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## Use of recycled milled-paper in HDPE matrix composites

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**Abstract** The aim of this work is to introduce recycled paper in HDPE matrix composites, an interesting alternative to traditional recycling process for paper. This strategy allows both re-using paper and reducing the amount of virgin polymer used in the same volume. For this application, the recycled paper goes through a micronization process, which uses simultaneously the action of impact and friction. The production of the composite is realized either by traditional injection moulding or by turbomixing. The best fibres' dispersion was obtained by turbomixing and the composites produced in this way have been additivated with maleated polyethylene (MAPE) in the amounts of 1, 3 and 5 wt.%. The resulting composites with 10 wt.% fibres were characterized from the morphological and mechanical point of view. Tensile tests revealed a rather constant stiffness and some improvement of strength with respect to the neat matrix, also indicating that the best results were obtained by the addition of 1 wt.% MAPE. SEM micrographs evidenced that, in the absence of additive, fibre-matrix interface was rather weak. In addition, the samples with added MAPE appear to experience a reduction in microporosity, which was confirmed also by water absorption test.

**Keywords:** A. Recycling, A. Polymer-matrix composites (PMCs), B. Mechanical properties, B. Interface/interphase, E. Injection moulding

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