



UNIVERSITI PUTRA MALAYSIA

***TOOL PATH CUTTING STRATEGY FOR MILLING AIRCRAFT
COMPONENTS USING ALUMINIUM 7050***

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**TOOL PATH CUTTING STRATEGY FOR MILLING AIRCRAFT
COMPONENTS USING ALUMINIUM 7050**

By

HAZEM K. ALSULTANEY

**Thesis Submitted to the School of Graduate Studies, Universiti
Putra Malaysia, in Fulfilment of the Requirement for the Degree
of Master of Science**

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Fulfillment of the requirement for the degree of Master of Science

**A TOOL PATH CUTTING STRATEGY FOR MILLING AIRCRAFT
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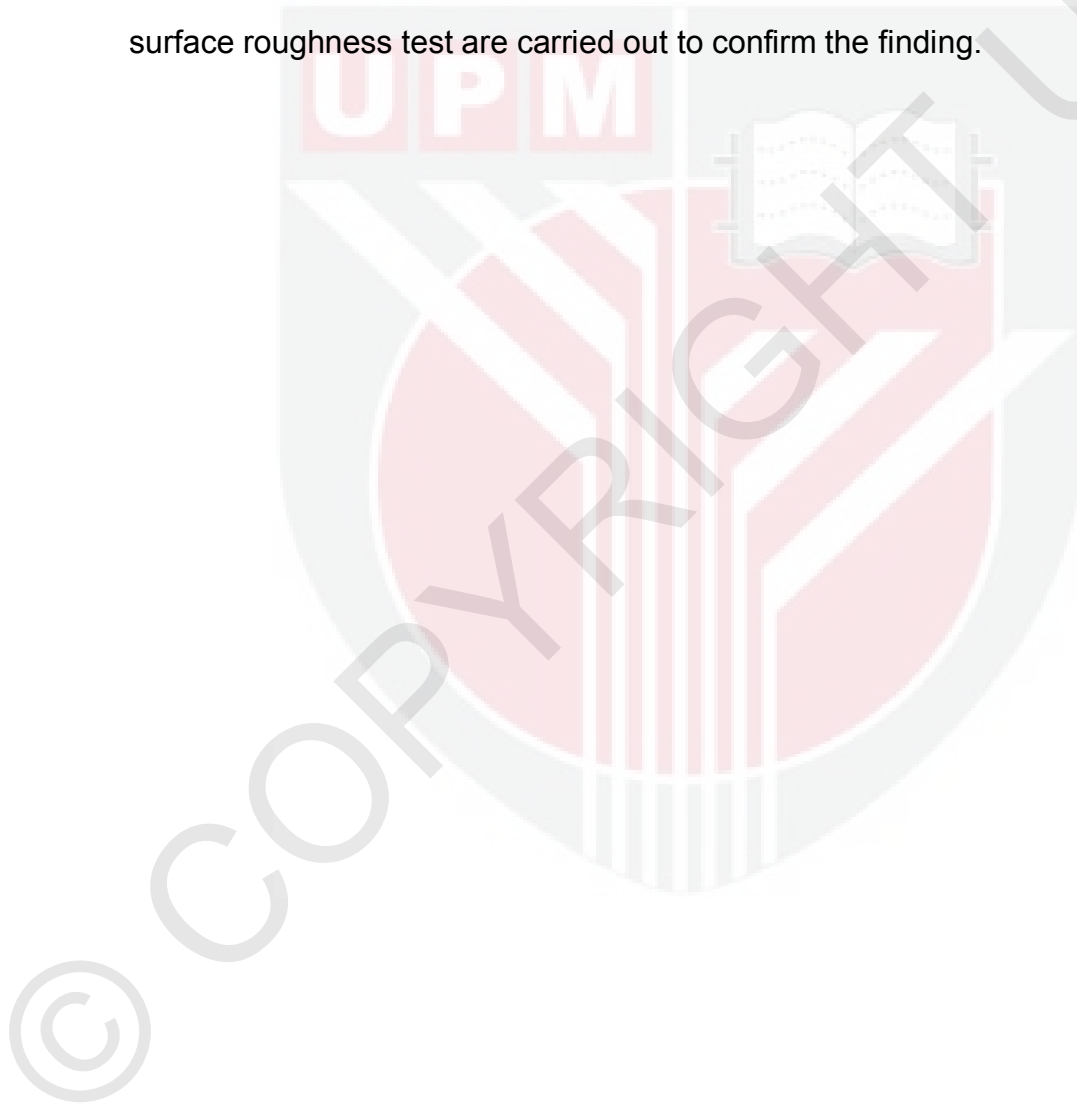
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Chairman : Dr. Mohd Khairol Anuar Mohd Ariffin, PhD

