity of injection molding.

Qualitative Influence of Fiber Length

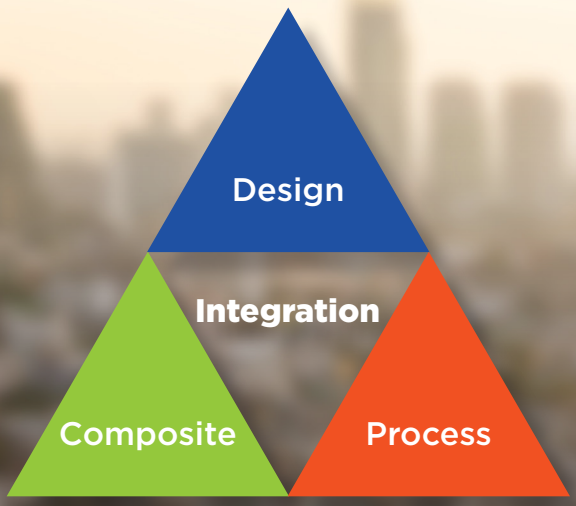


Adapted from Composites Part A: Applied Science and Manufacturing, Volume 33, Issue 12, J.L. Thomason, The Influence of Fibre Length and Concentration on the Properties of Glass Fibre Reinforced Polypropylene, pages 1641-1652, 2002, under license from Elsevier Science Ltd.

DELIVERING SUSTAINABILITY THROUGH LIGHTWEIGHTING

Long fiber reinforced polymers have a high strength-to-weight ratio, which provides structural performance at a fraction of the weight of metals. As a result, these long fiber materials can accelerate lightweighting initiatives across a broad range of industries, including automotive, aerospace, sporting goods, and any applications requiring portability.

With appropriate material selection and part design optimization, long carbon fiber materials can reduce the weight of components up to 50% compared to aluminum.



DESIGN & DEPLOY WITH CONFIDENCE

Transitioning from traditional materials to long fiber composites requires an integrated approach that includes material formulation, component design, and forming process. This is the best way to maximize long fiber performance and get the most benefit from material change. Our experts can help you make the transition, from concept to commercialization.

- **Customized Solutions** – Formulations tailored to meet specific performance targets utilizing a wide range of polymer resins and fiber reinforcement combinations including polypropylene, various nylon (polyamide) formulations, and engineered thermoplastic polyurethane resins combined with carbon and/or glass fibers, as well as functional performance enhancing additives.
- **Improve Design Freedom/Reduce Material Substitution Risk** – We're experts at helping you with structural design and manufacturability, along with detailed performance analysis using finite element, fiber orientation, and mold filling CAE tools.

AVIENT LONG FIBER TECHNOLOGIES

Avient has built a robust portfolio of long fiber formulations in a wide range of thermoplastic resins to meet your structural design and performance specifications—combine these technologies with an array of functional additives to make your products perform better.

OnForce™ LGF/PP
Common formulations of long glass fiber reinforced polypropylene widely used in higher volume applications.

Complēt™ LGF
Long glass fiber reinforced engineering resins with enhanced mechanical properties that obtain metal-like structural capabilities.

Complēt™ LCF
Higher performance long carbon fiber reinforced thermoplastics for weight sensitive applications or more load-carrying capabilities.

Complēt™ Hybrid
Synergistically combines long carbon and long glass fiber together in a unified material to optimize performance and cost.

Complēt™ MT
Maximum toughness, long fiber reinforced nylons (polyamides) formulated for extra impact and fatigue resistance.

Complēt™ Moisture Resistant
Long fiber reinforced nylon 6 or 66 thermoplastics formulated for more consistent performance in moisture-rich conditions.

Complēt™ REC
Long fiber solutions incorporating recycled content. Available with post-consumer recycled nylon 6, and post-industrial recycled nylon 66 and TPU.

OVERCOME MATERIAL CHALLENGES

Deploy long fiber reinforced composites to meet these needs:

- Metal replacement for weight reduction
- Failure of lower performing plastics
- Structural load carrying requirements
- Increased impact or fatigue durability
- Wide temperature range performance
- Thermoplastic design freedom
- Manufacturing process cost savings

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