# Close loop reuse of PET bottle scrap: A new perspective

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5million tonnes of plastics are produced in the UK every year, of which process scrap represents 250,000tonnes. Closed loop recycling operations for in-factory PET bottle scrap are still being avoided by many moulders. This is surprising considering that, unlike post-consumer bottles, in-factory scrap has the advantage of being contaminant free, well separated and from a known source. Whilst modest amounts are recycled (~10% incorporation level) , moulders and customers alike, are often fearful of using higher percentages due to fears over polymer degradation and consequent drop-off in mechanical performance or physical appearance. Consequently the scrap is often ground to flake for reuse further down the value chain. A major concern stems from the fact that PET long chain polymers progressively degrade with each thermal melting/cooling cycle, leading to changes in rheology and therefore, injection moulding parameters, and additionally, affecting the resulting mechanical performance of the final moulding. The present work studies the closed loop recyclability of different PET bottle scrap grades, to establish the relationship between thermal history of the material, mechanical properties and bottle performance (intrinsic viscosity and burst tests). The study compared regrind PET scrap, bottleflakes scrap and particularly, repelletized bottleflakes –that offers advantages to the moulder in terms of processabilty, but at the cost of an extra thermal excursion. Whilst thermal analysis and rheology were used to monitor degradation, a program of injection mould trials and mechanical testing provided performance profiles of each type of scrap, aiming to establish the level of scrap incorporation that can be achieved, without appreciably affecting material properties and injection moulding performance.