RESTORATION OF THE MARTORELL MUSEUM TILES: CHARACTERISTICS, PROBLEMS AND SOLUTIONS

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ABSTRACT

The Vicenç Ros Town Museum and L'Enrajolada, Santacana museum-house of Martorell, are two museums characterised by having a great number of ceramic tiles in their collections. The age of the facilities (1945 and 1876, respectively), building conditions and characteristics of the assemblies led to the commencement in 1989 of the restoration of the collections and the buildings, which is still ongoing. Various actions have been undertaken, taking into account the characteristics of the items, the problems that they presented and their definitive installation, using several restoration criteria.

1. INTRODUCTION

Martorell is a municipality in the Baix Llobregat district of the province of Barcelona, with a surface area of 12.9 km^2 and slightly over 20,000 inhabitants. There are currently two local museums, L'Enrajolada, Santacana museum-house, belonging to the Barcelona County Council and the Vicenç Ros Town Museum, and 4 ceramic collections, Santacana, Faraudo, Ros and Mir.

However, perhaps surprisingly, Martorell is not and never has been a centre of ceramic production, whether of ceramic articles or tiles. It has just been the interest of certain of its inhabitants, which has led to the presence of so many ceramic collections in the town.

2. THE MARTORELL MUSEUM COLLECTIONS

2.1.- «L'ENRAJOLADA», SANTACANA MUSEUM-HOUSE: THE SANTACANA COLLECTION AND THE FARAUDO COLLECTION

The museum was established in 1876 by Francisco Santacana Campmany (1810-1896) and set forth by his grandson, Francisco Santacana Romeu (1883-1936), who called it L'Enrajolada (in Catalonian meaning full of tiles). It is installed in a four-storey house with a garden, located in the old part of the town. It belonged to the Santacana family until it was purchased in the 70s by the Barcelona County Council, subsequently undergoing considerably improvements between 1965 and 1969.

This is one of the oldest museums of Catalonia and houses a highly varied collection of items from different sources: ceramic tiles and objects, architectural and sculptural elements from old buildings - mostly from Barcelona - 19th century paintings, archaeological materials, etc. It also conserves some of the furnishings, a collection of slate records with a gramophone and some decorative items such as clocks, fans, vases in glass display cases, little saints' chapels, etc,

In 1966, the Barcelona County Council installed part of the collection donated to this institution by Luís Faraudo de Saint-Germain (1867-1957) in certain specially fitted rooms of the house, thus further enriching the museum's ceramic collection.

Ceramics, particularly ceramic tiles, are the main item of this museum to which ceramics gives its name. Of the total inventory of 1800 items, 1180 are ceramic articles and of these about 900 are individual tiles or compositions. The Santacana collection has around 7000 tiles and the Faraud collection, which contains 329 ceramic items in all, has XXXX..

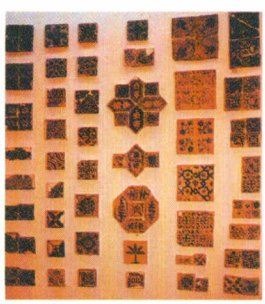
With regard to types, the following are particularly noteworthy: Catalonian and Valencian Gothic flooring; the so-called "cuerda seca" or Hispano-Arabic edge tiles (from Andalusia, Aragon, etc.); blue or polychrome tiles from Talavera and Andalusia; Catalonian and Valencian two-colour tiles (green/white, blue/white); polychrome sample tiles of the crafts from Catalonian and Valencian productions; compositions of Catalonian and Valencian tiles such as saint soffits, landscapes, vases with flowers, etc.; and tile dadoes from the same sources.

2.2.- THE VICENÇ ROS TOWN MUSEUM: THE ROS COLLECTION AND THE MIR COLLECTION

The museum was inaugurated in 1945 as a result of the donation by Vicenç Ros Batllevell to the town of his important collection of ceramics, amongst other items. The

L'Enrajolada. Santacana museum-house

Vicenç Ros Town Museum



Vicenç Ros Memorial Museum

museum is housed in part of an old capuchin monastery built at the end of the 17th century. Since its establishment, the museum has increased and continues to build up its collections with donations and purchases. Following the ceramic collections in importance, there is the ethnological collection, the documentary collection, the art collection, the library, and the newspaper and periodicals library.

In 1972, the Town Council acquired the ceramic collection of the painter Joaquín Mir Trinxet (1873-1940) and installed it in a specially constructed building, the Vicenç Ros Memorial Museum. This venue is currently used for the temporary exhibitions of the Vincenç Ros Town Museum, and the Mir collection is housed in this museum.

In all, of the over 7000 recorded items, 1072 are individual tiles or tile compositions, involving a total of 15,065 tiles. Of these, 12,357 belong to the Ros collection (291 pieces) and 2708 to the Mir collection (781 pieces).

Of the Ros collection, the dadoes created by Vicenç Ros are of particular interest. These involve sample polychrome tiles or with an individual motif, set square tiles, most made in Catalonia, belonging to different periods and styles. The altar frontispieces, certain compositions on religious subjects, a series of soffits on hunting themes and 15 soffits on the mysteries of the rosary are quite exceptional. To be noted furthermore for their variety and number are the saint soffits made of Catalonian and Valencian tiles, tiles of the Catalonian crafts of different periods, fruit and vegetables, and sets of Gothic ceramic floorings. To be added to these are the series of polychrome sample tiles, Hispano-Arabic tiles and so-called Pedralbes tiles.

