RESTORATION OF URBAN CERAMIC FURNITURE OF THE RIBALTA PARK IN CASTELLÓN

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The objective of this paper is to present the results of a project on the Restoration of urban ceramic Furniture of the Ribalta Park in Castellón. In this project, on the one hand it was intended to perform a series of interventions that would allow restoring the current clearly deteriorated state of most of the different ceramic elements of urban application. On the other, the project envisaged the design and execution of new benches to be located at various points in the park, new benches in the round square of Paseo Viejo and a semicircular bench in Pérez Galdós Street.

1. RIBALTA PARK

The construction of the Ribalta Park was an initiative of the City Council of Castellón in the mid XIXth century, as a result of city growth and rising population, confirming its role as main town of the province. The concept of the park drew its inspiration from the English tradition of romantic parks, with thick groves and twists and turns together with French-style garden landscaping, bounded and set off with flowerbeds, without shade, next to the pond. On 12 November 1869 work started on the first construction phase of the walk, called Paseo de Ribalta in honour of the painter Ribalta, was believed to be a native of Castellón, by the agreement of December 19, 1870. In a second phase toward 1876, the so-called Paseo de la Alameda was built, subsequently

known as Paseo del Obelisco. Both walks were separated by the Zaragoza-Morella road. They would be united definitively in 1913, when this road was diverted, with the installation there of the "Salón de coches" or "Salón de fiestas" but it was not till 1927 that the construction of the ceramic furniture commenced. Ribalta Park, together with Independence square and Tetuán square, was declared an artistic heritage by Royal Decree 176/1981 of June 19.

The restoration of the ceramic furniture is set in a larger frame of actions undertaken by the Castellón City Council, with the support of the Ministry of Development, and also includes improvements in the facilities, accesses and infrastructures of Ribalta Park. The project began in the year 2001 and will conclude in 2002.

1.1. THE REPLICAS

The urban furniture of Ribalta[1] Park has great value as a heritage in the history of Castellón, since it is exquisitely clad with ceramics, featuring products made in the first decades of the XXth century, at a time when the ceramic industry, a sector of vital importance for the growth of the city, formulated a new language, led by architects and designers.

Restoration in situ of the ceramics was discarded as an option due to the poor state of the ceramic material, which would continue being subjected to aggressive outdoor circumstances and vandalism. For this reason it was concluded that the best solution would be to deposit these items in a museum where they could be restored and conserved as part of the ceramic architectural heritage of the province. The unquestionable condition for this was to substitute them by rigorous replicas of the originals. As a second objective, it was also thought to make a product with better technical performance than the originals, without losing any of their more outstanding characteristics (colour, texture, size).

Thus, it was proposed to make replicas of the benches located along the Paseo Viejo and of the other ones scattered randomly throughout the park; the bench in the elliptical or Obelisco square, whose skirted base had become hidden and eroded by accumulations of successive layers of earth, besides the deterioration of the pilasters of the balustrade, whose state also required restoring, was also to be replaced. Replicas would also be made of the tiles that cover the pilasters of the balustrade and skirting of the square of the pond.

1.1.1. 13 benches with backs

The data supplied by Teresa Santamaría[2] indicate that in 1927 construction began of 7 benches in the Paseo de Ribalta, and in 1931, of 4 more, which according to the author, could be the benches with curved shapes located in the vicinity of the pond, larger than

[1] In order to identifying the furniture for its study and restoration, the items have been numbered correlatively from the Paseo de Ribalta, the first one being next to Independence Square: 1. Bench with scenes of manners depicted in panels of modernist influence. 2 Bench of geometric designs with orthogonal structure. 3 Bench of plant designs with ornamentation of Gothic influence. 4 Bench with plant designs and human figures with a great central shield of Baroque influence. 5 Bench with peacocks and floral garlands in horizontal arrangement of deco influence. 6 Bench with anthropomorphic designs of classical influence. 7 Bench with floral ornamentation and medallions with mythological figures. 8 Bench of floral designs of modernist influence. 9 Bench of fruit-bearing designs and animals of modernist influence. 10 Bench with geometric designs of two-colour bands. 11 Bench with Renaissance ornamentation. 12 Bench of geometric designs with orthogonal structure. 13. Bench with Renaissance ornamentation on yellow background. Elliptical square with ornamentation of Renaissance influence. Balustrade of the Lake of modernist influence.

[2] SANTAMARIA, M.T.: "El Parque de Ribalta", Valencia 1995.

the previous ones. It remains to be determined when two more benches were built; one could be bench 10 far from all the others, and bench 12 with a similar decoration to 2, but the whole group clearly exhibits a minimal difference as regards chronology.

Fig. 1. Bench with back.

As for the typology, except the 4 larger benches of 1931 (approximately 7 m.) with a curved shape, all the rest have the same characteristics. They are benches measuring approximately 4 meters consisting of a solid body for the seat and a lighter back, although with variants regarding the arrangement of the structures that make up the backs.

Structurally, all are made of brickwork and covered with ceramic pieces. The volumes are constructed using masonry work for the base and the lower parts as well as ceramic brickwork with cement mortar for backs and pilasters. The largest formal freedom is found in the backs of the seats of rectangular or oval bodies framed by fitted pilasters. (Fig. 1)

1.1.2. 9 benches without backs:

9 benches are furthermore scattered throughout the park, with a stone seat and masonry base. Only one of the nine benches had a base facing clad with ceramics, with rests of the closest bench with a back, so that we inferred that they had used the spare material.

Fig. 2. Bench without back.

