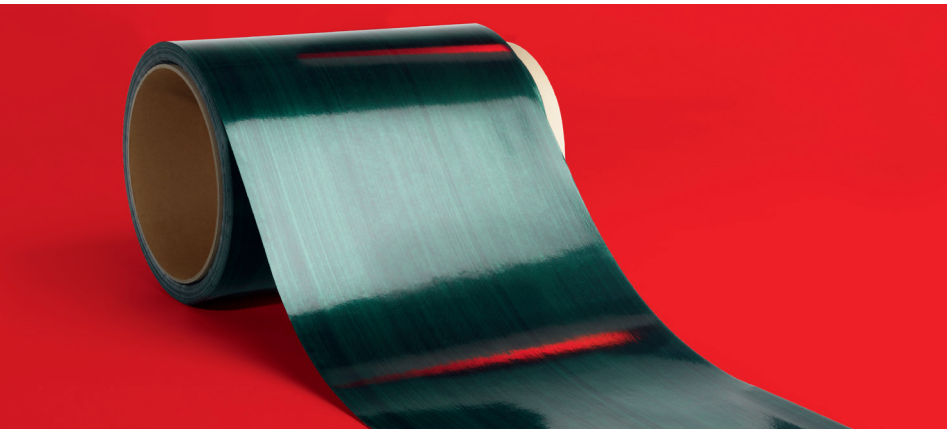
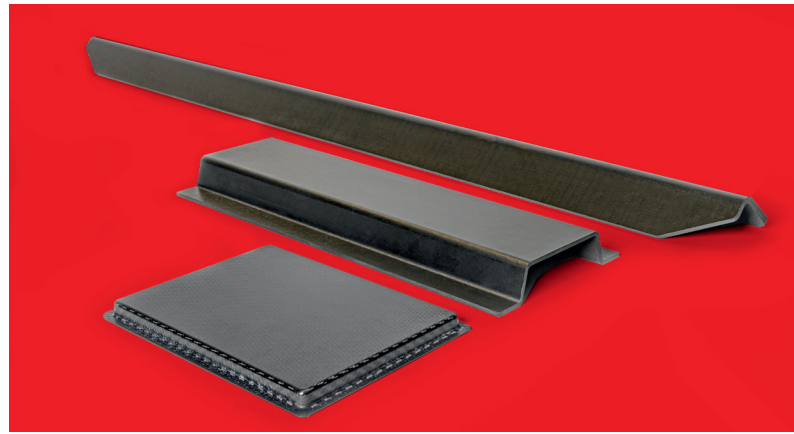


TEIJIN

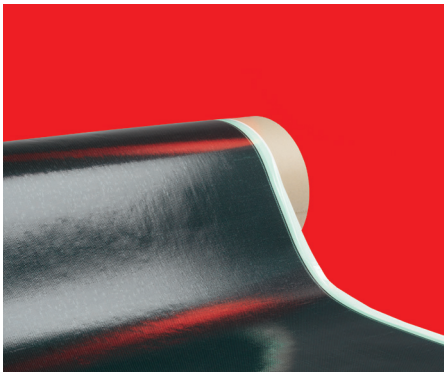
Human Chemistry, Human Solutions

Tenax™ THERMOSETS

RENEGADE™



Tenax™ ThermoSets and Renegade™ materials are innovative materials which provide high mechanical performance, chemical resistance and temperature resistance specially tailored for individual needs. From specific qualified aerospace to standard industrial materials these products can be found in several applications. We offer a variety of products: ThermoSet UniDirectional (TSUD), ThermoSet Woven Fabric (TSWF), ThermoSet Resin (TSRN), ThermoSet Resin Film (TSRF) and ThermoSet Towpreg (TSTP).



PREPREGS

Teijin offers thermoset prepreg systems for applications demanding a broad range of temperatures requirements. Our thermoset prepregs are offered in various forms including unidirectional, woven or non-woven goods depending on processing needs. These prepregs are utilized in automated tape laying and fiber placement along with conventional hand lay-up processes. Prepreg is available on Tenax™ Carbon Fibers, Teijin aramid fibers, and other standard aerospace fibers including glass and quartz.

CONVENTIONAL PREPREGS

Tenax™ ThermoSet epoxy-based prepregs can be reinforced with a variety of materials including high performance Tenax™ Carbon Fibers. These epoxy-based prepregs target aerospace, wind energy, rail and industrial applications where requirements range from moderate to very high performance. In line with this, our epoxy resins are available in balanced to highly toughened chemistries.