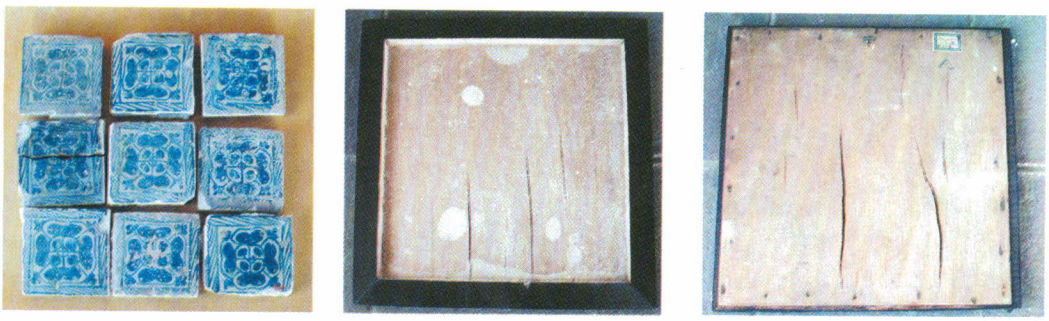
In the Mir collection, the groups of four samples tiles of the 16th to 19th centuries of different periods and styles predominate together with the Catalonian and Valencian tiles on the crafts. The collection also contains some compositions of saints or of religious subjects.

3. THE TILES

3.1.- CHARACTERISTICS OF THE ASSEMBLIES

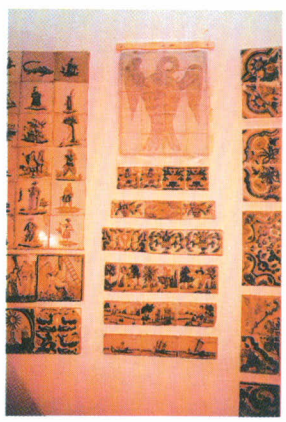
Two types of assemblies are found at L'Enrajolada: tiles framed like paintings and tiles fixed to the wall. The former have a wooden frame and some type of fastening system at the front and/or at the back (frame with a certain profile; some little nails at the front of the frame and sometimes between the tiles; plaster at the back, at the sides or between the joints of the tiles; or a wooden panel at the back). In the compositions fixed to the wall, the use of lime and sand mortar was detected in pieces that had come off the wall or that threatened to fall off as a result of problems of moisture.

At the Vicenç Ros Memorial Museum, where the Mir collection was housed, all the pieces were fixed to the wall, either directly or by means of the assembly that they had been mounted on, based on a combination of the following elements: plaster, cement, impact adhesive, paste, metal mesh, wooden boards, reeds, sacking, wire, nails or metal frames. While certain items were fixed with mortar, others were fastened to the brick wall by metal staples subsequently trimmed with a cement edging.



Typical l'Enrajolada assembly. Santacana museum-house.

Vincenç Ros Town Museum: dadoes, saint soffits and small compositions.



Mir collection. Vicenç Ros Memorial Museum.

At the Vincenç Ros Town Museum, all the pieces were fixed to the wall, generally with lime and sand mortar, though parts were found to be fixed with portland cement.

3.2.- THE STATE OF PRESERVATION

The most serious preservation problems found in the tiles at the Martorell museums have always been associated with a high moisture content in the tile backing or relative humidity in the ambient. The most frequent anomalies observed in the tiles were as follows: dirt on the tile surface caused by the accumulation of dust, varnish stains from the frames hiding the tile edges, stains from whitewashing the walls, rests of plaster, mortar or portland cement, stucco and repainting jobs; glaze deterioration (cracking, blisters, peeling, curling and chipping) and the presence of mineral salts in the body; missing body; tile failure on installing the tile or installation of already broken pieces joined with the fixing mortar.

4. INTERVENTION IN THE TILES

In 1990, a programmed restoration was started of the tiles at L'Enrajolada, which was cut short at the beginning of 1993, when funding was stopped and management and policy changed. Since then, there have been incidental interventions to solve specific problems or because of improvements in the buildings, such as virtually complete

electrical rewiring, painting of certain rooms, installing a fire alarm, improving the robbery alarm and roof repairs after a beam broke. The work done by the restorers was presented at the workshop on "Tiling repairs in architecture", held in Valencia in 1993 and published by the Asociación de Ceramología in 1995.

At the Vicenç Ros Memorial Museum, the dreadful conditions of the building with leaks and rainwater coming in threatened the state of the items, so that it was decided to perform an emergency operation in 1989, which together with the operation effected at the town museum, involved ripping out over 15,000 tiles that were fixed to the walls. The whole process related to taking down these tiles was presented at the IXth Congress on the Preservation and Restoration of Cultural Assets (Seville, 1992) and the workshop mentioned above (Valencia, 1993).

Some compositions and/or tiles were restored immediately after being detached from the wall, whereas others are still stored in boxes with the gauze wrapping that was applied before taking down the items, awaiting funding. Two interventions have taken place to date. In 1995, the dadoes created by Vicenç Ros Batllevell were restored, as were most of the tiles in this collection in 1997. The tiles of the Mir collection now await their turn.

