

## “Angel’s Hospital” Railway Station In Mestre Venice: Fire Analysis

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## Summary

In the framework of the Veneto Regional Metropolitan Railway System, “Angel’s Hospital” railway station has been designed from scratch in Mestre (Venice, Italy). It is constituted of six distinguished independent areas. The main frame of each of them is made of curved I-section polycentric steel beams placed every 4m to support the secondary frame (purlines) and the cover mantle, which is made of aluminium ribbed double sheet sandwiches with a soundproof infill.

A fire analysis (train fire) of the structure is carried out in an advanced calculation model, where the structure is modelled in a FEM program by beam elements. Localised fire model analysis with Eurocodes 1, 3 and 9 is performed taking into account time-and-space temperatures trends. Buckling stability analysis in fire condition is performed by varying Young modulus of structural elements in relation with the local induced temperature.

**Keywords:** fire analysis; localised fire model; advanced fire model; train station cover; aluminium; steel; fire design.

## 1. Introduction



Fig. 1: “Angel’s Hospital” Railway Station

In the framework of the Veneto Regional Metropolitan Railway System, that is an integrated transport system having the railways network as backbone, “Angel’s Hospital” railway station has been designed from scratch in Mestre (Venice, Italy); it became operative in October 2008. The various station buildings are located beneath a series of shell-shaped roofs which mark and accentuate the position of the various station components.

There are six distinguished independent areas whose covers’ main frame is made of curved I-section

polycentric steel beams placed every 4m to support the secondary frame (purlines) and the cover mantle made of aluminium ribbed double sheet sandwiches with a soundproof infill.

The biggest cover is supported also by two CHS columns every two polycentric beams in order to split the arches span (chord of about 49m) in three parts; they are connected to each curved beams by four CHS beams in an upside down pyramid configuration (total height of about 11,3m).

A fire analysis (train fire) of the structure is carried out in an advanced calculation model, where the