The mural paintings in S. Maria Maddalena church in Camuzzago: the conservation process.

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Abstract

This text describes the pattern that has been followed for drafting the conservation plan of the mural paintings in S. Maria Maddalena church.
The conservation project of the building and its interiors is focused on a multidisciplinary approach. It has been drawn up with the collaboration of several professionals engaged together from the beginning of the conservation process. These different skills have gathered up relevant results which have been able to provide a set of information related to the comprehension of the building, meant as a complex system. The main goal is to integrate all this data with the support of each different discipline, querying each professional's specific answers in order to outline a holistic view of the topic.
Through this method it has been possible to set up the criteria for the conservation project, based on the issues of preventive and planned conservation.

Keywords

Mural painting, holistic approach, preventive conservation,

Conservation process, system, mural paintings, diagnostics.

S. Maria Maddalena church was built in 1152 and was embellished with frescoes by a well-known Lombard painter, Bernardino Butinone, in the first decade of 16th century and with secco paintings dated back to a period between the second half of 19th and the first half of 20th century. The Cinquecento pictorial cycle survives in the presbytery and on the apse (Figures 1,2,3,4); there are also frescoes on the pillars, representing Saints and the Virgin with the Child (Figure 5), while a series of decorations with vegetal, floral and figurative patterns cover the vaults and the walls of the nave (Figures 6,7,8).

Figure 1: A view of the nave and of the presbytery

Figure 2: The apse

Figure 3 The presbytery's south side

Figure 4 The presbytery's north side

Since the Church has not been in use for a long period, some decay phenomena have appeared, caused by both the natural decay of some materials as well as by the aggressive action of external environment and internal microclimatic conditions.

The building conditions made it immediately evident that the restoration of painted surfaces should not be carried out without an intervention concerning all the architectural elements, aimed at achieving a "near equilibrium" condition, in which every single element's performance, in its relation to the whole, contributes to maintain and conserve the fabric [1].

On the one hand, the project's aim is the conservation of the building as a place of worship, while on the other hand using it in the future as a multifunction and exhibition space.

This potential reuse has been assessed according to the criterion of compatibility between form/fabric and function. In other words, the building has not been taken simply as the container of a new function, risking creating an empty box indifferent to the purpose of the original function, and conversely a use that is indifferent to the characteristics of the monument.

The ideas and solutions for a suitable use for the spaces came out by comparing the building's material conservation with functional issues [2].

A major aim was the restoration of the mural paintings which has produced a new recognition of their value, strictly aesthetic in the past, but nowadays more related to historical and documental purposes. Restoring, and in a sense rediscovering, the frescoes also aims at enhancing the property.

The typical Italian vision is that heritage ("beni culturali") is the whole of objects and sites strictly linked to the territory, which has generated them and constitutes their actual context, through a non interrupted historical process. Heritage is therefore what makes the identity, the "sense of place" of a territory.

Figure 5 A fresco on a pillar (S. Apollonia)

Figure 6 The nave's vaults

The conservation project for the building and its interiors is focused on a multidisciplinary approach drawn up with the collaboration of several professionals through their different skills. It is necessary to consider the building as a complex system ruled by the interactions among the technological elements that constitute the architecture.

A multidisciplinary designing method encompasses a number of criteria, which have to be used for assessing the options: authenticity, compatibility, durability and efficacy of interventions.

Such a method is necessary for a project which nevertheless "esige convergenza di intenzioni e contrasta la frammentazione esasperata dei saperi" (Crippa 2003: it needs convergence of purposes, and it fights an exasperated fragmentation of know-how's).

Therefore it's mandatory to overcome any reductive understanding of multidisciplinarity, in order to achieve a synthesis and a cross-fertilization of disciplines.

In this direction systemics can give a useful methodological support. Our project took in principle the idea that the conservation of an old artifact has to look at it as a complex open system, that is a system which interacts and has exchanges with its context.

A systemic approach gives foundation to a mixture of different disciplines where each discipline retains its own methodologies and assumptions, so that it is correct to speak of a multidisciplinary relationship, nevertheless interactions are effective in giving inputs and stimulating answers. Techniques do not change, but the outputs are different and more significant when they are performed as a set, than when each technician does his task separately.

