

Effect of Machining Induced Microstructure Changes on the Edge Formability of Titanium Alloys at Room Temperature

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Abstract : The challenges in forming titanium alloys at room temperature are well researched and are linked both to the limitations imposed by the basic crystal structure and their ability to form texture during plastic deformation. One major issue of concern for the sheet forming of titanium alloys is their high sensitivity to surface inhomogeneity. Various machining processes are utilised in preparing sheet hole edges for edge flanging applications. However, the response of edge forming tendencies of titanium to different edge surface finishes is not well investigated. The hole expansion test is used in this project to elucidate the impact of abrasive water jet (AWJ) and electro-discharge machining (EDM) cutting techniques on the edge formability of CP-Ti (Grade 2) and Ti-3Al-2.5V alloys at room temperature. The results show that the quality of the edge surface finish has a major effect on the edge formability of the materials. The work also found that the variations in the edge forming performance are mainly the result of the influence of machining induced edge surface defects.

Keywords : titanium alloys, hole expansion test, edge formability, non-conventional machining

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