The Concrete Shell of the Engineers Center in the state of Zulia, Maracaibo, Venezuela, analyzed with parametric tools.

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Abstract

The decade of the 60s in Venezuela speaks of a society with a firm will of modernizing even though there was inequity in it. A society that not only entered the peak of world oil production, but also in a stage of accelerated professionalization to direct the public institutions and the growing professional practice of architecture and urbanism, to accompany that modernization.

A new emerging professional class that demands new social spaces, among which recreational clubs and professional associations. Precisely one of them, the Playa Azul Beach Club (1955-1958) in Naiguatá, a recreational beach and sea club, summon Felix Candela for the realization of certain covers (concrete shells) for the club. This is how Candela will begin a large series of proposals and achievements in Venezuela, the second country to concentrate his projects and works after Mexico.

The project for the construction of the Engineers Center of Zulia State (CIDEZ, 1962-1965) [1], known as the oil state, and in the second largest city of the country, Maracaibo. Candela is summoned once again, not only for his completion of Playa Azul Beach Club, but also because he had already built, in the same city of Maracaibo, and in association with Miguel Casas Armengol (architect), the headquarters of the Medical Association Centre of Zulia State (1960-1963), and where he had also carried out several other projects and works.

The project required of Candela for the CIDEZ, is that of a cover (concrete shell) for a multiple use space (open auditorium, ballroom, court, etc.). The concrete shell proposed and subsequently built forms a hexagon in the plane, a geometry composed of the union of three hyperbolic paraboloids supported by three reinforced concrete beams.

This document will show elements and constructive details of the structural plan sent by Felix Candela, to later go on to analyze the structure of the concrete shell using advanced NURBS modeling techniques with Rhinoceros [2], and parametric design with Grasshopper. Force simulation and finite element analysis tools will be used along with shape search techniques and environmental design simulations to generate the geometry and compare the results of the simulation under normal design conditions with the concrete shell.

References

[1] *Drawings and Archives* de la Avery Library de Columbia University, New York, EEUU.

[2] G. Di Marco, “Simplified Complexity, Método para el modelado NURBS avanzado con Rhinoceros”, *Le Penseur*, 2017.