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CASE HISTORY



Bridge Deck Overlays Put Composite Technology on Top

Market Segment:	Infrastructure
Composite Applications:	Polyester Concrete
Resin:	Vicast® Isophthalic Polyester
Location:	Bridges on I-80 Between Truckee and Floriston, California
Installed:	2004



The surface is cleaned and primed prior to application of the polyester concrete.



The Vicast resin is stored on site in an ISO container.



The traffic lane can be re-opened for traffic within four hours of the polyester concrete application.



New polyester concrete deck overlays are being applied to multiple bridges on Interstate 80 between the California towns of Truckee and Floriston.

Polyester concrete overlays demonstrate that when it comes to bridge construction, polymer composite technology can start right at the top. When used as a bridge deck overlay, polyester concrete offers numerous cost and performance advantages over alternative materials such as conventional concrete, latex-modified concrete, methacrylate epoxy concrete, and asphalt.

Polyester concrete is a composite of dry aggregate in an unsaturated, or thermoset, polyester resin binder. When the liquid resin cures into a hardened, cross-linked state, a polyester concrete is formed to provide these primary features and resulting benefits:

- Ease of application for reduced production costs
- Quicker cure for shorter lane closure times
- Thinner overlays for greater live load capacity
- Higher elongation and tensile strength for improved dynamic performance
- A protective barrier against moisture and deicers for lower maintenance costs and longer service life
- Greater resistance to abrasion and impact for lower maintenance costs and longer service life.

I-80 Truckee-Floriston Project

Engineers for the State of California Department of Transportation (Caltrans) have advanced the art and science of polyester concrete overlays. One California project was for a scenic stretch of Interstate 80 in the Sierra Nevada Mountains. Atlas Construction Supply, Inc., San Diego, California, worked with Granite Construction, Sparks, Nevada, to overlay the decks on multiple I-80 bridges between the California towns of Truckee and Floriston.

The Truckee-Floriston Project consumed 700 cubic meters of polyester concrete material. Some 400,000 pounds of polyester resin were delivered in ten batches of 40,000 pounds each to allow for on-site polyester concrete processing. Processing and application of the polyester concrete are performed in accordance with the Standard Special Provisions published by Caltrans.

Caltrans specifies that the resin binder for a polyester concrete overlay be “an unsaturated isophthalic polyester-styrene co-polymer.” For the Truckee-Floriston Project, Atlas Tech-Deck™ polyester concrete is composed of AOC’s Vicast® isopolyester. Ryan Quinn, Product Manager, Atlas Construction Supply, points out how the role of the resin manufacturer goes beyond mere supply.

“The reaction chemistry for curing unsaturated polyester is very dependent on environmental conditions, especially deck and ambient temperatures,” Quinn says. “When we’re placing polyester concrete overlay, environmental conditions in the field are constantly changing,” he continues. “We adapt to the conditions by adapting the reaction chemistry. To do that, we received technical support from AOC. For example, with each resin batch that we receive, AOC Technical Service Manager Bill Longest ensures that we have the most efficient gel time [the point at which the resin sets up and is no longer workable].”

Overlay Processing and Application

For the I-80 Truckee-Floriston Project, the need for new overlay was evident as existing overlays showed signs of disrepair. After the old overlay was removed, the concrete deck surface was cleaned and then primed with a wax-free, low odor, high molecular weight methacrylate primer. The prime coat is designed to improve the adhesion of the polyester concrete to the concrete deck surface.

After the polyester concrete is struck off and before the resin gels, the overlay surface is tined and textured with a uniform application of sand to provide excellent skid resistance. After the resin cures, expansion joints are cut and filled with appropriate joint filler materials.

Polyester Concrete Overlay Benefits

By adjusting the chemical formulation, the Vicast isopolyester has the ability to cure over a 50° to 123°F range. The speed at which the resin cures provides one of polyester concrete’s most noteworthy advantages. With polyester concrete, cure is sufficient enough to re-open the work area to traffic within four hours after application. With alternative overlay materials, traffic is disrupted for at least twice as long and often more.

Increased Live Load

Depending on specific site requirements, a polyester concrete overlay can be built up in layers to a thickness as great as 5.5 inches. But for the majority of the Truckee-Floriston Project, the nominal overlay thickness is only 0.75 inch. Compared to alternative overlay materials, this represents a significant reduction in thickness – and thus mass – with no reduction in performance requirements. The net result is an increase in the bridge’s live load capacity and projected service life.

Flexibility and Abrasion Resistance. The Vicast isopolyester’s elongation of 50% (per ASTM 638) exceeds the Caltrans specification. The higher elongation enhances the overlay’s ability to flex under load and to accommodate the extreme freeze-thaw cycles of the Sierra Nevada environment. The Vicast isopolyester also has excellent abrasion resistance. This feature offers added protection against damage caused by tire chains used during extreme winter weather.

Corrosion Resistance

“For thousands of applications around the world, AOC isopolyesters have demonstrated their ability to resist the corrosive effects of moisture and chemicals,” states AOC Vice President, Emilio Oramas. “For polyester concrete overlays, this proven performance establishes a protective barrier against rain, snow, ice and road salts. The isopolyester helps reduce concrete spalling and steel rebar corrosion, and that reduces the maintenance costs and extends the service life of the bridge structure.”

About Atlas Construction Supply

Atlas Construction Supply Inc. is a customer-oriented company specializing in concrete construction chemicals and restoration products as well as the design, fabrication and supply of concrete forming and shoring systems.

In addition to company headquarters in San Diego, California, Atlas Construction Supply has branches in Las Vegas, Nevada; Phoenix, Arizona; and Los Angeles, California. For more information about Atlas Construction's polyester concrete capabilities, contact Ryan Quinn. Phone (858) 277-2100; fax (858) 277-0585; e-mail ryanquinn@atlasform.com.

About AOC

AOC is a leading global supplier of resins, gel coats, colorants, additives and synergistic material systems for composites and cast polymers. For more information on AOC technology, quality and service, e-mail corrosion-resins@aoc-resins.com, phone (866) 319-8827, or go to AOC-RESINS.com.



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