World Academy of Science, Engineering and Technology
International Journal of Electrical and Computer Engineering
Vol:8, No:03, 2014

Tool Wear Monitoring of High Speed Milling Based on Vibratory Signal Processing

Authors : Hadjadj Abdechafik, Kious Mecheri, Ameur Aissa

Abstract : The objective of this study is to develop a process of treatment of the vibratory signals generated during a horizontal high speed milling process without applying any coolant in order to establish a monitoring system able to improve the machining performance. Thus, many tests were carried out on the horizontal high speed centre (PCI Météor 10), in given cutting conditions, by using a milling cutter with only one insert and measured its frontal wear from its new state that is considered as a reference state until a worn state that is considered as unsuitable for the tool to be used. The results obtained show that the first harmonic follow well the evolution of frontal wear, on another hand a wavelet transform is used for signal processing and is found to be useful for observing the evolution of the wavelet approximations through the cutting tool life. The power and the Root Mean Square (RMS) values of the wavelet transformed signal gave the best results and can be used for tool wear estimation. All this features can constitute the suitable indicators for an effective detection of tool wear and then used for the input parameters of an online monitoring system. Although we noted the remarkable influence of the machining cycle on the quality of measurements by the introduction of a bias on the signal, this phenomenon appears in particular in horizontal milling and in the majority of studies is ignored.

Keywords : flank wear, vibration, milling, signal processing, monitoring
Conference Title : ICECSE 2014 : International Conference on Electrical, Computer and Systems Engineering
Conference Location : Istanbul, Türkiye
Conference Dates : March 24-25, 2014