

Recycled Carbon Fibre: Lineat's Innovative 'Solution' Aided by BPX



Dr. ir. Lourens Blok
CTO, Lineat Composites

"The BPX Applications team has helped us to specify components to quickly move from a specification, to a quote, to delivery, but also really understanding our process and our needs. At Lineat, key is our carbon fibre water mixture, and not all processing equipment can handle that. BPX understood this requirement, proposed suitable valves, and they are now installed on the machine behind me."

Dr. ir. Lourens Blok, CTO and co-founder of Lineat Composites

Case Study Background:

Established in 2020 and awarded the Southwest Manufacturing Start-up of the Year for 2023, Lineat Composites produce the world's strongest recycled material, made from carbon fibre.

Carbon fibre is like diamond hair - it's extremely robust, stronger than steel but lighter than aluminium. It is used to build lighter, more economical aircraft, longer wind turbine blades and faster, more fuel-efficient cars. As a material, carbon fibre is widely recognised as being expensive and highly wasteful. Modern air liners produce an estimated five tonnes of carbon fibre waste during manufacture, with a value of over half a million pounds. The material is so strong it can't be simply remelted like you can do when recycling metals.

Lineat have discovered a way to turn carbon fibre waste into a multi-use commodity material, using a two-step process. The first step is reclaiming the carbon fibre waste, the second is reprocessing it. Lineat take reclaimed chopped carbon fibre, which is a somewhat soft, fluffy-looking material and disperse it in water to break the reclaimed carbon fibre down into individual filaments. The carbon fibre water solution mix is then passed through a machine using patented alignment technology to realign the fibres, allowing them to produce a highly aligned, multi-use, recycled material in the form of carbon fibre tape.

Last year, Lineat demonstrated their technology with the Carbon Fibre Circular Alliance in partnership with World Sailing Trusts and leading sport manufacturers such as Wilson and Scott. They took broken carbon fibre products such as bike frames and tennis rackets, recovered the material, reprocessed and realigned it, producing new sporting goods such as the world's first recycled carbon fibre tennis racket.

Recycled Carbon Fibre Challenge:

In Lineat's carbon fibre recycling process, an essential aspect is the capability of their machine to manage the carbon fibre-water mixture, a requirement stemming from their need to apply the adhesive layer to the recycled carbon fibre tape. This unique mixture, owing to its inherent properties, poses a challenge for many processing equipment options. Our application team's challenge was to understand this practice and the processing problems Lineat needed to overcome.

Our Technical Solution:

Adopting a consultative approach, our applications team promptly grasped the presented challenges. Offering technical guidance, establishing trust and collaborating with our manufacturing partners, Lineat were supported in identifying the necessary components for processing the carbon fibre solution mix. This assistance extended to identifying components crucial for applying the adhesive to the carbon fibre tape, during the concluding phases of constructing their demonstration carbon fibre recycling machine.

After pinpointing and specifying the solution, we provided SMC MGPM guided actuators, SY5000 series manifolds, ITV proportional and SY series valves, tailored for adhesive application. Additionally, we supplied Bonomi Valpress, Berkit and Valbia-actuated 2-way and 3-way valves—perfectly aligned with Lineat's requirements for processing the carbon fibre solution mix.

The Outcome:

The proposed and supplied SMC actuators, Bonomi and Berkit valves are now installed on the demo carbon recycling machine. Thus, enabling Lineat to process the carbon fibre water mixture and apply their adhesive as required, allowing them to meet all of their demonstration and carbon fibre production needs.

How BPX will support Lineat Composites into the future:

Lineat's vision is to make the most from the carbon fibre they recover and recycle. Beyond their first demonstration machine, which continues to operate and process and recover carbon fibre waste, plans to build additional and larger machines are in place to turn recycled carbon fibre into sustainable materials of the future. Our team is ready to assist them in identifying and providing the essential components necessary to address any increased requirements they may encounter.