عنوان مقاله:

Cryogenic machining of hardened die steel for evaluation of thermal loads at different process conditions

محل انتشار:

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خلاصه مقاله:

AISI H13 die steel is widely used in different industries because of its especial properties. During the machining of hard materials, some of the mechanical properties the material is changed due to the generation of intensive thermomechanical loads and plastic deformation into the workpiece. Controlling these intensive changes in machined surfaces is important task and significantly affects the performance of the machined part. Since machining of hard materials is difficult procedure and it is confronted with several limitations, new methods in machining processes are essential to be developed. One of these methods is using cryogenic coolant where the machining temperature may be considerably reduced by spraying liquid nitrogen on the cutting region. Based on this, at the present study, the variation of thermal loads at different machining parameters was evaluated under cryogenic condition. To do this, a thermal infrared camera and liquid nitrogen delivery system was used during the machining of hardened AISI H13 steel. The effectiveness of the cryogenic coolant on thermal loads were analyzed and discussed at the different cutting speed, feed rate, and depth of cut. Finally, it was found that, applying cryogenic coolant in machining of AISI H13 die steel can be very effective to enhance performance and quality of the machined component in terms of thermal loads.

کلمات کلیدی:

AISI H13, Cryogenic Machining, Thermal loads.