

Fabrication of Ti-6Al-7Nb Alloys by Metal Injection Molding

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Abstract

The metal injection molding process was applied to produce Ti-6Al-7Nb alloys using 3 types of mixed powders, first is a mixture of Ti and Al53.3Nb pre-alloyed powders, second is a mixture of Ti, TiAl and Nb powders, and third is a mixed elemental powders of Ti, Al and Nb. The effects of the 3 types of mixed powders and sintering conditions on the microstructure, relative density and mechanical properties of injection molded compacts were mainly investigated. The sintered compacts using first and second powders showed higher density and mechanical properties as compared to the compacts using the third powder which existed many and a little large pores in the microstructure because of the melting of Al during sintering steps. Also the oxygen content of the compacts using second powder was higher than that of the compacts using other powders. Eventually, the mechanical properties of the compacts using a mixture of Ti+Al53.3Nb or Ti+TiAl+Nb powders were above 800MPa in tensile strength and above 10% in elongation, which were similar to the properties of wrought materials.

MIM of Titanium

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Abstract

The processing of Titanium by MIM still is a speciality of a limited number of parts producers. The reason for this can be found in the high cost of the powder and certain difficulties in processing them. On the other hand, also demand is limited due to the limited data on properties of Titanium parts produced by MIM. This paper discusses the challenges of the MIM of titanium, the powders that can be used and the properties that can be achieved with commercially available powders or their mixtures. Gas atomised powders are compared with HDH powders, hydride powder and master alloy powder. Case studies as well as properties of cp-titanium, Ti-6Al-4V and Ti-Al-Nb produced out of these powders are presented.