As an important surface treatment method, shot peening (SP) is widely used in industry for improving surface properties. In the present study SP was performed on the α-β titanium alloy Ti6Al4V under various parameters (particle impingement angle, particle acceleration pressure and particle size) by using a specially designed shot peening test rig. It is aimed to optimize surface roughness and hardness of the shot peened Ti6Al4V alloy under various parameters. In order to achieve this goal shot peened samples were investigated by using a non-contact laser optical profilometer in detail and surface hardness of the samples were measured by using a micro-hardness instrument. The surface roughness values, 3-D surface morphologies and micro-hardness of the samples were obtained and examined. The results show that both particle impingement angle, particle acceleration pressure and particle size dramatically affect the surface properties of the Ti6Al4V alloy.

**Keywords:** Shot peening, Ti6Al4V, Hardness, Surface roughness, 3-D surface morphology