In the restoration project it was planned to clad all the benches, following an identical approach, that is to say, to use the same ceramic material as that of the closest bench. (Fig. 2)

1.1.3. Pilasters of the continuous bench of the elliptical square

On the other hand, the elliptical square is skirted by a continuous curving bench, with a stone seat and balustrade in which pilasters are fitted crowned by Viennese-style jardinieres and adorned, just as the seat facing, with tiles of historical inspiration.

1.1.4. Pilasters of the balustrade of the square at the pond

Furthermore, next to the pond we find a square with a balustrade and garden, whose pilasters are decorated by tiles, 5 in number, which represent the head of an angel, bouquet of flowers and shield of the city. On the pilasters, false stone jardinieres and two griffins flank the entrance. The skirtings are decorated with mass-produced tiles, depicting two fauns with plant decoration, similar to those of bench 3. In the centre of the square there is a statue of mayor Domingo Herrero, who was behind the Paseo del Obelisco, whose skirting is also decorated with the faun design. The tiles are in good state except those that depict the shield, which in their majority have suffered deterioration.

1.1.5. The tiling

With regarding to the tiling, most of the tiles are square (20x 20 or 15x 15 cm.) with a regular cross section and angles for trims. Other pieces, such as the borders, are modular to the previous ones, made by cutting these up. As for the decorative techniques, stencilling was used most together with the "cuerda seca" technique, and free hand or water painting.

Regarding the authorship of the tiling on the benches, most tiles came from the factory of Juan Bautista Segarra Bernat, who had factories in Onda and Castellón[3] from 1906 to 1966. As for their chronology, we can set them in the 1920s and beginning of the 1930s. In some cases, we have found the models in the catalogues of the firm, most belonging to samples of tiles for dadoes[4], although some were also found in the catalogue of garden furniture[5]. We were also able to locate the original stencils of some of these models in the documentary archives of the Tile Museum in Onda on this factory. Only the stencils corresponding to the model at the pond indicate that they belong to another firm "José González", perhaps a distributor, since no records have been found of any company with this name in the area.

Three of the benches, bench nº 2 rhombus bench, nº 10 with green and white squares and nº 12 rhombus bench are not found in the catalogues. They all have simplicity of

[3] ESTALL POLES, V.J.: "La industria cerámica en Onda. Las fábricas, 1778-1997", Onda 1997.

[4] Fábricas de Azulejos en Castellón y Onda. J.B. Segarra Bernat, Castellón de la Plana España". Tile Museum. Onda.

[5] "Decoración jardines. J.B. Segarra Bernat. Fábricas de azulejos en Castellón y Onda (Castellón)". Archive of the Diputación Provincial de Castellón.

design in common, two-colour rhombuses in two of them, and two-colour bands in the other one. We may also mention that in the folders contain the stencils of the elliptical bench and of bench nº 11, there is a note: "Renaissance frieze". Paseo of Castellón", indicating work specifically commissioned for the park. With regard to the stencils, confirming the authorship of the models, we have found part or all the stencils of benches 5, 6, 8, 9, 11, elliptical square, and balustrade of the square at the pond. This group of stencils will only be used as documentary back-up material to reproduce the stencils that will be used in production, since their state it does not allow excessive handling.

The designs are geometric, of plants, zoomorphic and anthropomorphic, in isolated scenes, in modular combinations and in panels with scenes from mythology, manners and the countryside. Stylistically in this group we find neo-classical historicism, modernist stylised naturalism and deco schematism. The chromatic palette is rich and varied combining blues, greens, yellows, roses, oranges, violet and black, on a white glaze slurry.

The benches have suffered various interventions, most quite unfortunate, in which broken tiles have been substituted by remains of other benches or consolidated with cement mortar. Some oval structures also seem to have been replaced by other simpler ones, although these are conclusions arrived at after stylistic and formal analysis, since photographic evidence of the originals has not always been found.

As for the technical characteristics of the ceramic products, traditional twice-fire tiles are involved, whose performance exhibits the characteristic limitations of the technology of the time. A biscuit of 7 mm and low compactness, and as for the glazes used, they contain frits with a high lead content, based mainly on the advantages that this oxide presents compared to other fluxes for achieving good colour development. The use of these high quantities of lead provides the glaze with a series of chromatic characteristics, which are on the one hand very positive, but on the other quite disastrous for its outside location. As main disadvantages we may mention the low hardness of these glazes and their high solubility in acid medium, without forgetting their high toxicity in the production process.

Today, 70 years later, these limitations have been notably overcome, as regards the characteristics of the body, both with stoneware products of low water absorption and great compactness, and in the glazes: high temperature frits and colours assure greater resistance to aggressions of the type: resistance to thermal changes, scratching and impact. It seemed logical to consider making the replicas using current technology as far as possible, carrying out a technical study that would allow us to obtain finished pieces with a practically identical visual appearance but having much more acceptable technical characteristics than those of the original pieces. As main improvements are to be noted:

- Greater resistance to abrasion and scratching.
- Considerable increase in impact resistance.
- Greater resistance to acid attack.

Nevertheless, this approach entailed some difficulties, since to the characteristics of the body and the glazes it was necessary to add the decorative techniques used at the time: "cuerda seca", water painting with brushes, and stencilling. The difficulty resided in

combining the three variables: body, glazes and decorative technique, since there is no high-performance porcelain tile and glaze manufacturing company that also decorates with the sought-after traditional techniques.

1.2. THE NEW BENCHES

The project also involved the design and execution of new benches to be located at various points in the park, new benches in the round square of the Paseo de Ribalta and a semicircular bench in Pérez Galdós Street. These benches, just as the old ones were to be made with ceramics, to keep the unity of the materials, while also at the same time testifying to the evolution of a city and an industry whose history has unfolded together happily over the century.

