

## The Effect of the Adhesive Ductility on Bond Characteristics of CFRP/Steel Double Strap Joints Subjected to Dynamic Tensile Loadings

**Authors :** Haider Al-Zubaidy, Xiao-Ling Zhao, Riadh Al-Mahaidi

**Abstract :** In recent years, the technique adhesively-bonded fibre reinforced polymer (FRP) composites has found its way into civil engineering applications and it has attracted a widespread attention as a viable alternative strategy for the retrofitting of civil infrastructure such as bridges and buildings. When adopting this method, adhesive has a significant role and controls the general performance and degree of enhancement of the strengthened and/or upgraded structures. This is because the ultimate member strength is highly affected by the failure mode which is considerably dependent on the utilised adhesive. This paper concerns with experimental investigations on the effect of the adhesive used on the bond between CFRP patch and steel plate under medium impact tensile loading. Experiment were conducted using double strap joints and these samples were prepared using two different types of adhesives, Araldite 420 and MBrace saturant. Drop mass rig was used to carry out dynamic tests at impact speeds of 3.35, 4.43 and m/s while quasi-static tests were implemented at 2mm/min using Instrone machine. In this test program, ultimate load-carrying capacity and failure modes were examined for all loading speeds. For both static and dynamic tests, the adhesive type has a significant effect on ultimate joint strength. It was found that the double strap joints prepared using Araldite 420 showed higher strength than those prepared utilising MBrace saturant adhesive. Failure mechanism for joints prepared using Araldite 420 is completely different from those samples prepared utilising MBrace saturant. CFRP failure is the most common failure pattern for joints with Araldite 420, whereas the dominant failure for joints with MBrace saturant adhesive is adhesive failure.

**Keywords :** CFRP/steel double strap joints, adhesives of different ductility, dynamic tensile loading, bond between CFRP and steel

**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020