Figure 7 The nave's decoration

Figure 8 The northern aisle

This theoretical assumption is definitely relevant for modelling the interactions between architectural elements taking into account several problems, merely conservative but also relative to transformation which occurs by introducing new materials and contemporary techniques. The artifact is thought of as the stratification of events occurred during the time of its existence, building up an "architecture of time" (Pomian 1981, Bonfiglioli 1990) which gives every monument an identity, recognized only through the material permanence of objects. Architecture therefore has to be understood as a set of elements affected by evolutionary processes; a convenient image seems to be that which describes the building as an ensemble of parts which evolve contextually, adapting to mutual transformation, reaching every time an emerging equilibrium, that is a new physiognomy, determined by the emerging features of the system. It is a new physiognomy, but not a new identity: what happens is that identity is not fixed but dynamic.

A conservation work on an ancient building therefore requires knowledge (of all its parts; its history and building phases) made up in a form not analytical, but systemic; it implies a deep and intimate understanding of the historical logics of the objects.

The knowledge phase started with the historical research and then continued with the survey, which has been made with the laser scanner technology, and with the assessment and the diagnostic campaign that aimed at investigating the indoor microclimate conditions, the chemical and physical features of the materials, above all mortars and pigments, and the conservation conditions of painted surfaces. As previously stated, the main feature of all these activities was the continuous interaction between the different sights, pursuing a cross-fertilization of specialized performances.

The historical analysis is not a scholarly research outside the project, it is part of the design activity. Of course through history it is possible to achieve useful information about a building's special features, but the way itself of examining papers proceeds from the problems which day by day the monument reveals to the one who takes care of it.

This investigation takes the building as a document to study the culture and material culture of ancient times, and aims to acknowledge past events in order to understand the present, because architecture is thought as constituted by stratification of changes (Torsello 2003).

In Santa Maria Maddalena Church in Camuzzago, existing literature and a thorough archive investigation led to a satisfactory reconstruction of the main building phases of the property.

Published and unpublished documents have been studied to gather data for comparison with information and questions emerging from the diagnostic campaign and from the direct observation of the building, a document source in itself.

The survey has been performed by laser scanner technique. In this practice the object is no longer modelled by projections on a plane or fixed views, but through an operable tridimensional model. Thanks to this model it is easy to derive the plans and prospects, which are necessary for the thematic mapping. But such a survey is also detailed enough to allow a series of in-depth examinations of building stratigraphy, based on qualitative data as well as on metric features, as it gives the vision of the building as a whole, while making a large number of singularities emerge that are often invisible to the eye alone.

The third phase of the knowledge process is the diagnostic campaign, which has been planned by the architects with the advice of specialist technicians. The campaign foresaw a first set of characterization analyses and the microclimatic monitoring, but some analyses are scheduled also during the forthcoming restoration works, to evaluate treatment efficacy and compatibility between materials [3].

Plasters supporting painted decorations have been characterized through the study of samples in thin section, aimed at recognizing the chemical nature of the binder and the chemical and petrographic nature of the aggregate, as well as the state of conservation. The paintings have been studied by a microstratigraphic complete analysis, reaching the definition of pigments and binder of each layer thanks to a series of tests useful to understand also the techniques of execution. Moreover, thermal gravimetric analyses (TGA) have been performed to detect the presence of organic additives.

Each of these researches contributes to a comprehensive understanding of the monument.

Historical sources confirmed the reliability of the inscription behind the façade, which dates back to the erection of the church in 1152: a list of monasteries belonging to the Canons of the Holy Shrine written in 1143 does not include Camuzzago, while it is cited in two documents in the year 1163.

In 1581 St. Charles Borromeo visited Camuzzago [4] and described the church as consecrated, large and vaulted for one half (or just in the nave [5]) and for the rest missing horizontal structures, that is barely covered by the roof, whose structure was barely undisclosed. This information opens a few questions about construction issues; was only the nave vaulted, or were the nave and the aisles all vaulted, but only for half their length? Under the structural viewpoint, a pushing structure, like a barrel vault, cannot be

built without resistant elements; that is vaults on the aisles as well, but aisles are described as covered with masonry vaults only in the 19th century [6]. Therefore the hypothesis that on the nave a barrel vault was to be seen, but made up with light materials, like reeds, looks logical, and it is confirmed by two documents of the 19th century [7].

