ELIUM®
BY ARKEMA

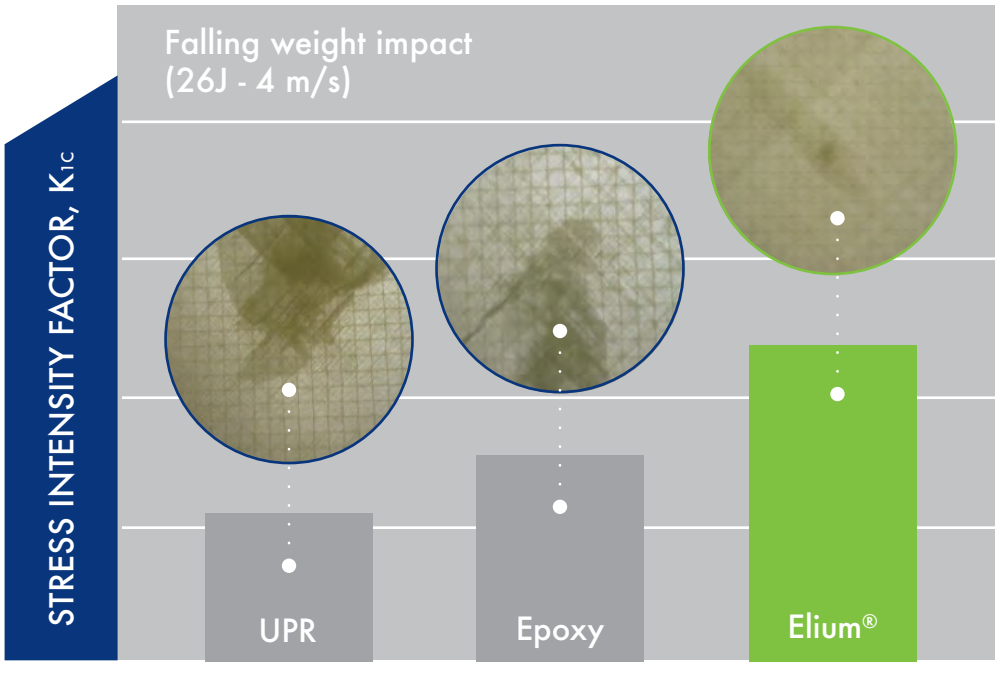
Liquid thermoplastic resin for tougher composites

Elium® resins are innovative materials for the production of thermoplastic composites reinforced by continuous glass, carbon or natural fibers.

The resulting parts show mechanical properties similar to epoxy composites while presenting **the major advantages of high impact resistance, post-thermoformability**, recyclability and offer new material assembling possibilities.
These results enable the production of structural composite parts in such industries as automotive, wind energy, sports, etc.

Shore D hardness	85 – 90		ISO 868
Coefficient of linear expansion	0.065	mm/m/°C	ISO 2155-1
Fracture toughness stress intensity, K_{1C}	1.2	$MPa.m^{0,5}$	ISO 13586
Elongation at break	2.8	%	ISO 527
Flexural strength	111	MPa	ISO 178
Flexural modulus	2.91	GPa	ISO 178
Tensile strength	66	MPa	ISO 527
Tensile modulus	3.17	GPa	ISO 527
Compression strength	116	MPa	ISO 14126
Compression modulus	3.83	GPa	ISO 14126

