

Smartcoco Research Project

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Abstract

The SMARTCOCO research project was developed to fill gaps in knowledge and provide design guidance for specific types of composite steel concrete structural elements used in high rise or heavily loaded structures. Those composite elements belong to structures defined as “hybrid” because they are neither reinforced concrete structures covered by Eurocode 2, nor composite steel concrete structures covered by Eurocode 4. A generic design approach based on the logics of composite sections and of reinforced concrete sections, like equivalent sections and struts and ties mechanisms, was first developed and used to design test specimens. These ones were tested in physical and/or numerical experimentations. The results were used to calibrate or correct the initial proposal for design. The output is written as a design guide which intends to complement Eurocode 2 and 4.

Keywords: steel profile, composite, hybrid, encased section, embedded section, columns, walls.

1 Introduction

During the detailed design of high rise buildings, the use of composite members is often becoming a necessity in order to optimize the size of the elements. Most of these specific calculations are not covered by international standard. This was the starting point of the SMARTCOCO project which stands for Smart Composite components.

The research project Smartcoco addresses composite steel concrete structural elements or connections that all belong to structures defined as “hybrid”, which means that they are neither reinforced concrete structures in the sense of

Eurocode 2, nor composite steel concrete structures in the sense of Eurocode 4.

Such structures constitute in fact a mix of reinforced concrete and steel or composite types of structures, without the limitations that are present in those reference types: composite steel concrete structures defined in Eurocode 4 possess a continuous steel skeleton with concrete around and there is only one encased steel element in composite sections. The hybrid structures envisaged in the project are reinforced concrete structures in which some elements are steel or composite or concrete reinforced in an unusual way by means of several embedded steel profiles (see Figure 1).