The LEO in Frankfurt, formerly known as Poseidon House, has been clad in glass-fibre-reinforced concrete.

# Cladding LEO in GRC

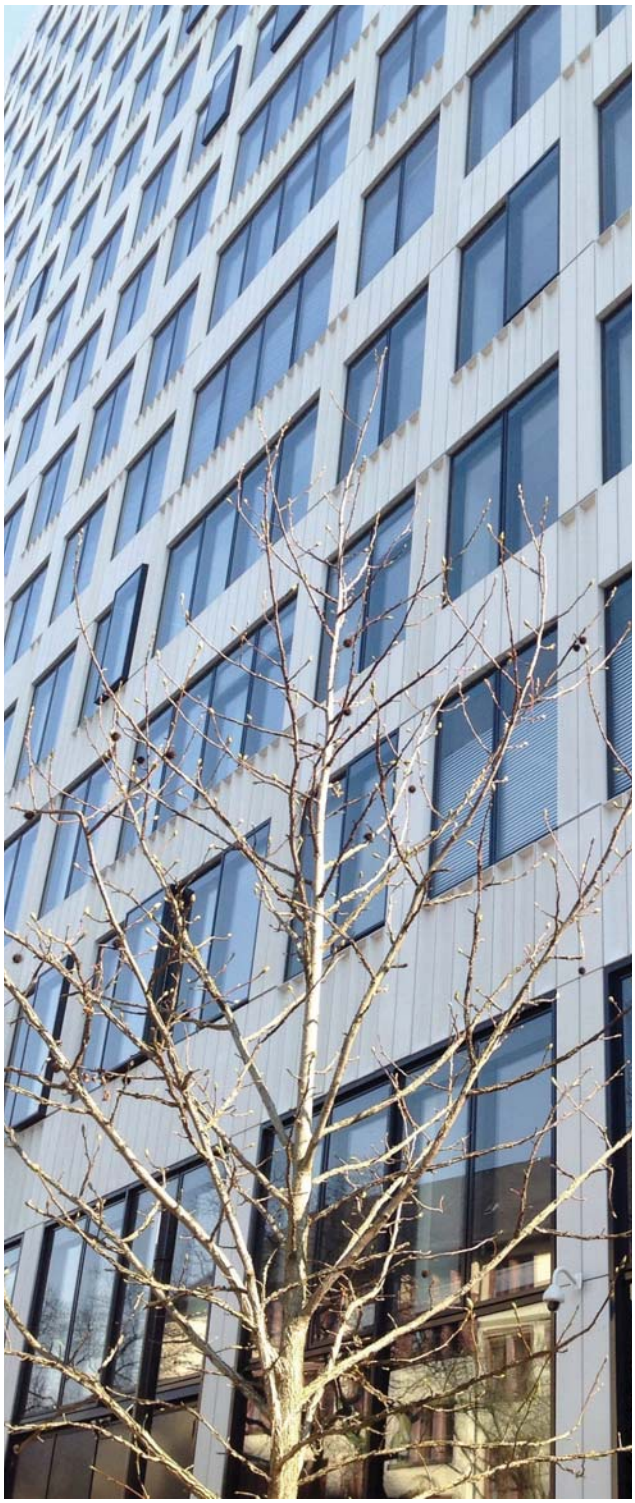
**Close to the exhibition centre of Frankfurt, a unique 'green' building has been constructed – the LEO. Formerly known as Poseidon House, the complex consisted of two rows of buildings facing each other. The site has now been refurbished into office and administration buildings. Glass-fibre-reinforced concrete (GRC) cladding has been used for the façades, replacing the original aluminium panels.**

*CEI* report

During the overall refurbishment and modernisation of the building, which was constructed in 1986, the Frankfurt-based architect Schneider+Schumacher created a design to connect the two pre-existing opposing 17-storey and nine-storey wings by means of a 67m-high diagonal building. Thus, a U-shaped complex has been created, enlarging the building by approximately 15,000m$^2$ to a total of approximately 47,000m$^2$. The window openings in the pre-existing buildings have been enlarged to allow more daylight to enter the office rooms. After renovation, the final energy demand for heating and cooling declined by 60% to approximately 90kWh/m$^2$a per year and primary energy demand for heating was reduced by 70% to 28kWh/m$^2$a. In summer 2013, ING-Diba, Europe's largest direct bank, moved into the new complex of buildings, which is located between Frankfurt's exhibition centre and the Westend-Gate with the Marriott Hotel.

Josef Gartner, the German subsidiary of the Permasteelisa Group, has clad the LEO building with a 10,000m$^2$ M-Free S, the Group's proprietary closed-cavity façade (CCF), as well as around 13,000m$^2$ of GRC units and 5000m$^2$ mullion-transom stick-system façades. The building envelope plays an essential role in the LEED Gold Certification of the LEO building by the US Green Building Council.

The CCF is a closed double-skin façade. This highly transparent façade has been installed at the LEO building for the first time in Germany and is equipped, for the first



Around 13,000m² GRC units were used in the refurbishment.

time on a worldwide scale, with parallel opening windows to allow for natural aeration. Bright GRC units shaping the external cladding provide a contrast to the dark aluminium profiles of the window frames. This façade design elegantly combines the new construction and the pre-existing building and creates a homogeneous appearance to the whole complex.

The definitive technical innovation of CCF is its fully closed cavity, which improves heat, sun and noise protection while offering maximum transparency. The highly transparent low-iron glazing does not in fact require any dark or reflective coatings for sun protection since a highly efficient blind system with automatic light control is incorporated into the 94mm façade cavity. Since the façade cavity is hermetically sealed, neither the inside of the glazing nor the surfaces of the solar control louvres can become soiled. In contrast to the open double-skin façades there is no need to clean the internal faces of the façade cavities.

Two pre-existing opposing 17-storey and nine-storey wings were connected by means of a 67m-high diagonal building.

Dry air flows through the closed cavity units in order to avoid condensation. During variations in temperature the dehumidified air prevents condensation on the external pane. Dimensions of the 2598 CCF units of the pre-existing building are 1200 × 2300mm (width × height) while in the new building dimensions are 2100 × 2300mm (width × height).

The parallel opening windows of the LEO façade can be opened electronically to allow for natural aeration and smoke evacuation in case of fire.

On the outside, Gartner has cladded the LEO building with bright GRC units. These are positioned under the sills and in front of the wall columns, as back-ventilated cladding on concealed fixings. The bright light concrete elements are structured in different ways: some are deep-profiled, some smooth. The changing surface structure creates special light effects. These units are made of cement, sand and additives with an alkali-resistant textile glass fibre, and which have been approved by the building inspection authorities. The concrete matrix was poured into closed moulds, creating smooth surfaces. All mouldings are through-pigmented. Stainless steel threaded inserts have been cast-in on the reverse side for installation purposes.

As far as price is concerned, a CCF façade is also an attractive solution since – in addition to low cleaning costs – there are no expenses for a maintenance wing, an additional frame nor any additional fittings. Therefore, there is an increasing demand for closed-cavity façades in the sustainable building sector. As an example, the German façade manufacturer Gartner is currently constructing a 33,200m² CCF façade for a new building of F Hoffmann-La Roche in Basel, Switzerland, which is designed by the Swiss architects Herzog & de Meuron. With a height of 178m, this new building of the pharmaceutical company is the highest building in Switzerland. ■