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Entitled

*COMBINING NON-DESTRUCTIVE TESTS TO IMPROVE THE RELIABILITY OF EVALUATING
CONCRETE QUALITY*

by

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Abstract

Non-destructive tests (NDT) are commonly used in construction to evaluate concrete quality for both existing structures and during construction. The reliability of these tests have been questioned. This thesis was concerned with evaluating concrete strength and durability using different non-destructive tests (NDT). Also, it focused on applying different combination of NDT to predict the concrete strength and durability using regression models. The main objective of the study was to investigate how to improve the reliability of nondestructive tests (NDT) to evaluate the concrete quality by combining more than one (NDT) test for concrete mixtures commonly used in Al Ain city, UAE. The concrete quality was evaluated by measuring strength and durability. Different tests were conducted like ultrasonic pulse velocity (UPV), surface rebound number (Rn) and core test for predicting the concrete strength, while surface resistivity (SR) was used to predicated the durability. NDT were combined using regression models to predict the concrete strength and durability. The study developed several models to combine NDT (UPV and Rn) to predict compressive strength based on individual results obtained from each test and chose the best model and evaluated the predicted values to actual results. Several models were developed to combine UPV and SR to predict concrete durability assessed by the rapid chloride permeability test (RCPT). The developed models were examined to choose the best one and evaluate the predicted values to the actual results. The developed models are expected to improve the reliability of predicting the concrete quality, strength and durability, for concrete structures in Al Ain city. Also, it is expected to improve quality control in concrete production by using a fast, cost efficient and reliable NDT methods.

Keywords: Non-destructive tests, concrete compressive strength, ultrasonic pulse velocity (UPV), rebound number (Rn), surface resistivity (SR), Rapid chloride permeability test (RCPT), durability, regression model, Al Ain, reliability.