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Polymer overlays lengthen bridge life

The effectiveness of polymer surfaces increases the material's popularity

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By Arthur Dinitz

State DOT engineers in recent years have started to look at the advantages of thin polymer wearing surfaces for bridge deck construction, rehabilitation, and preservation. Originally offered more than two decades ago, polymer bridge overlays slowly have been gaining wide acceptance as a viable alternative to more standard bridge construction and rehabilitation materials. Thin polymer overlays can consist of methacrylate, epoxy, or polyester resins and can be applied in a variety of methods. Today's polymer materials have been used on concrete, concrete-filled steel grid, steel orthotropic, fiberglass reinforced plastics, and wooden bridge decks.

Polymer overlays are appropriate for use on small bridges in remote locations due to the minimal equipment and labor required to install, and also have been used on large structures in cities where bridges carry more than 150,000 vehicles per day.

Such overlays are designed to be installed at thicknesses of 1/8 to 3/4 inch. The thinner, 1/8-inch installations are used primarily to renew the skid resistance of an older concrete bridge deck with polished aggregate that makes the surface dangerous during inclement weather conditions. This application typically is referred to as a "single coat chip seal" installation, which consists of a layer of mixed polymer resin applied to the bridge deck surface, followed by the application of a coarse (1/8 inch) angular aggregate. The chip seal will reduce the amount of moisture that is able to penetrate into the deck but will not completely waterproof the deck.



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A slurry application will waterproof the bridge deck surface, and can improve skid resistance.

Polymer overlays of 1/4 inch and thicker can be applied using two very different methods. The first such method is the "multiple coat broom and seed" application. This type of overlay consists of an application of mixed polymer resin on the bridge deck surface, followed by an application of coarse aggregate. This process is repeated until the surface is built up to the specified thickness, which is usually estimated at 1/8 inch per layer. A broom and seed overlay of 3/8 inch thickness or greater will almost completely eliminate moisture from penetrating; however, there will be a small amount of moisture that will get through the overlay. The broom and seed application is installed with an electric mixing drill and squeegee.

The second method of overlay application is the slurry application. The polymer resin is mixed with a fine filler component, usually pre-blended and supplied by the overlay manufacturer to form a slurry mortar. The slurry is applied to the bridge deck at a thickness of 1/8 inch less than the specified thickness. After the slurry is applied, the surface is covered with a coarse aggregate to obtain the finished overlay thickness. Because of the lack of air voids in the slurry application, it offers the highest level of resistance to moisture and offers waterproofing properties. The slurry application typically is performed with a standard concrete mortar mixer and gauge rakes.

With curing times of just a few hours, polymer overlays reduce the time required to complete a project and the inconvenience to the traveling public. Even though polymer overlay materials are more costly than conventional construction products, engineers and owners must consider the non-monetary benefit of using this proven technology.

— Arthur Dinitz is chairman and CEO of Transpo Industries Inc., New Rochelle, N.Y.

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