Thus, in the objectives of this restoration, the project addressed two fundamental challenges. On the one hand, it envisaged making a rigorous replica, with the possibility of improving the performance of the materials by applying the knowledge and technological advances achieved by the tile industry. On the other, designing new furniture that would merge harmoniously with the pre-existing furniture, but able to contribute a new urban element to the new millennium, using contemporary ceramic language. The project was to be submitted to those responsible at Artistic Heritage of the Culture and Education Authority for approval and subsequent execution.

2. THE PROJECT

2.1. THE REPLICAS

The project began with an exhaustive documentary search that included the archives of the Municipal Historical Archive and the Tile Museum in Onda, and consultation of existing literature. These sources enabled completing the information that we possessed and recovering a considerable number of original stencils that were cleaned, digitised and collected in digital format. Given their state of conservation and the high number of pieces to be made, it was decided not to use them, although they have served as a documentary basis for achieving faithful reproduction of the stencils.

To ensure exact reproduction of the designs that decorate the ceramic pieces, an extensive photographic report was made in which each of the different items was captured on a 6x8 cm slide, subsequently digitised at high resolution for storage and printing on a 1:1 size.

2.1.1. Technical development

Bodies and glazes

The main objective of the action on the ceramic elements in the park was preserving the original appearance of the benches adding as many technical improvements as possible in tile production and installation. For this reason a line of work was initiated aimed at seeking body and glazes with better characteristics than the traditional ones.

With this objective, as first option the possibility was studied of executing the work in glazed porcelain tile. As everybody knows, this material features certain excellent technical characteristics.

A study was made of the companies in the sector to determine which of them use the stencil technique on porcelain tile. No company was found to do so as habitual work process. On the other hand, aware of the aesthetic and technical difficulties that we could face, tests were carried out on the imitation of the colours that appear in the original pieces, produced at the time by the twice-fire technique.

Further difficulties for this option were, for example, the high shrinkage that porcelain tile undergoes or the need to co-ordinate tasks among companies which, in a principle, are competitors.

Once it was considered to have established the appropriate colour palette, a ceramic prototype was made in porcelain tile, producing the stencils from an original kept in the Tile Museum in Onda. The results, without being definitive, were excellent.

In parallel, another ceramic prototype was made with a twice-fire porous redware body of the traditional product type, which coincides with the one used at the time, independently of the technical improvements it features, such as thickness of the piece and optimised glaze.

Both product types were subjected to a series of physico-chemical tests, whose results follow:

TEST PERFORMED / MATERIAL TESTED	PORCELAIN TILE	TWICE-FIRE TILE
CRAZING RESISTANCE. UNE-EN ISO 10545-11	0 damaged tiles	0 damaged tiles
BENDING STRENGTH AND BREAKING LOAD. UNE-EN ISO 10545-4 (MODULUS OF RUPTURE)	2635 N	1406 N
RESISTANCE TO LIGHT IMPACT. CAHIER 3243 CSTB.	1	1
FROST RESISTANCE. UNE-EN ISO 10545-12	0 damaged tiles	0 damaged tiles
DETERMINATION OF RESISTANCE TO SURFACE ABRASION – GLAZED TILES. UNE-EN ISO 10545-7	PEI III	PEI III
DETERMINATION OF STAIN RESISTANCE. UNE-EN ISO 10545-14	5	5
DETERMINATION OF CHEMICAL RESISTANCE. UNE-EN ISO 10545-13	UA/ULA	UA/ULA
DET. OF SCRATCH HARDNESS OF SURFACE ACCORDING TO MOHS. UNE 67-101-85	HARDNESS 7	HARDNESS 6

Of these results we can highlight the high MOR values found in the bending strength tests on the twice-fire tile. These values even exceed the minimum set by standard ISO-13006 for porcelain tile, fixed at F>1300 N; in our case it was 1406 N. As a reference it may be observed that the normal tile MOR value lies between 700 and 1000 N.

Both options were submitted to representatives of the Artistic Heritage Head Office of the Autonomous Government of Valencia, since it was necessary at this point in the project to decide which option to pursue. Heritage discarded the first option relating to porcelain tile, and it was decided to use a twice-fire porous redware ceramic body.

Besides serving as base for the decorative applications, the function of the ceramic body is to provide the finished piece with certain MOR and bending strength values making it suitable for intended use. To reach these values a body is generally used of a thickness that ranges from 4 to 6 mm. In view of the open-air use of these benches, the rectangular base pieces were made with a special thickness of 1 centimetre, for two reasons: to improve their technical characteristics and to imitate the thickness and appearance of the original. However, this special thickness cannot be obtained when forming trims (angles and coves), since their singular geometry makes this technically impossible, so that the thickness of these pieces would finally be 5 mm.

On analysing the benches we found countless sizes, making it impossible to produce all of them by pressing. The adopted solution was to unify pressing in only two sizes (15x15 cm. and 20x20 cm.), based on which the rest were made by cutting.

With regard to the glazes, these would feature the same aesthetic characteristics as the originals (regarding appearance, colorimetry and gloss) however using technologically more advanced glazes, in which the incorporation of frits and new oxides has yielded substantial improvement of their physico-chemical properties.

Given the inevitable wear the ceramic pieces have suffered over the years, the colours the tiles exhibit differ greatly from those of the pieces at the initial fixing. To approach the original colour as closely as possible, samples were taken of the benches in those places where the pieces had suffered least wear. The procedure adopted to measure the colours was by measuring colorimetric co-ordinates of each colour with a colorimeter, recording each colour in terms of the Lab colorimetric values. To provide a physical base to each of these colours and facilitate the production phase, these colorimetric co-ordinates were related to a PANTONE colour palette code.

