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On the mechanical behavior of accumulative roll bonded lightweight composite

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Abstract

Multi-layered composites have received great interest due to their enhanced mechanical and physical properties. In this study, Al6061/Al2024 composites were processed by accumulative roll bonding as a severe plastic deformation technique. The processed structure after four cycles contained alternating layers of both aluminum compositions. For outlining the mechanical behavior, uniaxial deformation experiments in the monotonic and cyclic regime were performed. With increased number of processing cycles, decent progress in hardness levels was exhibited with varying degrees among constituent alloys. Accordingly, improvement levels of up to 1.5 and 2 times were recorded for Al2024 and Al6061 layers, respectively. The tensile strength of the bi-metallic composite reached over 320 MPa after two cycles, coinciding with more than two-fold of the weaker base composition. Fatigue strength was also improved, especially at the low cycle regime. Microstructural observations revealed

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