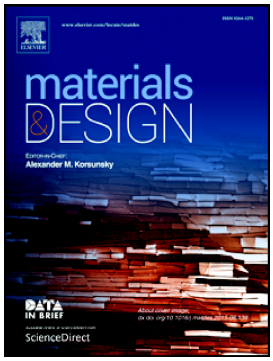


# Correlation between alpha phase morphology and tensile properties of a new beta titanium alloy

S. Sadeghpour, S.M. Abbasi, M. Morakabati, S. Bruschi

PII: S0264-1275(17)30178-8
DOI: doi: 10.1016/j.matdes.2017.02.043
Reference: JMADE 2783

To appear in: *Materials & Design*

Received date: 14 December 2016
Revised date: 21 January 2017
Accepted date: 14 February 2017

Please cite this article as: S. Sadeghpour, S.M. Abbasi, M. Morakabati, S. Bruschi , Correlation between alpha phase morphology and tensile properties of a new beta titanium alloy. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Jmade(2017), doi: 10.1016/j.matdes.2017.02.043

# Correlation between alpha phase morphology and tensile properties of a new beta titanium alloy

S.Sadeghpour[a,b*], S.M. Abbasi[a], M. Morakabati[a], S. Bruschi[b]

[a]*Metallic Materials Research Center, Malek Ashtar University of Technology, Tehran, Iran*

[b] *University of Padua, Industrial Engineering Department, Via Venezia, 1, Padova, 35131, Italy*

## Abstract

A novel beta titanium alloy Ti-4Al-7Mo-3Cr-3V (Ti-4733) was developed and the effect of its microstructure on the tensile properties was investigated and compared with the one of the commercial titanium alloy Ti-5553. Various alpha phase morphologies, namely globular, lamellar, acicular and a combination of them, were obtained as a result of the various heat treatments to which both the alloys were subjected. Although the alpha phase morphology for a given heat treatment was similar in both the alloys, the obtained microstructure was generally finer in the Ti-4733 alloy than in the Ti-5553 alloy, leading to enhanced tensile properties. The results showed that the microstructures with solely fine acicular alpha precipitates exhibited the highest tensile strength. While the highest reduction of area was derived in case of globular-acicular morphology, the maximum elongation was observed in microstructures containing lamellar-acicular alpha phase. Furthermore, for both the alloys the best balance between strength and ductility occurred in microstructures with a combination of globular and acicular alpha phase. The fractography analysis carried out on the tensile tested specimens showed a completely ductile fracture in case of globular-acicular morphology, ductile-transgranular brittle for lamellar-acicular morphology, and ductile-intergranular brittle for fully acicular α phase morphology.

* Corresponding author