Analysis and Prediction of Dynamic Disturbances of the BTA Deep Hole Drilling Process

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Abstract:
The BTA deep hole drilling method was developed for machining holes with a high length-to-diameter ratio, good surface finish and straightness. The dynamic properties of the slender tool-boring bar combination necessary for producing this type of geometry significantly influence the overall process dynamics and lead to characteristic disturbances. These disturbances can be classified as chatter vibration or spiralling. Statistical design of experiments has been employed to determine the influence of process parameters on the workpiece quality. Surface quality and roundness profiles have been determined. Time series of drilling torque, feed force and structure- and airborne sound were recorded during the experiments. This data has been analyzed with the longterm goal of intelligent control in mind. A model describing the longterm development of chatter vibration is presented.

Keywords:
Machining, Dynamic system, BTA deep hole drilling.