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Diagnostic of peripheral longitudinal grinding by using acoustic emission signal

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ABSTRACT

Grinding burn is one of the well-known problems in grinding processes. The phenomenon of burns causes permanent damage to the ground surface. Therefore, there is a need of monitoring the grinding processes in order to prevent surface damage of a workpiece. This paper presents a method of diagnosing grinding wheel wear with the use of acoustic emission signal generated during grinding. The method aims to detect the occurrence of burn in the surface layer of ground workpieces, and, thus, to replace costly and troublesome surface layer control methods performed after grinding. Experimental research of the grinding process together with the control of surface layer condition was conducted by means of the nital etching method. A band analysis of acoustic emission signal was completed and the influence of the grinding burns phenomenon on the signal amplitude in the range of low frequencies was presented. A boundary value of the *AE* describing the appearance of grinding burns was determined. Moreover, *RMS* value of acoustic emission signal was analysed, and the influence of grinding wheel wear on the signal variations was determined. A new parameter was proposed in order to determine the end of grinding wheel life-time. A boundary value of this *AE* parameter, which indicates the excessive wear of grinding wheel was determined.

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Izvirni znanstveni članek

Diagnostika stranskega vzdolžnega brušenja z uporabo emisije akustičnega signala

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POVZETEK

Ožganine so ena izmed dobro znanih težav pri brušenju in predstavljajo trajno poškodbo na obdelani površini. Da se prepreči površinske poškodbe obdelovanca je potreben nadzor procesa brušenja. Prispevek predlaga metodo za zaznavo obrabe brusilnega koluta na osnovi emisije akustičnega signala. Namen metode je zaznati nastanek ožganin v površinski plasti obdelovancev med brušenjem in tako nadomestiti drage in težavne kontrolne metode po brušenju. Eksperimentalne raziskave postopka brušenja skupaj s kontrolo stanja površinske plasti so bile izvedene z metodo nitalnega jedkanja. Na osnovi analize signala akustičnih emisij je predstavljen vpliv motečih ožganin na amplitudo signala v območju nizkih frekvenc. Določena je bila mejna vrednost akustičnih emisij (AE) pri kateri se pojavijo ožganine. Določen je bil tudi vpliv obrabe brusilnega koluta na spremembo signala akustičnih emisij. Vpeljali smo nov parameter za določitev konca življenjske dobe brusilnega koluta. Določena je bila tudi mejna vrednost parametra akustičnih emisij, ki predstavlja prekomerno obrabo brusilnega koluta.

PODATKI O ČLANKU

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