

PHD THESIS ABSTRACT

"CONTRIBUTIONS TO THE DESIGN OF COLD-FORMED STEEL PURLINS"

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This PhD thesis belongs to civil engineering field by it's subject based on the main problems that affect the continuity joint of cold-formed steel purlins.

In the research program that belongs to this PhD thesis, there were studied the main problems regarding the structural behavior of this bent elements and them specific failure modes.

The scope of this study was to provide enough information for using a finite element analysis program in order to extract the results which are required in the design procedures of steel purlins.

During this study some innovative ideas were developed in order to create an algorithm which can be followed for designing steel purlins in various configurations.

The thesis contains 7 chapters which presents the evolution of study from the current state of knowledge to the final conclusions.

In chapter 1 there were presented the scope of the thesis, a brief history of this kind of profiles and also the current state of knowledge in the field of cold formed steel structures. In the end of this chapter there were presented some building solutions by using cold-formed steel elements.

Chapter 2 is dedicated for the particular behavior problems that can occur in some practical situations that involves the use of thin walled profiles. This chapter contains information about the materials used and also the technology involved in manufacturing cold-formed steel profiles.

In chapter 3 there were presented the instability phenomena that can affect this kind of thin walled profiles. Cold formed steel purlins are subjected to some vulnerabilities that were discussed in this chapter in order to establish some design procedures.

Chapter 4 presents the main forces that can interact with steel purlins and also the implementation of Finite element analysis in designing of cold-formed steel purlins.

In chapter 5 were described the main methods used in the calculation of cold-formed steel elements that can be used in designing this kind of purlins.

Chapter 6, the widest one, contains the experimental program used for study of thin-walled steel purlins, which consists of presenting the experiments and the results that were used in order to express some analytical relations between deformation and rigidity which can be used in designing steel purlins subjected to lose the stability due to them thin walls.

Chapter 7 presents the conclusions and the main contributions regarding the design of steel purlins. In the end is highlighted the dissemination of research results by publishing some articles during the PhD studies.