Elegant Structures

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Summary

The theme of this conference is "Elegant Structures". Correspondingly, in the full version of the paper, which is summarized here, the intent will be made to define what elegance is and to find answers to questions such as: Is elegance is an ingredient for "good" building? Where do we find elegance in structures and do we really need elegant structures?

Keywords: elegance; light-weight structures; holistic quality; culture of building; conceptual and structural design.

1. What is elegance?

The word elegance stems from the Latin verb eligere = select and today is often referred to something of selected beauty. In the course of history elegance sometimes had a negative connotation, of dandyish matters and superfluous luxury. What is meant today and here, however, is elegance in the sense of selected beauty, of "beauty plus". Beauty plus lightness and transparent appearance. Beauty plus reduced and purist shapes. Beauty plus simplicity. Everyone has his own associations, the definition of elegance depends very much on the personal perspective. An important quality of elegance, however, is that it appears effortless. We feel the efforts that were needed to achieve something but we do not see them anymore. Elegance is effortless beauty.

2. Is elegance an ingredient for good building?

If we look at classic definitions of the principles for good building we find that often a trias is used. One of the oldest and the most well known is "firmitas", "utilitas" and "venustas" (strength, utility and beauty) by the roman architect Vitruvius. There are numerous other definitions and the term elegance does not always appear. When elegance is used, interestingly it is often engineers who name it as a principle for good structures. An example is David Billington who defines the ideals of structural art as efficiency, economy and elegance.

Fig.1 Principles for good structures

3. Where do we find elegance in structures?

Bridges and towers are often very demanding structures and to make them a success we should follow the above principles (fig. 1). When the design covers a trias of principles (more of them are described in the full paper) it is of holistic quality and it can contribute to the culture of building. Elegance is one of the principles for good structures but not the only one.

What is important is that in addition to the principles we understand the design of a structure as a conscious act, an act of conceiving the solution by carefully considering the local context, the boundary conditions to our design that can be of topographical-physical, technical-fabricational or political-cultural nature. Also it is interesting to note, that often good structures show a readable flow of forces, perhaps because then they are easy to understand and because we like what we understand. Often elegant structures are light-weight structures.

It is not only the final structure that can be elegant. In engineering, the methods of analysis and the construction process can be elegant in the sense that the solution appears obvious, effortless.

4. Do we need elegant structures?

Most agree, that good, i.e. quality structures increase our quality of life, they help us to live a good life.

Life is sometimes a challenge and we would like to live it effortlessly. With regard to this elegant structures around us can help. The claim is that elegant structures stimulate elegant life.