Candela: the man who gave concrete a free rein

1 APRIL 1998 • BY AJ CONTRIBUTOR

Felix Candela, who died last December, will be best remembered for the concrete shell roofs which underlined his unique approach as both an architect and builder. Concrete Quarterly takes this opportunity to celebrate his exploration of new spatial and structural concepts

Trained in the city of his birth at Madrid's School of Architecture, Candela emigrated to Mexico in 1939, where he became a national in 1941. From the mid-1940s Mexico experienced a period of major economic growth; this and a corresponding atmosphere of architectural innovation allowed Candela to develop his unique structural approach: the hyperbolic parabola.

The development began with a series of laminated-concrete structures. He completed his first concrete shell structure in 1949. A second experimental structure was carried out for the Fernandez factory with four cones in saw-tooth formation. In 1953, inside a double-curved roof, he constructed an experimental concrete umbrella. Candela found that umbrellas created very attractive roofs that consisted of four rectangular hyperbolic paraboloids resting on a central support. This system provides large roofs with few supports, allows the support structure to be re-used and permits lighting at points where the modules meet.

Candela was able to simplify the relevant calculations required for what were often very complicated structures. The result was a structural form that was both visually attractive and very economical to build. He counteracted the increasing cost of labour and timber by developing a revolving frame that could be re-used and structural systems that could be adapted to local conditions. Together with his brother Antonio and sister Julia, Candela founded the company Cubiertas ala, which specialised in the design and construction of reinforced-concrete shell structures.

Among his many works, several are outstanding for both their conception and quality of construction. A notable example is the Church of La Virgen Milagrosa in Mexico City. The importance of this work lies in its structural logic. The roof is built in concrete only 4cm thick. It comprises hyperbolic parabolas which join to form the supports. The resulting space has all the romantic mysticism of Gothic architecture.

Other outstanding examples of Candela's work include the Jamaica Flower Market, built in 1995, and the Bacardi bottling plant, completed in 1960. He also worked with other well-known architects. In 1968 he was commissioned together with Castaneda Tamborrel and Antonio Peyri to design the Mexico Olympic stadium. And he worked with Enrique de la Mora on a number of projects.

Candela's structural genius was recognised internationally and he received many awards. He published numerous articles and gave lectures throughout the world in which he explained his construction philiosphy. One such lecture was the 1992 bca lecture given at the Royal Institute of British Architects where he underlined his belief that no calculation, no matter how complex, can be more than a rough approximation of the natural model it is trying to represent by means of a mathematical model.

Felix Candela searched for and found a new form of structural expression. He developed an architectural and construction approach that was his own. His legacy comprises his many buildings that, without question, realise concrete's potential structural beauty.

Felix Candela, born 27 January 1910, died 7 December 1997 of heart failure. He is survived by his wife, Dorothy, and four daughters.