Changes in Porosity of Titanium Alloys During Sintering

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Summary

The utilisation of liquid-phase sintering of titanium alloys to achieve high density appears to be precluded by the development of very large pores. A gas, initially thought to be hydrogen, is probably responsible for the pore growth.

For compositions and temperatures at which liquid phases are absent (below the solidus), densification occurs during sintering. However, pore growth also takes place by means of Ostwald ripening.

During solid state sintering, higher density is achieved under better vacuum (1 mPa rather than 1 Pa) and for greater alloying addition (% Ni). As usually observed, density is also higher for higher compaction pressure, sintering temperature and sintering time.

The results provide a basis for selecting conditions for optimal density and mechanical properties, subject to the constraints on practical sintering operations.