

Study of Intelligent Bridge Cable Technology and Maintenance Management Platform

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Abstract

As the most critical member, the service status of the cable system plays a crucial role in the longevity of cable-supported bridges. As bridges advance in age, their cable system is undergoing a process of accelerated deterioration. Hence the need for safety evaluation of cables is getting more urgent. At present, cable maintenance mainly relies on the manual inspection by engineers, which features low efficiency, high costs and risk, and potential non-inspection zone. In this context, we studied the fusion technologies between sensors and cables, and developed a maintenance management platform, which can collect data of cable corrosion, temperature and humidity, as well as water accumulation, etc. The intelligent cable products have been tested in outdoor environment since April 2020, and have been successfully applied in several bridges.

Keywords: cable system; suspension bridge; cable-stayed bridge; corrosion; intelligent monitoring; maintenance platform.

1 Introduction

The cable system has the advantages of high strength, light weight, and ease of operation. It is widely used in the field of modern civil engineering structures, including the main cables and suspension cables of suspension bridges, the stay cables of cable-stayed bridge, the hangers of arch bridge, and the cables in large venues or exhibition halls, especially in the field of bridge structures. With the continuous development of bridge structures, more and more cable system bridges have been built internationally, such as suspension bridges, cable-stayed bridges, hanger or tied arch bridges [1].

As the major load-bearing component, the cable system determines the safety and service life of the overall structure. If not detected and maintained in time, the damage such as corrosion will accumulate, which will reduce the usability and durability of the structure [2]. In severe cases, there will be accidents such as cable break or bridge collapse.



Figure 1. Corrosion of cable wire and anchorage