



## Study of Joining Dissimilar Material using Hot Pressing Process

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### **Abstract**

The joining technologies for dissimilar materials joining to improving the ability to join dissimilar materials with mechanical properties. In this work, a hot pressing process used to join an aluminium alloy A5052 plate of thickness 0.8 mm with a polybutylene terephthalate plate of thickness 3 mm was investigated. The surface treatment from nano-structures on the aluminium plate was firstly generated by means of mechanical combined with a chemical surface treatment process. Two-period parameters were considered in a hot pressing process was pressure force and joining temperature. The joining between aluminium and polybutylene terephthalate specimens are tested by tension shear test under different surface treatment. Surface topographies of samples subjected to different procedures were characterized by SEM and Fourier transform infrared spectroscopy analysis to investigate the effect of C=O of the carbonyl group in thermoplastic. The results of tension shear test were analyzed using a design of experiments. The optimum value of joining strength was obtained at joining conditions of pressure force 1 ton and joining temperature 270 °C. Maximum joining strength was found at sandblasting combined with chemical surface treatment process on aluminium surface and surface roughness value in the range of 4-9 µm. The tested specimen exhibited a cohesive failure and the mechanical interlocking of dissimilar materials joining in the surface treatment process is approximately 21 µm. Direct bonding behavior between PBT and Al by hot pressing did not change the molecular structure of polybutylene terephthalate materials.

**Keywords:** Dissimilar materials / Hot pressing / Nano-structures / Surface treatment