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ScienceDirect

Procedia Manufacturing 13 (2017) 13–20

Procedia
MANUFACTURING

www.elsevier.com/locate/procedia

Manufacturing Engineering Society International Conference 2017, MESIC 2017, 28-30 June 2017, Vigo (Pontevedra), Spain

Cutting-tool wear characterization by means of conoscopic holography

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Abstract

The ability of Conoscopic Holography (CH) to provide accurate digitizing of tool wear is analysed in this work. Firstly, tests have been conducted to check out the performance of the sensor when digitizing inserts without chip breaker geometry, which have been artificially worn using electro-discharge machining (EDM). A methodology for determining the number of digitizing orientations has been also developed, in order to achieve best results in surface reconstruction. Secondly, digitizing tests have been carried upon inserts with chip breaker geometry and different grades of wear. Results support the use of CH.

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Peer-review under responsibility of the scientific committee of the Manufacturing Engineering Society International Conference 2017.

Keywords: Conoscopic Holography, Tool Wear, Digitizing

1. Introduction

Tool wear is among the key aspects that influence the quality of machined parts in many ways: it conditions the relative positioning between tool and part, which affects dimensional accuracy; it modifies chip flow over the rake surface of the tool; it also conditions the structural integrity of the tool. Therefore, characterization of cutting tool wear turns out to be an important issue, which is the reason why it has been the subject of numerous studies over the past decades.

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