



# Palma de Mallorca Cathedral cross-section analysis

Palma de Mallorca, Spain / S. XIV

Structural type  
Owner  
Scope

gothic cathedral, limestone masonry (sandstone)  
Cabildo de la Catedral de Palma de Mallorca  
auscultation and diagnosis



The columns of Palma de Mallorca Cathedral, which are the slenderest among Gothic Cathedrals in the world, showed curvatures in the vertical cross section as well as other damage (vertical cracks amongst others). This study was needed in order to establish the Management Program of the Cathedral. Likewise, disorders in the flying buttresses were also detected.

In order to find an answer to this problem, an analytical study of the cross sections structural behaviour was fulfilled. The mechanical behaviour of the masonry had to be characterized, as without recognizing the masonries and their resistant capacity, the degree of the columns' stability could not have been determined.

From this point of view it has been very useful to observe how the knowledge developed for concrete structures, especially regarding the second order effects analysis, has allowed the study of a masonry structure such as this, to be dealt with. In short, it is a fine example of the manner in which the solution of one structural material can be applied to other materials, permitting the solution to which, are otherwise, rather frequent problems.

The structural analysis allowed an estimation of the safety level of the columns expressed in terms of relation between failure and acting stress eccentricities. The safety level determined was deemed to be adequate. In this study, the importance of the consideration of the construction process has been shown. With regard to the thrusts, whose analysis required fairly simple tools, (stability and tensional verification with non-tension materials) the study concluded that the stability of these elements would not be compromised whilst there were no movements in the abutments.

In any case, the need to develop an intelligent monitoring plan was observed in order to follow through and control the evolution of the most significant parameters in comparison with the correspondent threshold values.



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