FUSION BONDED COATERS ASSOCIATION FBCA

anti-corrosion times

reporting on industry news, interesting applications and new developments of fusion bonded coated products

PUBLISHED BY FUSION BONDED COATERS ASSOCIATION

Vol. 1 No. 1 — August, 1983

FBCA ANNOUNCES NEW OFFICERS

At its annual meeting in Chicago, the Fusion Bonded Coaters Association (FBCA) elected a new slate of officers. Named to conduct the affairs of the Association were

Robert Theisen

H. Blair Trimble

President:
Robert D. Theisen
Midwest Pipe Coating, Inc.
Schererville, Indiana

Vice President:
H. Blair Trimble
Steel Service Company
Division of Azcon Corporation
Knoxville, Tennessee

Secretary/Treasurer:
T. Simon
Hysol Division
The Dexter Corporation
Industry, California

Director:
Douglas M. Green
Nantucket Rebar Services
Scarborough, Ontario, Canada

At the same meeting, a marketing committee was formed to prepare and approve promotional plans designed to foster the understanding and growth of fusion bonded coated products. This committee meets as required to plan and implement publication advertising, sales and technical literature, and trade show participation.

Expect to hear more from the FBCA as this organization actively puts its many plans and programs into action to inform highway and bridge officials, engineers and others concerned with the problem of preventing corrosion in reinforced concrete structures and other products.

States now have clear choice to use epoxy coated rebar as bridge deck restorations speed up

Earlier this year, the FHWA in docket 83-1, proposed revisions to 23 CFR.650 relating to concrete bridge decks. This, in effect, made the coating of reinforcing steel by epoxy or metallic means an option of each state.

The Fusion Bonded Coaters Association responded to this proposed revision with comments communicated to the FHWA in April. Following is a summary of those comments:

The Fusion Bonded Coaters Association wholeheartedly supports the concept of deregulation at the federal government level; likewise, delegation of responsibility and authority to states that is more appropriately theirs, providing —

(a) A timetable be established to accomplish orderly transition and allow adequate time for performance criteria to be developed for use in evaluating relative cost-effectiveness of the various corrosion protection systems.

(b) The burden of responsibility in terms of collection, assembly, updating, dissemination of relevent data should be with FHWA.

(c) Relative cost-effectiveness can readily be evaluated from **valid** performance criteria standards.

(d) FHWA makes final judgement as to validity of criteria used to determine relative cost-effectiveness of any given protective system; also, establishes a minimum performance level — below which approval will not be forthcoming in any instance. (New techniques or systems whose cost-effectiveness has yet to be demonstrated could continue to be installed on an experimental basis).

With regard to FHWA's decision to rescind the "experimental" classification for galvanized rebar, the regulatory evaluation paper states "It is not likely that there will be a significant switch to galvanized rebar if the restriction is removed." Yet the commentary speculates "On the other hand, there are situations where galvanized rebars may be more effective than some other systems".

Here, FBCA submits the question —

Under what possible circumstances can galvanized rebar be evaluated cost-ef-

See Page 2, Column 3

PRESIDENT'S MESSAGE . . .

THE TIMELINESS OF ANTI-CORROSION TIMES

FBCA's Anti-Corrosion Times embarks on its "maiden voyage" with this issue. Its purpose: to provide designers and specifiers with news of developments, events and people in the Fusion Bonded Coating Industry. It will include reports on specific uses and new applications, technical information and timely views of prominent professionals.

Considering the immediacy of the highly-publicized bridge deck deterioration problem (see page 3), special attention will be given to the protection of reinforcing steel in concrete structures subjected to high level concentrations of sodium chloride and other chemicals. The corrosive influence of such elements on unprotected metal can be thwarted by inert, tightly-adhering, epoxy powder coating applied by the fusion bonded process. The value of epoxy coated reinforcing steel in other concrete structures such as water and sewage treatment plants, garages, refineries, salt water piers, and marinas, etc. is also recognized as a major contribution to extending the life span of such facilities.

Fusion bonded epoxy coating to underground pipe proved its merit with twenty years service life and more. It was natural for federal highway administration officials to turn their attention toward epoxy in the early 1970's — at which time the new, highly-developed fusion bonded coating technology was at their command. Extensive research ensued and culminated with epoxy-coated reinforcing bars proclaimed (in 1976) as an FHWA "standard" system for corrosion prevention in concrete bridge decks. Rigid specifications, controlled powder manufacturing process and application methods were subsequently developed and published by ASTM.

