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NON DESTRUCTIVE TESTING

OF

CONCRETE

This thesis was submitted to the Department of Civil Engineering of the University of Moratuwa in partial fulfillment of the requirements for the Degree of Master of Engineering in Structural Engineering Design

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January 2006

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ABSTRACT

Assessment of in-situ concrete, a major building material in construction has been of considerable interest in Construction Industry, mainly for quality control as well as to find in-situ strength. The measurement of strength and other performance parameters is generally done by normal destructive tests. However load tests or core tests are not always possible or practicable. Since last decade, non-destructive testing (NDT) has been widely accepted throughout the world to assess the quality of in-situ concrete. The NDT technique includes Rebound hammer, Ultrasonic Pulse Velocity tests, Penetration tests, radiography tests etc. However none of these tests can be used independently to yield reliable quantitative results. Generally combination of a few Non-destructive tests yields results of acceptable levels. A number of Correlations between Rebound hammer test and Ultrasonic pulse velocity test results have been developed to obtain reliable results.

Recently a combination of NDT techniques like Rebound hammer, Ultrasonic pulse velocity and Windsor probe has been used to evaluate the quality of few distressed structures in India, successfully to recommend their restoration. Supplementary core test results confirmed the reliability of the correlation between the different NDT techniques used.

This thesis describes a study carried out to investigate the effects of some factors that have significant influence on Rebound Hammer and Ultrasonic Pulse Velocity results. Therefore, test cubes were cast and tested for different grades of concrete, curing conditions and age of testing in order to obtain correlations of concrete strength with Rebound Hammer and Ultrasonic Pulse Velocity test results. Use of more than one NDT method at a time is advantageous when the variation of properties of concrete affects the test results in opposite directions. Further, adopting the test results a combined method has been developed to predict concrete strength with a reasonable accuracy.

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ACKNOWLEDGEMENT

There are many people who deserve acknowledgement and gratitude for their contribution to my research project. First, many thanks to the project supervisor Mrs Dhammika Nanayakkara for devoting her valuable time in guiding me to complete the research study.

I wish to thank the Vice Chancellor, Dean of The Faculty of Engineering and Head of the Department of Civil Engineering for allowing me to use the facilities available at the University of Moratuwa.

Thanks also to Dr (Mrs) M.T.P Hettiarachchi, The course and research coordinator and all the lecturers of the post graduate course on Structural Engineering Design who helped to enhance my knowledge.

I would like to acknowledge the following three persons Mr Madanayake, Nalinda and Leenus for their fullest support given to me for casting and testing cubes for the research study.

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Finally, I would like to dedicate this hard work to my parents, wife and two sons Rajitha and Chirath for their enormous support and everybody who helped me in numerous ways in completing my research study.

L.I Warusavitarana.

Contents

	Page
Abstract	I
Acknowledgement	II
Contents	III
List of Tables	V
List of Figures	VI
Chapter 1-Introduction	
1.1 General	01
1.2 Historical background	02
1.3 Need for the research	03
1.4 The Objectives of the Study	04
1.5 The Methodology	05
Chapter 2-Non Destructive Testing of concrete	
2.1- Non Destructive Testing Methods	07
2.1.1Visual Inspection	08
2.1.2Rebound Hammer Test	10
2.1.3 Ultrasonic Pulse Velocity Test	21
2.1.4 Penetration Resistance Test	45
2.1.5 Pull-Out Test	47
2.1.6 Radar	48
2.1.7 Thermograph	49
2.1.8 Radiography	49
2.1.9 Acoustic Emission	49
2.1.10 Electromagnetic Cover Meter	49
2.1.11 Core Tests	51
2.2 Choice of Test Methods	53
2.3 Comparison of Non Destructive Tests	56
2.4 Combined Method of Strength Estimation	58
Chapter 3-Literature Review	
3.1 Development of NDT tests in Romania	61
3.2 The Correlation of Non Destructive Test Results with Concrete Strength	71

Electronic Theses & Dissertations

3.3 Rebound Number and Pulse Velocity combined Method 73

Chapter 4-Experimental Investigation

4.1 General 76

4.2 Test Program 76

4.3 Results 82

4.4 Conclusion 101

References 103

Appendix A –Table 10a-e 105

Appendix B –Table 11a-e 110

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Electronic Theses & Dissertations
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List of Tables

	Page
Table 1 Effect of temperature on pulse transmission	31
Table 2 Effect of specimen dimensions on pulse transmission (Extracted from BS 1881 Part 203 : 1986)	32
Table 3 Suitability of non-destructive test methods	55
Table 4 List of items can be evaluated by Non destructive testing.	56
Table 5 Comparison between rebound number, ultrasonic pulse velocity, penetration probe and pull-out tests.	57
Table 6 Parameters considered for the test	80
Table 7 Multiple regression analysis for combined method for Rebound Hammer in horizontal direction.	92
Table 8 Multiple regression analysis for combined method for Rebound Hammer in vertically down ward direction.	93
Table 9 Predicted compressive strengths of concrete test cubes	100

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Electronic Theses & Dissertations
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List of figures

