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Methods and Apparatus to Print with Continuous Multifunctional Composite Materials

A new technology enhances Extrusion Deposition Additive Manufacturing (EDAM) by integrating active heating, cooling, and sensing elements, improving mechanical properties and processing higher fiber counts for applications like aviation and propulsion systems.

Printing with continuous fibers is a state of the art process. Currently a popular technique is Extrusion Deposition Additive Manufacturing (EDAM). It is very flexible and is the favorite technique when producing 3-D geometrics. This technique has its disadvantages when it comes to the mechanical components like stiffness and strength. Also, the sensing or heating elements for this technique are very labor-intensive or just simply not possible.

Researchers at Purdue University have developed a new technology that will utilize Extrusion Deposition Additive Manufacturing and adds to it. They call it "Continuous Multifunctional Composites". This allows for adding of the sensing, heating, or cooling elements that the EDAM was not able to accomplish by itself. This new technology also allows for the printer to process much bigger fiber counts than before. It also improves the mechanical properties that were limited in the EDAM alone. By adding "Continuous Multifunctional Composites" to EDAM, it improves the overall efficiency of the machine.

Advantages:

-Improved mechanical properties

-Adds active heating, cooling, and sensing elements

-Processes bigger fiber counts

Potential Applications:

-Aviation

Technology ID

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Category

Aerospace & National Security/Hypersonics & Propulsion Systems
Materials Science & Nanotechnology/Composites & Hybrid Materials
Materials Science & Nanotechnology/Thermal Management Materials & Solutions

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-Propulsion systems

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