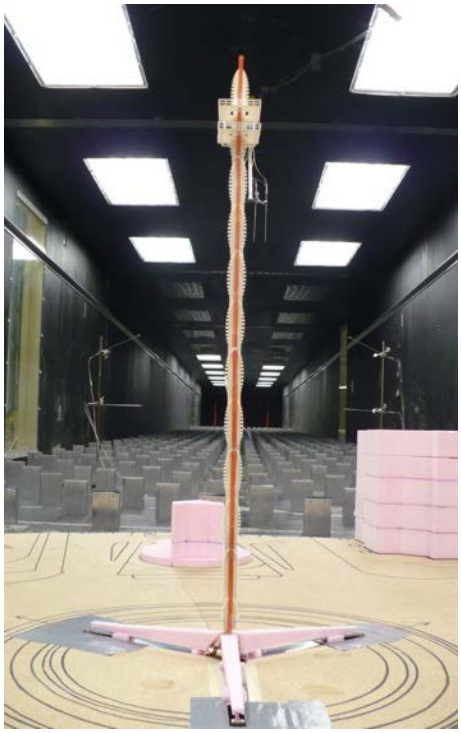
# The Obelisk in Plaza de Castilla, Madrid, Spain

## Wind Engineering Study



| Client | Structural Engineer | Architect |
|---|---|---|
| Acciona Infraestructuras, S.A.<br>Madrid, Spain | Santiago Calatrava Valls S.A.<br>Valencia, Spain | Santiago Calatrava Valls S.A.<br>Valencia, Spain |
| **Height** | **Year Tested** | **Model Scale** |
| 93m | 2008 | Section Model 1:4.3<br>Aeroelastic Model 1:100 |

### The Project

The proposed Obelisk is a steel structure composed of a tube of 2m in diameter and 93.1m high supported by three radial legs at the base. The tube is covered by 42 articulated and movable bronze bars. The movable bars can be driven by motors and a system of bell-cranks which allow the structure to change the external geometry in a prescribed manner. The movable bar system is intended to be locked in position once the wind speed at the top of the Obelisk reaches 40 km/h. The construction stage of the Obelisk incorporates a twin platform supported vertically by two scaffold masts and lateral support through an attachment to the main tube of the Obelisk.

### The Wind Tunnel Studies

The wind engineering studies for the Obelisk project included studies of the wind-induced structural loads and responses of the main structure using an aeroelastic model. The potential for instability of the movable bar system was investigated through the use of a 1:4.3 scale partial section model.

The aeroelastic model study was conducted for both the completed structure and the under-construction stage. Two sets of cladding segments were fabricated for the different configurations.

A supplemental study was also conducted to relate the responses of the Obelisk while under-construction to the mean wind speed at the top of the tower in order to govern construction activities.

**The Boundary Layer Wind Tunnel Laboratory**

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