Decoration of an Italian theatre after the unification of Italy in 1860: technical implementation and conservation after the great wars in an earthquake zone

Grazia De Cesare.
Conservator, Via F. Salomone n.1, 66100 Chieti, Italy, graziadecesare@hotmail.com

Abstract

After the unification of Italy in 1860, the theaters in towns saw a boom of complete redecorating. The Marrucino Theater in Chieti has a horseshoe architectural structure, with flexible vault: the roof frame is made of wooden beams and joists, which connect a thatch that supports a tempera painted plaster. This vault has survived two world wars and a recent earthquake unscathed, verification by a thermo vision control confirms this, but its technique suffers water infiltrations. The painted curtain was the center of the new decoration: this large canvas painting has been executed in a rapid and quick drying (around 75 mq executed in 4 months and painted in several layers up to seven) analyzed by FTIR and micro and histo-chemical tests. It is damaged by the mechanical problems inherent in a semi-free canvas, and by daily wear and tear due to stage activity. The challenge is to maintain this complex cultural heritage preserving its use as a theater: a completely different task from museum standards of preventive conservation.

Keywords: painted curtain, canvas painting, wall painting, thatch, thermo vision control
Introduction

The Italian city lifestyle has always considered the theater as a cultural place for excellence. In fact, after the unification of Italy in 1860, theaters in Italian towns saw a flourishing of redecoration.

The study and restoration of the Theater Marrucino in Chieti shows a similar history to many other Italian provinces. In 1874 the breakthrough in technology introduced gas lighting, followed by a new architectural decoration with replacement of the painted curtain, based on new tastes, and carried out, in the theater, by specialized artists. The architectural structure, in horseshoe plan, was decorated in the vault (fig.1), under-arch and arch stage with mural paintings (fig.2) depicting subjects traditionally inspired by the muses and great masters of music and prose. The execution technique is related to the elasticity of the architectural structure built from the roof with a frame of wooden beams and joists, which is connected to the thatch (fig.3), supporting the painted plaster. This is a traditional technique from ancient times, now mostly abandoned in Italy. Plasters with this substrate impression are still found today in archaeological sites, while in Latin America it remains a construction practice.

The vault appears flexible and light, this has allowed its preservation, and in fact the theater never lost its functionality, passing unscathed through two wars, bearing only some minor structural fractures. These are considered signs of settlement, as the theatre is situated in a seismic area. The chalk and the organic materials, such as the pictorial binders, are hygroscopic, and suffer from contact with water: the only damages that have occurred are, in fact, from water infiltration through the roof. The presence of gypsum in the plaster creates a swelling reaction, followed by cracking and detachment.

For several centuries the wall painters had not used the fresco technique, because it is difficult and not suitable for new results of nuances and continuous afterthoughts, preferring instead dry tempera paint.

Technical literature sources, from Heraclius in the X century, mention a preparation of lime plaster by soaking egg, or alternatively, glue [Cennini,1437 and Vasari,1550], while gum and starches are introduced later. By the end of 1600, was introduced an additional layer made of gypsum and animal glue [Carducho 1633, Pacheco 1638, Bisagno 1642, Pozzo 1693, Orlandi 1719, De Piles 1764, Watin 1773, Palomino, 1797, Blanc 1883, Bosc 1883]. This is a real priming: a hemihydrate or anhydrous gypsum (fast to dry) with [Armenini, 1578] or without glue [De Piles, 1764] or hydrated gypsum with glue. In Italy the most diffused is plaster and glue spread by brush, but Orlandi, [1719] also mentions a layer of chalk on a fresh coat of lime plaster that can receive all kind of colors. Micro-chemical analysis of the mortar found a mixed composition of lime and gypsum.
Background to the theatre

The theater was the result of the transformation in 1813 of the church and convent of SS. Ignazio and Stefano built in 1632. In 1876 it was re-inaugurated, after a complete new decoration: the mural painting was done by Samoggia, a local artist, in a continuity of style with the painted curtain created by Giovanni Ponticelli (fig.4), a then famous Neapolitan master, specialized in this kind of art work: Ponticelli was a student of Mancinelli, artist of the painted curtain in the famous San Carlo Theater in Naples.

