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Reinventing the wheel - Part one

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Like many heavy industry-based regional economies, Geelong found its economy collapsing in the face of globalisation. However the city is now set to be the centre of an advanced manufacturing industry, based on the manufacture and use of the lightest of materials.

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Carbon fibre materials are set to transform the world. Aviation, car-making, construction, defence, mining, renewable energy – it's hard to identify a significant industry the ready availability of lightweight, strong and adaptable composite materials isn't going to shake up. Counter-intuitive as it seems, many of those carbon fibre material products are being developed in an unassuming port town perched at the bottom of Australia.

Geelong, one hour from the Victorian capital of Melbourne, has had much well-publicised bad luck. The local building society went bust. Its aluminium smelting industry shut down. Its once mighty car-making sector imploded. Yet it has also had a lot of unpublicised good luck, attracting academics and entrepreneurs who've laid the groundwork for what looks set to become one of the 21st century's most important industries.

Professor Bronwyn Fox has been one of the key figures in Geelong's rebirth. With degrees from the University of Melbourne and Australian National University, and a stint at the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Fox had plenty of options when she was looking for a new role 14 years ago. But her Geelong-based mother encouraged her to apply for a position at the local university she'd seen advertised in the community paper.

"When I turned up at Deakin University for the job interview there was very little in the way of infrastructure, equipment or facilities," remembers Fox. "But there was a great group of people, a dynamic environment and a vision." Fox took the job and then convinced some of her CSIRO contacts to collaborate with Deakin University. Fox's mentor, Professor Peter Hodgson, secured financing for what became the Victorian Centre for Advanced Materials Manufacturing. It then supported start-ups, frequently ones launched by Fox's students. A thriving innovation hub emerged. Pioneering businesses such as Quickstep, currently manufacturing parts for Lockheed Martin's international F-35 Lightning II Joint Strike Fighter program, developed innovative composite materials and more efficient ways of producing them.

In 2014, the A\$34 million, open-access carbon fibre/composite research facility Carbon Nexus opened at Deakin University's Geelong Warrn Ponds campus. With state of the art research and analysis labs, pilot scale and research carbonisation lines, and excellent production and research staff, it has cemented Geelong's reputation as an advanced manufacturing hotspot.

Fox leads a multi-disciplinary team of 30 staff who research the manufacture and use of carbon fibre. Carbon fibre composites - materials where the carbon fibre is embedded in a polymer matrix - are being increasingly used across industries. In Boeing's 787 Dreamliner they are helping to improve fuel economy by 20 per cent and reduce CO2 emissions, also by 20 per cent.

"It's predicted to be a A\$36 billion industry by 2020 but as recently as 2008 there were maybe five [global] companies making carbon fibre. It was a material only found in boundary-pushing products, such as the Boeing 787 Dreamliner and the BMW i3 electric car.

"It was clear to me early on that this was the material of the future; that the world was moving away from digging metals out of the ground to engineering materials at a molecular level. And that those engineered materials would play a crucial role in other emerging technologies, such as 3D printing", Fox says.

"We believed we could create a centre of excellence around carbon fibre composites. We believed that would reinvent the local economy and put Australia on the map. And we were fortunate to have a visionary vice chancellor in Professor Jane den Hollander who saw in our work an opportunity to make a difference to the Geelong community."

Those determined to make Geelong a central node of the global carbon fibre industry face three challenges. First, creating carbon fibre materials fit for purpose. Second, creating them cost effectively enough to allow mass take-up. Third, convincing the rest of the world they've achieved the first two aims.

For years, Deakin University quietly worked with companies such as Quickstep and Carbon Revolution, a carbon fibre car wheel manufacturer, to design and manufacture innovative carbon fibre products.

Quickstep Holdings announced in August that it was investing A\$13.9 million in an automotive division and research and development (R&D) centre at Deakin's Waurn Ponds campus. The company is relocating its automotive R&D activities from Munich, Germany, creating at least 20 new high skilled jobs in Geelong. Acknowledging the support of the Australian and Victorian governments and Ford Australia, Quickstep managing director David Marino said "the company will benefit from access to Deakin University's 'carbon cluster' with its skilled researchers, laboratories and industry networks." Deakin will be Quickstep's largest research provider.

In part two of this story, we look at how one Australian start-up based in Geelong is now in the international spotlight for its carbon fibre products. [/technology/reinventing-the-wheel-part-two]

For more information

- [Carbon Nexus \[http://www.carbonnexus.com.au/\]](http://www.carbonnexus.com.au/)