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Pre-treatment processing of household plastic packaging waste

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Abstract

The purpose of this investigation was to investigate whether or not it would be possible to separate blow moulded and injection moulded waste plastics using two techniques; air classification and ballistic separation. Air classification and ballistic separation are two techniques that separate different types of material according to size, shape and density. Previous research, together with new measurements, has suggested that blow mould plastics tend to be thinner in terms of wall thickness than injection moulded plastics meaning that air classification could be used to separate each type of plastic. The material used for the study was supplied by a Romanian recycler and was a mixture of High Density Polyethylene and polypropylene. Two additional samples, one Polyethylene rich and the other polypropylene rich, were also included in the research.

The first part of the study involved measuring different characteristics of the material to determine how to go about performing the different air classification experiments. The second part of the study focused on separating the different material samples using different air classifier systems and a ballistic separation system. The third part of the study focused on processing the samples from part 2 (air classification) into test specimens for further mechanical and melt flow property measurements.

After measuring the mechanical and melt flow properties of the different samples it was found that air classification did not substantially improve the mechanical or melt flow properties of the material. The study did, however, show that there is a strong correlation between polymer type and melt flow properties. High Density polypropylene is generally used for blow mould applications whereas polypropylene is generally used for injection mould applications. Separating the material according to polymer type therefore means that the material is, to an extent, also sorted according to melt flow properties.