

**EFFECT OF GRINDING PROCESS PARAMETERS ON GRINDING FORCE OF
ALUMINIUM ALLOYS (AA6061-T6)**

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A final year report submitted in partial fulfillment of the
requirements for the award of the degree of
Bachelor of Mechanical Engineering with Manufacturing

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*Dedicated to all my beloved family members especially to
my father, mother, and sister.*

UNIVERSITI MALAYSIA PAHANG
FACULTY OF MECHANICAL ENGINEERING

We certify that the report written by Alexius Anak An'yan entitled "Effect of grinding process parameters on grinding force of aluminium alloys (AA6061-T6)". We have examined the final copy of this project and that in our opinion; it is fully adequate, in terms of scope and quality for the awarding the degree. We herewith recommend that it be accepted in fulfillment of the requirements for the Degree in the Mechanical Engineering with Manufacturing.

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ABSTRACT

Significant developments have recently been made in the grinding of metals. Many researches have been devoted to determining the effect of these grinding parameters towards grinding force. The aim of this project is to study the effect of grinding process parameters namely depth of cut, number of passes, and use of coolant on grinding force of aluminium alloy (AA6061-T6). A three component force transducer dynamometer (Kistler Model Type 5070) was used to measure grinding forces in this experiment. A full factorial experimental design was used as the approach for the design of experiment. Through the analysis of variance (ANOVA) conducted, it was found that the most significant parameter is the usage of coolant followed by depth of cut. Meanwhile, number of passes was found to be not significant. In conclusion, the grinding force values increased as the number of passes became higher in proportional to depth of cut. The grinding force also increased if running in dry condition.

ABSTRAK

Pemipisan logam semenjak akhir ini makin telah memberi kesan ketara yang nyata. Banyak kajian telah telah diperuntukkan untuk mengenal pasti kesan proses pemipisan terhadap daya pemipisan. Projek ini bertujuan untuk mengkaji kesan proses pemipisan terhadap daya pemipisan pada aluminium aloi (AA6061-T6). Tiga komponen daya sensor jenis “ Kistler Model Type 5070” digunakan dalam kajian ini. Kaedah faktorial penuh digunakan dalam reka bentuk eksperimen ini. Matlamat analisa variasi dalam projek ini adalah untuk mengkaji jenis parameter yang mempunyai kesan besar terhadap daya pemipisan aluminium aloi (AA6061-T6). Melalui analisa variasi (ANOVA) yang dijalankan, ditemui bahawa parameter yang paling mempengaruhi adalah penggunaan pelincir dan kedalaman pemotongan. Manakala, bilangan laluan pemipisan didapati tidak mempunyai pengaruh yang besar. Kesimpulannya, nilai daya pemipisan akan meningkat sekiranya bilangan laluan pemipisan bertambah berkadar dengan kedalaman pemotongan. Daya pemipisan turut bertambah jika proses keadaan tanpa pelincir dijalankan.

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LIST OF SYMBOLS AND ABBREVIATIONS

D	-	diameter
mm	-	millimeter
rpm	-	rotation per minute
%	-	percentage
min	-	minute
GPa	-	GigaPascal
MPa	-	MegaPascal
AA	-	Aluminium Alloys
UNS	-	Unified Numbering System
°C	-	Degree Celcius
Hz	-	Hertz
kg	-	kilogram
kW	-	kilowatt
μm	-	micron meter
kg	-	kilogram

F_n	-	normal force
F_t	-	tangential force
F_r	-	resultant force
m/min	-	meter per minute
mm/min	-	milimeter per minute
N	-	normal force
s	-	second
V	-	volts
d_{wh}	-	diameter of wheel
L_c	-	length of contact
v_{wh}	-	periphial velocity
v	-	velocity
d_c	-	depth of cut
v_s	-	wheel speed

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