- High performance mechanical properties
- Excellent resistance to chemicals and solvents
- Typical prepreg shelf life properties
- Tailored handling properties to fit your needs
- Material widths up to 1.5 m (60")
- Compliant with REACH requirements

Additionally, Renegade offers cyanate ester and epoxy prepregs & syntactics uniquely designed to meet electrical requirements of radome and satellite applications.

RAPID CURE PREPREG

Tenax™ ThermoSet Rapid Cure Prepregs were originally developed for aerospace secondary structures to replace conventional 180°C/2hrs cure systems and to give the customer significant advantages regarding emission reductions and processing costs. These materials have the unique ability to fully cure after 20 minutes at 160°C with no post-cure required. Tenax™ Thermoset Rapid Cure Prepregs are processable via press or autoclave and as well for tailored vacuum-bag-only curing. For sandwich applications, we can offer several types of rapid cure resin films. Teijin also offers an FST (Flamability, Smoke, Toxicity) modified version for aerospace or rail/transportation interiors with a total cure time of 15 minutes without post-cure and an automotive version with a total cycle time of less than 5 minutes.

- Excellent hot/wet properties
- High wet Tg
- Designed for high rate production of monolithic and sandwich parts
- Low process costs compared to standard cure materials
- No post-cure required
- Shelf life comparable to conventional epoxies

HIGH TEMPERATURE PREPREGS

Renegade™ High Temperature Prepregs are designed to stand up against the most demanding high temperature aerospace applications. Renegade's broad range of resin formulations include cyanate esters, bismaleimides (BMI) and polyimides. Resin systems are available on fabrics and fibers including carbon, quartz and S2 glass. These products are widely used for commercial and defense aviation as well as for space applications.

- High temperature performance up to 345 °C service with peaks up to 400 °C
- Superior hot/wet performance for airframe and propulsion applications
- Excellent damage tolerance at high temperature
- Excellent resistance to chemicals and solvents
- Non-ITAR
- Non-carcinogenic solutions

TOWPREG

Tenax™ ThermoSet Towpreg has been developed for applications in the industrial and filament winding sector. The aim is to use this fiber-matrix combination to increase the composite material performance, increase the material throughput and reduce non-productive machine time (vs. liquid impregnation methods). Our towpreg is based on the Tenax™ ITS50 24K fiber and an optimized epoxy resin system. The Tg is around 140°C. Further towpreg variants for other winding applications are under development.

- High speed processing
- Controlled width and resin content
- Long shelf life (1 month at room temperature)

RESIN FILM

Tenax™ ThermoSet Resin Films are suitable for several temperature ranges. From standard epoxy resin films to high temperature BMI and polyimide films, Teijin has a product to meet your process and application needs.

ADHESIVES

Renegade offers high temperature polyimide and BMI adhesives to provide a complete material package for your applications. Each of the prepreg- or resin systems is supported by a complete line of paste and film adhesive products.

RESINS

Our resins are available from epoxy infusion systems to high temperature BMI and polyimide infusion systems. Our BMI product line includes a Vacuum Assisted Resin Transfer Molded (VARTM) resin for large or complex part manufacturing as well as standard RTM resins. The rapid cure epoxy infusion systems cure within 30 minutes. High temperature infusion systems offer superior hot-wet performance. BMI and polyimide resins come in a fractured form for easy handling.



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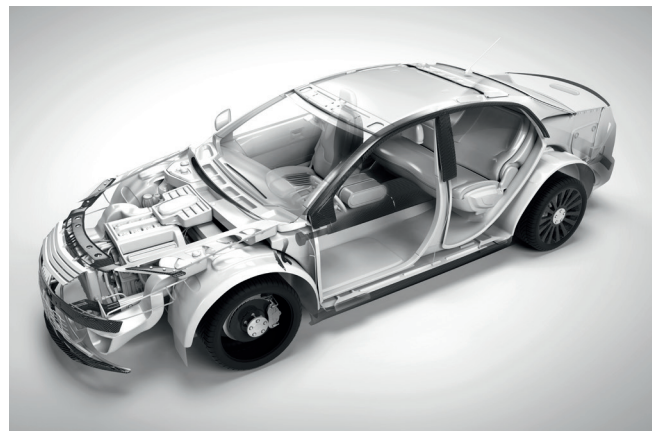
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