Fibre reinforcement in fused filament fabrication and sustainability: a literature review and future research agenda

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Abstract: This paper presents a comprehensive review of fibre reinforced additive manufacturing and its pertinence in the domain of sustainable manufacturing. In comparison to other additive manufacturing processes, fused filament fabrication (FFF) has more adaptability for the use of fibre reinforcement due to its controlled, meticulous orientation and good dispersal capabilities for additively manufactured products. Many researchers have made numerous efforts to enhance the application domain using composite materials in FFF. The inclusion of fibres in the polymers is attractive in increasing the strength of products. In addition, recent studies have defined the relationship between sustainability and additive manufacturing by incorporating natural fibres and recycled matrix materials in AM. This review article summarises various possibilities of fibre reinforced additive manufacturing, specifically in FFF of thermoplastic composites that enhance the mechanical properties. Finally, the critical research questions for the future advancement of sustainable additive manufacturing, particularly in fibre reinforced FFF, are posed.

Keywords: additive manufacturing; sustainable manufacturing; fused filament fabrication; continuous fibre reinforcement; natural fibres.

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