

**CONVERTING INDUSTRIAL SPACES**  
THREE INTERVENTIONS IN PORTUGAL

EXTENDED ABSTRACT  
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## 1. INTRODUCTION TO THE STUDY

### OBJECTIVES

The main objective of this study is to understand the conversion of obsolete industrial buildings with historic value, considered as the adaptation of a structure to a new use without jeopardizing its cultural significance. It aims to explore this type of intervention as a possibility for rehabilitating and reintegrating industrial testimonies, considering the impacts in the original building and its urban and social surroundings. The main goal is to investigate and understand the architectural process inherent to these interventions.

It is intended to:

- 1| Recognize the value of industrial heritage as an essential element for the knowledge of global society, in social, technical, architectural and historic matters;
- 2| Explore building conversion as a possibility for urban, social and functional rehabilitation, and for preserving the heritage;
- 3| Study multiple projects that intended to preserve industrial heritage throughout the adaptation of an obsolete building to a new use;
- 4| Develop a methodology of analysis, concerning the conversion of industrial buildings, which allows the understanding of the intervention.

Through an extensive study of three examples of conversion of industrial buildings, it seeks to explore the intervention process and the architectural approach applied to three different uses. The study aims to understand the transformations that occurred during the process and how they were introduced. Moreover it also aims to apprehend the objectives, the action parameters and the constraints of adapting an industrial and cultural testimony to a new use in order to integrate it into contemporary life. Considering the examples approached according to the same scheme of analysis, it is possible to explore different methods of addressing a complex intervention and, finally, to establish a comparison between the three cases, their particularities and, finally, draw conclusions.

### THEMATIC FRAMEWORK

The industrial revolutions, which have occurred since the 18<sup>th</sup> century, have profoundly transformed the territory and have introduced significant changes in society – not only political, in social and in urban organization terms, but also in the way of living, working, and even ‘making architecture’ and ‘building cities’.

The built testimonies related to industrial activities can easily be observed in urban, suburban and rural areas nationwide. The technical content is one of the most important resources to study the History of Humanity and has always been associated with the cultural and social evolution. However, the progressive technological development has been supplanting and eliminating the systems and infrastructures that do not respond to the contemporary

requirements of production and consumption. Therefore, many industrial buildings, with different typologies and scales, are currently obsolete and in progressive degradation, deteriorating the urban, social and environment quality of their surroundings. Since 1980, due to the growing awareness regarding the degradation of old areas within the cities, often associated to obsolete industrial places, the solution for these issues was integrated in rehabilitation plans.

Urban guidelines for these problematic areas of the city concern, nowadays, the revalorisation of the existing urban tissue, throughout its recovery and integration into contemporary life. In Portugal, there are several projects for the conversion of industrial buildings, aiming at its adaptation to a new use, more suitable to current needs and requirements, responding to the preservation of heritage and urban regeneration.

Despite its late and less deep industrialization, comparing to the rest of Europe, Portugal presents some testimonies of previous industrial activities. These structures are often neglected and in growing state of disrepair. The location in attractive areas for public or private investment, and lack of cultural recognition, leads to the destruction of many industrial buildings, resulting in the (unconscious) loss of a unique and irreplaceable heritage.

According to several authors, the post-industrial society should be able to recognize a value to safeguard in industrial structures that have been supplanted and deactivated. These buildings are a source of knowledge about society and its evolutions, showing materials, textures, spaces and techniques of productions of the past. However, there is still the possibility of their valorisation as a heritage and cultural asset, and even their restoration and integration in contemporary life. The conversion is one of many possibilities of intervention in urban fabric, which has become increasingly common in Europe, but still underused in Portugal.

## **JUSTIFICATION**

Concerning the Portuguese heritage, the studies related to the testimonies of industrial activities are largely unexplored, and this is considered to be one of the most difficult, unusual, yet most ignored patrimonial areas, by the majority of professionals and even by political and economical plans for heritage preservation. Since there is some reluctance from society in considering industrial structures as a value to preserve, this theme is driven away from historical, patrimonial and architectural matters.

In the educational area, the industrial archaeology is only referred in some disciplines of degrees related to heritage or sociology, and with some occasional references throughout the primary and secondary schooling. The lack of interest is also visible through the numerous examples of factories, warehouses, ports, bridges and stations that are destroyed without performing any study or even considering their preservation. The conservation of existing buildings and their reintegration is still often perceived by the majority of the population, and even by some experts, as an obstacle to modernization and progress.