The paintings in the choir and on the pillars are quoted in documents from the 16th century, while it is now clear that the aisle vaults were not to be painted until the middle of the 19th century. The archival information has been confirmed by direct survey. It can be observed that the aisle vaults are built upon walls coated with plasters from previous building phases. Therefore the thesis that these decorations, stylistically recent, were painted over older frescoes has been disregarded, as it is clear that they were painted ex novo. Laboratory tests gave one more help. The microstratigraphic analysis showed that no layer is to be found below, and some of the pigments used in the colors were in commerce only after 1920.

The first concern for Renaissance frescoes, evident also to the naked eye, is the high level of humidity. The main cause can be pointed out in percolations from the roof. Infra Red Thermography recordings have been performed to evaluate infiltrations, while indoor parameters of temperature and humidity have been evaluated by psychometric measures and continuous monitoring. These combined tests confirmed the presence of active infiltrations, but pointed out also the problem of condensation dampness, so that the apse requires microclimate control, particularly in summer. Salts in the plasters have been characterized, and their concentration determined by HPLC ionic chromatography.

The diagnostic campaign covered different materials and problems to be found in the building, in order to get a thorough picture of the whole architectural system.

In the meantime stress tests were performed on the walls and internal pillars, to calibrate the finite elements structural model of the church, that allowed an understanding of the structural behavior of the building and to assess its safety [8]. The results of tests and analyses pointed out some problems in the pillars, owing to their construction method [9], and the necessity of strengthening the structures to get the minimum safety factor. New functions, such as the fact that the building will be open to the public, require the reinforcement of horizontal structures, to provide them with the loading capacity required by Italian standards.

All the information gathered during the knowledge phase has been revised with a holistic view of the fabric system, so the conservation plan has also been based on the integration of each discipline.

The restoration of the frescos, which are in an advanced decay condition, and a renewed fruition of the church are the main goals, so the project has to match the requirements both of the conservation of painted surfaces and the requirements of functional and structural adjustment, in order to allow the use of the building. This set of requirements obviously has meant drawing up a plan which out of necessity will cause changes that translate into further proof of time passing, not the cause of damage and decay in the future.

The topic of “compatibility” that has already been mentioned in this text becomes central. In this planning phase it has been essential to define both the compatibility between the artifact and new function and the compatibility among materials.

The compatibility can be determined by the specificity of the elements on which we will intervene (physical and technical characteristic, previous interventions, the conservation conditions) and by the utilisation condition in order not to neglect the safety, structural adjustment and functional requirements.

To achieve these results it has been necessary to acknowledge the relevance of the information resulting from each contribution, just as it is relevant to point out that the outcomes of these analyses have guided

the choice of each intervention. Structural safety is required by law, but it is equally important to guarantee that structural interventions don't cause damage to the frescos, and furthermore the balance between the preservation of painted surfaces and the thermo-hygrometric comfort is an outstanding issue.

Structural reinforcement needed to upgrade the horizontal structures and to enlarge foundations requires the addition of two continuous beams, avoiding any contact with ancient foundation structures, which will be loaded by means of steel elements, set in holes drilled into the walls, and then forced by a screw device. Pillars will be upgraded by injection of a compatible mortar that is obtained with a special pozzolanic binder, which has a good resistance to the attack of soluble salts, and reinforced also by stainless steel bars [10].

The functional adjustment follows the structural adjustment. The presence of high moisture levels, both inside the masonry and in the indoor environment, is the problem that some interventions are focused on. The renewal of the roof covering, the construction of a ventilated loose stone foundation, the insertion of suitable windows [11], and the installation of a heating system that is able to control the values of temperature and relative humidity in the different areas of the church.

An active collaboration was necessary among the conservation architects, the diagnostics and the engineers (structural and mechanical services) in order to agree on the appropriate solutions.

The psychometric survey has provided data about indoor microclimatic conditions useful for evaluating the conservation conditions of the surfaces (painted and not painted) and for the consequent sizing of the heating system and of other interventions, such as repairing/replacing windows and insulation.

