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Autor(en): **Günter, Martin / Müller, Harald S. / Hilsdorf, Hubert K.**

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Investigation and Repair of Old Culturally Valuable Concrete Structures

Martin GÜNTER
Dipl.-Ing.
University of Karlsruhe
Karlsruhe, Germany

Harald S. MÜLLER
Prof. Dr.-Ing.
University of Karlsruhe
Karlsruhe, Germany

Hubert K. HILSDORF
Prof. Dr.-Ing.
University of Karlsruhe
Karlsruhe, Germany

Summary

The preliminary investigation and the repair of culturally valuable concrete structures is determined by the demand for preserving the original architectural appearance and surface texture of the altered concrete structure as well as for meeting the technical requirements for a durable structure. The characteristics of such an investigation and corresponding repair strategies are described and illustrated by two examples, the music center "Liederhalle Stuttgart" and the concrete dam "Schluchseesperre" in the Black Forest.

Keywords: investigation methods, concrete surfaces, architectural aspects, preserving the surface texture, repair strategies

1. Introduction

In almost all conventional measures of protection and repair of concrete structures where the surfaces are damaged due to various deterioration mechanisms the repair consists of applying surface coatings or overlays made of polymer or mineral materials to the entire surface of the structure. Sometimes, this is indeed the only method to preserve the load carrying capacity and the functioning of the structure. But in many cases this is not necessary at all, and the only purpose of such a measure is to give the building an immaculate appearance.

In the full paper it will be shown, that, on the basis of accurate and detailled investigations of the structure and its materials, it may be possible to repair old concrete buildings much more carefully. In this context we limit ourselves to the repair of concrete and reinforced concrete structures which have gained historical importance due to their architectural appearance or due to special technical qualities.

2. Investigations

The objective of such investigations is to create a solid basis for the prediction of the progress of the deterioration and corrosion of the old structure so that a restoration concept can be developed which preserves the original concrete surface whenever possible. Furthermore, such investigations are necessary to derive measures for a suitable restoration of the deteriorated parts of the concrete surface as well as to develop and specify repair mortars or concretes which are compatible with the old concrete surface in technological as well as in architectural

respects. Finally on the basis of the investigations strategies for the maintenance and the inspection of a particular member or building have to be derived.

3. Repair work

The method of repair of the structure depends on the results of the comprehensive investigation and may differ from conventional methods. In some cases, repair mortars or concretes have to be used which are not commercially available, and which have to be optimized in its particular technological and visual properties. In the full paper the investigation and the repair of two culturally valuable buildings under the aspects described above are illustrated.

4. Conclusions

The preservation and repair of monuments and historical buildings made of plain or reinforced concrete should be designed such that the original appearance and the original surface texture is preserved as far as possible. To accomplish this, preliminary investigations and strategies are required which differ from those usually applied in the conventional repair of concrete surfaces. Hence, special methods and planning tools have to be developed and used to take into account particular architectural and technological aspects. The detailed scientific based investigations create the basis to minimize the extent to which the original surfaces had to be altered in order to preserve the overall impression of the structure. Further damage, which also has to be expected in conventional repair work, should occur only to a very limited extent and may be repaired within the regular maintenance work.

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