

XANTU.LAYR

CONTINUOUS NANOFIBRE. PERFORMANCE COMPOSITES

Xantu.Layr® nanofibre interleaving veils provide a technological leap forward for the toughening of high performance composites.

Xantu.Layr® enhances composite performance by specifically targeting key weaknesses, especially low delamination strength and low impact resistance.

Xantu.Layr® can easily be incorporated into laminates using existing composite manufacturing techniques.

Revolution Fibres has been supplying Xantu.Layr® to the composites industry since 2012 and invite you to see the benefits for yourself.

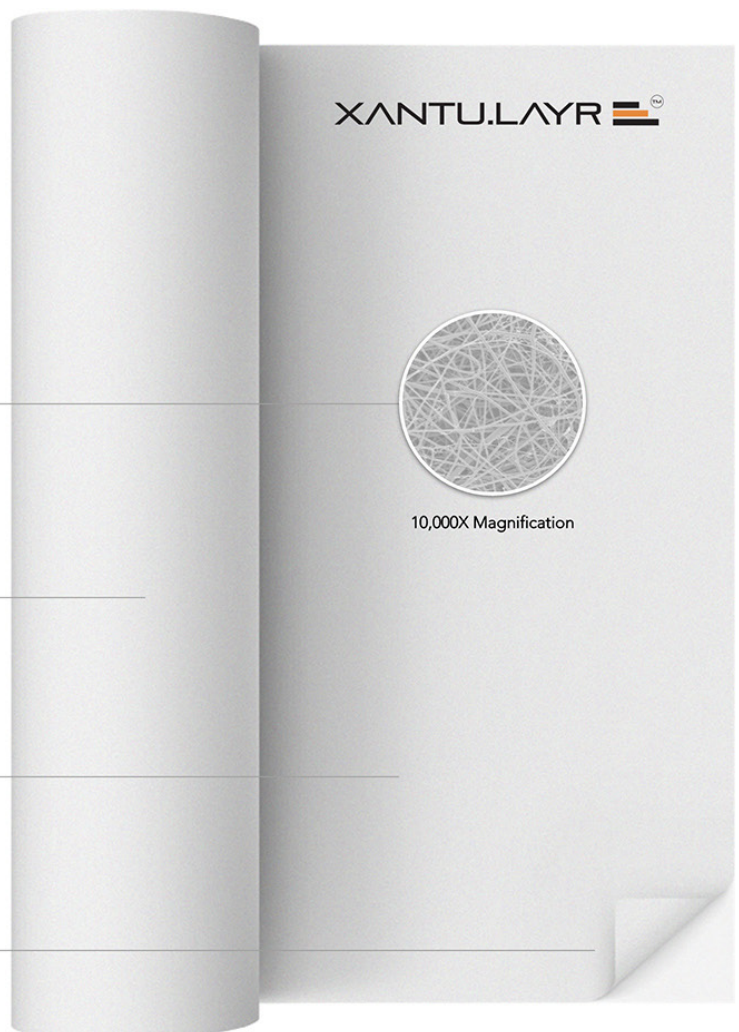
SIMPLE YET INCREDIBLE

Thermoplastic
nanofibres are
electrospun onto
silicone release paper
to create Xantu.Layr

Compatible with
epoxy and polyester
resin systems

The highly porous
nanofibre allows resin
to penetrate and
retain the layer

Available in 1.5gsm,
3gsm and 4.5gsm



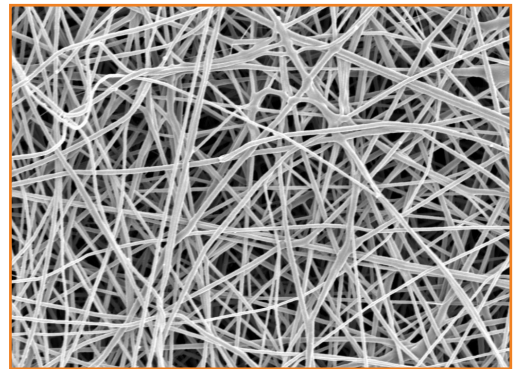
XANTU.LAYR

Xantu.Layr® is a unique interlaminar reinforcement veil consisting of tough thermoplastic nanofibres which have the ability to greatly enhance the performance of composite materials.