This work replaces the former curtain of 1815, containing theatrical masks and cupids, produced by a local painter, Del Ponte. The 1876 curtain is the center of this new project: it marks every city in Italy in a particular way, celebrating an event or a historical figure, and is very representative. In our case everything is expressed in a style between historical realism and the impressionist style for colors and light, mixing an academic art with a new modern realism.
Execution technique of the curtain: paint layer and analysis

The large canvas painting (9,28 x 8,00 m) is characterized by a rapid technique based on animal glue and egg, with a terpene resin, analyzed by FTIR and micro-histo-chemical tests. The analyses have been done by Domenico Poggi from Artelab in Rome. The stratigraphic sections show up to seven layers of paint films. The analysis identified a rich palette of lead: the white, yellow, orange red; the green is ultramarine blue + yellow lead, the earths are mixed with lead, and cobalt blue: all the colors are very opaque. The Artist suffered, incidentally, from lead poisoning (saturnismo), a common painter’s disease at that time.

Structure of the curtain support

The feature of this painting is that it should not be tensioned laterally but to be as a scenery, a canvas partly free, although lateral cables with sliding rings have been attached in the past. The fabric is fixed and stretched at the top and bottom by a wooden beam (approx, 20 kg and 25 cm high each) nailed to the canvas edges: this system provides horizontal tension, helping to minimize the effect of nearby drapery, but the painting suffers mechanical problems without tension in the horizontal direction. The top trellis is suspended from double-boards held by 5 sliding cables and pulled by a motor (fig.5).

The support is made up of 12 pieces of fabric approx. 90cm wide (half on each side), sewn together vertically on both sides, to give a total dimension of 9,28m in width and 8m in height. Traces of a double row of stitching are present horizontally indicating, pockets to accommodate since removed beams. These are needed to fold the canvas in several parts and have it slide into the ceiling technical closet space over the stage.

In recent years, the painting was still being folded in two and placed between the curtain of the stage and the lighting beam: it was no longer sent down, to avoid further damages by tearing and lateral deformation.
**Analysys of the canvas**

To assess, if necessary, the support lining, the yarn has been analyzed by Giovanni Testa of the SSCCP: the Italian pulp and paper Institute. One of the characteristics of the yarn is the title that is the conventional notation that refers to the fineness (diameter on length). The title of this fabric is 85.6 tex (W / L of sample x 1000)

Strength = (ability to resist to traction) is 4.7g / tex. The breaking load before restoration was 402g for each thread (title x strength: 85.6 x 4.7=402).

The reduction is 13 warp yarns per square centimeter, therefore the resistance to the breaking load per cm is: 402g x 13 = 5226g/cm=5,226 kg/cm, that is around 523kg/m, a value much higher than required for the load to bear at the highest point.

The degree of polymerization (DPv) equal 476, which confirms the macroscopic natural aging of this 120 year old fabric. The DPv of a new linen canvas is 2200-2500 DPv, and 1200-1300 after bleaching (necessary prior to receive colors). The pH of the canvas is 6.6, which is a stabilizing condition, as the tissue is not affected by acid hydrolysis.

**Conservation of the mural surfaces**

The glue tempera binder gives the possibility to paint rapidly, but in conservation it suffers de-cohesion of the paint film, as the binder is absorbed by the support, and stains are caused by the infiltration of water.

Losses of the plaster (fig.6) and an inspection of the backside of the ceiling, took in evidence the thatch texture: it was used as an elastic coating for the wooden and masonry structures, where the painted plaster adheres. After an urgent-treatment on the facing by using cotton tissue and Paraloid® B72 in solvent, the adherence between the layers was recovered through infiltrating a light hydraulic mortar to fill the gaps, while as an additional bond, steel threaded bolts have also been introduced as mechanical anchors to ensure a better grip without weighing too much on the plaster.

![Figure 6: the plaster losses show the thatch substrate](image)

Three years after the 2006 restoration, in 2009, a violent earthquake struck the region: its epicenter was approximately 100 km from the theater. It was evident that some fillings on the edges lost fragments of the mortar. Some cracks in the ceiling, treated only on the perimeter area in 2006 (as it was not affected by water presence), but restored in the '70s, had become more evident. Certain answers were mandatory for security measures, as being a public place, a decision on whether or not the theater season could continue had to be taken.
A thermo vision inspection had been entrusted to verify possible detaching of plaster in the vault. It was done by “Artemis” a company from the, Engineering Faculty of the Polytechnic University of Marche, by Eng. Enrico Esposito and Eng. Antonio Del Conte via thermal camera FLIR ThermoCAM B400. The thermo-grams have been realized by passive and active records, heating the surfaces with 2 theater lamps type “Erre” 5 KW and 2 KW, shooting from stalls or from closer boxes, fitted with Fresnel filter for a homogeneous incident beam.

