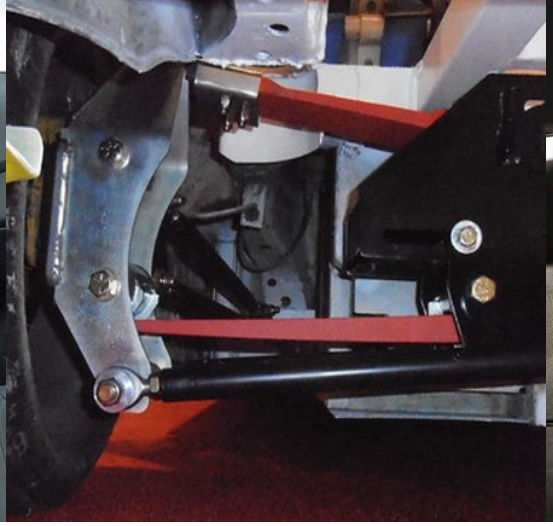




APPLICATION BULLETIN

Move Over Metal

Composites for Lightweighting, Reinforcing, and Replacing Metal in Automotive Applications

Composites offer higher strength-to-weight ratios exceeding the structural performance of traditional materials while significantly reducing weight—up to 75% lighter than steel and up to 25% lighter than aluminum.

Fiber reinforced polymer composites are exceptional alternatives to traditional materials such as wood, ceramic, and metal, enabling designers to create lighter weight structural components for increased lifetime performance, and improved fuel efficiency.

They also offer an array of additional benefits including:

- Reduced logistical and assembly costs
- Extended product life to reduce part replacement and warranty expenses
- Corrosion, weather, flame, and fatigue resistance to improve component durability
- Reduced energy consumption during installation and use

At Avient, we work with customers to customize our composites to meet application-specific material and performance requirements. Avient's manufacturing processes can leverage strength-to-weight ratios and anisotropy to make highly engineered composites that optimize material usage. Our solutions can be functionalized to provide characteristics including electrical insulation, thermal insulation, radiopacity, low thermal expansion, flexural memory, and load damping, while delivering desired performance and aesthetic specifications.

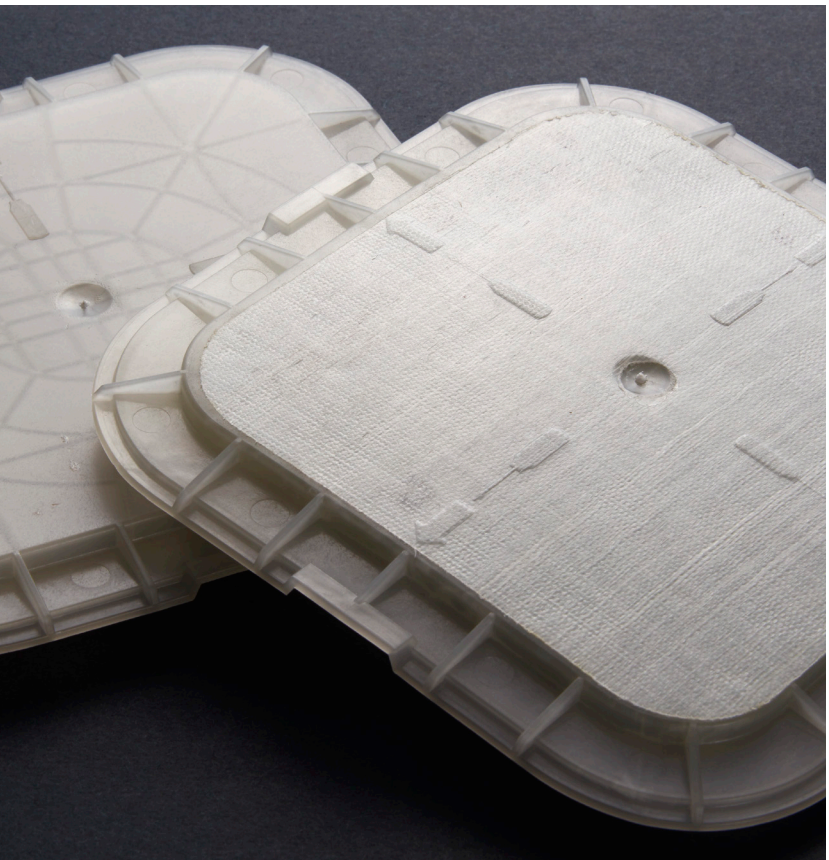
POLYSTRAND™ THERMOPLASTIC COMPOSITES

Tapes, Laminates & Panels

Polystrand™ high performance composite tapes and laminates are made by combining thermoplastic polymers and continuous fibers to create continuous fiber reinforced thermoplastic (CFRTP) composites.

Thermoplastic chemistry enables CFRTP composites to be incorporated into high volume manufacturing processes such as compression and injection molding as well as into structures with dissimilar materials via overmolding, adhesive bonding, and thermal lamination. In combination with other materials, CFRTP materials can be integrated and positioned locally where needed to achieve structural performance requirements. The material is recyclable and can be incorporated back into traditional thermoplastic products and processes.

Polystrand composite panels are made with continuous fiber reinforced thermoplastic face sheets thermally bonded or adhered to traditional core materials such as honeycomb, foam, aluminum, and nonwovens as reinforcement. They are engineered to provide simplified installation, long service life, and overall cost effectiveness.



Standard and custom tapes, laminates, and panels are available in a variety of combinations of matrix resin systems including PP, PE, PET, and PA6, and include fiber reinforcements such as E-Glass and S-Glass. Avient also offers custom configurations including fiber concentration, additives, and colors based on our customers' requirements.