The aim is to tune the distribution of temperature and relative humidity in the different zones of the church, defined by different use and construction technologies. On the one hand the nave and aisles, in which there are a 19th century decoration and some frescoes, are now characterized by microclimatic conditions due to the absence of windows; this area will be destined to activities which involve the people staying there, and therefore a change of conditions is foreseen. On the other hand the presbytery and the apse are areas characterized by a thermal range and by a high level of dampness. They represent a second area with different microclimatic conditions and where the main objective is the preservation of the frescoes, because it will be an area where a reduced number of people will remain only for the time necessary to see the mural paintings. In this area the microclimatic variations will be controlled in order to keep them as smooth as possible.

The procedures of the structural intervention have been the subject of careful consideration, to control the impact on the fabric of these operations. First of all it has been necessary to plan the interventions to make the paintings safe with a view to the following phases of the restoration and to the consolidation interventions of the structural elements.

Interventions are different according to the characteristics of materials and techniques, and operations will also take into account salt concentration and high water content.

Fine tuning of operating methodologies will depend on several criteria: effectiveness in protecting surfaces against vibrations caused by drilling, as well as against injection pressure; effectiveness of products for cortical consolidation of coatings; compatibility of products with chemical/physical characteristics of decayed plaster, in presence of microclimatic conditions, which will be achieved at the end of the procedure.

The new heating system will be able to keep correct microclimatic parameters, but it will not modify the water content inside walls, unless by raising transpiration: and this will entail a migration of salts toward the outer surface.

Therefore for a period after the works some efflorescence is expected, and it will be useful to be careful when evaluating concentrations of organic consolidants, if they were assumed as the most effective, to avoid a non transpiring film on the surface, and the consequent formation of subflorescences below the finish layer.

Plasters which are more detached from their support will be pre-consolidated: protection by Japanese tissue paper has been foreseen on the whole surface of the frescoes on the pillars, while for the ones in the apse and in the nave preliminary protections will be limited to the parts affected by detachments.

The strengthening of pillars required a very careful schedule of operations performed alternatively by conservators and workers specialized in injections and the insertion of steel bars.

Conclusion

A multidisciplinary concept requires compatibility, which in turn can have another sense if the terms of comparison get modified, no longer looking at the materials, but at the operators. It is definitely important that the skills of the different professionals who participate both in the design phase and on site during the works are compatible with each other as well as with the characteristics for the cultural element. (Montagni 2003).

This statement becomes even more relevant if one agrees with the assumption that conservation of an object does not end with the restoration work, as keeping a good state of conservation depends on management activities. In fact it is necessary to plan a monitoring system and a series of maintenance interventions in a long term vision of preventive conservation.

Endnotes

1 *Thinking about a building as a system, it is possible to influence its characteristics by planning interventions, which regard a plurality of single elements and their interactions.* (Della Torre, Minati 2004).

2 The conservation plan is based on the respect of the artifact, of its technological characteristics, of the materials and of its history. La conservazione (…) si fonda sul riconoscimento di un valore, sulla coscienza della sua irriproducibilità e insostituibilità, sulla fiducia nella possibilità di trasmetterlo al futuro, almeno nei suoi caratteri essenziali, di poterne trarre un insegnamento (Bellini 1996).

3 The microclimate monitoring has been made by Laboratorio sperimentale BEST, Politecnico di Milano. The characterization analyses have been made by Dr. Gianni Miani – ProArte s.r.l.

4 A.S.D.Mi., Archivio Spirituale, sezione X, vol. 32, 8 giugno 1581.

5 The text carries this description: "Consacratam, ut dicitur, est ampla et media fornicata, reliqua pars est sub tegulis."

6 A.S.P.A.T., Cartella Patrimonio attivo, Case e poderi Ornago e Camuzzago, AFFITTUARI 1799-1826, Consegna dei fondi di Camuzzago e Ornago 1808.

7 Idem e A.S.P.A.T., Cartella Patrimonio attivo, Case e poderi Ornago e Camuzzago, AFFITTUARI 1826-1835.

8 The structural analyses have been perfomed by Foppoli Moretta e Associati s.r.l.

9 The pillar has a stone covering made of tiny blocks and an inner part that is rubble filled.

10 A sample has been executed on a pilaster: a mortar that has been made of a special windows hydraulic binder (Rurewall B1®) and then the Anstett tests have been performed to evaluate the non reactivity of the material.

11 Now most are not framed or spanned with glass.

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