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CRATER WEAR MONITORING OF SINGLE POINT CUTTINGTOOL USING ACOUSTIC EMISSION SENS OR TECHNIQUES

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Abstract

Wear of a cutting tool in a machining operation is highly undesirable because it severely degrades the quality of machined surfaces and causes undesirable and unpredictable changes in the work geometry. From a process automation point of view, it is therefore necessary that an intelligent sensing system be devised to detect the progress of tool wear during cutting operations so that worn tools can be identified and replaced in time. As a 'non – destructive' sensing methodology, Acoustic Emission (AE) based techniques offer some advantages over force or power based tool monitoring techniques because of the close relationship between the generation of the emission signal and the fracture or wear phenomenon in machining. The generation of the AE signals directly in the cutting zone makes them very sensitive to changes in the cutting process. Acoustic Emission Techniques (AET) is a relatively recent entry into the field of non – destructive evaluation (NDE) which has particularly shown very high potential for material characterization and damage assessment in conventional as well as nonconventional processes. This method has also been widely used in the field of metal cutting to detect process changes like tool wear etc. In this research work the results obtained from the analysis of Acoustic Emission sensor employs to predict crater wear in turning of C45 steel of 250 BHN hardness using Polycrystalline diamond (PCD) insert. Machining trails were conducted in 5 H.P all geared lathe to obtain the data. The observations noted during the experimental work are analyzed for correlations between the tool wear and the AE parameters.

Keywords: Tool wear; acoustic emission; in – process monitoring; rise time; Crater wear.