Decorative applications

The decoration of all the ceramic pieces would be carried out using an identical decorative technique to the one used in the original benches. We found three different types of ceramic decoration:

The stencil

Although its origin goes back to previous centuries, from the mid XIXth century to the 1960s stencilling was the major decorating technique. The technique consists of using

stencils of waxed paper that are placed on the piece to be decorated, and only allow the colour to be deposited through the perforated areas. The number of stencils needed to make a model depends on the number of colours present in the original and on the characteristics of the design. Given their minor use at present, it is difficult to find skilled craftsmen. Stencilling is also laborious and this meant a time drawback. For this reason technological alternatives were studied, using cutting plotters. (Fig. 3)

Fig. 3. Stencil.

All the benches except nº 1 and nº 4 were made by this technique.

"Cuerda seca"

This decorative technique appeared as a more economic alternative to the laborious tiling technique. In the first place, a stencil is made of the design, then this profile is drawn with a mixture of metallic oxides. The profile acts a separation so that the colours that are deposited will not mix. Once this operation has been carried out, the cavities are filled with ceramic glazes. Finally the piece is fired.

Fig. 4. "Cuerda seca".

This technique has been used in bench nº 1. (Fig. 4)

Water painting

This consists of hand painting each piece with a paintbrush. To transfer the drawing to the ceramic body the stencil technique is used, consisting of perforating the original paper following the lines of the drawing. The perforated paper is placed on the group of pieces that make up the panel. Subsequently, a pad impregnated with graphite powder is rubbed over the stencil transferring the drawing to the body. Finally, the craftsman paints the drawing with ceramic colours, which after drying is prepared for firing.

Fig. 5. Water painting.

This technique was used in bench nº 4. (Fig. 5)

2.2. DESIGN OF NEW FURNITURE

As stated at the beginning, the restoration of the Park involved a second challenge, to design new furniture that was to merge harmoniously with the pre-existing items, though able to contribute a new urban element to the new millennium using contemporary ceramic language. Two projects were prepared, one that pursued this objective in a resolute way and a second one, following the guidelines set by Heritage, which was finally the selected one.

2.2.1. Design of a new system of benches

The starting premise was maintaining the documental value of the existing ceramic furniture for the history of the city and its main industry, since the benches of the Ribalta Park represent the technical situation of the industrial sector and its aesthetic style of that era. Therefore, we addressed the design of the new benches with the products resulting from the evolution of the industrial sector. The new furniture was also to respond to contemporary aesthetics and to fit harmoniously into the environment. Besides these criteria, aspects relating to technical feasibility, production costs, ease of maintenance and cleanability were also kept in mind.

Similarly, the profile of the user was considered, whose age varies depending on the time of day. For this reason, proposals were avoided with sharp angles that could mean a risk in the event of children's accidents, seeking solutions where groups of young people or couples could converse, or do more individual activities. Elderly people were also to feel comfortable, so that ergonomic criteria were considered in the design of the new furniture for assuring these objectives.

With these premises we analysed the existing ceramic offer: on one hand, and after the changes in the decorating processes toward a greater industrialisation, ceramic products have become mass-produced goods, and have therefore been standardised in an offer that responds, in aesthetic appearance, to mainstream tastes. Craftwork processes that allowed short series of pieces decorated manually with the help of stencils are a minority, at the present time serving the repair or restoration market.

It is also true that aesthetic currents have changed, yielding a more rational and less decorative formal expression found in all artistic manifestations: architecture, urban art, design and interior decoration. In the ceramic sector, the range of base ceramic colours has broadened going from whites and light colours, to reproducing practically the whole colour spectrum with different intensities. Sizes have also grown, constantly increasing their dimensions, going from 20x20cm to 30x60 cm. in porous tiles, or 60x60 cm. in stoneware flooring. Finally, the typology of the products has widened to incorporate porcelain tile, the latest generation product that achieves its best performance in the ceramic mass without needing to be glazed to reduce its water absorption capacity.

Thus, the use of porcelain tile was considered, whose resistance provides greater durability. At the same time, the recently extended colour range of these products would also contribute a aesthetic solution fitting in with current trends.

The four solutions submitted to the Artistic Heritage Head Office were the result of these considerations.

Proposal nº1

The first solution was defined based an oval cross section, of which parts were eliminated to create the resting area of the bench itself, as well as its seat and back. Ergonomic criteria were taken into account for the definition of this profile. An extrusion operation defined the bench.

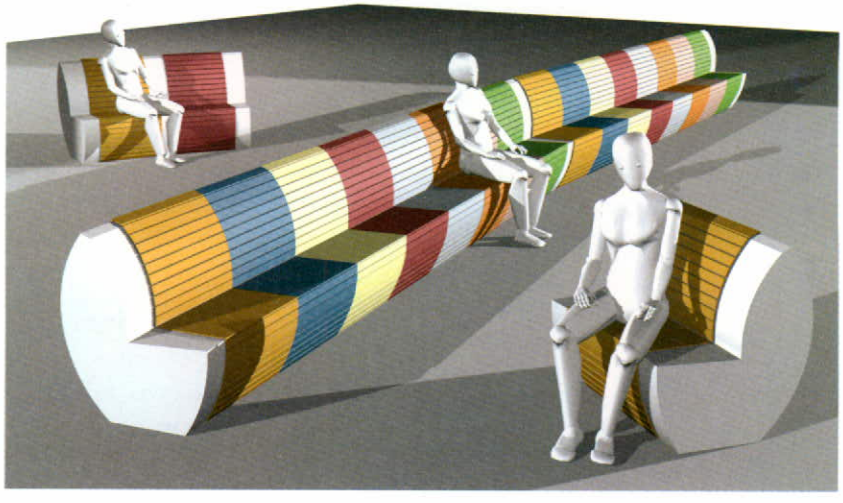

Fig. 6. New furniture. Proposal nº 1.

