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Surtreat - Concrete Restoration & Protection System

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SURTREAT - CONCRETE RESTORATION & PROTECTION SYSTEM

THE NEED

Reinforcing steel corrosion is the most common cause of failure of concrete structures. Once started, rebar corrosion can not be stopped by simply waterproofing the surface of the concrete. The corrosion process is influenced and promoted by penetration of air, water, chloride and an acid environment. Surtreat can be used to prevent contamination and decomposition of concrete surfaces in hostile, chloride and acid containing environments.

FIGURE 1 SURTREAT APPLICATION

THE TECHNOLOGY

Surtreat is a proprietary concrete restoration and protection system. The system includes sequential application of chemical treatments to improve the properties of the deteriorating concrete and protect new structures. Surtreat proprietary chemical formulations penetrate into the concrete microstructure in liquid and vapor state to combine with the cement phase of concrete and deposit on steel components. Surtreat increases the ability of concrete to resist deterioration by increasing compressive strength, reducing permeability, inhibiting corrosion of the reinforcing steel components and improving concrete's resistance to acid attack. Surtreat is used in the widest variety of applications and every owner/manager/operator of structures that include concrete components can benefit from the installation of Surtreat.

All tests were conducted at the NASA Kennedy Space Center laboratories and in compliance with applicable ASTM Standard Test Methods. The evaluation methods employed by NASA specialists included measurement of half-cell potential, corrosion current and polarization resistance.

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FIGURE 2 UNTREATED LANES (LEFT) VS. TREATED LANES (RIGHT)

The most direct measure of the corrosion rate, polarization resistance was increased by 300% after application of Surtreat. Half-cell potential and corrosion current measurements also reflect a significant decline in corrosion rates after application of Surtreat corrosion inhibitors.

TABLE 1 COST PERFORMANCE (SURTREAT COST VS ALTERNATIVE COST)

Project	Surtreat Cost	Alternative Cost*
Allright Parking Columbus, OH, Parking structure rehabilitation, 1990	$173,500	$1.4 mil
Port Authority City of Pittsburgh, PA, Bridge foundation restoration, 1991	$32,000	$240,000
DOE Fermco Nuclear site, Fernald OH, Storage Pad Protection, 1995	$170,000	$510,000
Essex Waste Management Warehouse Floor Protection, 1996	$31,617	$250,000

*Since the projects described above were performed by Surtreat Corp., "Alternative Cost" describes the restoration estimate based on an engineering study or the lowest bid.

THE BENEFITS

The performance of Surtreat has been verified on numerous projects as well as through extensive independent laboratory testing. The results of the testing reflect the following:

- Compression Strength - ASTM (American Society for Testing Materials) C-42 increased by 300 to 2,000 psi depending on original strength and number of applications.

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- Water Penetration Reduction - 100% resistance after 14 days exposure to 6 inch column of water. 75% resistance after 28 days exposure to 6 inch column of water. 90% resistance after 24 hours when 100 psi is applied.
- Freeze Thaw Resistance - ASTM C-672 -50 cycles with no surface loss. AASHTO (American Association of State Highway and Transportation Officials) T-161 - 146 cycles with no surface loss.
- Chloride Penetration Resistance - AASHTO T-250 -30% decrease at 1 inch depth.
- Water-soluble Chloride Reduction - Reduced by 58% and 67% at 1 and 2 inches, respectively.
- Increase in Hardness - ASTM C-418 - 14% increase in hardness of new concrete. ASTM C-414 - 64% increase in hardness of deteriorated concrete. ASTM C-501 - 1,000 cycles with a 38% increase in wear index.
- Reduced Rebar Corrosion Potential - ASTM C-876 - Half cell potential showed a reduced voltage by 70% in 14 days (0.8 to 0.3)
- Increased Surface Adhesion - No failure of epoxy bonded to treated surface.
- Reduced Chemical Reactivity - Resists reaction with concentrated hydrochloric acid
- Flexural Strength - Increased from 423 to 543 psi.
- Increases pH Level - Edges of concrete increased from 5 to 9, center of concrete increased from 9 to 12.

STATUS

Some of the major markets/industries being serviced by Surtreat Corp. include: parking, utilities – electric/sanitary/water, bridge/road construction/maintenance, airports, hazardous/nuclear materials storage/disposal, waste management, real estate management. With the usage in above table, Surtreat is also used at NASA for shuttle launch pad restoration.

BARRIERS

Surtreat has to be applied at temperatures above freezing. Surtreat application requires a clean surface. Previously applied sealers, curing compounds and coatings have to be completely removed to open concrete porosity. If original construction included admixtures in high proportion (such as GGBFS, etc.) sample evaluation may be required to specify proper treatment.

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