The incredible nanofibres used in Xantu.Layr® are produced in the form of non-woven webs consisting of kilometre long fibres which can be used to reinforce the resin rich interlayers of composite laminates. These nanofibres are carefully produced by our team of experts at Revolution Fibres using our unique Sonic Electrospinning technology, developed here in New Zealand.

Xantu.Layr® has the ability to improve composite mechanical properties, especially interlaminar fracture toughness, impact resistance and fatigue life, without having detrimental effects on other mechanical and physical properties. All of 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 a unique solution for the enhancement of advanced composite materials, offering performance and competitive advantages to our clients in the composites industry.



Performance Benefits:

Advantages:

- Improved interlaminar fracture toughness
- Improved impact resistance
- Improved fatigue life
- Improved flexural strength
- Improved interlaminar shear strength
- No decrease in compression strength
- No decrease in flexural stiffness
- No decrease in glass transition temperature
- Reduced ply delamination
- Enhanced resin toughness

No Additions:

- Virtually no added weight
- Virtually no added thickness

Compatible:

- Compatible with most industrial resins
- Supplied in easy to handle roll form

Safe:

- Continuous polymer nanofibre
- No health & safety issues

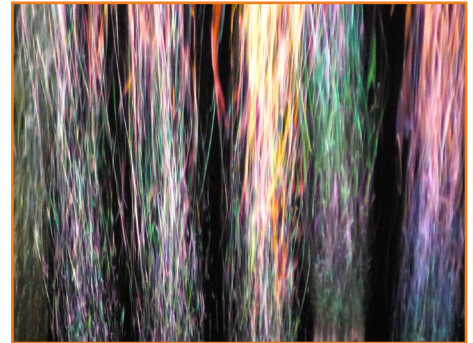
Easy To Use:

- Easy one-step integration to existing manufacturing techniques
- Potential addition to composite pre-pregs
- Can be used in out-of-autoclave composite manufacturing processes
- Can be used for localized resin reinforcement in composite laminates

Nanofibre Science

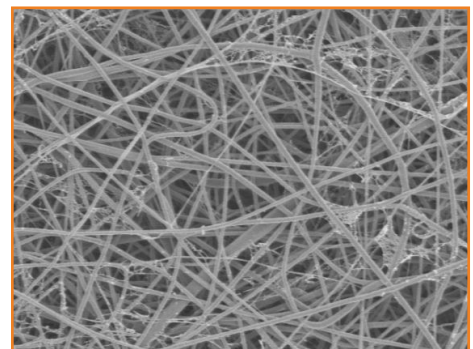
Electrospinning

Nanofibres are produced by a process called electrospinning, where an electrical charge is used to draw very fine fibres from a liquid. While electrospinning has been around since the early 1900's, there has been little commercialisation of electrospun materials 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 on an industrial scale.



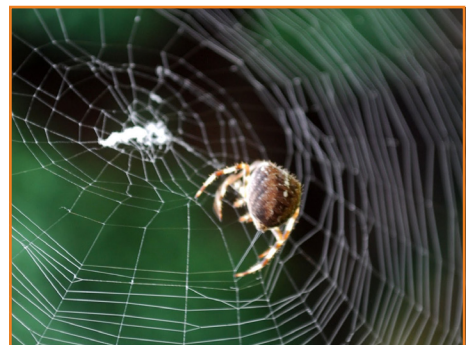
The Electrospinning Process

Electrospinnable polymers are dissolved in a liquid and then supercharged with up to 100,000 volts of electricity. Using the laws of attraction, tiny fibres leap out of the supercharged liquid at 80 m/s, spinning and spiralling until they settle onto a substrate. Only a scanning electron microscope can reveal the individual nano-scale fibres that this process can create.



