THE CONSERVATION-RESTORATION OF THE "CHAROLA" PAINTINGS OF THE CONVENT OF CHRIST IN TOMAR

2002-2006

by Frederico Henriques, Ana Bailão and Miguel Garcia

Between 2002 and 2006, sixteenth century monumental panel paintings from the Charola of the Convent of Christ in Tomar were submitted to conservation and restoration campaigns. The aim of this paper is to describe the historical context, aspects related to artistic techniques, conservation procedures and the materials used in the treatment of these works of art. The activities were undertaken in two phases: the first, under a project of the Instituto Português de Conservação e Restauro (IPCR) and a second, by the initiative of the Instituto Português do Património Arquitectónico (IPPAR).

Introduction

In 2002, the Instituto Português de Conservação e Restauro (IPCR) created a two-year project, sponsored by the Operational Programme for Culture (POC), for research and conservation of the panel paintings from Charola in Tomar (Figure 1). This initiative was developed by a large team of conservator-restorers, photographers, art historians, physicists, chemists and biologists, who studied the following works: "Baptism of Christ", "Resurrection of Lazarus", "Entrance of Christ in Jerusalem", "Instruments of Martyrdom" and "The Virgin and the Apostles". This program concluded with the intervention on the painting "Baptism of Christ" as well as on a small fragment salvaged from a lost panel "Instruments of Martyrdom". The "Resurrection of Lazarus" was not completed due to severe structural problems of its support [1].

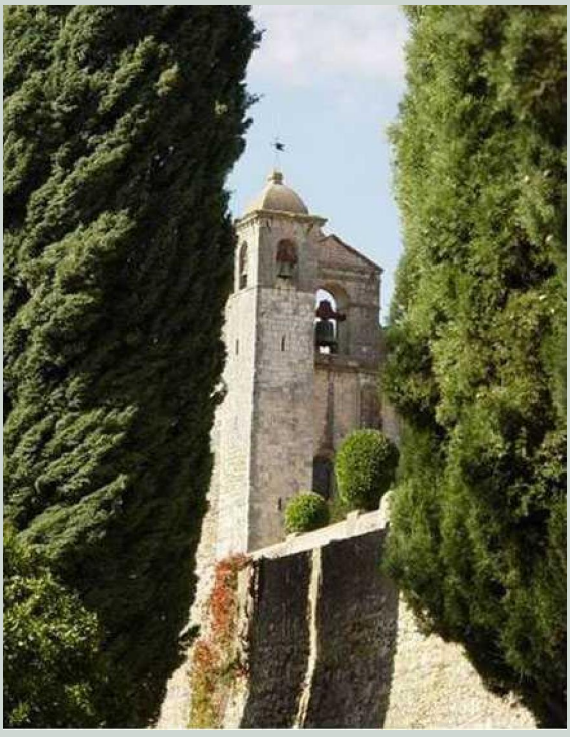
Between 2004 and 2006, by the initiative of IPPAR and the Director of the Convent of Christ Dr. Jorge Custódio, the work was continued according to the same conservation criteria. The success of this work made possible to place back the panels into their own original niches.

The objective of this text, presented publicly at the 2nd Conference of the Professional Association of Conservator-restorers of Portugal (ARP), "The Practice of Theory" (29 and 30 May 2009), is to disseminate the intervention procedures performed on the support and paint layers, indicating the methodologies and materials used. In the first phase of the work, problems in the supports were addressed by panel paintings conservator Miguel Garcia, and his master Pedro Correia, and the chromatic layer was treated by conservators-restorers Frederico Henriques and Sónia Pires. In the second phase, the treatment of the support and the chromatic layer was performed by conservator-restorers Frederico Henriques and Ana Bailão.

Art Historical Context: the 'Charola' Panels

The monumental panels of the Charola are probably the biggest sixteenth century works produced at the time of king D. Manuel I (1469-1521). The

Figure 1. View of Charola, the Convento de Cristo in Tomar.