As in the whole process there have been and there still are more or less short waits, the first step before continuing with the work, whatever the stage involved, is making a diagnostic of the items to be restored.

Often, despite the care taken on detaching the tiles (1988-1990), the items to be dealt with required a preliminary intervention before removing the rests of adhesive (and medium) between the broken fragments and the mortar. These were not eliminated after detaching and storing the items, as they were very hard and removal involved a certain danger for the tile. It was advisable to solve this problem when the tile was to be relocated. Sometimes the generally cracked glaze was found to be stuck to the protecting cloth, or excessive polyvinyl acetate (adhesive used with the gauze) was found, especially in the tiles that were originally located at the bottom of the dado compositions, because the adhesive slid and accumulated in these areas. This was an added difficulty in removing the protective gauze and subsequently cleaning the items.

We shall now look at the process followed after this diagnostic and the solutions adopted to restore the collection's beauty.

Details of various defects found in the tiles to be restored in the Ros collection.

4.1.- REMOVING THE GAUZE CLOTH

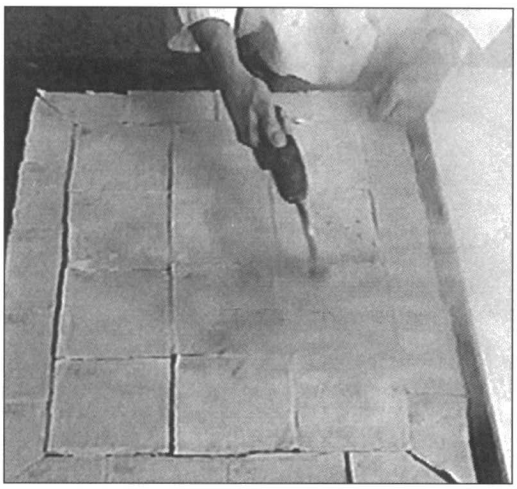
Steam was used to separate the protective cloth from the tiles. A rather rudimentary system was employed to start with. This involved heating the water in a vessel covered with a grating on top of which the tile was placed face down for 3-5 minutes, to remove the cloth. However, in view of the great number of tiles to be dealt with in the next stage, a much more agile, rapid and efficient method was sought. It was thus decided to use a steam gun to moisten the whole gauze-wrapped tile surface without needing to handle the tiles, which enabled focussing on the points that most required treatment.

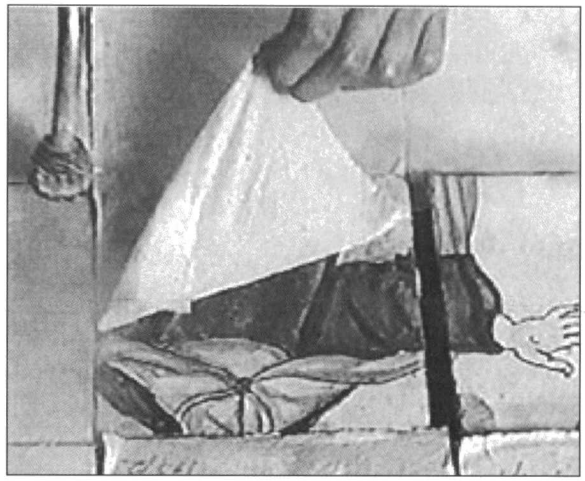
After removing the cloth, the various types of deterioration that had occurred with time became visible from the interventions in the 40s and the intervention involved in ripping out the tiles. This was when different repair strategies needed to be chosen according to the defects found.

When the tiles exhibited no problems relating to detachments, it sufficed to apply steam and wipe the surface with a cloth damped with alcohol to produce a perfectly clean tile. A scalpel was run along all the edges to eliminate plaster and mortar rests from old re-groutings. In this process, it was observed how the pictorial layer or the cracked or missing glaze of many tiles was the result of the proliferation of mineral salts from the wall backing; the moisture had crossed through the mortar and tile body to reach the glaze.

The desalinisation process had been taken into account at the very outset of the restoration but on establishing the brittleness of the glaze, it was realised that the method was more aggressive than preventive. The best treatment to keep salts from proliferating was to hold the ceramics in stable ambient conditions at a temperature of 18-20°C and a relative humidity of around 65%.

Summing up, the cloth was removed with the steam gun, the polyvinyl acetate was neutralised and the tile surface was wiped clean, being careful to work in an open area to keep vapour condensation from forming while at the same time encouraging rapid drying.





