CONSERVAR PATRIMÓNIO

NOTE / NOTA

Relocation and reuse of iron architecture in the contemporary period – case studies in Seville and Badajoz (Spain)

Deslocação e reutilização da arquitetura do ferro no período contemporâneo – casos de estudo em Sevilha e Badajoz (Espanha)

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Abstract

The dismantling, relocation and reassembly of iron architecture has been a process almost inherent to this type of building since the most complex works were built in the mid-19th century. However, the passing of time and the lack of appreciation for these buildings has meant that fewer and fewer buildings made of this material managed to survive to this day. In this context, two case studies were considered: the old Badajoz food market and the old *Círculo de Labradores de Sevilla* fair booth, buildings made of iron dismantled and reassembled in a different location. The aim of this article is, on the one hand, to analyse how this relocation took place from a constructive point of view and, on the other hand, to contribute to the discussion on the following issue: are all uses appropriate when it comes to the reuse of industrial architecture?

KEYWORDS

Industrial heritage
Conservation and rehabilitation strategies
Markets
Wineries
Spain

Resumo

Desde as obras mais complexas de arquitetura do ferro, construídas em meados do século XIX, que a desmontagem, deslocação e remontagem tem sido um processo quase inerente a este tipo de edifícios. Porém, o passar do tempo e a falta de interesse por edifícios feitos neste material levou a que poucos exemplares tenham sobrevivido até aos dias de hoje. Tendo como casos de estudo o antigo mercado alimentar de Badajoz e o antigo expositor da feira *Círculo de Labradores de Sevilha*, edifícios feitos de ferro que foram desmontados e remontados num local diferente, este artigo analisa como foi feita a relocalização do ponto de vista construtivo e contribuí para a discussão sobre a seguinte questão: serão todas as utilizações apropriadas quando se trata da reutilização da arquitetura industrial?

PALAVRAS-CHAVE

Património industrial
Estratégias de conservação e reabilitação
Mercados
Adegas
Espanha

Introduction

The dismantling, relocation and reassembly of iron architecture has been a process almost inherent to this type of building since the most complex works were built in the mid-nineteenth century.

Although it is known that iron was initially used mainly for roofs, because of its high resistance to fire, as in the *Théâtre Français* in Paris, designed by Victor Louis in 1786, it was soon used for beams and columns, because of its ease of assembly, which were decorated with a wide variety of elements and allowed greater spans to be achieved without intermediate components, as in the *Royal Pavilion* in Brighton, designed by John Nash in 1818 [1].

The use of iron in façades also made it possible to bring more light into buildings, which is why it began to be used in combination with glass in domes, as in the reconstruction of the dome of the *Halle au Blé* in Paris, built in 1818 and designed by the architect François-Joseph Bélanger and the engineer François Brunet, who covered the metal structure first with copper and then with glass [2]. These materials continued to be used in greenhouses, markets, exhibition buildings and railway stations [3].

One of the landmarks of European iron architecture, the *Crystal Palace*, a pavilion built in 1851 in London's Hyde Park for the *Great Exhibition of the Works of Industry of All Nations*, was dismantled, extended and rebuilt by the *Crystal Palace Company* [4] at Sydenham Hill, in Kent, between 1852 and 1854. It was Joseph Paxton who founded the company, bought the pavilion from Fox & Henderson and acquired the land to relocate the *Crystal Palace* to Sydenham [5].

The original building, an iron and glass pavilion designed by architect Joseph Paxton, was a modular, prefabricated, three-level construction, easy to assemble and dismantle, almost 20 m high, over 500 m long and almost 125 m wide. The new building, also designed by Paxton, had two additional transepts but was assembled as a smaller building, 490 m long and 95 m wide, although the main transept reached a height of 51 m.

From its inauguration in 1854 until its destruction by fire in 1936, it was used as a venue for other exhibitions, concerts and sporting events [6].

The *Crystal Palace* was not the only iconic iron architecture building to be dismantled and relocated. One of the twelve pavilions of *Les Halles* in Paris, the markets that inspired many European architects, was also dismantled and rebuilt in Nogent-sur-Marne in 1976 [7], while the rest of the market was demolished between 1969 and 1973.

Were any iron buildings dismantled and relocated in Southern Spain? If so, how were they rebuilt? What were their new uses? These were some of the questions that motivated this research and to which this article aims to provide an answer.