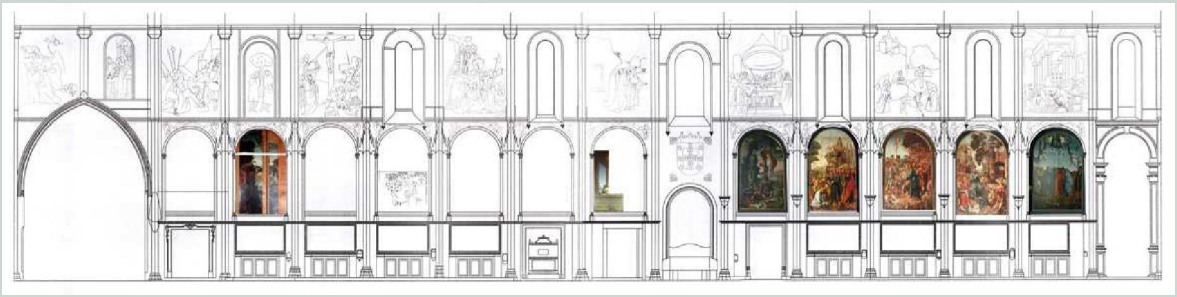


Figure 2 (above). Drawing showing the location of the paintings in the deambulatory (© IGESPAR).

Figure 3 (below). Diagram of the painting construction: vertical oak boards and reinforcement cross-bars in orange.

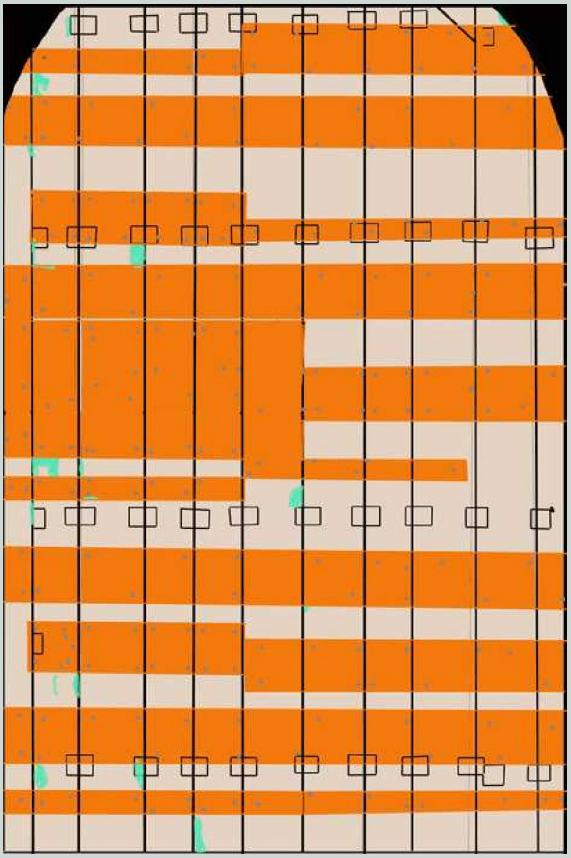
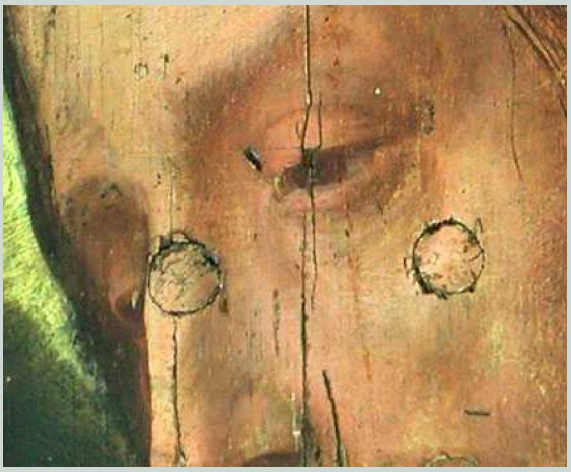


Figure 4 (below). View of the wood dowels on the painting surface.



panels are attributed by Portuguese historiography, but with some doubts, to painter Jorge Afonso. The paintings are originally distributed through a deambulatory of twelve niches, representing the Life of Christ. At the present, though, only five complete panels and three fragments exist. The intervention was carried out on two complete paintings and three fragments, in the following sequence: "Resurrection of Lazarus", "Entrance of Christ into Jerusalem", "Baptism of Christ", "The Virgin and the Apostles" and "Instruments of Martyrdom" (Figure 2). The art historical context of the Operational Programme for Culture (POC) in this project was carried out by Dr. Pedro Redol and Dr. Amélia Casanova.

