FINITE ELEMENT BASED FATIGUE ANALYSIS OF ALUMINIUM TAILOR WELDED BLANKS

CHE AZRAL IZZUDDIN BIN CHE RUDI

Report submitted in partial fulfillment of requirements
for award of the Degree of
Bachelor of Mechanical Engineering

Faculty of Mechanical Engineering
UNIVERSITI MALAYSIA PAHANG

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EXAMINERS APPROVAL DOCUMENT

UNIVERSITI MALAYSIA PAHANG
FACULTY OF MECHANICAL ENGINEERING

I certify that report entitled “Finite Element Based Fatigue Analysis of Aluminium Tailor Welded Blanks” is written by Che Azral Izzuddin Bin Che Rudi with matric number MH09013. I have examined the final copy of this report and in my opinion, it is fully adequate in terms of language standard, and report formatting requirement for the award of the degree of Bachelor in Mechanical Engineering with Automotive Engineering. I herewith recommend that it be accepted in fulfillment of the requirements for the degree of Bachelor Engineering.

Signature:

Examiner: DR. SITI RABIATUL AISHA BT IDRIS

SUPERVISOR'S DECLARATION

I hereby declare that I have checked this report and in my opinion this report is satisfactory in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering with Automotive Engineering.

Signature:

Name: DR. MD. MUSTAFIZUR RAHMAN
Position: ASSOCIATE PROFESSOR
Date:

STUDENT'S DECLARATION

I hereby declare that the work in this project report "Finite Element Based Fatigue Analysis of Aluminium Tailor Welded Blanks" is my own except for quotations and summaries which have been duly acknowledged. The report has not been accepted for any degree and is not contently submitted in candidate of any other degree.

Signature:

Name: CHE AZRAL IZZUDDIN BIN CHE RUDI
ID Number: MH09013
Date:

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ε'_a	Fatigue ductility coefficient
ε_a	Total strain amplitude
σ'_f	Fatigue strength coefficient
σ'_m	Mean stress
b	Fatigue strength exponent
c	Fatigue ductility exponent
E	Modulus of elasticity
N_f	Fatigue life
S_a	Alternating stress
S_f	Reversed fatigue limit
S_m	Mean stress
S_u	Ultimate tensile strength

LIST OF ABBREVIATIONS

ASAME	Automated Strain Analysis and Measurement Environment
AISI	American Iron and Steel Institute
ASTM	American Society for Testing and Material
CAD	Computer Aided Design
CM	Coffin Mansion
FEA	Finite Element Analysis
FEM	Finite Element Method
FLC	Forming Limit Curve
FLD	Forming Limit Diagram
HAZ	Heat Affected Zone
HCF	High Cycle Fatigue
HSS	High Strength Steel
LCF	Low Cycle Fatigue
LDH	Limiting Dome Height
NVH	Noise, Vibration, Harshness
S-N	Total Life
SAE	Society of Automotive Engineers
SAETRN	Tensile Mean Loading History
SAESUS	Compressive Loading History
SAEBKT	Zero Mean Loading
SWT	Smith-Watson-Topper
TET10	Tetrahedral 10
TWB	Tailor Welded Blanks