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## **Strengthening of the Minutolo Chapel in Naples Cathedral**

**Renforcement de la chapelle Minutolo de la cathédrale de Naples**

**Verstärkung der Minutolo-Kappelle in der Kathedrale Neapels**

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### Historical notes

The Minutolo Chapel was probably built during the same period as the opposite Illustrissimi Chapel. Before the construction of the Cathedral was finished, it was decided to increase its size and importance by widening the transept and adding the two chapels to either side of the apsis.

The date of the frescos in the Minutolo Chapel, almost wedged in between the already existing structure of the right apsis, leads us to believe that it was therefore built after the Cathedral rostrum, though not after the last 10 years in the 13th century. Inside the chapel the underlying hypogaeum is even clearer, the external buttresses and the lower base inclined towards the upper cornice of the siding and the square tower of the transept are evident. These walls, in square tufa blocks, show signs of a lengthy period exposed to atmospheric conditions. This leads us to believe that the Minutolo Chapel, already in use as originally designed on the aisle, was brought about after the construction of the apsis. The inside of the chapel, built with a rectangular design with an ogivally crossed vault, ends with a polygon apsis added in the second phase of construction, which took place in the beginning of the 15th century. Even the small vestry is an addition, exploiting an area between the Cathedral apsis and that of the chapel. Nearly all of the pavement is decorated with precious marquetry with policrome marble inlays of the Cosmos. Throughout the various centuries the internal walls have been completely covered with frescos.

### State of conservation and erosion.

As can be gathered from the history of the chapels' construction, the walls in the supporting structures were built in various periods and with various characteristics. The wall on the left and that of the entrance, is the transept pillar in the shape of a polygon, also in tufa blocks. The nave is roofed by two bay-vaults with crossed ribbing, while the apsis is formed by a large gothic style arch and a semivault with ogival ribbing.

On the left wall, the irregular external apsis buttress is hidden by part of a wall situated between the two pillars and the cornice of a depressed arch. A small chapel has been built under this arch.

The above floor is vaulted in tufa stones with a strongly depressed curve that is thin and flat at the extrados, almost like a "plate". Considering the use of



small stones of an excellent quality, there are signs of considerable erosion. The technical solution used in the past was that of a supporting element in relation to the crown by a large pillar in stone masonry.

Two large brick arches were then added, converging towards the centre of the pillar, creating a larger support area in the vault. About 30 years ago, in the hope to block the increasing fissures, it was considered necessary to increase the width of the pillar (by at least 4 square meters), without considering the need for a suitable foundation for this heavy structure.

In this period, structural work was also carried out on the previous pillar that had obviously pulled away from the vault intrados through sinking. The foundations for the converging walls in the south corner were also realized.

#### Intervention for consolidation.

The problem concerning the static restoration of the main structure of the Calpestian vault in the chapel, was formed with the birth of the actual vault due to its dimensions and form. The bulky supporting walls, built in the past to the hypogeum quota, have continually proved to be not only insufficient, but also damaging by creating an excessive weight to the supporting ground, thus causing sinking.

The object of this restoration, carried out by the Superintendant for the Architectural and Environmental Treasures of Naples, and Suburban Areas, is to eliminate the enormous pillars and to use a crypt method that will allow the chapel to be opened to the public and, with time to ensure the definitive strengthening of the vault. Apart from being a piece of particular architectural work with precious mosaics of the Cosmos, it is without a doubt a significant structural element in the original building.

The technical solution used was that planned with the advise of Eng. Bruno Pandolfi and Paolo Falasca. This method created the supporting structure (for both above and below ground) by a frame of metal beams, positioned on the shortest side of the chapel, and interconnected at the right-angles by another series of steel sections placed according to where they are required. These steel sections were welded to the inferior sides of the beams and supported the vault by stays bolted above and a distribution plate at the intrados. The use of this metallic frame, limited in width and disposition, has given both support to the fissured vault and to an overload equivalent to that determined by overcrowding, (a rare occurrence but not to be excluded). This solution has been positively valued, because it does not detract from the architectural image and has provided a quick and easy execution. The last phase was to progressively demolish the preceding reinforcement structures in the crypt. This operation was carried out by evaluating and controlling, with the use of a computerized monitoring system, the eventual static alterations in the vault structure.

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