In this proposal, several options were considered, varying the form of the cross section, the one mentioned being the one that presented a more up-to-date appearance. This solution was completed with pieces of coloured cement acting as intermediate knee

and side closure, since the larger faces are not parallel. Thus the union is facilitated of two or more modules adapted to such curved ground plans as the round and semicircular square or the creation of independent modules.

In this case, a construction material would be used such as coloured and polished cement to eliminate the problems of the meeting points in tiling curved shapes, given the complexity of the knee curve. On the other hand, the combination of ceramics with other materials is a commonly used resource to define volumes with an urban furniture function and has also been used in the Ribalta Park balustrades.

The ceramic product selected for this proposal was mass-coloured porcelain tile measuring 60x60 cm which would be divided into pieces of 5x60 cm.

The current available colour palette allows us to study different solutions, either dividing the bench into modules that define different seats or distributing the colour in the different areas that make up the bench with a colour mass or with borders that create parallel lines of different colours. (Fig. 6)

Proposal nº2

The second solution consisted of a modular system with a single module that is repeated to create benches with a greater or lesser numbers of seats, being able to alternate benches of different size. This solution was completed with two semicircular shapes joined at the central prism, which acted as a closure.

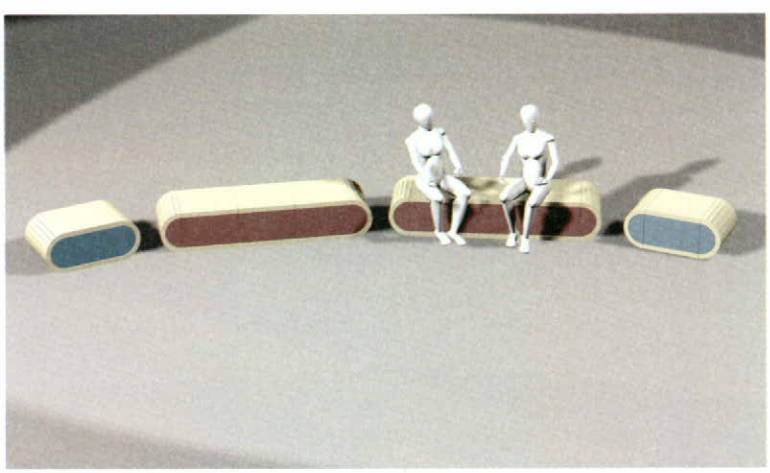

Fig. 7. New furniture. Proposal 2.

In this case the bench was to be clad in its entirety with pieces of porcelain tile measuring 60x60 cm. for the envelope and 45x60 for the vertical facing generated from the square piece. To clad semicircular areas, pieces of 5x60 cm were to be cut. The colour distribution caused a visual effect of elastic tape, by creating a colour perimeter around a central volume of different colour, seen laterally. The colour used in the central part varied giving a greater dynamism to the set of benches.

In this case as in the previous one, the same bench was used in the semicircular square and in the round one, varying the colour dimension and distribution of the modules making up the benches. (Fig. 7)

Proposal nº3

The third option presented a similar appearance to second one, but unlike this one, envisages incorporation of a back and the side module loses its semicircular form, becoming a flattened prism.

The back is not used over the entirety of the bench, but appears in some of its divisions. As in the previous solution, the bench is composed of modules to produce different lengths.

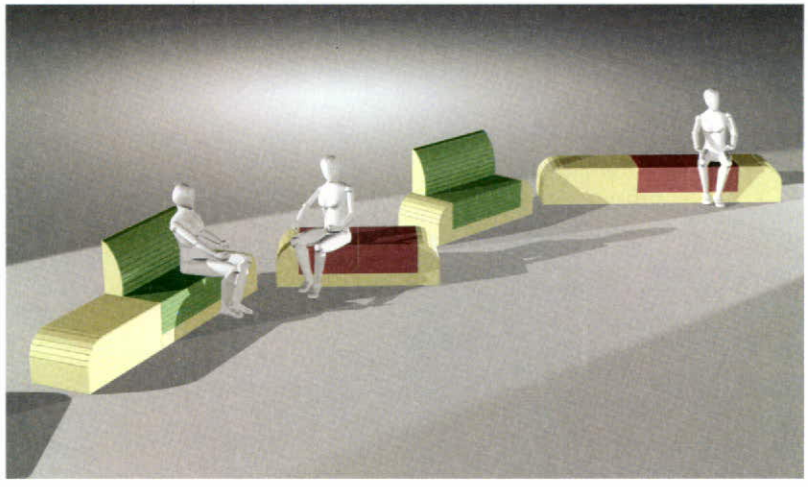

Fig. 8. New furniture. Proposal 3.

Cladding was to be carried out with porcelain tile based on a size of 60x60 cm, and its divisions for the different areas of the bench. Colour was used to highlight certain areas, which appeared embedded in a part of the bench by changes of colour.

In this case, the same bench system was also used for the round square and the semicircular one, alternating the arrangement of the benches by different numbers of seats and colours. (Fig. 8)

Proposal nº4

In this solution the design of the bench for the semicircular and round square involved different solutions based on the same constructive concepts.

Semicircular square:

Based on current benches, defined by prisms that define the seat, with the back and the armrests in a geometric arrangement, an upgrade or new composition is achieved, breaking with the symmetry and traditional way of arranging the seat, back and armrests, distributing the volumes that provide these functions in an arbitrary way, which broadens the use of the benches in all their perimeter, not only in their front shape, by incorporating the surrounding space to increase their functional dimensions.

Round square:

Using the same approach the circular square is resolved with four large benches that play with the same composition of prismatic volumes, while introducing the function of "a gathering" on having spaces that break up the lengthways arrangement and double back on themselves.