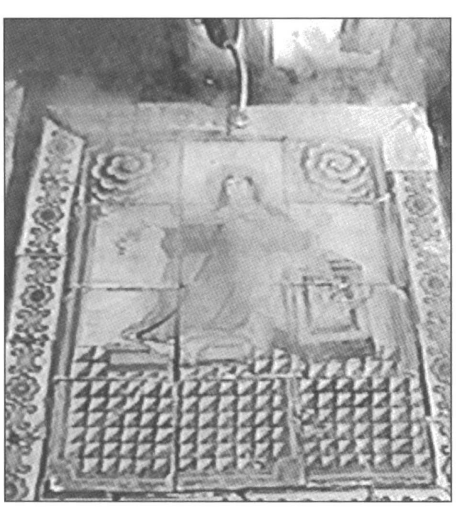
4.2.- CONSOLIDATION

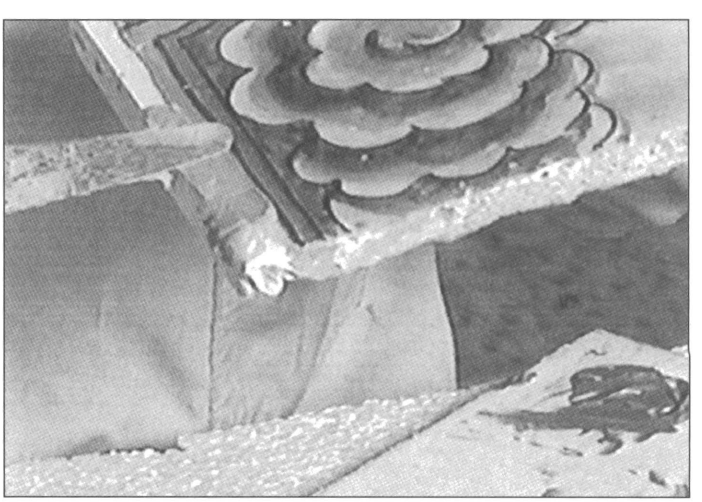
Two types of consolidation were performed, in two different moments of the process: before taking down the tiles and after wrapping them in gauze. The first was a kind of first-aid consolidation, so as not to lose material and leave each fragment in place. This was done by using a 50-50 mixture of nitrocellulose adhesive and acetone, to which a 10% solution of paraloid B72 in xylol was added, with the same volume as the acetone, and some drops of alcohol to dilute the intensity of the consolidating agent. Prior to the consolidation, the precaution was taken to choose readily removable, sufficiently elastic materials with fixing strength and penetration. It should be remembered that a highly brittle, rigid glaze surface was involved with deformations caused by moisture.

The second, definitive consolidation was performed with the tiles in the workshop. After taking off the gauze, the pieces were disassembled and the fragments were correctly re-set, fixing the broken glaze in its place.

Paraloid B72 was used for the second, definitive consolidation, at a 10% concentration in toluene. This was applied to the ceramic body where the small fragments were later stuck back on or, when the surface layer was missing, where the body was to be reintegrated with stucco or plaster, when deep surfaces were involved. The paraloid was also used for edge chips, faults caused by the original glaze firing or for very porous tiles, with a very thin, worn away, surface layer (floor tile). In this case, the consolidating agent provided the whole surface with a protective coating, heightening tile colour and fostering a better reading of the design or pattern depicted. Furthermore, it protected the item from external agents such as dust, by keeping dust from adhering and therefore facilitating removal.

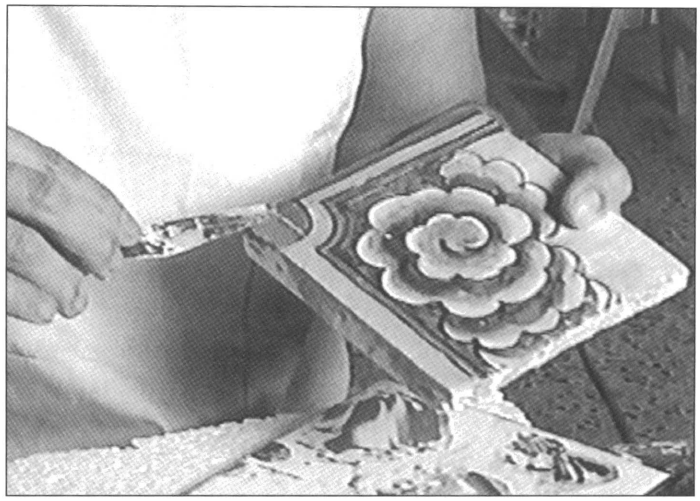
4.3.- REINTEGRATION





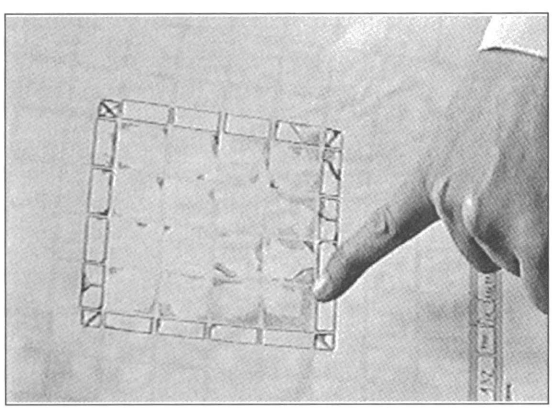
The missing parts of the body and surface layer were reintegrated by filling the gaps with plaster and the more superficial layers with stucco. After sandpapering these areas, the reintegration was consolidated with paraloid B72, then retouching with a brush using

acrylic paints, which allow working faster than oil paints that take longer to dry. Finally, a varnish was applied regardless of the repair process used.



At first, retouching was done in an archaeological way, softly colouring all the reintegrated parts in a colour similar to that of the original tile.

