

ITMA 2011 observations – Textiles in Composites

Against the backdrop of Barcelona's rich cultural heritage, the atmosphere for ITMA 2011 was upbeat, with most internationals believing the financial crisis of 2009 (which affected the rest of the world more than it did Australia) and subsequent downturn in expenditure was behind us, marking the end of the "old industrial landscape". The future, it was said, is key enabling technologies, one of which is composites. Indeed, Thomas Babacon, the CEO of the industrial giant Oerlikon claimed that textiles, including those used in composite technology, are now the fifth largest building material in the world, following stone, steel, timber and glass.



Confirming this, Karl Mayer, one of the European warp knitting machinery giants, displayed a number of new machines that could produce the finest lace to a carbon fibre warp knitted scrim that is being marketed as a light-weight, easily handled alternative to steel reinforcement for concrete. The company's technology also extends to high-performance stitch-bonding machines for over stitching of yarn sheets and surface fabrics to form nonwovens for composites for marine and automotive applications.



The decarbonisation of the transport system, as we know, is driving the need for lighter and more recyclable vehicles. The show confirmed that fibre based composites are becoming increasingly important in the manufacture of automotive components. This year BMW unveiled prototypes of its carbon fibre-based composite i3 and i8 electrically powered production cars at a special showcase in Frankfurt am Main, Germany. The developers claim this car will be the first volume-produced car to feature bodywork largely of carbon fibre. AUDI has also created a concept for an electric urban car, benefitting from lightweight carbon fibre reinforced plastics.

Given the transformative nature of carbon fibre applications, the global anxiety around the price, availability and future supply of carbon fibre for advanced composites was palpable.



Indeed, it is predicted that the two largest end uses by 2017, both around the 100Kt each, will be wind energy and automotive, with aerospace a modest 40Kt. High volume carbon fibre production was said to be the biggest challenge, though it was believed that the negative effect of significant supply and demand swings will not be moderated until the market grows at least three to four times and the application of research and development investment.

And, reinforcing renewed interest in natural fibres for industrial and automotive applications, particularly baste fibres such as hemp, I heard for the first time the term "from glass to grass."

Braiding machines for the production of textile products have a long tradition and are still indispensable for many

applications. A sophisticated 21st century evolution of braiding technology that has traditionally been used to produce mundane products such as shoelaces, cables and ropes is now being used to produce contoured 3D parts such as an aeroplane propeller. The Herzog Radialbraider displayed an aeroplane propeller profile that was over braided to shape with carbon fibre rovings.

The exceptional characteristics of fibre reinforced composites are also now being viewed as critical for use in the machine building sector. These include excellent fatigue strength and a low density, but especially a specific coefficient of thermal expansion, which can be set in the positive and negative value range, including zero. Components can also be produced with several curves, 3D reinforcement and other complex geometrical shapes. Karl Mayer says these are important factors, particularly when the machine components have to interact precisely with each other under varying climatic conditions.

Addressing the need for expertise in textile reinforced composites, RWTH Aachen University, one of Europe's leading institutions for science and research, collaborated with Katholieke Universiteit Leuven (Belgium) to design and deliver a certificate course tailored to the needs of young professionals in the composites and textiles industry. Participants are trained throughout the two week long course to evaluate and exploit the specific potential of textile reinforced composites and the related manufacturing and simulation technologies.

Developing new uses and products for textiles through composites, it was said, does not simply evolve through product development in isolation. It is usually the result of innovative and transparent partnerships across supply chains that have been formed to tackle societal and technological challenges. Whilst shared knowledge and transparency is counter-intuitive for competitive companies, these concepts are necessary as supply chains are increasingly



being held to account over issues of sustainability and liability. Business and new product development are now simply being done differently, driven by the concept of shared value creation and liability mitigation.

For those brave enough to invest and trust in long term partnerships, the opportunities for textile technology in composites is promising.