



Hybrid Additive Deposition Modeling System for Recycled Plastic Products Manufacturing

ID# 2023030

HIGHLIGHTS

- A system with a novel configuration that gives a large-scale 3D printing additive manufacturing machine the capability of printing parts components at high deposition rates with fused filament deposition (FFD) and direct fused deposition (DFDM) with either polymer pellets, small-size particles or flakes.
- Potential application in plastic, eco-friendly 3D printing products.

OPPORTUNITY

University of Alberta researchers invented a hybrid system with a 3D printing head extruder design, which has a nozzle configuration to print parts at a larger scale size and with high deposition rates within the same carriage, a Filament Fused Deposition (FFD) head extruder and Direct Fused Deposition (DFD) polymers of pellets or flakes particles by a screw-extruding system. The attachment leads to higher throughputs with faster printing speeds and thicker printing layers. Additionally, it selectively uses filament fused deposition polymer to print zones of the plastic parts where higher resolutions based on the part performance are required. The system's capabilities employ raw materials from 3D-printed wasted parts and other conventional plastic manufacturing processes. The main advantages of this system are the versatility of product design with a higher production rate and final cost reduction. Furthermore, in terms of the environmental problems generated by plastic waste, the system promotes the "Circular Economy" strategy for part production where material after life-use can be easily reincorporated into the supply chain to avoid plastic accumulation.

COMPETITIVE ADVANTAGE

- Layer printing deposition rates can increase up to 4 times compared to normal FFDM capabilities.
- Expand the use of raw materials from plastic wasted parts after life-use and solve the environmental problem generated by plastic waste accumulation through the "Circular Economy" cost-benefit strategy.

STATUS

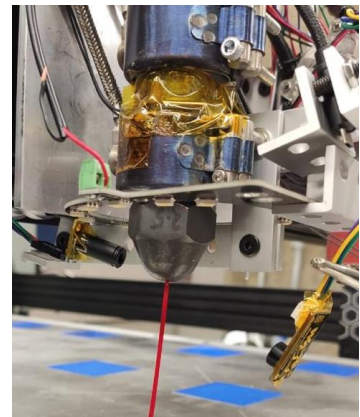
- Patent Pending.
- [Kuclourya, Tanay, Roberto Monroy, and Rafiq Ahmad. "Design of experiments to compare the reprocessing effect with Fused Deposition Modeling printing parameters on mechanical properties of Polylactic Acid specimens towards circular economy." Progress in Rubber, Plastics and Recycling Technology 39.2 \(2023\): 111-140.](#)
- [Kuclourya, Tanay, et al. "Design of a hybrid high-throughput fused deposition modeling system for circular economy applications." Clean Technologies and Recycling 2.4 \(2022\): 170-198.](#)

INVENTORS

- [Dr. Rafiq Ahmad](#) and his team.

MORE INFORMATION

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