

# Optimisation of the acquisition points in wind tunnel pressure measurements

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## Summary

In order to optimize the structural design of buildings it is often convenient to recur to wind tunnel tests on scaled models, including loads and pressure measurements. While performing pressure measurements models have to be equipped with a limited number of sensors; one of the problems to be faced during the setting-up of the tests is to determine the optimal number and placement of the pressure taps.

It is proposed a method that uses statistical techniques able to reconstruct the pressure time histories in real scale, in the zones between the investigated positions. Finally the optimal number and position of the measuring points is analyzed by means of a technique based on neural networks.

**Keywords:** neural networks ; wind tunnel tests; pressure measurements.

## 1. Introduction



*Fig. 1: Render of the new Stadium of Siena*

In the present work, the proposed procedure has been tested on the case-study of the new Municipal Stadium in Siena, Italy. The wind induced pressure on its roofing was investigated through an experimental campaign conducted in the CRIACIV boundary layer wind tunnel, Florence.

The stadium has a capacity of 20,000 spectators and was conceived as a 'bowl' in which the playing field is under elevated respect to the plan of campaign. The coverage of the stands, with a 'U' form, is the only visible element from the outside, this solution has permitted to reduce the visual impact and to blend structure and land in the sensitive context of Siena.