Continuous Fibre

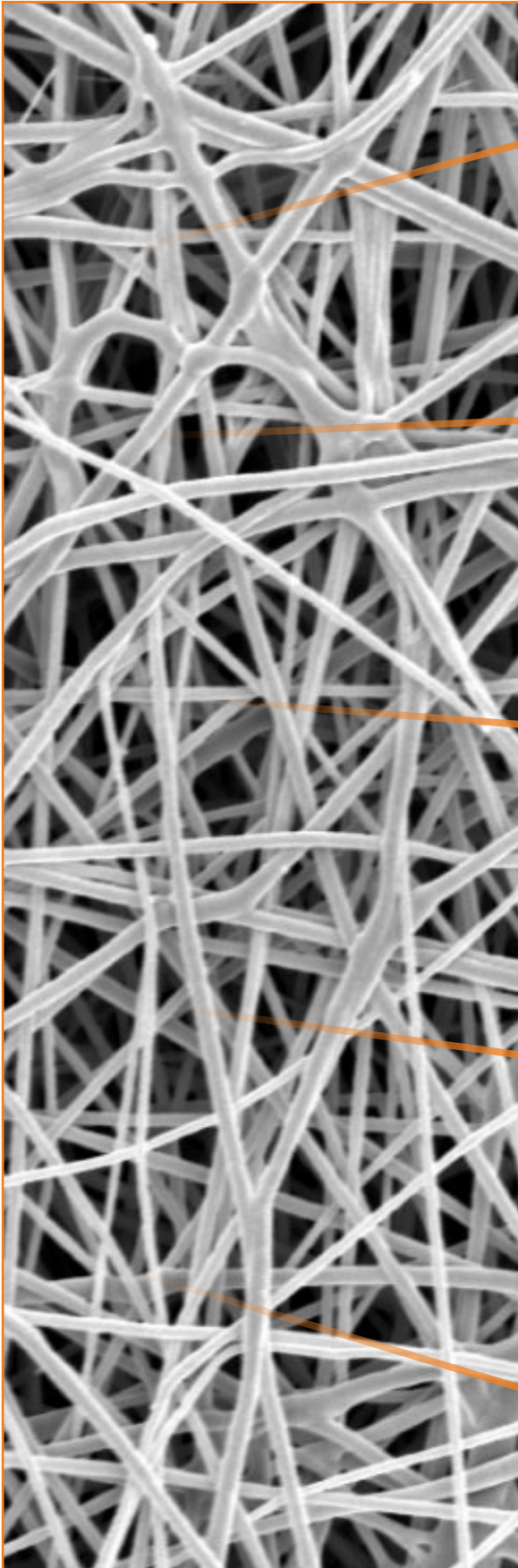
The electrospinning process creates non-woven mats, or veils, consisting of millions of continuous nanofibres. Individual nanofibres are drawn out from the supercharged liquid and continue to form until they are kilometres long. This process is comparable to how spiders spin their webs. The end result is a fine non-woven veil thousands of layers thick, yet only weighing a few grams per square metre.



Non-Woven Veils

The nanofibre veil material is deposited on a silicone release paper, which is then wound up in roll form onto a 76mm core. Nanofibre areal weight and fibre diameter can be closely monitored to maintain product quality and consistency. Rolls are typically 1m wide, but can be slit to customer specified widths if required.





Non-woven web

Xantu.Layr® nanofibres are produced using our Sonic Electrospinning Technology to form a non-woven structure which can be used to improve the mechanical properties of composite materials.

Negligible weight & thickness

Xantu.Layr® nanofibres are so incredibly fine that even in veil 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 veil 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.

