



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**THE EFFECT OF MATERIAL AND TOOL PROPERTIES ON THE  
CHEMICAL AND PHYSICAL PROPERTIES OF COOLANT**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Process) with Honours.

by

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FACULTY OF MANUFACTURING ENGINEERING

2011



# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: The Effect of Material and Tool Properties on the Chemical and Physical Properties of Coolant

SESI PENGAJIAN: 2010/11 Semester 2

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## **DECLARATION**

I hereby, declared this report entitled “The effect of material and tool properties on the chemical and physical properties of Coolant” is the results of my own research except as cited in references.

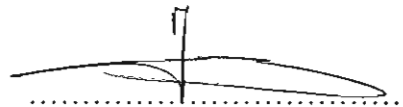
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Date : 14 April 2011

## APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the Degree in Bachelor of Manufacturing Engineering (Manufacturing Process). The member of the supervisory committee is as follow:



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## **ABSTRAK**

Cecair penyejuk akan memberi pelinciran antara benda kerja dan alat pemotongan dan juga menyingkirkan haba yg terhasil semasa proses pemotongan besi. Prestasi cecair penyejuk akan menyusut mengikut masa dan akan mempengaruhi kualiti produk . Tujuan kajian ini adalah untuk menentukan sama ada sifat benda kerja dan alat pemotongan akan memberikan kesan pada sifat kimia dan fizikal cecair penyejuk. Selain itu, kajian ini juga akan menentukan jenis bahan dan alat pemotongan yang akan mempercepatkan penyusutan cecair penyejuk. Perbandingan tersebut berdasarkan hasil dari proses pelarikan yang akan dianalisis menggunakan FT-IR dan viscometer. Dalam proses pemotongan, ada lima parameter yang perlu dipertimbangkan iaitu kelajuan pemotong, masa pemotongan, kelajuan dan kedalaman pemotongan, jenis pendingin, jenis bahan kerja dan alat pemotongan. Semasa proses pemesinan berjalan kelajuan potong, masa pemotongan, kelajuan dan kedalaman potong, dan jenis cecair penyejuk adalah malar sementara bahan kerja dan alat pemotongan adalah pemboleh ubah tak bersandar.

## **ABSTRACT**

Coolants provide lubrication between the work piece and tool and also remove heat generated during the metal processes. Coolant performance will degrade against time hence affected machining quality of the finish product. The purpose of this study is to determine whether material and tool properties give an effect on the chemical and physical properties of the coolant. In addition, this study will define type of material and tool that may accelerate the degradation of coolant. The comparison is based on the result from turning operation which will be analyzed using FT-iR and viscometer. In the machining process, there are five parameter need to be considered which are cutting speed, cutting time, feed rate and depth of cut, type of coolant, types of material and tool. During machining cutting speed, cutting time, feed rate, and depth of cut, and type of coolant are kept constant while the material and tool are independent variables.

## **ACKNOWLEDGMENT**

Bismillahirrahmanirrahim,

First of all, I would like to thank our Creates Allah SWT that gives me a chance to breathe in the earth. I also would like to acknowledge and express my gratitude and appreciation to my supervisor, En. Mohd Fairuz Bin Dimin for his supervision, encouragement, suggestion, advice and support.

It is pleasure for me to express huge gratitude to all individuals and colleagues which have contribute so much throughout my study and give commitment during this research. Not forget to my friends and other people that are not listed in fulfilling this research, whereas their advice and assistance in various ways was extremely helpful. I could offer here only an inadequate gesture of my appreciation and all of your good deeds will always in my mind.

Thank you.

## **DEDICATION**

*For my supervisor, lecturer, family and friends*



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## LIST OF ABBREVIATIONS

ASTM	-	American Society for Testing and Materials
C	-	Carbon
Cr	-	Chromium
Co	-	Cobalt
DIN	-	Deutsches Institut für Normung (German Institute for Standardization),
FTIR	-	Fourier Transform Infrared
HSS	-	High Speed Steel
Mn	-	Manganese
Mo	-	Molybdenum
pH	-	the power of Hydrogen
Si	-	silicon
SUS	-	Saybolt universal second
T	-	Tungsten
TiC	-	Titanium Carbide
V	-	Vanadium
W	-	Tungsten
WC	-	Tungsten Carbide



## **ABSTRAK**

Cecair penyejuk akan memberi pelinciran antara benda kerja dan alat pemotongan dan juga menyingkirkan haba yg terhasil semasa proses pemotongan besi. Prestasi cecair penyejuk akan menyusut mengikut masa dan akan mempengaruhi kualiti produk . Tujuan kajian ini adalah untuk menentukan sama ada sifat benda kerja dan alat pemotongan akan memberikan kesan pada sifat kimia dan fizikal cecair penyejuk. Selain itu, kajian ini juga akan menentukan jenis bahan dan alat pemotongan yang akan mempercepatkan penyusutan cecair penyejuk. Perbandingan tersebut berdasarkan hasil dari proses pelarikan yang akan dianalisis menggunakan FT-IR dan viscometer. Dalam proses pemotongan, ada lima parameter yang perlu dipertimbangkan iaitu kelajuan pemotong, masa pemotongan, kelajuan dan kedalaman pemotongan, jenis pendingin, jenis bahan kerja dan alat pemotongan. Semasa proses pemesinan berjalan kelajuan potong, masa pemotongan, kelajuan dan kedalaman potong, dan jenis cecair penyejuk adalah malar sementara bahan kerja dan alat pemotongan adalah pemboleh ubah tak bersandar.

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