Execution Techniques

Naked eye and dendrochronological analyses supported the identification of the wood selected for the construction of the supports as oak from the forests of the Baltic region, most likely a "sessile oak" (Quercus petraea), a native species from that region. Dendrochronological analyses made by Dr. Peter Klein and Dr. Lília Esteves indicate the possible manufacturing of these paintings towards a period between 1488 and 1499.

Each panel, measuring around 4 x 2,40 meters, is composed of 10 radial cut oak boards of 4 cm thickness disposed vertically (Figure 3). Their thickness was entirely thinned with adzes, whose marks are

still present on the back. The boards are butt-joined (junta viva) and reinforced by square keys doubled pinned across the thick slats (taleiras) (Figures 4, 5, 6), a Flemish technological typology [2]. These are equidistant in 4 levels high. Comparative observation has shown that, the "Entrance of Christ into Jerusalem" panel follows more accurately this construction pattern. To get boards with the extensions of 4 meters high, the woodworkers used scarf joints, called in Portugal "empalmes". Here, two types of scarf joints were found: in bevel shape (in the Lazarus panel) and in "Z" shape (in all the other panels) (Figure 7). We concluded that the two different work techniques could in fact indicate the possibility of two independent carpentry workshops involved in this big project. The solid decorative oak black painted frames lock the whole panel in the slot and the entire system panel-frame is locked perfectly inside the niches through metal spikes nailed against the stone bricks.

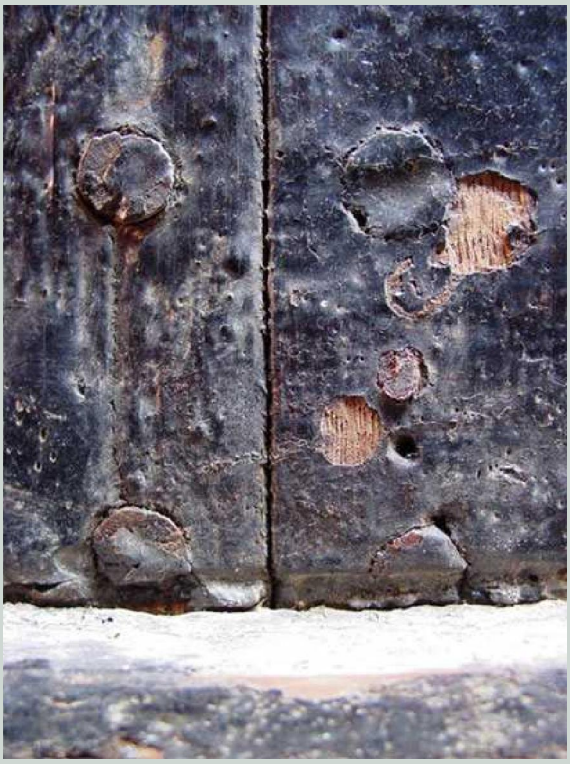


Figure 5. View of the wood dowels on the back of the painting "Resurrection of Lazarus" and the shellac coverage.

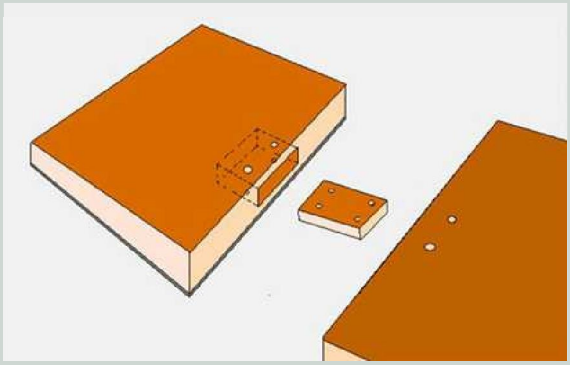


Figure 6. Butt-joint reinforcement: floating key locked with a pair of dowels (or pins).

