Influence of steel innovations and experiments on Belgian architecture

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I. INTRODUCTION

Since the industrial revolution, cast iron, wrought iron and steel became more and more important as a building material. Although plenty of technological studies and new production methods have been executed, there is very little known about its evolution and use in non-engineering applications in Belgium. As a result, numerous experiments and innovative buildings remain unstudied.

II. OBJECTIVE

In the history of building as such, new materials as well as the improvement of its characteristics resulted in the erection of new building types which time after time demonstrated inventive technical and architectural possibilities. The main objective of this project is to examine how the evolution of iron and steel affected the evolution of Belgian architecture.

III. TOPICS

A. Evolution of material properties, and calculation and connection methods

Several innovations in steel production characterized the 19th century. The Bessemer process and the Thomas and Martin-Siemens furnaces were on the threshold of a new era. With these new processes there also came a quality upgrade of steel which led to a broader use of this material in architectural and structural applications.

Which principles were used when calculating a structure and how did these evolve from empirical formulas and calculations to the Eurocode which is in use today? When and why was graphostatics introduced for the calculation of steel constructions?

B. Case studies and literature research

In order to examine the influence the several innovations had on architectural an infrastructural design, it is necessary to study several buildings that can be tagged as innovative. Not only buildings where steel of a higher quality or new connection methods are used will be examined, but also those where the material is used in a new, innovative way.

C. Export of knowledge, ideas, and technology

The Vierendeel beam is a well-known international application of this design method described by the Belgian architecture after which it was named. Other examples include the construction of the Cathedral of Managua designed by the Ateliers Métallurgiques de Nivelles and more importantly the export of prefabricated pavillons to the colonies in both the 19th and 20th century.

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IV. METHODOLOGY

A study which contains many different topics involves the consulting of several sources and literature. Numerous books, (technical) manuals, papers and periodicals have appeared describing history and innovations in steel. Many reference works will be analyzed to provide a solid base for the research. Next to these more general works, there are also some specific technical books and manuals about the characteristics of steel and the calculation of (steel) constructions. Researchers and engineers as Magnel, Vierendeel and Vandepitte are eminences in this field.

V. CONCLUSION

Architectural and (infra)structural design are based on the characteristics of the used materials. Hence, it is easy to see that, with the introduction of a new material or the improvement or innovation of an already existing one, the constructional bounds are being transferred to a higher level. In order to determine the influence one has had upon the other, this research project will link architectural design with the technological aspect of steel and its processing.

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