OPTIMISATION OF A MILLING PROCESS BASED ON SIMULATED RESPONSE SURFACE METHODOLOGY

Ricardo Morgado[1], Laurențiu Slătineanu[2], António Gonçalves-Coelho[1] & António Mourão[1]

[1] The New University of Lisbon, Faculty of Science and Technology, Department of Mechanical & Industrial Engineeering
[2] Technical University "Gheorghe Asachi" of Iaşi-Romania, Department of Machine Manufacturing Technology

Corresponding author: António Gonçalves-Coelho, goncalves.coelho@fct.unl.pt

Abstract: The Response Surface Methodology (RSM) based on Design of Experiments (DoE) is an efficient way to optimise machining processes, specifically in terms of machining time and operational conditions. However, in industries with short-run productions - *e.g.* tool die manufacturers - the time and cost related to the experiments can be unreasonable. One possible alternative is DoE simulation through a Computer Aided Manufacturing (CAM) system, which allows for creating response surfaces, in order to identify the most suitable working zones in terms of cutting parameters - for example, to avoid excessive vibration. One can make some tests before the production run to validate the zones of the parameters' values, allowing for the fast adjustment of the cutting parameters, as a means for improving the machine tool performance. This paper presents an industrial case study where this unusual approach was applied with success to a milling process in a die tools manufacturing company.
Key words: Optimisation, RSM, Design of Experiments, Simulation.