World Academy of Science, Engineering and Technology
International Journal of Industrial and Manufacturing Engineering
Vol:12, No:05, 2018

Intelligent Tooling Embedded Sensors for Monitoring the Wear of Cutting Tools in Turning Applications

Authors : Hatim Laalej, Jon Stammers

Abstract : In machining, monitoring of tool wear is essential for achieving the desired dimensional accuracy and surface finish of a machined workpiece. Currently, the task of monitoring the wear on the cutting tool is carried out by the operator who performs manual inspections of the cutting tool, causing undesirable stoppages of machine tools and consequently resulting in costs incurred from loss of productivity. The cutting tool consumable costs may also be higher than necessary when tools are changed before the end of their useful life. Furthermore, damage can be caused to the workpiece when tools are not changed soon enough leading to a significant increase in the costs of manufacturing. The present study is concerned with the development of break sensor printed on the flank surface of poly-crystalline diamond (PCD) cutting to perform on-line condition monitoring of the cutting tool used to machine Titanium Ti-6al-4v bar. The results clearly show that there is a strong correlation between the break sensor measurements and the amount of wear in the cutting tool. These findings are significant in that they help the user/operator of the machine tool to determine the condition of the cutting tool without the need of performing manual inspection, thereby reducing the manufacturing costs such as the machine down time.

Keywords : machining, manufacturing, tool wear, signal processing
Conference Title : ICIME 2018 : International Conference on Information and Manufacturing Engineering
Conference Location : Tokyo, Japan
Conference Dates : May 28-29, 2018