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## **RESTORATION OF A POLYMATERIC SCULPTURE OF THE IMMACULATE CONCEPTION**

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### **Abstract**

This study focuses on the intervention methodologies applied on a polymateric polychrome sculpture of the Immaculate Conception (18<sup>th</sup> century), located inside the chapel of the Oratorio dei Falegnami in Palermo. The peculiarity of this artefact is the employment of two different supports, upon which both the ground and paint layers are laid: a wooden one, carved and prepared, for the execution of the anatomical parts, and a textile one, sewn, pinned on and stiffened with glue, for the garments. The damage found was mainly attributed to: reaction of the artwork's materials to the environment, lack of ordinary maintenance, and previous interventions. On the textile support, cleaning was hindered by adhesion and cohesion problems in the preparation and the paint layers. The thick re-paintings had altered the original colours and stiffened the garments. Dimensional variations due to un-stretched fabric had produced deformations, lacerations and tearing, thus altering the original shapes. The critical part of the intervention was to properly consolidate the layers on the canvas support. The application of the adhesive Dispersion K52, based on an acrylic resin, was particularly effective on this organic artefact. This positive result was essential to: a) removing dust and grime, as well as the re-paintings; b) reshaping the fabric flaps; c) removing the plaster and fabric patches added in previous interventions; d) refilling and retouching the lacunae. Finally, a specially prepared varnish, with chemical-physical and aesthetic characteristics similar to those of the artefact, was applied. At the same time, the iconography and style of the sculpture were evaluated in order to identify its original context.

*Keywords:* conservative restoration, consolidation, Dispersion K52, polymateric sculpture, Regalrez 1094

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## 1. Introduction

The cult of the Immaculate Conception, documented in Sicily from the 8<sup>th</sup> century [1], is closely related to the history of the Palermo people. It was declared as dogma only in the 19<sup>th</sup> century (8 December 1854, by Pope Pius IX), after long theological disputes. It was supported by a strong popular devotion, acting as driving force in the creation and development of this iconographic subject.

The iconography had been defined along Counter-Reformation guidelines: a young woman dressed in white and blue, with hands folded on her chest, a halo of twelve stars around her head and the crescent moon under her feet [2].

The Immaculate Conception of the *Oratorio dei Falegnami* (Figure 1) measures 182 cm in height, wears a red robe and a blue cloak, typical Marian colours, though not in compliance with the canonised image. The statue dates back to the second half of the 18<sup>th</sup> century, and resembles wooden devotional sculptures in both shape and size. However, this particular Immaculate is one of those large statues made of light, inexpensive materials designed for being transported during processions.

In fact, the technique used for these processional polymateric sculptures, executed between the 17<sup>th</sup> and 18<sup>th</sup> century in the area of Trapani (Sicily), is known as “legno tela e colla” [3], that is, wood, canvas and glue, though it may also include straw and cork. It consists of an inner wooden structure, to which the carved wooden anatomical parts are anchored; these are then dressed with pieces of fabrics sewn together and soaked with animal glue. The surface of the visible parts (face, hands, feet, clothes) is covered with thin layers of plaster and then painted.

The main critical conservative aspect of this kind of artefacts relates to the textile support being un-stretched linen canvas, pinned to the inner structure. As a consequence, dimensional changes due to temperature and humidity variations had misshapen the modelled parts, thus exposing portions of the underlying fabric, unprepared and unpainted because it was intended to remain concealed. Besides, lacerations, tears and unstitched seams were apparent, some of which had been roughly patched with fabric partly superimposed on the original paint.

Finally, the above alterations had caused mechanical stresses to the ground and paint layers. These had thus undergone de-adhesion and de-cohesion, due to insufficient elasticity in the preparation layer, which had therefore failed to follow the movements of the fabric. The entity of the damage was accentuated in the ridges and hollows of the drapery, where the preparation layer was so altered that some fragments detached, exposing the textile support. Also the paint layer on the textile support was badly crackled throughout, with blistering and cupping, which undermined adhesion between layers; it also showed cohesion defects as well as diffused abrasions, and medium- and small-sized lacunae (Figure 2).



