



POLYCHROMY OF LATE GOTHIC CIVIL ARCHITECTURE: A WORLD HERITAGE MONUMENT CASE IN SPAIN

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ABSTRACT

The Silk Exchange of Valencia, Spain, is one of the best examples of late Gothic civil architecture in Europe, and was declared a World Heritage Monument by UNESCO in 1996. Prior to cleaning and conservation, technical examination identified the original pigments used to paint the walls, keys, vaults, arches and columns in the main hall, the Contract Hall. Cross sections of remnants of original colour (blue, green, red, gold, etc.) were investigated with optical microscopy, scanning electron microscopy with energy dispersive X-ray analysis, X-ray diffraction techniques and UV light. The study has revealed that the original paint today remains only in very limited areas. Evidence for a later maintenance operation of repainting was also found in the inscription that runs around the Contract Hall. The information has been very useful for deciding on the cleaning and conservation process.

KEYWORDS: Historical buildings, Pigment analysis, Repaints, SEM-EDX, Walls paintings, World Heritage Monument.



Figure 2: a) The Contract Hall. b) Horizontal band in the Contract Hall.

This magnificent building was and is a building of great importance and content. Now it is used for exhibitions, conferences and other cultural activities.

The use of bush-hammering during late nineteenth and early twentieth restoration almost completely removed any paint from the stone. The object of this paper is the study of original polychromy of walls, columns, keystones, vaults, arches and the band around the walls of the Contract Hall in the Silk Exchange building, Valencia, Spain. The study used different analytical techniques well suited for characterizing the inorganic pigments used in wall paintings in some historical Gothic buildings in the Mediterranean area (Manzano et al., 2000; Rampazi et al., 2002; Roascio et al., 2002; Genestar and Pons, 2003; Ajó et al., 2004; Katsibiri and Boon, 2004; Casadio et al., 2005; Fiorin and Vigato, 2007; Skapin et al., 2007a; Daniilia et al., 2008; Skapin and Robret, 2010b; Durán et al., 2011).

MATERIALS AND METHODS

The study used optical microscopy, scanning electron microscopy with energy dispersive X-ray analysis (SEM-EDS), X-ray diffraction (XRD) techniques and ultraviolet illumination.

Micro-samples of small fragments of pigment and ground from around already damaged areas were mounted in epoxy resin (SpeciFix-40) and polished as cross-section to obtain stratigraphy of the layers. Samples were examined with a Nikon SMZ 10A optical microscope. For SEM-EDS analysis, samples were vaporised with carbon to make the material conductive.

Pigment elemental analysis was carried out using a JSM-6300 scanning electron microscope operating at 20 kV, with backscattered electron mode under vacuum, equipped with a Link energy-dispersive X-ray microanalytical system, lifetime 100 s. The software was Oxford Link Isis. Crystalline compounds were determined using a Philips (PW1830) XRD diffractometer with X'Pert software.

Ultraviolet illumination was used to detect possible repaints in the inscription that runs around the Contract Hall.

RESULTS AND DISCUSSION

The presence of gold leaf was observed in traces of paint on arches, vaults, and keystones, always on red bole (Fig. 3a-b). Red bole, also known as Armenian bole is an iron-rich material (hematite compound) particularly suitable for applications such as substrates for water gilding where a high surface polish is required. This finding is in line with bibliographic documentation stating that the Contract Hall was built with terraces and in 1516 the vaults were damaged by humidity caused by infiltration from the roof. A tile roof was constructed to prevent further damage and the master Anthoni Ribesaltes was given the task of repainting. After the intervention, the keys and arches were coated with gold leaf.

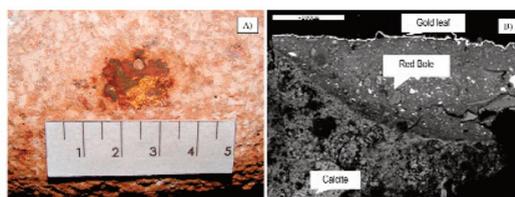


Figure 3: a) Gold over red bole (scale in cm). b). Cross section. Backscattered electrons image.

Blue pigment remnants corresponding to azurite pigment were observed in the keys and vaults on a thin white lead layer. The Fig. (4) shows the distribution of elements in a sample. According to

excellent covering power. It was used throughout Europe from the 12th century, although it only became widespread in the 15th century when artificially produced alternatives started to become available.

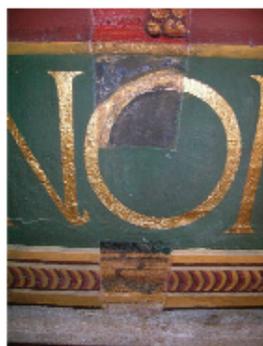


Figure 7: Overpainting of original band (Ramírez et al., 2006b)

Where Latin characters are found the outer layer is made of a copper and zinc alloy known as brass (85% copper, 15% zinc). Brass has a yellow colour, somewhat similar to dark gold. The inner layer is made of yellow bole (goethite crystalline compound) and a ground calcite layer. Gold leaf was found underneath, corresponding to the original Latin characters.

Small differences in calligraphy were found using ultraviolet illumination. The overpainted band is lightly displaced in relation to the original band, whose gothic characters are much purer than the repainted one (Fig. 8).

CONCLUSIONS

Cleaning and conservation works carried out recently at the Silk Exchange of Valencia,

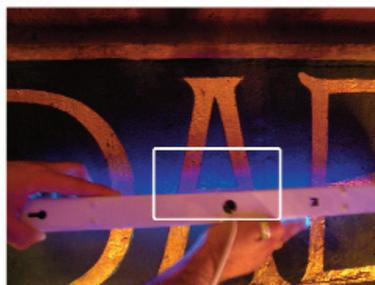


Figure 8: UV illumination of band.

Spain, have enabled study of the pigments used in the polychromy of the Contract Hall. The analytical information on pigments obtained with different techniques has allowed us to complete the documentation on the polychromy of this building and to verify the existing documentation.

In addition, beneath the broad horizontal band with a Latin inscription around the walls of the Hall of Columns a previously unknown original band was discovered with different decoration. The repainted band was probably painted during the late 19th Century restoration works. The information has been of great interest as documentation and cleaning to be performed.

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