

## Evaluation of Shrinkage Control Methods on High Performance Concretes

Yifeng Ling

Postdoctoral Research Associate, Institute for transportation, yling@iastate.edu

Gilson Lomboy

Assistant professor, Rowan University, lomboy@rowan.edu

Kejin Wang

Professor, ISU, kejinw@iastate.edu

In this study, compressive strength, autogenous shrinkage and free drying shrinkage were investigated in a certain high performance concrete (HPC) mixes made with various dosage of shrinkage reducing admixture (SRA), shrinkage compensating admixture (SCA) and internal curing admixture (ICA). Their shrinkage behaviors were compared with the original HPC mix (Mix 0) to evaluate the effects of SRA, SCA and ICA on shrinkage reduction of HPC. A water-to-cement ratio (w/c) of 0.33 was used for all mixes. The drying condition of 25% and 50% RH was applied for both autogenous and free drying shrinkage tests. The results indicated that SRA addition slightly increased HPC compressive strength at all ages. SCA had more effect on strength improvement than SRA. The addition of ICA overall decreased the compressive strength of HPC. The SRA in HPC reduced both autogenous shrinkage and free drying shrinkage by approximately 44% and 58% respectively. Dosage of SCA ranging from 2.5% to 7.5% decreased the both autogenous and free drying shrinkage significantly. Use of ICA from 0.4 to 1.4 g/kg in the HPC slightly reduced autogenous shrinkage but increased free drying shrinkage somehow. Internal curing using SAP appeared to be not effective in reducing shrinkage of HPC.

**Keywords:** Shrinkage control, Autogenous shrinkage, Drying shrinkage, Shrinkage reducing admixture, Shrinkage compensating admixture, Internal curing admixture