As a consequence of these developments, a whole new industry was born. Today, FBCA member plant facilities (powder manufacturing and coating application), reflect the highest state of quality control and productivity. Such control of product quality is unique among corrosion protective systems — with some others requiring laboratory controlled mix proportions and installation to achieve success. Yet, the responsibility for this quality is usually left to field laborers of varying skills, who must contend with the vagaries of job-site circumstances. Not so with fusion bonded products. Quality is exactingly controlled by specialists all through the powder manufacturing and application processes.

I am hopeful that Anti-Corrosion Times will spark your interest and provide information of value. I invite your comments and constructive criticisms as to content. Your input will serve to sharpen our focus on the real issues and foster improvement in future issues.

Robert D. Theisen, President
Fusion Bonded Coaters Association

CONTRACTORS MEET FBCA AT WORLD OF CONCRETE

The men who transform engineering plans into reinforced concrete structures had a first-hand look at the most popular corrosion preventive method — epoxy coatings — at the recent World of Concrete. Over 16,323 concrete contractors, designers and others attended the 5-day event at Las Vegas. Epoxy coating producers and applicators manned the FBCA booth to show and tell why fusion bonded coatings are the most cost-effective way of preventing corrosion-caused problems in reinforced concrete structures.

Clear Choice — Continued from Page 1

fective — irrespective of the reference to "some other systems" of unstated identity? Rationale for the question follows:

- Based on the well documented FHWA research findings (validity of which is substantiated by at least two authoritative and independent sources) epoxy-coated rebars in bridge deck, top mat only, is deemed to constitute a cost-effective corrosion prevention system.
- Similar research on the part of FHWA indicates that galvanized rebar in bridge deck, top mat only, has a predictable life (in salt contaminated concrete) **less than** when both top and bottom mats are plain black steel. (When both mats are galvanized, predictable life at best, is only fractionally better than plain black rebar).
- Cost of epoxy-coated rebars is equal to, or slightly less than, galvanized rebar on a **pound** for **pound** basis. On a **deck for deck** comparison, the acknowledged "cost-effective" top mat only epoxy-coated rebar system (predictable life = 11.5 x black rebar) is half the cost or less, than the two mat galvanized rebar system (predictable life = 1.3 x black rebar). A predictable bridge deck life extension equal to 41 times black rebar (31.5 x galvanized rebar) can be achieved with the two mat epoxy-coated rebar system — at a cost equal to, or slightly less than galvanized rebar.

Reference materials to substantiate rationale;

Report No. FHWA RO 82/082. "Time to Corrosion of Reinforcing Steel in Concrete Slabs." Vol. 4 Galvanized Reinforcing Steel, Dec. 1981 Interim Report.

Discussion of ACI Committee 345 Report on Proposed Revision of ACI 345-74. "Standard Practice for Concrete Highway Bridge Deck Construction." **Concrete International,** Sept. 1981 Vol. 3 No. 9.

Corrosion of Non-Specification Epoxy-Coated Rebars in Salty Concrete, Paper 114, NACE Corrosion Forum, Anaheim, California, April 18-22, 1983.

Panel Report of Researchers convened to review available technical information on the performance of galvanized reinforcing steel in salt contaminated concrete. D.G. Manning, E. Escalante and D. Whiting.

FUSION BONDED COATERS ASSOCIATION FBCA

Published by

FUSION BONDED COATERS ASSOCIATION
21 Spinning Wheel Road
Suite 8K
Hinsdale, IL 60521 312/920-1411

R. T. Stafford, *Executive Director*

U.S. BRIDGES ARE FALLING DOWN

There are over 557,000 highway bridges in the U.S. Nearly half are officially classed as structurally deficient or functionally obsolete.

This grim record is finally being addressed with the passage of the additional 5¢ per gallon user fee. While the revenue to be generated for bridge rehabilitation will still be far short of meeting the estimated $50 billion required to upgrade all the nation's bridges, partial funding will become available for a substantial attack on the problem.

BETTER ROADS magazine has conducted a bridge inventory that shows the extent of substandard bridges state by state. This just completed breakdown is presented with special permission of this publication. All figures are those provided by state highway departments.

