

Bridge

DESIGN & ENGINEERING



HIGH-LEVEL THRILLS

CAPILANO CLIFFWALK GIVES
VISITORS A BIRD'S-EYE VIEW

NEW GENERATION OF CBPCS PROMISE TO FIGHT CORROSION

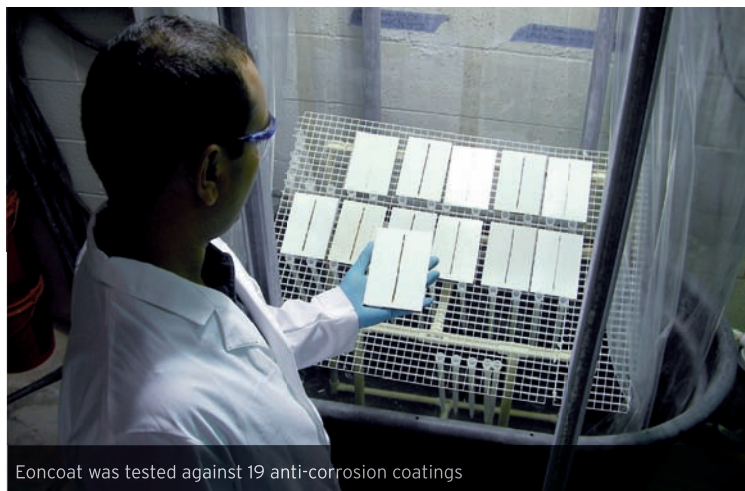
Chemically-bonded phosphate ceramics create a passivation layer that stops corrosion, protected by a tough ceramic outer layer that is ideal for bridges.

Fighting corrosion in bridges, ships, tanks, planes and equipment costs an estimated US\$22.9 billion a year in the USA alone.

For generations, polymer paints have acted as a physical barrier but once the paint is scratched and corrosion promoters enter the gap, the coating acts like a greenhouse. Likewise, sacrificial, reactive elements work until the sacrificial elements are used up and recoating must be done, usually after a few years.

Ideally, engineers, facility managers, and paint contractors would want the long-term corrosion-resistance of a stainless steel part with the lower cost of coating application. A new category of CBPCs such as Eoncoat is now claiming to make this possible.

Arun Wagh, a former materials engineer at Argonne National Lab, and lead developer of the technologies underlying Eoncoat ceramics, explains it as follows: "When a dual-component spray gun mixes an acid phosphate with base minerals and metal oxides in a water slurry, a chemical reaction occurs on the surface of the steel substrate. A hand-held thermometer indicates a 10-12°F temperature rise, as iron becomes



Eoncoat was tested against 19 anti-corrosion coatings

a corrosion-resistant passivation layer of iron oxy hydroxide. Because the passivation layer is electrochemically stable, like gold and platinum, it does not react with corrosion promoters such as water and oxygen."

Scanning electron microscopy indicates this passivation layer is about 20 microns thick. X-ray diffraction indicates this passivation layer is about 60% iron with components of phosphate, magnesium, silicon, hydrogen, and oxygen.

In contrast to typical paint polymer coatings which sit on top of the substrate, Eoncoat bonds through a chemical reaction with the substrate, so slight surface oxidation actually improves the reaction. This makes it virtually impossible for corrosion promoters like

salt water, oxygen and humidity to get behind the coating the way they can with ordinary paints.

The corrosion-resistant passivation layer is further protected by a true ceramic outer shell which forms simultaneously with the passivation layer and chemically bonds with it, after acid and base materials mix in the spray gun nozzle then react with the substrate surface. The dual-layer ceramic coating can be used both as a primer and a topcoat, and can be applied in a single pass that's dry to the touch in a minute, hard dry in 15 minutes, and can be returned to service in an hour.

A major issue for painting bridges is the problem with overspray. Eoncoat is a dry fall. There is no need to build a

containment structure underneath where you are painting to catch any hazardous chemicals that might fall into the water because the product has no VOCs.

There are no hazardous chemicals - in fact if you were to pour Eoncoat in the water it would promote plant growth because it is a very slowly dissolving, all-natural fertiliser.

This particular CBPC is also forgiving on surface prep, its manufacturer says. This is important because while prepping bridges, blasting to get a pristine surface over the water is extremely difficult and expensive. It is also difficult to maintain a pristine blasted surface until you can get a coat of paint on it. With Eoncoat, the flash rust isn't an issue.

Only one coat and no primer is needed - this means less labour in the extremely challenging environment of bridge work.

Eoncoat CEO Tony Collins put Eoncoat to the test against 19 leading anti-corrosion coatings in a live corrosion test, viewable to the public by webcam. Coated samples were scribed, then exposed to 12 hours of sea spray, followed by 12 hours of sunlight, or the UV light equivalent.

After 45 days, every other high-performance coating tested failed. Except for the rust on its scribe line, the Eoncoat sample looked the same as day one.

Eoncoat
www.eoncoat.com

SHUTTER PLATE PLUGS STRUCTURAL GAPS

A new mobile steel shutter plate which can be driven over at up to 70km/h has been launched by Maurer Söhne. The Maurer Modular Bridging System can be installed over structural gaps in bridge decks in a very short time.

This new development was prompted by the high costs involved in setting up a job site when expansion joints have to be replaced - in connection with high

penalties imposed when the replacement period is exceeded and hence traffic delays are increased. Conventional systems are too bulky and can be only be established with the help of expensive mobile cranes; by contrast, the MMBS can be delivered using an efficient transporter. One side is anchored firmly in the ground, and the other side can be swung open or closed. It can bridge a structural gap of up to 2.2m wide. The flexibility of

the new bridging system comes about through its modular structure, and the individual elements can be produced in various widths according to the requirements of the customer. When placed next to each other, they very quickly create an interim bridge which can be driven over by vehicles travelling at up to 70km/h.

Maurer Söhne
www.maurer-soehne.com