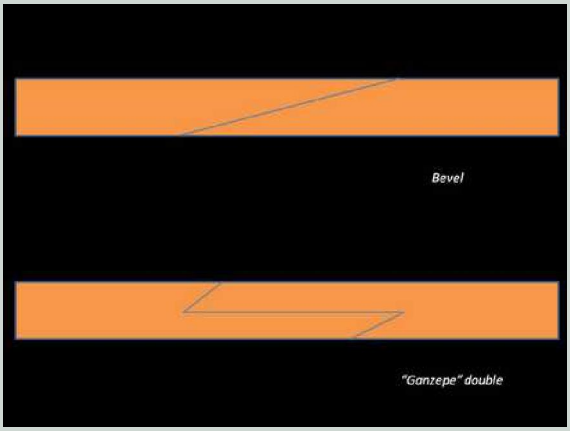


Figure 7. Scarf joints found in the panel boards.

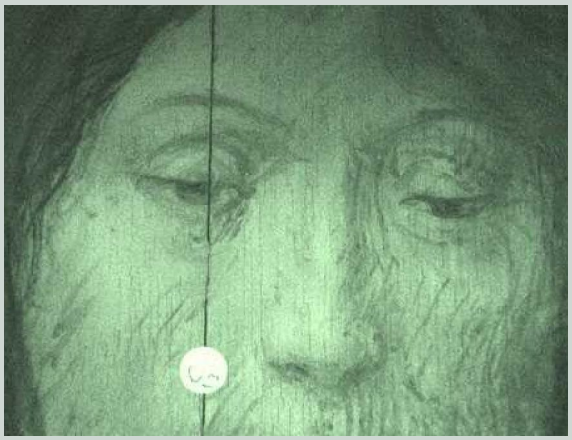
Conservation Analysis

After an exhaustive photographic documentation in day light, infrared photography, ultraviolet fluorescence photography, infrared reflectography and X-rays made by Dr. Pedro Sousa and chemical analysis to the constituent materials performed by Dr. Carmo Serrano, the plans of action for the project were finally elaborated (Figure 8). There was a proposal for diagnosis and treatment. Apart from some exceptions, the methodologies were current conservation-restoration techniques that are commonly used in Portugal.

The observation of the under-drawing observation was made with naked eye - due to the increasing transparency of the painting caused by the natural aging of the materials and the various abrasions – and by infrared reflectography through digital recording. This was done with a Sony Handycam

DCR PC115E PALTM in NightShot mode, with an infrared filter HoyaTM attached to the lenses. This video camera has provided images of excellent quality and high contrast (Figure 9) in relation to traditional systems such as infrared reflectography (vidicon), which was also tested, and infrared photography film. In a second phase a Sony Cybershot F-717TM digital camera (Figure 10) was used. Concerning the drawing technique, and in comparison with other examples [3] we can say that it was done by brush with carbon black on white ground layer.

Figure 8 (above). General view during the photographic session (© Miguel Garcia).
Figure 9 (below). Registration of the underdrawing by infrared (video).
Figure 10 (right). Registration of the underdrawing by digital infrared photography.

