

CONCRETE IN THE SAGRADA FAMILIA TEMPLE

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ABSTRACT

The “Sagrada Familia” Temple under construction in Barcelona is one the most important buildings of Antoni Gaudí. Gaudí is the most famous architect of the modernism (the architectural movement of the beginnings the s. XX).

The continuity of the works after the Gaudí’s death has caused the opposition of the public opinion and this situation has derived in a critic attitude about the way of building and the materials used in the works (specially the substitution of the stone by the concrete). In this context, this work wants to analyse the role of the concrete into the “Sagrada familia” construction process.

Since the beginning of the construction in 1883 the “Sagrada Familia” Temple has lived different stages conditioned by the economical and political situation of Spain. Besides the construction improvements have modified the works. The first period (with Gaudy as the architect) lasts from 1883 to 1936. The materials used in those years were traditional, especially masonry with cal cement. The reinforced concrete with Portland cement was only used in the last times.

The Gaudí’s attitude about the concrete has been very discussed . The first Portland cement factory in Cataluña was founded by Eusebi Güell , friend and mecens of Gaudí. As a result of this relationship between them Gaudí Knew this material since the beginning and he began to use it in some of his buildings, although most of the times in an auxiliary way.

In the “Sagrada Familia” Gaudí did not use concrete until 1918 because the works lived a difficult moment the first decade of s. XX. These years the architect fixed his residence in the Temple and designed the rest of the building. In this studio Gaudí also discover the properties of the concrete (resistance, adaptability...) and considered the use of this material in most of the elements.

The first parts of the “Sagrada Familia” built using concrete with certainty are the pinnacles of the towers located in the “Nacimiento” façade. The result of the analyses realized in 1997 demonstrate the use of the reinforced concrete. Because of the form and the situation of these elements located 110m high the concrete has a structural function.

After Gaudí’s death, the young architects who had been his assistants continued the construction ot the “Sagrada Familia” until the beginning of the Spanish Civil war (1939). After the conflict the same architects renew the works and from this moment the concrete was one of the most important materials in the building. In this period they used, specially, ciclopy concrete in the walls filling and reinforced concrete in the resistant elements. From 1960 to 1970 approximately the social opposition to the continuity of the building increase, this situation caused that the information about the works of those years were really poor.

In 1990 a new stage begins, the works rhythm and the interest by the Sagrada Familia increase. The new technologies make a change in the works of the Temple.

Nowadays the concrete is used in most of the parts of the construction. The technical team uses reinforced concrete, pre-fabricated concrete, in mass, high resistance... All of them are made by selected materials in order to achieve the necessary conditions of resistance and durability. The building of the “Sagrada Familia” needs lots of construction methods very specials and materials of high quality. Some elements (such as columns) should resist large loads but it is not possible to increase theirs geometry to respect Gaudí’s design. So, it is necessary structures very reinforced and sometimes the use of high resistance concrete very liquid in order to make possible its collocation. Analysing dossification of high resistance concrete, we have known that by selecting the relation between filler and soars it is possible to improve the quantity of fluidificant.

It’s thought to finish the Sagrada Familia by 2020, but we do not know which new materials are going to be use. As the concrete did solve and improve some problems, maybe other material can do it in the future.