

Erasmus Mundus Joint Master in Manufacturing 4.0 by intElligent and susTAinable technologies



MASTER's Degree Thesis

Quality-Driven Process Optimisation of Finish Turning on 316L Stainless Steel for a Customised Cutting Tool

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Abstract:

The purpose of this thesis was to investigate the effect of a customised tool's cutting-edge radius and high-pressure jet cooling on the CNC finish turning of 316L stainless steels. The primary goal was to use the design of experiment to determine the best process parameter, particularly to achieve N5 grade surface quality while also improving productivity, reducing forces, and minimising cutting temperature, as well as producing acceptable chips. RSM-based Box-Behnken design was used to investigate the relationship between cutting-edge radius, feed, and depth of cut. ANOVA and regression analysis were used to analyse data. The expected optimised values yielded the desired output responses verified by the conformity experiments. Finally, this study revealed findings that support clean manufacturing.

Keywords: finish turning, 316L stainless steel, N5 grade surface, design of experiment, clean manufacturing.

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