



# Kansas State University Research Foundation TECHNOLOGY LICENSING PROFILE

## METHOD FOR 3D PRINTING OF CONTINUOUS CARBON- GLASS FIBER REINFORCED POLYMER COMPOSITES

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### **Brief Description:**

Researchers at Kansas State University have developed a method to achieve 3D printing of continuous carbon and/or glass fiber reinforced thermoplastic composites. The process involves the use of laser cutting of carbon/glass fiber prepreg or tape in each layer, and its subsequent layer by layer additive manufacturing via laser bonding to achieve the desired shape and dimensions for the end-product.

Continuous carbon fiber/glass fiber composites exhibit superior mechanical performance, the potential for light-weight structures, ease of processing, lower associated manufacturing costs, and high volume processing potential. Additionally, these composites exhibit enhanced toughness, chemical-environmental resistance, damage tolerance, and an unlimited shelf life at relatively low cost. To the best of our knowledge, ours is the best method that can be used to print continuous carbon fiber/glass fiber composites with superior mechanical properties and excellent interfacial bonding relative to competing methods.

### **Advantages:**

- Continuous fiber reinforcement offers substantially more strength and stiffness, because almost all the load is carried by fibers in loading direction.
- This 3D printing method greatly improves the bonding strength between layers when compared to fuse deposition modeling (FDM) or extrusion method.
- Tensile properties of components printed were superior to those of FDM printed short and continuous fiber composites.
- Tensile strength of printed components was comparable to compression molding and stamping.
- Fiber alignment in each layer can be easily controlled.

### **Applications and Commercial Opportunities:**

- Substitute material for metal and conventional thermoset polymers in automotive, transportation, aerospace, and marine applications.

### **Intellectual Property Status:**

Patent Pending

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