Kamath, S.\textsuperscript{a}, Sultornsanee, S.\textsuperscript{b}, Zeid, A.\textsuperscript{a}

\textbf{In-situ work piece surface roughness estimation in turning}


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\textsuperscript{a} Mechanical and Industrial Engineering Department, Northeastern University, Boston, MA, United States

\textsuperscript{b} Dept. of Logistics Management, School of Business, University of Thai Chamber of Commerce, Bangkok, Thailand

\textbf{Abstract}

This paper describes a method for in-process estimation of surface roughness of the workpiece in a turning process from acoustic emission signals generated by the sliding friction between a graphite probe and the workpiece. Acoustic emission signals are transformed into recurrence plots and a set of recurrence statistics are computed using the recurrence quantification analysis. The surface roughness parameters are estimated using an artificial neural network, taking the recurrence statistics of the acoustic emission signals as inputs. This method is verified by conducting an extensive set of experiments on AISI 1054 steel workpiece and K420 grade uncoated carbon inserts. We consider three surface roughness parameters for estimation, namely arithmetic mean, maximum peak-to-valley roughness, and mean roughness depth. The estimation accuracy of the proposed method is in the range of 90.13% to 91.26%. © 2014 IEEE.

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