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Optimizing Machining Processes with the Aid of Bayesian Networks

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Abstract: Product quality in machining processes like drilling or milling depends on a variety of parameters like the cutting speed or the feed rate as well as dependencies among these parameters. The type of lubrication, method of chip removal and tool wear also play a decisive role for quality characteristics like roughness, roundness or surface finish. Finding an optimal combination for all these influencing factors to meet the required quality properties is a demanding task. In this paper a Bayesian network will be presented which covers the relations and dependencies between influencing parameters, quality characteristics as well as additional process relevant variables for a spiral drilling process. The network is quantified, i.e. the network is provided with the required conditional and unconditional probability values, by parameter learning with the aid of a dataset from the considered spiral drilling process. Finally, the network model will be tested and validated with the help of selected application scenarios and it turns out, that it yields plausible results.

Keywords: Machining Production, Bayesian Networks, Quality Optimization