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ADVANCED MATERIALS AND MANUFACTURING PROCESSES FOR NEXT GENERATION  
SPACECRAFT

**Abstract**

The paper identifies advanced materials manufacturing processes, and analyze their projected impact on the performance of future spacecraft. When looking at the past, developments in this area have spurred innovation within spacecraft design, increasing the performance and/or driving down the cost of component and subsystem designs. Many of these materials and processes are spin-in technologies benefiting from research in adjacent high technology sectors. This spin-in enables a cross-sectorial shared burden of the basic research costs, and thus allows more RD funds to be allocated to dedicated development of space technologies. Some examples of advanced materials of high interest for the space sector discussed in this paper include Metamaterials, Fullerenes (e.g. Graphene/ Carbon Nanotubes / buckyballs), Metal Foams, Self-Healing Materials, High temperature super conducting materials and Amorphous Metals. The paper focus also on advanced manufacturing processes currently under development such as Additive Manufacturing, Advance Welding processes (eg. Friction stir, Magnetic Pulse, Ultrasonic) and advanced CFRP production methods.