

LINEO - FlaxPreg

FlaxPreg Breakthrough Eco-Friendly Technology Opens Up New Markets



Case History

With the help of FlaxPreg, a revolutionary method of combining the damping properties of flax with the well-known high performance of carbon fiber is being used to make bicycles.

Bringing a new eco-friendly technology, LINEO, winner of the JEC 2010 Bio-Based Award, will help riders of all abilities.

Lineo's FlaxPreg products have facilitated a revolutionary method of incorporating renewable flax fibers into composite materials to make bicycles which will damp vibration and provide more comfort for every enthusiastic riders.

The ultimate technical goal was to combine the damping properties of flax with the well-known high performance of carbon fiber without sacrificing mechanical performance.

Using hybrid technology to combine flax fibers and carbon fibers, up to 25% of flax fibers have been used for different parts of bicycles, using a flax/epoxy commercial prepreg made from a unique yarn treatment and impregnation process which overcomes past technology problems of working with flax.

The unique process incorporates flax into composites to give the bicycle an amazing ability to absorb the vibrations due to the road surface, increasing performance and riding comfort while decreasing fatigue of rider.

After many years in development, bicycles riders of any level will soon be able to buy bicycles which absorb vibrations, helping them to browse more kilometers.

Lineo supplied pre-impregnated flax solutions on an industrial scale allowing renewable materials to be incorporated into composite products.

In applications requiring the stiffness of carbon, such as high-performance bicycle frame, the dynamic properties of the structure can be further improved by replacing some of the carbon by a flax layer, sandwiched between high-stiffness carbon layers.

Using the right amount and position within the hybrid structure will generate what is commonly known as constrained layer damping. Standard constrained damping layers are usually made from highly viscoelastic polymers with poor structural properties, relatively complicated to integrate during processing and adding a lot of weight to the structure. In comparison, flax is light, has great structural properties and is processed the same way as carbon.

"Flax fibers can now be considered as a genuine reinforcement fiber, to be used alone or with conventional fibers such as carbon, glass, aramid or basalt, providing high damping properties to composite structures."

• Application:

- FlaxPreg used for the manufacture of a range of bicycles
- Suitable for sports markets, leisure, furniture and transport

• Advantages for users:

- Damping properties without sacrificing performance
- Can be used alone, or with conventional fibers such as carbon, glass, aramid or basalt
- Flax containing reinforcements suitable for many different markets that can be sized fabrics for direct processes such as wet lay-up, infusion and RTM and which can also be flax preregs

• Key features:

- Eco-friendly
- Affordable
- Enormous range of colors available

• Lineo Advanced Materials used:

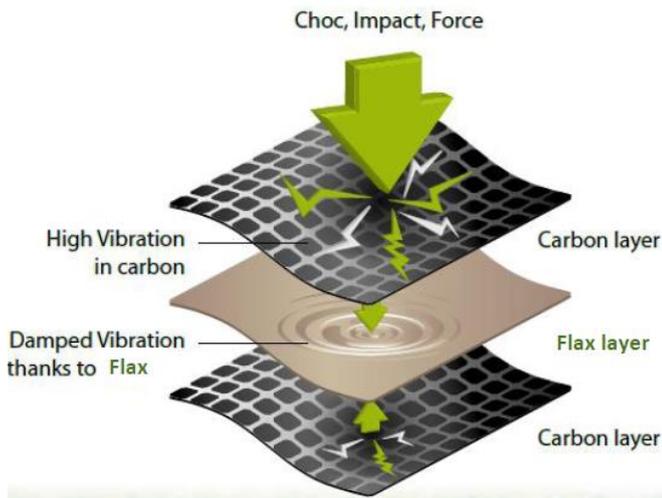
- FlaxPreg



Case History

Distribution between flax and carbon is different for each part, and depends on the stresses to which they are subject.

POWERFUL BY NATURE



Flax, More Performance!

Flax gets rid of the parasitic vibrations in the composites, which other materials cannot do. The game becomes purer and more dynamic.

Flax, Innovative Solution

After 5 years of research and development, the technology and properties of flax have been validated by leading sports brands.

Flax, More Security

By reducing vibrations, flax improves the riding comfort. So it reduces the risk of health problems.

Flax, Powerful by Nature

These natural fibers are more environmentally friendly

FLAXPREG



"We found that low environmental impact is not the only advantage of flax fibers. Their intrinsic technical properties can also make significant contributions to improving the performance of the finished product."

Francois Vanfleteren, Lineo CEO



When optimally engineered, a carbon-flax structure can exhibit significantly higher damping behavior in comparison to its full-carbon counterpart of equal weight. In addition to the damping increase, the right use of flax layers simultaneously improves the buckling strength and stiffness of the composite part by up to 25%.

Once more, this is due to the lower density of flax fibers. Thus, when replacing an intermediate carbon layer by a flax layer of equal weight, the distance between the remaining top and bottom carbon layers is increased, resulting in a carbon-flax-carbon sandwich structure with higher stiffness and strength than full-carbon reference part.

"Initially working with FlaxPreg was quite challenging, but the hurdles have been overcome, and now it is possible for new products to contain more FlaxPreg", said Francois.

Intrinsic flame resistance is another property which will be explored and will certainly make flax fibers attractive to other markets such as transport.

Major markets to benefit from the new eco-friendly technology are sports, leisure, furniture and transport, with cycling and tennis being the first sectors where the technology has been put into commercial production.

