AMGC
ADVANCED MANUFACTURING GROWTH CENTRE LTD

A WORLD-FIRST GEOPOLYMER AND CARBON FIBRE SOLUTION

Austeng

Well-regarded Geelong engineering firm **Austeng** is leading a project to develop a world-first construction industry innovation. This geopolymer and carbon fibre solution offers superior thermal stability, corrosion resistance, and durability compared to concrete. The City of Greater Geelong has published a procurement for innovation tender, which if Austeng were successful would provide an opportunity to demonstrate the product in three pedestrian bridges. A decision regarding this tender is pending.

How the Growth Centre helped:

This project combines the skills of the Advanced Fibre Cluster Geelong, which was established through an AMGC co-funded project. The Growth Centre also assisted through a second $50,000 co-funded project, with Lyn George of Austeng commenting, "The AMGC is leading the way in relation to giving us informed access and information on their co-funding process. I'm very impressed at their flexibility and the ability to support advanced manufacturing."

What's changed:

Matching the experience in polymer concrete projects with the world-class carbon fibre expertise of the Carbon Nexus research facility creates a high-value solution with applicability in and well beyond bridges. Servitisation will be demonstrated through post-production design services based around this unique composite material. It appears this will be the first such combination in the world and a Provisional Patent has been lodged. The project involves members of the Advanced Fibre Cluster Geelong, and Rocla.

Success story overview

Geelong engineering firm Austeng was established in 1984, and has evolved from an automotive industry supplier to a technology enabler for advanced manufacturing startups. It has earned accolades including a recent Australian Engineering Excellence Award (Victoria) for Innovation, Research and Development.

Corporate Manager Lyn George describes the company as having, **"A proven track record providing a bridge between a concept, idea or research and commercial reality."**

Austeng also finds itself acting as a connector between academia and businesses, as is the case in a current project to manufacture carbon fibre-reinforced geopolymer bridges.

The company leads this collaborative effort, which also includes concrete products supplier Rocla, and Advanced Fibre Cluster Geelong member Carbon Nexus (part of Deakin University).

“We know them and we’ve done geopolymer projects before, so our role in this was initially to bring them together and coordinate it,” explains Ross George, Austeng’s Managing Director.

“Our ongoing role, and it will be interesting to see how it evolves, will be ongoing support for Rocla in terms of moulds, it will be marketing, it’ll be potentially manufacturing some of the product, but it’s yet to be finalised depending on how the process evolves.”

Ross George calls the solution being developed “a cure for concrete cancer”. A problem with concrete using steel rebar is rusting and swelling of this reinforcement over time, displacing and breaking the concrete (therefore, known as, “concrete cancer”.) The carbon fibre and geopolymer matrix will not suffer rust, acid-resistant, salt-resistant, and it is thermally stable up to high temperatures.

According to background research by project participants, their proposed solution is a world-first. If successful, they will develop, manufacture and test a footbridge using this novel composite material for the City of Greater Geelong. According to the council, the City owns and maintains 160 bridges, and spends between $150,000 and $200,000 maintenance costs. As part of its efforts to address this, it established a forward commitment to procure three “zero maintenance” bridges from the local Fibre Cluster.

If viable, the product could have applications far beyond bridges. It would offer advantages over cement through lower embedded energy levels and lower greenhouse gas emissions. Cement contributes an estimated 5 per cent of worldwide manmade CO2 output. Half of this is through clinker production, 40 per cent through producing heat and 10 per cent through electricity and transport.

The project is estimated to cost $120,000, and pre project research is being facilitated through a $50,000 co-funded project from the Advanced Manufacturing Growth Centre.

If successful, the solution being developed will be moved to Technology Readiness Level (TRL) 8 or 9.

Medium-term impacts from commercialisation are predicted to be more than 10 full-time equivalent jobs.

According to IBISWorld research, the Australian concrete products market is worth $2 billion. Capturing up to a per cent of this, or $20 million, as well as achieving exports is considered a realistic early proposition.

Ross George believes that given concrete’s long history, established standards, and familiarity to builders and engineers, there is a degree of inertia to be overcome, but the product being developed is a winner.

“It’s actually got better flexural strength than concrete,” he explains.

“Basically, you can dump it in a tub full of acid, you can light a fire underneath it, you can put it next to salt water and it won’t degrade, it won’t rust, and it’ll still be there in 100 years or more.”