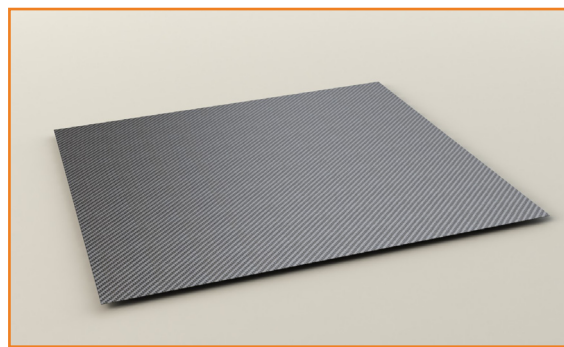
Nanofibres

Millions of tough, tiny nanofibres reinforce the resin component of the composite, providing multitudes of obstacles for any crack that might propagate through the brittle resin matrix.

Continuous fibre

Xantu.Layr® fibres continually overlap, loop and entangle with 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:



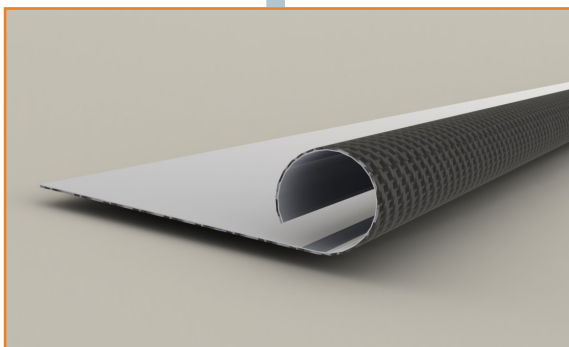
Carbon Fibre



Integration

Roll up

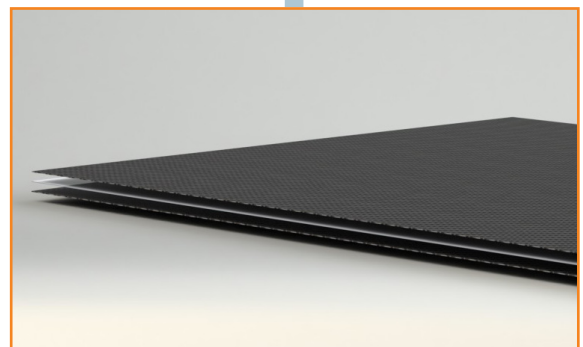
Sandwich



Tube integration

Xantu.Layr® can be easily integrated into the carbon fibre tube manufacturing process.

The addition of a single step to incorporate Xantu.Layr® into the prepreg prior to roll up will dramatically boost the performance of the composite tube.



Panel integration

Xantu.Layr® can be easily integrated into the process of making carbon fibre panels.

It only takes one easy step of laying Xantu.Layr® in between the plies of the skin layers to dramatically boost performance of a sandwich panel.



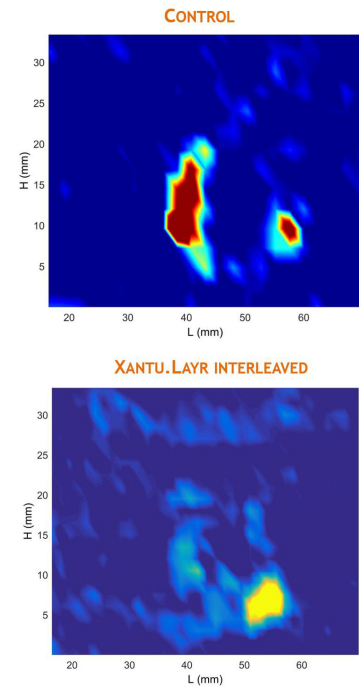
Product Range and Performance

Three nanofibre veil areal weights are available in the Xantu.Layr® AP Series: 1.5gsm, 3gsm and 4.5gsm. The levels of performance gains are dependant on the veil areal weight.

