THE STUDY ON THE MICRO-PITS LOCATION ON THE EXTRUSION DIE SURFACE

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To my beloved parent, husband and my friends
without fail, encourage and support me
to concentrate on my study

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ABSTRACT

The present research concerns study of the effects of micro-pits arrays formed on the taper die by experimental verification using. A series of taper die with micro-pits with different location at existence of die were design. A taper without micro-pits was used as a reference. The lubricant is additive free paraffinic mineral oil. P2 is a low viscosity lubricant while P3 is a high viscosity lubricant. The experimental results are focusing on the extrusion load, billet surface roughness, and grid pattern observation. From the result, the micro-pits array affected on surface roughness if the lubricant viscosity is higher but the extrusion load also become higher.

ABSTRAK

Kajian ini bertujuan untuk mengkaji kesan susunan pit mikro yang dibuat di atas permukaan acuan tirus dengan menggunakan kaedah experimen. Sepasang acuan tirus dengan pit mikro yang dibuat pada lokasi yang berbeza pada bahagian keluaran acuan tirus. Acuan tirus tanpa pit mikro dijadikan sebagai rujukan. Minyak paraffin digunakan sebagai pelincir. P2 adalah parafin berkelikatan rendah manakala P3 adalah parafin berkelikatan tinggi. Keputusan eksperimen seperti beban penyempritan, kelicinan permukaan billet, dan pencerapan corak pada grid di. diberi perhatian. Daripada keputusan, susunan pit mikro memberi kesan pada kelicinan permukaan jika pelincir yang digunakan adalah berkelikatan tinggi tetapi beban penyempritan juga bertambah.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

F -	Force
ºC	Degree Celcius (temperature unit)
Hv	Vickers hardness (strength unit)
mm/s	Speed
mm	Displacement
N	Load which equal to weight time gravity acceleration, 9.81m/s^2
μm	Thickness value with $\mu = 1 \times 10^{-6}$
A	Area
d	Diameter

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1   Introduction

The importance of tribological parameters in metal forming processes have been generally recognized as affecting tool and die life, material flow during forming, work-piece integrity and surface finish, the relationship of the lubricant to the machine elements, cost considerations and energy conservation. Surface texturing has been successfully used in many applications to improve the performance of surfaces. Some concepts of texturing find their inspiration in nature. For example, surface texturing can be used to reduce drag on engineering surfaces moving through liquids. Surface texturing also as an option of surface engineering resulting in improvement in load capacity, wear resistance, the coefficient of friction etc.

One of the most successful applications in engineering is the improvement of tribological performance. Observations of the surface topography of some engineering surfaces have suggested that systematic patterning could lead to optimized behavior, as a logical development of the more random texturing

achieved through processes such as abrasive finishing and honing. Different mechanisms may contribute towards better tribological performance.

1.2   Problem Statements

Extrusion is a bulk forming process commonly used to produce long and straight metal parts. This forming process is based on the plastic deformation of a material due to compressive and shears forces only. The shape of the cross-sections can be solid round, rectangular, to T shapes, L shapes and Tubes etc. The quality of extruded product depends on many technological factors and the proper die design. In order to obtain an appropriate shape, dimensional tolerances, improved surface quality, the fine homogenous structure and uniform mechanical properties on extrudates cross-section, the metal flow through the die opening must be as uniform as possible. Therefore, this research will work on to acquire the possibility surface texture of using die with micro-pits array were indented as a case study.

1.3   Objectives

The objectives of this study are:

a) To compare the effect of micro-pits location on the extrusion load with different lubricant viscosity at the interface between tool and work-piece

b) To analyze the surface roughness and grid pattern observation on friction between tool and work-piece

1.4   The Aims and Scope of the Investigations

The fundamental aim and scope of the investigation are

a) The shape of micro-pit is diamond with size is in microns.

b) The micro-pits were indented on the existence of die surface at two difference section. The plane existence of die surface use as a reference

c) Two different viscosity of paraffin mineral oil as a lubricant were applied on the die surface.

d) To analyze the effect of micro-pits and viscosity of lubricant on the extrusion load, surface quality of product extruded and friction between tool and workpiece.