Subsequently, in 1995, as it was intended to restore most of the material that was left of the Ros collection, a different reintegration approach was adopted. To speed up the work, colour was applied during the reintegration, i.e., the stucco was tinted before being applied according to the prevailing colours and sometimes following the tile pattern. Though the colour of the stucco faded a little on drying, this was solved by the consolidation with paraloid, which heightened the colour so that the reintegration resembled the original colour more closely. This yielded enhanced integration, with a heightened stability and colour strength compared to the traditional way of working, which involves superimposing many materials in the same repair area. With this method there were only two materials, the stucco and the consolidating agent.



At this point in the reintegration, the issue was also raised of the type of retouches. Given the great number of tiles to be dealt with and the characteristics of the compositions, the archaeological retouching approach was rejected, to keep the evidence of the repairs from affecting the beauty of the sets of items. An illusionist retouching approach was chosen, which although not readily perceivable, can be distinguished if

looked at closely. Moreover, the retouches were graphically documented to record these and allow them to be individually examined.

Another possibility was the "strattegio" technique which consists of applying very thin scratches to the retouched areas, which are not distinguishable at a simple glance.

Whatever the reintegration approach in the treated tiles, the reintegration was equally reversible. The tiles that had lost over 50% of the body, or those whose original state was not known, were consolidated and left as such.

4.4.- THE NEW PRESENTATION. TYPES OF ASSEMBLY

When restored tiles are to be exhibited, their shape, surface area, volume and weight need to be taken into account. The same composition can contain items of different size, shape and thickness, and the support will need to be chosen in terms of these parameters.

The support needs to be insulating, reversible, strong and lightweight. Under these circumstances, there were two alternatives Hexlite 620 (previously known as Aerolam F-MBoard) and foamed polyurethane, both framed with an aluminium profile. One or the other was chosen, depending on the number of items in each soffit, tile shape, weight and especially, the different tile thicknesses in the same group. Sometimes, to keep the aesthetics of the assembly of certain items, methacrylate and transparent PVC were used as supports (L'Enrajolada. Santacana museum-house).

Besides these types of mobile support, a fixed support also needs to be mentioned, which was used in some compositions created by the founder of the Vincenç Ros Town Museum, which were to be relocated on the wall where they had originally been set.

The following sets out how each type of material was converted into a support for our purposes, together with the advantages and disadvantages of working with the material involved:

- ***Polyurethane support***

Polyurethane is a sponge-like material, made by mixing two components, polyol and isocyanate, which produce a foam that grows and hardens in a few minutes depending on ambient humidity and temperature. Polyurethane foam insulates, fixes, and fills all the openings, while also impeding water filtration, dust and moisture. It is an odourless, non-corrosive, non-reactive, inert, moisture resistant, and totally dielectric substance. It forms a permanent, watertight bond when applied to wood, metal, ceramics, concrete, glass and most plastic materials. It can be removed with acetone and is a totally reversible material, which is an indispensable condition in the field of restoration.

It is more practical to use it in smaller-sized compositions (50x60cm) and especially in those featuring items of different thickness. The differences made it necessary to use this support for some large-size sets of tiles (98x210cm, with 105 tiles and 117x195cm with 135 tiles), which had to be divided into modules, joined by a vertical crossbeam that fitted into the aluminium frame, and when installed inversely, left practically unnoticeable joints.

This support was made as follows:

1° All the tiles making up the soffit were laid face down on a sufficiently high glass table, to allow checking from beneath to make sure that all the pieces were properly arranged.

2° Tiles are usually not perfectly flat. To keep them from moving, they were levelled with little pieces of cardboard placed at the ends of each tile until attaining the flattest possible surface.

