# Replacement of Corroded Cable Stays on Tjörn Bridge

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## Abstract

This paper presents the replacement of cable stays of the 33 years old Tjörn Bridge located in Sweden. The bridge has a main span 366 m and a total length of 664 m. The bridge has a locked coil cable system of 64 cables, where some cables have corroded with a number of wire failures. The reason is exposure to water and ice combined with insufficient drainage. The paper describes the full story from detecting the corrosion problem to restoring the safety of the bridge by replacing the cables in a safe way. The paper presents and discusses the history of inspection and identification of the corrosion problem and the challenges and solutions of the replacement of cables. As several cables had been ex-posed to a corrosion risk, the replacements carried out, required an in depth safety analyses to consider the strength of all cables

**Keywords:** Cable stays, corrosion, rehabilitation, safety, finite elements, measurements.

## 1 Introduction

### 1.1 Cable Stay Bridges

For medium to long-span bridges, cable stay bridges have been used as an effective bridge concept over the last 60 years. As cable stay bridges have begun to get old, focus has increased on inspecting and maintaining these bridges as different examples of durability problems have started to occur, [1], [2]. Suspension bridges have experienced the same type of problems, [3] and [4]. The main issues are corrosion, vibrations, fatigue and coating problems.

### 1.2 Corrosion

Corrosion at the lower anchorage is the typical the controlling parameter for cable stays and suspenders. The weakness may be due to design, construction or operation and maintenance. The lower anchorage is a weak spot because water from outer surfaces on the cable runs down to the anchorage, where it may lead to corrosion unless the water is drained away very efficient. For parallel wire strands in a HDPE tube also condensation of air inside tube may be a problem.

The expected service life is considered to be about 60 years but may be significant smaller if the cable



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