These benches were to be clad by square pieces, always using the same size, which gives the group of volumes a harmonious, well-proportioned appearance. For the angles, trims and cappings were used of the same material.

Both in the solution defined for the benches of the round and semicircular square, each prism was clad in a different colour, arranged inside the group in a random way, providing the final composition with greater mobility.

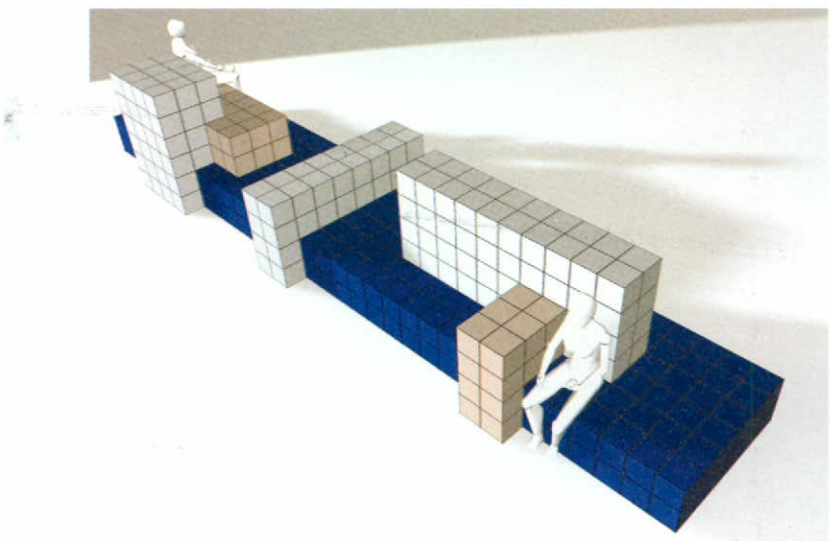

Fig. 9. New furniture. Proposal 4.

The selected material, just as in the previous solutions, was mass-coloured porcelain tile with the palette mentioned above. (Fig. 9)

2.2.2. Redesigning ceramic pieces for their adaptation to the semicircular and round square

As we have already mentioned, Heritage decided that the project finally to be carried out was the one that sought a marked continuity with the existing furniture. Since there was a continuous bench in the area of the pergola with a Borriol stone seat and wrought iron back, it was opted to follow this model and to only clad the facings of the masonry work of these benches with ceramics, together with the pilaster fittings. Furthermore, in order to unify all the ceramic interventions in the Park, the designs were selected that were initially used in the square at the pond, which were redesigned to create a system of pieces that were combinable with each other, enabling us to clad, both the round and the semicircular square.

Although several possibilities were discussed in the wide range of ceramic pieces used in the Ribalta Park, those of the balustrade were ultimately selected, as they were the designs best adapted to the volume to be tiled, since in their original location they were part of a similar constructive volume.

Old pieces *New pieces*

Fig. 10 Redesign. Round and semicircular square.

The items selected were as follows according to the cataloguing made:

Piece E-5 (Fruit bowl): this remained like the original except the top part, which was modified to provide continuity with piece E-3.

Piece E-3 (Four flowers): This piece was modified to simplify it, creating a piece that has a continuity with itself in such a way as to enable creating compositions of greater or smaller length. To lighten the design of this piece, designs of piece E-3 and E-2 were merged, maintaining the floral designs and illustrations of butterflies.

As **Closure Piece**, to complete the established composition, we used the original design employed in the balustrade for the same purpose, substituting the angel face design by a floral design in harmony with the composition.

The resulting group of pieces allowed adaptation to the columns that act as a closure to the benches, and to the vertical facing that supports the seat, which in these constructions consists of natural stone from Borriol. Finally, the original format of 15x15 cm was converted to 20x20 cm. (Fig. 10).

3. THE REALISATION

3.1. TRANSFER TO THE MUSEUM

To conserve the old benches, they were prepared for transfer to the Tile Museum in Onda as the most suitable solution in order to preserve them and subsequently to restore them. The procedure for the extraction of the benches involved different stages: Preparation of the slab, protection of the bench and transport.

Fig. 11. Transfer.

Preparation of the slab: This was designed to create a rigid platform on which to support the bench, so that the bench would not be subject to bending during transfer, besides allowing it to be held. In the first place a trench was dug under the bench in such a way that half of it remained unsupported, avoiding any breakage. After making this trench the slab reinforcing was prepared, followed by concreting. The reinforcing also included some handles that would subsequently allow it to be held by the hoist boom.

After the slab had set, the excavation of the other half was done. To achieve a solid bond between both parts of the slab, drilling was done in the already hardened half of the slab, as well as applying epoxy resins. After this, the reinforcing of the other half was installed and concreted.

Protection of the bench: In this phase it was proceeded to protect the bench in order to avoiding fracturing or damaging the tiles, by first covering them with gauze and synthetic resin adhesive of the "paraloid" type, and putting the bench in a frame with butt plates and planks braced by means of metal bars. Subsequently the whole object was bound up.

