

SL 14.8

Treatment of SMC Composite Waste for Recycling as Reinforcing Fillers in Thermoplastics

*D. Perrin, L. Clerc, E. Leroy, J.-M. Lopez-Cuesta, A. Bergeret
Centre des Matériaux de Grande Diffusion (CMGD), Ecole des Mines d'Alès,
6, avenue de Clavières, 30319 Alès cedex, France*

The principal objective consists in developing waste of SMC (SheetMoulding Compound), composed mainly of polyester, of carbonate of calcium and glass fibres, by reincorporating them in polypropylene functionalized by the means of polypropylene grafted maleic anhydride. The final goal is to obtain recycled materials able to compete with glass fibres within the composites. For that, the need for functionalizing the whole of the components of load SMC as well as the matrix host is essential for obtaining good mechanical properties. Initially, we concentrated on the phase of release of glass fibres by shredding. The fact of using a shredder allowed the conservation lengths of top fibres than the length of critical fibre necessary to the contribution as a reinforcement of load SMC with respect to the PP composite / SMC. Lastly, an analysis of image by SEM made it possible to highlight a coarse organic matter coating (polyester) and inorganic (calcium carbonate) the surface of fibre. However, the content of fibres remained always weak, what was not sufficient to consider a reincorporation in thermoplastics. We thus retained a "physico-chemical" way, by preferential dissolution of calcium carbonate, using a buffer solution recycled thereafter. The objective was an increase in the fibrous fraction necessary to the improvement of the modulus and strength. At the exit of this modification, a clear improvement of the mechanical properties appears without however modifying the interface. Also, in order to "create" a notable interfacial adhesion enters the PP matrix PP grafted maleic anhydride and load SMC, the idea was to activate the organic matter thermally. Polyester, transformed chemically (creation of anhydrides) by thermic action controlled, then could ionicly react with the Ca^{2+} ions of calcium present carbonate within the load and at the surface of glass fibres. The SMC functionalized in the presence of the PP matrix / PP grafted maleic anhydride then allowed an increase in the whole of the mechanical properties, comparable with those of new fibres in of PP.