A STUDY ON PARTIAL REPLACEMENT OF CEMENT WITH POWDERED EGG SHELLS IN SCC CONTAINING STEEL SLAG SAND

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A PROJECT REPORT
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ABSTRACT

The idea for our project originated from the sight of waste egg shells lying in piles on land masses in rural Karnataka. It is dumped as land fill, which in turn renders the land useless for other developmental purposes. Egg shells contain similar chemical composition as cement, with high percentage of calcium oxide, making it an ideal supplementary cementitious material. This would lead to sustainable development and reduce the quantity of cement required per m^3, thereby eventually reducing the carbon dioxide emission.

This study considers volume of paste of SCC as 0.37, after trial mixes at different volume of pastes were done initially. The project was divided into two phases; mixes in phase 1 consisted of natural sand only, while mixes in phase 2 consisted of a combination of natural sand and steel slag sand. The water content was 190L/m^3 for phase 1. However, it was increased to 200L/m3 in phase 2 since steel slag sand was used. Three cement contents were considered, i.e. 300, 375 and 450kg/m3. In each phase, the varying parameter was the percentage of egg shells, from 0 to 20% replacement by weight of cement. The mixes were developed based on absolute volume concept, which reduces the number of trials for making SCC.

The fresh properties that were measured were slump flow and T-50 time. The slump flow was maintained between 550-850mm as per EFNARC guidelines for SCC. The compressive strength test was performed on the cubes of side 100mm at 3, 7 and 28 days. Once the optimum percentage replacement of egg shells was found, trial mixes at varying volume of pastes were done.