



A NEW THERMOFORMING CFRP: CF MAT/HIGH-FLOW PP COMPOSITE

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For the high-speed production of big car parts, e.g., fender, the injection molding of plastics cannot overcome the stamping of steel plates. Thermoforming of plastics sheet, e.g., press forming and vacuum forming, would lead to the faster production. It will also save the mold cost and render more flexibility of parts design both in shape and size. We propose here a new thermoforming CFRP (carbon fiber reinforced plastics) sheet. The CFRP sheet was prepared by press-penetrating a high-flow PP into CF mat. In the sheet, the original fiber length remains without breaking down during the penetration (7 mm) and the fibers were dispersed at random in xy-plane. The high-flow PP was prepared by melt extrusion of conventional PP with organic peroxide and phenol resin. The PP modified with phenol (donated as PP-Ph) showed excellent fluidity and ductility. PP-Ph was press molded to a film of 1 mm thickness. Then, the CF mat was sandwiched by two films and press-molded at @200oC to penetrate the polymer into the mat to make a 70/30 composite. Compared with a control sample prepared by simple melt-blending CF and PP-Ph in the extruder in which carbon fibers were seriously broken down to ca. 0.2 mm length, the melt-penetrated composite showed extremely high rigidity (flexural modulus=14 GPa vs. 2 GPa). Izod impact strength of the melt-mixed composite was sacrificed by the incorporation of CF (2 kJ/m²). By contrast, the impact strength of the melt-penetrated composite increased surprisingly (90 kJ/m²).