**A time-dependent Proportional Hazard model for cutting tools Remaining Useful Life estimate under varying cutting parameters**

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The replacement of cutting tools is a recurring subject in the manufacturing industry, as their improper management induces considerable costs. Among the common approaches to the replacement of the cutting inserts, the survival analysis of failure data is often proposed, taking covariates such as cutting parameters, which are often considered constant over time. However, this approach has not allowed yet to use condition monitoring data as a covariate. In this study, we propose the use of the extended Proportional Hazards (PH) model to the case of cutting tools maintenance. With help of this model, the Remaining Useful Life (RUL) of cutting inserts may be estimated when varying cutting parameters are used, considering past and planned future operations. The extended PH model also allows using condition monitoring data as covariates. This model is first illustrated on data generated by a stochastic model producing the evolution of the tool degradation over time. Then, it is applied to an original experimental data set, with 29 cutting inserts worn at constant and varying cutting parameters in C45 steel. The tool life prediction of this work is similar in quality with results of traditional PH models, while it can additionally accept time-varying data.