

Using Single Decision Tree to Assess the Impact of Cutting Conditions on Vibration

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Abstract : Vibration during machining process is crucial since it affects cutting tool, machine, and workpiece leading to a tool wear, tool breakage, and an unacceptable surface roughness. This paper applies a nonparametric statistical method, single decision tree (SDT), to identify factors affecting on vibration in machining process. Workpiece material (AISI 1045 Steel, AA2024 Aluminum alloy, A48-class30 Gray Cast Iron), cutting tool (conventional, cutting tool with holes in toolholder, cutting tool filled up with epoxy-granite), tool overhang (41-65 mm), spindle speed (630-1000 rpm), feed rate (0.05-0.075 mm/rev) and depth of cut (0.05-0.15 mm) were used as input variables, while vibration was the output parameter. It is concluded that workpiece material is the most important parameters for natural frequency followed by cutting tool and overhang.

Keywords : cutting condition, vibration, natural frequency, decision tree, CART algorithm

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