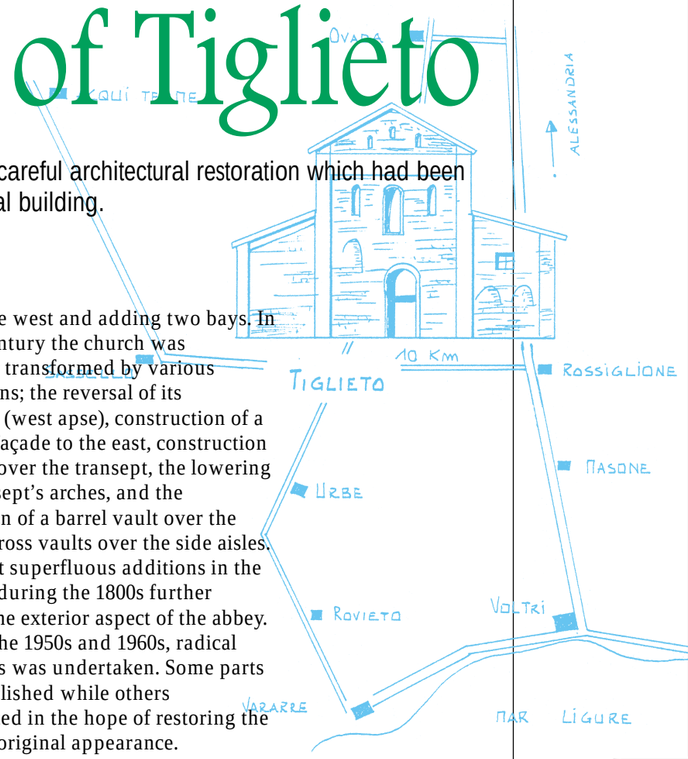
The Abbey of Tiglieto

Italy's first Cistercian settlement has been subject to careful architectural restoration which had been carried out respecting the appearance of the original building.



Over the centuries, the abbey of Santa Maria di Tiglieto has undergone numerous transformations and has often been tampered with. Built by white monks from France at the beginning of 1120, the abbey is situated on a plain inland of Genoa surrounded by thick forest. The abbey was the first Cistercian structure to be built outside Burgundy. The region in which the abbey was founded - Selva dell'Orba (meaning "Orba wood" after the river) – was, and still is, wrapped in the silence of the mountains; ideal conditions given the community's solitude yet, at the same time, it was not far from important communication routes with Genoa and Savona.

The church is laid out like a basilica with three naves, with the apse orientated towards the east, and a non-protruding transept. In the 13th century the layout was modified by extending the church towards the west and adding two bays. In the 17th century the church was completely transformed by various interventions; the reversal of its orientation (west apse), construction of a new front façade to the east, construction of a belfry over the transept, the lowering of the transept's arches, and the construction of a barrel vault over the nave and cross vaults over the side aisles. Subsequent superfluous additions in the side aisles during the 1800s further modified the exterior aspect of the abbey. Finally in the 1950s and 1960s, radical restorations was undertaken. Some parts were demolished while others reconstructed in the hope of restoring the building's original appearance.

Complex structural stability

This brief descriptive historical summery of the building explains how, during the course of the centuries, the structural stability of the construction has been completely altered, weakening some parts, introducing pressure and greater stress on others while, at the same time, reducing or removing structural links between various masonry elements (photo 1). In other words the architects where faced with a series of disconnected elements that could not support each other's loads and thrusts or withstand possible subsidence in the foundations.


PHOTO 1


PHOTO 2

These fundamental problems had to be taken into consideration during restoration, favouring solutions that could restore the links between the various structural elements. Special attention was paid to reconstructing the roof. Preliminary inspections were made on the building's general structural state, identifying the most urgent interventions needed to give the building the necessary level of structural safety.

An unstable vault

The nave's round vault which was build in the 1600s when the building passed into the hands of the Raggi family, is made up of ribbed brickwork approximately 15 cm thick. There was widespread cracking throughout the vault which risked putting the whole structure out of balance. The bearing wall's foundations has probably subsided causing the vaults to deform, increasing the eccentricity of the crown and creating stress on the extrados. Since the walls have very low resistance to tensile stress, cracks opened along the intrados keystone (photo 2).

Restructuring involved the construction of a thin reinforced concrete shell on the extrados of the vault, the erection of new support walls (in reinforced concrete) and the installation of a double series of support ties to efficiently resist the thrust of the vault on the side walls. This extremely delicate procedure called for a precise plan of action.

A new shell

The construction of a cover over the extrados required a series of highly sophisticated technical approaches. First of all, after having erected a structural steel scaffolding above and below the nave able to support its whole weight (photos 3 and 4), the cracks in the vault were sealed. MAPEANTIQUE MC, a pre-mixed sulphate-resistant mortar for the restoration of historic buildings was used to repair the cracks from the intrados of the vault. The extrados was then thoroughly cleaned using compressed air (photo 5). The new shell was then constructed over it and supported by beams using the side walls that had already been reinforced.

