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CHANTHIPA VAJRASTHIRA: A STUDY OF MECHANICAL  
PROPERTIES AND MORPHOLOGY OF ARAMID SHORT  
FIBRES/THERMOPLASTIC POLYURETHANE ELASTOMER COMPOSITES.  
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The present thesis is concerned with the study of the mechanical properties, dynamic mechanical properties, and morphology of polyester-based thermoplastic polyurethane elastomer (TPU) reinforced with two types of aramid short fibres, i.e. *m*-aramid (Conex) and copoly-*p*-aramid (Technora). The aramid/TPU composites were prepared using a co-rotating twin screw extruder and shaped using an injection moulding machine. The effects of fibre loading on the properties of both types of the composites were investigated. In the both cases, it was found that increasing the fibre loading led to an increase in modulus, hardness, and glass transition temperature of TPU, but a decrease in tensile strength, elongation at break, and loss factor. In addition, the morphology of both composites revealed good fibre-matrix adhesion. However, the composites containing Technora fibre showed greater values of properties in most tests, except the elongation at break and loss factor which were about the same. This might be due to the fact that the strength of Technora fibre is higher.

Attempts have been made to modify the aramid fibres using two different surface modification techniques, i.e. oxygen plasma treatment and partial hydrolysis in alkali solution, in order to improve the fibre-matrix adhesion. Both treatments were found to create the reactive end groups such as  $-NH_2$  and  $-COOH$  on the fibre surfaces, which were expected to react with the polar matrix TPU. Furthermore, the oxygen plasma treatment was also found to increase the roughness of fibre surface, particularly in the case of Technora fibre, which provided a larger contact area between the fibre and the matrix. The effects of both treatments on the improvement of interfacial adhesion of Conex/TPU and Technora/TPU composites were compared. The properties of Conex/TPU composites containing fibres treated by both techniques were not significantly different from the system with untreated fibre. While, in the case of Technora /TPU composites, the oxygen plasma treatment was found to be successful for the improvement of the tensile strength of the composites due to the increase of surface roughness and strength of the fibre surface through the possible molecular crosslinking.