Process parameter influence and characterization of spot friction melt bonded titanium and aluminium alloy

Sanjay C Krishnamurthy [a] and Aude Simar [a]

[a] *Université Catholique de Louvain, Institute of Mechanics, Materials and Civil Engineering, B-1348, Louvain la neuve, Belgium*

Abstract

Titanium and aluminium alloys are extensively used in aerospace industry. Joining these dissimilar metals increases the performance of the structures by combining the high strength property of titanium and low density of aluminium. However, joining these two metals is challenging with existing welding techniques towards retaining the base property of the metals. Friction melt bonding (FMB) is an innovative technique invented at UCLouvain to lap weld dissimilar metals having large difference in their melting point [1]. The aim of the current research is to join dissimilar titanium and aluminium alloy by spot FMB process and address the challenges to increase the weld performance. Certain drawbacks such as formation of intermetallics is involved under heat assisted fusion welding process. Which could be controlled and eliminated by optimising the FMB process parameter. The interlocking mechanism and pile up of alloying elements is observed at the FMB spot weld interface. The preliminary results indicated formation of thin oxide layer at the weld interface. The origin of oxide layer and its role on mechanical properties of the joint to be further investigated.

References

1. Van Der Rest, C., Jacques, P. J., & Simar, A. (2014). On the joining of steel and aluminium by means of a new friction melt bonding process. *Scripta Materialia*, *77*, 25–28. https://doi.org/10.1016/j.scriptamat.2014.01.008