Based on the hypothesis that there were cases of iron buildings in Southern Spain that were dismantled and relocated, an exhaustive bibliographical survey of iron architecture in Spain has been carried out, which has resulted in a large number of publications, such as *Arquitectura en España 1770-1900* [8], *La arquitectura del hierro en España. Los mercados del siglo XIX* [9] or *Arquitectura e ingeniería del hierro en España (1814-1936)* [10], as well as an important search of inventories and online databases in the search for possible case studies.

However, there was a perceived absence of studies analysing the dismantling, relocation and reassembly of iron markets in Southern Spain. On the other hand, previous experience in the analysis of iron architecture, either in markets or in agri-food industrial architecture, has allowed to observe that the old *Círculo de Labradores de Sevilla* fair booth and the old Badajoz food market could be suitable for case studies.

At that point, important research of primary sources was conducted in several archives in order to find sufficient information to carry out the analysis of the relocation of the two buildings. The following archives were consulted (in alphabetical order):

- *Archivo de la Diputación Provincial de Huelva* (Archive of the Provincial Council of Huelva);
- *Archivo Municipal de Bollullos Par del Condado* (Huelva) (Municipal Archive of Bollullos Par del Condado (Huelva));

- *Fototeca Municipal – ICAS-SAHP* (Municipal Photo Library – ICAS-SAHP) Ayuntamiento de Sevilla (Seville City Council);
- *Archivo Municipal de Valladolid* (AMV) (Municipal Archive of Valladolid (AMV));
- *Archivo General de la Universidad de Extremadura* (Badajoz) (General Archive of the University of Extremadura (Badajoz));
- *Archivo Histórico Municipal de Badajoz* (Municipal Historical Archive of Badajoz).

Finally, it is worth highlighting the importance of the detailed fieldwork that has allowed us to analyse first-hand the objects of study previously mentioned and explained below.

The old *Círculo de Labradores de Sevilla* fair booth

Queen Isabella II granted the fair privilege to the city of Seville in 1847. It was held in April and lasted three days. It was the first livestock fair held outside the walled city, in a field called *Prado de San Sebastián*, where it continued to be held in successive years; its commercial purposes gradually changed and it became a recreational festival as early as 1850 [11].

In 1890, *Círculo de Labradores de Sevilla* commissioned its fair booth to the engineers Martín Ongay and Peralo Jimeno. It was built by *Fundición San Antonio*, in Seville, and it was assembled in Seville, in Prado de San Sebastián (Figure 1) until September 1930, when it was auctioned and bought by José Ayala Matheu, a resident of Bollullos Par del Condado (Huelva) (Figure 2), who used it to set up a winery in it, which was active until the 1990s [12].

Figure 1. General view of *Plaza de España* under construction and Prado de San Sebastián; the *Real Círculo de Labradores* Fair Booth can be seen on the corner (1) of what is now *Plaza de Don Juan de Austria* (1920-1923) (sp4_puv1_sf_002, ICAS-SAHP, Fototeca Municipal de Sevilla, Sánchez del Pando Collection).

Figure 2. Seville (1) is 56 km from Bollullos Par del Condado (2) [13].

Fundición San Antonio, originally called *Talleres de San Antonio*, was founded by Narciso Bonaplata in 1840 and, in addition to the booth (1890), they also built the *Isabel II Bridge* (1850), known as the *Triana Bridge*, and the *Pasarela* (1896), which was the main entrance to the Seville April Fair between 1896 and 1920. According to Díaz [11] the first entrances to the Seville April fair were: in a first period, *Puerta de San Fernando* (1847-1868); in a second period, several ephemeral gates (1869-1895), and in a third period, the *Pasarela* (1896-1920).

During this period, the Barranco market, a wholesale fish market, was also built in iron, in 1883, by *Fundición Portilla White & Cía*, although it had been designed in 1876. The municipal architect José Sáenz López was in charge of managing its construction [14].

Despite the fact that iron structures were easy to assemble, these buildings were not designed as ephemeral structures as were, for example, the Argentinean pavilion at the Paris Universal Exhibition of 1889, built in iron.