Transport: A tow-truck was used to extract and transfer the bench to the above museum. (Fig. 11)

3.2. MAKING THE BENCHES. PARTICULAR FEATURES.

All the benches are to be built with cellular brickwork according to the current models. Although most of the benches have conserved the entire original structure, in two cases we have observed alterations caused by deterioration and by subsequent not very rigorous restorations. To make the replica we used documentary sources, or when unavailable we carried out a stylistic analysis that led to the conclusions set out below

In **bench 1,** the yellow cornice was restored that contained the central oval of the back, as found in the catalogue on urban furniture of the J.B. Segarra Bernat factory, and as witness the small framed ovals and the presence of vestiges of the cornice in the top part of the central oval. (Fig. 12)

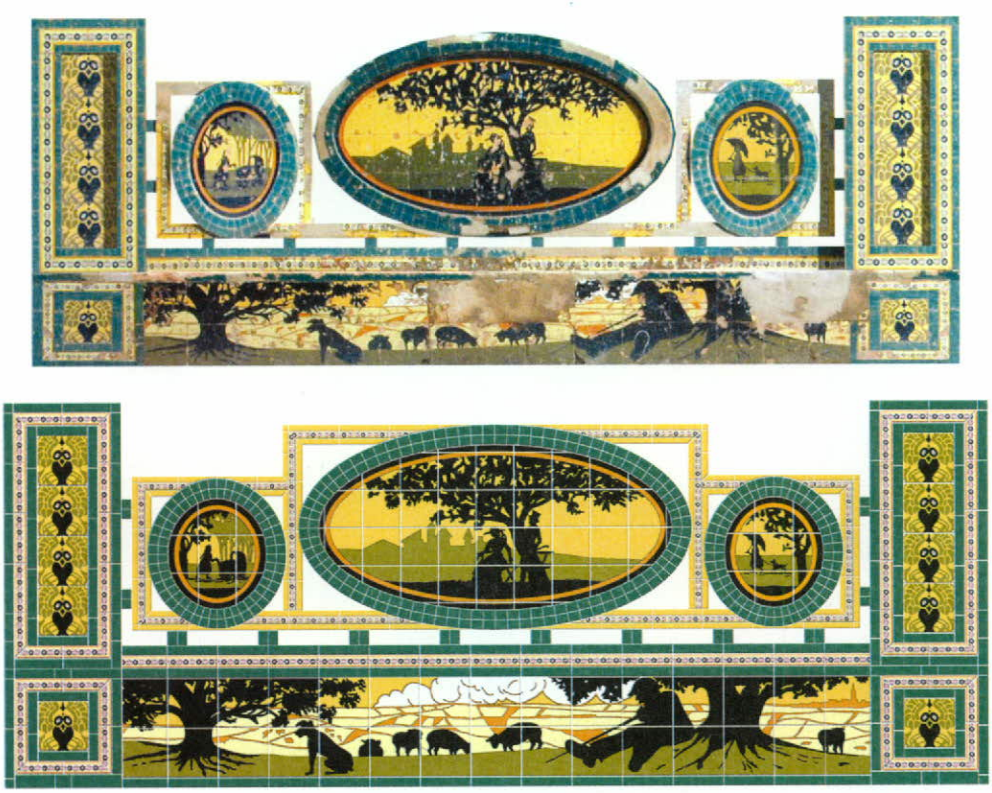

Fig. 12. Bench 1.

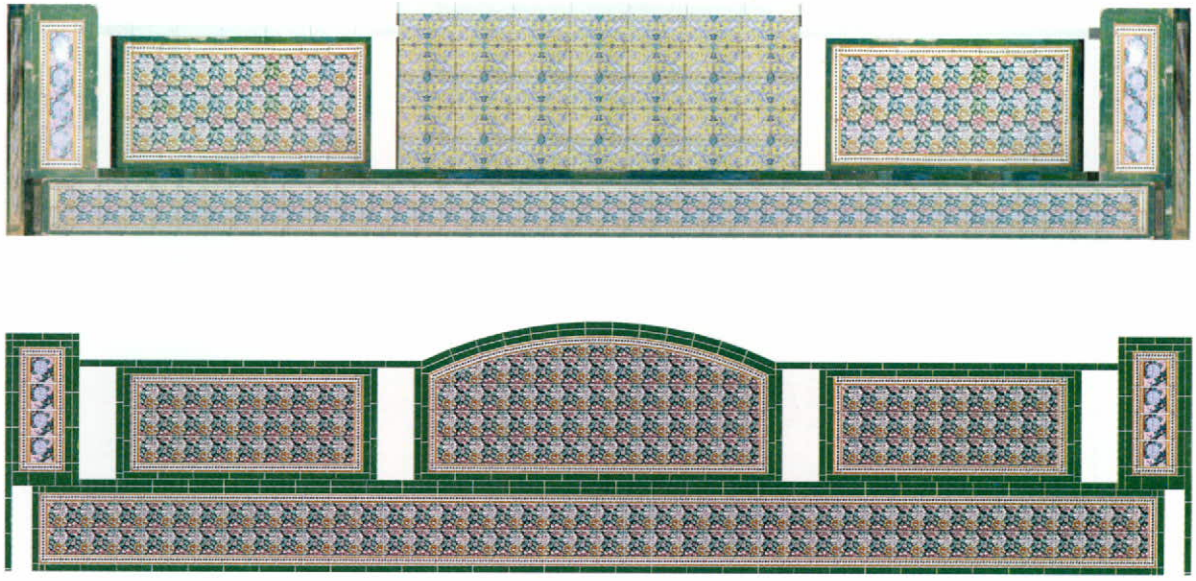

Fig. 13. Bench 8.

In **bench 8** a reconstruction was detected in the back, in the central part as well as in the trimming cornice. The part of the reconstructed back had been carried out without taking into consideration the reality of the bench, causing a deformation in the primitive state, changing the volumes and type of tiling with randomly chosen tiles. (Fig. 13)

As images or trustworthy descriptions could not be found for the design of this part of the bench, bench 9 served as a reference for its design, since it shares the same geometric and decorative characteristics with the parts that are conserved of bench 8 in the park.

3.3. MAKING AND DECORATING THE TILES. PARTICULAR FEATURES

As indicated above, the tiles are being manufactured by twice firing with a porous redware body of 1 cm, and they are being decorated by original techniques, in which skilled craftsmen from Castellón are participating.

