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# Steel and Light in the Reinhabit of Ruins with a Scenographic Character

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**Abstract.** In Popular Portuguese Architecture, there are a large number of buildings that we should have as a reference and whose essence should be analyzed during the rehabilitation or development of the project, in order to create a connection to the place and to keep their identity. These places, full of history and memories, give us the idea of scenarios which can be traversed and which present us with light and the surrounding nature in each opening. The introduction of the New involves its characterization in modern architecture as being the one that should be able to establish a connection to the past without destroying it and without renouncing to its means of expression. This way, these concepts reflect the importance of connecting in the same urban mesh, as a living organism, two periods in which one does not override the other, but that, in turn, add value to each other. In popular architecture, the dwelling space is adapted by Man through his way of living and experiencing the place and it can be compared to the 'Living Machine' of Le Corbusier. Both had to respond to the psychological, functional and spiritual needs of the people, through the building simplicity and the study of light entry in the spaces. The illumination of the spaces was not designed to the meet human needs not even those for domestic purposes. Inhabiting immediately assumes the relationship with the surroundings and the orientation of the sun, and, in this sense, illumination is one of the most important elements in architecture. The Light is the "soul" of architecture, as it gives life, movement and different dimensions and depths to it by using natural illumination during the day and artificial at night. The illumination should be part of the conceptual process of the project, as the structural part is and of everything, that is part of an architectural project and of its peculiarities.

## 1. Introduction

Understanding the essence of the architectural space – as being vernacular or erudite - requires the interaction of all human senses. Only then, one can begin to see and experience the architecture [1].

The architectural heritage that will be approached is part of the popular Portuguese architecture: vernacular buildings in shale and granite. In this type of architecture, construction techniques passed from generation to generation and gave Man the opportunity to live in and build at the same time. It is increasingly important that architects acquire knowledge of these construction techniques in order to reinterpret or reuse them so that there is a better interconnection between periods. The rehabilitation of this architecture is delicate because it has very particular characteristics: they are harmonious constructions with functional simplicity framed in the landscapes that surround them [2]. In the



rehabilitation of popular Portuguese architecture, the heritage is preserved through steel structures that allow a harmonious relationship between the two building systems, in conjunction with the light, which penetrates inside the ruin with a scenographic character thus creating several possibilities of intervention.

## **2. Reinhabit using light and steel as a spatial concept**

The use of light in spaces reflects the spirit of a period of the history and it is very clear in Gothic buildings with their rosettes and stained glass. The illumination had the ability to create a solemn supreme atmosphere that was part of the cult. The Light is the "soul" of architecture, as it gives life, movement and different dimensions and depths to it by using natural illumination during the day and artificial at night. The illumination should be part of the conceptual process of the project, as the structural part is, and of everything, that is part of an architectural project and of its peculiarities. In this case, steel systems are analyzed as they allow a symbiosis of constructive processes and conceptual simplicity. Traditional materials such as shale and granite masonry structures are combined with the introduction of an industrialized, very rigorous and minimal system, thus allowing the design of spaces where the effect of light will constantly influence and transform the entire composition.

Industrialization allowed the emergence of new materials, such as glass, concrete and steel with the possibility of being standardized. With the modern movement, new factors and ideas were introduced and guided design concepts such as light, shadow, nature and sun. By combining all these concepts, architects began to design simple, open, clean, easy and of quick construction structures that were disseminated across cultures. The generalization of the use of electricity and artificial illumination - which is a major advance in the evolution of technology and very significant for buildings - was fundamental to improve the conditions considered appropriate for architecture and modern cities in the twentieth century.

The evolution of the relationship between the elements that support (structure) and those that are supported (walls) characterizes the development of the Modern Movement. The skeleton structure, in steel, is absorbed by rationalism in its program of dynamic spaces that serves to shape the light of the spaces, entrusted to the pure measure of volumes, thus becoming an emblematic feature of the rationalist architecture.

This new architecture designed for idealized clients, the 'living machines' of Le Corbusier, solved the problem created by the housing shortage of that time. The Modern Movement, in less than half a century, managed to impose semi-transparent glass boxes of light materials as buildings which created a better interconnection between the interior and exterior and which made houses more illuminated, facing nature and much more welcoming.

