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Mechanical Characterization of a novel epoxy adhesive

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In this paper, a new epoxy adhesive, XNR6852, has been mechanically characterized. Epoxy adhesives are known for their high tensile strength, high shear strength, low elongation and low toughness [1-3]. In this case, the adhesive presents an improvement of these properties. It combines the properties of an epoxy adhesive and a typical polyurethane (PU) adhesive, such as high elongation and high toughness [4]. A new adhesive with these combined properties is an excellent solution to be used as a structural adhesive, especially when high toughness is required such in the automotive industry. Experimental tests were performed to measure the tensile properties, shear properties, thermal properties and fracture properties. The tensile test shows a high tensile strength and a high elongation. The single lap joint (SLJ) test shows that the failure load is proportional to the overlap length which is typical of a highly ductile adhesive. The toughness of the material was determined using the double cantilever beam (DCB) test. Different data reduction techniques were used to determine the fracture energy in pure mode I, GIC: compliance calibration method (CCM), corrected beam theory (CBT) and compliance based beam method (CBBM). The determined toughness of XNR6852 is much higher than for conventional epoxy adhesives, and can be compared to a PU adhesive's toughness.

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