

**THE DEVELOPMENT OF LIGHTWEIGHT
CONCRETE USING MODIFIED EXPANDED
POLYSTYRENE BEADS**

by

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Report submitted in partial fulfillment
of the requirements for the degree
of Bachelor of Engineering



JUNE 2013

ACKNOWLEDGEMENT

Alhamdulillah. I would like to thank and praise to Allah S.W.T., the Most Merciful and the Most Compassionate with His willing giving me opportunity to complete this Final Year Project.

I would like to express my gratitude and appreciation to my supervisor, Assoc. Prof. Dr. Khairul Nizar Bin Ismail for continual guidance, support and motivations throughout this project. Without his supportive, motivation, and positive critics, this report will not be completed.

Importantly, deepest appreciation and heartfelt thanks to my beloved family, especially my parents for their fullest support throughout my three years study in Universiti Malaysia Perlis (UniMAP). Thanks for encouragement, love, emotional and willing that had given to me.

Outmost gratitude is extended to all my friends and lecturers who were there for me and giving me advices and motivations, regardless their busy schedules. Their kindness and helpful are very appreciated. Lastly, my gratitude goes to anyone who is involved directly or indirectly in this project.

APPROVAL AND DECLARATION SHEET

This project report titled The Development of Lightweight Concrete Using Modified Expanded Polystyrene Beads was prepared and submitted by Nur Zati Zulaikha Binti Zaaba (Matrix Number: 101201812) and has been found satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Engineering (Building Engineering) in Universiti Malaysia Perlis (UniMAP).

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June 2013

PEMBANGUNAN KONKRIT RINGAN MENGGUNAKAN MANIK POLISTIRENA YANG DIUBAHSUAI

ABSTRAK

Konkrit ringan didefinisikan sebagai salah satu jenis konkrit yang menggunakan agregat ringan dan lebih ringan dengan berketumpatan rendah berbanding dengan konkrit biasa. Objektif utama kajian ini adalah untuk menghasilkan konkrit ringan yang berkualiti tinggi dengan menggunakan manik polistirena yang diubahsuai. Penghasilan manik polistirena yang diubahsuai ini adalah dengan menggunakan manik polistirena biasa melalui proses pemanasan dengan menggunakan relau. Bancuhan konkrit percubaan yang menggunakan manik polistirena dilakukan dahulu untuk mendapatkan kadar bancuhan yang terbaik. Selepas itu, tiga sampel kiub konkrit yang menggunakan manik polistirena yang diubahsuai dibancuh berdasarkan daripada kadar bancuhan yang terbaik itu. Beberapa ujian makmal telah dilakukan seperti ketumpatan, penyerapan air, kekuatan dan analisis mikrostruktur telah dikaji 7 sehingga 56 hari. Sampel D adalah bancuhan percubaan yang terbaik dengan kekuatan mampatan tertinggi dengan 7.092 MPa dan ketumpatannya 1783 kg/m^3 pada umur 56 hari yang mematuhi BS EN 206-1:2000. Sampel X adalah bancuhan terbaik berbanding sampel Y dan Z dan lebih baik daripada sampel D kerana kekuatan mampatan pada umur 56 hari dengan 16.466 MPa. Secara ringkas, kekuatan konkrit ringan adalah lebih baik dengan menggunakan manik polistirena yang diubahsuai.

ABSTRACT

Lightweight concrete defined that is a type of concrete that is use lightweight aggregates and more lighter with low density than the conventional concrete. The main objectives of this research were to produce a good quality of lightweight concrete by using modified expanded polystyrene beads. The producing of the modified expanded polystyrene beads was by heating process of the expanded polystyrene beads by using furnace. Trial concrete mixes were done first using expanded polystyrene beads to get the best mix proportions. After that, three samples of cube concrete by using modified expanded polystyrene beads were mixed based on the best mix proportion. A few laboratory tests were done such as density, water absorption, compressive strength and microstructure analysis that were studied up 7 to 56 days. Sample D is the best trial mix with higher compressive strength by 7.092 MPa and the density by 1783 kg/m³ on ages 56 days that is complies with the BS EN 206-1:2000. Sample X is the best mix than sample Y and Z and even better than sample D due to the compressive strength on ages 56 days by 16.466 MPa. In a nutshell, strength of lightweight concrete was better by using modified expanded polystyrene beads.

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LIST OF SYMBOLS, ABBREVIATIONS OR NOMENCLATURE

MPa	Mega Pascal
°	Degree
F	Fahrenheit
C	Celcius
EPS	Expanded Polystyrene
LWA	Lightweight Aggregates
mm	Millimeter
µm	Micrometer
OPC	Ordinary Portland Cement
XRF	X-ray Fluorescence
Ca	Calcium
kg	Kilogram
pcf	Pound per cubic foot
%	Percent

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