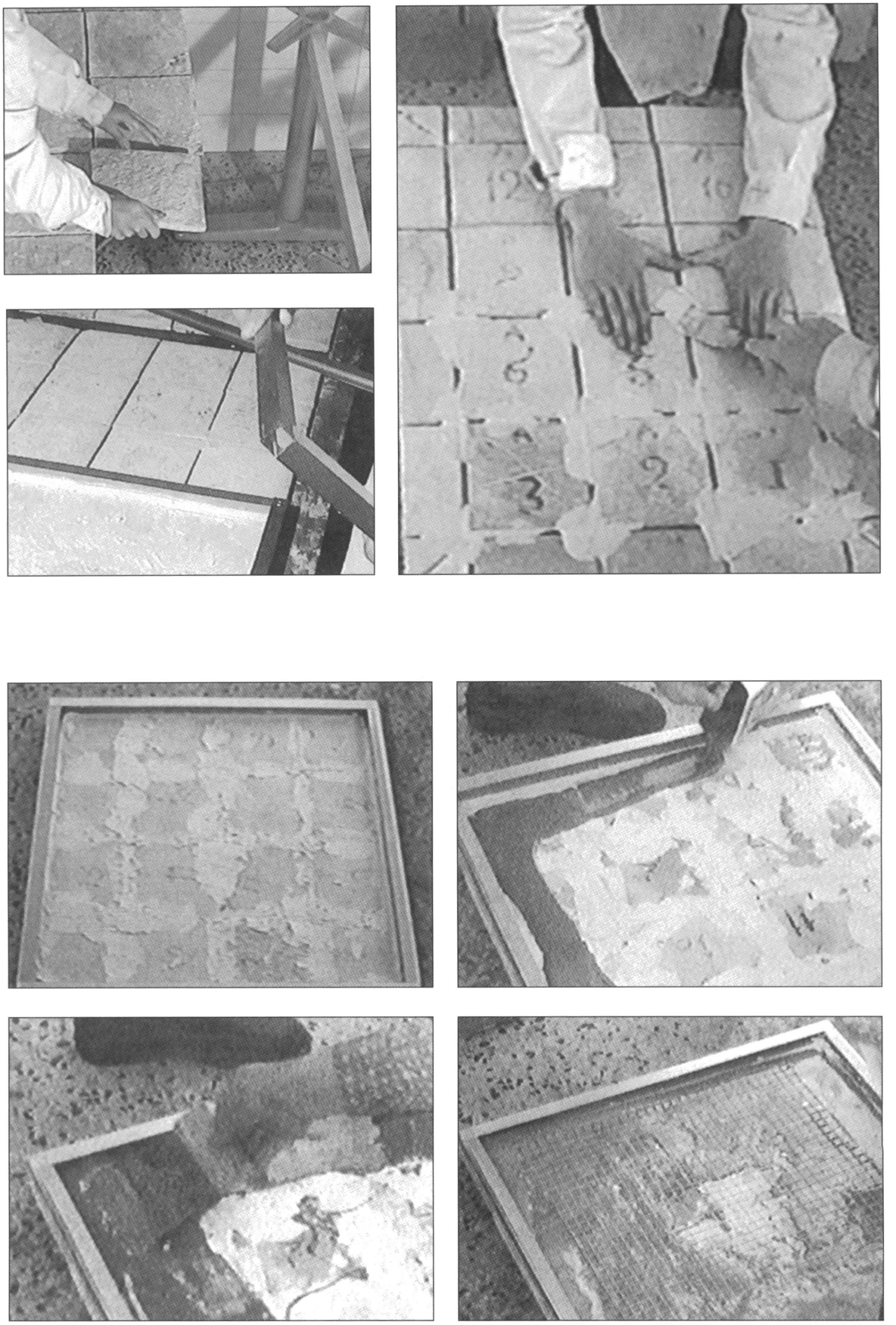
3° A spatula was used to spread the adhesive paste joining the tiles to each other, leaving no unfilled opening and ensuring that nothing moved. The product used was Fermafix, an adhesive paste made and marketed by a company that specialises in producing industrial mortars made up of synthetic resins in an aqueous dispersion with mineral fillers. It has a mass density of 1.7 g/cm^3 and pH=9. It is used for fixing ceramic wall tiles on internal walls. The product is flexible, has a correction time of about 40 minutes and a total hardening time of 6 to 8 days, which varies according to thickness and temperature. The material is reversible and can be removed with acetone.

4° The exact measurements were taken of the soffit perimeter and the frame was fitted with the U-shaped aluminium profile, riveted at the four ends. The frame was adhered to the tiles with the same adhesive paste, pressing to achieve a good bond. The assembly was left to dry for 36-48 hours at a temperature of 18-22°C.

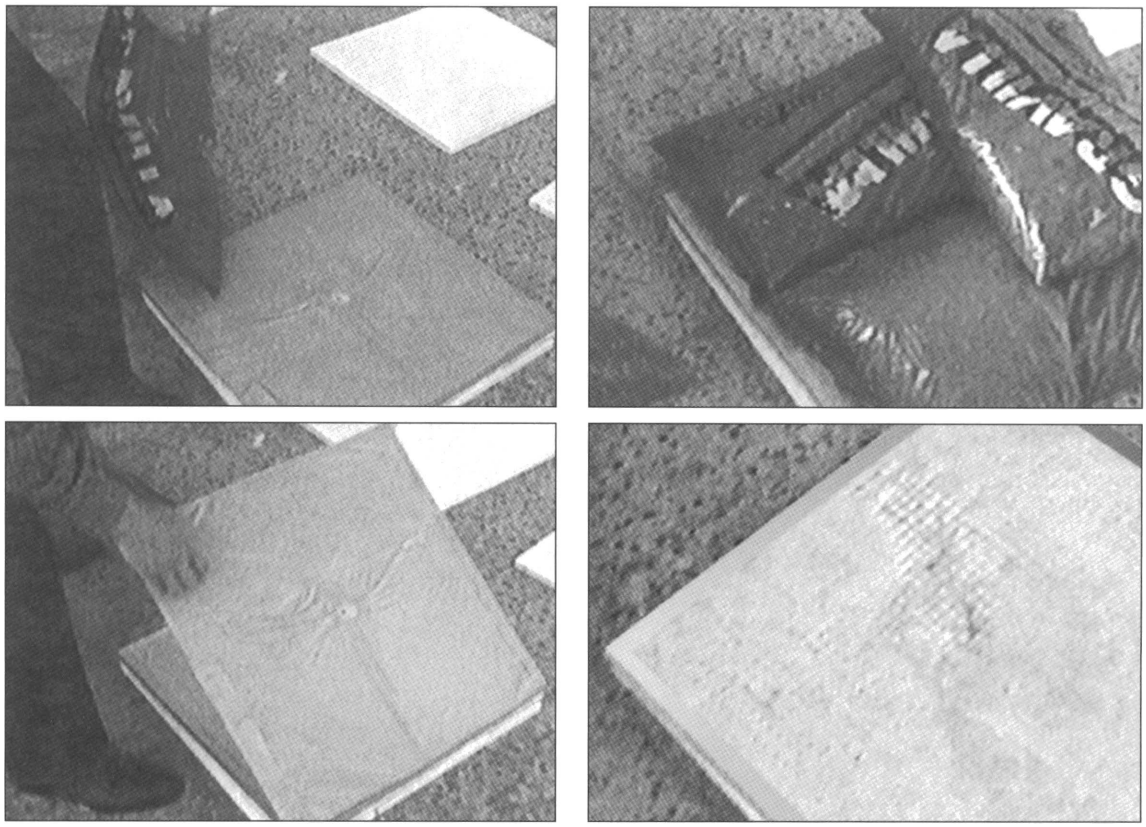
5° The framed tiles were placed on a foamed plastic sheet of a certain density as a cushion for protection. A conglomerate board was prepared with a hole in the middle to let out the excess material and have the polyurethane expand uniformly. Weights were also prepared of 25 or 30 kg, according to the soffit surface area. A piece of galvanised aluminium mesh was then cut and the proportions of the two polyurethane components were prepared.

