Abstract

Techniques of dimensioning concrete superstructures

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Contractor: Dr.-Ing. Lissi Pfeifer, Berlin
Researchers: Dr.-Ing. Lissi Pfeifer, Berlin
Dipl.-Ing. Alexander Kiehne, Dresden
Dipl.-Ing. Stephan Villaret, Hönnow
Customer: Bundesministerium für Verkehr, Bau- und Wohnungswesen

Superstructural design of traffic surfaces in Germany is governed exclusively by RStO standards regarding pavements. This also applies to the thickness of concrete pavements.

The activities forming part of this project are by no means intended to revoke the RStO specifications, which usually underlie planning and construction measures. However, the required thickness of concrete pavements depends on a large number of factors which cannot be taken into consideration during a standardization of pavement design. This can only be achieved with a free dimensioning technique. General techniques of concrete design can be used as a basis for this.

The prepared dimensioning technique is intended primarily for plain concrete pavements but can also be used for reinforced pavements if the moment of resistance is determined and specified in accordance with the steel reinforcements used.

In recent years, semi-probabilistic techniques of dimensioning structures and components have generally been introduced in the construction industry, also on an international scale. Decisive aspects of such techniques include:

- Comparisons between acting moments and moments of resistance
- Formation of a nested complex comprising design loads, calculations (of moments) and verification (in accordance with limit states)
- Definition of limit states
- Use of partial safety factors (related to load, adaptation, material) which provide differentiated references to influences on dimensioning and are replaceable in accordance with current findings and states of advancement. General safety factors are accordingly dispensed with.

A further consideration, especially in the case of plain concrete structures, is that the moment of resistance is ascertained via the tensile strength, which is determined as an interlamellar tensile strength during initial tests and on drill-core discs during check tests.

Verification is performed in 6 different cases: quasistatistical verification at the limits of load-bearing capacity and proper utility, as well as fatigue verification at the limits of load-bearing capacity, for transverse and longitudinal joints in each case. The largest resulting thickness is authoritative.

The AWDSTAKO computer program developed for this purpose in 1990 was re-written to permit dimensioning via an easy-to-use dialog and calculations of variants on the basis of parameter entries within specified ranges.

The project activities included an examination of the calculation system and all partial safety
factors. A number of factors needed to be updated here, including all load-related factors (tyre type, contact pressure, design wheel load, reference axle, impact factor). Functions were also prepared and introduced for several dependencies.

The easy-to-use AWDSTAKO computer program 1.0 was developed for the dimensioning technique.