

Fatigue behaviour of Ti6Al4V alloy components manufactured by SLM subjected to HIP and residual stress relief

Joel da Silva de Jesus¹, Luis Borrego², José Ferreira³, Jose Costa³, and Carlos Capela⁴

¹Universidade de Coimbra Departamento de Engenharia Mecanica

²ISEC, Polytechnic Institute of Coimbra

³University of Coimbra

⁴Instituto Politecnico de Leiria Escola Superior de Tecnologia e Gestao

November 12, 2020

Abstract

Fatigue behaviour of HIPed and stress relieved Ti6Al4V alloy specimen's produced by SLM was analysed ($R\epsilon = -1$). The HIP process caused a microstructural transformation decreasing the hardness and monotonic properties that not allowed fatigue strength increase. A bilinear behaviour in the elastic strain-fatigue life curve was observed, because of Young 's modulus decrease during the cyclic elasto-plastic tests consequence of subgrains formation. The Smith-Watson-Topper and total strain energy density models showed a good concordance between predicted and experimental fatigue lives in notched samples.

Hosted file

Manuscrit.pdf available at <https://authorea.com/users/371799/articles/492591-fatigue-behaviour-of-ti6al4v-alloy-components-manufactured-by-slm-subjected-to-hip-and-residual-stress-relief>

Hosted file

Table 1.pdf available at <https://authorea.com/users/371799/articles/492591-fatigue-behaviour-of-ti6al4v-alloy-components-manufactured-by-slm-subjected-to-hip-and-residual-stress-relief>

Hosted file

Table 2.pdf available at <https://authorea.com/users/371799/articles/492591-fatigue-behaviour-of-ti6al4v-alloy-components-manufactured-by-slm-subjected-to-hip-and-residual-stress-relief>

Hosted file

Table 3.pdf available at <https://authorea.com/users/371799/articles/492591-fatigue-behaviour-of-ti6al4v-alloy-components-manufactured-by-slm-subjected-to-hip-and-residual-stress-relief>

















