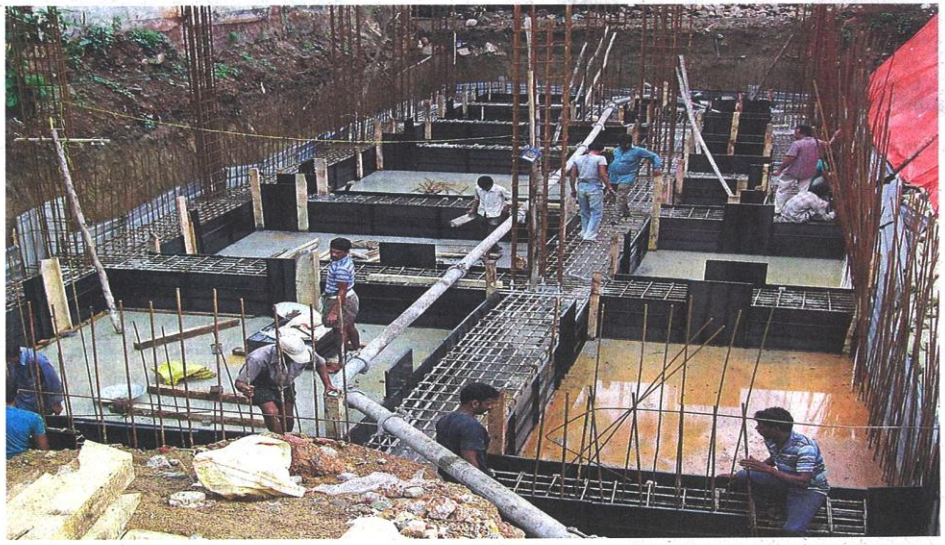
THE HINDU
Habitat
www.thehindu.com/homes&gardens
VISAKHAPATNAM | REAL ESTATE, HOMES & GARDENS | SUNDAY, JULY 27, 2014

# Fly ash with admixtures A VIABLE OPTION

Stalemate over cement price focuses attention on alternatives for reducing the use of cement without compromising on the strength of the structure, writes **G.V. PRASADA SARMA**



*Raft foundation being laid using dynamic concrete for a commerical comlex at Vizianagaram . (Right) Self-compacting concrete being poured for a concrete slab of an industrial unit in Visakhapatnam district.*
-- PHOTO: BY ARRANGEMENT

The stalemate over cement price increase has been continuing with builders and allied sectors forming a joint action committee and calling for a purchase holiday for the third week in a row and cement manufacturers categorically ruling out rollback of the hike.

This focuses attention on alternatives for reducing the use of cement without compromising on the strength of the structure. Though construction sector dealing with engineering projects continuously tries to innovate, the practices in building construction still appear to be conventional.

"For sustainable high performance, high cementitious content rather than high cement is required," say Bhanumathi Das and N. Kalidas, Director General and Director respectively of Institute of Solid Waste Research and Ecological Balance (INSWAREB).

Generally, for 50 MPa strength for cubic meter of concrete 400 kg. or more of ordinary Portland cement (OPC) is used. Even if builders prefer 20 MPa strength they use between 250 and 300 kg of cement. But choosing a mix design, using fly ash and 12mm metal, and only 230 kg. of OPC the durability can be increased more than three times and strength two times. The use of fly ash and admixtures will improve durability and strength and cost will be the same. However, cost could be reduced if mix design is changed, he points out.

On their part builders have to spend time and energy to bring the fly ash. Mixing it properly using the right admixtures and the patience to supervise are essential, says Mr. Kalidas.

It is also important that builders display the work done using less cement and convince public about the benefits of using less cement and how it is an environment-friendly practice and helps in the beneficial use of fly ash, disposal of which has turned out to be a massive problem. Data should be developed for the purpose.

## Raft foundation

To demonstrate the use of more cementitous materials and prove it on field, raft foundation of a commercial complex of a CREDAI member Nageswara Rao was done at Vizianagaram a few days ago. Mr. Rao was afraid that since a tank was nearby steel in the foundation might be corroded.

The foundation of 40 MPa strength was taken up with dynamic concrete. Mr. and Mrs. Das had spent six days in the laboratory and followed it up at the ready mix plant for the foundation work of the complex. Mr. Das also points out the reservations in using 12mm metal in aggregate. Many engineers are averse to using lower size in spite of advantages, he says emphasising the need to change the mindset.

The permeability for OPC concrete is 4,000 Coulombs and it will be reduced to 1000 c in the dynamic mix.

Dynamic concrete with 12 mm metal, 170 kg. of cement, 300 kg. of fly ash and admixtures achieves strength of 53.9 MPa, Mr. Kalidas says giving an example. Dynamic concrete comes very close to self-compacting concrete.

## CCMs

Fly ash and ground granulated blast furnace slag (GGBS) are among Complementary Cement materials (CCMs) that can reduce the use of cement.

About 35 per cent of the 220 million tonnes of fly ash produced is of fine quality and it is advisable to use this in dynamic concrete. Fly ash is preferable to GGBS since the latter has more lime and heat of hydration than fly ash but less than that of OPC.

## Role of colleges

The concept of dynamic concrete has to be spread by Civil Engineering Departments in colleges by creating models, Mr. Kalidas opines.

## A foray into new method with foundation

For A. Nageswara Rao, a builder and CREDAI member of Vizianagaram, the dynamic concrete use came as a solution for the raft foundation of his commercial complex near a tank.

The tank being big seepage of water leading corrosion of steel is likely. He first came to know about fly ash bricks when he had attended a workshop organised by NTPC three years ago.

However, he could not take any decision on his own as he was involved in joint ventures.

Two months ago when Director of INSWAREB N. Kalidas came for the installation of CREDAI executive, he approached him seeking a solution for the foundation.

Convinced by his advice, he took up work on raft foundation on the 550 square yards of site. With total footings being uniform like a slab between two (iron) mats, raft foundation requires 50 per cent more cement and steel than ordinary foundation, says Mr. Nageswara Rao. With the use of fly ash in dynamic concrete, the quantity of cement is estimated to have been reduced by 30 per cent. However, considering the large quantity of cement required for raft foundation, the saving is more, says Mr. Nageswara Rao. He got the fly ash from NTPC.

G.V. Prasada Sarma