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On-site strength assessment of limestone based concrete slabs by combining non-destructive techniques

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Abstract

For rehabilitation of existing concrete structures, knowing the strength of the different elements is mandatory. Assessment of the compressive strength of 'old' structures can be performed by (i) destructive testing of drilled cores in varying amounts and (ii) calibrated indirect methods by combining destructive core drilling with non- or semi-destructive techniques. The use of core-drilling is a time-consuming and labor-intensive method that weakens the existing concrete structure, leaving a lasting impression on it. As an alternative, many different non- and semi-destructive techniques are available for the in-situ determination of compressive strength.

An experimental program is conducted on concrete slabs of different strength classes intended for various exposure classes, based on a limestone aggregate matrix, which is typically used for Belgian applications. Besides destructive core drilling and testing, the following non-destructive techniques were selected for this study: the rebound hammer, the ultrasonic pulse velocity tester, the Wenner probe for concrete resistivity and the Windsor probe (semi-destructive). Best fit correlations between the output of these different techniques and the destructively determined compressive strength were

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