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بسم الله الرحمن الرحيم

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قسم

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Evaluation of Shear Bond Strength between Repair Materials and Substrate Concrete

By

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B.Sc Civil Engineering
Ain Shams University, 2010

A Thesis

Submitted in Partial Fulfillment for the Requirements of the
Degree of Master of Science in Structural Engineering

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STATEMENT

This thesis is submitted as a partial fulfillment of Master of Science in Civil Engineering (Structural Engineering), Faculty of Engineering, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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ABSTRACT

Nowadays, application of adding a fresh concrete layer (Overlay) to a hardened one (Substrate) has been used widely as a main in mass concrete, concrete replacement, and concrete jacketing. Deterioration of concrete structures usually begins at the surface of structural members, and progresses into the structure. The most common strengthening technique is adding a new concrete layer to increase the member effective size**.**

Bond tests between repair materials and substrate concrete have been developed for several specific applications. Till now there is no consensus among practitioners for evaluating the bond strength under a shear state of stress that is commonly encountered in concrete structures. It is simple to carry out tension bond test in situ or in laboratory than shear bond test. The main aim of this work is to try to find out correlations between tensions and shear bond tests.

The main objective of the experimental program is to evaluate the tension and the shear bond strength between substrate concrete and overlay repair materials, and to find correlations between shear bond strength and tension bond strength. Several parameters were adapted to evaluate the bond strength

Experimental work was carried out including casting thirty six concrete slabs specimens with dimension 500*500*200 mm overlaid with different types of repair materials. Concrete slab specimens were prepared using three different grades of substrate concrete, three different types of overlaid repair materials, three different types of surface bonding agents, and two different interface roughness methods. One hundred and eight locations on prepared slabs were tested in tension. One hundred and eight specimens were drilled and tested in direct shear. Test results show strong correlation between both tension and shear bond strength between repair materials and substrate concrete. Experimental relations between tension and shear bond strength were estimated.

Keywords

Bond strength, Tensile strength, Shear strength, Bonding materials, Surface roughness.

ACKNOWLEDGEMENT

First and Foremost praise is to ALLAH, the Almighty, the greatest of all on whom ultimately we depend for sustenance and guidance. His continuous grace and mercy was with me throughout my life and ever more during the tenure of my research.

I would like to express my deepest thanks and appreciation to my supervisors, Dr. Khaled Mohamed Morsy, Dr. Mohamed Ragab Masoud for their valuable assistance, guidance, patience and endless support throughout this research, and reviewing of the manuscript are greatly acknowledged. I am grateful to their all for having the opportunity to work under their supervision.

The experimental work was carried out at the Properties and Testing of Materials Laboratory of the Structural Engineering Department of Ain- Shams University. The help of the laboratory staff in developing work is greatly appreciated.

Finally, I would like to thank my family for their continuous encouragement, overwhelming support, fruitful care and patience, especially during the hard times

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