State	Inventory Completed	Total Interstate & State Bridges	Total Substandard	Total City/County/ Township Bridges	Total Substandard	Total All Bridges	Combined Total Substandard
Alabama*	Yes	5,190	1,693(32.9%)	10,152	5,237(51.5%)	15,342	6,930(45.2%)
Alaska	Yes	575	40(6.9%)	225	25(11.1%)	800	65(8.1%)
Arizona*	Yes	3,860	66(1.7%)	1,167	161(13.8%)	5,027	227(4.5%)
Arkansas*	Yes	6,691	1,777(26.6%)	8,017	6,522(81.4%)	14,708	8,299(56.4%)
California*	Yes	12,167	932(7.6%)	10,983	4,336(3.9%)	23,150	5,268(22.7%)
Colorado*	Yes	3,877	416(10.7%)	3,415	2,342(68.6%)	7,292	2,758(37.8%)
Connecticut*	Yes	2,535	350(13.8%)	1,217	479(39.3%)	3,752	829(22.0%)
Washington, D.C.	Yes	202	58(28.7%)	26	None	228	58(25.4%)
Delaware	Yes	436	54(12.3%)	234	62(26.4%)	870	116(17.3%)
Florida	Yes	5,310	1,526(28.7%)	4,500	1,217(27.0%)	9,810	2,743(27.6%)
Georgia*	Yes	6,291	1,275(20.6%)	8,341	4,030(48.3%)	14,632	5,305(36.2%)
Hawaii*	Yes	690	137(19.9%)	414	145(35%)	1,104	282(25.5%)
Idaho	Yes	1,778	549(30.8%)	1,860	1,000(53.7%)	3,638	1,549(42.5%)
Illinois*	Yes	8,006	1,687(21.1%)	17,085	7,023(41.1%)	25,091	8,701(34.4%)
Indiana*	Yes	5,181	2,035(39.2%)	12,697	8,504(66.9%)	17,878	10,359(57.9%)
Iowa*	Yes	3,730	1,095(29.3%)	23,335	12,358(52.9%)	27,065	13,453(49.7%)
Kansas*	Yes	4,942	1,171(23.6%)	20,768	12,611(60.7%)	25,708	13,782(53.6%)
Kentucky	Yes	6,033	1,131(14%)	4,477	2,786(62.2%)	12,510	3,917(31.3%)
Louisiana	Yes	7,196	2,502(34.7%)	7,500	6,750(90%)	15,696	9,252(58.9%)
Maine	Yes	1,857	388(20.8%)	495	326(65.6%)	2,668	714(26.7%)
Maryland*	Yes	2,374	689(29%)	1,974	1,017(51.6%)	4,384	1,706(51.5%)
Massachusetts	Yes	3,400	1,300(38.2%)	1,600	800(50%)	5,000	2,100(42%)
Michigan	Yes	5,525	874(15.6%)	4,313	2,505(58%)	9,638	3,379(34.3%)
Minnesota	Yes	3,523	469(13.3%)	9,884	3,014(30.5%)	13,407	3,483(26.03%)
Mississippi	Yes	4,755	1,462(30.7%)	4,313	2,505(58%)	9,068	3,967(52.6%)
Missouri*	Yes	9,407	3,461(36.6%)	14,556	12,514(86.0%)	23,963	15,975(66.7%)
Montana*	Yes	2,372	1,189(50.1%)	2,221	1,689(76%)	4,593	2,878(62.6%)
Nebraska	Yes	3,074	517(16.8%)	13,540	10,069(74.4%)	16,614	10,586(63.7%)
Nevada*	Yes	769	101(13.1%)	255	80(39.6%)	1,024	181(17.7%)
New Hampshire*	Yes	1,241	492(39.6%)	1,359	1,058(77.8%)	2,600	1,550(59.6%)
New Jersey	Yes	2,276	316(13.8%)	4,089	774(18.9%)	6,365	1,090(17.1%)
New Mexico	Yes	3,074	580(18.8%)	537	214(39.8%)	3,611	794(21.9%)
New York	Yes	8,621	1,233(16.6%)	10,451	5,462(52.2%)	17,072	6,695(39.2%)
North Carolina*	Yes	16,856	10,942(64.9%)	479	230(48%)	17,335	11,172(64.4%)
North Dakota	Yes	1,291	249(19.2%)	4,416	3,006(68%)	5,707	3,255(57%)
Ohio	Yes	10,879	765(7.0%)	17,376	4,125(23.7%)	28,255	4,890(17.3%)
Oklahoma	Yes	7,029	564(8.0%)	14,844	11,058(74.5%)	21,873	11,622(53.1%)
Oregon*	Yes	2,700	277(10.2%)	3,300	1,014(30.7%)	6,000	1,291(21.5%)
Rhode Island	Yes	583	76(13%)	117	41(35%)	700	117(16.7%)
Pennsylvania	Yes	15,527	2,657(17.1%)	6,040(est)	2,245(37.2%)	21,587	4,902(22.7%)
South Carolina	Yes	7,495	955(12.7%)	1,318	1,135(86.1%)	6,813	2,090(23.7%)
South Dakota	Yes	1,882	226(12%)	5,411	1,604(29.6%)	7,293	1,930(26.4%)
Tennessee	Yes	7,707	1,654(21.4%)	9,361	3,499(37.3%)	17,068	5,153(30.1%)
Texas	Yes	25,867	5,251(20.2%)	16,611	11,610(72.1%)	41,978	16,861(40.1%)
Utah	Yes	1,185	190(16%)	1,014	450(44.0%)	2,199	640(29%)
Vermont	Yes	1,349	439(32.5%)	1,300	707(54.3%)	2,649	1,146(43.2%)
Virginia	Yes	11,189	1,917(17.1%)	825	131(15.6%)	12,014	2,048(17%)
Washington*	Yes	2,932	522(17.6%)	4,349	1,167(26.6%)	7,281	1,689(23.1%)
West Virginia	Yes	6,505	1,971(30.2%)	201	67(33.3%)	6,706	2,038(30.3%)
Wisconsin	Yes	4,270	1,979(46.3%)	8,858	5,570(62.8%)	13,128	7,549(57.5%)
Wyoming*	Yes	1,874	141(7.5%)	957	654(68.3%)	2,631	795(28.0%)
Totals	Yes - 51	264,078	62,830(23.6%)	302,775	165,928(54.7%)	567,820	227,003(39.9%)