Currently, it is the role and the responsibility of the architect, as a main stakeholder in this process, to know how to act having the privilege to develop a project of such a patrimonial value, mainly considering the market growth of building rehabilitation. The motivation for choosing this theme is related to the urgent need to understand the origin, the values, the history of the industrial testimonies that are currently at risk, as well as to explore the role of the architect as a major responsible in the future of industrial heritage throughout the conversion of buildings. Taking into account the growing relevance of designing based on existing buildings, the study of the specificities regarding this kind of intervention and the exploitation of previous similar projects is of outmost importance.

The main motivation concerning the choice of this theme is related to the lack of awareness, even in the academic and political environment, given to this type of rehabilitation, which the author considers of major relevance for preserving an important patrimony. This study aims to contribute to the comprehension of this problem and to present some general objectives to be considered in architectural interventions on industrial buildings, applied to the specific context of industrial heritage. This study does not intend to reach definite answers; but seeks to raise questions and point out possible ways of acting.

## **2. DEVELOPMENT OF THE STUDY**

The study was developed in 4 sequential phases:

### **1| Bibliographical Research, Theoretical and Historical Approach – Industrial Heritage**

The first phase of the study, Chapter 1, concerns a theoretical and historical approach, which aims to introduce a framework of buildings within industrial activities, gathering information about industrial heritage. Initially, through a documental and bibliographical research, the origin, the development and the value of national industrial structures are explored. In this chapter, the author seeks to understand the object of the study in the patrimonial, archaeological and architectural context, and explore its expression on the territory. The study is limited to the Portuguese context, however, throughout the work, it was necessary to use international examples, as this theme is further developed in other countries. In this first part, it was also carried out a survey of industrial units in Portugal in order to understand the national industry, its chronological and territorial distribution, and its recognition as cultural heritage.

### **2| Bibliographical Research, Theoretical and Historical Approach – Conversion of Spaces and Urban Rehabilitation**

The second part of this thesis, Chapter 2, is also an historical and descriptive explanation, which explores the conversion of industrial buildings in the context of urban regeneration, heritage preservation and in terms of the architectural changes introduced in the original structure.

As a complement to this part, the diversity of industrial spaces and scales, and different types of architectural intervention, are developed concerning several national and international examples. In the context of intervening on heritage, the issue of conversion of buildings is expanded, taking into account the particular characteristics of the structure: the industrial use and the cultural value. In order to analyse and evaluate the circumstances and

methodologies inherent to this type of project, three converted industrial buildings were selected. As a tool for the analysis the author adapted a matrix based on the various layers of durability of a building, which was developed by Francis Duffy and Steward Brand. This scheme allows to study the adaptability of the original structure and to understand the transformations introduced, which is not always possible only by direct and intuitive observation.

### 3 | Presentation and Descriptive Analysis of the selected cases

The Chapter 3, of practical and experimental nature, is related to the third part of the thesis where a descriptive analysis of three conversion projects held in Portugal is carried out. The case studies are related to three different programs: housing, culture and education. These were considered, within the multiplicity of solutions, the most relevant and meaningful programs to explore under the theme, besides being the most commonly performed.

The selected projects were:

- 1 | Cold Storage Warehouse of Massarelos – Douro’s Place **Carlos Prata** 1937/39 - 2005/07
- 2 | Cold Storage Warehouse of Doca de Alcântara – ‘Oriente’ Museum **João Carrilho da Graça** 1938/44 - 2002/08
- 3 | ‘Leões’ Factory (milling) – Complex of Arts and Architecture of Évora University **Inês Lobo** 1916 - 2007/2010

#### Methodology applied to the case studies

Each case is dealt under the same criteria, defined in advance, where the author seeks to evaluate and understand the transformations introduced in the original building and the architectural response to distinct contexts, which had in common their industrial essence, together with the circumstances and consequences of this process.

The study of the projects relied on a descriptive and analytical approach of the two phases of the building, before and after the intervention: the pre-existent and the converted structure. The analysis will be carried out according to various criteria previously defined and considered to be the most relevant in the context of the study. Initially, an historical and urban framework is developed and a description based on the architectonic characteristics of the original building is made. Then, concerning the intervention, several parameters of the adaptation project are described: the program, the main actions and strategies and the building system and materials.