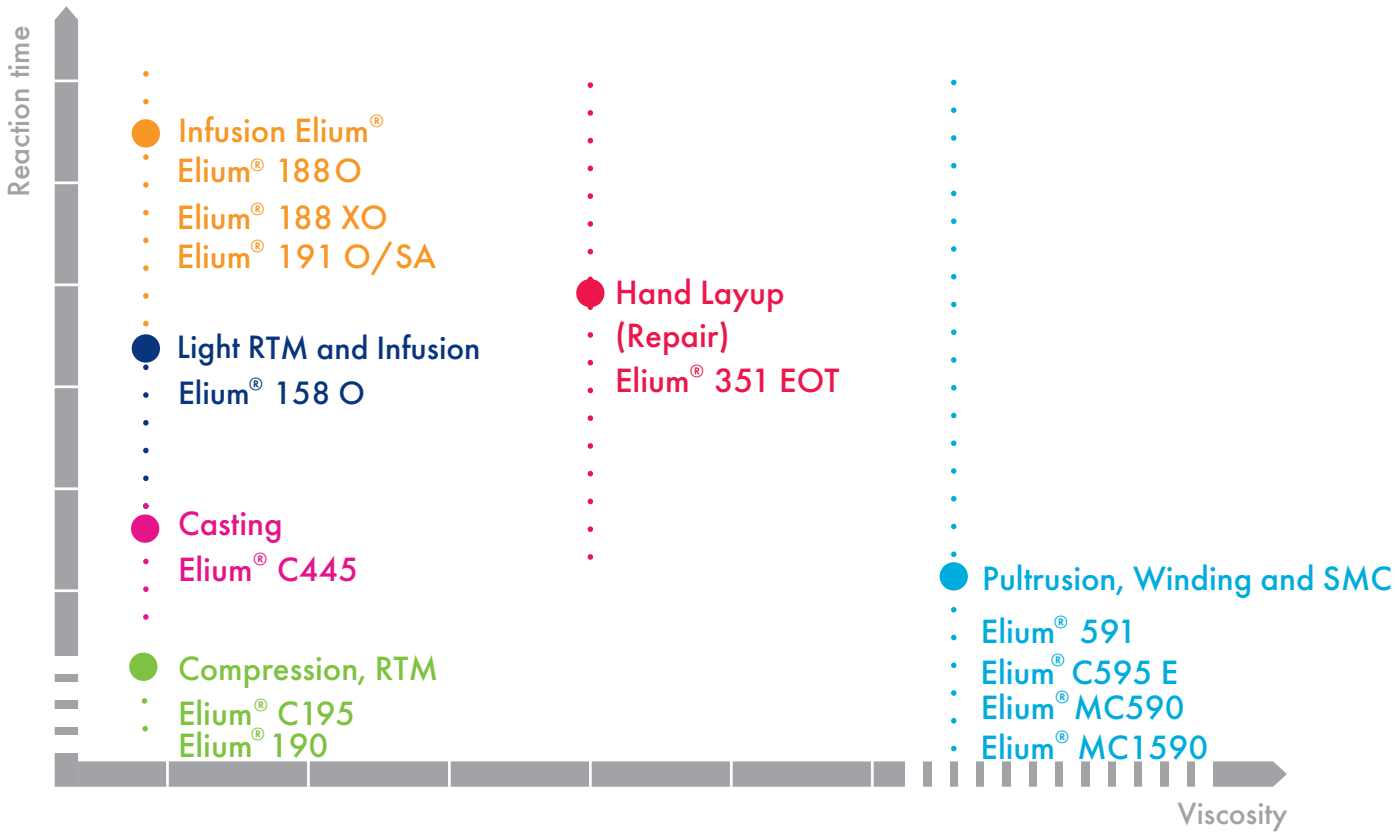
Typical cured resin non reinforced properties (post curing 24 h at 60 °C)



Typical impact behaviour compared between Polyester, Epoxy and Elium® in neat resin (figures) and composite (pictures)

Elium® resins can be processed by RTM, Infusion and pultrusion depending on the number of parts to be manufactured per day and the specifications of the part.

Elium® resins are processed on similar equipment to that used today for thermoset composites, with similar polymerization cycle times and conditions.



