



Thermal Spray Zinc Coatings for Protecting Bridges from Corrosion

M.C. van Leeuwen

International Zinc Association, Brussels, Belgium

M. Gagné

Zelixir Inc, Toronto, Canada

Delin Lai, Gang Kong, Yanqi Wang

South China University of Technology, Guangzhou, China

Contact: flyaaa01@163.com

Abstract

Metallic zinc coatings are recognized as environmentally friendly, sustainable, and low maintenance, providing the lowest life cycle cost corrosion protection. Various case studies illustrate that the corrosion protection of steel bridges with thermal spray zinc (TSZ) duplex coating are very good in the environmental corrosivity of class 4 or 5 without any maintenance for a long time. Meanwhile, TSZ coatings on the exposed surface of the concrete of reinforced concrete structures can be electrically connected to the steel reinforcement and provide corrosion protection to the steel. The lives of iconic bridges have been successfully extended by using TSZ coatings for use as anodes in ICCP systems.

Keywords: thermal sprayed zinc; corrosion; steel bridge; reinforced concrete bridge.

1. Introduction

Steel is a strong, versatile and inexpensive material with uses in many different construction industries, the bridge industry amongst others. It has the highest strength to weight ratio of all construction metals and is recyclable. However, in order to enhance and protect this vital asset, corrosion prevention is essential. Metallic zinc coatings are well established and recognized as the most cost-effective corrosion protection available for steel structures. Zinc coatings protect steel from atmospheric, marine and in-soil exposure conditions, and can be applied either by hot dip galvanizing or by thermal spraying [1,2]. Hot dip

galvanizing involves the full immersion of the steel into a bath of molten zinc, ensuring complete coverage over all surfaces with a zinc coating. However, some structures can be too large to galvanize. With thermal sprayed zinc coatings, there is no size limitation to the part to be coated, and the technology is fully portable, allowing easy field applications.

Road steel bridges are typically designed with a lifetime of 100 years. However, lifetime extensions are normal and there are many bridges that are older than 100 years. Bridges are most likely to be replaced or decommissioned due to increased traffic capacity or the closing of the road than for