Precision joining of steel-aluminum hybrid structure by clinching process

ABSTRACT

An innovative technology of clinching joining can reduce the production costs, cycle times, and also offer prospective product design and manufacturing. In this study, the overlap joining of low carbon steel and aluminum alloy in clinching process was experimentally and numerically investigated. The tensile-shear strength of overlap-clinched joints was evaluated through tensile-shear test. This test was also used to study the deformation and failure of clinched joints under tensile-shear loading. The results showed that the higher press load had a great influence for achieving better interlocking between steel-aluminum hybrid structures. Insufficient interlocking and thin neck thickness led to the failure of clinched joints. Moreover, the most critical region of the clinching tool was located at the radius corner of punch and die.

Keyword: Clinching; Undercut; Necking; FEM; Dissimilar material