Reproducibility of a reaming test - DTU Orbit (31/12/2018)

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The reproducibility of a reaming test was analysed to document its applicability as a performance test for cutting fluids. Reaming tests were carried out on a drilling machine using HSS reamers. Workpiece material was an austenitic stainless steel, machined using 4.75 m·min⁻¹ cutting speed and 0.3 mm·rev⁻¹ feed. A mineral straight oil and a water-based lubricant at two different oil concentrations were compared with respect to hole quality, evaluated in terms of surface finish (conventional average roughness parameter Ra and roughness profiles), and hole geometry (hole diameter and roundness). Process reproducibility was assessed as the ability of different operators to ensure a consistent rating of individual lubricants. Absolute average values as well as experimental standard deviations of the evaluation parameters were calculated, and uncertainty budgeting was performed. Results document a built-up edge occurrence hindering a robust evaluation of cutting fluid performance, if the data evaluation is based on surface finish only. Measurements of hole geometry provide documentation to recognize systematic error distorting the performance test.

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