Cross-Sections of long Composite Bridges – Performance based Design

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Steel-concrete composite bridges play an important role in building motorway bridges of small and of long spans. The paper puts the focus on large span bridges of the construction type deck bridge. Today, four different cross-sections are built regularly. These four cross-section types are investigated and the adequate area of use is proposed considering life cycle performance. Possibilities of further development are discussed.

Keywords: steel-concrete composite bridges; deck bridges; cross-section types; comparative study; performance based design; options for development;

1 Introduction

Steel-concrete composite bridges play an important role in building motorway bridges of small and of long spans. Topic of this paper is the area of large span bridges of the construction type deck bridge. For these bridges are used different cross-section types today. The cross-sections are investigated and the adequate area of use is discussed considering life cycle performance. Furthermore, chances for future development are shown.

2 The current types of Composite Deck Bridges

At about 1990 a certain standard of composite bridge construction was reached. The large steel box was used since about 1970; the mobile formwork for the deck slab was known since about 1980; and in the 1980ies research had been done after which the deck slab could be constructed without longitudinal prestressing. Efficient composite bridges could be built on this basis.

Two types were built considering the cross-section; first, the open large box for the regular width of the superstructure; secondly, the large box with inclined struts for very broad bridges, especially when one superstructure was constructed for the two motorway directions.

Modifications of these standards were soon worked out. At about 1995 the cross-section with two small boxes was developed and since about 2000 the cross-section large box with cross girders was introduced.

The characteristics of these four types are discussed in the following.

The most frequently used erection method is the launching of the steel construction. In the following this method is taken as basis.

2.1 Cross-section - Open large Box

The usual configuration is shown in figure 1. A tension element between the web plates is often used to counteract the loads during concreting the deck slab.

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