

Polymer Concretes, Adhesives, and Sealers

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Polymer concretes, adhesives, and sealers have been developed, refined, and used considerably in the last quarter of the 20th century. Even though most applications were experimental until recently, these experimental applications have gradually evolved and been implemented into the construction, repair, and rehabilitation of transportation facilities.

POLYMER CONCRETE

The most significant implementation of the past 25 years is polymer concrete. Largely unused prior to the 1970s, polymer concretes now are used routinely for overlays, crack sealing and repair, and precast products (for example, forms for median barriers and tunnel and curb liners). Standards and specifications for each of these applications have been refined gradually, as experience has been gained. American Association of State Highway and Transportation Officials guide specifications for polymer overlays make it feasible for all state departments of transportation to use proven overlay systems.

ADHESIVES

The field of adhesives has experienced significant growth. Applications have expanded to include bonding aids between hardened concretes, between fresh and hardened concretes, and between steel and concrete. Specifications have been refined to include making crack repairs, bonding hardened concrete segmental bridge sections, bonding fresh concrete to hardened concrete in segmented bridge construction and repair applications, and bonding steel coverplates to concrete to strengthen bridge beams. Currently, adhesives are used to bond a variety of fiber reinforcements to concrete beams and columns to increase load-carrying capacity and to restore strength lost prior to a repair. Standards and specifications for the use of adhesives with various fiber-reinforcement systems are now under development.

SEALERS

In the last quarter of the 20th century, we have witnessed an explosion in the number of concrete sealers available to reduce the infiltration of chlorides, moisture, and other aggressive solutions that can reduce the life of a concrete structure. National Cooperative Highway Research Program Synthesis of Practice 209 (1) identifies 273 sealant choices. Sealers typically either fill the pores of concrete or react with the concrete to create a hydrophobic surface. They come in a range of concentrations. Water-repelling sealers usually are used on surfaces that must have good skid resistance, such as bridge decks. Pore blockers are used on elements such as parapets and pier caps. Standards and specifications for sealers are evolving gradually.

WHAT'S AHEAD

Because the U.S. transportation infrastructure is decaying, the use of polymer concretes will increase in the 21st century. As concrete structures age, more repairs will be necessary; the number of polymer overlays, crack repairs, and precast polymer concrete elements will increase. Traffic volumes will continue to grow, and motorist demand for repair and replacement options that can be done with a minimum of lane-closure time (that is, minimal delays) will increase. Likewise, the use of adhesives with fiber-reinforced repairs will increase dramatically. Many bridge piers, beams, and other elements will be repaired, and their strength will be improved. Also, sealers will continue to be used as owners try to increase the service life of their transportation structures.

The Transportation Research Board (TRB) Committee on Polymer Concretes, Adhesives, and Sealers will play an increasingly important role in deploying technical developments in polymer concretes and sealers. The committee's role in the use of adhesives probably will slow in the 21st century as the TRB Committee on Structural Fiber Reinforced Plastics assumes responsibility for the larger share of adhesive use. Our committee will continue to promote the use of polymer concretes and sealers through technical sessions and publications. The committee likely will meet the challenge of educating more users through technical sessions and publications. Committee members will be involved with refining standards and specifications for polymer concretes, polymer concrete precast products, and sealers. Considerable work needs to be done with respect to standards, specifications, acceptance testing, and evaluation of sealers. In the 21st century, our committee will play an active role in the maintenance of transportation structures.

REFERENCE

1. Cady, P. D. *NCHRP Synthesis of Highway Practice 209: Sealers for Portland Cement Concrete Highway Facilities*. TRB, National Research Council, Washington, D.C., 1994, 91 pp.