# TENSILE STRENGTH OF ALUMINIUM FOR DIFFERENT SLENDERNESS USING FINITE ELEMENT METHOD (FEM)

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2012





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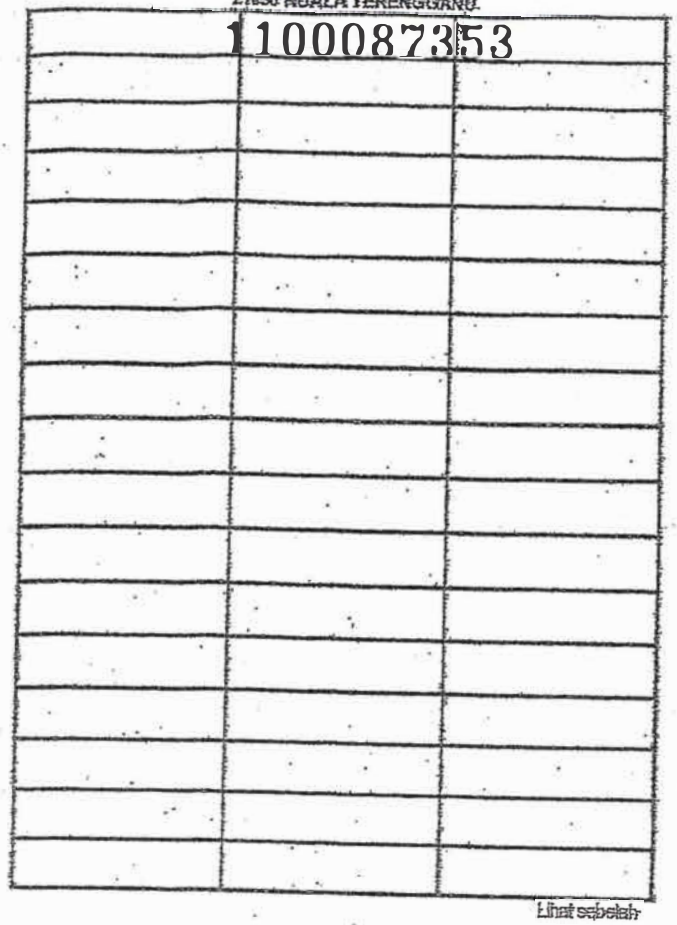


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# TENSILE STRENGTH OF ALUMINIUM FOR DIFFERENT SLENDERNESS USING FINITE ELEMENT METHOD (FEM)

By

Nor Afiqah Binti Idris

Research Report submitted in partial fulfillment of
the requirement for the degree of
Bachelor of Applied Science (Maritime Technology)

Department of Maritime Technology
Faculty of Maritime Studies and Marine Science
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DEPARTMENT OF MARITIME TECHNOLOGY
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
UNIVERSITY MALAYSIA TERENGGANU

# DECLARATION AND VERIFICATION REPORT

## FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled:

**TENSILE STRENGTH OF ALUMINIUM FOR DIFFERENT SLENDERNESS USING FINITE ELEMENT METHOD (FEM)**

by **NOR AFIQAH IDRIS**, Matric No, **UK 16517** have been examined and all errors identified have been corrected. This report is submitted to the Department of Maritime Techonolgy as partial fulfillment towards obtaining the Degree of Applied Science (Maritime Technology), Faculty of Maritime Studies and Marine Science, University Malaysia Terengganu.

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## DECLARATION

I hereby declare that this thesis entitled Tensile Strength of Aluminium for Different Slenderness using Finite Element Method (FEM) is the result of my own research except as cited in the references.

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# TENSILE STRENGTH OF ALUMINIUM FOR DIFFERENT SLENDERNESS USING FINITE ELEMENT METHOD (FEM)

## ABSTRACT

For many years, strength of material have been a topic of analysis but the demand to have further knowledge about this topic is remains important especially for aluminium alloy. Increasing usage of aluminium alloy nowadays has made the research about aluminium become more important. This research is about tensile strength of aluminium plate for different slenderness. Aluminium alloy 5083-H116 is used in this investigation since it is the common aluminium used in marine structures. This research involving three different size of tensile coupon which gives different slenderness ratio. The method used to investigate tensile strength of aluminium is by simulation program, ABAQUS. Using ABAQUS software, model can be developed using finite element method to predict the tensile strength. The data of tensile stress is compared with the experimental data from previous research to know the reliability of simulation program. In addition, this research also studies about damage and failure of aluminium alloy. Comparison is made between the prediction with and without damage criteria.

# TEKANAN REGANGAN ALUMINIUM DENGAN KELANGSINGAN YANG BERBEZA MENGGUNAKAN KAEDAH UNSUR TERHINGGA

## ABSTRAK

Sejak sekian lama, kekuatan bahan telah menjadi topik untuk dianalisa tetapi keperluan untuk mendapatkan pendedahan yang lebih tentang topik ini sentiasa penting terutamanya bagi bahan aluminium. Peningkatan penggunaan aluminium pada masa kini membuatkan kajian tentang aluminium menjadi bertambah penting. Kajian ini akan membincangkan tentang tekanan regangan bagi aluminium aloi untuk kelangsingan yang berbeza. Aluminium aloi jenis 5083-H116 digunakan dalam kajian ini kerana aluminium jenis ini adalah aluminium yang paling banyak digunakan dalam struktur marin. Kajian ini melibatkan tiga saiz kupon plat yag memberikan nisbah kelangsingan yang berbeza. Kaedah yang digunakan bagi menyiasat tekanan regangan aluminium adalah program simulasi iaitu ABAQUS. Menggunakan perisian ABAQUS, model dibuat menggunakan kaedah unsur terhingga untuk meramalkan tekanan regangan. Data tekanan regangan akan dibandingkan dengan data daripada kaedah eksperimen yang diambil daripada kajian sebelum ini untuk mengkaji kebolehan program simulasi. Selain itu, kajian ini juga mengambil kira tentang kerosakan dan kegagalan aluminium aloi. Perbandingan dibuat antara data yang diramalkan dengan kegagalan dan tanpa kegagalan struktur aluminium.