SINTERING SUPPORTS FOR TI-BASED POWDER METALLURGY COMPONENTS

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Titanium and titanium-based alloys are high-performance materials principally used in aerospace, as well as in the biomedical and chemical sectors. This is mainly due to the very high strength and corrosion resistance of titanium. Because of its high cost, powder metallurgy (PM) is a logical processing route to form complex shape while minimizing waste and machining cost. Compaction, cold or hot isostatic pressing or powder injection molding (PIM) are titanium shaping technologies that share a sintering step in an inert or vacuum atmosphere at high temperature. During this step, the part must be supported and zirconia seems to be the material of choice for the sintering support. However, due to its strong affinity for oxygen and other interstitial elements (O, C and N), the interaction between the titanium-based material and the ceramic support may be important. The best sintering support should be chosen to avoid contamination of the part and any sticking or adhesion.

Derived from IMI activities in Ti-PIM and Ti-porous processes, this paper presents experimental work on the interaction, during the high temperature sintering, of titanium with ceramic materials, such as zirconia, boron nitride, yttria. The experiments were conducted using bulk titanium rod and PM parts made by compaction and PIM. Both temperature and atmosphere (argon gas or vacuum) effects on the titanium-based and support materials were studied. X-ray diffraction (XRD), Scanning electron microscope (SEM) observations, Electron Probe Micronanalysis (EPMA), bulk chemical analysis and micro-hardness were used to characterize the titanium-ceramic material interface. The effect of the sintering support on the properties of the final parts will be discussed.

Oral presentation : yes - no Poster presentation yes - no