STUDY OF STRUCTURAL CAPACITY IN REINFORCED CONCRETE BEAM BY ADDING REAL-SET 233 AS AN ADDITIVE

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B. ENG (HONS.) CIVIL ENGINEERING

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Thesis submitted in fulfillment of the requirements for the award of the degree of

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of degree of Bachelor of Civil Engineering (Hons.).

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Date : 12 JANUARY 2017

STUDENT'S DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.

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LIST OF SYMBOLS

%	Percentage
kg	Kilogram
m^3	Meter cubic
mm	Millimetre
ml	Millilitre
MPa	Mega Pascal
Gpa	Giga Pascal
kN	Kilo Newton
vs	Versus

LIST OF ABBREVIATIONS

ACI	American Concrete Institute
ASTM	American Section of the International Association for Testing Materials
BS	British Standard
CFRP	Carbon Fiber Reinforced Polymer
RC	Reinforced Concrete

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ABSTRACT

This research aims to determine the structural capacity in reinforced concrete beam by adding REAL-SET 233 as concrete admixture when the concrete cracks in tension. This study points out two objectives, namely to determine the load-displacement of concrete and the strain-stress of steel bars in reinforced concrete beam which adding REAL-SET 233 as concrete admixture. This has be done by making a number of concrete mixes each with different amount of REAL-SET 233 admixture added to the concrete mix. The ratios of admixture that used in this study are 150 ml and 175 ml per m^3 of concrete from the basic concrete grade C25/30. An experimental approach that has been taken in this study is Magnus Frame Four Point Test. There are 9 beams are provided with different mix proportion of concrete in this study. The size of the beam is 150 mm x 200 mm x 1500 mm. There are also provided 9 cubes with dimension size of 150 mm x 150 mm x 150 mm to get the average results of the compressive strength. From the analysis of data, it clearly shows that the use of REAL SET-233 admixture in concrete can be widely used in the construction industry and will have a major impact on the concrete technology industry in the future.

ABSTRAK

Kajian ini bertujuan untuk mengetahui kapasiti struktur dalam rasuk konkrit bertetulang dengan meletakkan bahan tambah REAL SET-233 dalam campuran konkrit apabila konkrit retak dalam ketegangan. Kajian ini mempunyai dua objektif, iaitu untuk mengetahui beban-anjakan daripada konkrit dan mengkaji tekanan yang dikenakan pada tetulang besi dalam rasuk konkrit bertetulang yang yang ditambah REAL-SET 233 sebagai bahan tambah konkrit. Ini dapat dilakukan dengan membuat beberapa campuran konkrit dengan jumlah campuran bahan tambah REAL-SET 233 yang berbeza yang ditambah ke dalam campuran konkrit. Nisbah bahan tambah yang digunakan dalam kajian ini ialah 150 ml dan 175 ml per m^3 konkrit dari gred asas konkrit C25/30. Ujian yang dijalankan dalam kajian ini adalah *Magnus Frame Four Point Test*. Terdapat 9 rasuk dihasilkan dengan kadar campuran konkrit yang berbeza dalam kajian ini. Saiz rasuk adalah 150 mm x 200 mm x 1500 mm. Terdapat 9 kiub disediakan dengan saiz dimensi 150 mm x 150 mm x 150 mm untuk mendapatkan keputusan purata Ujian Kekuatan Mampatan. Daripada analisis data, ia jelas menunjukkan bahawa penggunaan REAL SET-233 ke dalam konkrit boleh digunakan secara meluas dalam industri pembinaan dan akan mempunyai kesan yang besar kepada industri teknologi konkrit pada masa hadapan.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Concrete is one of the building materials that are widely used in the construction industry and civil engineering. Concrete is a material used in construction which is consisting of a mixture of cement, coarse aggregate, fine aggregate, water and admixture that is mixed together according to a certain ratio until it harden and dense. The uses of concrete as the main construction material is because concrete properties are durable, inexpensive, easily formed by aesthetic requirements, easily to get materials, protect the reinforcement from rusting and good in compressive strength. In other word, concrete is more cost-effective compared with other materials and provide a good level of service within a long time of period. Concrete is a brittle material which may fail without a warning signal under peak compressive force. Therefore, improving the ductility and strain capacity of concrete is very important. Concrete is very strong in compression resistance, but weak in tension hence cracks easily. Therefore, steel bars or meshes have been embedded into the concrete to resist the tensile force imposed on the structure.

The use of chemical admixtures has become common place in the production of concrete which concretes absent of admixtures tend to be the exception today. Admixtures are used to impart some beneficial influence onto concrete whether it is to be in its fresh or hardened state. Typically, admixtures are used in combination with others so as to achieve a combined benefit and are generally successful when used together.

1.2 PROBLEM STATEMENT

Reinforced concrete is a composite material in which concrete's relatively low in tensile strength and ductility are counteracted by the inclusion of reinforcement having higher tensile strength or ductility. The capacity problem with reinforced concrete is that the ability of the structure to withstand external loads which can cause the deflection. The finished product of concrete should perform tests on it, to make sure that they are capable to carry the design loads. It actually can develop a lot of structural and aesthetic problems if improperly laid such as cracks. Fresh concrete is the stage where the concrete in which can be moulded and it is in plastic state. During casting the beam, the concrete mixture is at the state to be workable when it is easily placed and easy to form the shape. However, unworkable concrete needs more work or effort to be compacted in place and also honeycombs may also be visible in finished concrete.

1.3 OBJECTIVES

The main goal of this study is to determine the effectiveness of REAL SET-233 use in concrete. To achieve that goal, the following objectives are:

i. To determine the load-displacement of reinforced concrete by adding REAL-SET 233 as concrete admixture.
ii. To determine the strain-stress of steel bars in reinforced concrete beam which adding REAL-SET 233 as concrete admixture.

1.4 SCOPE OF PROJECT

This study is to determine the load displacement and stress-strain of steel bars of reinforced concrete beam. The reinforced concrete beam than compare between normal concrete mix with concrete mix added with REAL SET-233. It is to classify the use of REAL SET-233 as admixture of concrete which is one of the reforms that led to the advancement in the field of civil engineering. The tests conducted to accomplish this study objectives is Magnus Frame Four Point Test. This study also involves laboratory works such as Slump Test and Compressive Strength Test. In this study, a total number of reinforced concrete beams and cube samples are 9 samples, which 3 samples for each ratio including standard concrete will be produced for the tests. The ratios of admixture that used in this study are 150 ml and 175 ml per m^3 of concrete. The curing period for the samples will be 28 days. Then, the concrete mixes will get difference outcome and the results of a study will be accompanied with tables and graphs.

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