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# Carbon Fibre Reinforced Thermoplastic Composites Developed from Innovative Hybrid Yarn Structures Consisting of Staple Carbon Fibres and Polyamide 6 Fibres

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**Abstract**. With the increased demand and usage of carbon fibre reinforced composites (CFRP), effective methods to reuse waste carbon fibres (CF), which are recoverable either from manufacturing waste or from end-of-life components, are attracting growing attention. In this paper, the development of innovative core-sheath hybrid yarn structures consisting of staple CF and polyamide 6 (PA 6) fibres of 60 mm lengths using a DREF-3000 friction spinning machine with varying machine parameters, such as core to sheath ratio and suction air pressure, is described. Furthermore, uni-directional (UD) CFRP were manufactured based on the developed hybrid yarns, and the influence of the processing parameters on tensile properties and CF content of the composites was analysed. UD composites manufactured from the developed hybrid yarns possess approximately at least 86 percentage of the tensile strength and Young's modulus of composites produced from virgin CF filament yarn.

Keywords: Staple rCF; hybrid yarn; friction spinning; tensile property.

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