

# Hipercor Roof in Guadalajara

The existence of a longitudinal wave shape suggests the existence of two elements: an arch coinciding with the positive curvature area (upwards) and a hanging element (tie) in the negative curvature area (downwards). The sequence of these two elements, if their extremes are sufficiently anchored horizontally, would allow the construction of an exceptionally light structure, working longitudinally by form and, therefore, with small bending moments and minimum depth.

However, the location of the supports of both sections on different levels and the presence of the supports at intermediate points instead of at the extremes of the 'arch' and the 'cable', slightly modify this initial idea which has to be adapted to the geometry of the project and to the extended situation of the building below the roof.

In order to solve this problem, the following elements and solutions have to be included:

- To introduce cables which anchor the two springs of the arch between one another in order to avoid the horizontal reactions on different levels which harm the concrete structure.
- To introduce an anchored stanchion in the exterior area of the tension area to anchor this force.

In this way, it is basically possible to obtain a structural arch and cable type behavior and to practically eliminate the corresponding moments of longitudinal forces.

## TEXTILE MEMBRANE SOLUTION

Within the previously conceived structural concept: longitudinal arch-cable behavior, the use of a pierced textile membrane; a roof element which allows to reduce the longitudinal structure to two lines located at the extremes of each module, separated at 24.00m.

The textile membrane permits the covering of the 24.0m span thanks to the double curvature:

The longitudinal curvature is obtained via the wave plan in the longitudinal structure and the curvature in the opposite direction to the aforementioned, so obtained through the pattern of the textile membrane.

## PERFORATED STEEL SHEETING ROOF SOLUTION

This solution is put into practice by employing a series of purlins composed of cut, variable-depth shell profiles, separated at a distance of 12.00m, which receive the loads transferred by the perforated steel plate.

The purlins consist of HEB240 steel profiles which rest upon the two longitudinal beams which follow the direction of the waves in the roof structure.



Spain /2008  
Project data

Structural type:  
Steel and textile membrane roof  
Location:  
Guadalajara  
Opening date:  
2008  
Proprietor:  
El Corte Inglés  
Scope of Works:  
Construction Project and  
Technical Assistance