

**What's new in concrete?****EMC – Energetically Modified Cement**

The following is a summary from a paper by Professor V Ronin of the Lurea University of Technology in Sweden: **“An Industrially Proven Solution for Sustainable Pavements of High Volume Pozzolan Concrete – Using Energetically Modified Cement (EMC)”**, that was presented at the International Conference on Sustainable Concrete Pavements in Sacramento, California in September 2010.

Some five years ago the use of EMC and Supplementary Cementitious Materials (EMC – SCM) entered the concrete market in Texas. The commercial product is called “CemPozz”. It is a binder where 50 – 80% of the Portland Cement (PC) is replaced by natural pozzolans or flyash (FA). Depending on the requirements, the CemPozz concrete could be 5% PC and 95% FA. Such mixes are called high volume pozzolan concretes (HVPC).

These mixes are applicable for paving and structural concretes. This significant increase in FA reduces the “carbon footprint” by over 50% of the industrially produced conventional concrete.

The EMC – SCM technology comprises of mechanical processing of blends of pozzolan with small volumes of PC, using a special milling system. This process creates increased surface activation of the pozzolan and PC particles. It is suggested that the starting trials with HVPC should be 30% PC and 70% CemPozz (FA).

The following are pertinent test results from trials at Pennsylvania DoT with various proportions of CemPozz FA:

- The CemPozz concrete had significantly less cracking and drying shrinkage;
- The 50/50 (PC/FA) mixes perform in line with the normal 80/20 mix concretes;
- A 30/70 mix can reach 34 MPa in 28 days, but will continue to gain significant strength to 56 days;
- The 50/50 mix shrinks only about ¼ of the normally permitted strain level;
- The w/c, initial set and final set are virtually identical to the normal concrete mixes for the same strength;

- The actual compressive strengths (MPa) were:

Cement type	w/c	Curing time (days)			
		1	3	7	28
PC	0.48	10.3	26.6	30.0	38.6
50% CemPozz	0.43	9.1	21.9	27.2	41.1
80% PC/20% FA	0.46	6.5	20.4	23.6	35.8
60% PC/40% FA	0.44	3.8	15.1	17.7	29.6