

RICCARDO MORANDI AND HIS LEGACY IN THE REALIZATION OF ITALIAN CONCRETE BRIDGES

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SUMMARY

The realization of concrete bridges in Italy in the last century started a bit later in comparison to other European countries such as Germany and France. However, the work of important designers such as Arturo Danusso, Eugenio Miozzi, Giulio Krall gave a huge impulse to bridge engineering in Italy, reducing the gap with leading countries. In particular, the role of Riccardo Morandi was quite exceptional, due to his innovative design criteria which are very well represented, for example, in the Storms River bridge in South Africa and in the Fiumarella Bridge in Catanzaro. The recent tragedy of the collapse of Polcevera viaduct in Genova is instrumental in discussing the different approaches needed when dealing with important existing bridges and the possible retrofitting techniques.

Keywords: *Concrete bridges in Italy, Innovative design, Riccardo Morandi. Polcevera bridge reconstruction.*

1. INTRODUCTION

This paper presents a brief history of concrete bridge design in Italy, describing the work of some of the most representative and influential designers in XXth Century. In particular, the paper focuses on the figure of Riccardo Morandi, amongst the greatest designers in Italy, and to the recent collapse of a bridge designed by him in Genova. Today's interest in environmental protection, combined with durability issues have contributed to a renewed effort in modern design concepts, building methods, and administrative controls. Looking into the bridge's history constitutes an appropriate approach to understand this scientific and technological progress, and to decide how to deal with existing infrastructures which need to be refurbished.

The introduction of concrete as a building material, at the end of the XIX Century, represented a significant step forward in construction history. The potential of this new material was not immediately recognized, such as the freedom to adopt any structural shape and the capability of withstanding flexural loads. In fact, concrete favored the transition to a new era in the construction of a variety of structures and – particularly – of arch bridges.

2. THE FIRST DESIGNERS TO EMPLOY CONCRETE IN BRIDGE DESIGN

The first theoretical studies and applications of reinforced concrete were French and German. François Hennebique (1842-1921) and Emil Mörsch (1872-1950) were the most eminent researchers that contributed to the development and success of reinforced concrete, influencing the next generation of designers. In Italy, a few years later, Arturo Danusso (1880-1968), was among the first to realize innovative works in structural conception, selling in Italy the 'Hennebique' system from 1895 to 1933.

Danusso designed in 1907 the Astico bridge in Calvene (Fig. 2). The bridge is made of a lowered arch 34.50 m long with a 2 m rise. The arch is linked to the deck in the central part and sustains the upper slab with two vertical walls. The structure is light and harmonic and is one of the more interesting lowered arch bridges of that time.