The possibility of taking advantage of the scenographic character that characterizes these buildings, when we find them occupied by nature, allows a new reading of the full/empty dichotomy, of the interior/exterior relationship, of the old that can become empty, thus showing memories in another perspective [3].

### *2.1. Scenographic Character*

In the creative process for the conservation of the heritage by using a steel building system, it is necessary to combine some fundamental points such as the analysis and the influence of the characteristics of the Portuguese popular architecture (figure 1) with the analysis and influence of some references of modern and contemporary architecture. The ways of inhabiting, the minimal spaces and their functions, the forms and typologies, the scale and proportion of spaces, the integration in the place and the materials used, are concepts to use in the building process that are inherent to this type of structures.



**Figure 1.** Portuguese Popular Architecture, House in Shale, Porto de Asnos, Fundão, Portugal

Each project should be able to evidence traces of the particular conditions of the site under analysis in which the landscape is an important reference. In the conception of the architectural design, the use of factors such as the space delimitation and its internal/external relationship - being it physical or visual - allows the architect to create intimate spaces due to the limits created by the proximity and distance between the new and the existing.

When using ruins for the design concept, the architect Aires Mateus tries to preserve the pre-existence of the Portuguese popular architecture by introducing his proposal inside these scenes loaded with memories. In his project of the House in Alenquer, in Portugal, the pre-existing walls were kept and the ruins around the new construction were rehabilitated. The interior space of these ruins was used to create voids and paths that generated tension in the spaces that contact with them, with a controlled luminosity. The walls gave spaces a strong character due to their size, material and limits.

The Portuguese architect João Mendes Ribeiro, by combining the art of Scenography with Architecture, achieves the perfect relationship between the project and the surrounding landscape, in some cases, ruins. In his design of the Tea House in the rehabilitation of the Castle of Montemor-o-Velho, the natural relationship between a steel and glass building inside the castle's stone ruins can be seen. Each architectural space has its own identity and this identity is changing with the appropriation by the Man who is more interested in the link to the place with its maximum exponent that is its 'habitat': the house.

The same architectural thought of João Mendes Ribeiro is presented in his rehabilitation of the Cloister of Silence of the Monastery of Lorvão or in the architectural landscape (figure 2) of the enclosure of S. Bernardo in Coimbra [4], [5].



**Figure 2.** João Mendes Ribeiro's intervention in the architectural landscape of the enclosure of S. Bernardo in Coimbra, Portugal.

The relationship between the place and the project is not formal but conceptual (figure 3). The place has been claimed by Architecture not as a formal resource but rather for reconstituting its meaning. The place has incorporated a poetic and interpretative content of the complexity of the surroundings and its configuration [6]. In the design concept, when we interpret the site for the implementation of the proposal, the fact of it being natural or built is one of the important references for the organization and construction of the place. The harmony that is intended for the place passes not only through the conjugation of forms and scale but also through its extension to the precise limits of the surrounding of this object.

The relationship between the place, its characteristics and the constructions - built or ruined - has as a primary reference the "Genius Loci". The places, in general, contain singular points that are characteristic of each site and that identify themselves in different forms, thus making them different. This allows all qualitative points to be emphasized, so that the conditions necessary for the design of an urban element acquire their symbolic characteristics, affirm their identity and allow a good combination and interconnection between object and place.



**Figure 3.** Architectural Intervention, Castelo Novo, Fundão, Portugal

When we design, more than doing an invasive surgery to the place or to the building, as in David Closes's project of the Auditorium of Sant Francesc, a compromise between our architectural proposal and the existing one must be sought. On the other hand, this project shows the delicacy of how we can intervene in a historical building, adding a light and translucent structure that, with the implementation of illumination, makes it pure and integrative. Steel, together with materials that the technological evolution gives us every day and glass, grants - with the simplicity of grandeur - the perfect combination in which both objects are respected and evident.

