

ANTI-CORROSION TIMES

REPORTING ON INDUSTRY NEWS, NOTEWORTHY APPLICATIONS & NEW DEVELOPMENTS
ON FUSION BONDED EPOXY COATINGS FOR CORROSION PROTECTION ON STEEL REBAR.

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18 Years Later—Epoxy-Coated Rebar Still Performing In Indiana.

In January 1995, researchers from Purdue University reported on the performance of six Indiana bridge decks reinforced with epoxy-coated rebar. Included in the report was the first bridge in the state where epoxy-coated rebar was used. This report, presented at the National Research Councils' Transportation Board meeting concluded that, even after eighteen years, epoxy-coated rebar performed satisfactorily in surveyed bridge decks.

This is important research for Indiana, a state in the middle of the spectrum in terms of aggressive environments. From north to south in the state, there is a noticeable difference in

environments. In the study, it was noted that the northern

portion of the state has heavier traffic, more severe weather and is more dependent on deicing salts. This was proven in the report where the four northern bridge decks tested were above commonly accepted levels of chloride concentration.

Because recent research claims that epoxy coating is a flawed technology, that does not ensure adequate long-term field performance in severe chloride environments, it was important for Indiana to check the system used for many of its highways and bridges. Their conclusion—epoxy coating performance is satisfactory in Indiana.



Other findings from this Indiana study include:



Chloride content in concrete decreases with increased cover. Also, larger cover-to-bar diameter ratios are recommended in harsh environments to reduce crack openings and should not be reduced with the expectation that epoxy coating will be the sole corrosion protection system.



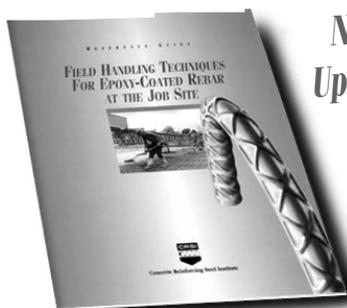
No disbondment of the coating or corrosion was observed in the reinforcement removed from the bridge decks.



Good construction practices; adequate inspection, good finishing and curing techniques will lead to durable concrete. The use, proper manufacturing and handling of epoxy-coated bars are also related to durable bridge decks.



More research is needed on the long term effectiveness and durability issues of epoxy-coated rebar as a corrosion protection system for highway and bridge structures.



New . . .
Up-to-date!

Field Handling Guide for Epoxy-Coated Rebar

Call, fax or write to CRSI for information on this updated, color illustrated reference. Cost \$10.

Minnesota DOT Reports Successes on Concrete Bridge Decks

Because of negative publicity concerning bridge decks with epoxy-coated reinforcement in Florida, New York and Ontario, Canada, the Minnesota Physical Research Section was asked by the office of Bridges and Structures at the Minnesota Department of Transportation to conduct a limited field survey to determine if a problem existed in Minnesota.

Ten bridge decks built between 1964 and 1984 were studied in 1993. The bridge constructed in 1964 was not opened to traffic until 1980. Epoxy-coated rebar was placed in a 4-inch overlay on the original bridges surface.

The first bridge deck to be constructed with epoxy-coated rebar was built in 1974. Only the top mat of the

bridge was epoxy-coated. The bottom mat was black steel. All bridges studied were constructed in this manner. The reasoning at the time was that there was no need for the lower mat to be coated because the bars would be protected by concrete uncontaminated by chlorides from deicing chemicals. However, it was later found that corrosion could be accelerated by electro-mechanical reaction from flaws or breaks in the coating on the top mat that reacted with the uncoated bars on the lower mat. Since the mid 80's, all bridge deck rebar has been epoxy-coated.

The findings of the inspection were very favorable to epoxy coating. Even though both mats in the bridges studied were not epoxy-coated, they have performed extremely well. In fact, the first bridge deck built with epoxy-coated rebar shows no signs of distress after almost 20

years of service. Actually, the bridge decks with pre-stressed concrete girders had fewer transverse cracks than decks with steel girders.

This initial pilot study was completed to determine if a limited survey would reveal significant corrosion in bridge decks. A national consultant is scheduled to do an in-depth study of four Minnesota bridge decks in 1995.

The 4th in a Series of Research Reports prepared by various agencies



and reprinted by CRSI, discusses this study in *Field Examination of Epoxy-Coated Rebars in Concrete Bridge Decks*.

For a free copy of the complete findings of MNDOT, contact CRSI.

Independent survey findings indicate epoxy-coated rebar extends project life

In a survey recently conducted for CRSI but where CRSI was not identified, many perceptions about epoxy-coated rebar, its use, cost life cycle, performance were reviewed. The project was completed by an outside agency in April 1995. Questions targeted owners, engineers, engineering management and others involved in corrosion protection programs.

Of particular interest in this report, were the responses to a question about project life.

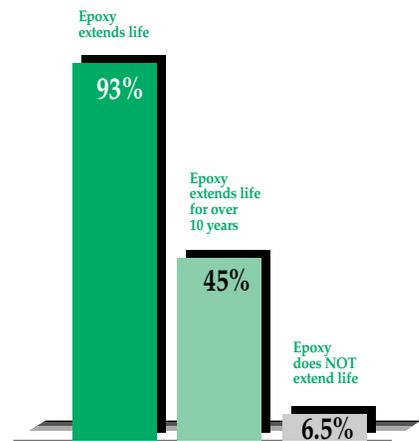
The question asked:

Do you think epoxy-coated rebar will extend the life of your project? (Base 122)

Yes.....114(93%)
 1 to 10 years.....34 (30%)
 10 to 25 years.....46 (40%)
 25 + years.....6 (5%)
 Base.....86

Note: 28 (25%) of those answering yes did not respond to the longevity question.

