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In March this year the Potain MD 560B was replaced by a new Liebherr 710 HC-L 32-64 luffer.



The Weitz X1266 tower crane that originally got Nick Johnson interested in the Sagrada Familia project



New and larger Potain cranes joined the elderly Weitz between 1998 and 2001

THE WORLD'S LONGEST CONSTRUCTION PROJECT

Cranes & Access features editor Nick Johnson catalogues the numerous tower cranes used on the world's longest running construction project - Gaudí's masterpiece, the Basilica of the Sagrada Família in Barcelona.

I first became aware of the Sagrada Família from an article in a travel magazine in the late 1980s. What caught my eye was not only the strikingly ornate towers of the building's Passion Facade but also the then elderly Weitz X1266 tower crane being used to construct them. As someone who had long been interested in tower cranes, I decided to visit Barcelona and see this iconic site for myself.

My first sight of the tall Weitz X1266 crane tied to the Passion Facade towers came early in 1989 when I travelled to Barcelona to visit Spanish manufacturer Ausa. I have been back regularly ever since to follow the project and the multitude of tower cranes that have been used over the years. Considering that the Sagrada Família is being built on a relatively small 12,800 square metre city centre site, the project has employed at least 11 different tower cranes so far. And some of them have been installed in two or even three different locations!

Work began in 1882 with the legendary architect and designer Antoni Gaudí taking over the project in November 1883. He changed the style of the building and oversaw the construction of the first four towers of the Nativity Facade. These were constructed with the aid of wooden scaffolding and along with block and tackle to lift materials aloft.

When Gaudí was tragically crushed under the wheels of a tram at the age of 74 in 1926 only one tower was completely finished. However, the models and plans he left behind meant that

work has been able to continue in the way he envisaged it.

Despite wars, civil unrest and an arson attack, construction of the ornate Sagrada Família has progressed as fast as money was received from public donations and, more recently, site admission fees. The development of new construction materials, methods and equipment - particularly tower cranes - has in fact helped the building to be built in the spirit of Gaudí's original plans.

FIRST CRANES

A boost came in around 1966 when the first tower cranes were deployed on the project. These were the Weitz X1266 which had first alerted me to the project and a smaller Weitz G20HV.

Both cranes were made in France by a company that had been established by Jules Weitz in 1883. The business was taken over by Paulin Richier in 1943 but the cranes continued to be sold under the Weitz brand name for many years. Interestingly, Babcock & Wilcox in Scotland made Weitz tower cranes under licence for the UK market. The X1265 - a sister machine to the X1266 on the Sagrada Família - proved very popular in the UK during the 1960s.

The Weitz X1266 between the Passion Facade Towers had a 40 metre jib, an under hook height of 110 metres and was on site for 35 years. A G20HV with a 20 metre jib was initially positioned inside the building to help construct the side walls of the Nave. It was later relocated and erected at a lower height outside the structure to serve



The Weitz X1266 (top), the Imenasa crane (middle) and the G20HV - lower right in the stone cutting yard

the on-site stone cutting workshop and storage yard.

The next tower crane to be used came from Spanish manufacturer Imenasa in the 1990s. The company built cranes under licence from Liebherr and the machine on the Sagrada Família appears to be based on a Liebherr 30C. Like the Weitz models, this crane had a short inner mast section under its slew ring and was climbed using pairs of wraparound outer mast sections. Liebherr bought a 10 percent stake in Imenasa



The ballasted base of the Potain MD235A was erected 54 metres up on the roof



High and low level Potain cranes including the MC50A (right foreground) in the stone cutting yard

The following year a new 30 metre high MC50A with a 20 metre jib was installed to help speed up the building work. It was subsequently moved to replace the old Weitz G30HV at the stone cutting and storage yard in 2001.

Then, in early 2001 an MD238B was added. It had a 12 tonne maximum capacity and a 60 metre jib. This crane provided a total height under hook above ground level of 80.7 metres.

September 2001 saw the arrival of a 125 tonne/ metre class MD125B with a 35 metre jib and 114.9 metres under hook. This crane's first job was to dismantle the by now very rusty Weitz X1266. The project also took delivery of an MD175B with a 22.5m jib and a maximum hook height of 33.9 metres that year. This was used for unloading materials delivered by road.

Mid 2004 saw a second MD 125B installed with 35 metre jib and a ballasted base placed 54 metres up on the structure to provide a maximum hook height above ground of 110.1 metres. This crane assisted the construction of the Apostles and Evangelists towers.

in 1987 renaming the company Imenasa Grúas SA. Three years later Liebherr acquired the rest of the company and in 1993 renamed it Liebherr Industrias Metálicas.

FIRST POTAIN

Richier - the new name for Weitz - merged in 1977 with fellow French crane makers Boillot and Pignon to form BPR. In 1982 BPR was acquired by Potain which became the next tower crane supplier to the Sagrada Familia. Potain's Spanish dealer Ibergruas started working with the Sagrada

Familia construction team in the late 1990s to develop a modern multi tower crane plan, using the latest technology. As a result, the first new Potain to arrive on site was a 10 tonne capacity MD235A in 1998. Fitted with a 60 metre jib, the MD235A was erected on a ballasted base placed 54 metres up on the roof of the structure to provide a maximum hook height of 127 metres above ground. It assisted with the construction of the Passion façade, the Evangelists Towers and the Tower of Mary.



