

Manufacturing Ti-48Al-2Cr-2Nb Pre-forms with Electron Beam Melting: A Comprehensive Study

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Titanium aluminide alloys based on the γ -TiAl phase have been of great interest owing to their high specific strength, good strength retention and good corrosion and oxidation resistance at high temperatures. However, their brittle nature makes them hard to manufacture and machine using conventional techniques. Additive manufacturing is a promising alternative for the manufacture of complex geometries with its near net shape manufacturing capability. In this feasibility work, Ti-48Al-2Cr-2Nb preforms have been manufactured using the electron beam melting technique. Mechanical testing was performed both at room and high temperature. Characterization experiments were performed to assess the constituent phases, residual stresses, microstructures and grain orientations. CALPHAD modeling was used to predict the solidification paths. Effect of process/solidification conditions on the resultant microstructures and microstructure-mechanical property relations are discussed.