6° The polyol and isocyanate were vigorously mixed to a homogeneous solution as fast as possible. The liquid was poured into the flat box made up of the tiling surface and aluminium frame and quickly spread, positioning the mesh used to reinforce the support and provide it with a greater consistency. This was then covered with the conglomerate lined with plastic, to keep the polyurethane from sticking to the wood, and weight was put on top to keep everything tightly sealed. This was allowed to stand for a few minutes to allow the polyurethane to expand and harden.

7° Finally, after verifying that the sample had hardened, the weight was removed, the wooden lid was lifted and the support was ready.



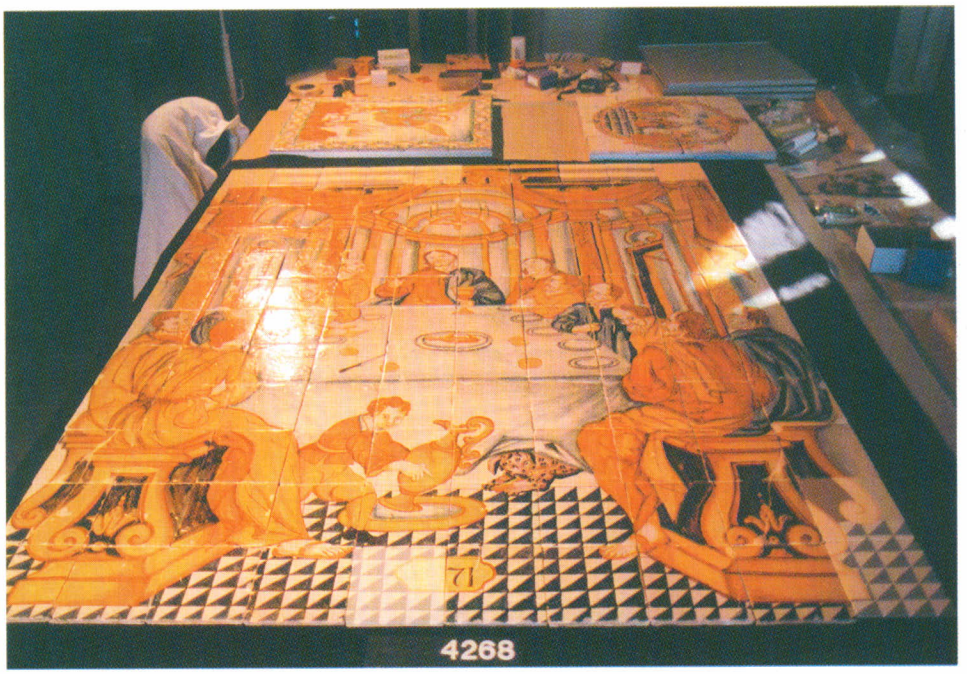
Different stages in the assembly with polyurethane foam (1st part).



Different stages in the assembly with polyurethane foam (2nd part).

- *Advantages:*
  - It adds no extra weight to the group of tiles.
  - It is an excellent insulating material.
  - Polyurethane foam acts as an adhesive, bonding the tile to the support and the aluminium frame.
  - It is totally reversible and readily removable with acetone.
  - The tiles are not fastened to a hard, rigid surface but are fixed to a surface that has a certain cushioning effect.
  - All the elements are perfectly held together.
  - If any holes remain, additions can be made without any difficulties.
  - With this type of support, differences in thickness are hidden, and the whole tiling is level at the front and back.
  - Permits mobility in the installation of the pieces.

- *Disadvantages:*
  - The product is toxic while being handled, and it is necessary to work in a well-ventilated area.
  - A laborious set-up is involved for preparing the support.
  - The material requires speed and safety measures in working with it.
  - Ambient conditions influence the behaviour of the products comprising it.



Preparation of the restored tiles to be mounted on Aerolam. Item from the Mir collection.

