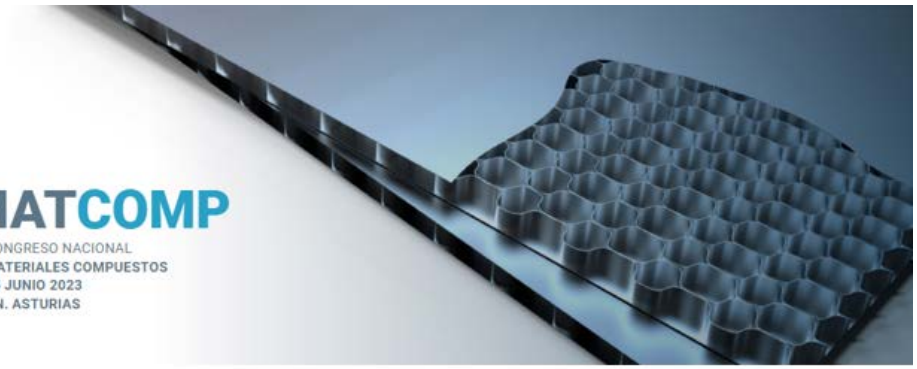

PLENARY CONFERENCE:

Digital design of carbon fibre composite materials: Achievements and limitations

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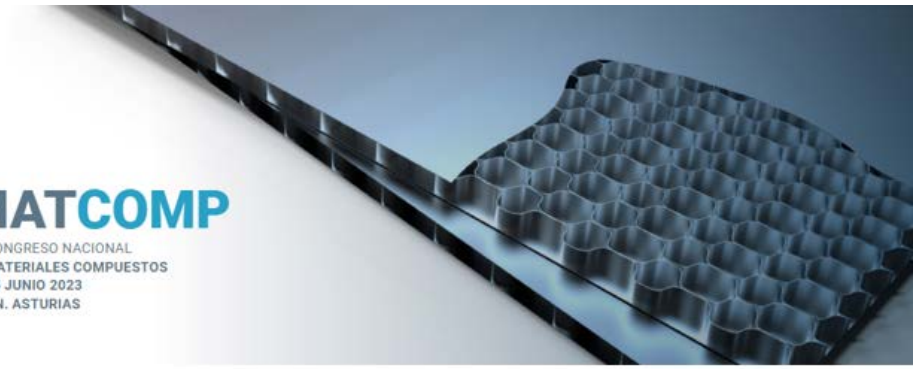
Ideally, we would like to build a material system from scratch, atom by atom engineering. Then you would be able to build in functionality on a material level. Imagine, you create a hetero-structure such as say the top layer acts as a sensor, the next few work as amplifier and interconnects, few layers act as mechanical reinforcement. Somewhere there would also be a solar cell to generate power to run the whole circuit. Multi-layered carbon fibre reinforced composites together with 2D materials such as graphene will enable such structural configurations to be tailored according to needs.

In this talk, applications of modern carbon fibre composite systems will be presented and achievements, but also challenges and limitations will be discussed, in the non-destructive damage characterisation (benefiting from AI) and modelling of such materials where machine learning algorithms can speed up design optimisation with some thoughts on future developments and prospects for novel multi-functional materials (graphene based composites with tailored thermal/electrical conductivity, notch insensitive 3D hybrid woven architectures) and processes that offer real time structural health monitoring (SHM), self-healing and repair capabilities.



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is Professor Emeritus of Aerospace Engineering at the University of Manchester and Director and co-Founder of Manchester Robotics Ltd., a spin-out company from the University of Manchester, a solution provider and robotic platform builder, a 'lab in a robot', for independent learning in STEM education. https://www.manchester-robotics.com/.

Prior to this, he has held professorial appointments at Imperial College London and the University of Sheffield and visiting professorial positions in the USA, at Massachusetts Institute of Technology and the University of South Carolina, Chosun University in South Korea, ISMANS, Le Mans, France and Xi'an JiaoTong University in China, a C9 League university. Prof Soutis is Fellow of the Royal Academy of Engineering, elected in August 2014 and a leading authority in mechanics and failure of composite materials, with significant contributions on modelling damage and structural health monitoring using low frequency Lamb waves techniques. He is the author or co-author of over 400 archived articles and some 40 PhD students have qualified under his supervision and guidance.