

An Integrated Multidisciplinary Approach to Design of Major Fixed Links

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Summary:

The decision process at current time for planning, design and construction of major fixed links is in many ways considerably more complex than previously. The ultimate challenge has shifted from the pure design and proof of structural adequacy, to become much more multidisciplinary because of two trends: The methods of analysis and check of various structural configurations have improved immensely because of modern computer software and high capacity computers capable of analysing the most complex structure, even including higher order effects. Society, however, require much more comprehensive documentation and justification with high transparency as a basis for debate and dialogue in connection with the decision process.

These trends shift the focus of the leadership from the specialised bridge engineer towards a more comprehensive approach with other investigations to be performed by other disciplines, i.e. climate- and environmental engineers, resource experts, economists, risk managers, planners, biologists, energy experts, logistics experts, architects and many other disciplines. On top of this, employment and currency aspects import/export as well as political aspects enter the complicated decision complex.

Based on a.o. northern european experience an integrated approach is proposed to respond to these future challenges as well as the need for future development in materials and bridge systems.

1. Introduction:

Bridges have traditionally been designed by imminent individual and visionary engineers, and this is universal all over the world. Bridge conceptual development, design and construction were considered an art based often more on structural intuition than detailed design and analysis.

This has changed considerably with the advance in structural engineering and other non engineering factors influencing the design decisions for major fixed links.

The case for a multidisciplinary approach in the future is presented which takes advantage of the immense progress in the state-of- the- art for bridge engineering and takes into account other influential factors of the modern time in an ever increasing complex world.

Although bridge engineering in itself is a key discipline in the process, it plays a smaller role in the overall political decision process.

The bridge has to be functional, look excellent, have signature character etc. but people do basically resist to changes from what they know and are comfortable with. Environmentalists defend the existing environment and do basically not want changes. The concerns about climate, CO₂ emissions and the expected lack of energy resources make people hesitant or nervous. Local people resist because of risks of local impact from noise, air and water pollution, and increased traffic congestions etc. Bridge- and traffic experts may be looked upon as technocrats who are constantly