



Complementary Zinc Coatings

Martin Gagné, Frank E. Goodwin, Martin van Leeuwen

International Zinc Association, Durham, USA

Contact: mgagne@zinc.org

Abstract

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. Hot dip galvanizing involves the full immersion of the steel into a bath of molten zinc, ensuring complete coverage over all surfaces. However, some structures can be too large to be galvanized. Zinc thermal spray involves projecting drops of liquid zinc onto the surface of the steel using compressed air. 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. Whether applied by galvanizing or thermal spraying, zinc coatings are fully compatible and steels coated by either method can be incorporated into one structure with no concerns. Zinc coatings provide decades of maintenance free service and case studies of hot dip galvanized and zinc thermal sprayed steel structures will be presented.

Keywords: Zinc, Galvanizing, Thermal Spray, Infrastructure, Corrosion.

1 Introduction

In an analysis to determine the cost of corrosion, the U.S. economy was divided into five major sector categories, including infrastructure, utilities, transportation, production and manufacturing, and these were further broken down into 26 sectors. It was found that direct corrosion control costs are estimated to be over 3% of GDP every year [1]. The study defined the total direct annual corrosion control costs as those incurred by owners and operators of structures. The indirect costs, which include such factors as lost productivity because of outages, delays, failures, and litigation were not included. The indirect costs of corrosion were conservatively

estimated to be equal to the direct cost, or a combined total of 6% of GDP.

Zinc provides the most effective corrosion protection for steel by acting first as a barrier coating, keeping corrosive elements away from the steel, and secondly as a sacrificial anode. Zinc will corrode preferentially to protect the steel [2]. Two ways zinc coatings can be applied are by hot-dip galvanizing or by thermal spraying. Zinc coatings applied by hot-dip galvanizing involve the full immersion of the steel piece into a bath of molten zinc, which ensures complete coverage of all surfaces, inside and out. Zinc thermal spray involves projecting drops of molten zinc onto the surface of the steel using compressed air. With thermal sprayed zinc coatings, there is no size limitation to the part to be coated, and the