Xantu.Layr™ presents a technological leap for high performance composites through the delivery of continuous nanofibre layers that can be incorporated into composite laminates.

Xantu.Layr™ is a unique interlayer reinforcing veil that enhances composite performance by specifically targeting the key weaknesses, namely low delamination strength and low impact resistance.

Xantu.Layr™ is easy to apply and can be integrated into laminates using existing composite manufacturing techniques.

Revolution Fibres launched the first generation of Xantu.Layr™ in 2012 and invite you to see the benefits for yourself.
Xantu.Layr™ is a unique interlaminar reinforcement consisting of continuous nanofibres which have the ability to enhance high performance composites.

The incredible nanofibres used in Xantu.Layr™ are dispersed to form a non-woven web consisting of kilometre long fibres which reinforce the resin rich interlayers of a composite laminate. These nanofibres are carefully produced by our team at Revolution Fibres using our unique Sonic Electrospinning Technology, developed here in New Zealand.

Xantu.Layr™ has the ability to enhance composite mechanical properties, especially interlaminar fracture toughness and impact resistance, without having detrimental effects on the flexural and interlaminar shear strength. All these benefits come with virtually no gain in weight or thickness of the composite, and incorporation of the veil can be done in one easy step during lay-up.

Xantu.Layr™ offers unique advantages for the composites market and will likely become the benchmark for high performance composites.

Performance Benefits:

Mechanical advantages:
- Increased interlaminar fracture toughness
- Impact resistance
- Increased flexural strength
- No decrease in flexural stiffness
- Increased interlaminar shear strength
- Reduced ply delamination
- Enhances resin toughness

Safe:
- Continuous polymer nanofibre
- No health & safety issues

Easy to use:
- Easy one step integration to existing manufacturing techniques
- Potential addition to composite pre-pregs
- Can be used out of autoclave manufacturing eg. RTM

No Additions:
- Virtually no added weight
- Virtually no added thickness

Compatible:
- Compatible with most industrial resins
Nanofibre Science

Electrospinning
Nanofibres are produced by a process called electrospinning, using an electrical charge to draw very fine fibres from a liquid. While electrospinning has been around since the early 1900’s, there has been little commercialisation of this process due to the lack of commercial production capacity. With some smart innovative thinking, Revolution Fibres has developed Sonic Electrospinning Technology, which gives us the capability to produce nanofibres at a industrial rate.

The Electrospinning process
Polymer electrospinning material is dissolved into liquid form, then supercharged with up to 100,000 volts. Using the laws of attraction, tiny fibres leap out of supercharged liquid at 80 m/s, spinning and spiralling until they settle onto a substrate. Only a scanning electron microscope can reveal the small nano diameter fibres that this process has created.

Van der waals forces
Nanofibres are so small, that they start to interact with things on the atomic/molecular level. Nanofibres possess an inherit attraction force between molecules called Van Der Waals forces. This same force is used by geckos to scale vertical walls and walk upside down on ceilings.

Continuous fibre
The electrospinning process creates a non-woven mat of continuous nanofibres. Individual nanofibres are drawn out from the supercharged liquid and continue to form until they are kilometres long. This process can be compared to how spiders spin their webs. The end result is a fine non-woven mat 1000’s of layers thick, yet only a few grams per square metre.
Mechanics

**Non-woven web**
Xantu.Layr™ nanofibres are dispersed by our Sonic Electrospinning Technology to form a non-woven structure which enhances strength properties in every direction.

**Negligible weight & thickness**
Xantu.Layr™ nanofibres are so incredibly fine that even in mat form, Xantu.Layr™ has virtually zero weight and zero thickness. The result is incredible performance enhancement with zero compromise.

**Porous structure**
The Xantu.Layr™ nanofibre web is highly porous which allows resin to penetrate the veil, resulting in a complete resin wet out. This results in increased resin toughness and greater impact protection.

**Van der Waals Forces**
Millions of these tiny molecular bonds give Xantu.Layr™ the ability to bind the laminate layers of the composite together, enhancing the interlaminar strength of the composite when subjected to bending stresses.

**Continuous fibre**
Xantu.Layr™ fibres continually overlap, loop and entangle on top of each other, forming a structure that is comparable to an extremely dense spider web. These kilometre long fibres are the key to Xantu.Layr™’s amazing strength enhancing properties.
Examples of use:

**Tube integration**
Xantu.Layr™ is easily integrated in the carbon fibre tube manufacturing process.

The one additional step of integrating Xantu.Layr™ prior to roll up will dramatically boost the performance of the carbon fibre tube composite.

**Panel integration**
Xantu.Layr™ is easily integrated in the process of making carbon fibre panels.

It takes one easy step of laying Xantu.Layr™ in between the laminates in a sandwich panel to dramatically boost performance.
Product Range
The AP Series enhances the Mode I (crack opening) and Mode II (crack sliding) interlaminar fracture toughness. This results in composites with higher impact strength, delamination resistance and damage tolerance.

The AP series nanofibre veils are compatible with epoxy and polyester resin systems. The resin saturates the veils within the interlaminar regions between the prepreg or fibre laminae during the curing process.

The nanofibres are strong and tough, and reduce crack initiation energy and propagation by means of crack deflection and energy absorption. Dramatic improvements in fracture toughness have been seen for already toughened resin systems.
Mode I: Crack Opening

Mode I crack energy release rates (crack onset) were obtained for MTM57/T700S (24K)-300-35%RW using the Double Cantilever Beam test and the Modified Beam Theory in ASTM D 5528.

Mode II: Crack Sliding

Mode II crack energy release rates (crack onset) were obtained for MTM57/T700S (24K)-300-35%RW using the End Notch Flexure test and the method stated in the ASTM draft standard test method for determination of Mode II interlaminar fracture toughness.
How to order:

Product orders:

Xantu.Layr™ is available in single rolls. For large commercial orders please contact us for pricing and supply information.

Xantu.Layr™ can also be customised to meet your specific needs. We can change the nanofibre parameters and materials to achieve a large range of effects.

If you would like a custom nanofibre to be developed for your composite products, please get in touch with us and we can discuss our Services.

Product format:
• Length: 100 metres rolls
• Width: 1000 mm
• Custom configurations are available on request

Revolution Fibres

Revolution Fibres is a nanofibre development and production company based in Auckland, New Zealand. As an established designer, developer and manufacturer of functional fibre and nanofibre products, we are currently manufacturing for filtration, cosmetics, medical, composites and other applications.

We are dedicated to revolutionising products and industries through implementation of our unique continuous nanofibre technologies.

We have the technology to produce industrial scale, high-volume nanofibres – the key barrier to the use of nanofibres in most industries.

Revolution Fibres aims to work with domestic and international companies on new materials and products through nanofibre innovation.

Proudly 100% New Zealand owned, we are the leader in nanofibres in the Southern Hemisphere!

Contact us:

Revolution Fibres Ltd.

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Email: enquiries@revolutionfibres.com
Visit: www.revolutionfibres.com

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