**Figure 1.** The Immaculate Conception before and after the restoration.



**Figure 2.** Deadhesion and decohesion defects.

As often happens with processional polychrome sculptures, this artwork appeared to have been restored several times: in fact, it showed repainting layers of considerable thickness, as well as the application of protective, wax-based substances. In fact, beside covering the original colours, the repainting had stiffened and coarsened the paint layers on the textile support, affecting lightness

and realistic rendering, and concealing the original technique, so that the statue looked more similar to a papier-mâché or an entirely wooden one.

Besides, at some point the gilding had been coarsely painted gold. A section of the fabric support, originally not intended to be painted because it was concealed by drapery, was also covered with golden paint, as deformations in the folds had exposed it.

Unlike the fabric support, the wooden one, as well as the inner structure of the statue, appeared to be in a fairly good state of conservation. The only damage was caused by the presence of metal pins and nails whose size had been increased by oxidation, thus producing cracks, probably made worse by the wood's expansion and shrinkage, which were particularly visible on the hair and face of the figure.

Some micro lacunae in the support affected the right eye at the level of the upper lid, as well as the area surrounding the crack on the face. Further damage was due to accidental impact which had caused the loss of the wooden support, detectable on one finger in the left hand and on the braided hair bun.

Finally, minor insect infestation was detected by the presence of tunnels and flight holes. Besides, *Periplaneta americana oothecae* were identified inside the sculpture, as well as the remains of a (bees'?) nest, built inside a lock of hair concealed by the figure's veil.

The preparation on the wooden support looked fairly well preserved.

Unlike the extensive damage apparent on the fabric support, the only cohesion or adhesion defects were detected near the crack on the face. On the other hand, a number of lacunae exposing the wood had been covered partly with repainting and partly with thick plaster (gypsum and animal glue?), coloured as to mimicking a pale complexion. Beside the actual lacunae, it had been applied on the original paint layer of eyelids, eyebrows, nostrils and lips, slightly affecting the expression on the Immaculate's face.

The base presented small- and medium-sized lacunae on the sides, probably due to the fact that the lower part of the artwork had been subjected to impact, presumably during processions.

Also the paint layer on the wooden support had undergone repainting, with the result that the original hues had been thoroughly concealed.

## 2. Treatment

The choice of the method to be followed in the different phases of the intervention was preceded by an in-depth analysis of the possible solutions, in order to identify the least invasive techniques and those most compatible with the nature and condition of the work. Some of the operations carried out on the paint layer on the fabric support required an adaptation of the methods to the characteristics of the materials and the state of conservation of the artwork.

## **2.1. Consolidation**

The re-adhesion of the ground layer involved applying 30% aqueous dispersion of Plextol B500, a thermoplastic, medium-viscosity acrylic resin. The macromolecular size of the adhesive particles was effective on the interface between the two layers (Figure 3).

For the re-adhesion of the paint layer, Dispersion K52 (Kremer Pigmente GmbH & Co, an acrylic dispersion) was applied. This latter product is characterised by nanometre particles (20-40 nm) and has been used in the consolidation of wall paintings, with excellent visual and cohesive results. For these reasons, it was decided to test the dispersion on an organic artefact characterised by an opaque painted surface, and with evident adhesion and cohesion defects. The obtained results enabled a safe intervention.

## **2.2. Removal of dust and grime**

In order to remove dust, mechanical dusting was executed by using soft brushes and a micro vacuum cleaner.

The subsequent step concerned the removal of grime. This was composed of atmospheric particles trapped inside the protective waxy layer covering the whole surface of the artefact and concealing the original colour under a uniform grey film. The initial cleaning was made with Wishab sponges and the following stage with a w/o emulsion containing an aqueous solution with a chelating agent (2% tri-ammonium citrate), selected after some preliminary tests.

The parts of the wooden support without any preparatory or paint layers, such as in the hair and shoulders area, responded positively only to the swabbing with aqueous solution. The nest was removed from the lock of hair using a scalpel. In the same way, (candle?) wax drippings on the blue cloak, by the left elbow, were also removed.

