

Consolidation of titanium hydride powders during the production of titanium PM parts: The effect of die wall lubricants

C. Machio , R. Machaka, H.K. Chikwanda

CSIR Materials Science and Manufacturing, Light Metals, PO Box 395, Pretoria 0001, South Africa

Abstract

The effects of die wall lubricants on the cold compaction of titanium hydride powder are studied. Three commonly-used die wall powder metallurgy lubricants – zinc stearate, Acrawax® C dispersion and Mirror Glaze® – are compared. The influence of each lubricant on the cold compaction behaviour of titanium hydride powder was assessed with respect to the green density and strength, green compact ejection force, and the occurrence of green compact cracking. In addition, green compacts were sintered under vacuum at various sintering temperatures in order to determine the effect of the lubricants on oxygen content, phase compositions, microstructures and hardness of the sintered components. The results indicate that there is an immediate improvement in the cold compaction process when lubrication is used. The results further indicate that the lubricity of the lubricants is similar and most of the monitored variables are insensitive to the die wall lubricant used, the microstructures of the sintered components included. However, the use of Acrawax® dispersion resulted in more instances of green compact cracking, while zinc stearate tended to increase the oxygen content of sintered specimens due to the tentative decomposition of zinc oxide, a residual of the high temperature decomposition of zinc stearate.