

Development of temporary joining elements in lightweight metal systems between complexity of form and simplicity of installation (Analytical study)

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Abstract

Complexity and simplicity are two interrelated terms that refer to each other in many fields of knowledge. Complexity is an integrative structural arrangement that indicates the number of possibilities in a system. In design, complexity is a case that stems from dimensions and philosophical visions of different design trends. Complexity is usually employed to change the stereotypes of systems and products to interest the end user. Simplicity means that something is easy to understand or do and it is a way of describing seemingly complex results using just a few rules, bits, and interactions. The structural assembly of metal systems includes many single elements that are grouped temporarily together, each of them has a secondary function that shares together to achieve the overall function of the required system. The multiplicity of parts and components of the system may result in varying degrees of structural and functional complexity, the degree of which varies according to the function of the system, its environment and the characteristics of its components. As long as the end user becomes a part of the system building process, it is important that complexity is not reflected in the end user and the process of assembling system is simplified with the least amount of skill.

When developing metal systems, many designers often focus on one of two aspects: either the orientation towards the complexity of the structural forms of the system through the complexity of the parts that it consists of, or the orientation towards simplifying the assembling process in order to reduce the manufacturing cost and facilitate maintenance operations. Hence, the **problem of research** included the following questions: From where does the process of developing light metal systems begin: from the inside or from the outside? How can enhance the structural solutions that based on a single system designing to meet different functions? How can the complexity of the form be combined with the simplicity of construction to enhance the economic, formal, aesthetic and functional values of these systems? How can metal systems be developed and made extremely diverse in formality, structural complexity and structural simplification?

Then the **Research aims** make an analytical study about development of temporary joining elements in lightweight metal systems, between complexity of form and simplicity of installation. This aim was accomplished according to an **analytical descriptive approach** based on three **topics**: First, joining in prefabricated metal systems, second, the simplicity and complexity in designing prefabricated metal systems, third, an analytical study about development of the components of the synthesized construction between simplicity and

complexity. The aim was achieved on the basis of a research hypothesis according to: the balanced mege between the complexity of the form and the simplicity of assembling in the elements of the assembly construction of metall systems, which will lead to the enrichment of the functions and competitive valeuss of those systems. It makes its structural and functional images more effective in meeting changing user requirements, achieving ease of assembly, use and maintenance, and creating forms of seemingly complex metal systems, but they are easily constructed from simple parts. Finally the research concluded with a discussion and conclusion of relevant results.

Keywords:

(Lightweight metal systems, Simplicity, Complexity, Prefabrication, temporary joining and Separated jointing nodes)

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