## **2.3. Removal of re-paintings**

In order to ascertain the presence of the original painting layer and investigate the nature and thickness of the re-paintings, digital microscope observations and stratigraphic analyses were carried out.

The re-paintings were found to be composed of pigments in an oil binding medium. For their removal, an alkaline pH aqueous solution was needed.

Tests were carried out with buffer solutions pH 8 and 9, thickened with 4% hydroxyl-propyl cellulose (Klucel G). Finally, a buffer solution pH 8.5 thickened with 4% hydroxyl-propyl cellulose (Klucel G) made with Tris Base in demineralised water plus hydrochloric acid 1M was chosen for the cleaning.

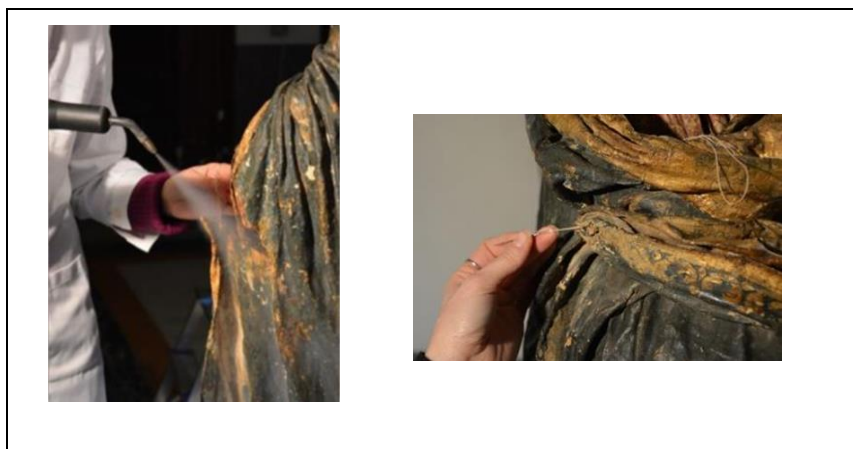
The same solution was used for removing the golden paint and a resinous substance present on the gilding, supported by stearic emulsion (*pappina fiorentina*) applied on top of an interposed sheet of Japanese paper.

#### **2.4. Removal of added plaster and fabric patches**

The plaster added to the nostrils, right cheek and upper lip by previous restorers was softened and removed using a scalpel. The fabric patches glued onto the lacerations and tears in the blue cloak (right knee) and red robe, stiffened by the glue, and of varying degrees of weave tightness, were also softened and removed.



**Figure 3.** The re-adhesion of the ground layer involved applying 30% aqueous dispersion of Plextol B500.



**Figure 4.** Spray-steaming of the textile support and sewing of the flaps.

#### **2.5. Repositioning and sewing of the drapery**

In order to pull together the flaps of the torn and misshapen garments, the linen support needed softening. Therefore, it was spray-steamed, from a safe

distance and intermittently. The flaps were brought together cautiously and whip-stitched with cotton thread, as in the original seams (Figure 4).

## **2.6. Woodworm treatment**

The statue underwent a preventive woodworm treatment with a permethrin-based pesticide, brushed on and syringed into specific points.

## **2.7. Filling, retouching and varnishing**

Following a first coat of acrylic retouching varnish (Vernis à Retoucher Surfin, Lefranc & Bourgeois), losses in the preparation of the wooden support were filled with plaster (gypsum and animal glue).

To reintegrate the fillings on the wooden support (face, hands and feet) a pointillist technique was employed. The abrasions in both hair and complexion were chromatically balanced in watercolour first and varnish colours later, in order to reconstruct the original effect.

On the other hand, the abrasions and losses in the paint layers of the textile support were toned down in watercolour, so as to eliminate the glare of the white preparation.

The final varnishing was made by spraying the artwork with a protective film based on 15% aliphatic resin Regalrez 1094 in petroleum ether, with the addition of 2% light stabiliser, Tinuvin 292, 5% elastomer Kraton G1650 and 1/4 matting agent Ozokerite (percentage concentration expressed as weight of resin/volume of additives).

