Triple Point Bending Tests on Polyurethane based Fabric Composite Shafts.

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EXTENDED ABSTRACT

Polyurethane based composites are in use in various disciplines including thermal insulations, protective clothing, medical and structural applications. It also has applications in race car industries. Due to its light weight and water resistant properties it has a potential to be used in water sports like water skiing. The more common form of fabrication of fabric composite of this nature is making sheets with a layer of fabric. However, in Georgia Southern University, fabric coated polyurethane based shafts are made using high pressure injection molding process at a very low cost.

Composite shafts are expected to undergo various loading conditions including beading during their applications. While tensile testing is the most common form of testing for this type of composites, it was decided to evaluate the composite under more realistic bending load. A setup was designed and subsequently fabricated to conduct triple point bending tests on these composite shafts. Three different fibers, fiber glass, Kevlar 49 and carbon fiber are used as fabric materials. So the testing was done on these three different composites as well as on the shaft without any fabric reinforcement.

Different characteristics of deformation are observed and noted for different composites. Also, the different failure modes were documented. In all the composites a “yield” like phenomenon were observed marking the onset of local bucking in the fibers on the top (compressed) surfaces of the composites. Results were compared and discussed in detail.

Future work will include traditional tensile test and torque test on those composite shafts.