Effect of pulse anodizing on mechanical properties of TC4 titanium alloy

ZHAN Zhongwei, JIA Tianyi, GE Yulin, SUN Zhihua
AECC Beijing Institute of Aeronautical Materials, Beijing 100095, China

Abstract: Aiming at the pulse anodic oxidation process of TC4 titanium alloy, the effects of two kinds of anodic oxide films (2~3μm, 8~10μm) specified in current navigation standards on the wear resistance, tensile properties and fatigue properties of TC4 titanium alloy were studied, and the reasons for the effects of different thickness anodic oxide films on the mechanical properties of TC4 titanium alloy were compared with that of bare materials. The results show that with the increase of the film thickness, the hole diameter on the surface of the oxide film decreases gradually, the surface hardness of titanium alloy increases and the wear resistance also increases. Compared with the substrate, it is found that the two thicknesses have little effect on the tensile properties of TC4 titanium alloy, but have a significant effect on the fatigue properties. The reasons are as follows: With the increase of the thickness, the oxide film on the specimen surface gradually cracks due to excessive internal stress during the formation process, resulting in notch effect on the specimen surface, which greatly reduces the fatigue crack initiation life on the specimen surface.

Keywords: pulse anodizing, mechanical property, TC4 titanium alloy