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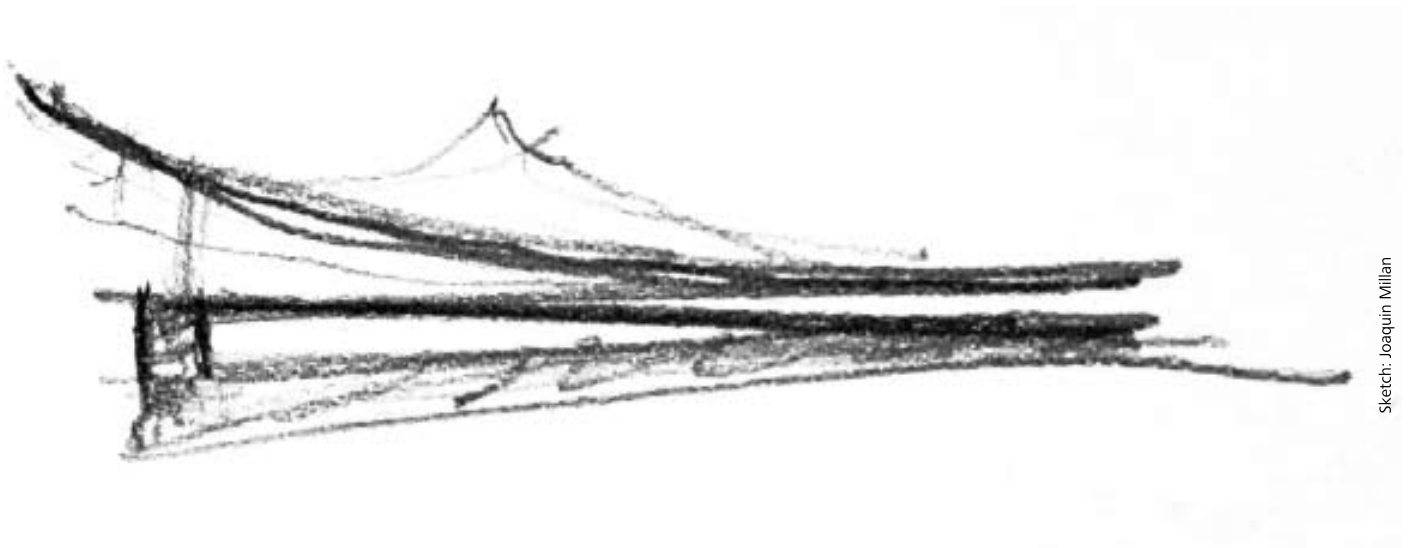
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Auer + Weber + Assoziierte, Architekten Perenthaler, José Antonio Sosa Díaz-Saavedra, nps tchoban voss, OOIO, Sead Gološ, Studio Leoni & Leoni



Sketch: Joaquin Millan

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Sto  Building with conscience.

Auer + Weber + Assoziierte, Architekten Perenthaler, José Antonio Sosa Díaz-Saavedra, nps tchoban voss, OOIO, Sead Gološ, Studio Leoni & Leoni

## Ornamentation and freedom

Facade design always relies on excellent products. But it is especially when using architectural elements to structure a facade that design issues are intrinsically linked with the demand for safety and durability. Profiles and other sculptural products made from Verofill satisfy all of these requirements.



Ken Shuttleworth was able to create the heavily contoured shapes of "The Crescent" using StoDeco profiles.  
Photo: Nigel Young, GB

Equating ornament with crime, as postulated by Adolf Loos in his famous polemic paper from 1908, was the radicalisation of the aesthetic attitude of the emergent modern era and its desire to break with the canons of old. However, it was not a point of view that encompassed all of the architectural challenges faced by modern architects. Knowledge of the rules and conventions surrounding the structuring and ornamentation of historical facades has remained essential, especially with regard to the preservation and, more recently, the reconstruction of our built heritage. Meanwhile, a new generation of architects has emerged that is no longer weighed down by the overly ideological ballast of the early 20th century and has taken a more relaxed approach to ornamentation and the use of architectural elements on contemporary buildings, too. This topic is gaining interest as a result of the recent debate sparked by fears that the necessary requirements for building efficiency, if handled insensitively, could accelerate the increasing uniformity of our towns and cities, particularly in the case of renovation projects. But more and more examples of contemporary projects are showing us that the same applies to ornamentation as applies to facade insulation systems and ventilated rainscreen cladding systems: it's what you make of them.

