

## Barcelona (Spain)

# Hospital de la Santa Creu i Sant Pau

STRUCTURAL STRENGTHENING AND NEW CEMENTITIOUS FLOORS IN THE LARGEST MODERNIST COMPLEX IN EUROPE

Built between 1902 and 1930, Sant Pau Hospital is one of the icons of Catalan Modernism. Conceived by the architect Lluís Domènech i Montaner as a “city within a city”, for 80 years it was a healthcare centre for the people of Barcelona. It is one of the most important modernist complexes in Europe and, at the same time, a symbol of Barcelona and, because of its architectural and artistic significance, one of the city’s major tourist attractions. In 1997 it became a UNESCO World

Heritage Site for the originality of the construction techniques used and for its artistic value. Once all healthcare services had been transferred to other sites, restoration work started on the pavilions which were converted to host administrative or business activities. The last restoration intervention of the buildings in the complex was carried out between 2011 and 2014 and was based on three main principles: restore the original spaces, convert the pavilions into more

functional surroundings suitable for the new type of use and the application of sustainability and energy saving criterion. Climate control of the internal areas is via a geothermal system fed from 400 wells, each one 100 m deep, to help reduce CO<sub>2</sub> emissions. The complex is now home for companies and organisations specialised in sustainability, healthcare services and education, all with the common objective of improving the quality of life of the city’s inhabitants.

**LEFT.** Hospital de la Santa Creu i Sant Pau was designed by the architect Lluís Domènech i Montaner and recently restored with Mapei solutions.

**BELOW.** In the Administration Pavilion PLANITOP HDM RESTAURO and MAPEGRID G 220 were used to strengthen the arches, vaulted ceilings and walls. New cementitious floors were created by using ULTRATOP.

### ADMINISTRATION PAVILION

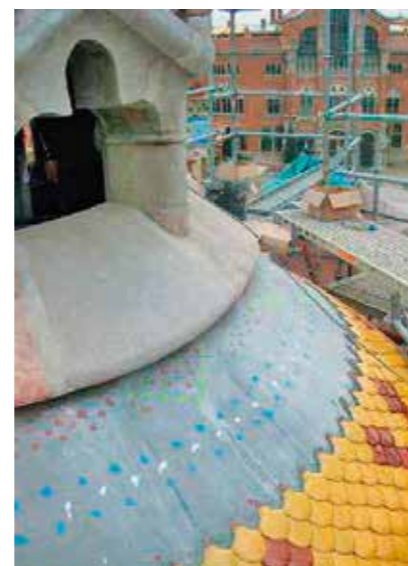
This is the largest and one of the most ornately decorated buildings in the entire complex. Built between 1905 and 1910, it was originally conceived as the main entrance to the complex and used for hosting the main management and administration offices of the hospital.

In 2013 work was carried out to restore the pavilion and to create polyfunctional, versatile spaces with the most up-to-date equipment, while preserving the artistic value of Lluís Domènech i Montaner’s work. It is now used for conferences and events and is also home of the hospital’s historic archives.

“Reinforced” structural strengthening work was carried out on the masonry arches, vaulted ceilings and walls of this building using PLANITOP HDM RESTAURO mortar and MAPEGRID G 220 glass fibre mesh to guarantee a high level of durability and excellent mechanical performance.

New cementitious flooring was created in several areas using ULTRATOP cementitious self-levelling mortar, after building new screeds with TOPCEM hydraulic binder and treating their surface with PRIMER SN and QUARTZ 0.5, and before applying a final protective finish of MAPECRETE STAIN PROTECTION coating.





**SANT LEOPOLD PAVILION**

The vaulted ceilings of this pavilion were constructed using a technique which was widely adopted in Catalonia and Valencia at the beginning of the 20<sup>th</sup> century. A system was chosen to strengthen their structure consisting of PLANITOP HDM RESTAURO mortar and MAPEGRID G 220 glass fibre mesh. Cracks in the masonry were repaired with EPORIP epoxy adhesive and EPOJET epoxy resin while several concrete and masonry features and elements were repaired with MAPEGROUT HI-FLOW shrinkage-compensated, fibre-reinforced mortar.

**SANT RAFEL PAVILION**

The cupola of this pavilion was also strengthened with Mapei solutions. After removing the external ceramic roof, a system based on FRG (Fibre Reinforced Grout) materials included the positioning of MAPEGRID G 220 glass fibre mesh on the metal profiles. The strengthening system also included the use of PLANITOP HDM RESTAURO and MAPEWRAP G FIOCCO unidirectional, high strength glass fibre cord. The surfaces were waterproofed with MAPELASTIC SMART and strengthened with MAPENET 150 mesh before finally installing ceramic tiles using KERAFLEX adhesive.



