



## Structural Assessment and Rehabilitation of Concrete Bridges

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## Summary

The Italian infrastructural network presents some thousand bridges, many of which more than 50 years old and often situated in unfavourable environmental conditions. Transportation agencies are faced with continuous challenge of keeping bridges in good service conditions despite the unavoidable sources of damage leading during time to a deterioration of the structural performance. The need of upgrading the civil infrastructures might arise from many factors, like normal aging, damage induced by particular strong environmental conditions, absence of periodic maintenance interventions, wrong design choices or construction defects, upgrade of the structural safety demand required by codes, some exceptional situations like accidents or earthquakes, and others.

In this context, the problem of structural rehabilitation is receiving a growing attention. Recently, besides the traditional methods using conventional materials, some new rehabilitation techniques using fiber reinforced polymers (FRP) are emerging.

This paper shows the efforts spent by SPEA Ingegneria Europea and Autostrade per l'Italia companies in developing rehabilitation interventions of existing bridges affected by different kinds of deficiencies and problems. To this aim, some applications to structural rehabilitation of bridges using both traditional and innovative techniques are presented.

**Keywords:** Concrete bridges, assessment, rehabilitation, FRP techniques.

## 1. Introduction

In Italy the most part of the national infrastructures was realized since the 1950s. Due to aging and unfavourable environmental conditions, many of these structures are no longer able to sustain the safety level required by the codes. In addition, there is a growing need for widening the highway system to comply with higher volume of traffic and for strengthening existing structures to carry heavier loads at higher speeds.

Autostrade per l'Italia, the main Italian transportation agency, and Spea Ingegneria Europea, its design company, are spending great efforts in updating the highway network and improving its safety level both by designing new durable structures, and by rehabilitating existing structures using innovative technologies. Within these assessment and design processes, a crucial role is played by the performance requirements imposed by the new Italian seismic design code. In this context, the need of a consistent methodology for the design of proper rehabilitation strategies arose and led to the creation of a set of basic guidelines and practical applications that are presented in this paper. These guidelines are developed specifically for concrete bridges, but should provide useful recommendations even for retrofitting of other types of bridges.