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Simulation of Particle Damping in Boring Tool Using Combined Particles

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Abstract : Particle damping is a promising vibration attenuating technique in boring tool than other type of damping with minimal effect on the strength, rigidity and stiffness ratio of the machine tool structure. Due to the cantilever nature of boring tool holder in operations, it suffers chatter when the slenderness ratio of the tool gets increased. In this study, Copper-Stainless steel (SS) particles were packed inside the boring tool which acts as a damper. Damper suppresses chatter generated during machining and also improves the machining efficiency of the tool with better slenderness ratio. In the first approach of particle damping, combined Cu-SS particles were packed inside the vibrating tool, whereas Copper and Stainless steel particles were selected separately and packed inside another tool and their effectiveness was analysed in this simulation. This study reveals that the efficiency of finite element simulation of the boring tools when equipped with particles such as copper, stainless steel and a combination of both. In this study, the newly modified boring tool holder with particle damping was simulated using ANSYS12.0 with and without particles. The aim of this study is to enhance the structural rigidity through particle damping thus avoiding the occurrence of resonance in the boring tool during machining.

Keywords : boring bar, copper-stainless steel, chatter, particle damping
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