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## Renovation of Facades and Masonry with Special Dry-Mix-Mortars

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### Summary

The successful renovation of buildings with special dry-mix-mortars requires the exact knowledge of the conditions at the building generated by a competent analysis of the actual situation and an evaluation on the factors that caused the damage.

The right interpretation of the collected data will then result in the selection of special dry-mix-mortars. These materials must fulfil the requirements of high quality dry mix mortars according to technical properties, applicability, and quality assurance.

**Keywords:** Mortar, renovation, renovation render, damage analysis, joint-filling-mortar, stone-repair-mortar

### 1. Introduction

The maintenance and renovation of existing buildings are objects of common interest. The decay of buildings may be caused by ageing, increasing exposure to aggressive environmental factors, intensified exploitation and many others. The restoration of the damaged structures follows a wide spread area of different objectives. Whether it will be the structural repair on a road bridge in order to maintain infrastructure necessities, or the renovation of an ancient palace of high historical and cultural value. At a first glance the repair work at the different job sites make use of similar technical equipment and in many cases similar repair materials but going deeper into details it becomes clear that in most cases specialty products are required and applied. Before deciding on the right repair materials the object has to be analyzed in order to adjust the repair materials to the conditions at the job site and to maximize the success of the renovation operation. This paper will deal with some aspects on building condition analysis and the adjustment of special dry-mix mortars to minimize the risk of application failures.

### 2. Evaluation of the Building

#### 2.1 Damage Analysis

The renovation of a building should include the removal of the circumstances that lead to the damage and the protection of the building. The first factor is therefore of present interest whereas

the second one is future orientated. An all-including investigation plan should contain the documentation of the history of the building, the localisation of the damages and the analysis of the inherent factors causing the damages. This work builds the basis for the renovation plan which leads to the right choice of technical means and materials. Detailed analysis plans lead to the fixing of renovation plans which are mostly not standardized. Therefore it is absolutely compulsory that special materials are available which are very often exactly and only designed for one special project.

## **2.2 Building History**

The history of a building is composed by a variety of interacting parameters. It may be the age of the building, how it was utilized, which building materials were used and which techniques were applied to erect it. Other circumstances, not mentioned here, may be of interest for certain projects. The detailed knowledge of the history of a building allows for the classification of the building into categories of historical value. It will detect changes in its utilization, clarify the situation on the availability and will give hints on the types of the original building materials. Furthermore, the knowledge of the history of a building could direct the analyst to investigations which would not be forced, because the importance would not become obvious otherwise. Some utilisation generates aggressive substances for buildings and certain trades were operating with specific substances that lead to damages over time. If, for example, the location of a former stable is known which was utilized later for some other totally different purpose, this is indicative to salt contamination of the masonry. Knowing that an ancient house was occupied by a tanner would lead the investigation instantly to the detection of masonry contaminated with chromium or other salts used earlier for the tanning of the animal skins.

## **2.3 Localisation of Damages**

The renovation strategy can not start before fixing the extend of damage at a building. Data on type of damages like spalling, crack size and shape, efflorescence, moisture, area of defects, external impact and so on, have to be collected and must be documented completely together with photographs of the object. Only the evaluation of the significance of the detected defects can lead to the decision on which type of renovation system should be applied or whether it is principally possible, according to technical or financial constraints, to carry out the renovation plan.

## **2.4 Damage Analysis**

The analysis of the damage goes along with a sampling plan of the object and the selection of the proper analysis methods. As the taking away of a sample specimen from a building means always an additional destruction of the original substance the right locations for the sampling at the building must be well organized in order to get a general overview on the type of damage by the lowest possible number of samples. In some cases it may be sufficient to analyze the damage by non destructive methods. This methods should be preferably used, if the results of such methods are generally sufficient to create a clear overview on the situation of the whole damage. Depending on the type of destruction at the building and the type of structure there is a great variety on the necessary data to be collected. The following enumeration of different material parameters that are necessary for a proper analysis are therefore only a selection.