Renovations and redevelopments using facade elements not only need to meet aesthetic and functional criteria but also ensure safety and durability. A suitable material is required to satisfy these demands: Verofill is a solid, non-combustible material that is not directly prepared on a construction site like conventional

stucco mortar, but rather comes prefabricated from a factory. The architectural elements that are manufactured according to designer specifications are either milled from boards with millimetre precision or cast if they are of a more complex design. On-site assembly takes place regardless of whether the substrate is a facade insulation system, ventilated rainscreen cladding system or a simple rendered wall. In addition to a wide range of prefabricated profiles, it is also possible to use custom plans to create highly individualised products that are made to measure: these include intricate reliefs, beautiful inscriptions, splendid cornices, delicate window frames, solid columns, magnificent capitals and geometric shapes. Thanks to the material's homogeneity, mitre cuts can be produced for perfect fits and a seamless appearance. StoDeco architectural elements not only structure facades and highlight certain facade features, they also transform surfaces. For example, panels with edge moulding or contouring can be used to create rustications or joint patterns on wall surfaces. In addition to the three-dimensional shaping of the facade itself, it is essential in such applications that stringent requirements in terms of substrate evenness be taken into account and the number and arrangement of joints planned precisely. The building is a major factor here. Expansion joints should be incorporated into the entire facade cladding system e.g. facade insulation system plus profile. It is vital that these are resistant to driving rain.

Another significant planning factor is the size of individual elements, which must not exceed 0.96 square metres. Joints



ABG Frankfurt Holding used solid Verofill to create facade details when reconstructing a historical building. Photo: Axel Stephan, Frankfurt a. M., DE



Mineral StoDeco profiles meet heritage authority requirements.



A great deal of attention was drawn to Sto's stand at BAU 2010 thanks to its experimental approach to profiles.



Art-covered buildings as part of a residential project in Mühlheim am Main. Photo: Johannes Vogt, Mannheim, DE

between elements are created during full-surface bonding on substrates. Individual panels can be separated by shadow gaps, but another possibility is to bond several elements together at the joints, which requires them to have bevelled edges. The larger the arrangement of contoured panels or longer the extruded profile, the greater the relevance of stresses and strains in the profiles. Panelled surfaces can reach a maximum of ten metres long and ten metres high without visible shadow gaps or expansion joints. Element length is limited to a maximum of 2.4 metres. Extruded profiles comprising several elements must include a shadow gap or extension joint beyond a length of 25 metres.

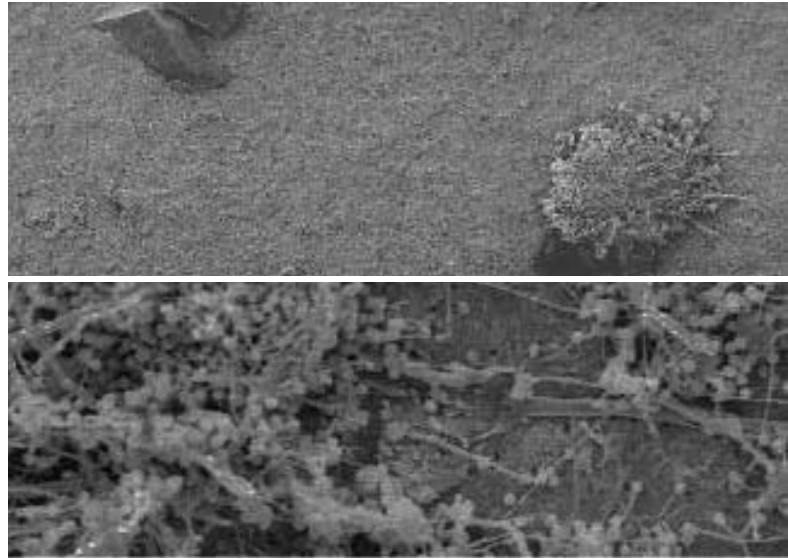
These field limitation joints help absorb hygrothermal stresses in a manner that is free from constraint forces and therefore causes no damage. Movement joints need not necessarily be used throughout an entire existing facade insulation system; it is generally sufficient to make an incision in the insulation. The layout of such joints can be adjusted (within structural limits) to design requirements.

The frequency, arrangement and position of necessary joints depend on other factors: if a facade has a three-dimensional surface, its design must include cross joints around the corners of windows and doors in the case of bonded panels or expansion joints to separate elements. To protect building corners, it may be necessary to separate different sides of the building using joints to counteract temperature variations and irregular deformations that may subsequently arise.

Verofill is a lightweight mineral material mixed with special binders. It is as compact as stone, completely homogeneous, non-combustible (A2-s1, d0) and yet weighs very little (550 kg/m<sup>3</sup>). It can be used in the production of everything from extruded profiles, contoured panels, window sills and plastic architectural elements to printing sorts, lettering and company logos. Facade elements made from Verofill are frost-proof, impact-resistant and ideally suited for use on listed buildings.

## Defending against mould

It has now been confirmed by a scientific study that the long-term high pH value of silicate interior paints and plasters prevents mould growth. The Mykon Institute (University of Innsbruck) analysed the susceptibility of various paints and one plaster to mould attack in a long-term study and found that silicate products performed exceptionally well. The health hazards posed by mould growth can therefore be countered in a natural way.