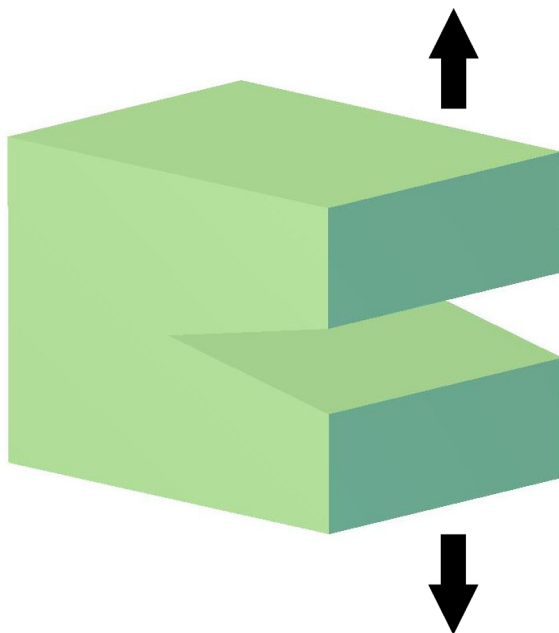
Xantu.Layr® enhances the Mode I (crack opening) and Mode II (crack sliding) interlaminar fracture toughness of composite materials. This results in improvements in impact strength, delamination resistance and damage tolerance.

These 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.

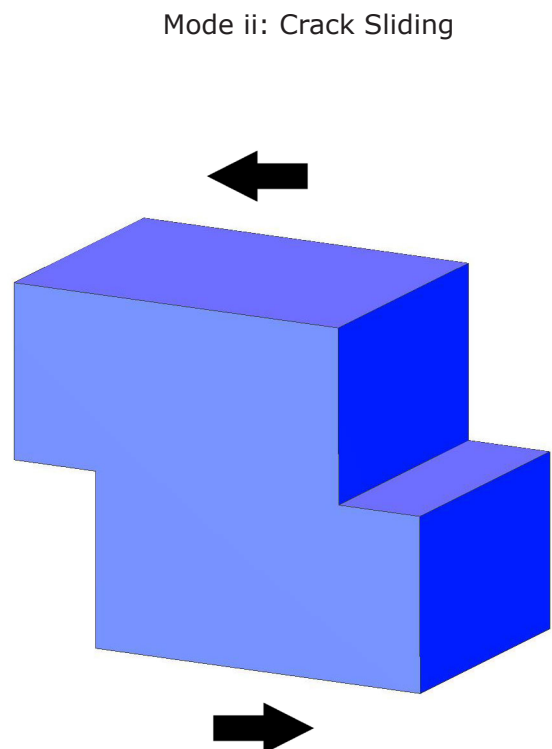
The thermoplastic nanofibres are strong and tough, and reduce crack initiation energy and propagation in the resin by means of crack deflection and energy absorption. Dramatic improvements in fracture toughness, compression after impact (CAI) and fatigue life have been seen for already toughened resin systems.



C-scans of laminates with and without Xantu.Layr® interleaving veils. Both laminates were impacted at 10J energy.

