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Research on Various Welding Methods on Aerospace Titanium Alloys: Collaboration between Akita University and Auckland University of Technology

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In the past two decades or so, titanium and its alloys have found a significant increase in the aerospace applications. One of the reasons is associated with the introduction of various new titanium alloys. Ti-5Al-5V-5Mo-3Cr (Ti5553) is one of the most notable new titanium alloys. This alloy has a high strength, excellent hardenability and good fracture toughness. Landing gear beam truck of aircraft has been successfully manufactured using this alloy. In order to find more applications in various areas, a number of factors are to be investigated, and one of them is its weldability. Three types of welding methods were used in this investigation, i.e. Laser Beam Welding (LBW), Electron Beam Welding and Gas Tungsten Arc Welding (GTAW). The results showed that it is possible to perform similar Ti5553 alloy weld as well as dissimilar titanium welds. It was observed that the (i) strength at the weld zones was lower compared with the base metal, and (ii) grains grew epitaxially from the near heat affected zone into the fusion zones. This study is part of a strong on-going collaboration projects between Akita University and Auckland University of Technology.

Key Words : Titanium alloys, electron beam welding, laser beam welding, gas tungsten arc welding