

**Alessandro Premier, Amina Dehò**

Alessandro Premier is a fellow professor of Architectural Planning at the Iuav University in Venice. Amina Dehò is a designer, and a member of the Colour and Light Technologies department at the Iuav University in Venice.

# Shading and darkening closures using mobile panels





1 - Carabanchel Social Housing in Madrid by Foreign Office Architects. Close-up of the envelope. Photo © Francisco Andeyro Garcia

The use of screening as an architectural element and not just as a technical device has become a consolidated trend in contemporary architecture. Without their screening, some buildings would be totally unrecognizable. I am thinking as an example of the Social Housing Carabanchel project in Madrid, designed by Foreign Office Architects and built in 2007 (photo 1). It has been featured in many magazines, and its entire envelope is covered with bamboo folding louvers: it is a parallelepiped covered with several identical panels that open and close to create its overall appearance.

The use of mobile panel screens, in addition to the advancement of other screening systems, has been increasingly successful thanks to the “growth” of glass surfaces. Evidently, the larger the transparent or translucent surfaces, the greater the need for protection from daylight, especially at the warmest latitudes.

The use of mobile panels on the façade is a relatively recent evolution of the closing louver shutters and sunbreakers. The “classical” blades or horizontal slats of the latter are being replaced with panels in perforated or drawn sheet metal or other material assembled on electro-mechanical or even hydraulic handling systems. As far as closing systems for the louvers are concerned, Herzog & de Meuron has come up with new interpretations of its 1980s darkening shutter designs that fold shut, and which have been proposed in some more recent projects. Over the years, darkening systems have grown to become actual façade systems.

In the Schwitter Apartments in Basel by Herzog & de Meuron (competition and project 1985 – built 1987-88) the main façade, which follows the curve of the parcel, is made up of prefabricated units in coloured reinforced concrete. The residential floors are separated by terraces and access balconies, which are also curved, and the large windows of each unit are a main feature of the façade. Each window is screened by folding, wooden shutters so when all the louvers are closed the external envelope of the building has a uniform screen. This concept of “external screen-skin” is proposed in an even more explicit way in the façade of the Schützenmattstrasse Apartments in Basel (competition 1984-85, project 1991, built 1992-93) with perforated metal louvers that open outwards on the outside of the balconies, closing in the entire floor. The screening becomes the façade, just like in the Foreign Office Architects building constructed in 2007 (photo 1). Herzog & de Meuron also used this type of solution in other designs, in the Rue des Suisses Apartments in Paris (2000) and the entry façade of the Fünf Höfe CityQuartier in Munich, Bavaria (2003). Other designers have leant towards this type of interpretation of screening, for example Baumschlager & Eberle of Austria with the Lohbach Residence in Innsbruck, where the folding screen is made up of blackened copper, or the housing project in Krems where folding panels protect individual windows on all levels. Baumschlager & Eberle have also designed a number of sliding panel darkening closures. Other buildings include the university residences of Molkereistraße in Vienna (2003-2005), with brass sliding panels, and the Eichgut residences in Winterthur in Switzerland (2002-2005) with etched glass sliding panels that cover the entire envelope of the complex.

The sunbreaker systems incorporate large mobile panels in place of louvers or blades in extruded material, always designed first and foremost with the language of expression in mind. The large south-facing façade of the Musée du quai Branly in Paris (2006), a building designed by Jean Nouvel, comprises of two blades that





overlap to define the two factories which in reality are a single building. The two façades come together and are entirely covered with adjustable panels all of the exact same size and make up a uniform grill pattern over the entire surface. The panels come in micro-perforated aluminium and open individually, rotating upwards. The entire façade is red. The designer has accentuated the dynamic appearance using the screening panels like many coloured cells, each of a slightly different shade, as though his intention is to show us the triangular section of the six layers that make up the NCS (Natural Colour System) colour classification, where all the shades of red are catalogued for comparison purposes with three basic colours: red, white and black. The resulting shades go from saturated red gradually dimming to shades "cut" with white or black. The "Breath Building" envelope in via Torino in Milan, the Geox "building that breathes", designed by Dante O. Benini & Partners (2010), is covered with 734 metal panels in a square shape that define the rigorous pattern. The panels are micro-perforated, electrically coloured stainless steel that open by rotating upwards. The façade grid features a number of colours: gold, bronze, copper or blackened copper - reminiscent of Autumn. They alternate according to an apparently random pattern with the warmest colours at the bottom and the coldest ones at the top, while dark brown marks snake through and emphasize this variation. The entire composition plays on tones of yellow, between orange and brown.

Probably the most innovative aspects of this type of mobile surface are in the combination between movement and expression. On the one hand, the designers rely on colour combining the elements that can move according to a rigorously practical logic (screening natural light), on the other there is a possibility to use these panels also for an expressive purpose. Thanks to computer control, the degrees of opening and closing can be set up in order to create particular designs on the building façade. Once again, the project has more than one purpose: to create a façade that controls the light coming in, thereby reducing the energy consumed by the summer climate control system, and at the same time giving the building an identity, a symbolism. This goal is clearly apparent in the work of the Austrian Giselbrecht + Partner for the Kiefer Technic Showroom in Bad Gleichenberg (2007). The glass façade is completely covered with white micro-perforated aluminium panels which open and close to reproduce curious designs (photo 2).