*States submitting new totals since 1982 inventory report.

FBCA POPULAR AT NACE MEET

Attendees of the Rebar Corrosion Seminar in Chicago last fall, sponsored by the National Association of Corrosion Engineers (NACE), enjoyed friendly exchanges and good spirits at the hospitality suite staffed jointly by the Fusion Bonded Coaters Association and Concrete Reinforcing Steel Institute. Both were seminar co-sponsors.

The happy group shown here includes, left to right, Robert P. Brown, Florida DOT; Gordon Beecroft, Oregon State Highway Division; R.F. Stratfull, consulting corrosion engineer, West Sacramento, CA., who provided Summation; Past, Present and Future, at NACE conference; Patricia Stratfull, and Robert T. Stafford, FBCA.

TASK GROUP TO PREPARE STANDARD ON REBAR CORROSION

A special Task Group is being formed by the National Association of Corrosion Engineers (NACE) to prepare a standard on the prevention of corrosion in steel reinforced concrete structures. An organizational meeting of the Task Group met June 20-21, 1983, in Orlando, Florida.

Robert P. Brown of the Florida Department of Transportation, Office of Materials and Research, has been appointed chairman of the NACE Task Group which is designated as T-3K-5 on "Corrosion Control Measures for Steel Reinforced Concrete Structures".

The Task Group has been given the assignment to prepare a "Recommended Practice", one type of standard issued by NACE, covering the pre-design corrosion control measures that should be used as part of any specification involving steel reinforced concrete structures using Portland cement. The proposed standard will include any requirements necessary to deter initiation of the corrosion process, to allow monitoring of the structure to analyze the condition of the steel reinforcement and to install equipment required for future cathodic protection or other corrective measures.

The standard will cover the basic components of site investigation, concrete, reinforcement, sealants and protective coatings, and monitoring equipment.

Representatives from technical societies and other organizations are naming advisers to become members of Task Group T-3K-5. The FBCA will be represented by Bertrand K. Thornley, Florida Steel Corporation, Tampa, Florida.

Late Report:

A newly released FHWA report by the Journal Highway Research Development details findings of an extensive study on, "Corrosion of Nonspecification Epoxy-Coated Rebars in Salty Concrete." This not only confirms the excellent corrosion resistance of epoxy-coated rebars in accelerated corrosion tests, but also reveals that, "a few damaged areas on epoxy-coated reinforcing bars do not negate performance for electrically isolated epoxy-coated rebars." For a copy of the well illustrated 10-page report, contact Fusion Bonded Coaters Association.

SOLID FOUNDATIONS FOR RECORD SETTING BRIDGE SPAN

Epoxy-coated Rebars Specified

Florida soon will boast the world's longest cable-stayed bridge — with a center span of 1200 feet! It's the new Sunshine Skyway over Tampa bay to replace a span toppled by a ship a few years ago.

