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CRYOGENIC TREATMENT OF Ti6Al4V-HARD TURNING: STATE OF ART, CHALLENGES AND FUTURE DIRECTIONS

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ABSTRACT

Ti-6Al-4V is an alpha beta titanium grade 5 alloy which has high strength to weight ratio. It has high toughness, excellent corrosion resistance and low density, which is extensively, implemented in various sectors like aeronautical, marines, automobile, architectural, chemical process and various biomedical implants. Titanium alloys has high-pressure load and heat stress, poor thermal conductivity, varying chip thickness so that they are hard to machine material. Due to poor machinability, Ti-6Al-4V having extremely short tool life. To overcome this problem, advanced techniques need to be practiced in machining of titanium alloy; one of the efficient and environmental friendly technique is cryogenic cooling. Hard turning requires coolants or very low cryogenic environment in order to machining of these super alloys so many researchers are taking keen interest to study the effects of different machining aspects on the machining performance of Ti-6Al-4V alloy. The present paper presents a comprehensive review on important aspects associated with cryogenic machining of Ti-6Al-4V alloy using coated and uncoated cutting inserts. Experimental, numerical and theoretical observations for tool wear, surface roughness, cutting force, tool life and machining temperature using different types of cutting inserts under deep and shallow cryogenic cooling environments are also been discussed.

Keywords: Cryogenic Machining, Tool wear, Surface characteristics, Finite element analysis

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