

# Wide membrane enclosures: personal experiences – Structural Membranes 2015

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## ABSTRACT

Scope of this lesson is to explain the architectural and structural design approach adopted for the following wide span membrane roof designed by the author:

- Stainless steel membrane roof for the walkways of Roma Fair
- The suspended roof of the new Juventus stadium in Turin
- “The “Vela” reticular spatial roof near the Unipol tower in Bologna
- The roof of the pedestrian walkway for the Milan Expo 2015

The Trade Fair complex in Rome assumed an international importance in the exhibition sector with the new 186,000 square metre structure made up of 22 pavilions. The coverage of the walkways is made with a steel membrane multispan roof for a total length of 1,9km..

The “new Juventus stadium” replaces the Delle Alpi stadium in Turin, which was built for the World Cup in the nineties, after nineteen years in operation. The new stadium is built to the most modern standards on public and sports buildings, and has a capacity of 41,000 spectators. Roof structure is composed by the suspended main structure and secondary reticular trusses. At the four intersection joints a system of 4 stay cables (105mm, about 93m length) suspend the main structure at the heads of two main columns. Each head is then anchored to ground by a system of 6 stay cables (105, about 128m length).

The «Vela» is a double layer reticular spatial roof located near the Unipol Tower in north eastern Bologna, near the ring road. The roof coverage is made by ETFE pneumatic modules with one opaque (printed) layer and another transparent, the system is meant to block the direct solar radiation while it allows the transmission of diffuse daylight. The design of this structure has been made following integrated performance evaluations.

The design of the roof of the pedestrian walkways for the EXPO 2015 exhibition structure adopted the distribution and functional methods proposed by the EXPO 2015 Masterplan Project. The Masterplan approach is to adopt a lightweight version of the design solution, using a typology/morphology which creates a slimline, simple, almost archaic sensation in the collective imagination, in the shape of a curtain, in antithesis with the dominant megatrend of the previous Expo solutions. With a view to retaining the value of the design idea in the later phases and up to the construction stage, the decision was taken to use a dual effect tensile structure, with the membrane roof laid on the intrados cables on the one side and on the extrados cables on the other, thus guaranteeing a pleasant aesthetic effect of movement and allowing warm air to flow outside the volume covered by the curtains.

## REFERENCES

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