> *Its skeleton is made of iron; its decoration of porcelain and earthenware, polychrome bricks, and very curious mosaics. It cost 1,200,000 francs, and since it is very beautiful as a whole, there is the idea of dismantling it and transporting it to Buenos Aires when the Exhibition is over, in order to rebuild it there for an official purpose. At night, it is spectacularly illuminated by electric lights on its four fronts, and it is one of the most striking among the many buildings that stand to the right of the Eiffel Tower.* [15, p. 334]

The government required the architect Albert Ballu to allow the building to be dismantled so that it could be moved to Buenos Aires. In the competition organised by the Republic of Argentina in January 1888, he initially came second out of 27 candidates. However, after making the changes suggested by the jury, Albert Ballu won the competition and was appointed to manage the works. Once in Argentina, during the reconstruction, the Argentine pavilion was equipped with a restaurant, a theatre and a music kiosk and it was used for parties, exhibitions and as the National Museum of Fine Arts until 1933 [16]. Another example, years later, was the well-known *Hexagon Pavilion*, a work by José Antonio Corrales and Ramón Vázquez Molezún, built in 1958 for the Brussels Universal Exhibition, which was designed to be dismantled and then rebuilt in 1959 at the *Casa de Campo de Madrid*, where it was used for national exhibitions until 1975, and where it has been abandoned ever since [17].

The *Pasarela*, for example, was a fixed metal structure designed by Dionisio Pérez Tobía that allowed vehicles and trams to circulate on its lower part and pedestrians to walk on top of it. In fact, it was after its demolition, in 1920, that the first ephemeral entrances to the Seville April Fair began to be designed [18].

Although we have not been able to locate the original project for the booth, the documentary sources we have consulted lead us to believe that the fair booth was designed as a fixed construction, since it stood as such for forty years. It was an isolated, single-storey building, with an elongated polygonal floor plan, with 14 sides (each a little more than 5 m), measuring 27.50 m at its longest and 15.80 m wide, built with perimeter columns and an iron structure. Two small buildings were attached to the main building, which served as kitchen, toilets and storeroom when it was used as a fair booth (Figure 3a).

The roof, also made of metal, was double height in the central area, creating a skylight around the entire perimeter. It had no external shell, being surrounded by tarpaulins. Around the perimeter of the building, there were only the iron columns, delicately decorated with motifs reminiscent of the Corinthian order.

The main building is reminiscent of the iron markets built in the Iberian Peninsula at that time, inspired by *Les Halles* (central markets) in Paris [7], although its irregular dodecagonal floor plan gives it a special value, because, although markets had different shapes and types, there were many with square or rectangular floor plans, such as the food markets of Salamanca, Almería and Málaga.

Its front side is reminiscent of the Val market, in Valladolid, built in 1882 by Joaquín Ruíz Sierra [19], as the floor plan of its smaller sides are also polygonal in shape (Figure 3b). Furthermore, both buildings are free-standing and have a two-storey roof with a perimeter skylight.

As already mentioned, once the fair booth was auctioned and bought by its new owner, between October and November 1930, it was dismantled and, with its pieces numbered, reassembled in its current location in *Bollullos Par del Condado*, in the province of Huelva. This procedure, i.e. numbering the pieces for their subsequent assembly in the correct order, had already been used in other contexts, such as, for example, in the relocation of the entrance to the old Atarazanas de Málaga for its restoration and integration into the new market, which adopted the same name [20].

A visual inspection of the building revealed that the iron building had been preserved in its new location and a perimeter shell had been built between the columns, leaving them exposed. A single-storey construction was also built, its iron columns were supported by footings with just over one cubic metre [21] and the roof structure was respected (it is currently clad in fibre cement); it was a dismantling and reassembly process. The wine-making operations were carried out inside the building, which maintained its open space concept. On the outside, the winery is white on a clay-coloured plinth. The metal elements are painted dark green.

It is also worth highlighting the existence of decorative elements in the rest of the metal structure, as well as the porch-like canopy over the round-arched entrance gate. On the other hand, the other two adjacent buildings, one vaulted and the other with a hipped roof were used as wine presses. The paths had porch-like canopies over the entrance doors, similar in design to the winery door, and reminiscent of those used in the old railway stations built at the dawn of the twentieth century.

We should note that the winery was in use for 60 years, which suggests that the space met the architectural conditions for making wine, that the *reuse* was successful. It is likely that this happened because it was, in short, a one-storey open-space hall, elongated, slender (to control the temperature and humidity) and with longitudinal openings both at the intersection of the shell with the roof (which they covered with tarpaulins to control the light) and at the intersection of the two roof levels, which would allow the space to be ventilated and maintain the ideal humidity for making wine, as in other wineries in the area [22].

Figure 3. View of the old *Círculo de Labradores de Sevilla* fair booth, later, *El Majuelo* de Soto de Bollullos Par del Condado Winery, Huelva: *a)* main façade; *b)* rear façade (photographies: Sheila Palomares Alarcón, 2020).