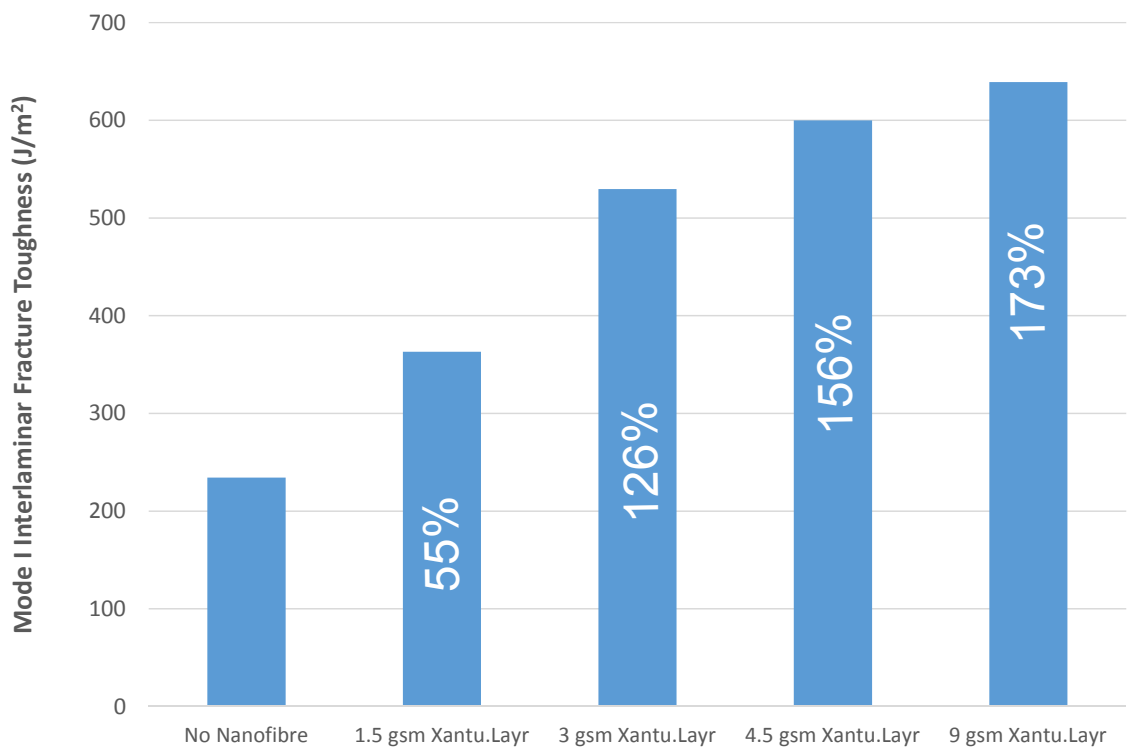


Mode i: Crack Opening



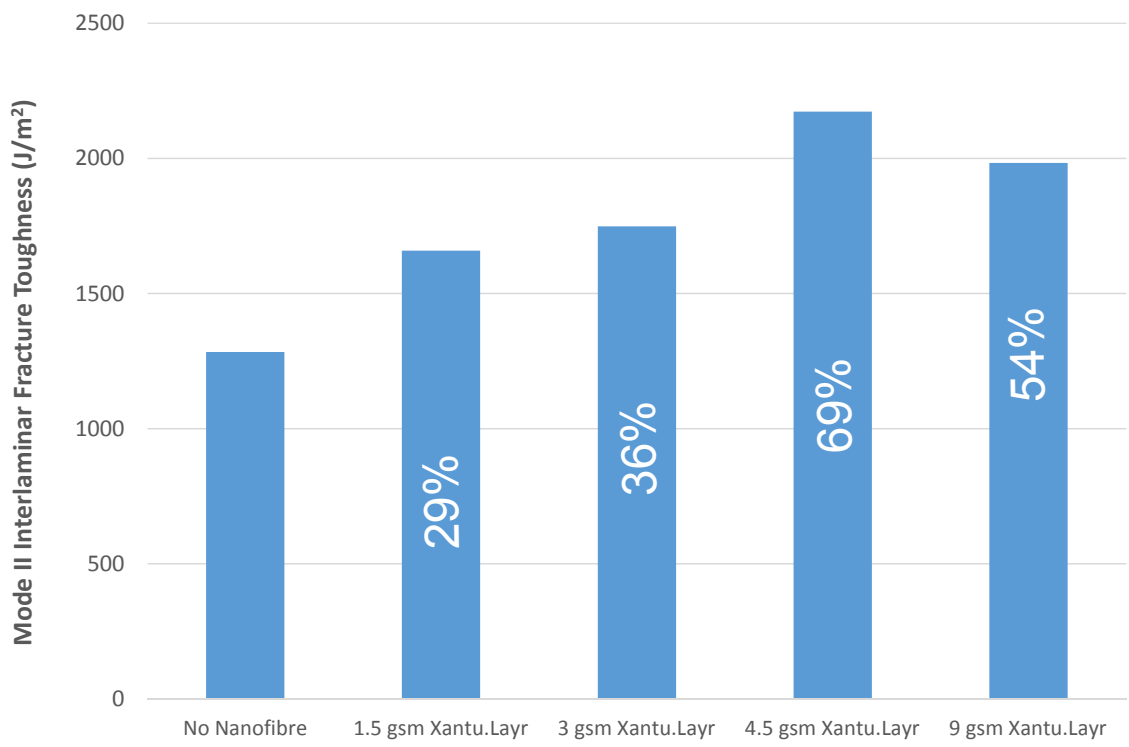
Mode ii: Crack Sliding

Mode I: Crack Opening



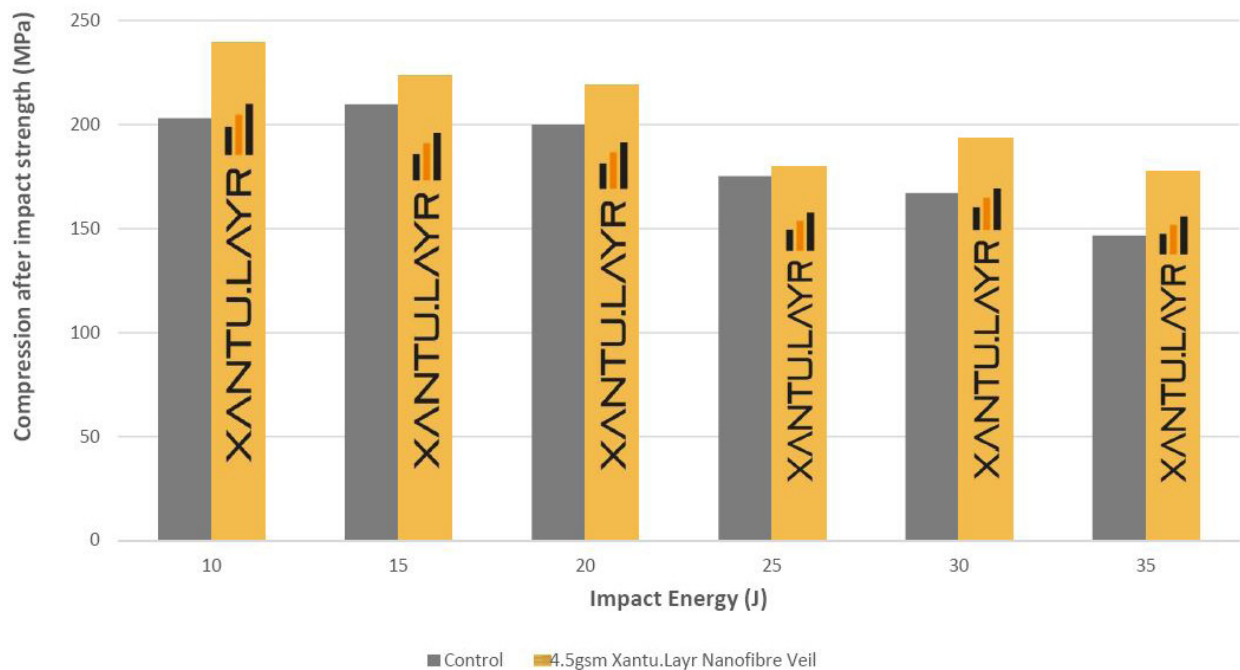
Mode I crack energy release rates (crack onset) were obtained for MTM57/T700S (24K)-300-35%RW using the Double Cantilever Beam test and the Modified Beam Theory in ASTM D 5528.