### 3. Results and discussions

It is time to recognize the public interest of architecture, thought by architects, as an organizer, qualifier and humanizer of space. To discipline the occupation of the territory it is necessary to require quality projects by assigning their responsibilities [7].

Taking advantage of light has always been a concept of architecture that aesthetically allows the exploration of the levels of illumination of an environment in different periods of the year. By deluging environment with light or blocking its incidence, it is possible to create varied sensations, from the freshness aspect to an atmosphere of intimacy and reflection.

In the project of the Portuguese architect Paulo Serôdio, Casa in Cabrelade, the perfect harmony between the two materials in the creation of an intimate courtyard can be seen. It is necessary to be aware of the transformations of lifestyles, the reinterpretations of spaces and the difference between intermediate, semi-public and semiprivate spaces. Along with the interior/exterior relationships thanks to the introduction of natural and artificial light, that gives life to day and night, sustainability systems, which translate greater efficiency into the architecture of metallic constructions, lower costs to be borne by the client, thus satisfying the conditions for his welfare.

The appropriation of an architectural urban space constituted by a set of complex and heterogeneous elements, full and empty building, is based on the recognition of the experiences of their places. The architectural space can be present and experienced as a system of relationships between streets and squares, alleys and parks, spaces that inhabit the dwelling and the light that crosses them.

The prototype was designed with very precise objectives that go through the implementation of industrialized processes for the construction of modular housing. A standard metallic profile is used to

economize the construction process, which aims to reduce construction costs and economize them as well. It promotes a high diversity and customization of the offer and a flexibility of the designed solutions, creating a high degree of satisfaction regarding the quality of the final product.

It is a perfectly valid solution for the recovery or rehabilitation of pre-existent buildings that have been the case of study in this investigation and that can be customized for an individual client. The concept of individuality in this structural system is present, although it starts in a model that is always the same, it has different dimensions for each function of dwelling so that it is necessary to think each intervention as a unique and specific project of each place [6].

#### **4. Conclusions**

It is important to systematize a set of tools to create typologies that adapt to a new housing module, as a solution for industrialized housing is adapted to current needs. Through the combination of the minimalistic simplicity with the structural elegance, the interconnection between the interior with the exterior is created and the analysis and project of dwellings with a great pragmatism that can be perfectly integrated anywhere without losing respect to their cultural particularities.

Even in the recovery of buildings or ruins - places with specific and special characteristics - it is necessary to understand the richness of the existing place and its identity. Two periods, but only one project.

The interconnection of the conceptual idea, using the steel architecture, through the rehabilitation of the pre-existence, allows the fusion of two epochs as if it is a living organism in which a continuous route between the interior and exterior spaces of the ruin due to the existing openings/spans is added and created [8].

When we make the decision to build in this building system, as architects, we have to think conceptually regarding its specificity. One of the reasons for not using this constructive system in housing is the cost of the work because most of the projects are designed for traditional construction and for this type of project a greater budget is needed. On the other hand, few architects opt for a Metallic system due to lack of knowledge, personal discomfort or, for the simple convenience of habits related to their knowledge. If during the design, this constructive system is taken into consideration as the creation of a solution with "standard" models, it allows saving labor time as well as manufacturing and assembly times, the conditions of work in the workplace are more controlled, thus reducing costs significantly.

If the combination of architectural design with metal structures exceeds all existing constraints (especially the prevailing mentality of the traditional masonry construction), the advantages of using metal structures in housing construction increases. The shape and materiality of the construction must be minimal and meet the needs and requirements of comfort, hygiene, aesthetics and durability with reduced maintenance costs [9].

Designing steel is a great challenge; however, it stimulates the creativity of the architects by allowing a wide range of compositions by taking advantage of the formal purity that the material offers and with the possibility of making it complex.

The relationship between the metallic structure and the stone masonry construction system allows the individuality of each system and when combined they gain their own identity. When we need to improve the existing, during the rehabilitation of empty buildings due to the need to give them a new life, steel is one of the materials that has more advantages and more pragmatism and that perfectly matches other materials.

Light makes the connection between the two constructive systems by creating shadows and reflections through the amount of life the metal system allows to use.

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