World Academy of Science, Engineering and Technology
International Journal of Aerospace and Mechanical Engineering
Vol:11, No:02, 2017

Investigation of Stellram Indexable Milling Cutter XDLT09-D41 Tool Wear for Machining of Ti6Al4V

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Abstract : Titanium alloys are attractive materials for aerospace industry due to their exceptional strength to weight ratio that is maintained at elevated temperatures and their good corrosion resistance. Major applications of titanium alloys were military aerospace industry, but since last decade the trend has now shifted towards commercial industry. On the other hand, titanium alloys are notorious for being poor thermal conductor that leads to them being difficult materials for machining. In this experimental study, Stellram Indexable milling cutter XDLT09-D41 is used for rough down milling of Ti6Al4V for small depth of cut under different combinations of parameters and application of high-pressure coolant. The machining performance was evaluated in terms of tool wear, tool life, and thermal crack. The tool wear was mostly observed at the tool tip and at bottom part of tool thermal deformations were observed which propagated with respect to time. Flank wear due to scratching of the cutting chips and diffusion wear because of high thermal stresses were observed specially at the bottom of the cutting tool. It was found that maximum tool life was obtained at the speed of 40m/min, feed rate of 358mm/min and depth of cut of 0.8mm. In the end, it was concluded that machining of Ti6Al4V is a thermally dominant process which leads to high thermal stresses in machining zone that results in increasing tool wear rate and deformation propagation.

Keywords : tool wear, cutting speed, flank wear , tool life
Conference Title : ICAMAME 2017 : International Conference on Aerospace, Mechanical, Automotive and Materials Engineering
Conference Location : Venice, Italy
Conference Dates : February 16-17, 2017

Open Science Index, Aerospace and Mechanical Engineering Vol:11, No:02, 2017 publications.waset.org/abstracts/55620.pdf