A glimpse through the microscope 13 months into the study shows the difference: above is the silicate surface, which is virtually mould-free, and below is the extremely mould-ridden control sample, where dense hyphal branching can be seen.

Photo: Sto AG

The alkalinity of traditional lime paints protects walls against mould attack. Our ancestors were already aware of this and would regularly whitewash their walls before Easter – but whitewashing only provided short-term protection. The high pH value (>11) of lime paints drops relatively quickly below the value necessary for the desired effect as a result of carbonation. The same cannot be said of silicate products. "The pH value of interior walls stays high for years. Mould doesn't like that and so it doesn't grow on these paints," says Dr Werner Duttlinger, Head of Analytics, Testing and Processing Technology at Sto AG.

### Permanently high pH value

The Mykon laboratory at the University of Innsbruck analysed interior paints and one interior plaster as part of a long-term study. The study focused on the following test surfaces:

1. a high-quality dispersion silicate paint;
2. a dispersion paint with anti-mould agent;
3. a control sample (dispersion paint without preservatives);
4. a dispersion silicate plaster; and
5. a highly filled, structurable dispersion silicate paint.

The test surfaces were exposed to mould spores over an incubation period of 17 months, during which mould growth and pH value were checked regularly. The study replicated optimal growth conditions for the spores to ensure representative results after approximately 18 months. As expected, very high mould growth was seen on the control sample. By contrast, the dispersion silicate products inhibited virtually all mould growth. The experts rated

the plaster "very good", closely followed by the high-quality dispersion silicate paint. It was rated "good", as was the dispersion paint with anti-mould agent. The result for the control sample was deemed "unsatisfactory".

The pleasing results can be attributed to the high pH value of these coatings. Even after 17 months, the surfaces of the silicate products still had a pH value of more than 11. Both dispersion paints registered a slightly acidic to neutral pH value, i.e. below 7, which was in line with expectations. These results indicate that silicate products are ideally suited for successful mould prevention in indoor environments without the use of biocides

### Silicates

Silicates comprise the majority of the Earth's crust and are a group of minerals that make up rocks such as granite, gneiss and basalt. Quartz sand and potash are melted to obtain silicate binders for the building industry. The resulting 'water glass' is used in various applications, e.g. as a binder, a impregnating agent and in drinking water purification.

## Rock-hard resistance

The new, basalt-fibre-reinforced StoTherm Classic S1 facade insulation system has a mineral-fibre wool base and is both impact-resistant and non-combustible. It can be used in high-rise buildings, has an impact resistance of up to 100 joules and is also suitable for nearly zero-energy and passive houses when used in conjunction with mineral-fibre wool insulation (maximum thickness: 34 centimetres) as approved by the building authorities.



Thanks to StoTherm Classic S1, very dark colour shades are now a viable option. One example is the base level of Hamburg's Asklepios Westklinikum. The system is also suitable for nearly zero-energy and passive houses above the high-rise building limit.

Photo: Christoph Gäbler, Hamburg

Natural basalt, which is used in products such as heat shields for space shuttles, ensures the resilience of the system, which combines tried and tested organic reinforcement fibre and finishing renders with a mineral insulating material (mineral-fibre wool or mineral-fibre wool lamella). The resulting hybrid system brings together the key advantage of mineral EWIS (non-combustible) and the benefits of organic systems (crack-proof, mechanically resistant, multiple design options).

### Higher

StoTherm Classic S1 is an approved (Z-33.43-61) non-combustible insulation system (A2-s1, d0 according to EN 13501-1) on a mineral-fibre wool base. Thanks to these properties, it can even be used in high-rise buildings up to 100 metres in height. This means that organic finishing renders can also demonstrate strengths such as high crack-resistance and outstanding impact resistance above the high-rise limit, too. Mineral-fibre wool insulation (maximum thickness: 34 centimetres) can also be fitted in new buildings and building renovations as approved by the building authorities. This means that the system is also suitable for passive and nearly zero-energy houses in accordance with the requirements of the Energy Performance of Buildings Directive (EPBD).

### Harder

The completely cement-free system has an unprecedented impact resistance of up to 100 joules – not least because of the high-tech basalt fibres contained in StoArmat Classic S1 reinforcing compound. The current European guideline (ETAG 004) specifies at least three joules for organic systems, while purely mineral

structures with comparable layer thicknesses reach between three and five joules. The new system's extremely high impact resistance does not affect water vapour permeability or carbon dioxide diffusion capacity.

### More intense

The new insulation system makes possible what mineral structures, due to the limited tintability of their finishing renders, cannot: they make it possible to use intense colour shades on high-rise buildings. As a result, very dark surfaces are now an option for non-combustible structures, too. The standard lightness value of 20 (100 = white, 0 = black), which marks the limit of feasibility for most facade insulation systems, can be made even lower on request. The Stolit finishing render used here is highly resistant to both algae and fungi and can be tinted in all 800 shades of the StoColor System. Despite having a mineral insulation layer, neither priming nor equalisation coats are necessary.