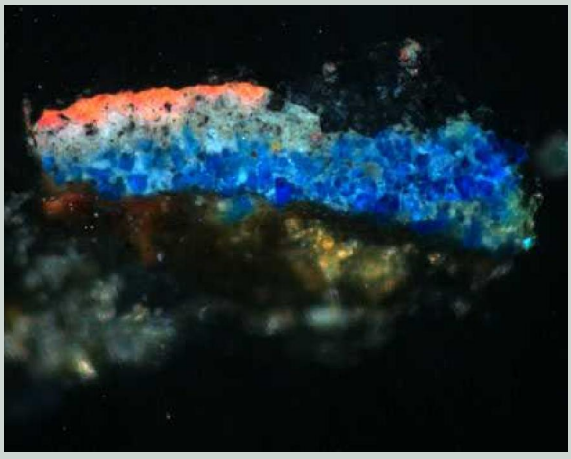


Various methods of examination and analysis were used to determine the paint layer materials: the stratigraphic analysis (Figure 11), micro-chemical analysis aided by micro X-ray fluorescence (EIS FRL - XRF 38TM, equipped with a silicon detector), high resolution liquid chromatography (2795TM Waters) with mass spectrometry (Waters Micromass ZQ-4000) and with simultaneous detection in UV-Vis (996TM Waters). The analysis allowed the identification of the following pigments and dyes: azurite, blue smalt, lead-tin yellow, lead white, animal charcoal, mineral charcoal, brown and yellow ochre, verdigris, vermilion, madder lake and cochineal for the original work; and barium yellow, strontium yellow, Prussian blue, green chromium and chromium resinate for the pigments used in earlier restorations. Laboratory analyses also concluded the presence of gypsum (calcium sulphate semi-hydrate), mixed with animal glue and applied in a single layer, as the preparation layer of the painting. Traces of original varnish were not observed. The varnish used in the restoration interventions was identified as shellac [4].

Radiography, for example, was essential to study the constructive techniques of the wood support in order to confirm issues concerning the conservation state of the works. It was possible to determine the existence of keys inside the butt-joints, the lines of the boards' scarf joints, the structural integrity of the slats, the location and level of decay of the wood, degraded by fungus and insect activity (Figure 12). Laser scanning was also used in the conservation project of the painting "Entrance of Christ in Jerusalem", for the documentation the warp of the boards (Figure 13) [5].

The paintings were subjected to technical study in order to identify what is original [6], after which several well preserved marks were found on the back of the panels. These include carpenter tool marks and marks of inventory made in previous treatments, travels, etc. Of all marks, one inscription on the painting of "Entrance of Christ in Jerusalem" was selected. A recent study attempted the identification of inscriptions located on a cross-

Figure 11 (below). Example of stratigraphic layer (© IMC).
Figure 12 (right). Full size radiography of "Resurrection of Lazarus" (© IMC).



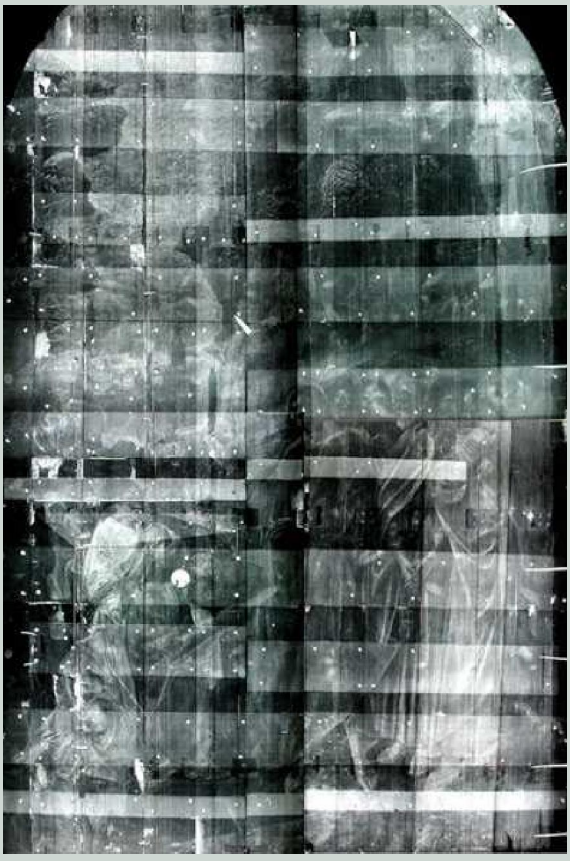
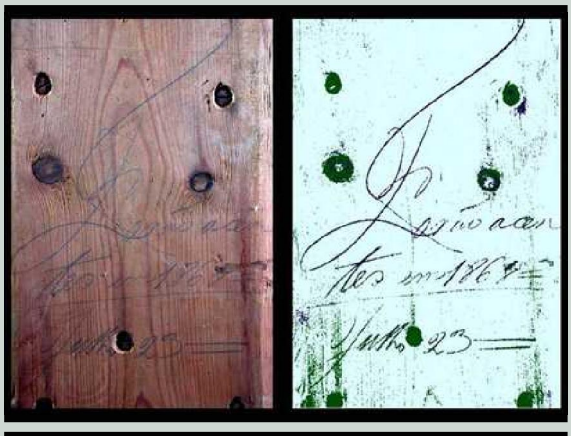


