Thesis Title	A Study of the Utilisation of Scrap Rubber Dusts as Fillers for Seven Different Thermoplastics
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ABSTRACT

The use of scrap dusts as fillers for commodity plastics have been investigated. The scrap dusts are produced during sports shoe manufacture and classified in three types: outsole scrap dust (consisting of vulcanised rubber blend of NR, SBR and BR), midsole scrap dust (consisting of EVA foam) and laminate scrap dust (the mixture of midsole and outsole scrap after sole assembly). The plastics studied were high impact polypropylene (HIPP), polypropylene copolymer (PP copolymer), polypropylene homopolymer (PP homopolymer), polyethylene (PE), polystyrene (PS), high impact polystyrene, acrylonitrile-butadiene-styrene copolymer (ABS), and polyvinyl chloride (PVC).

The variation of scrap dusts were determined by sieving, bulk density and scanning electron microscopy (SEM).

The mechanical properties of commodity plastics filled with scrap dust were evaluated by using Charpy notched impact testing, tensile testing and melt flow index measurement.

The effect of sieving the laminate scrap dust added in PP homopolymer/ scrap dust blends, the effect of peroxide on PP homopolymer filled with scrap dust, and the effect of processing conditions on PS / 10% outsole scrap dust blends were studied.

The addition of the scrap dusts in PVC increased the impact strength. The impact strength of PE with each of the three types of scrap dust, PS with each of the three types of scrap dust, and HIPS/ outsole scrap dust blends were similar to the original plastics. Impact strength of blends of HIPP with each of the three types of scrap dust, PP copolymer with each of the three types of scrap dust, HIPS/ midsole , HIPS/ laminate, and ABS with each of the three types of scrap dust blends were less than the original plastics.

PP was more readily degraded than crosslinked in the presence of organic peroxide, so adding organic peroxide to the PP / scrap dust blend resulted in a decreased impact strength. A decrease in the scrap particle size resulted in only a minor effect on the impact strength of the PP homopolymer / laminate scrap dust blends.

Analysis of yield strength data demonstrated that the scrap dust introduced stress concentrations in the PS, ABS, and PVC blends with scrap dust, but did not introduce stress concentrations in the HIPP, PP copolymer, and PE blends with scrap dust.

The scrap dust not only acted as a filler, but also acted as a special effect pigment, especially the outsole scrap dust in polystyrene and polyethylene.