Conceptual design for bridges: Are we doing it in education & practice?

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Abstract

The engineer's responsibility nowadays is not only in technical optimisation and maximization but also more in developing innovative design ideas, which fulfil the cultural and social demands and simultaneously combine the beauty, economy, slenderness and stability criteria. The concept of the bridge design is the most important phase, however the designer should be capable to consider different structural systems and he should deal with the structural behaviour and design of different structural materials without any restrictions. Focusing on the status of the structural engineering nowadays, one can state the following:

- Due to the splitting of the educational system according to the material type, i.e. design of concrete structures, design of steel and timber structures, there are engineers, who could deal only with either steel or concrete bridges. Therefore, in frequent cases the decision is pre-made according to the experience of the designer!
- The standard well-known technical solutions are easier to be followed for a certain design than thinking from scratch, due to mental, social and economic reasons. As a result of that, the standard technical solutions and/or repeated ideas will be applied, thus it results in an overall low/bad quality. Therefore, the structural engineering has lost great part of its social image worldwide and thus less qualified brains are attracted to this profession, which again has negative retains on the whole thing.

Keywords: Conceptual Design, Innovative, Bridge, Design, Extradosed.

1. The University Role and Society Role

Improving of the overall quality of bridges starts from the university level in order to have qualified engineer, who could deal with the overall conceptual approach. Therefore, bridge design should be taught as early as in the undergraduate study level. Further, the engineering society should contribute to the development of bridge engineering by supporting education and research.

1.1 A Model for Educational System

The proposed educational model is based on the following two pillars:

Material independent design teaching system, in which the bridge design should be taught independent of the applied materials, e.g. concrete, steel, timber and/or their composite action.

The overall conceptual design approach should be taught in the early stages of the university studies, taking into consideration

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