**Table 1. Parameters for approaching the case studies**

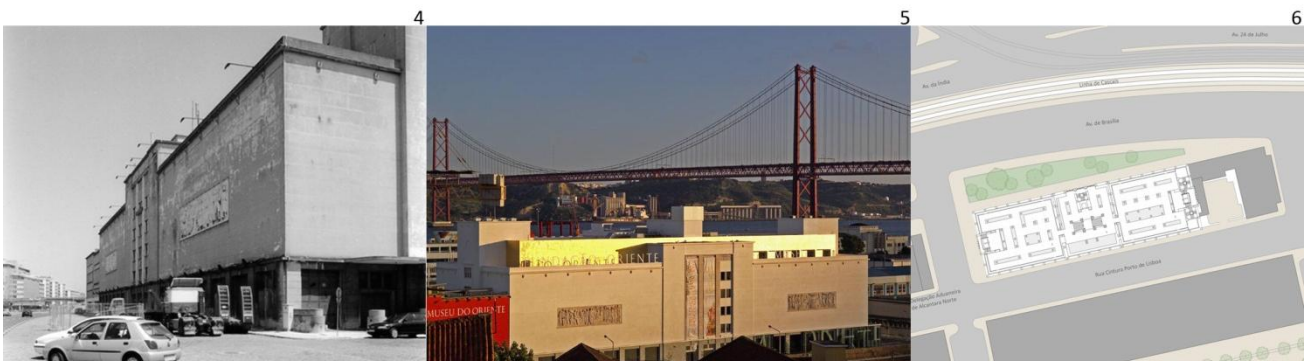
1   PREEXISTING BUILDING	2   INTERVENTION	3   SYNTHESIS
Historic Context	Program	Matrix of Analysis
Urban Context	Project Description	
Description	Building System and Materials	

The site visiting, with a brief photographic survey, registration of notes and direct observation, are tools of a descriptive and documental analysis, besides the research of literature and the study of elements of the projects provided by the architects. Therefore, the author contacted the offices *Inês Lobo Arquitectos*, *Carlos Prata Gabinete de Arquitectura e Serviços*, e *JLCG Arquitectos*, aiming to gather information and to interview the architects responsible for these projects.

## CASE STUDIES



1 | Cold Storage Warehouse of Massarelos - Douro's



2 | Cold Storage Warehouse of Doca de Alcantara - 'Oriente' Museum



3 | 'Leões' Factory - Évora University

### Source:

1. Carlos Prata, Gabinete de Arquitectura
- 2, 3, 6, 8, 9. Author
4. Fundação Oriente
5. JLCG Arquitectos
7. Inês Lobo Arquitectos

By way of summary, the author used the matrix, elaborated previously, to synthesise the intervention and to specify the transformations occurred on each 'layer' of the building, besides it is presented a brief conclusion considering the main goals of the conversion and its consequences at different levels.

The matrix conception relies on the components of a building, which have different behaviors and demands throughout time, allowing to analyze changes occurred during the structures life time (especially during its reconversion), and its adaptability and functional performance. The matrix contains 10 items considered utterly important on the evaluation of the conversion, allowing to understand the transformations occurred through the study of each 'layer' of the building: *function*; (exterior) *volumetry, skin, materials and image*; (interior) *building system, layout, materials, image and integrated heritage* (production machines).

This scheme allowed to understand the changes induced on the preexisting elements and to establish a comparison between the three case studies, concluding that *Douro's Place (Cold Storage Warehouse of Porto)* introducing the highest transformation on the original building. The *Complexo de Artes e Arquitectura da Universidade de Évora ('Leões' Factory)* project was able to perform the adaptation to the new program, inducing the lowest level of transformation of all the three case studies.

#### 4| Comparative Analysis of the Selected Cases

Afterwards, a comparative analysis was made between all three cases, regarding the characteristics of the buildings, their industrial typology, the architectural strategy of the project and its consequences. It was intended to identify and understand the conditions and implications of the interventions, as well as the architect's response towards difficulties.

This comparative analysis seeks to establish a simultaneous evaluation of the three case studies. The basis of this evaluation relies, not only on the matrix previously designed, but also on the characteristics and circumstances of the preexisting structures and the nature of the projects. The author's goal was to reflect on historical buildings conversion and its consequences regarding the cultural value of original structure and its characteristics as a space of industrial utility.

**Table 2. Table of values of transformation**

LEVEL OF TRANSFORMATION	VALUE
High	3
Medium	2
Low	1

By attributing values to all the levels of transformation of the existent, it is able to quantify the changes occurred. The values were defined as such: **High** level has value of 3, **Medium** level has value of 2, **Low** level has value of 1, and no level of transformation has level of 0. This way, a reconversion may score a value of 30 corresponding to a value of 3 on all 10 items of the analysis, and a minimum value of 0, if there was not any transformation. A conversion project retains a minimum value of 3, since there is a changing of the original building function.

