CONCRETE STEPS TO SUSTAINABILITY AND PROFITS

By Tom Nickell, MBA

Concrete. Gray, dull, boring. Not something to think about, right? Well, it's also the most common man-made material. We walk on it, drive on it, and park on it. It's no exaggeration to say that concrete and steel make up 99 percent of the materials used to build parking facilities.

Concrete is durable, but it also sustains damage. It cracks, pits, scales, dusts, and deteriorates over time. Damage comes from two major sources: corrosion from acid or acid-like substances such as salt, and expansion from freezing water. Concrete is porous, and this quality provides the pathway to destruction. Water and the chemicals it can carry get into the pore structure of the concrete and initiate damage.

We all know the costs of that damage—safety hazards, loss of use, and tear-out and replacement. What if there was a way to slow down this deterioration? Believe it or not, it's a sustainability issue.

Concrete and Sustainability

Manufacturing Portland cement, a primary component of concrete, is a major contributor to global warming, producing 5 percent of all carbon emissions. Increasing concrete durability reduces replacement and repairs and avoids greenhouse gas production.

What if your facility could see 10 or 20 additional years of useful life? If you think of three basic stages in the life cycle of a building—construction, use, and end-of-life disposal—you see that increased durability lowers the need for replacement construction and maintenance during use. Both have significant effects on carbon dioxide (CO_2) production, and the longer a facility lasts, the less disposal is required over time.

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The Bottom Line

Every 1,000 square feet of concrete torn out and replaced costs anywhere from $25,000 to $65,000, and possibly even more if we include lost revenue and the effect of downtime on customer satisfaction. Even before replacement, we face the harder-to-quantify cost of poor aesthetics and potential safety hazards posed by deteriorating surfaces. Increasing durability lowers net operating costs.

How to Increase Durability

Increasing durability is all about increasing density and reducing porosity. That can be done in two ways. The first way is by choosing a well-engineered concrete mixture that's properly placed and finished, whether pre-cast or cast-in-place. A tighter pore structure can be achieved with lower water-to-cement ratios and by adding fly ash, micro silica, or slag to the compound. Air entrainment significantly reduces freeze-thaw damage, but also decreases density and strength. Like air entrainment, all mix solutions have trade-offs and limitations.

What about concrete that's already in place? There are several options. Coatings, overlays, sealers, and water repellants help, but are temporary solutions that require frequent maintenance and re-application that can greatly increase their total lifetime costs. Gel or crystal-forming chemicals increase concrete density and don't require re-application. These chemicals can save more than 90 percent of the total expense of maintaining concrete over the life of a facility.

You can prevent and even stop damage to concrete while increasing its usable life and lowering maintenance requirements. By focusing on concrete durability, you can enhance the sustainability scores of your facilities, save money, and have more functional, safer, and aesthetically pleasing facilities. Owners, investors, and customers will all be happier. Not bad for gray, dull, and boring!

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