Mode II: Crack Sliding



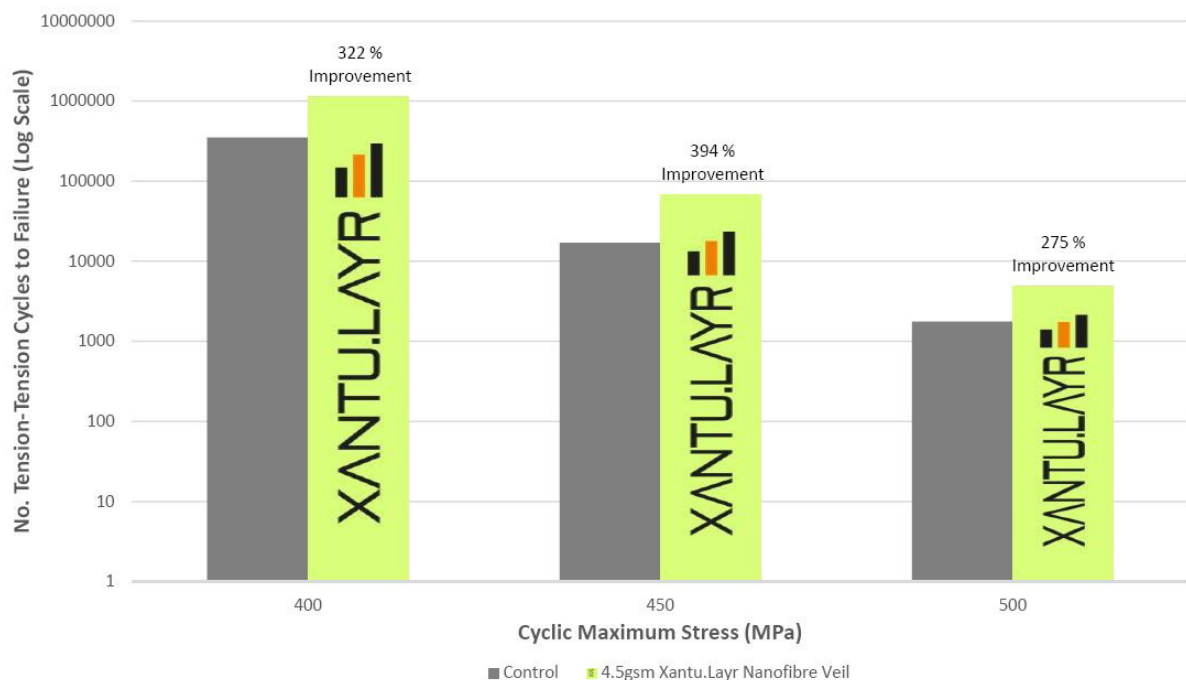
Mode II crack energy release rates (crack onset) were obtained for MTM57/T700S (24K)-300-35%RW using the End Notch Flexure test and the method stated in the ASTM draft standard test method for determination of Mode II interlaminar fracture toughness.

Compression After Impact Strength (CAI)



CAI tests were performed on 16 ply QI laminates made from SE70/VRC/200/400/35+/-3% UD prepreg interleaved with nanofibre veils in accordance with ASTM D7136/D7136M and ASTM D7137/D7137M.

Fatigue Resistance



Fatigue tests were performed on 16 ply QI laminates made from SE70/VRC/200/400/35+/-3% UD prepreg interleaved with nanofibre veils in accordance with ASTM D3479/D3479M Standard Test Method for Tension-Tension Fatigue of Polymer Matrix Composite Materials.

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 nanofibre customization services.

Product format:

- Areal Weight: 1.5gsm, 3gsm and 4.5gsm
- Length: 100 metres rolls
- Width: 1000 mm
- Custom configurations are available on request

Sample packs can be purchased online at www.xantulayr.com



Revolution Fibres is a nanofibre development and production company based in Auckland, New Zealand. We are dedicated to revolutionising products and industries through the implementation of our unique continuous nanofibre technologies.

With our diverse range of domestic and international clients, we continue to explore the use of nanofibre veils in areas of impact, delamination and fatigue resistance, vibration damping and more. Using the expertise of our in-house composites engineers, we can help with design, testing and integration of nanofibre veils into your composite products to achieve the best results.

We have the technology to produce nanofibre veils on an industrial scale – the key barrier to use in industry.

Proudly 100% New Zealand owned, we are AS 9100 certified and are a global leader in nanofibre production and development.



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