- ***Aerolam support***

This material is supplied ready for use in sheets measuring 122x244cm, in thicknesses of half and one inch, i.e., of 13.7 mm and 27.4 mm, respectively. It consists of two glass fibre panels sandwiching a beehive aluminium structure, which can be cut relatively easily. It is an excellent insulating material and withstands weight without deforming. It is a well-known material in the field of restoration work, but its high cost is an important drawback. Most of the tiles that were installed on Aerolam were groups with many items and large sizes or irregular shapes, as this support could be cut in the desired shape. There were also complicated tile composition arrangements that were easier to lay face up. Some individual tiles were also set on this base, which allowed using scraps of material, and also speeding up the work.

The soffit to be installed was set out, measurements are taken and the Aerolam was cut with an electric saw. The profile was covered with an aluminium frame that covered the Aerolam thickness and a little over half that of the tiles. The large compositions were split up into manageable modules, in terms of weight and size.

The same adhesive (Fermafix) was used to adhere the tiles to the Aerolam as with the polyurethane. After drying completely (6-8 days), the soffit was placed face down on a foamed plastic sheet and framed with an L-shaped aluminium profile, riveting the ends. The profile served to hide most of the support, to keep from cutting oneself on handling it, protecting the tile profile and making the soffit more compact and stronger. The same operation was performed with the items arranged in modules, however without covering the contact areas with the profile, to provide a better fit. The choice of Aerolam thickness depended on the weight to be withstood.

- *Advantages:*

  - It is a support that is ready for use.
  - It is an excellent insulating material.
  - It withstands great weight without deforming.
  - The sheets can be cut into the desired shapes and sizes.
  - The sheet sizes are sufficiently large to meet the needs.
  - The material permits mobility in installing the items.

- *Disadvantages:*

  - The assembly is not as light as it appears, as the weight of the tiles and that of the adhesive are to be added together.
  - It is an aggressive material. The tiny glass fibres that are released in cutting require working with protection in an open area.
  - The material is a highly priced German import.
  - Its use is not recommended if tiles of different thickness are to be installed.

** **Fixed support***

The system was used for all the tiles that belonged to the large dado compositions. The problems relating to the moisture in the walls where the tiles were to be installed needed to be solved first. The walls were cut away until sound material was reached, subsequently applying the rendering and fitting sheets of insulating material of the foamed type of great density (Estiropor). These were levelled, and the surface was prepared for tile installation, using the same adhesive paste as in the other supports. In this process, after restoring the items and organising the compositions for their correct installation, the restorer watched over the tile installation by the tile fixer, ensuring that all the materials used were reversible, compatible, quality materials. Finally the restorer applied the grout filler

- *Advantages:*

  - It is a practical system given the large size of the dadoes
  - Reversibility of the assembly
  - Assured insulation

- *Disadvantages:*

  - Immobility of the compositions
  - Vertical work

Preparation of the walls, insulation and tile assembly in situ.

- ***PVC / methacrylate support***

A sheet of 3 or 5-mm-thick, transparent PVC was involved, screwed to a frame on which the tiles were fixed with the same adhesive paste used in the other supports (Fermafix). This type of support was used for the items in which the old frame was to be preserved to keep the aesthetic unity of the museum (L'Enrajolada. Santacana museum-house), where all the elements follow the same presentation criterion. They are usually supports for individual pieces or small compositions.

- *Advantages*

  - The transparency allows seeing the back of the items (numbers, marks, notes, etc.).
  - Easy handling

- *Drawbacks:*

  - Fragility
  - It is only recommended for small compositions or individual tiles.

Comparison of the initial state of a composition after removing the gauze and end state.

4.5.- RETOUCHING AND GROUTING

After assembling the tiles, independently of the system used, retouches of an illusionist type or using the archaeological approach were performed and grout was applied in some compositions, in accordance with the criteria set out below.

An illusionist retouch was used in all the sets of items with a motif or depicting a scene, i.e., where the individual tiles were only fragments (saint soffits, altar frontispieces, hunting scenes, etc.).

This retouching approach was also used in tiles that formed a scene by themselves, such as the tiles on arts and crafts. This was applied after the soffit was mounted and in this case involved the last stage of the whole process.

The illusionist retouching approach was also used when there was enough information to make the drawing without this being an invention. If the design was unclear, the stroke was simplified without applying any colour, which enabled providing the group of tiles with a greater unity, and which, if it was not correct, could be easily removed. In this way, the result yielded a better reading of the work and the restoration did not take front stage.

All the compositions with illusionist retouches were accompanied by the relevant documentation that recorded the intervention performed.

Archaeological retouching was done in the tiles in which the same schematic pattern was used, and in which there were only one or two colours. Generally very porous tiles were involved, with a highly worn away glaze and irregular edges.

Archaeological retouches were determined by the reintegration, as the stucco used was tinted a neutral colour approaching the predominant tile colour. Where this technique was used, mostly involving floor tiles with geometric compositions, the retouches were highly integrated. The colour of the reintegration was adapted to each particular tile, as they all had very different shades, so that although they formed part of a set, each had its own individuality.

The grout filler was applied in the groups of tiles that formed a scene, or that had traditionally been presented like this, as such being more attractive for the beholder. This was done whenever the tile surface allowed. For this reason, no grout was applied when tiles were involved with a very porous surface. Grouting was not performed either in sets of tiles without a clear unity, in case modifications were ever to be made to the arrangement or composition.

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