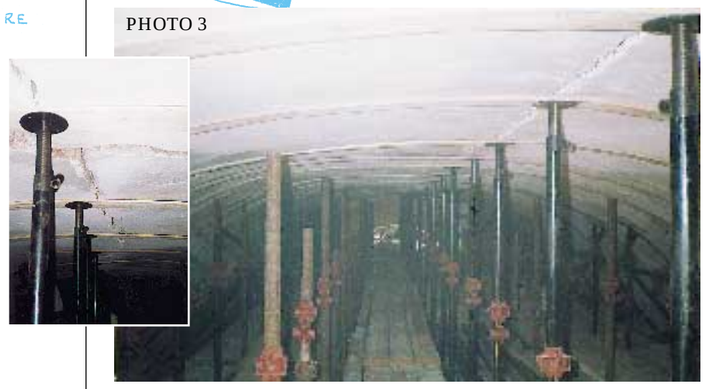


PHOTO 3


PHOTO 4


PHOTO 5

The reinforced vaulting was made using STABILCEM (photo 6), an expanding cement binder used instead of normal cement, which then adhered to the vault. STABILCEM is a high quality concrete with high compressive strength after only a short period of time (23.70 N / mm^2 after one day).

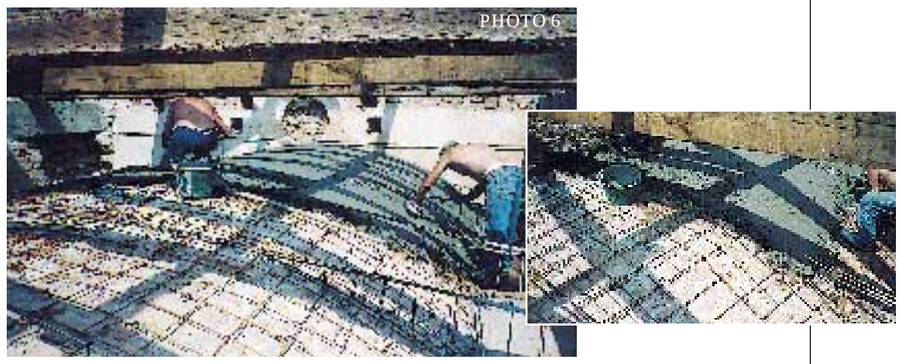


PHOTO 6

To be sure that the new structure solidly supported the vault, 2,000 holes were made in the extrados of the vaults to take iron support tie rods and, lastly, a layer of cement modified with PLANICRETE - a synthetic-rubber latex that improves cement slurries' adhesive characteristics and resistance to flex - was spread. The tie rod brackets were structurally anchored by injecting EPORIP, an epoxy-based resin that cures without shrinkage and has excellent dielectric and high mechanical resistance properties.

A resinous wood

The wooden roofing is made up of flint laggings, 18x36x2.5 cm tiling similar to the original scandola oak or chestnut tiles. Before restoration, the roofing was in an advanced stage of deterioration.

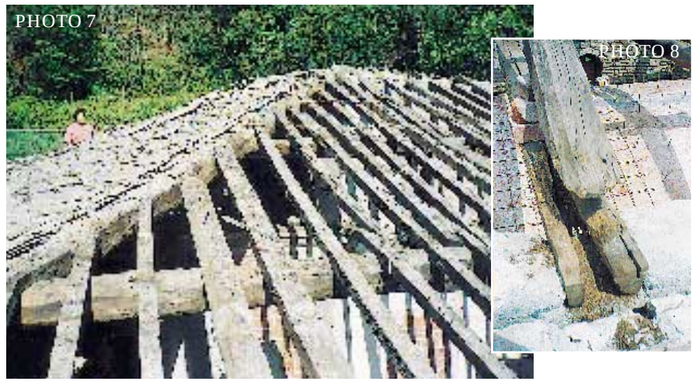


PHOTO 7
PHOTO 8

The pitches had numerous cracks where water and snow penetrated causing further damage to the already precarious structure. The massive wooden frame of the roof composed of chestnut truss and beams was also seriously damaged (photo 7 and 8).

The temporary removal of the wooden roofing was necessary for the reconstruction of the vault. This revealed the state of conservation of the trusses. Since some of the trusses were either rotten or missing, the Project Managers decided to reconstruct or insert new sections where required to recreate the original geometrical form of the roof (photo 9).

After verifying the compatibility with the wood, EPORIP was poured into a mould around the trusses and reinforced with stainless steel. The trusses were then covered with a roof similar to the original.

A delicate intervention

The analysis of the Tiglieto church revealed its importance as a monument of great historic-artistic prestige and as a rare example of the Cistercian spirit and life-style. The restoration of the church was carried out under extremely rigorous historical control and was backed up by considerable technical and scientific competence.

Without doubt the Medieval-17th-century bipolarity is a special characteristic of the Tiglieto building; the conservation for future generations of this duality reflects the effort to preserve the building's authenticity (photo 11 and 12).


PHOTO 9


PHOTO 10

The collaboration, both during the project and during reconstruction, between the various professions – art historian, the architect overseeing the restoration, the architect responsible for the protection of the building, the structural engineer and the expert in building materials – lead to a philologically and scientifically based restoration. Given the results obtained, it is considered vitally important that the restoration of the church continues, extending work to the interior and the cloistered areas which are in very poor conditions.


PHOTO 11

The Technical Data Sheet for the products mentioned in this article are contained in Mapei binder No. 3, "Building Speciality Line".

TECHNICAL DATA

Abbey of Santa Maria di Tiglieto – Tiglieto (Genoa, Italy)

Year Built: 12th century

Restored: 1998
Structural Designer: Giorgio Stella – an engineer with Studio Tecnico Stella Franzese e Associati (Genoa, Italy)

Project Manager: Paolo Franzese, Arch.

Contractor: Edilge Costruzioni Srl - Genoa

Project Manager for the Contractor:
Francesco Molinari

Mapei Products used for the restoration of the vault:
MAPE-ANTIQUE MC
EPORIP
MAPE-ANTIQUE FC
PLANICRETE
STABILCEM

Mapei Product used for the reconstruction of the trusses:
EPORIP

Mapei coordinator: Enrico Grasso