

Faculty of Manufacturing Engineering

MULTI OBJECTIVE PERFORMANCE OPTIMIZATION OF HYBRID ROTARY ULTRASONIC ASSISTED END MILLING FOR MACHINING HARDENED STEEL MATERIAL

Azlan Bin Ramli

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AZLAN BIN RAMLI

A thesis submitted
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DECLARATION

I declare that this thesis entitled “Multi Objective Performance Optimization of Hybrid Rotary Ultrasonic Assisted End Milling for Machining Hardened Steel Material” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : ……

Name : Azlan Bin Ramli

Date : ……

APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Doctor of Philosophy.

Signature	:	……..……
Supervisor Name	:	Associate Professor Dr. Raja Izamshah Bin Raja Abdullah
Date	:	……..…

DEDICATION

I dedicated this thesis to my beloved family.

Ramli Bin Muda

Esah Binti Mahmud

Linawati Binti Razak @ Ali

Nurul Fadhlina Binti Azlan

Nurul Zahirah Farhanah Binti Azlan

Nurul Najihah Farhanah Binti Azlan

Nurul Anisah Amni Binti Azlan

Faris Iskandar Bin Azlan

Nurul Auni Nabihah Binti Azlan

and

Associate Professor Dr. Raja Izamshah Bin Raja Abdullah

and

Ir. Dr. Muhamad Arfauz Bin A Rahman

and

to all my friends