Comments on Interaction of Materials Used in Concrete
by H. Wang, C. Qi, H. Farzam, and J. Turici, Concrete International, April 2006

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The authors should be commended on conducting the research study and publishing this article on this important subject. I would like to comment on some of their findings and recommendations.

Are cement based calorimetry tests magnifying the differences between the mixtures needlessly? From the results presented in this article one could conclude the Portland cement mixture should have an initial setting time of about 4 hours. The 20% Class F ash mixture with chemical admixtures should have an initial setting time of 10 to 13 hours depending on the chemical admixture dosage. Similarly the 20% Class C Fly ash should have an initial setting time of 12 to 17 hours. The higher admixture dosage that was tested in this program is only 25% more than the lower admixture dosage (5 oz vs 4 oz per 100 lbs of cement). These appear to be unusually high levels of retardation. For Type II cement the situation is even more severe, most of the fly ash mixtures with chemical admixtures do not attain initial setting. So, here is my question: Are cement based calorimetry tests magnifying the differences between the mixtures needlessly? Do the researchers believe that a similar level of retardation will be evident by measuring setting time of concrete mixtures by ASTM C 403? Or would the differences be of a lower magnitude?

It is in this regard that I view the author's first recommendation that concrete mixtures containing both mineral and chemical admixtures are complicated and unpredictable, somewhat too generalized. Since about 65% of all ready mixed concrete in the US contains mineral admixtures and almost all of them contain chemical admixtures it would seem that most concrete mixtures are unpredictable. My view is somewhat different though I agree that in certain situations interaction problems do occur. I do agree with the author's recommendation that trial batches should be performed for each mixture.

The authors also conclude that "Once mixture performance is verified using trial batches, follow it strictly. Any field adjustments to the type of admixture or dosage rate can change the performance". While this is generally good advice I hope this does not lead specifiers to start specifying admixture dosage in their specifications! An alternative suggestion could be "Test concrete mixtures with different admixture dosages to understand its behavior so that when circumstances necessitate change in admixture dosage one is planned for it"

Calorimetry has excellent potential as a process control device in concrete plants and for troubleshooting problems. Correlations between paste behavior (in the calorimeter) and concrete behavior (in workability and setting tests) must be carried out so that one can better predict concrete performance. I agree with the other recommendations made by the authors and thank them for publishing this valuable article.