

Development of Powder Metallurgy Based Materials for Space Applications

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In recent years, there has been increasing interest in developing powder metallurgy (PM) parts due to ease of manufacturability, reduced buy-to-fly ratio, shorter supply chain length and superior mechanical & tribological properties. TWI has partnered with Airbus Defence & Space, Nammo Westcott Ltd, ESR Technology and the University of Birmingham on a ESA funded project to investigate the use of PM for space applications with the aim to replace the current conventional materials with newly developed PM materials to enhance the performance of space components. In this work, hot isostatic pressing (HIP) consolidation technique was employed to develop powder-base niobium and nickel alloy materials for rocket combustion chamber and mechanical gas seals components respectively. Powders were characterised to assess their chemical composition, flowability, apparent, tap & packing densities, particle size distribution and surface morphology. Niobium and Inconel 625 powders were HIPed to assess the microstructure and mechanical & tribological properties