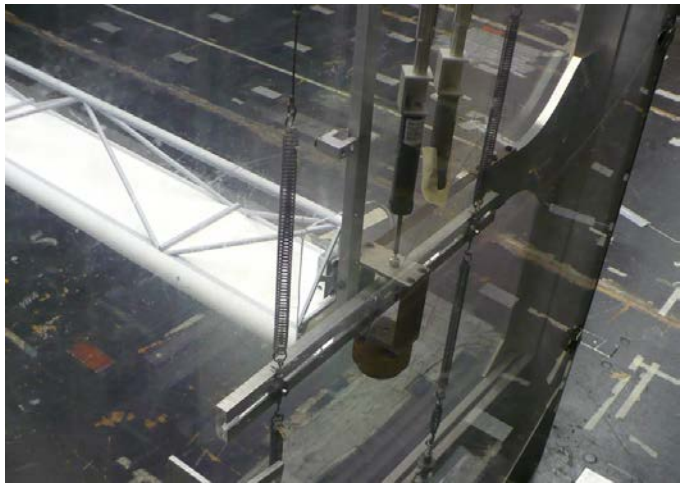
Areva Solar Energy Facility – Receiver Structure

Wind Engineering Study



Client: Areva Solar Energy Facility	*Year Tested: 2011*	*Length of Solar Receiver: 570 m*
Section Width: 1.4 m	*Section Height: 30 m above Ground*	*Section Model Scale: 1 to 9*

The Project

The project involves the construction of a 25 tower support system for a solar receiver which is approximately 1800 ft in length. The receiver trusses span 74ft-8in between the towers and carry a series of tubes in a metal and transparent panel assembly. The ground-mounted solar reflectors are in an array of 15 x 7 panels units on each side of the receiver for each of the 24 spans and cover a plan area of approximately 1800ft x 308ft. The 7-panel units are fixed to tubular space trusses which are capable of rotating along the axis of the truss for the optimum angle relative to the sun and receiver.

The Wind Tunnel Studies

A section model of the solar receiver was designed and constructed at a geometric scale of 1:9.

The behaviour of the structure was studied at the Boundary Layer Wind Tunnel Laboratory. The purpose of the investigation is to define the aerodynamic characteristics of the solar receiver and the reflector panels over a full range of wind speeds and to provide information for the design against wind effects.

The Wind Tunnel Studies (Cont.)

The specific objectives of the study were to provide the following information:

1. Basic aerodynamic information for the design of the solar receiver truss,
2. Determination of the static force coefficients of the receiver truss in both smooth and turbulent winds,
3. Investigation of the overall stability of the receiver truss in smooth wind,
4. Definition of the dynamic behavior of the receiver truss due to buffeting in turbulent wind,
5. Estimation of the aerodynamic derivatives for the receiver truss,
6. Estimation of the equivalent static wind loads for the receiver truss, using the results of the static section model tests and the aerodynamic derivative tests, and
7. Estimation of the equivalent static wind loads for the tower using a gust factor approach.

The Boundary Layer Wind Tunnel Laboratory

Western

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