Elium® resin grades overview: comparison between reactivity and viscosity

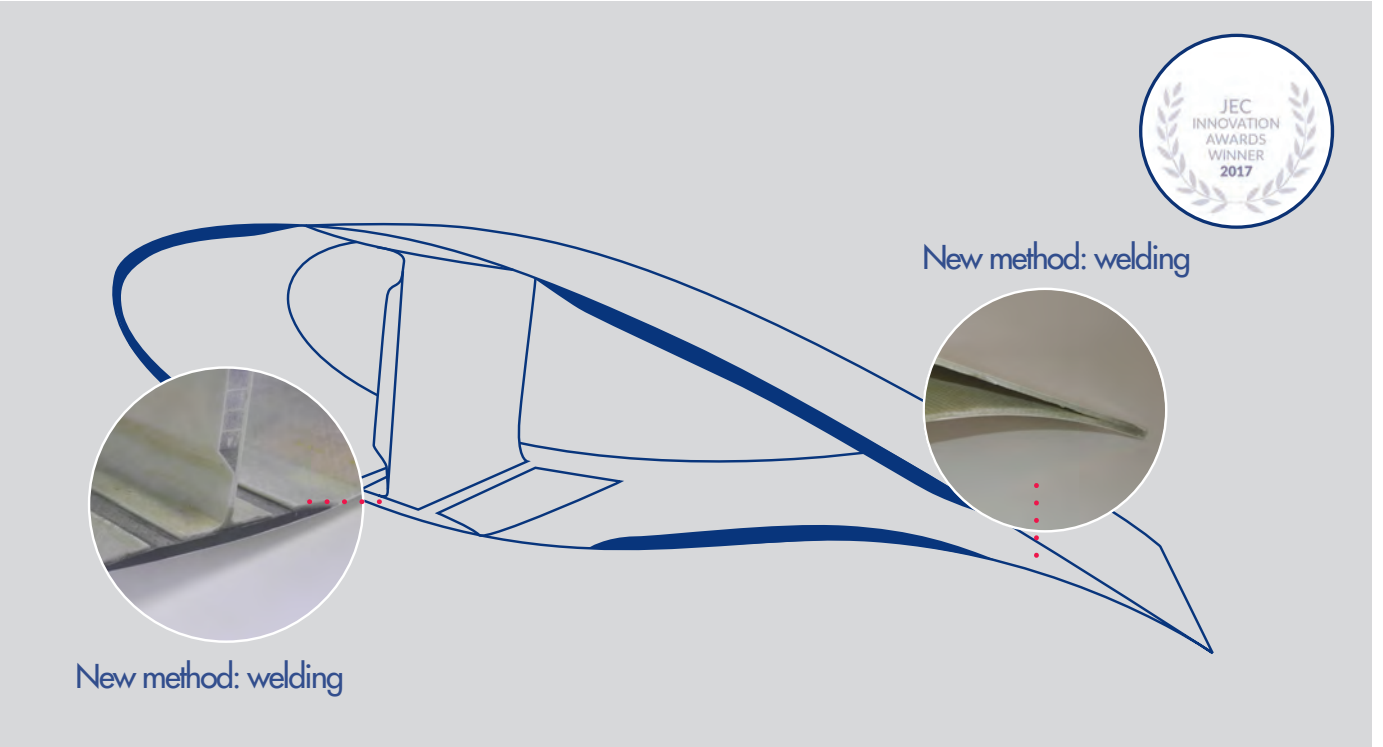
Resin Type	Application	Process	Viscosity [cP @25°]	Reactivity [min]	Temperature Range [°C]	e.g. Peroxide
Elium® 158 O	Sport Medicine	Infusion	100	15– 60	20 – 60	Dibenzoyl Peroxide
Elium® 188 O **Elium® 188 XO**	Wind Marine B&C	Infusion	100	60 - 90	20 - 60	Dibenzoyl Peroxide
Elium® 191 O/SA	Wind Marine	Infusion	100	> 60	20 – 60	Methyl Ethyl Ketone Peroxide
Elium® 351 EOT	Wind Marine	Hand Layup	300	30 – 60	20 - 40	Methyl Ethyl Ketone Peroxide
Elium® 190	Industrial	Infusion Compression RTM	100	5 - 180	40 - 110	Peroxide blend
Elium® C195	Automotive Sports Industrial	Compression RTM	100	2 - 5	80 - 115	Peroxide blend
Elium® 591	Automotive Construction	Pultrusion Prepreg	500	2 - 5	80 - 115	Peroxide blend
Elium® C595 E	Automotive Construction	Pultrusion Winding	500	2 - 5	80 - 115	Peroxide blend
Elium® MC590	Automotive	SMC	500	2 - 5	80 - 115	Peroxide blend
Elium® MC1590	Automotive	SMC	1500	2 - 5	80 - 115	Peroxide blend
Elium® C040	Solid Surface	Casting	15	40 - 50	20 - 60	Dibenzoyl Peroxide
Elium® C445	Solid Surface	Casting	300	20	20	Tert Butyl Monoperoxy Maleate

Specifications of some Elium® grades. (If a lower or higher reactivity infusion or injection resin is needed, please contact your Arkema representative for more information.) The presented Peroxide systems are commonly used in Europe. For specifications in US or Asia, please contact your Arkema representative for more information.

Fiber-reinforced **Elium® resin** parts can be *thermoformed* with heat and pressure. This process requires the heating of the consolidated part at 180 – 200°C for a few minutes, and the compression at a pressure between 5 and 20 bars depending on the reinforcement type and the thickness of the part.