**Table 3. Synthetic matrix of the conversions**

PARAMETERS		DOURO'S PLACE	'ORIENTE' MUSEUM	ÉVORA UNIV.
EXTERIOR	1  Function	3	3	3
	2  Volumetry	1	0	2
	3  Skin	3	0	1
	4  Materials	0	1	1
	5  Image	3	1	2
INTERIOR	6  Building System	1	1	1
	7  Layout	3	3	1
	8  Materials	3	3	1
	9  Image	3	3	1
	10  Integrated Heritage	3	3	2
<b>TOTAL (0-30)</b>		<b>23</b>	<b>18</b>	<b>15</b>
<b>TOTAL %</b>		<b>77%</b>	<b>60%</b>	<b>50%</b>

However, in order to attain a deeper understanding of the projects and of the constraints related to this type of intervention, five parameters were defined, which are considered essential in the analysis and, possibly, in the completion of a reconversion project: the preexisting characteristics of the program, the promoter, the asset value and the project strategy. These parameters allowed to understand the design process, the modifications made, the objectives and, finally, the constraints beyond the architect's responsibility which have limited the intervention's final result.

Combining these five parameters with the elaborated matrix of analysis, the author concludes that the most interesting conversion, not only in terms of architectural quality but also considering the preservation of cultural values of pre-existence, was the *Arts and Architecture Complex for 'Leões' Factory*. This industrial complex had, at the first glance, a great transformation of the existing characteristics, concerning demolition and new construction. However, through the analysis which was undertaken, the author realized that the architect Inês Lobo's project is the intervention that most respects and truly interprets the essence of the industrial factory, while addressing, with quality and ease of use, the requirements of the proposed program.

It is concluded that one of the most common industrial typologies in Portugal, the factory of the XXth century, presents architectural features which can be easily adapted to new uses, and that this adaptation is not limited to the cultural program (the most common conversion program for obsolete industrial areas in Portugal). The author identified the possibility of successfully adapting industrial buildings to other programs besides the cultural or museological ones, including the conversion to housing and university.



It was perceived that the three projects successfully responded to the proposed objectives with architectural quality, ensuring the conditions required by the new programs introduced and allowing to reintegrate the obsolete industrial structures in contemporary life, returning them to society and to the city. However, it is considered that the projects for the cold storage warehouses, the Douro's Place and the 'Oriente' Museum, are interventions that undermine the cultural values of preexistence and do not fully respect their industrial essence.

The architect Carlos Prata's project for the Cold Storage Warehouse of Massarelos proved to be an intrusive intervention that discharacterized both the exterior (with the opening of gaps in the main façade) and the interior of the building (with the total reformulation of space, through designing common housing typologies with no formal, material or spacial references to its previous function). However, it must be underlined that this architect's design strategy was deeply conditioned by the preexisting architectural features (cold storage warehouse) and by the promoter's requests.

The architect Carrilho da Graça's project, for the old *Cold Storage Warehouse of Doca de Alcântara*, reveals a concern for the preservation of the building envelope, a project-oriented attitude which was not applied as accurately in its interior. The warehouse interior space was completely redesigned in terms of its spatial configuration and materials; however, through the dense mesh of pillars and low ceilings, it is still possible to experience the industrial essence of old cold storage chambers completely isolated. In this case, one should also consider the architectural characteristics of the industrial typology of cold storage warehouse, which profoundly affected the building's adaptation to a new use.

It was also noted that the construction system is one of the most valued features in industrial buildings, and also the feature which suffered the fewest changes. The buildings' structure (columns, beams and slabs) presents good conservation conditions due to its recent date of construction (early XXth century), and due to its design characteristics to handle big loads, which enable its adaptation for any use, also presenting versatility regarding the configuration of interior spaces.

Through the case studies, the author realized that the building's integrated heritage (such as machinery and other objects of production) is often excluded from reconversion projects. It is believed that these elements can be integrated in the new program through architecture, contributing to the experimentation of the industrial essence of the property, as is the case, for example, of the University of Beira Interior, where the dyeing wells of the former 'Real Fábrica dos Panos' are part of the circulation corridor for students and teachers.

### **3. CONCLUSIONS OF THE STUDY**

#### **The urgency of industrial heritage preservation in Portugal**

One of the immediate conclusions of this study is the urgency of the explored theme. It was found that, in Portugal, the problem of the obsolete industrial buildings is a reality very little known and explored. The lack of recognition of the value and potential of these structures, and the insufficient protection measures, allow their mischaracterization and destruction. This is also reflected in the low number of studies and inventories published in this area.