To support this gargantuan structure, two huge pier shafts, 76 feet in diameter, 1200 feet apart, are being driven 100 feet below the bay into bedrock. Being constructed in these great holes are two main reinforced concrete pier foundations. When completed, the two foundations will consist of reinforced concrete footings, each sitting on 44 reinforced concrete drilled shafts. The concrete shafts are being reinforced with a total of 460 tons of epoxy-coated reinforcing steel.

Each shaft will be driven 100 feet below the bottom of the Bay into bedrock. The two concrete footings will be reinforced with an additional 912 tons of epoxy-coated reinforcing steel.

The $6.5 million pier foundation job, a joint venture of Hardaway Constructors, Inc., Chesapeake, Va. and Michael Construction Co., Biloxi, Miss., is being supplied concrete from a customized barge. This is equipped with two concrete batch plants and an ice-making plant to make ice for the concrete. Also, there are cement and fly-ash silos and a conveyor system to charge a concrete pump and to move sand and aggregate. Each pier foundation will require 7,500 cubic yards of concrete. The finished bridge will require 12,689 tons of epoxy coated rebar.

Why Florida DOT Specified Epoxy Coated Rebar

Florida's first use of epoxy coated rebar was in 1978 when the spans that connect the Florida keys were being replaced. In order to build maximum life span into these structures, they took a tip from northern states which are using epoxy coated rebar to extend bridge life. While Florida didn't have the problem caused by deicing salt, it does have salt penetration at water levels around coastal areas.

Today, it is mandatory that all Florida bridges built in such hostile areas include epoxy coated reinforcing steel. It's low-cost insurance against future maintenance problems and costs.

The long center span was designed by Figg and Muller Engineers, Inc. of Tallahassee. Chicago based Paschen Contractors, Inc. is erecting the main span which, with two 540 foot side spans, are scheduled for completion in 1986.

FUSION BONDED EPOXY IN NEW MARKET APPLICATIONS

Epoxy coating, electrostatically applied by the fusion bonded coating process, is recognized as the most cost-effective method of rebar corrosion prevention for concrete bridge deck applications. Word of its success is rapidly spreading to other areas where steel, imbedded in concrete or earth materials, is subjected to corrosion influences. Many new applications came to light at the NACE seminar on Rebar Corrosion held in September, '82 and at the World of Concrete '83 exposition — including:

Reinforcing steel hoops for precast concrete silos used for salt storage.

Precast channel slab roof decks as tested and manufactured by Federal Cement Products Inc., Hammond, Indiana — considered particularly applicable to pulp and paper industry uses.

Concrete floor encased hot water pipe — installed to alleviate condensation in salt storage warehouse.

Welded wire fabric as used in general concrete applications. Here FBCA and Wire Reinforcement Institute have joined forces to provide input toward specification development.

Reinforcement for earth retention — Steel reinforcement strips as manufactured by the Reinforced Earth Company, Arlington, Virginia. In addition to reinforcing earth, its products are used in load supporting structures, such as retaining walls, bridge abutments, dams. Also welded wire manufactured by the Welded Wire Wall Corporation, Los Gatos, California. Both systems are for retaining soil embankments.

Horizontal joint reinforcing for masonry wall construction looms as a strong potential application for epoxy coating. **In above applications, epoxy coatings supplant metallic coatings to protect against hostile environments.**

EPOXY COATED WELDED WIRE FABRIC GROWTH PROMPTS WRI/FBCA MEETING

The Wire Reinforcement Institute, at its annual convention in Washington, met with members of the Fusion Bonded Coaters Association to consider specification and standards development for epoxy coated welded wire fabric. In light of accelerating demand for this system of corrosion protection, it was unanimously agreed that a joint effort between the two industry associations should begin immediately. A transfer of technology from the highly developed process of coating reinforcing steel bars will help speed development toward final specifications. Differences in the two products dictate special attention and input from the welded wire fabric and coating industries. ASTM has been apprised of this critical specification need.

NEW SHORT-SPAN REINFORCED CONCRETE BRIDGE PUBLICATION

The Concrete Reinforcing Steel Institute (CRSI) has launched a new program which provides engineering drawings and guidance to persons involved in short and medium-span reinforced concrete bridge construction.

The publication, entitled "A New Look at Short-Span Reinforced Concrete Bridges", serves as a design and construction tool, and assists in the preparation of cost estimates for bridges. Government officials and contractors, working with their engineering affiliates, are finding the new publication an excellent means to save design and construction time and money. The publication is priced at $10.00 and is available from Concrete Reinforcing Steel Institute, 933 N. Plum Grove Road, Schaumburg, IL 60195.