

Metropol Parasol – An icon of world-class timber engineering

A leading wood products company in Europe, Finnforest has delivered the elements based on Finnforest Kerto LVL to one of the world's largest timber buildings: Metropol Parasol, an urban centre in Seville, Spain. Architect Jürgen Mayer H. won the competition for redesigning the Plaza de la Encarnación in 2004.

This building, which represents one of the most visionary and exciting urban projects throughout Europe, will no doubt become the town's new landmark. Metropol Parasol with its six "parasols" is one of the world's largest timber buildings. The complex timber construction reaches a height of 28 metres and covers a surface area of over 11,000 square metres.

The basement houses an archaeological museum, the ground floor will be used as a market hall, and the roof space can be used for events. At the very top, a 300-square metre restaurant will be located amid the beams of the parasol roof, next to a public promenade affording a magnificent view of the city.

"Metropol Parasol explores the potential of the Plaza de la Encarnación to become the new contemporary urban centre. Its role as a unique urban space within the dense fabric of the medieval inner city of Seville allows for a great variety of activities such as memory, leisure and commerce. A highly developed infrastructure helps to activate the square, making it an attractive destination for tourists and locals alike," says architect **Jürgen Mayer H.**, from J. MAYER H. Architects, based in Berlin.

"Metropol Parasol is a highly complex wood composite structure setting a totally new level for timber engineering. It is perhaps the most complex timber structure ever built. Extremely large dimensions, three-dimensional load bearing system and creative geometrical forms have been great challenges both for the use of wood, but also for engineering skills. The final result shows that Finnforest has managed to accomplish the challenges together with construction company Sacyr, our customer," says **Mika Kallio**, head of Building Products, Finnforest.

The Metropol Parasol makes a strong statement also in terms of engineering technology. Three characteristics make this project stand out in particular: use of highly load-bearing Finnforest Kerto LVL, and post-curing using an epoxy resin, as well as application of a polyurethane spray coating.

Further information on structures, protection methods and implementation

The wooden mega structure consists of glued Kerto-Q laminated veneer lumber panels arranged in an orthogonal grid with a spacing of 1.5 x 1.5 metres. The size of the individual load-bearing elements is adapted to the actual load and is thus highly variable. The thickness of the wooden panels ranges from 68 millimetres to 311 millimetres. The largest of the approximately 3,400 wooden parts measures 16.5 metres high by 3.5 metres wide and 140 millimetres thick.

The foundations and the cylinder-shaped lift towers below the panorama restaurant are made of concrete. In contrast, the museum is topped off with far-reaching composite frames made of reinforced steel and concrete. The load-bearing platform for the restaurant 21.5 metres above ground level is also being realised using a steel-concrete composite construction.

The Metropol Parasol project would not have been possible without the close planning and cooperation among architects, structural engineers, building technicians, fire protection and timber engineering experts. A prerequisite for effective planning was the seamless electronic data exchange including 3D modelling between all partners, including the main contractor, across all German and Spanish sites. Data from the architectural model were directly integrated into the software of the structural engineers.

The individual parts of the grid structure consist of Finnforest Kerto. The parts were cut out with millimetre precision using a CNC-controlled trimming robot that also adds milling details and cut-outs. But many tasks were also carried out manually, for example drilling 35,000 holes for gluing in the threaded bars that form part of the connecting joints.

Roughly 3,400 individual wooden elements were manufactured by Finnforest's component factory in Aichach, near Munich, Germany. 2,500 cubic metres of Kerto LVL were transported by road to Seville, where it was coated with polyurethane and finally assembled.

The Metropol Parasol has no roof and must therefore rely on a different form of protection from the damaging effects of weather. To meet this requirement, the architects chose a new wood protection system. The exposed pressure treated wood is covered with a waterproof but diffusion-permeable 2–3 millimetre thick 2-component polyurethane coating.

The load-bearing characteristics of the Metropol Parasol greatly depend on the more than 3,000 joints where the Kerto LVL panels intersect. The engineers from Arup and Finnforest developed an innovative joining mechanism based on glued-in steel rods, which also resulted in a swift assembly on site. In light of the extreme thermal conditions existing in Southern Spain, the epoxy resin was tempered, thus ensuring that the connecting joints remain strong even at high temperatures.

Finnforest Kerto® LVL (laminated veneer lumber), manufactured in Finland, is a highly flexible material made of softwood veneer by gluing. Kerto has been used successfully in the timber construction for decades. It is ideal for projects demanding dimension-stable, weather-proof and high-strength materials.

Basic facts of Metropol Parasol

- Location: Plaza de la Encarnación, Seville, Spain
- Developer: The City of Seville, Spain
- Architect and project lead: J. MAYER H. Architects, Berlin
- Contractor: Sacyr S.A.U.
- Structural engineering and building services: Arup Berlin & Madrid
- Timber engineering and detail design: Finnforest
- Building period: 2005-2011
- Opening: 27 March 2011
- Scheduled completion: Spring 2011

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J. MAYER H. Architects, founded in 1996 in Berlin, Germany, focuses on works at the intersection of architecture, communication and new technology. www.jmayerh.de

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