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Carbon nanotube reinforced structural composite core for sandwich construction applications

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The transition of Carbon Nanotubes (CNT) from the lab to application is frequently limited to conditions with tailored placement or low mass ratios of CNT being incorporated into the overall. Using CNT as a primary structural element on a macro scale faces many challenges. Obstacles include available quantity and price of the nano-format, and compatibility with established production infrastructures. Another challenge frequently encountered is the language barrier between materials scientists and application engineers. Alliant Techsystems (ATK), Nanocomp Technologies Incorporated (NTI), and Patz Materials and Technologies (PMT) have overcome many of these obstacles to create a structural composite core produced from carbon nanotubes (CNT) and cyanate ester polymer resin. The core has a high mass fraction of CNT, which is enabled by the large CNT sheet format produced in a semi-continuous process. This CNT format fits deftly in standard prepreg operations and automated corrugation processes. Compared to other composite core products, the CNT core displays increased capacity for tailoring the cell geometry and resulting structural core properties. This affords the engineer of advanced composite structures an option to reach into the architecture of the light weight structural core and optimize the overall system further than conventional approaches would permit. The advancement path is described, as well as expected capabilities and benefits are explored. A discussion of engineering properties versus materials scientist properties is also addressed.

Biography

A Marcel Bluth has a Master of Science Degree in Mechanical Engineering from the University of Utah and is currently a candidate for a Doctorate of Philosophy in Mechanical Engineering at the same university. He is a senior fellow engineer at Alliant Techsystems and has 30 years of experience developing and engineering composite structures for aerospace applications. His background covers launch vehicle, payload, and aircraft structures. Composites experience includes conventional polymer matrix composites, carbon-carbon, and ablative structures.

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