شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

جامعة عين شمس
Ain Shams University Information Network
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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

Design and Production Engineering Department

Magnetic Field Effect on Abrasive Flow Machining Process

A Thesis submitted in a partial fulfilment of the requirements of the degree of

Master of Science in Mechanical Engineering

(Production Engineering)

by

Ebrahim Mohamed Sabry Ebrahim Ahmed Mohamed

Bachelor of Science in Mechanical Engineering

(Production Engineering)

Modern Academy for Engineering and Technology, 2013.

Supervised By

Prof. M. AbdelMohsen Mahdy

Associate Prof. Mohamed Ahmed Awad

Dr. Fouad Farag Mansour

Cairo - (2020)

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Statement

This thesis is submitted as a partial fulfilment of Master of Science in Mechanical Engineering , Faculty of Engineering, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Summary

AFM is the most important process of finishing products and obtaining high surface quality. In this research, the effect of magnetic field on the quality of surfaces resulting from the cutting process was studied. In addition to the construction of experimental and mathematical models based on Design of Experiment concepts were built.

The quality of surfaces resulting from AFM process were recorded to distinguish the improvement of surface roughness and rate of metal removal during operation.
As two of the most important problems resulting from the process of cutting directly affect the quality of the finished product.

The raw materials used in this study were identified as: 318 stainless steel, in addition to its chemical composition and mechanical properties. Also, the specifications of the machine used in this research and the devices used in the measurement processes. And the method of calculating the weight of the material removed. sixteen experiments were conducted to study the effect of three different variables: the number of operating cycles, the flow rate of the plastic cutter, and the magnetic field strength on two performance parameters: the value of the removed material, as well as the surface roughness resulting from the cutting process.

The design of the experimental plan was designed using the standard L16 orthogonal matrix of Taguci method. As well as the average practical results recorded. The necessary graphs were created. The magnetic field results were analysed in addition to the effect of various factors on the cutting process such as: number of operating cycles, flow rate of plastic cutting material, magnetic field strength on two performance parameters namely the value of the removed material and the surface roughness resulting from the cutting process.

Mini Tab Version 17 was used to create the main effect drawings of the different variables on the performance parameters in order to determine the most important variables. It was then determined the effect of the different variables controlling the cutting process, and it was investigated that magnetic field has a significant effect on surface processed by AFM.

Keywords:

Abrasive Flow Machining, Magnetic field effect on AFM.

Abstract

In this research, studding of the effect of adding a magnetic field around the workpiece in abrasive flow machining has been addressed. Beside determination of effect between the parameter of AFM and the magnetic field and the effect of it on metal removal rate and the final surface finish.

It was investigated that magnetic field is a significant factor on Abrasive Flow Machining process. Number of cycles conducted has showed a significant effect than media flow rate of Abrasive Flow Machining process.

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