

Arkema presents its unique range of advanced materials for composites at JEC WORLD 2019

At JEC WORLD 2019, held from 12 to 14 March 2019 at Paris Villepinte, Arkema will be showcasing its unique range of high performance materials and cutting-edge solutions to meet growing demand for advanced composites in the construction, transportation and sports sectors. By offering resins and thermoplastic materials for the manufacture of recyclable composites, Arkema is committed to addressing the major environmental challenges of end-of-life composites.

Elium[®], the value of recyclability for wind turbine blades

Conserving resources, minimizing waste and promoting recycling are challenges of the circular economy which the Elium[®] liquid thermoplastic resins can aptly meet.

The ever growing global expanse of wind farms, however, raises a major environmental and societal problem: the processing or landfilling of end-of-life blades, which are currently made from thermoset, epoxy or polyester composites. Arkema is addressing this challenge by marketing Elium[®], the first liquid thermoplastic resin suitable for manufacturing new generation blades from recyclable composites.

These wind turbine blades made from the Elium[®] resin will be suitable for mechanical and chemical recycling:

- Mechanical recycling: end-of-life blades are cut up and ground, and the thermoplastic composite can be melted again and mixed with another virgin material (ABS, PC, PVC, etc.) to be processed into a new material.
- Chemical recycling: this entails depolymerizing the resin back to the basic monomer. The ground-up material is then heated to obtain the monomer in gaseous form by separating it from the other components like fiber and any other organic or inorganic material (adhesive, foam, filler, coating, etc.). Once condensed and distilled, the resulting monomer in the form of a brown liquid is then purified. The clear and transparent liquid thus recovered can then be used to manufacture new Elium[®] resins.

Elium[®], the value of recyclability in boat building

Won over by the performances of the Mini 6.50 Arkema boat prototype made of Elium[®], Brittany-based Pro Marine has just manufactured the underside of a semi-rigid boat in Elium[®] by infusion molding, in partnership with Arkema. This recyclable semi-rigid boat will be exhibited for the first time at JEC WORLD 2019.

Innovations nominated for the JEC Innovation Award 2019

Sireg (Arcore, Italy) and Arkema (Colombes, France) have joined forces to develop and manufacture glass fiber composite reinforcement bars (rebars) for concrete as well as cables for prestressed concrete applications using Arkema's Elium[®] thermoplastic resin in place of conventional thermoset solutions. These products are processed through pultrusion using this technology's standard equipment.

These composite rebars and cables do not rust or corrode, are relatively insensitive to snow-clearance salts and chemicals used for de-icing, and have an interesting weight-to-strength ratio. The use of composite reinforcement

also allows the use of seawater instead of fresh water and the deployment of aggregates contaminated with salt in concrete mixing, a major advantage in coastal or arid areas of the world where fresh water is scarce. Additionally, Elium®-based rebars and cables can be reheated and easily shaped or bent, reducing the cost of supplying rebars with custom shapes.

Concrete has intrinsically high compressive strength but limited tensile strength and brittle behavior. The use of rebars provides the necessary tensile strength without inhibiting the formation of cracks. A much more efficient use of concrete is by inducing in it, at the time of construction, a state of compression at a level higher than the tensile stresses it will experience during its service life. This is the principle of prestressed concrete. For this reason, Sireg, Arkema and their partners, the University of Miami and the National Cooperative Highway Research Program (NCHRP), are concurrently developing a patented thermoplastic composite cable for prestressed concrete.

The use of composite materials for concrete prestressing is a major innovation, revolutionizing the durability of concrete construction to an unprecedented level since its invention in the 1930s by Eugène Freyssinet.

The recent publication of new standards paves the way for the wider use of composite rebars and cables in reinforced and prestressed concrete. This type of application is expected to grow significantly in the coming years and become one of the major fields of deployment for composites all around the world.

Finally, the use of a thermoplastic matrix sets the stage for the recycling of these parts, which, in this particular case, will help generate cost savings throughout the value chain: extended lifetime for concrete, lower environmental impact, recycling and re-use.



This innovation has been nominated for a JEC Innovation Award 2019 in the "Construction" category.

Arkema, a major player in the composites market

For the last ten years or so, growing demand for advanced composites has represented for Arkema, thanks to its expertise in the field of materials, a development opportunity for a range of thermoplastic matrices with outstanding properties that help speed up the development of composite tapes.

A renowned key supplier to the high-tech composites industry, Arkema will be taking part in round-table discussions on "**French Excellence in Composites: a growing demand for advanced composites**" scheduled at 11 am on Thursday 14 March 2019 as part of the JEC 2019 conference program. Michel Glotin, Materials Scientific Director, will present Arkema's many initiatives in highly diverse sectors such as construction, aerospace, oil & gas, and sport. Arkema's range of advanced materials for composites.

Arkema's range of advanced materials for composites

High performance thermoplastic resins

- **Kynar® PVDF** thermoplastic resin features outstanding mechanical properties, as well as corrosion resistance and good fire-resistance.
- Carbon fiber reinforced **Kepstan® PEKK** offers a degree of rigidity comparable to that of certain metals, as well as very good resistance to impact, high temperatures and highly aggressive chemical agents.
- **Rilsan® Matrix polyamide** is a high temperature polyamide reinforced with carbon fiber or continuous glass fiber.
- **Elium® resin** is a liquid thermoplastic resin used to manufacture recyclable composite parts. It is processed using the same technologies as thermosets, with one major asset: it can be processed at ambient temperature. The mechanical properties of the resulting parts are similar to those of thermosets.

The new Sartomer liquid resins combine superior mechanical properties with low VOC levels for composite matrices.

Additives for stronger thermoset composites

- **Clearstrength®** impact modifiers
- **Nanostrength®** acrylic block copolymers
- **Orgasol®** polyamide ultra-fine powders
- **Luperox®** organic peroxides

Bostik SAF® structural adhesives for high performance assemblies



To find out about our range of materials for composites, do come and talk to our experts on our stand (V39 - Hall 5A) and register on line for your visitor's badge:
<https://www.arkema.com/fr/media/evenements/jec-world/>

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