A NEW METHOD FOR NON-DESTRUCTIVE TESTING OF WEAR RESISTANCE OF POLYCRYSTALLINE DIAMOND BLANKS

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ABSTRACT

A new method for non-destructive testing of wear resistance of tools made of hard alloys, polycrystalline superhard materials, ceramic composite materials as well as for testing polycrystalline diamond (PCD) blanks for drilling tools has been developed.

The method allows a considerable reduction in the duration of the test as the diagnostics does not exceed 5 sec.

The method is simple to realize, very efficient and does not require complicated equipment.

The method is based on acoustic emission (AE). On the short term loading in the process of cutting test sample an AE signal is being generated, of which the parameters adequate to the cutting edge wear are extracted.

According to these AE signal parameters tools and PCD blanks are classified according to the preset degree of wear resistance. Off-grade products are rejected.

The non-destructive method for wear testing can be efficiently used for evaluation of wear resistance of new materials and tools at the stages of the tools development and testing.

INTRODUCTION

In the process of development and improvement of superhard cutting-tool materials the in-process diagnostics of their wear resistans takes on great significance. Although commercial PCD blanks have the same certificate indications, they exhibit a considerable spread in wear resistance values [1]. PCD blanks of poor wear resistance can not be used in tools under high load, such as drilling bits, or in automated lines.

At present, wear resistance of polycrystalline diamond (PCD) blanks is determined by planing a sandstone block at a given cutting length of 50±1m. This is followed by measuring flank wear area on PCD blanks (h) using a toolmaker's microscope; and the blanks are ranked according to