

## 5 Years of Sacrificial Anode Cathodic Protection for Cast-In-Place Concrete Structures in Thailand

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**Keywords:** Corrosion, Reinforced Concrete, Cathodic Protection, Sacrificial Anode

Thai Marine Protection Co., Ltd., or TMP was established from the commercialization of Aluminium Anode research and development in 2008 and received a scholarship from National Innovation Agency (NIA) to pursue the innovative sacrificial anode or concrete anode which is suitable for corrosion prevention in reinforced concrete since 2018. According to the U.S. Department of Transportation's Federal Highway Administration (*Washington, DC*), Cathodic Protection is the only rehabilitation technique that has been proven to stop corrosion in salt-contaminated bridge decks regardless of the chloride content of the concrete. The construction was repaired by concrete anode for more than forty years in the U.S. but recently use in concrete repair method with evidence base practice for about five years in Thailand.

The durability of reinforced concrete which remedy by concrete anode installation will be explained in the survey report after the maintenance of the bridge for almost five years such as the site surveyed for the performance of concrete anode after installation at Bangpakong Bridge in Chachoengsao province conducted by Department of Highways, and a bridge at Phanthai Norasing district in Samut Sakhon province conducted by Department of Rural Road (DRR). The cathodic protection performance results that the concrete anode can distribute the protective current and shows its effectiveness in good condition according to NACE SP0408: *Cathodic Protection of Reinforcing Steel in Buried or Submerged Concrete Structures* and pass the cathodic polarization shift 100 mV criteria refer to NACE RP0290: *Impressed Current Cathodic Protection of Reinforcing Steel in Atmospherically Exposed Concrete Structures* without any cracking and spalling in the concrete structures. The main point of this paper is the corrosion problem stays still in the construction even if there is far from the coastal area or has no chloride contamination of about 35 ppt. In this case, the deterioration of concrete remains because of brackish water or saline soil in Bangkok Metropolitan and Northeastern region. Nevertheless, the cost of concrete repair by concrete anode will be added to the construction budget by approximately 0.5-10% of the overall cost depending on the nature of the construction that may extend the service life of the construction by more than 10 years compared to the construction with the regular repair.

This demonstrates and case studies present and carries out to assist in the decision-making process on maintenance strategy for coastal structures, piers, or concrete structures in saline soil in Thailand which supposed that using double-protection for concrete structures by repairing with concrete anode is a must for the new era to prevent the deterioration of the concrete.