Due to the presence of the decorations and paintings, analysis has been conducted comparing areas where colours can be considered at least approximately, homogeneous. The images highlighted a reticular structure of the wood, that is warmer than plaster, and some fractures and small detachments, by the presence of the hottest air pockets on the back side of the plaster, although of modest and not worrying dimensions (fig.7).

![Figure 7: thermography of the vault (by courtesy of the authors)](image)

**Conservation of the curtain**

The absence of the frame shows that in the distribution of the forces, the vertical remains dominant with losses of paint film in the subsequent horizontal orientation.

The effect of "draping", or better ripple, due to the unrestrained non-horizontal tension on the vertical sides, becomes the inherent effect of the curtain, ethically acceptable. It remains the weak point of the system however, as the stresses induced on the painting structure without the frame are relieved directly into the paint film. The conservation intervention has addressed to contain the deterioration of the artifact while giving back the curtain’s function.

Based on the results of the analysis the decision was taken to consolidate the fibers, keep the canvas loose unrestrained by the frame. Moreover the proportionally small stage area related to the dimension of the entire stretched curtain avoids any movement or handling in case of the in case of immediate danger, because it is impossible to take it outside.

The consolidation was done in two phases: 1) with Plexisol®P550 from the back (if it passed on the surface it has the optical characteristics as superficial film), 2) with Beva® 371 O.F. which gave greater flexibility. Experimental studies demonstrate that a Beva® impregnation doubles the tensile strength values, while the Plexisol® increases it by one and half times [Bonfatti A.M. et al.1995].

Approximately 648 holes have been patched with polyester non woven fabric, impregnated with 60% of Beva® 371 O.F., and then reactivated by heat. A strip-lining of the perimeter only was done with a lining
added to the weakened transverse areas, using two types of polyester fabrics with different weights: 350 g/sq.m (stronger for the perimeter) and 100 g/sq. m (lighter for the transverse) (fig.8).

![Figure 8: Backside of the curtain after consolidation and strip lining](image)

The old lining of the seams has been removed as it caused localized tensions, and deformation of the fabric. The canvas has been treated on the deformations, moistening them indirectly through absorbent paper and applying pressure. The paint layer was consolidated locally with Beva® 371 O.F. from the front via syringes and hot spatula. The previous retouching consists of a water-soluble tempera, which has been removed with a aqueous cleaning solution but only on the ceiling where it has completely altered; the new retouchings were applied with Rembrandt pastels and the fixative Lefranc et Bourgeois 1325.

Talcum powder was used to absorb and remove the water stains. The wooden beams were replaced with 2 aluminum profiles that house a metal rod inserted into the strip lining pocket on the top and bottom edges of the canvas (planning by Carlo Serino from Equilibrarte). A lightweight polyester fabric, 100 g/sq.m was applied on the rear, fixed around the perimeter edges and the profile of aluminum by Velcro strips, to protect the support from dust and any direct contact. Reducing the beam width prevented the drape from slumping, and kept it taut and at its correct height in the stage space. All intervention was conducted on the stage, handling the curtain recto-verso through the pulling motor machines normally employed to move up and down the scenography; the stage floor (perfectly flat) protected by geotextile and a mono-silicone Melinex polyester film was the plane to dispose horizontal the curtain for working on.

**Conclusion**

Generally the highest risks for the works of art are during the handling, display or storage, and the admittance to the public. It is certainly easy to imagine how the risks for the artworks are also increased by the theater with its specific activity as place of conservation instead of a museum, with temperature, humidity, lighting control, and trained caretakers, moreover for the large dimension of this canvas painting. However the life of the theater itself, involving continuous activity around its artifacts, constitutes in fact, an effectively animated cultural interest which in return results in concrete care and attention for these works and has made it possible for them to reach our modern era.
Material List:

Beva ®371 O.F. [Elvax (ethylene vinyl acetate [EVA] copolymer), Ketone Resin N (polycyclohexanone), AC copolymer (EVA), Cellolyn 21 (phthalate ester of hydroabietyl alcohol) and paraffin]

CTS srl
Via di Cervara, 194,
00155 Roma (Lazio),
Italy +39 06 22796588

Plexisol ®P-550 [butylmethacrylate]
CTS srl

Fixative Lefranc et Bourgeois 1325 spray for crayon, charcoal and pastels

Ditta G.Poggi Srl: Belle Arti
Via del Gesù, 74/75
00186 Roma, Italy

Rembrandt Soft Pastels
Ditta G.Poggi Srl

Hydraulic mortar PLM-AL
CTS srl

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