The old Badajoz food market

The Badajoz food market was built in Plaza Alta, where commercial activity had been taking place for centuries, albeit out in the open air and unsanitary conditions. As in many Spanish towns and cities at the end of the nineteenth century, according to Brioso (1890) [23] the market was regarded as a solution to hygiene and public health problems, since the construction of a covered building dealt with the problem of rain and solar heat that could damage the food products.

The market construction works were carried out between 1897 and 1899 by *Pérez Hermanos San Antonio de Sevilla*, the same company that built the Seville fair booth. It should be noted that, according to González [24], the first known photograph of the Plaza Alta shows the market construction works and the assembly of the building's metal structure [25].

The project for the Badajoz market was designed in 1890 by Tomás Brioso Mapelli, an architect from Malaga who, since graduating in 1879, had been the municipal architect of Badajoz, holding that position at least until 1892, when he signed a project for a housing complex on lands adjacent to the railway station [26]. The construction works were commissioned to Dionisio Hernández Tobías [27].

As mentioned in the project description written by Brioso for the market, it was a free-standing building with a rectangular floor plan, 60 m long by 23 m wide, which was centred on the widest side of Plaza Alta (Figure 4), leaving a free area, a sort of corridor, between three of its sides and the arches of the covered walkways that surrounded the square.

The main façade, located on one of the short sides of the market, was preceded by a square with enough space to accommodate labourers looking for work on a daily basis and the passers-by. Access was via a staircase.

The building consisted of a main 10 m-wide hall, with a greater height (9.20 m), and two secondary halls, one on each side, with a width of 6.20 m (leaving the rest of the surface for the construction of the shells and the structure) and a height of 7.2 m, both covered by gable roofs. It had two floors – the ground floor and basement (for loading and unloading goods) –, connected by two staircases at the ends of the building.

Figure 4. Plaza Alta Square, Badajoz (photography: Sheila Palomares Alarcón, 2016).

The halls were separated by cast-iron columns, leaving an open space with a capacity for 150 separate and independent stalls, not including those that could be itinerant. There were *Polonceau* trusses on the roof of the main hall and simpler trusses on the side ones.

The foundations and the basement were built with stone and cement masonry; a simple brick masonry was used for partition walls and vaults; the plinths were made of roughly carved stone masonry and exposed brick in order to avoid plastering.

The lower part of the external shell was built with exposed cast-iron pilasters and exposed, arched cast-iron panels, crowned with a decorated cornice, which rested on the plinth. The area between the iron columns consisted of semicircular arched openings enclosed by wooden shutters and glazed windows.

The main façades, which were shorter in length, had a different treatment as they were designed with a large metal semicircular arch topped by a pediment. On the roof, there were two skylights covered with glass: a perimeter one at the intersection of the halls with different heights and another one in the central area of the raised roof of the main hall.

The design of the main façade, characterised by this large arch, is reminiscent of the secondary façade of the Atarazanas market in Málaga, built a few years earlier, in 1879, by Joaquín Rucoba [28] and especially of the Palencia food market, also made of iron, built in 1895 by Juan Agapito y Revilla, with a similar composition and dimensions, as it was also a rectangle, 60 m long by 25.5 m wide, although in this case the composition of the façade is based on the design of a basilica and the height of the main hall is greater, reaching 12 m [29].

Badajoz's food market was active until the 1970s when it was bought by the University of Extremadura and moved to the university campus (Figure 5) between 1975 and 1977 (Figure 6). Since then, there have been several projects to refurbish and adapt the old market.

Initially, in 1977, the intention was to adapt the building to serve as a library for the University of Extremadura and, therefore, a basement was built, adapted to the modulation of the metallic structure, according to a project by Eduardo Escudero [30].

Figure 5. *Plaza Alta Square* (1) is 4.2 km from University of Extremadura, Badajoz (2) [13].

Figure 6. External view of the old Badajoz food market, Universidad de Extremadura, Badajoz (photography: Sheila Palomares Alarcón, 2021).

The new concrete columns were arranged to support the cast-iron columns. A reinforced concrete retaining wall was built around the perimeter, with the corresponding drainage, and a slab connecting to the ground floor, which was also made of reinforced concrete, with prefabricated joists and ceramic vaults. A staircase connecting the two floors was designed for the secondary façade and clad in marble, the same material that was used as pavement on the ground floor.

