Concrete Additives

Sticking of concrete to moulds brought about a wave of remedies in the 1920s, but they soon amplified a sobering truth –

Factors which help to make concrete easier to handle are also the factors which tend to permanently weaken the product.

The problem was easily identified – water exuding from fresh concrete glued the whole mass together, including the mould. Waterproofing would solve the problem. Oil, bitumen, wax or other organic materials were added to concrete mixtures before pouring to provide an internal release from the mould, but they were all found to weaken the final product, often dangerously so.

These problems were overcome in the 1930s by application of an exterior mould release rather than adding something to the concrete – download *Quality needs of Mould release agents*. Since then, the construction industry has demanded higher strength and easier handling without compromising concrete's durability.

Home-made sloppy concrete commonly made in wheelbarrows is too weak for major construction because it contains too much water, but without so much water the wet concrete is too stiff to mix adequately with a shovel. An associated problem is the economic pressure to make concrete which gains its initial stiffness – its ***green strength*** – as quickly as possible. Various additives which accelerate concrete setting and which make the wet mix flow more easily have been marketed for many years. So-called ***superplasticizers*** allow the amount of water to be reduced from 38-40 parts per hundred (pph) of cement down to 28-32 pph, and at this ratio, concrete becomes manageable while wet but still strong when dry. So-called ***air entrainment agents*** effectively reduce the viscosity of wet concrete, but they cause a significant reduction in final strength unless the moulded mixture is severely vibrated either with a vibrating probe or by shaking the mould.

The most widespread, obvious long term effect of a disastrous concrete additive is ***concrete cancer.*** This disintegration of old concrete can be seen in many places – crumbling and rusty marks around piers, especially near the sea, and the criss-cross pattern of repairs on old grain silos. Essentially this is the result of gradual intrusion of water carrying carbon dioxide or other acids into the concrete, reducing its alkalinity and thereby reducing its strength. This was especially aggrevated by the common inclusion of calcium chloride in concrete mixtures 40-50 years ago which accelerated the setting of fresh concrete. Over many years this additive acidified the concrete and rusted the steel reinforcements. The rust slowly expanded, pressurizing and exploding the weakened concrete, letting in more air and CO_2 to make the corrosion worse.

The high, on-going cost of concrete cancer illustrates the care which needs to be exercised when blending anything new with a product with such high safety and durability requirements as concrete. Mould release agents have virtually no penetration beyond the very top, visible layer of concrete, so their effects are immediately apparent and without any hidden long-term deficits.

However, additives in concrete can affect the performance of mould release agents. Berryessa's ***Repel*** has not shown any variations in performance which can be attributed to any of the known concrete additives.

Repel works well with every kind of concrete against which it has been tested.