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MANUFACTURING MANAGEMENT

From basic machining to quality product

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In-Situ Syntheses Of High Wear Resistant Coating Reinforced Ti-6al-4v Matrix

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1. Introduction

Ti-6Al-4V and other titanium alloys are extensively used in many of engineering applications such as marine applications, aeronautical, biomedical application and power generation due to its high strength to weight ratio, low modulus, good biocompatibility and low density [1-5]. Additionally, it has good thermal properties such as good high temperature corrosion and oxidation resistance. However, titanium and its alloys have high friction coefficient and low hardness which indicate that Ti and its alloys have poor surface properties which restricted the use of the materials in high temperature and high sliding wears applications [2]. As a result several researches have been conducted to improve the surface wear resistance of Ti based alloys through alloying and Hardfacing techniques which involve formation of high wear resistant layer reinforced the metal matrix [13-14]. Generally, there are several techniques used to develop abrasive coatings reinforced metal matrices such as thermal spraying, electron beam cladding, Laser cladding and Gas Tungsten Arc Welding cladding (GTAW). The last two methods are widely applied in surface hardening of Ti, Fe and Al.

The objectives of this research are to understand the in-situ formation of high wear resistance material reinforced metal matrix, to study the wear resistance behavior of MMC composite coating formed by melt syntheses techniques using high energetic laser power and GTAW technique. The research focuses on the influence of surface hardening technique on the surface properties and the metallurgical behavior of the MMC composite. Furthermore, the influential factors that affect the in-situ formation are highlighted in this chapter. The significant of this research is due to the high demand for materials with superior tribiolgical properties at high temperature combined with high strength properties, such properties are difficult to be achieved by pure metallic materials. MMC