THE RECYCLING OF RUBBER INSOLE WASTE MATERIAL: A NOVEL SOLUTION TO IN-HOUSE WASTE

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THE SUMMARY

At Stadex Industries, Wrexham, UK, insoles are manufactured from a foamed polyrayon rubber sheet compound material. Manufacturing waste exceeds 30% that is disposed of into landfill. The aim of this work was to negate the need of landfill disposal by identifying a way to recycle waste in-house.

A novel recycling concept using cryogenically reduced insole waste as a substitute filler for calcium carbonate filler in fresh compound is proposed. Foam and cure investigations were undertaken to study the effects of various degrees of substitution of calcium carbonate for reduced rubber powder waste. Foam and cure methodology was also used to investigate how the insole compound, deficient of calcium carbonate, would react to loading of waste particulate as the sole filler of the material.

The results show that calcium carbonate filler can be exchanged for waste particulate and that the two can co-exist as fillers at various substitution levels without detriment to in-house material standards. Furthermore, it is shown that waste powder has the potential to make calcium carbonate obsolete as a filler in virgin sheet material by replacing it completely in the standard compound formula. It is also suggested that it may be possible to reduce the concentration of virgin natural latex in the compound with increased waste loading.

The research has shown that the wet out of powdered rubber waste in a natural latex lattice is possible in the absence of compatiblisers. This phenomenon is shown to occur due to the provision of increased cross-linking sites by the reduced rayon element and is the first of its kind to be recorded in the literature.

Technical barriers to up-scaling the recycling model for industrial application have been identified and recommendations on further research included. Suggestions refer largely to the preliminary process of reducing the waste to powdered rubber and to testing the efficiency of the compound mixing processes.