It is necessary to point out that the new stencils were produced, based on the original pieces, the proposed separation being consulted according to the conserved stencils. Thus, new sets have been made by means of the new cutting plotter technologies.

Only in two benches were original pieces lost due to aggressions. In the bench 1 it has been possible to carry out a complete reconstruction, since we have the image of the bench in a catalogue of urban furniture, and part of the designs in another catalogue of tiled dadoes of the J.B. Segarra Bernat factory. In bench 4 decorated by water painting, as there were no reference documents and in order to replicate those forms that were completely lost (faces of human figures), a stylistic analysis was carried out together with a documentary search with the collaboration of the historian and curator Mr. Vicente Estall, director of Onda Tile Museum; with regard to the seat of the bench, we will be able to recover the graphic by contrasting the digitised image.

Fig. 14. Bench 11.

Also, with a view to recovering the original appearance of benches 11 and 13, where it seems that broken pieces were replaced by remains of other benches, it has been proposed to substitute these by the original ones.

In **bench nº 11,** pieces appear that are found in a large part of the benches in the park and there are even new fill-in pieces. The composition of the panels in this bench is a little random and chaotic. In order to resolve this chaos, it has been decided to compose the new bench with the predominant ceramic pieces of the initial group of pieces; the dragon border, white butt plate and for the panels the most numerously appearing pieces, which coincide with those used in the elliptical square. (Fig. 14)

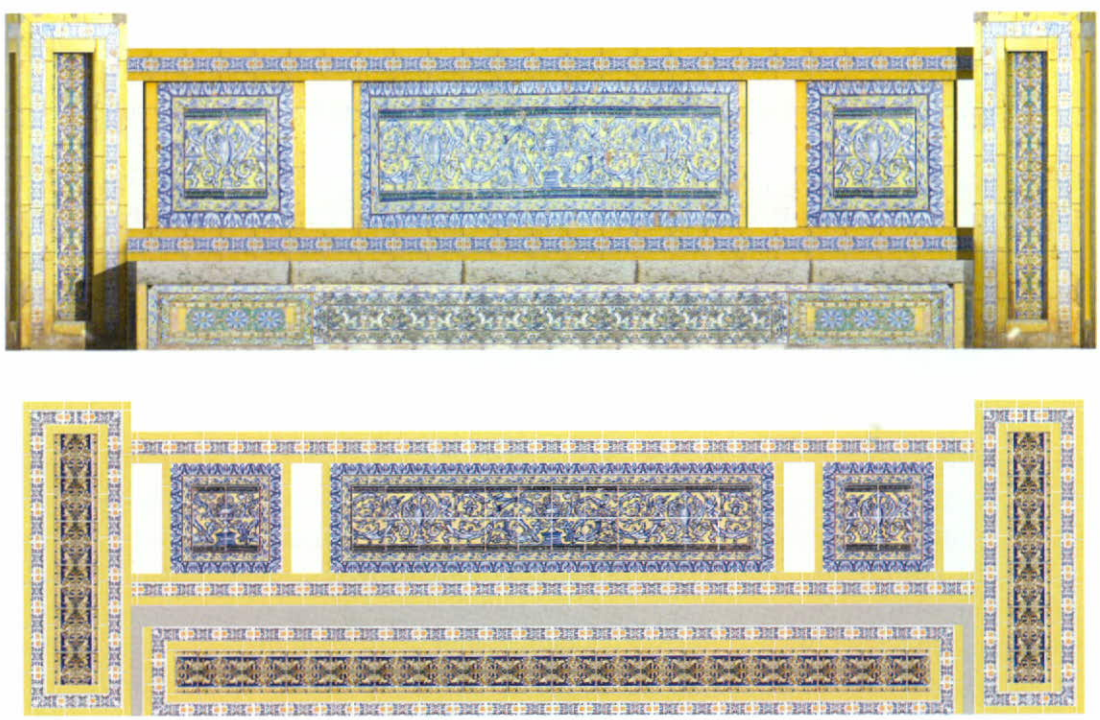

Fig. 15. Bench 13.

The seat facing of **bench nº 13** presents an agglomeration of ceramic pieces of quite diverse nature in which floral designs, animals and geometric designs are mixed, which do not have common style. We have acted on this part eliminating the seat facing and substituting it by a panel with the same arrangement of pieces found in the pilasters of this bench, thus giving the bench back an image coherent with its style. (Fig. 15)

3.4. FIXING

Since to avoid new acts of vandalism during the park restoration works, the installation of the ceramic materials has been left to the end of the project, we must limit ourselves here to mentioning the technical indications that have been given to those works director.

It is necessary to bear in mind that the fixing of the ceramic pieces in the original benches was done by applying the knowledge and materials of the time. At the moment, important advances have taken place in this field, which will be incorporated in the replicas of the urban furniture in the park, once their production has been completed. The characteristics of this installation will be:

In the first place, preparation of the body that shall be sound and clean without any powder, grease or surface cement grout. The surface shall be screeded with a levelling mortar, and should not present departures greater than 3 mm with regard to the measurements that appear in the project.

The tiles shall be fixed by means of a cement mortar with elasticising resins to absorb any movement produced by changes of temperature or deformations of the body. The application shall be carried out according to the producer's recommendations.

With regard to the tile-to-tile joints, in the original benches no type of joint was considered, except in some places where cardboard spacers were used. At the moment, all the recommendations6 in this respect advise against this type of installation. In order to keep to the original appearance of the benches as much as possible and to assure good quality work, it has been decided to use a 1 mm joint. Joint sealing shall be carried out by means of deformable, waterproof mortar. Its application will follow the producer's recommendations.

[6] IPC: "Guía electrónica de la colocación de baldosas cerámicas", 1998.
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