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Rotating nozzle to twist short fibers in a filament

Rotating nozzle twists recycled short carbon fibers into stronger yarn-reinforced filaments for load-bearing 3D prints.

Researchers at Purdue University have developed a new approach to strengthen mechanically recycled short carbon fibers by twisting them into a yarn within a polymer matrix to create a filament that can be used in 3D printing. This approach enhances the mechanical properties to be used in load-carrying applications through reducing tensile strength of short fibers compared to continuous fibers thus increasing their market value and sustainability. This method uniquely combines fiber twisting with polymer integration. This technology can be integrated into existing 3D printing solutions and offers more sustainable second-life options for short fibers. The innovation is protected by the design and operation of a rotating nozzle, with ongoing work focusing on process optimization and understanding how twist levels affect mechanical properties. Potential users include 3D printing companies, and the technology represents a cost-effective, eco-friendly advancement in recycled fiber applications.

Technology Validation:

The technology was presented as part of a senior design class at Purdue University on April 23, 2024, with a prototype demonstration and a poster presentation the following day. These presentations suggest some initial proof-of-concept validation, but no specific experimental data, testing procedures, or performance benchmarks are detailed.

Advantages:

-Improved Strength

-Sustainability

-Cost Effectiveness

Applications:

Technology ID

2024-TORG-70710

Category

GreenTech/Circular Economy & Waste Reduction

Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

Authors

Ryan Herr

Monique Suzanne McClain

Emma Schultz

Matthew Stuber

Tina Tailor

Nicholas Richard Torgerson

Kaitlyn Yu

Further information

Parag Vasekar

psvasekar@prf.org

View online

-3D Printing

-Prototyping

-Sustainable Manufacturing

TRL: 3

Intellectual Property:

Provisional-Patent, 2024-10-31, United States

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