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Aerospace industry is a value-added and technology integrated industry. In addition, it is a technique-intensive, capital-intensive, and labor-intensive industry. It also integrates the mechanical, electronic, material, chemical and information technology. The old aircraft consist of a lot of components from the sheet metal components which nowadays is being replacing with a thin walled monolithic structure. The thin walled parts normally come from the single billet material and are machined to it intended shape using the high speed milling machine. Improper parameter setting and the way of the part machined will determined the quality of the finished product. The tool path i.e. machining sequence plays a key role in avoiding these problems as it help to minimize the

workpiece vibration during machining. This work aims to verify the simulation of finite element analysis (FEA) with an experimental works in order to determine the best machining sequence for the cutting process. It is proven that by using FEA software the optimized tool path can be obtained as it is agreed with the experimental work. The simulated FEA not only can be used for the Macro milling but also suitable for the Micro milling. Tests such as tensile, harness and surface roughness test are carried out to confirm the finding.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Master Sains

**STRATEGI LALUAN ALAT PEMOTONGAN UNTUK MENGISAR KOMPONEN
KAPAL TERBANG ALUMINUM 7050**

Oleh

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March 2011

Pengerusi: Dr. Mohd Khairol Anuar Mohd Ariffin, PhD

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Industri Aeroangkasa merupakan nilai tambah dan teknologi industri yang terintegrasi. Selain itu, adalah teknik-intensif, padat modal, dan industri padat karya. Ini juga menyepadukan mekanikal, elektronik, bahan, kimia dan teknologi maklumat. Bahagian logam lembaran bahagian penting aero-struktur. Ada ribuan bahagian logam lembaran yang berbeza dalam satu pesawat. Bahagian berdinding tipis biasanya datang dari billet bahan tunggal dan enjin untuk itu direka bentuk menggunakan quality kelajuan mesin penggilingan. Tetapan parameter yang tidak benar dan cara bahagian mesin akan menentukan kualitas produkjadi. Alatjalans usunan mesin iaitu memainkan peranan penting dalam mengelakkan masalah ini kerana membantu untuk meminimumkan getaran benda kerja pada mesin. Karya ini bertujuan untuk mengesahkan simulasi

analisis elemen hingga (FEA) dengan karya-karya eksperimental di untuk menentukan urutan pemesinan terbaik untuk proses pemotongan.

Hal ini terbukti bahawa dengan menggunakan perisian FEA laluan alat dioptimumkan disepakati dengan karya eksperimental. The FEA disimulasikan tidak hanya boleh digunakan untuk penggilingan Makro tetapi juga sesuai untuk penggilingan mikro. Ujian tersebut sebagai tarik, baju zirah dan uji kekasaran permukaan dilakukan untuk mengesahkan mencari.

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I certify that the an Examination Committee has met on 27 April 2010 to conduct the final examination of Hazem K. Alsultaney on his Master Degree thesis entitled “A tool path cutting strategy for milling aircraft components using aluminium 7050 ” in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The committee recommends that the student de awarded the Master of Science.

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotation and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Putra Malaysia or other institutions.



HAZEM K.ALSULTANEY

Date:

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