

Carbon fibre composites have about 5 times the specific strength of steel. BMW are currently making their high volume BMW i3 "Life module" from a carbon-fibre-reinforced polymer. Use of this material has significant advantages for BMW. The high stiffness to weight ratio means that a stronger and lighter "Life module" can be created to improve passenger safety and to remove weight to increase the vehicles range on battery power. This revolutionary material is very much the enabler for battery electric vehicles such as the i3.

The use of carbon fibre is continuing to expand into civil infrastructure – wind turbines, bridges, gas storage pipelines – and aeroplanes, medical prosthetics, inter alia. Its lower weight can lead to reduced transport costs compared to steel and it's easier to handle leading to reduced site costs. So why is carbon fibre not more ubiquitous? Why is steel so prevalent in manufacturing? One word: Cost.

Price is falling rapidly

At it's current price, carbon fibre is economic for weight-sensitive products such as electric vehicles, aircraft, racing cars, wind turbine blades and elite sporting goods. However, the price of carbon fibre is falling rapidly. It was US \$120 a pound just a few decades ago and \$10-12 per pound today and the price is continuing to fall as the demand for this material increases.

Industry experts cite US \$5 a pound as the tipping point at which carbon fibre enters mainstream automotive applications. How fast prices actually fall depends on solving technical problems, and this solution rate is heavily related to the number and commitment of entities investing in carbon fibre technologies and end users willing to embrace carbon fibre products.

Australian research

The car companies are beginning to line up. Partnerships have been formed between BMW and the Germany-based SGL Group; Ford and DowAksa; GM and Teijin (Japan). Other companies such as Toray Industries, Multimatic, Plasan Carbon Composites, Zoltek Cos., Magna Exteriors, Cytec, Sigmatex, Toho Tenax, Mitsubishi Rayon, inter alia are also active in this space. Here in Australia, carbon fibre research is being undertaken by Swinburne, CSIRO, Deakin and RMIT

Will carbon fibre become BHP's Kodak moment?

Written by The Conversation USA

universities with manufacturing and technical centres such as, Boeing, Multimatic, CST, CME, Carbon Revolution and Quickstep. There is little or no evidence that the companies that currently depend on the demand for steel for their livelihood, i.e. BHP, are interested in manufacturing carbon fibre or carbon fibre composites.

Arguably 50% of global steel demand under threat

So when price falls below the magical US\$5 per pound and as a result, carbon fibre moves into mainstream automotive manufacturing, what will happen to demand for our iron ore? – our second main export? At about 18% of global steel production, transport is currently a significant user of steel. Add in other appliances and machinery where carbon fibre can play a substantial role, this could impact up to of 50% of world steel demand. This would have implications to overall demand for our iron ore – and they are not pretty.

The raw material for carbon fibre is not iron ore

But who wins from an expansion of carbon fibre? About 90% of the carbon fibres are made from polyacrylonitrile (PAN) with the remaining 10% from rayon or petroleum pitch. PAN is largely sourced from by-products of the petrochemical industry. However, there is significant work in looking at alternative precursors to reduce the dependency of the industry on oil. The largest resource shortage in the ongoing development of the carbon fibre industry is not petroleum, it will be intellectual capital. As it works to lower costs to the magical US\$5 a pound, the industry will remain in the research intensive stage. In the end, who owns the technical solutions, via patents and embedded technical expertise, could be in a position to capture a significant share of the wealth creation.

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