

# **Analysis of the Causes of Moulding Defects in ABS and HIPS Polymer Recyclate Blends**

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## **SUMMARY**

Defects may arise when blends of post consumer acrylonitrile butadiene styrene (ABS) and high impact polystyrene (HIPS) from waste electrical and electronic equipment (WEEE) are manufactured and moulded. The occurrence, severity and impact of these defects were analysed. Literature concerning the polymer recycling industry is reviewed. This review covers a range of topics including markets for plastics, environmental issues, legislation and recycling methods as well as scientific detail concerning polymeric materials, blending, compatibilisation and manufacture. An experimental study was then undertaken to explore the potential occurrence of defects. First a set of samples was produced with a range of ABS to HIPS ratios and a range of mixing speeds. Control virgin plastic samples were also produced. Mechanical testing was carried out on the samples; this showed that samples with higher HIPS contents generally had better mechanical properties. Also higher mixing speeds gave improved results. Despite an expectation to get delamination defects, it was voiding that was found to be the main defect in these samples. ABS was identified as the source of the voiding.

Further samples were produced by injection moulding to investigate the voiding defects and to see whether delamination would occur. One set of samples with a composition representative of that of a fraction of ABS and HIPS as separated from mixed waste plastics from WEEE was produced with a range of injection moulding conditions to investigate delamination. The other set of samples was produced from 100% post consumer ABS with a range of extrusion conditions. These were used to investigate voiding. As expected from the results of the first set of samples produced, voiding was a problem with the ABS samples. Severe delamination was present in the ABS and HIPS blend samples. The severity of both types of defect was dependent on the processing conditions used.