



**REINFORCEMENT BAR MEASUREMENT IN  
STRUCTURAL CONCRETE USING GROUND  
PENETRATING RADAR METHOD**

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**(2002333901)**

A thesis submitted in partial fulfillment of the requirements for the award  
of Bachelor of Engineering (Hons) (Mechanical)

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**DECEMBER 2005**

## ACKNOWLEDGEMENT

First and foremost, Alhamdulillah and thanks to Allah The Almighty for the completion of this Final Project on Non-destructive Testing (NDT) – Reinforcement bars measurement in structural concrete using Ground penetrating radar method as part of the requirements for the award of Degree in Engineering (Hons) (Mechanical).

Secondly, I would like to thank our supervisor and co – supervisor Prof. Madya Nor Aini Wahab, Dr Mohamad Pauzi Ismail, Mr Amry Amin Abas and Mr Suhairy Sani for their help and effort in guiding me to complete the final project. Their endless effort and work has certainly given me the moral boost in completing the final project in such a hectic schedule.

Our thanks extends to all staff in Malaysia Institute of Nuclear Technology (MINT). Without them we certainly will not finish the project on time. They have been grateful enough to grant us their time and place for doing all the experiment despite of their works and deadlines.

I would also like to thank all the staffs at Universiti Teknologi MARA (UiTM) Shah Alam, especially the staffs at the Faculty of Mechanical Engineering for their very helpful guidance.

Last but not least, our thanks goes to my family that had supported me in term of financial and also thanks to all staff, lecturers and colleagues for sharing with us the valuable information about this project and those people who help us directly and indirectly in the completion of this project.

## ABSTRACT

Rebar diameter in structural concrete is an important parameter for a structural engineer to calculate the strength of certain construction. For construction, the critical area for structure is at beam, column and slab. At present only Radiography is the reliable and accurate non-destructive method for rebars diameter determination. However, radiography requires accessibility for placement of radiation source and film from both side of the object to be tested and this is not applicable for certain concrete member such as floor slab. In GPR technique, a Handisearch RC Radar NJJ-85A has been used to measure bar sizing in five different type of concrete. It is observed that a concrete containing bars with a separation distance of 200mm has shown more accurate result, whereby the one containing bars with separation distance of 100mm exhibited dimension which are two or more times smaller than the actual diameter. Observations on the sample containing bar with different height revealed that result are not affected by the depth of the bar from the surface. GPR can be considered as a reliable and accurate non-destructive method for rebars diameter determination if a technique to interpret the hyperbolic curve can be established.

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## **CHAPTER 1**

### **INTRODUCTION OF NON DESTRUCTIVE TEST**

#### **1.1 History of non destructive test**

The art and science of Non-destructive Testing (NDT) are very old. Since, 1920, the art of NDT has developed from a laboratory curiosity to an indispensable tool of production. However, the real revolution in NDT took place during World War II. The progress in materials engineering in identifying new and improved materials subsequent to a number of catastrophic failures in World War II like the brittle fracture of Liberty ships, necessitated the requirement to test and improve material properties. This requirement resulted in a wider application of the then existing NDT methods and techniques and also paved the way for development of new methods and techniques. Though in the beginning, NDT was used primarily for process control and secondarily for quality control, subsequently, the use of NDT was recognized by management as a means of meeting consumer demands for better products, reduced cost and increased production. NDT tests were used world-wide to detect variations in structure, minute changes in surface finish, the presence of cracks or other physical discontinuities, to measure thickness of materials and coatings and to determine other characteristics of