OPTIMIZATION OF CUTTING FORCE, SURFACE ROUGHNESS AND MATERIAL REMOVAL RATE IN FACE MILLING PROCESS ON AN AISI 1045 USING TAGUCHI-GREY METHOD

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ABSTRACT
Milling is one of the machining process which is widely used for component manufacturing. Cutting force, surface roughness and material removal rate are critical quality characteristics in face milling process. Machining parameters including cutting speed, feed rate and depth of cut have an influence on the quality. Therefore, an optimization to minimize cutting force and surface roughness as well as maximize material removal rate needs to be performed. This study was carried out by vertical milling machine on AISI 1045 steel. Taguchi based grey relational analysis was used to optimize process. An orthogonal L₉ (3³) array was used. The selected setting parameter were cutting speed, feed rate and depth of cut. Each parameter has 3 levels. Results show that this method can reduce cutting force and surface roughness and increase material removal rate effectively and efficiently.

Keyword: cutting force, grey relational analysis, surface roughness, material removal rate, Taguchi
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