The basement was built to accommodate toilets, and two staircases were built at the entrances. The metal structure was assembled at the new location.

At the new site, there were some differences from the original building, such as the window louvres, which were metallic because the original wooden ones had been replaced at an undetermined time (before the relocation); or the spandrels and keystones of the façade arches, which had medallions with the coat of arms of Badajoz and were only partially preserved.

> *Inside, the simplicity and absence of decorative elements stand out, as the lightness and design of the structural elements themselves make this large space, designed based on functional criteria, attractive. Only the lamppost supports, with an artistic interest, have some decorative elements* [31, p. 6792].

The building was never really used as a library. Years later, in 1984, another project was drawn up by Jorge López to adapt it for multifunctional use, with the intention to accommodate a multi-purpose hall, a library, a central hall and an exhibition hall (the original programme was designed by the architect Dionisio Hernández Gil in 1979) [32].

The main purpose of the project was to renovate the building, whose metal structure was in poor condition; the roof had several cracks in the ribbed fibre cement plates; the glazing was very deteriorated, as it was mounted on the original profiles and the filler had disappeared; the metal elements were already beginning to corrode due to lack of maintenance, and there were damp spots inside the building.

The proposed refurbishment consisted, among other things, in replacing the deteriorated elements of the roof; closing the skylights with translucent ribbed plates (keeping their formal appearance), ensuring overhead ventilation with static extractors; improving the insulation under the roof with plasterboard cladding; installing mobile aluminium profiles with two types of glazing (cellular methacrylate where there were metal slats, and double glazing where there were none); and applying anti-rust paint to the metal elements after cleaning.

For some time, the old Badajoz food market was the headquarters of the Faculty of Economics (cafeteria, archives, offices, etc. in the basement), an exhibition hall and a space for associations [33]. In 2006, it was closed to the public due to its poor state of repair and, in 2012, it was declared an asset of cultural interest in the monument category.

In 2017, another tender was launched to refurbish the building and turn it into the university's auditorium, to hold graduation ceremonies or the opening of the academic year, and to adapt it to serve as an exhibition hall. The construction works were carried out in accordance with a rehabilitation project by the architect Francisco Hipólito Ojalvo and were completed in 2018 (Figure 7).

These works consisted of replacing the roof (which was made of fibre cement); reinforcing the metal structure; improving the metal slats; and adjusting the building to accessibility regulations. The basement was not refurbished (only the toilets).

Despite all the renovations to which the building has been subject, it still has comfort-related problems that make it difficult to use. For this reason, in September 2021, the University of Extremadura informed that it will install underfloor heating and air conditioning in the building [34].

