



## Influence Evaluation of Scratch, Coating Method and Spray Method by Combined Cycle Test of Metal Spray Plate

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### Abstract

Metal spray is beginning to come into use as a means of extending the life of steel bridges by preventing corrosion. A combined cycle test parameterizing the type of spray metal, scratch depth, surface preparation grade and the spray method was carried out to evaluate the effect of scratch caused during construction, the effect of the coating methods of the sprayed metal surface and the effect of spray methods. The test showed that the spray method, scratch depth and coating method affect durability, that coating on the spray metal surface can have adverse effects on durability and that even simple touch-up coating can be highly effective as a repair method.

**Keywords:** spray bridges; corrosion durability; scratch; combined cycle test; repair coating.

### 1 Introduction

Steel bridges account for about 6,000 bridges managed by NEXCO (Nippon Expressway Company Limited), and about 40 percent of those bridges have been in service for more than 40 years. Steel corrosion is one of the main causes of deterioration of steel bridges in Japan. It has been reported that steel corrosion is the reason for the reconstruction of one half of all the bridges in need of reconstruction [1], and there are also bridge structures whose load-bearing capacity has been affected by corrosion [2]. Corrosion control, therefore, is important in the maintenance of steel bridges. In view of the growing maintenance cost and the tendency of decrease in maintenance personnel, there is a pressing need to carry out maintenance efficiently and establish corrosion control measures that can be expected to reduce life cycle cost and maintenance manpower needs.

In recent years, metal spray began to be used, mainly in areas where repainting is difficult to carry out (e.g. overbridges) and areas under highly corrosive conditions (e.g. offshore/estuary sites,

girder-end zones), as a means of corrosion control that can be expected to reduce life cycle cost. Not much is known, however, about important considerations associated with durability and spraying work management.

In this study, a combined cycle test was carried out to evaluate the effect of scratch caused during construction, the effect of the coating methods of the sprayed metal surface and the effect of spraying methods.

### 2 Test method

#### 2.1 Test specimens

*Table 1* shows the test specimens. The combined cycle test parameterizing the type of spray metal, coating method, scratch depth, surface preparation grade and the spray method was carried out on a total of 31 types of specimens.

Four types of metal whose performance has been proven in bridge projects were used for spray metal: (1) zinc (Zn), (2) zinc–aluminum alloy (ZnAl), (3) aluminum (Al) and (4) aluminum–magnesium