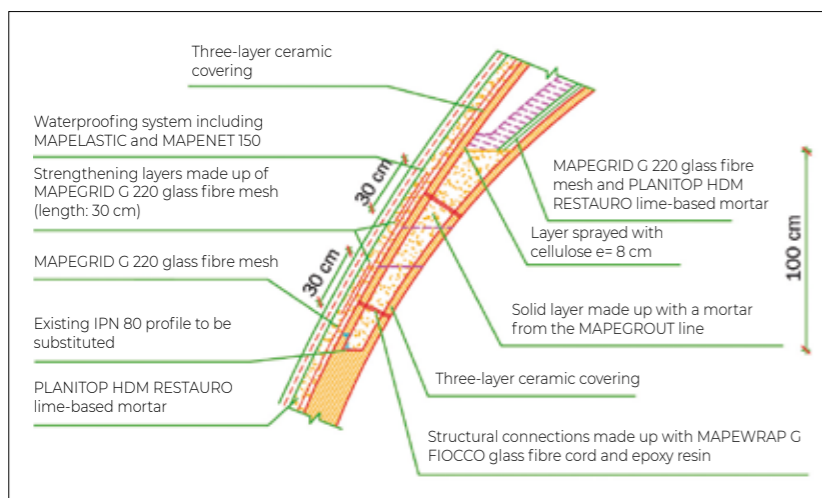
**SANT MANUEL PAVILION**

One of the semi-cupolas of this building had cracks and the covering material had become detached in various points. To overcome these problems a strengthening system was applied based on the use of composite materials, consisting of PLANITOP HDM RESTAURO mortar and MAPEGRID G 220 glass fibre mesh. The system guaranteed excellent chemical and elastic/mechanical compatibility with the masonry substrates. On the internal face of the vaulted ceilings, the surfaces were treated with MAPEGROUT T 40 medium-strength (40 MPa), fibre-reinforced, compensated-shrinkage thixotropic mortar for restoring concrete. Also, because of infiltrations of water in certain areas of the vaulted ceilings, after grouting the cracks with LAMPOCEM, MAPE-ANTIQUÉ F21 slurry was injected to fill the gaps created by the cracks through which water had been passing through. Some areas of the flooring had underfloor heating systems installed after creating screeds made from TOPCEM, which are ready to be put into service after 4 days.



Find out more  
**PLANITOP HDM RESTAURO**

**The strengthening system by Mapei**



**ABOVE.** In the Sant Rafael Pavilion the ceramic covering was first detached and then bonded again with KERAFLEX on the cupola after strengthening its structure with MAPEGRID G 220, PLANITOP HDM RESTAURO and MAPEWRAP G FIOCCO. **LEFT.** The layout of the strengthening system chosen for the Sant Rafael Pavilion.

**TECHNICAL DATA**

**Sant Pau Hospital,** Barcelona (Spain)  
**Period of construction:** 1902-1930  
**Original designer:** Lluís Domènech i Montaner  
**Period of restoration:** 2011-2014  
**Owner:** Fundació Privada Hospital de la Santa Creu i Sant Pau  
**Design and works direction for the pavilions:** ONL Arquitectura (Administration Pavilion);

Bernúz Fernández Arquitectes (Sant Rafel Pavilion); Josep Ramon Calonge i Vallbona, José Luis González (Sant Leopold Pavilion), Moreno-Navarro y Albert, Casals i Balagué, Alicia Doctor Navarro, Esther García Mateu, Kerstin Nething y Belén, Onecha Pérez (Sant Manuel Pavilion)  
**Main contractors:** Constructora de Calaf, S.A. (Administration Pavilion); Natur System (Sant Leopold Pavilion); SAPIC

(Sant Rafel Pavilion); UTE Xèdex-Rècop (Sant Manuel Pavilion)  
**Installation companies:** Pavindus, CREB  
**Mapei coordinators:** Joan Lleal and Toni Catllà, Mapei Spain  
**MAPEI PRODUCTS:**  
**Structural strengthening:** Mapegrid G 220, Planitop HDM Restauro, MapeWrap G Fiocco, MapeWrap 21  
**Creating screeds:** Topcem  
**Waterproofing substrates:** Mapeelastic Smart, Idrosilex

Pronto; Mapenet 150  
**Laying cementitious floors:** Ultratop, Primer SN, Mapecrete Stain Protection  
**Bonding and grouting ceramic tiles:** Keraflex, Keracolor FF  
**Restoring masonry:** Lam pocem, Mapegrout Hi-Flow, Mape-antique F21  
**Repairing cracks:** Eporip, Epoj et  
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