No.....8(6.5%)



Of significance, 60% of respondents indicating longevity, believed that epoxy-coated rebar would increase service life by 10 or more years, a very positive response about their use or perception of epoxy-coated rebar.

Parking facility uses epoxy-coated rebar throughout.



The City Center Parking Facility in Columbus, Ohio is a 1.4 million square foot structure built with a cast-in-place concrete frame and conventionally reinforced columns.

The six-level parking structure provides parking for more than 3,700 automobiles. 16,000 square feet of retail space and a ten-bay bus terminal are on the first level of the structure.

Because of the nature of the structure, and the use of deicing salts in this area, corrosion resistance was a necessity. Epoxy-coated steel reinforcing bars were used throughout the facility.

Cast-in-placed reinforced concrete was chosen as the primary building material for a number of reasons:

1. Epoxy coated reinforcement offers better corrosion resistance than structural steel.
2. Concrete offers easy construction solutions for special elements, including ingress/ egress areas, ramps and bus terminal bridges.
3. Longer spans are available with reinforced concrete.
4. The material is naturally fire-resistant.

5. It's durable and requires low maintenance.

This parking structure was designed by the architectural firm, Feinknopf Macioce Schappa Architects, Inc. and engineered by Paul J. Ford & Co., both in Columbus, Ohio.

This parking structure is featured in Case History No. 48, Creative Parking Facility Design, available from CRSI.



Case History available



New Research Series available.

This new series of independent studies conducted by professional engineers and published by CRSI focuses on different aspects of cast-in-place concrete construction. Three of these reports focus on epoxy coating performance.

Call, fax or write CRSI to receive the first four reports and to reserve all subsequent issues of this informative research series.

ASTM Developments

ASTM Workshop

At the D4 Road & Paving Materials Meeting in Denver during June of 1995, approximately 100 attendees from many areas of the United States and Canada came together at this ASTM workshop.

During the two-day event, thirty-two diverse topics on epoxy-coated rebar were presented. Speakers represented disciplines ranging from DOTs, university educators, researchers, consulting engineers, materials manufacturers to producers. The variety of viewpoints provided an unprecedented exchange of ideas and greater understanding of all topics.

General topics included: research, field performance, adhesion, structural and field consideration, testing/re-

**Ask for Free
ASTM Workshop Abstracts . . .
contact CRSI.**

search and quality control/quality assurance. Specific discussions on bridge decks, marine structures, coating procedures, new testing methods and other subjects were presented.

ASTM Specifications

Recently approved was ASTM A 934-95, *Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars*. Revisions were also made to ASTM A 775-95c, *Standard Specification for Epoxy-Coated Reinforcing Steel Bars*. Changes to this specification included:

- all visible damage must be repaired
- no more than 1.0 holidays per foot are acceptable
- coating thickness is to fall into a range of 7-12 mils
- when epoxy-coated rebar is stored outside, it must be covered if the period of storage is more than two months.

The scope of ASTM D 3963/D 3963M-93a, *Standard Specification for Epoxy-Coated Reinforcing Steel* is currently under review. Revisions possible would change the spec to cover only fabrication and job-site considerations. If approved, the new specification will be a companion, not an alternative to ASTM A 775 and A 934.

For copies of specifications contact:
ASTM, 100 Bar Harbor Dr., West
Conshohocken, PA 19428, 610-832-9500.

CRSI Epoxy Certification Program success continues

Use certified plants to ensure quality! Look for this symbol



Instituted in 1991, this program benefits both the epoxy coating industry and end users. It's designed to establish a high level of quality in the manufacturing of epoxy-coated reinforcing steel bars and provide an independent testing agency certification of the plant and its personnel.

The CRSI Fusion Bonded Epoxy Coating Applicator Plant Certification Program is voluntary and open to all plants that apply fusion bonded epoxy coatings to reinforcing bars.

Acceptance Continues to Grow

Approximately 75%, of all North American epoxy coating plants have been certified. In addition, many state Departments of Transportation and specifying agencies now require CRSI Certification for epoxy rebar suppliers.

For information on plant certification, contact Theodore L. Neff, P.E., Administrator of the program at CRSI.

Certified Plants*

Northeast Region

Harris Rebar Eastern, Inc.,
Bethlehem, PA
Lane Enterprises, Inc., Carlisle, PA
Milton Rebar Coating Company,
Milton, PA
New Jersey Steel Corp.,
Sayreville, NJ
Steel Cities Coating Corp.,
Pittsburgh, PA

Southeast Region

Florida Steel Corp., Knoxville, TN
Southwest Region
ABC Coating, Inc., Waxahatchie, TX
and Tulsa, OK

West Coast Region

Western Coating, Inc., Eugene, OR
and Auburn, WA

Mid-Atlantic Region

Free State Coating, Baltimore, MD

Rocky Mountain Region

ABC Coating, Inc., Brighton, CO
Western Coating, Inc., Ogden, UT
National Coating Co., Inc.,
Pueblo, CO

Midwest Region

ABC Coating, Inc., Wyoming, MI
Sheffield Steel Corp., Kansas City, MO
Simcote, Inc., Newport, MN
and Marion, OH

Continental Rebar Coatings,

Sioux City, IA
Midwest Pipe Coating, Inc.,
Scherverville, IN

Canada

Harris Rebar, Stoney Creek, ONT
and Leduc, ALB
EpoxiCote, Inc., Longueuil, QUE
Teme Rebar Concepts, Fruitland, ONT
CSI Coating Systems, Inc., Nisku, ALB