## **3. Results and discussion**

The methodology used for the intervention was chosen after consideration of the artwork's constituent materials, techniques of execution and state of conservation. It was necessary to employ a number of different materials, some already known to be effective in routine painting restoration (Plextol B500, w/o emulsion with tri-ammonium citrate, buffer solution with Klucel G, Tris Base and hydrochloric acid, stearic emulsion), one (Dispersion K52) so far utilised on stone surfaces and now used for the first time on an organic artefact, and a specially devised protective varnish made up of pure components.

In order to consolidate the artwork, Plextol B500 was chosen because of the macromolecular size of its particles acting neatly between the ground and the textile support. Dispersion K52 was effective in ensuring cohesion among the painting layer particles and adhesion between the painting and ground layers, as well as strengthening the canvas support: its nanomolecular particles could penetrate in depth without interfering visually with the aesthetic quality of the artefact.

Thanks to consolidation, it was possible to thoroughly remove the dust from the fabric folds without affecting the stability and completeness of the paint film by using a micro vacuum cleaner. The grime embedded in the wax layer was successfully removed by an emulsion containing a chelating agent. In fact, the solution formed a chelate complex with the ions present in the grime, leaving the moisture-sensitive surface of the work unaffected, while the non-polar solvent in the continuous phase dissolved the wax.

The solution chosen for the removal of re-paintings has provided excellent results: the pH level (8.5) ensured protection of the underlying painting layers. Thickening the solution with cellulose ether increased viscosity, thus reducing penetration. The same solution dissolved the metallic alloys of the golden paint covering the gilding, as well as the resinous film. It was applied with a stearic emulsion in order to boost the cleaning action. The natural craquelure reappeared, and the painting layer recovered lightness and a more authentic look, highlighting the realistic rendering of the drapery.

Steaming, used for softening the misshapen and torn textile support, was effective and in conformity with the materials: in fact, controlled spraying from a safe distance prevented damages to the hygroscopic surface of the sculpture.

Repositioning and sewing proved consistent with the technique of execution, so that the original volumes of the garments were recovered, and the plasticity, characteristic of the baroque sculpture, was restored.

The method chosen for retouching the garments was motivated by the large number of lacunae and micro-lacunae in the paint layers. The lacunae were made to recede into the background through the application of watercolour glazes, so as to achieve a chromatic continuum. This technique ensures reversibility and respects the lightness of the original hues and fabric. Conversely, the pointillist retouching used on the wooden support ensured fitting the work's three-dimensional quality, whilst respecting the colours as well as the details of the carving.

Finally, the formula used for the protective varnish was based on Regalrez 1094, a resin diluted with a pure solvent, with the addition of Tinuvin 292, Kraton G1650 and Ozokerite, rather than a ready-made varnish, in order to obtain a product made of known components whose behaviour had already been tested [4]. The film thus obtained was highly elastic (to fit the movements of both the supports and the upper layers), adjusted to a matt effect (to make the drapery look natural), resistant to aging and yellowing, and permanently soluble in non-polar solvents.

#### **4. Conclusions**

In this paper the conservation work on a polymateric sculpture of the Immaculate Conception was reported and discussed. The technique of execution and state of conservation of the artefact required a differentiated approach based on the type of support. In particular, the critical aspects of intervening on the paint layered on the unstretched textile support were evaluated.



Through an appropriate consolidation system, involving the application of Plextol B500 and then Dispersion K52, adhesion and cohesion were obtained to a satisfactory level. This operation was crucial to the cleaning stages and the removal of re-paintings, and therefore to recovering the original colours and lightness of the garments. The volumes of the drapery, altered by deformations and tearing, were thus restored through a non-invasive and easy-to-apply method.

The final varnish was formulated in order to obtain a protective film visually and aesthetically suitable for the artwork, as well as able to ensure compatibility with constituent materials, and easy to be removed with non-polar solvents.

All operations were performed in compliance with the artefact's history, always maintaining proper balance between aesthetic quality and historical value.

This work is a contribution to the study of the restoration methods applied to polymateric artefacts from Trapani. The intended purpose is to value this type of artworks made with non-precious materials but executed in a masterly fashion to achieve considerable historical and artistic quality.

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