Fiber-reinforced composites made with **Elium® resins** can be *assembled with adhesives*. The SAF® 30 adhesive, from AEC Polymers, is recommended for structural bonding. A cohesive rupture is obtained according to the EN-1465.

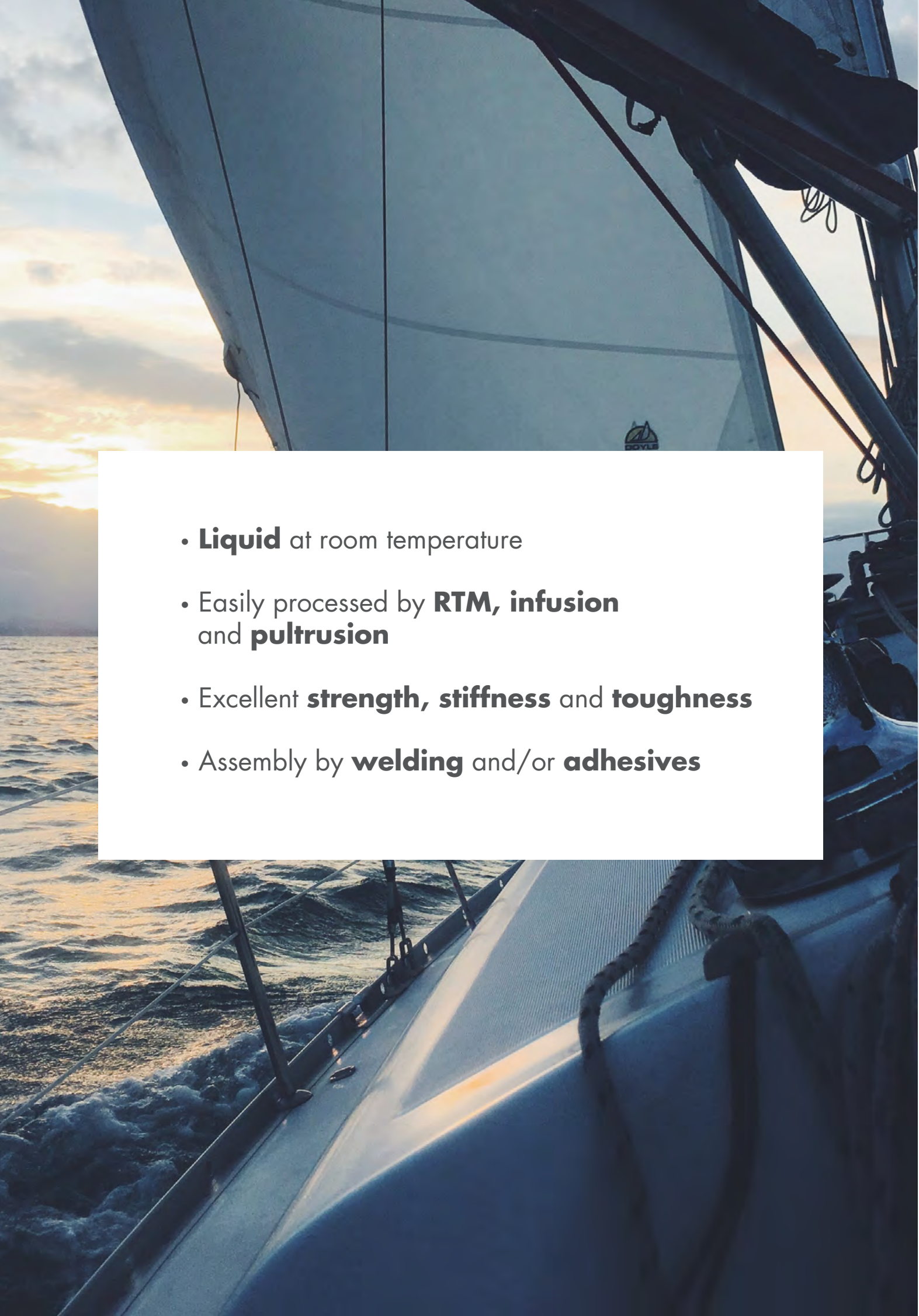
To use the advantage of the thermoplastic behaviour of **Elium® resin** an *assembly by welding* is also possible. This process requires the heating of the two consolidated parts at 180 – 200°C for a few minutes, followed by compression till it solidifies again.



