

New Systems Open Opportunities for Cathodic Protection in Concrete Repair

Cathodic protection (CP) offers the advantage of permanent repair that does not require the expensive break out of sound but chloride contaminated concrete. Current is passed between an anode and the reinforcement, the reinforcement becomes cathodic and corrosion is halted, even if there are high levels of chlorides at the bar.

Although recognised as providing the ultimate corrosion protection impressed current CP (ICCP) may, in some circumstances be expensive to design, install and maintain. Michael Moore of Road and Marine Services (RMS) has been trialling a range of sacrificial anode CP (SACP) systems that have the potential to provide low cost, low maintenance holding repairs. If ICCP systems were all that was available Mr. Moore believes it would be difficult to provide the required maintenance in NSW bridges within budgetary constraints. Unfortunately there are reservations about sacrificial systems as historically zinc anodes have passivated and CP Standard criteria for potential decays have not been met. Three new innovative systems available in Australia are changing how people perceive ICCP and SACP.

Low pH, Chloride Based Activation Pastes for Sacrificial Zinc Anodes

RMS have recently installed corrPRE's 'Zinc Layer Anode' as a small-scale trial on a Bridge in NSW. Mr Moore noted "This is part of a wider assessment of SACP but the apparent advantage of corrPRE Zinc Layer Anode is the relatively simple installation". Other advantages of corrPRE Anodes is that they offer a higher long term output due to the nature of the zinc activation medium and they can be easily replaced. They also have a long term track record in Europe of giving repairs that meet the potential decay criteria in the Australian CP Standard he added. Hence they can be used as true CP systems not requiring removal of sound but chloride contaminated concrete rather than just for cathodic prevention.



Figure 1 : Zinc Layer Anode applied to bridge beam and columns prior to application of top coats.

The Zinc Layer Anode (ZLA) is a 250 micron thick, 250mm wide roll of zinc sheet. The protective sheet over the adhesive backing is peeled off and the zinc sheet pushed onto the concrete surface. The adhesive has a slightly acid pH and contains chlorides that keep the zinc active. The zinc chloride reaction products that form as the zinc is consumed in the protection process are soluble and move away from the zinc so it remains active. Chlorides in the concrete are pushed away from the reinforcement and into the adhesive and are beneficial to the CP system. Removal of the chlorides and re-alkalisation at the bar follow the normal trend of CP providing for lower currents and longer life of the system. The ZLA adhesive is water soluble so it is only used above the splash level and is coated with a water proof aesthetically pleasing coating.

RMS are also using the corrPRE Roll Anodes that comprise rolled up zinc sheet with a similar activation paste to the ZLA. They are inserted into drilled holes and capped with a mortar plug. RMS are using them in a system with remote anodes in the water to protect the lower tidal zone, ZLA in the atmospheric zone and Roll Anodes in between.

Ribbon Anodes Deployed in Inert Housing

At Dalrymple Bay Coal Terminal (DBCT) 3.3 m long glass fibre trays containing ribbon anode and a contact felt were bolted across the tunnel at approximately 200mm centres. The system was designed as a standard ribbon anode system by Infracorr Consulting. 'Cassette' offered the installer, Freyssinet Australia the advantage of easier installation than the alternative of placing the anode in slots or shotcrete. For the client it offered simple inspection and maintenance but with a long life and low risk relative to ribbon anodes in cement where acid attack at the anode concrete interface has caused problem in the past.

Freyssinet's repair manager Chris Mein told ACA that "Freyssinet found it easy to adopt Cassette as apart from the simplicity and speed of installation it offered us, it had been used successfully overseas and it has a 10 year track record and good credentials."

According to Mr Mein installation of Cassette at DBCT went according to plan and proved as simple to install as they had expected. "The lead time for this project was short but the manufacturer was able to manufacture a special product

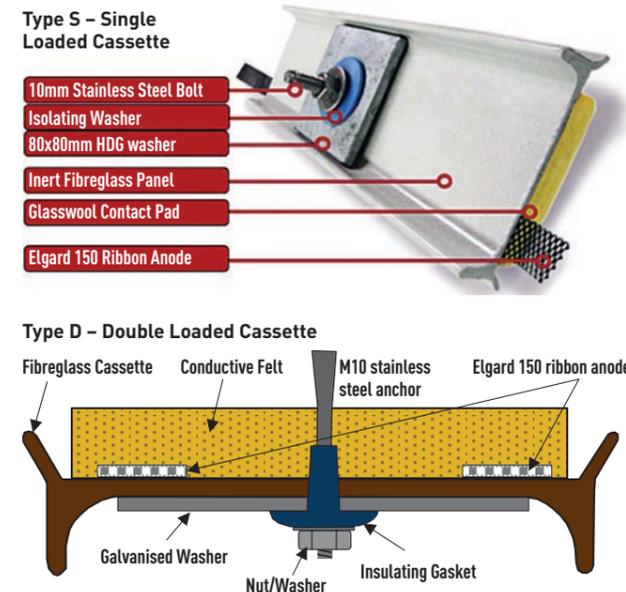


Figure 2 : Cassette system types components.



Figure 3 : Cassette Installed in the DBCT Tunnel.

and deliver it to our yard in Brisbane in under 2 weeks" he said. He went on "Cassette removes many of the obstacles of applying a ribbon anode and its ease of application and relatively low cost makes it very competitive. At the time of the DBCT project only Type S1 was available. If Type D had been available then the spacing of Cassettes would have been doubled making it even more economic. We have recently tendered on a project using the Types D1, D2 and D3 for a significant saving relative to the shotcrete and mesh

system specified. The system is ideal in industrial applications such as tunnels, basements and under wharves and bridges where the cassettes on the surface are not an impediment. Where an obstacle free, aesthetically pleasing surface is required we are offering the Zebra conductive coating as another alternative to conventional ICCP".

Conductive Coating ICCP System

The Zebra anode system is another new product to Australia but with an even longer overseas track record.



Figure 4 : Zebra conductive coating on a floor slab before application of high build cementitious overlay.

Conductive paints are not new to Australia and one system was applied in WA nearly 30 years ago as a trial. It exceeded its design life of 20 years but no-one took on the system commercially. An improved system that uses a silicate based binder rather than the chlorinated rubber based binder on the system installed 30 years ago is now being offered in Australia. The silicate offers good bond to the concrete and enhanced conductivity.

Specialist Repair & Construction Products (SRCP) are the importer of Cassette, Zebra and corrPRE anodes.

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