Figure 13.Orthophotography made with laser infrared reflectance and topographic mapping (© Superfície-Geomática, Lda.).



bar, made with graphite on the back of the panel by the nineteenth-century restorer [7]. The method involved the application of tools of remote sensing: maximum likelihood classification and the elaboration of thematic classes (created polygons were classified as "inscription area", "wood background" and "screw"). This study allowed the reading of the inscription: "Foram acentes em 1868 Julho 23" meaning the reinforcement crossbars were subjected to restoration by July 23rd, 1868 (Figure 14). Another similar exercise was applied to determine a shellac area brushed widely on the back of the Lazarus panel. The results showed the presence of shellac on approximately 41% of the surface (Figure 15).

Figure 14. Inscription obtained by supervised classification.
Figure 15. Shellac area detection by supervised classification (in black).

Subsequent Interventions and Some Historical Notes (16th-21st century)

Table 1 shows an explanatory framework in chronological order of some known interventions [8, 9].

Table 1. Chronological order of some known interventions and historical notes.

Year	Performed by	Intervention
1533	Reymão d´Armas Fernão Rodrigues	" to glue and to fix the small and large altars of the Charola" "to paint some lacunas and fissures in the panels of the Charola"
1573/75	Fernão Roiz	"... Repaint the paintings of the rotunda and instruct the painter Fernão Roiz to refresh the colors ... and all the panels."
1802	João Jorge (Plasterer)	"Some of these panels have been retouched in 1802."
1811	General Massena Troops	The written documentation indicated by União dos Amigos dos Monumentos da Ordem de Cristo (UAMOC) says that "Some have been misled and destroyed during the French invasion of Massena".
1834	Academy of Fine Arts	22 paintings are taken to Lisbon (Royal Academy of Fine Arts). The Charola paintings were assigned to Grão Vasco.
1845	Academy of Fine Arts	Repair ordered by King D. Fernando II to the "Resurrection of Lazarus" in Lisbon. "It had arrived destroyed in Lisbon, after the extinction of religious orders." Application of shellac in the "Resurrection of Lazarus" and "Entrance of Christ into Jerusalem" (1849), treatment of the support and retouching.
1855	António Manuel Fonseca	Repairs completed and directed by Antonio Manuel Fonseca (head of the Fine Arts Academy).
1861	António Manuel Fonseca	Return to Tomar, mounting and retouching.
1863	António Manuel Fonseca (?)	Returning to the Academy. Went to Lisbon on the occasion of the Centennial Exposition, the death of King José I (1714-1777). There is no record of António Manuel Fonseca being once more the responsible for the restoration.
1867	-	Return to Tomar: "Resurrection of Christ"; "Entrance of Christ into Jerusalem"; "Christ and the Centurion"; "Resurrection of Lazarus".
20th century 1930s (?)	(?)	Travel to Lisbon (?). The paintings would have gone to Lisbon to be restored on the occasion of the Portuguese World Exhibition in 1940 (?)
1936	Fernando Mardel	"Ascension of Christ", "Entrance of Christ into Jerusalem", "Christ and the Centurion" and "Resurrection of Lazarus" are returned to Tomar
1970	José de Figueiredo Institute (IJF)	IJF Report (observations): "... were all with disjointed planks, yellowed varnish and in some cases, the chromatic film in detachment." (Manuel Reys-Santos and Maria Fernanda Viana)
1971	Instituto José de Figueiredo (IJF)	Intervention in the "Ascension of Christ". Should have consisted of reattachment of the paint layer and chromatic reintegration.
1977	José de Figueiredo Institute (IJF)	IJF Report (observation): "Resurrection of Lazarus" has wood decay. Chromatic layer detachment, disjoint boards and dirt (Luísa Santos).

