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Galvanized Reinforcement in Bridge and Coastal Construction

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Dr Yeomans is known internationally for his research on galvanized reinforcement. He has lectured and published widely on this topic and edited the reference text "Galvanized Steel Reinforcement in Concrete".

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1 Abstract

This paper discusses the use of galvanizing for the corrosion protection of steel reinforcement in bridges and coastal structures exposed to deicing salts or the marine environment. Whilst providing both barrier and sacrificial protection to the base steel, the galvanized coating is also effectively immune to carbonation effects in concrete. More importantly, zinc has a significantly higher chloride tolerance than black steel and a chloride threshold some 2-3 times higher than that for uncoated "black" steel is widely accepted. This combination of factors provides for a significant life extension with the use of galvanized reinforcement and is fundamental to achieving a 50-100 year service life for concrete infrastructure exposed to high-chloride conditions.

The characteristics and behaviour of traditional hot dipped galvanized reinforcement in concrete and the recent development of the continuous coating of steel reinforcement are explored. The important role of the presence of pure zinc for the passivation of galvanized steel in concrete and the long-term behaviour of the coating are discussed. Design and construction issues specific to galvanized reinforcement are briefly reviewed. Field studies of existing infrastructure and recent applications of galvanized reinforcement in new bridge and coastal construction are presented.

Keywords:. galvanized reinforcement; hot dipping, continuous coating, chlorides, field studies; applications

2 Introduction

Galvanizing affords multi-faceted protection to reinforcement and other embedded steel in concrete. While the coating provides both barrier and sacrificial protection to steel and is essentially immune to the effects of carbonation, it also has a significantly higher tolerance to chlorides than uncoated steel. In bridge and coastal structures exposed to deicing salts or the marine atmosphere, the higher chloride tolerance in particular translates into reduced corrosion rates and the extension of service life - a key factor in the sustainability of concrete infrastructure where 50-100 year design lives are required.

The characteristics and behaviour of galvanized reinforcement has been widely investigated in both laboratory-based studies and also field investigations of long-term structures. A detailed record of this research has been published [1-4].

Since the 1950s, galvanized reinforcement has been used extensively in high-chloride exposure

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