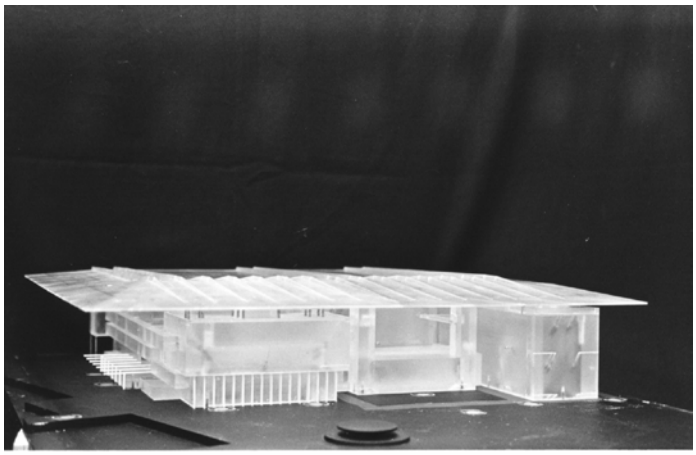
Culture and Congress Centre, Lucerne, Switzerland

Wind Engineering Study



Wind Tunnel Model

Photo of completed structure

Client	*Structural Engineer*	*Architect*
Electrowatt Engineering Ltd.	Electrowatt Engineering Ltd.	Jean Nouvel
Height	*Year Tested*	*Model Scale*
23m in height 12,070 m^2 roof area	1994	1:200

The Project

The Lucerne Congress Centre is located on the shore of Lake Lucerne adjacent to the main railway station and main public square. Built in two phases between 1995 and 2000, the facility contains a 1900-seat concert hall, a 300-seat congress hall, a museum and restaurants. One of its features is an extensive cantilevered roof overhanging. It was selected as one of the top 10 structures worldwide constructed over the ten years between 1991 and 2001 as ranked by Structural Engineering International (SEI), the respected quarterly journal of the International Association for Bridge and Structural Engineering (IABSE).

The massing of the Congress Centre is substantially greater than that of its surroundings, and there were concerns for the effects of wind on the design and performance of the Congress Centre and the potential impact on the wind environment in surrounding areas. A particularly important question was the wind loading and the response of the cantilevered portion of the main roof. Visually perceivable motions of the roof were to be avoided.

The Wind Tunnel Studies

The study of the Congress Centre in Lucerne included wind-induced loads on the main structural system of the roof and its vertical deflections. One corner of the roof has a double cantilevered overhang of 35m and 24m in the north and east directions, respectively.

Simultaneously measured pressures were analyzed to determine structural wind loads and responses for the roof. Resonant vibrations of the first mode which comprised a ''flapping'' of the cantilevered corner increased the peak corner deflections by about 15%.

The wind tunnel model study also provided information on local peak wind-induced pressures and suctions on components of the building envelope. Wind conditions in surrounding public areas and on the roof were also examined.

The roof of the Congress Centre has been instrumented and a website has been established by the owners to permit the behaviour of the structure under wind action to be tracked.

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