### **Kiefer Technic Showroom of Giselbrecht + Partner**

Travelling north along Grazer Straße, towards Gratz, immersed in the rural countryside just outside the centre of Bad Gleichenberg, you will find an unexpected "spectacle": a white façade, that curves gently towards the East, animated by the fluid movements of an aluminium screen, that opens and closes, sometimes like a large eye, sometimes like a chess board. Designer Ernst Giselbrecht calls it a "dancing façade". It took him and his staff two years to build the Showroom building, inaugurated in summer 2007 for Astrid Kiefer, owner of Kiefer Technic. Kiefer Technic has been in operation for more than thirty years. The company specialises in processing steel and aluminium for the production of furnishings and equipment for medical operating theatres, and was involved in the project not only as the client, but also as bidder, producing 112 panels in micro-perforated aluminium that make up the dynamic façade of the factory.

Giselbrecht designed a building on a 420 square meter parcel, located to the south of the factory, with a conical layout, and which, like a perfect band of light, projects the company's message of advanced specialisation on the curved screen of the south-facing façade.

The building has two stories, and an area of 545 square metres. It has an open plan layout and a 6m x 9m section connects it to the factory. The new suspended floors are located at the same height as the factory floors, linking the two buildings directly. The entryway to the Showroom is located on the east-facing façade. A ramp leads up to the entryway to the two storey hall, which houses a staircase with steel structure clad in wood. Just off the hall is an open space that runs along the length of the main window reserved for displaying products. A bar and public restrooms are also located on the ground floor, near the entrance to the factory. The conference hall is on the first floor, also along the south-facing side and overlooking the hall. There are bathrooms for personnel, a kitchen and an office off the hallway that goes to the factory.

The new building is supported by reinforced concrete pillars, as are the suspended floors. The masonry wall vertical partitions between the building and factory are whitewashed. The double skin façade system incorporates 200mmx200mmx2mm square tube steel uprights, reinforced by an internal jet of concrete. The inner glass envelope is made with thermal break aluminium fixtures, while the mobile screening system has an aluminium frame, painted white.

In the double envelope system, the external facade is 28 m and is made up of micro-perforated aluminium panels that act as sunbreakers. The panels are 96cmx200cm, an identical size to the units on the factory facade: a formal and production decision that brings continuity to the two different buildings, built on the basis of very different concepts (photo 3). The panels are set out on 14 columns corresponding to the spans between the internal pillars. Each span is in turn made up of 8 panels (96cmx200cm), 4 to each floor, which are moved in pairs by 56 motors that control opening and closing, sending the signal to the runners that slide vertically on guides. The screening system has an overall weight of 10 tons. Its support structure is made up of steel uprights formed by a dual L shaped profile (100mmx50mmx8mm), welded edge-on to a steel plate (700mmx140mmx2mm) that joins with a horizontal shingling of L shaped profiles (100mmx100mmx8mm) attached to the concrete slab. The horizontal elements act as supports for the frills of the walkways located in the cavity of the double skin. The mobile screening panels are connected, in pairs, by hinges on the sides. In the fully closed position, the elements are not perfectly flush, thanks to a spacer pivot located near the hing-



es: a detail of formal as well as technical relevance, because when fully closed, the façade demonstrates its dynamic nature with a subtle ripple.

The internal façade, located at about 60 cm from the screen façade, is continuous and made entirely of glass. It is mostly transparent, except for a strip at about 53 cm from the ground at the same height as the suspended floor and the edging beams and buffered with enamel glass sheets. The aluminium windows are of a unitary size of 200cmx300cm in height. Some incorporate a transom that opens (100cmx228cm) to provide access to the walkway located in the space between the two façade systems. The support system for the glass façade is anodized aluminium, and it attaches to the concrete slab using a system of brackets and L shaped steel profiles. In the upper closure, the two façade systems are topped by a horizontal glass screen (100cmx200cm sheets) which tilts inwards. Thermal insulation is provided by the high performance windows integrated with the insertion of an isolating layer about 10cm along the thickness of the edge beam of the intermediate suspended floor. The building's heating and ventilation system is a series of thermal convectors located the perimeter of the façade near the threshold.

The success of the Kiefer Technic Showroom, confirmed by numerous international awards, unquestionable comes from its level of innovation which has inspired meticulous research into the pursuit of high standards in terms of energy saving, by controlling the natural light filtered through moving screens. But probably the most significant feature of this project is the expressiveness of the façade thanks to the special design of the mobile panel system: the result of a winning relationship between the client and the designer. Where construction promotes research, development and technological innovation, productive partnerships are created. This is a trend that has been consolidated in many countries, but has yet to take hold in Italy, where multiple, highly specialised enterprises still have much to explore and to venture in this regard.

*3 - Kiefer Technic Showroom  
in Bad Gleichenberg by Ernst  
Giselbrecht + Partner. Close  
up of the screening system.  
Photo® Paul Ott*