Welded wind blade section without adhesive. (Project in cooperation with Pontis Engineering)

The Composite parts made out of **Elium® resin** can be *recycled* after End-of-life in two different ways. The first one would involve grinding and compounding to use as chopped fiber compounding resin and the second would be a thermolysis process which allows the recovery of fibers and the monomers by depolymerisation.

The *shelf life* of the **Elium® resins** in original sealed container is 6 months guaranteed at a temperature not higher than 25 °C.
For further information we advise you to read carefully the current Safety Data Sheet or get in contact with your Arkema representative.



- **Liquid** at room temperature
- Easily processed by **RTM, infusion** and **pultrusion**
- Excellent **strength, *stiffness*** and **toughness**
- Assembly by **welding** and/or **adhesives**

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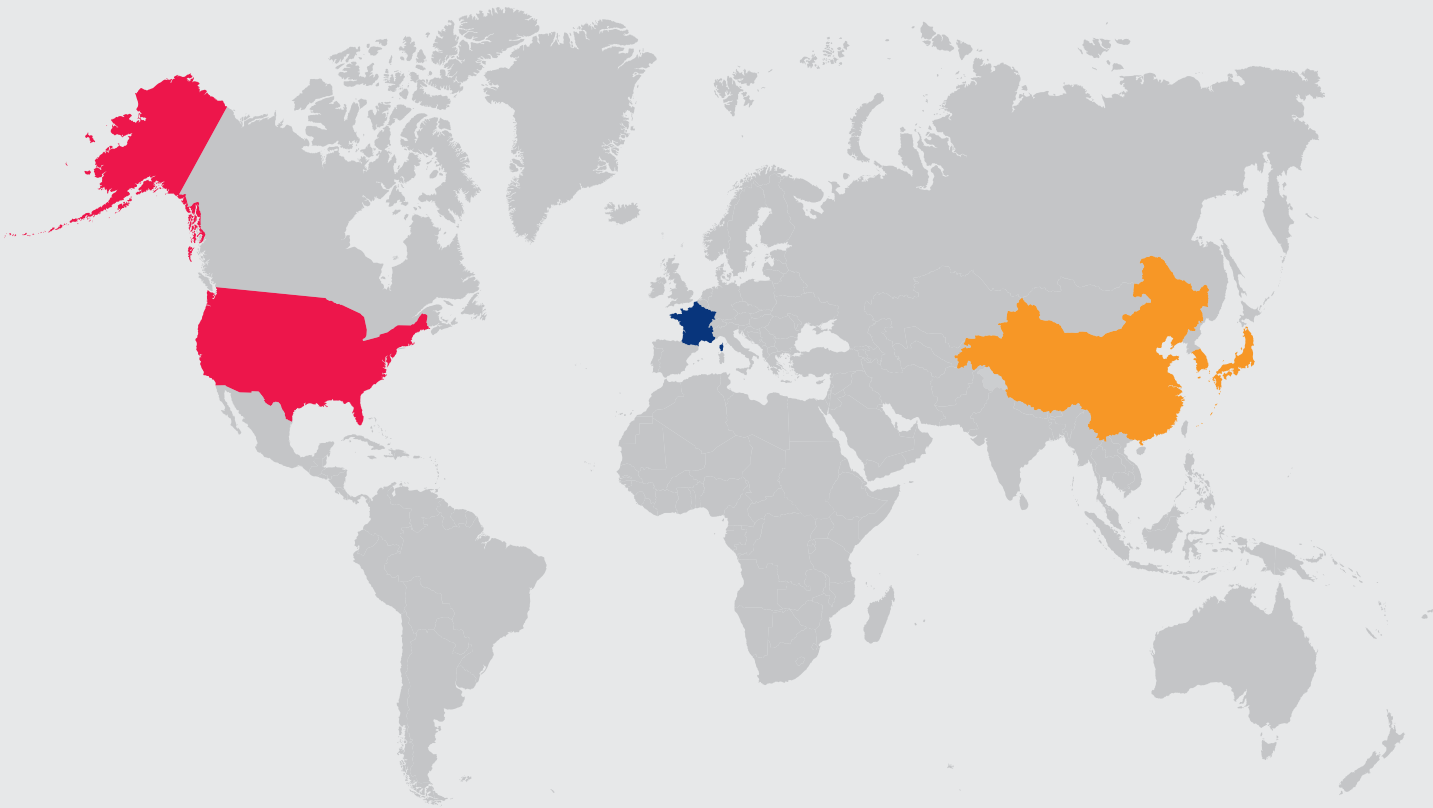

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