

Experimental Investigation of the Static and Dynamic Behaviour of Double Lap Joints

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Abstract : For many applications, adhesively bonded assemblies have gained an increasing interest in the industry due to several advantages over welding, riveting and bolting, such as reduction of stress concentrations, lightness, low cost and easy manufacturing. This work is largely concerned to show the effects of the loading rate of the adhesively bonded joints under different speed rates. The tensile tests were conducted at four different rates; static (5mm/min, 50mm/min) and dynamic tests (1m/s, and 10m/s). An attempt was made to determine the damage kinetic and a comparison between the use of aluminium and composite laminate substrates is introduced. Aluminum T6082 and glass/vinylester laminated composite Substrates were used to construct aluminum/aluminum and laminate/laminate specimens. The adhesive used in this study was Araldite 2015. The results showed the effects of the loading rate evolution on the double joint strength. The comparison of the results of static and dynamic tests showed a raise of the strength of the specimens while the load velocity is elevated. In the case of composite substrates double joint lap, the stiffness increased by more than 60% between static and dynamic tests. However, in the case of aluminum substrates, the rigidity improved about 28% from static to moderately high velocity loading. For both aluminum and composite double joint lap, the strength increased by approximately 25% when the tensile velocity is increased from 5 mm/min to 50 mm/min (static tests). Nevertheless, the tensile velocity is extended to 1m/s the strength increased by 13% and 25% respectively for composite and aluminum substrates.

Keywords : adhesive, double lap joints, static and dynamic behavior, tensile tests

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