

The three



The Three Crowns office building in Augsburg, Germany gets an impressive new look after a complete remodeling.

by *Walter Mauer*

The Three Crowns Building was erected on the Bahnhofstrasse in the heart of Augsburg, Germany, on the site of the Three Crowns Hotel that was destroyed by bombing in the Second World War. The Bahnhofstrasse was developed at the end of the nineteenth century and featured commercial buildings four and five stories tall built in the typical style of the German industrial revolution, most of which were destroyed along with the hotel. In the 1970's with the agreement of local zoning authorities it was decided to remodel the exterior so it would harmonize with the architectural fabric of the remaining undamaged buildings on the street. Among the many designs considered, the one chosen was cladding the facade in precast foamed concrete. The external surfaces were sandblasted, then covered with the concrete panels. Regulations in effect



at the time called for panels 20 cm thick, but 40-cm thick panels were used to prevent the concrete from decaying due to corrosion of the metal reinforcing.

Air pollution and concrete

At the end of the 1980's it became obvious that the measures taken to protect the concrete had been ineffective. The damage caused by vehicle traffic and industrial pollution, acid rain, fumes from automobile exhaust and heating fuel, and the carbon dioxide naturally present in the atmosphere caused severe surface decay and penetrated the concrete. Freeze-thaw cycles and rusting of the rebars caused by carbonation had caused some sections of the concrete to crack and others to come loose. The carbonation of the material, favored by its extreme hygroscopicity, caused the worst damage. Carbon dioxide attacks concrete and reacts with the calcium hydroxide

The Three Crowns Building in Augsburg, Germany after its remodeling





At left and on opposite page, details of the facade with its eye-catching porcelain tile cladding

released during the hydration of cement to form calcium carbonate. This chemical reaction in turn brings about a decrease in alkalinity. When

the pH went lower than 9.5 the rebars were no longer protected from rust. They were corroded by moisture and oxygen, and the rust, which increased the volume of the rebars, caused the concrete covering to detach.

Initially cold-rolled sheet aluminum cladding coated with baking paint was considered, as was covering the facade with a colored, corrosion-resistant acrylic resin-based dispersion system, but both ideas were discarded.

Porcelain tile cladding

The architect engaged by the building's owners studied every possible solution that would enable the facade to be restored without having to use metal cladding. The material had to be waterproof and highly resistant to air pollution, freeze-thaw cycles and variations in humidity. The architect chose ceramic tile which met all of the criteria, since tile:

- has high mechanical strength;
- has a very hard surface with a high resistance to abrasion;
- absorbs very little water;
- is highly resistant to aggressive chemical agents;
- is highly fire-resistant;
- is color-fast.

A trial application was carried out using AP 756 30x30 cm/12"x12" porcelain stoneware tiles by Flaviker. Adhesives and grout were selected that

could resist the considerable stresses that are generated in cladding. For this reason a highly flexible adhesive was used. Naturally the materials had to comply with current German standards, especially with DIN 18156 which specifies that materials must

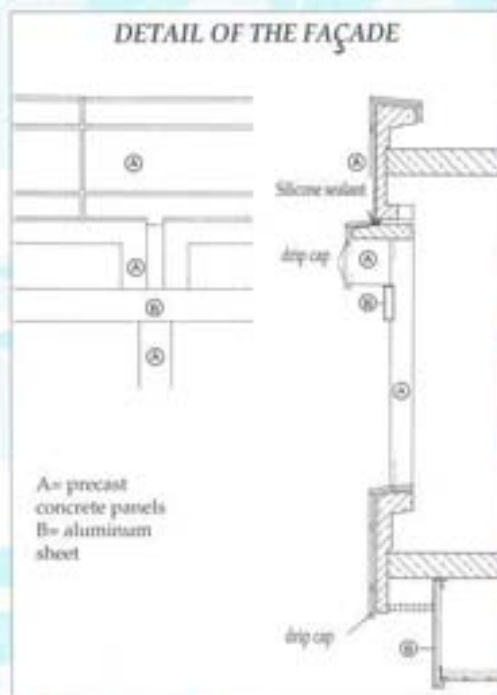
be supplied by a firm with ISO 9001 certification and be installed by a qualified specialized contractor. Mapei products met these conditions perfectly. The tile cladding was installed by Rauten Strauch und Hartman of Augsburg.

After the underlying masonry was properly prepared, repair work was started on the damaged concrete, following methods outlined in DIN standard 18349, specification VOP, section C. The concrete was repaired with special cementitious mortars. The tile was then applied on a surface measuring about 2,100 square meters (22,600 sq ft) using methods prescribed in DIN standard 18157, section 1, as called for in the design and the installation criteria for external cladding in DIN 18515, section 1, of April 1993.

KERABOND* was used to bond the cladding. This product is a powdered ceramic tile adhesive that complies with DIN 18156, section 2, modified with ISOLASTIC*, an elasticising latex for cementitious adhesives. This adhesive is highly flexible and reduces the stresses caused by thermal expansion between the ceramic cladding and the concrete substrate. The adhesive was applied to both tiles and the substrate using the backbutter and float method. This eliminates voids on the substrate, preventing water from seeping in under the tiles, causing them to come loose when ice forms.

Colored grout

ULTRACOLOR* grout was used for





the 5 mm-wide joints. ULTRACOLOR is a fast-setting, fast-hardening cementitious grout that is flexible and water-resistant. A customized shade of ULTRACOLOR was used to give the facade a uniform color, as requested by the city planning commission. The expansion joints on the facade and the aluminum profiles of the windows were sealed with a one-component polyurethane sealant. Using ceramic tile installed with hi-tech materials and systems satisfied the architect's requirements and dispelled all the doubts initially expressed by the city zoning and planning commissions about the size of the tiles used. The long custom-colored vertical and horizontal grout lines make the parapets stand out in bold relief, yet pull all the elements together into a harmonious overall look that is now much admired by all concerned.

Walter Maurer is an engineer who studied at the building department of the Faculty of Civil Engineering at the University of Essen, Germany. Formerly director for Northern Germany of the Technical Applications division of a chemical company, since 1996 he

has been the Technical Service Manager of Mapei GmbH in Erlenbach, Germany.

TECHNICAL DATA

Project: Three Crowns Building, Augsburg, Germany

Built: 1970-72

Remodeled: 1997

Architects: Studio Brendle und Partner BDA, Augsburg, Germany

Cladding contractor: Rauten Strauch und Hartmann, Augsburg, Germany

Cladding: 30x30 cm porcelain tiles by Flavier, Italy

Mapei products used:*
KERABOND + ISOLASTIC
ULTRACOLOR

*The Mapei products mentioned in this article are manufactured in Europe.



The technical data sheets for the products mentioned in this article are contained in Mapei binder No. 1, "Ceramic Tile Installation Products"

