ADVANCED MANUFACTURING GROWTH CENTRE

MEMBER PROFILE

partington

Partington Advanced Engineering (formerly 36T) was formed in 2014 and combines its founder's advanced composites expertise with his passion for cycling.

Jon Partington has two decades of automotive industry experience and is an expert on carbon fibre-based materials; and has seen these composites find their way into motorsport and luxury car products, with the potential to migrate successfully into many other environments.

"I guess carbon fibre is very engineered, it is very considered, but at the same time it is really a young technology so there is lots of opportunity for innovation and new ideas and development," he explains.

"I have been a keen competitive amateur cyclist on the road, and recognised there was an opportunity within the composites space to bring these two together, particularly around lightweight wheels for pushbikes."

Partington separates existing approaches to carbon fibre bike wheels into two genres: a lower tech variant with a carbon fibre rim, and a higher-end, "holistic" approach using the material in spokes and hubs. The latter is pursued by maybe two companies worldwide.

Currently working towards a PhD in advanced composites, Partington realised that while replacing alloy parts with composite could be interesting, a simple material substitution approach is not optimal.

"Polymer composites have very different qualities to metals and they process very differently; they have different strengths and weaknesses," he says.

"The whole design needs to be sympathetic to these characteristics.

"That obviously starts with the design phase, developing several methods for modelling potential and design solutions using software such as finite element analysis, using computer-aided engineering, and basically optimising these discrete materials. Generally, we do that at all levels."

The company is developing what Partington calls a "multi-material architecture", an approach using digital modelling to combine composites, plastics and metals to get the best out of each constituent material within a structure.

The design has matured through three prototype iterations. Handmade wheels have been produced and trialled by elite cyclists, and the company is find a way to commercialise high-end wheels. This includes designing the smartest, most economical use of expensive constituent materials, and the least labour-intensive and most highly-automated way to manufacture.

The approach has "a whole plethora" of applications beyond bike wheel manufacture. The most obvious, according to the Partington, is in underbody components for automotive due to requirements around durability, strength and complex geometries.

Partington Advanced Engineering moved into Deakin University's ManuFutures Hub in late-January 2018 to finalise the shift to commercial reality. The University's Innovation Precinct is home to established composites specialists such as Carbon Revolution, the makers of one-piece carbon composite automobile wheels, and the open access Carbon Nexus research facility, which has played a role in Partington's company's development.

The location brings exciting future collaboration opportunities.

"They are pioneering some very good technology in the space of carbon fibre manufacture, be that low-cost and/or high-performance carbon fibres, and they obviously look for applications to demonstrate this new technology on," he offers.

Of the company's collaboration with the Advanced Manufacturing Growth Centre, he says this has been beneficial in the journey, which is demanding from both a capital intensity and expertise intensity point of view.

"It has put me in touch with people within engineering enterprises which are pioneering or developing technologies and/or starting up."

"It puts you in a small community of people that are having similar experiences, and that can be really useful from the very basic point of just having someone to dialogue with over similar problems or that can extend to creating new contacts and professional relationships which might support other business activities in the future."

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Jon Partington, Founder CEO/CTO