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PRESS RELEASE



Value Engineering Meets Sustainability with MCI® Technology for Concrete

In this day and age of inflation, supply chain delays, and raw material shortages, value engineering is becoming more and more important as a way to cope with out-of-control market factors. Construction industry engineers are looking for alternative materials to compensate for shortages and higher prices. At the same time, there is increasing concern about being safe, extending service life, and enhancing



sustainability. How do engineers meet these demands while staying sane and within budget? Migrating Corrosion Inhibitor™ (MCI®) Technology is an excellent answer for maximizing sustainability and service life while balancing cost considerations in these unpredictable times.

Extend Service Life at a Fraction of Total Cost

When it comes to construction, engineers can enhance sustainability by extending the service life of new concrete structures. This reduces the need to replace existing concrete, thus minimizing carbon output since cement production is a large contributor to global greenhouse gas emissions. Corrosion inhibiting admixtures are one way to enhance longevity from the start of a project by counteracting the deteriorating effect of carbonation, chlorides, and corrosives that cause rusted rebar in concrete. For example, MCI[®]-2005 and MCI[®]-2005 NS are two MCI[®] concrete admixtures that delay time to corrosion and reduce corrosion rates once started by forming a molecular protective layer on the rebar surface. This is especially important where exposure to seaside environments, winter deicing salts, and sabkha soil is expected. It can also be important as a structure ages and carbonation sets in, reducing the naturally protective high alkalinity of the concrete.

ITEM	COST (USD)
Construction Cost	188,000,000
Construction Cost of MCI [®] -2005	136,000 (0.07%)
Service Life (Without MCI [®])	48 Years
Service Life (With MCI [®])	103 Years

It is further important to note that MCI[®]-2005 and MCI[®]-2005 NS can significantly increase the estimated service life of a structure at a small fraction of total construction costs. For example, one service life prediction estimated that using

MCI[®]-2005 in the podium substructure of the Princess Tower in Dubai would extend service life from 48 years to 103 years. This was at 0.07% of the total construction cost.

MCI[®] Technology vs. Calcium Nitrite

MCI[®]-2005 and MCI[®]-2005 NS also have advantages when compared to other strategies of corrosion mitigation. For instance, they are great alternatives to calcium nitrite (CNI) admixtures, the go-to corrosion inhibiting admixtures for decades. Some of the advantages of MCI[®]-2005 and MCI[®]-2005 NS are that they contain renewable materials, do not accelerate set time, have a fixed dosage rate, and are certified to meet NSF Standard 61 for use in potable water structures. In



contrast, CNI is an inorganic, non-biobased chemistry that can be difficult for ready-mixers because it works as a set accelerator. It is not certified to meet NSF Standard 61, and it requires a higher dosage rate that increases based on expected chloride loading. It is not effective against carbonation corrosion.

Parking Garage Cost Comparison Example		
CNI Dosage	MCI [®] -2005 NS Dosage	Estimated Cost Savings by Using MCI [®]
2 gals/yd ³ (10 L/m ³)	1.5 pt/yd ³ (1.0 L/m ³)	14%
4 gals/yd ³ (20 L/m ³)	1.5 pt/yd ³ (1.0 L/m ³)	129%
6 gals/yd ³ (30 L/m ³)	1.5 pt/yd ³ (1.0 L/m ³)	243%

At first glance, CNI appears to be less expensive than MCI[®] due to a lower price per gallon. However, the true cost is hidden behind the dosage rate, which can be 2.0 or more gallons per cubic yard (10 L/m³), depending on expected chloride loading. MCI[®]-2005/2005 NS is more

economical than CNI in almost all cases because it is dosed at a fixed rate of 1.0-1.5 pints per cubic yard (0.6-1.0 L/m³). A recent parking garage project brings this cost comparison into focus. The garage required enough admixture for 20,000 cubic yards (15,291 m³) of concrete. The estimated cost savings by using MCI[®] was 14% when compared with the price of CNI dosed at 2.0 gallons per cubic yard (10 L/m³). At higher dosages (e.g., 4.0-6.0 gallons per cubic yard [20-30 L/m³]), the cost savings would have soared to between 129% and 243%. Furthermore, the use of CNI may require a higher dose of air-entraining agents or the addition of set-retarding or shrinkage-compensating admixtures. This is not required when using MCI[®], making room for additional savings.

MCI[®] Technology vs. Epoxy Coated Rebar



Another common strategy to mitigate corrosion and extend service life is to use epoxy coated reinforcing steel. The major challenges are high cost and vulnerability to corrosion where the epoxy coating has chipped. Interestingly, MCI[®] can offer substantial cost savings and service life advantages. For example, the recently constructed Lodge at Gulf State Park was initially specified to use epoxy coated rebar. However, due to budget constraints and a better service life prediction with MCI[®], the

specifying engineer ultimately settled on MCI[®]-2005 admixture instead. As a result, the project saved six figures and incorporated a biobased product that could help earn credit toward LEED certification.

Value Engineering with MCI®

The comparative advantage goes on. Some designers have used MCI® to reduce the concrete cover requirements while achieving the same service life estimates, which consequently allowed them to reduce the amount of steel reinforcement to control concrete cracks. In some cases, this allowed for a seven-figure savings in the total cost of the project. The important point is that, by evaluating MCI® next to other materials and strategies, engineers can find the best cost-benefit ratio for their structures in the construction, repair, and maintenance phases. Contact Cortec® for an MCI®/CNI cost comparison and more strategic ideas on value engineering with MCI®: <https://www.cortecmci.com/contact-us/>



MIGRATING CORROSION INHIBITORS
FROM GREY TO GREEN

Keywords: value engineering, sustainability, MCI, concrete admixtures, rusted rebar in concrete, extend service life, increasing inflation, raw material shortage, From Grey to Green, Cortec

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