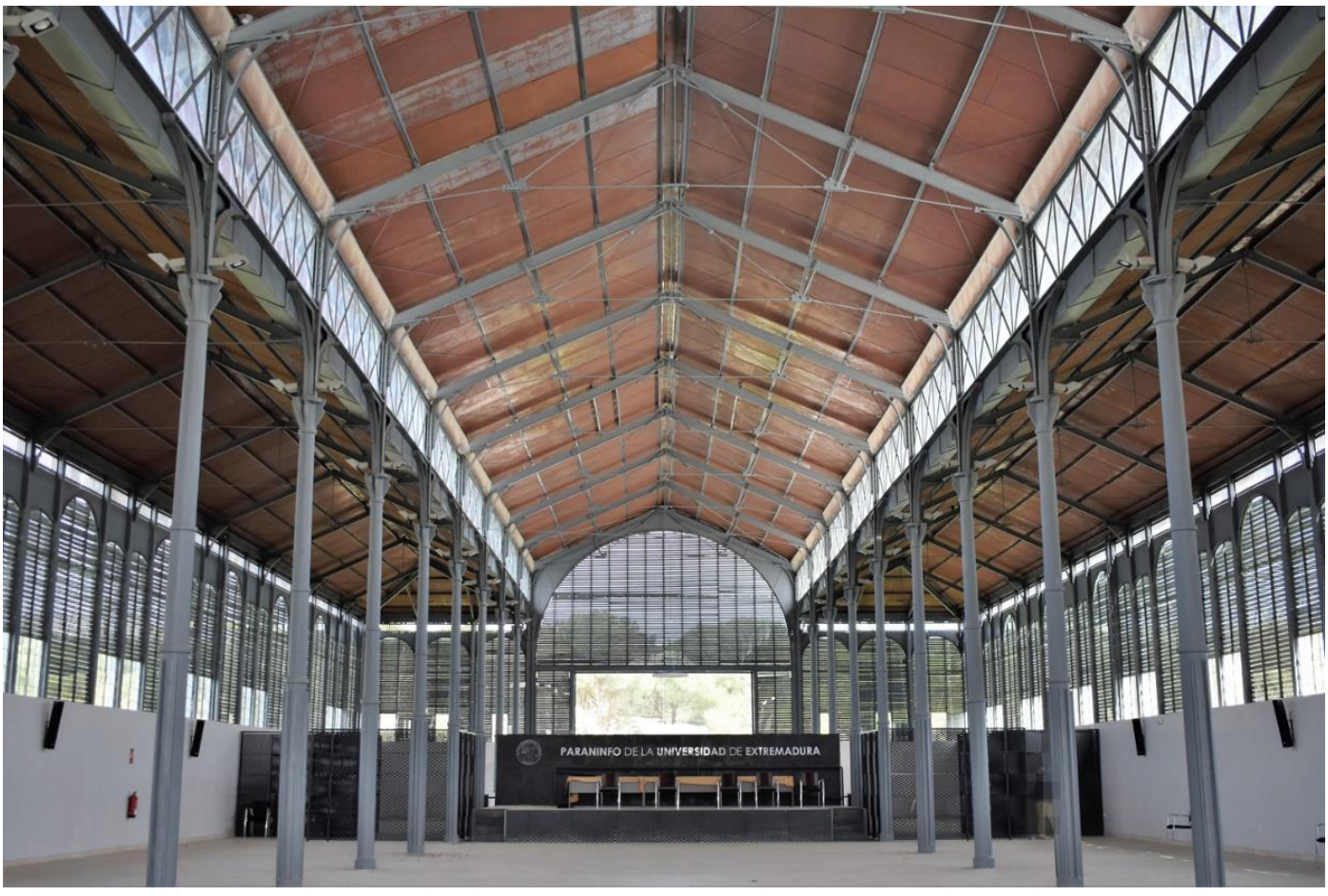

Figure 7. Internal view of the old Badajoz food market, Universidad de Extremadura, Badajoz (photography: Sheila Palomares Alarcón, 2021).

Conclusions

The results of this research have revealed two representative examples of the dismantling and relocation of iron architecture buildings in Southern Spain, originally located in Seville and Badajoz. The first question that prompted this research can therefore be answered in the affirmative: Have iron buildings dismantled and relocated in southern Spain?

These buildings have some elements in common: they were built in the same period, the 1890s, by the same company, *Talleres San Antonio de Sevilla*, and were made of iron. Although their use, scale and dimensions were very different (the market was almost twice the size of the fair booth), the design of the metal structure was inspired by elements that were repeated in markets, greenhouses and exhibition pavilions designed during this period.

The relocation of these buildings involved the dismantling and reassembly of their iron elements, which was relatively easy. However, their reconstruction entailed changes to their architectural design to adapt them to their new uses.

In the case of the old fair booth, which was renovated to become a winery, the most significant change was the closure of the outer perimeter. It should be noted that this decision was also taken with regard to other structures built from the 1880s onwards, such as the food markets, because although they were made of iron and had functional supports on the inside, the external shells were reconstructed using masonry because, among other things, it improved the thermal insulation of these buildings.

The fact that wine was produced in the winery (old fair booth) for 60 years, corroborates the fact that this *reuse* was appropriate. It consisted mainly of the dismantling and assembly of the iron elements and the construction of the external shell, which respected the original structure by leaving it exposed and improving its interior thermal insulation.

The old market was rebuilt almost identically to how it had been originally planned. The iron structure was maintained and refurbished, and the elements that were in poor condition, such as the bricks of the external shell, were replaced with similar ones.

The reconstruction of the building has been very respectful of the original architecture, although there were construction problems, such as excessive humidity in the basements and lack of interior comfort, which made it difficult to satisfactorily pursue the new uses that were assigned to it. However, these are aspects that can be solved and, as mentioned above, work will be carried out to improve the air conditioning system.

This makes us reflect on the fact that, when we talk about the *reuse* of industrial architecture, we should not only talk about choosing a new use, respecting the original structure or analysing how the dismantling and reassembly of the buildings were carried out. The new use must ensure the comfort of its occupants and, therefore, energy efficiency requirements should be considered as another key element in the refurbishment project, always bearing in mind the rational use of energy in relation to new use chosen.

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