

A study of self-compacting concrete using local marginal aggregates

Shamsad Ahmad and Abul Kalam Azad

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Abstract:

A self-compacting or self-consolidating concrete (SCC) can easily flow through obstructions to fill-in the forms by its own weight without needing vibration. Since its first development in Japan in 1988, SCC has gained wider acceptance in Japan, Europe and USA due to its inherent distinct advantages. Although there are visible signs of its gradual acceptance in the Middle East through its limited use in construction, Saudi Arabia has yet to explore the feasibility and applicability of SCC in new construction. The contributing factors to this reluctance appear to be lack of any supportive evidence of its suitability with local marginal aggregates and the harsh environmental conditions.

The primary aim of this study is to explore the feasibility of using SCC made with local marginal aggregates of the Eastern Province of Saudi Arabia by examining its basic properties and short-term durability characteristics.

This research consists of: (i) development of a suitable mix for SCC that would satisfy the requirements of the plastic state; (ii) casting of concrete samples and testing them for compressive strength, drying shrinkage, water permeability, and chloride permeability; and (iii) cyclic exposure tests involving wet-dry and heat-cool cycles to observe the degradation of the prepared SCC samples. Local aggregates, cement, admixtures and additives produced by the local suppliers were used by in this work.

The significance of this work lies in its attempt to provide some performance data of SCC made in the Eastern Province of Saudi Arabia so as to draw attention to the possible commercial use of SCC.