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Management of Dry Air Injection System for Main Cables of Suspension Bridges in Honshu-Shikoku Bridges for 20 Years

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ABSTRACT

Main cables are the most important components of suspension bridges and require reliable corrosion protection because they are difficult to replace. In the past, corrosion protection has been performed mainly by coating the cables to block moisture. In 1989, after six years of service, inside of the main cable of the Innoshima Bridge was investigated. As a result, water was found inside the main cable and corrosion was confirmed on the surface of the galvanized steel wire. This revealed that conventional methods alone were insufficient to prevent corrosion. Because of this fact, investigation of effective methods of main cable corrosion protection under Japanese climate was started. As a result, a dry air injection system was developed to prevent corrosion by injecting dry air into the cables. The system was adopted for the first time in the world for the Akashi-Kaikyo Bridge in 1997 and the Kurushima Kaikyo Bridge in 1999. In addition, the dry air injection system was installed on six existing suspension bridges, including the Ohnaruto Bridge, from 1997 to 1999. More than 20 years after the system was introduced, the relative humidity in the main cables has become stable on all suspension bridges of the Honshu-Shikoku bridges. This paper presents the maintenance, improvement, and future prospects of the dry air injection system for the Akashi-Kaikyo Bridge, the first newly constructed suspension bridge to adopt the system, and the Ohnaruto Bridge, the first existing suspension bridge to adopt the system.

Keywords: Suspension Bridges, Main Cables, Dry Air Injection, Corrosion Protection, Maintenance

1 INTRODUCTION

The Honshu-Shikoku Bridge Expressway (HSBE) consists of three expressway routes connecting Honshu and Shikoku islands with long-span bridges (Honshu-Shikoku Bridges) (Figure

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