

Evaluating the Mechanical Behavior of ARB Processed Aluminum Composites Using Shear Punch Testing

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Abstract. Multi-layered metal composites have received considerable attention due to their improved mechanical and physical properties. In this study, Al6061/Al2024 composite was processed by accumulative roll bonding (ARB) as a severe plastic deformation technique. Mechanical properties of processed material were evaluated using the uniaxial tensile test and shear punch test method (SPT). The correlation between the results of the tension experiments and shear strengths was calculated. Experimental results demonstrated that the shear strength enhanced with increased number of ARB passes. However, the elongation under shear manifested a reduction when the number of ARB passes increased. Inspection of the results of tensile tests and SPT revealed that they follow a similar trend for both strength and ductility. Therefore, it can be asserted that the shear punch test represents a useful and complementary tool in the mechanical analysis of the ARB sample.