

**FINAL YEAR PROJECT REPORT  
B.ENG (HONS) MECHANICAL  
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**ENVIRONMENTAL ASSISTED CRACKING  
OF ALUMINIUM ALLOY AA 6061**

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## ACKNOWLEDGMENT

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*In name of Allah s.w.t, the most Gracious and Merciful Creator. We praise Him and we seek his blessing on His Noble Prophet Muhammad s.a.w.*

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*Last but not least, we have tried our best and hopefully this report can be guidance and reference to other students who may be interested in this topic in the future.*

## ABSTRACT

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Aluminium alloy 6061 is widely used as structure, components and equipment in seawater such as propellers, shafts, pumps, piping system and ship hulls. Since aluminium alloys AA 6061 have various type of application in corrosive environment (seawater) and easily available in market, we decide to do an environmental assisted cracking studies. This is to collect meaningful data and then to predict the effect of seawater to this type of alloy in term of mechanical properties such as ductility, yield strength, tensile strength, and percentage of elongation.

One of the environmental assisted cracking testing which have been selected is stress corrosion cracking. The method that has been used in this stress corrosion cracking testing is a constant load condition. Specimens of aluminium alloy AA 6061 is conditioning under constant tension at 250N in seawater environment. The duration of the conditioning is varied from one test to another. For the purpose comparison, we also conditioned the specimen of aluminium alloy AA6061 in seawater without loading. The duration of this conditioning also varies from one to another. Both conditioning have had been carried out at room temperature.

The results of the experimentation have been gathered for different duration of conditioning. It showed that some variations in the surface of fractured specimens was observed under the effect of the seawater. Unconditioned specimens did not show any striation features as compared to those of conditioned specimens. The stress-strain curves of the specimen tested show some the differences. This study have indicated that environment do effect property of aluminium alloy AA 6061.

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# CHAPTER 1

## INTRODUCTION

Aluminium alloy structure is frequently used in seawater such as navigation buoys, lifeboats, motor launches, cabin cruisers, patrol boats, barges and larger vessels. This is because aluminium alloys have favorable characteristics, including moderately high strength and good stress corrosion cracking resistance.

It is necessary for design engineer to know the deterioration of mechanical properties and characteristics of aluminium alloy that to use under seawater environment. Thus, we do a laboratory testing that called stress corrosion cracking testing using an apparatus that had prepared by previous student in final year project. [ref.1]

By do stress corrosion cracking testing and then followed by tensile and scanning fractured surface of a material, we can determine the effect of mechanical properties of a material under a specific corrosive environment and certain duration of exposure. In our case, we try to identify the trend of deterioration of mechanical properties of aluminium alloy effected by seawater under various duration of exposure. Also, we can know the endurance of aluminium alloy that known for their corrosion resistance withstands under seawater.

It is also important to select measure that may be taken to prevent, or at least to reduce, include material selection, environmental alteration, the used of inhibitors, design changes, application of coatings and cathodic protection.