A group of Potain cranes dominating the skyline above the Sagrada Familia



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Large mobile cranes like this 500 tonne Liebherr LTM1500-8.1 from Gruas Rigar have been used to erect, dismantle and move tower cranes



The big Potain MD 560B 'Mother Crane' arrived on site in 2012



The operator of the Liebherr 710 HC-L 32-64 gets a good view of Barcelona

The landmark welcomed almost five million visitors in 2023.

ALMOST COMPLETE

Nearing completion, the iconic Sagrada Família has become the must see tourist sight in Barcelona. It was consecrated in November 2010 by Pope Benedict XVI and its interior, with a fantastic 'forest' of tree like columns and beautiful stained glass windows is simply stunning.

There is also a fascinating museum onsite with early pictures and photographs of the project and captivating models, including upside down hanging sandbags, showing how Gaudi checked out his structural ideas.

Due to the building's popularity, visitors are advised to book online in advance and, if you are really interested in the construction side of the project, make sure you take the optional ticket providing access to the towers. A lift will take you aloft so you can get closer to the big new Liebherr crane as well as providing a great panoramic view of Barcelona.

When it is finally finished, the top of the Jesus Christ Tower will make the Sagrada Família the highest church in Europe. Once the cranes are gone, the postcard sellers will no longer have to Photoshop them off their wares! And I will have less of a reason to visit Barcelona. ■

THE 'MOTHER CRANE'

A big development took place in 2012 when a much larger Potain MD 560B crane arrived on site. Described at the time as the 'Mother Crane' it had a maximum capacity of 25 tonnes and a 70 metre jib. The base of the MD-560B was installed 67 metres up on the structure with enough tower height for a maximum lift height of 141 metres above ground level. This allowed the crane to oversail the other cranes on site and to assist with the construction of the Evangelists Towers, along with the Mary and Jesus Christ Towers.

The greater capacity of the MD 560B allowed the Sagrada Família construction team to use larger, heavier precast units, made in Galera, in Gaià, in the Bages region of Spain.

The high point, literally, of the Sagrada Família will be its central Jesus Tower which will eventually rise to a height of 172.2 metres above ground and be surmounted by a large illuminated cross. Interestingly, this height was selected by Gaudi because he did not want to upset God by building his Temple higher than the nearby Montjuïc mountain which is 177.7 metres high.

At the end of 2016 it was deemed necessary to move the tower of the big MD 560B sideways by 800mm in order to allow more clearance for one of the Temple's towers. So, the crane was dismantled and re-erected with the addition of a special base section that allowed the required mast realignment. This mast section was engineered by engineers from the Sagrada Família, Potain and Ibergruas.

Safety features on the cranes have included wind speed indicators, fog alerts - which activated automatic shutdowns - lightning rods and hook cameras with zoom feature. Tower sections have been equipped with anti-climb panel enclosures and lockable doors to prevent unauthorised access.

Originally it was proposed to add more sections to the MD 560B tower to take its height above ground to 180 metres to complete the Jesus Christ Tower. A change of plan will see a newly erected Liebherr 125 HC-L luffing jib tower crane carry out the work.

The big newcomer is a Liebherr 710 HC-L 32-64 Litronic luffer with a 55 metre jib and a 64 tonne capacity. It was erected in March with a base near the Potain 560B. The luffer was then used to dismantle the 560B. An external climbing frame was used to raise the Liebherr which has been secured to the Jesus Christ Tower by means of a special bracing structure. This substantial 20 metres long by 10 metres wide tie weighs 27 tonnes.

The installation of the 710 HC-L involved close cooperation between the Sagrada Família site team, local Liebherr crane supplier Grúas Cerezo and the Tower Crane Solutions department at the Liebherr plant in Germany. The crane will subsequently be climbed to provide sufficient height under the hook to complete the big cross on top of the Jesus Christ Tower.

The new six tonne capacity Liebherr 125 HC-L luffer with 30 metre jib is now working on the Chapel of the Assumption and the adjacent cloisters. The switch to luffing jib cranes is said to be due to their load curves and the ability to raise their jibs in order to work in very tight spaces. It also avoids oversailing areas used by the public.



This special section was constructed when it was necessary to move the mast of the MD 560B by 800mm

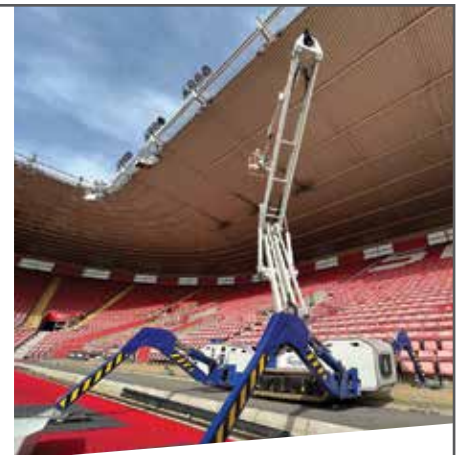


Now tied into the Jesus Christ Tower, the Liebherr 710 HC-L 32-64 will help extend this structure to its full height

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