KEY CHARACTERISTICS

- Lightweight
- High strength & stiffness
- Excellent fatigue & impact resistance
- Exceptional strength-to-weight ratio
- Strong adhesive properties
- Chemical and corrosion resistance
- Reduced NVH compared to metals
- Rapid cycle times
- Low VOCs

VALUE SOLUTION

- Replaces metal without sacrificing strength
- Reduced vehicle weight improves fuel economy, reduces energy consumption
- Selective reinforcement adds strength in high stress areas
- Easily integrated & streamlined manufacturing process
- Easy bonding to various materials
- Increases structure & puncture resistance
- Can be used in injection and compression overmolding operations
- Enables thin-walling and material reduction by adding reinforcement to traditional materials
- Able to be re-formed, reused, recycled

USES & APPLICATIONS

- Interior structural reinforcement such as walls, load floors, headliners, door panels, storage, storage lids, and trim pieces
- External body panels
- Front end and door module reinforcement
- Service access cover reinforcement
- Interior hatch covers

GORDON COMPOSITES™ & GLASFORMS™ THERMOSET COMPOSITES

Gordon Composites™ and Glasforms™ thermoset composites are made with proprietary resin/fiber reinforcement technologies. We offer unidirectionally reinforced barstock, laminates, and hybrid composites engineered to maximize deflection and fatigue resistance in customizable shapes and sizes. The Glasforms continuous, automated pultrusion manufacturing process creates constant cross section profiles of any pre-determined length with consistent, uniform quality, and exceptional mechanical performance.

Standard and custom shapes and sizes are available with a variety of matrix resins including polyester, vinyl ester, and epoxy, and reinforcements including, fiberglass mat/roving (MR-GFRP) or unidirectional (U-GFRP) fiberglass, or high-performance unidirectional carbon fiber.

KEY CHARACTERISTICS

- Superior strength-to-weight ratio
- Exceptional mechanical performance—consistent and repeatable
- Deep deflection
- Corrosion resistance
- High fatigue resistance & tensile strength
- Excellent interlaminar shear strength
- Lighter weight than steel
- High modulus of elasticity
- High temperature performance
- Low VOCs

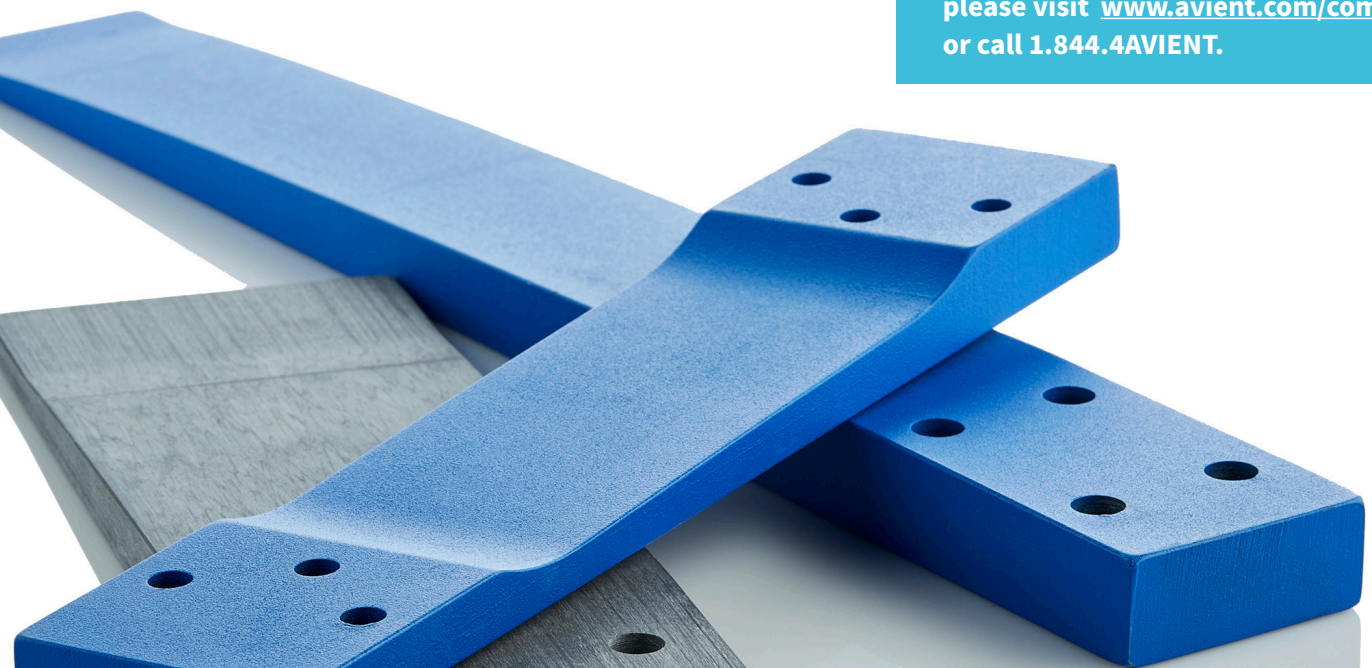
VALUE SOLUTION

- Ideal in applications where high stiffness and light weight performance are critical
- Replacement of metal, wood, and other less efficient materials in order to improve overall product performance while reducing weight, cost, and complexity
- Simplified assembly
- A good choice for constant cross-section profiles
- Laminates available in continuous lengths
- Specialty surface treatments available to improve bonding
- Full machining capabilities (surface modification, drilling, shaping, waterjet, etc.)
- Custom sizes, profiles, tooling design, and prototyping available for specific applications
- Hollow profiles

USES & APPLICATIONS

- Hybrid body in white components
- Structural mounting
- Stress contoured leaf (elliptical, semi-elliptical, and cantilever) suspension springs

For more information on our composite solutions for the automotive industry, please visit www.avient.com/composites or call 1.844.4AVIENT.



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