Page

Figure 1: Serious cracks at bridge structure 8
Figure 2: Water mark indicates leak 8
Figure 3: Serious crack at building structure 9
Figure 4: Exposed bar 9
Figure 5: Heavy cracks and lime leaching at dam wall 9
Figure 6: Using of Schmidt concrete test hammer. 10
Figure 7: Longitudinal section of Schmidt rebound hammer . 11
Figure 8: Schematic cross section of rebound hammer showing principle of Operation. 12
Figure 9: Effect of restraining load on calibration specimen. 14
Figure10: Calibration chart for concrete made with crushed limestone and natural sand aggregates. 18
Figure11: Rebound number/compressive strength calibration chart for concrete test hammer type N. 19
Figure12: Ultrasonic pulse velocity technique for determining the compressive strength of concrete. 22
Figure13: Schematic diagram of pulse velocity testing circuit. (ASTM C597.) 23
Figure14: Calibration of Ultrasonic pulse velocity equipment. 24
Figure15: Testing of a cube using direct method. 25
Figure16: Ultrasonic pulse velocity equipment transducer configurations 26
Figure17: Correlation of pulse velocity with compressive strength. (R. Jones, Non destructive Testing of Concrete, Cambridge University Press,1962.) 28
Figure18: PUNDIT set up in the laboratory. 30
Figure19: Pulse velocity Vs Vertical Compressive Load 33
Figure20: Typical correlation curve for pulse velocity vs equivalent cube strength 36
Figure21: Compressive strength versus pulse velocity relationship based upon 46 mixtures made with the same aggregate [based on Parker,1953]. 38
Figure22: The Windsor- probe technique for determining the relative compressive strength of concrete. 46
Figure23: Schematic of conical failure zone during probe penetration test. 47
Figure24: Pullout test equipment being used to measure the in-place strength of concrete. 48
Figure25: Schematic of cast-in-place pullout test. 48
Figure26: Electromagnetic cover meter 50

Electronic Theses & Dissertations

Figure27: Small current induced in sensing coil when no bar is present. 51
Figure28: Presence of bar increases flux and increases current in sensing coil. 51
Figure29: Influence of dosage on the correlation between velocity and strength. 63
Figure30: Influence of type of cement on the correlation between velocity and strength. 64
Figure31: Influence of aggregate granulosity on the correlation between velocity and strength. 65
Figure32: Influence of age of concrete on the correlation between velocity and Strength. 66
Figure33: Influence of moisture content of concrete on the correlation between velocity and strength. 66
Figure34: Influence of water/cement ratio and compaction on the correlation between velocity and strength. 67
Figure35: Influence of fine fraction of aggregate on the correlation between attenuation and strength. 68
Figure36: Influence of maximum size of aggregate on the correlation between attenuation and strength. 69
Figure37: Influence of moisture content of concrete on the correlation between attenuation and strength. 69
Figure38: Data using the combined method of rebound hammer and pulse velocity. (Cianfrone and Facaoaru 1979): equal strength lines based on linear multiple regression equation. 74
Figure39: Data using the combined method of rebound hammer and pulse velocity. (Cianfrone and Facaoaru 1979): comparision of estimated and measured strength. 75
Figure40: Relation between compressive strength and rebound number readings for the hammer horizontal on wet cured and air cured cubes. 82
Figure41: Relation between compressive strength and rebound number readings for the hammer vertical on wet cured and air cured cubes. 83
Figure42: Relation between compressive strength and rebound number readings for the hammer horizontal on wet cured with surface dry and air cured with surface wet cubes. 84
Figure43: Relation between compressive strength and rebound number readings for the hammer vertical on wet cured with surface dry and air cured with surface wet cubes. 85

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Figure44: Relation between compressive strength and pulse velocity of wet cured and air cured cubes. 86
Figure45: Relation between compressive strength and pulse velocity of wet cured with surface dry and air cured with surface wet cubes. 87
Figure46: A particular pulse velocity represents corresponding compressive strengths of cubes for different curing conditions. 88
Figure47: Compressive strength obtained from a particular condition represents relevant rebound number. 89
Figure48: Relationship between compressive strength and rebound number for different values of ultrasonic pulse velocities (Rebound hammer in horizontal direction). 91
Figure49: Relationship between compressive strength and rebound number for different values of ultrasonic pulse velocities (Rebound hammer in vertically down ward direction). 94
Figure50: Variation of b_0 with ultrasonic pulse velocities (hammer horizontal) 96
Figure51: Variation of b_1 with ultrasonic pulse velocities (hammer horizontal) 96
Figure52: Variation of b_0 with ultrasonic pulse velocities (hammer vertical) 97
Figure53: Variation of b_1 with ultrasonic pulse velocities (hammer vertical) 97
Figure54: Curves for the estimation of compressive strength of concrete using the Combined rebound number and ultrasonic pulse velocity (Rebound hammer in horizontal direction). 98
Figure55: Curves for the estimation of compressive strength of concrete using the Combined rebound number and ultrasonic pulse velocity (Rebound hammer in vertically down ward direction). 99

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