1988	José de Figueiredo Institute (IJF)	Detachment of the Panels of the rotunda. Transportation to Lisbon for storage. Coincides with the beginning of the great mural campaign of conservation-restoration.
2002	IPCR	Transportation to the Convent of Christ. Beginning of POC project (Frederico Henriques, Sónia Pires and Miguel Garcia).
2004	IPPAR	Beginning of the 2nd work phase, started in 2002. Conservation-restoration finished in 2006 (Frederico Henriques and Ana Bailão).

Methodologies of Conservation-Restoration Intervention

The methodology of conservation-restoration presented here briefly was performed on the wooden support and chromatic layer.

Wooden support

- Removal of the panels with removal of non-original parts and crossbars;
- Disinfestations with liquid Permethrin-based biocide (CuprinolTM);
- Mechanical cleaning of wood joints;
- Volumetric reconstructions with the use of slim and flat trapezoidal Castanea sp. pieces in areas of cubical rot and some cracks;
- Union of wood joints with polyvinyl acetate (Figure 16);
- Replacement of the old crossbars by aluminum bars, which slide over small bridge sections of wooden blocks, connected themselves with a slim flat key of the same metal, creating a lighter structure and reinforcing the panel. The application and development of the system was previously studied [10]. The presented system is similar to the Carità model by Istituto Centrale del Restauro, in Rome, but it uses aluminum bars with rectangular section instead of circular shape section (Figures 17 and 18) [11].

Chromatic layer

- Application of facing with diluted adhesive animal glue;
- Testing the solubility of the aged resins and overpaintings. To this end, we used the protocol of cleaning polychromy of Masschelein-Kleiner [12] and the gel system formulated by Richard Wolbers [13, 14]. In all panels, the chemical cleaning of the varnish and overpaintings was made with a solvent gel (Propanol-2) (Figure 19). The laboratory information indicated that the coatings were shellac, thus, not originals.

Figures 16. The union of the wood joints (© Miguel Garcia).

Figure 17. The new reinforcement system with cross aluminum bars.

• The chosen material for gap-filling was the commercial product ModostucTM, in white color, due to its stability and elasticity properties.
• The chromatic reintegration was initially made with gouache and watercolor Talens and Winsor & NewtonTM. The gouache was applied in most cases because of their opacity. After the saturation of colours with synthetic resin, the second phase was started with the use of powder pigments admixed in the same resin to match the colour of the gouache used as protective coating and finishing (Figure 20). This technique is very common in Portugal.
• The application of protective layers was made according to the paintings. Two systems were used: one was the application of dammar resin in contact with the original paint layer followed by a sprayed layer of the copolymer Paraloid B72TM. In these cases the chromatic reintegration was done with acrylic synthetic resin dissolved in diacetone alcohol. The other consisted in using a commercial cyclohexanone resin as a retouching varnish. In such cases the chromatic reintegration was finished with pigment powder in the same resin that was used as a protective varnish.

Figure 18. Detail of the new reinforcement system with cross aluminum bars.

Conclusions

The main objective achieved with these projects, conducted and followed up by state institutions was the return of the panel paintings to their original location, the Charola. It is through such initiatives involving multidisciplinary teams that we can acquire and disseminate knowledge about cultural heritage (Figures 21, 22, 23).

When we started this project, in 2002, the treatment of the support was frequently made, in Portugal, only by woodworkers. The painting conservator-restorer merely acted on the chromatic layer. This work has proved that the paintings conservator-restorer can undertake, with the proper knowledge, the support treatment as well. It is important that this form of understanding the intervention of conservation-restoration in panel paintings becomes a common practice in Portugal, since only a conservator-restorer is aware of general problems of the work. Woodworkers do not interpret the painting as a whole, but try to collaborate in solving the problems of wood support.

Figures 19 and 20. Cleaning of the varnish (below) and retouching with gouache (second below).

Figure 21. General view of "Resurrection of Lazarus" after the intervention.

Figure 22. General view of "Entrance of Christ in Jerusalem" after intervention.

Figure 23. General view of "Batism of Christ" after the intervention.

This unique collection of panel paintings represented a conservation challenge that was successfully met due to the highest standard of scientific collaboration between all the project participants.

Acknowledgments

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