In order to understand the current situation of industrial heritage in Portugal, it was carried out an inventory of industrial units identified in Portuguese territory. The study allows concluding that approximately half of the units identified are not protected or there isn't information about their classification, what allows to point out that the industrial testimonies in Portugal present a reality little recognized and their identification, inventory and protection is low in comparison to other elements of heritage. This situation has slightly improved, but it is a long process that has little attention from the state and society in general.

The investigation led to consider that the cities of Lisboa, Setúbal and Porto, present more identified industrial units. It also emphasizes the effort of Azores Government in the protection of wind and water mills. Many industrial units identified dated from the twentieth century and were deactivated recently, presenting still a good preservation. Their adaptation to a new use would be easier and less demanding immediately after its closure, revealing also the urgency of actions and projects that explore this current situation.

#### **The selection**

The question of the identification and selection of the industrial structures to preserve, appears to be also an issue of great importance and urgency, as the industrial remains are a vast and diverse heritage that first needs to be known and understood. Its elements cannot and should not all be preserved. Investigation, inventory and education are essential tools to prevent the demolition and pejorative alteration of significant industrial structures, as well as it provides a conscious selection of the elements to preserve. Besides that, this process allows to manage the conflicts of urban development between the past and future of the city.

The intervention should ensure the adaptation to the new program, as well as the preservation of the essence and authenticity of the building, both exterior and interior, preventing the mischaracterization and consequent loss of cultural and industrial identity. Through the promotion and dissemination of this heritage it is possible to alert and inform society for the values of industrial remains, revealing itself as a tool for reducing and avoiding intrusive and destructive actions.

#### **The architects' role**

The lack of recognition of such assets may also be observed in the attitude of architects towards an industrial remain, where there are interventions that often result in the mischaracterization of the buildings (as seen in two of three case

studies) or in their destruction in favour of new construction. From the case studies the author points out positively the 'Leões' Factory, where the conversion avoided the initially planned destruction of the most emblematic elements, managing to restore the integrity of the industrial complex, preserving its industrial essence.

In fact, this study emphasized the responsibility of the architect towards the destiny of industrial remains, as his work can contribute for the promotion and preservation of these structures and for the valorisation of the existing urban tissue. Through conversion projects, it is possible to awaken minds and markets for these types of spaces and projects. However, it appears that the architect's work is deeply conditioned by exterior interests (conditions of the promoter) that wish to optimize the investment made in these structures or in their implantation areas (which have a high real estate value).

### **Conclusion**

Knowing in advance that there isn't just one valid answer to a conversion project, it is concluded that the solution necessarily involves the consideration of the program that best suits the architectural features of the building and the local needs (seeking to reconcile these two aspects); the quality of the spaces created, which should ensure comfort in use and respond to the demands of the new program; and the respect for the industrial essence and for the patrimonial value of the pre-existence, guaranteeing the preservation of its identity and authenticity.

The study led to consider that the conversion of vacant industrial buildings allows the reintegration of these structures in urban space, with clear benefits for its surroundings and for society, when compared to new construction. This type of intervention appears to be a mean to achieve urban regeneration through the reuse of buildings and the introduction of a necessary program. The conversion addresses several issues simultaneously:

- \_ Safeguarding industrial testimonies;
- \_ Reuse of existing structures with economy of materials, resources and capital;
- \_ Continuity of the urban image and the local social memory;
- \_ Promoting diversity and identity of places, encouraging tourism.

However, the author alerts for the lack of communication between the entities involved in these projects: those responsible for heritage, the promoters, the society (representing the target market) and the architects. Only with knowledge and awareness, these stakeholders will be able to act properly and do a good work in the recovery and revitalization of the old city, where industrial testimonies are included. The conversion must be presented, not only as a project with architectural quality and of patrimonial safeguard that could fill a need in society, but also as an economically attractive investment, boosting other interventions in urban space and the enhancement valorisation of industrial structures.

### **Future developments**

In conclusion, this thesis is innovative in the analysis and interpretation of projects involving the conversion of industrial buildings, presenting an actual study concerning industrial heritage in Portugal, particularly through the inventory of

industrial units realized. The author considers of equal importance the adaptation made to the matrix, which revealed to be a tool for analyses and evaluation that could be used to explore other types of interventions as well as in the process of futures conversions.

Nevertheless, it is important to refer that the results of this study should be considered taking into account the subjectivity of its interpretation, which reflects the cultural context of the author. The study realized could provide a basis for future investigations, particularly concerning industrial heritage or building rehabilitation. Regarding the theme, the thesis presents itself as a starting point for a deeper and urgent investigation, concerning other programs and typologies, and even more pragmatic issues related to the economic viability of conversion projects and the financial incentives that exist, or should exist, in order to promote such actions.