

# WATER AND INDUSTRIAL ARCHITECTURE. FROM TECHNOLOGICAL PROCESS TO AESTHETIC MEANING

## APA ȘI ARHITECTURA INDUSTRIALĂ. DE LA PROCES TEHNOLOGIC LA SEMNIFICAȚIE ESTETICĂ

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**Abstract.** *Water has been one of the natural elements with a major influence in industrial development. Both as an energy source and as a cheap and effective transportation means for materials and products, natural and artificial water courses have influenced not only the layout of industrial buildings, but also their relationship with the urban environment, bringing radical changes in the outlook of cities. Once they cease to function, deserted industries left behind an impressive built heritage. Our study probes into the potential of this natural element as a premise of industrial architecture form, further exploring the possibility of redesigning the relationship between city and water through architectural conversion.*

**Key-words:** *water, industrial architecture, architectural conversion, urban regeneration.*

**Rezumat.** *Apa a constituit unul din elementele naturale cu o importanță majoră pentru dezvoltarea industrială. Deopotrivă sursă de energie și mijloc eficient și ieftin pentru transportul produselor și materiilor prime, cursurile naturale și artificiale de apă au influențat atât configurația clădirilor industriale, cât și dispunerea lor în mediul urban, schimbând radical imaginea orașelor. După încetarea funcționării, industriile părăsite lasă în urmă un fond construit impresionabil și totodată posibilitatea de a reface conexiunea orașului cu apa. Studiul explorează potențialul elementului natural ca premisă a formei arhitecturale industriale și totodată ca resursă de regenerare urbană.*

**Cuvinte cheie:** *apă, arhitectură industrială, conversie arhitecturală, regenerare urbană.*

### INTRODUCTION

The layout of industries in the territory is based on a system of merely practical constraints. Some of them are specific to each branch, deriving from the characteristics of the raw materials as well as of the end products. Others, of more general nature, are determined by the situation of the human resources, the position and evolution of the market and the transport required to link these industries to the place of origin of the primary resources.

In relationship to the means of transport and the production technologies, the natural elements have often had a major influence.

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In the decision to preserve and reuse industrial buildings, beside the economic or built heritage value, an important role was played by the favourable positioning in relation to the natural elements.

## **MATERIAL AND METHOD**

This paper focuses on highlighting the relationship between the industrial buildings layout and their site, respectively the natural conditions. The study area was reduced to the specific situation shown by the proximity of water, initially strictly based on functional reasons and which is often a strong argument for the conversion to civil architecture programmes.

In order to define this aspect there have been identified and analysed some examples, significant in number as well as in typology regarding the historical evolution of production and the production specific, respectively by studying the positioning plan and the key elements of the architectural configuration: plans, sections, images of the building's volume.

This study takes into consideration the relationship between the landscape and the industrial architecture by analysing the different functional types – production buildings and storage buildings. The ideas are supported by plans and images from representative areas for the industrial development.

It is shown the influence of water on one side as a modelling factor in the concept of town planning and the industrial architecture from the 18th and 19th centuries and on the other side as an aesthetic factor in its ulterior conversion.

## **RESULTS AND DISCUSSION**

The study has underlined two significant aspects:

1. The positioning of industrial buildings next to water flows has directly influenced their architectural features.
  2. The positioning of former industrial buildings next to water fronts is a decisive argument, most of the times, in the conversion option.
1. The research made on the industrial halls from different stages in the technological development and belonging to different branches has shown that there are two categories of buildings directly connected to water: production buildings and warehouses.

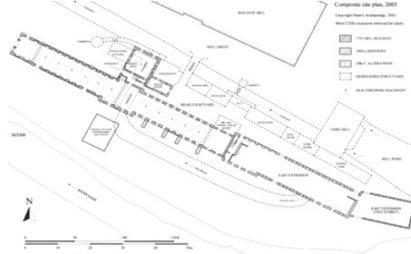
### **1.1 Production buildings**

At the beginning of the industrial revolution the positioning near the water of the first production buildings belonging to the textile industry was an essential condition for the production activity as water was the main source of energy as well as an efficient and cheap means of transport, mostly before the development of the railway transport.

Examples from this period show that the main principle which generated the solution for the multi-level layout is related to the source of energy used by the machines which were needed for the mechanization in textile production. The use of water energy implied connecting the machines to a big wheel through a system of spur wheel and shafts. Thus, it was more efficient to place the industrial

equipment on different levels close to a single vertical axis. Starting from the functional and technical details of the production flow, the so called *cottonmills* were built as production halls on 3-6 levels.

Still, the interesting fact is that water has also influenced the structure of the industrial buildings due to its features as a landscape element. The level plan was thus elongated in order to obtain the best contact with the water. The subsequent extensions followed the same motivation for a linear structure. (fig. 1, fig. 2)



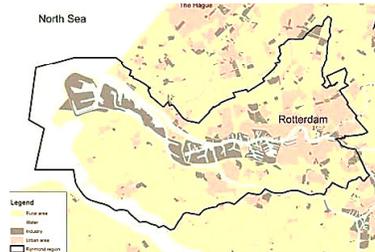
**Fig. 1** - Linear plan configuration  
Old Mill, EastCheshire, half of the 18th  
century



**Fig. 2** - Old Mill, EastCheshire, aerial  
view, half of the 18th century

The perspective of accomplishing a profitable activity led to the strategic connection between the production places and markets, either directly, by placing them inside town areas or indirectly, by getting closer to natural or artificial transport means. The 19th century brought the development of several water channels which enhanced these connections and contributed to the spreading of industrial buildings.

The continuous development of the energy resources added to the transport development flourished during the second half of the 20th century. This aspect was in favour to a new criterion in choosing the position of industrial buildings, namely the strategic element. The development of industrial buildings in the port area was based on strategic reason. The efficiency of this production system is explained by the spreading of these buildings in the neighbourhood of ports, areas which include a wide range of production branches and which cover wide areas. (fig.3)



**Fig. 3** - Map for the current position  
of industries in Rotterdam (the  
industrial area is marked in a darker  
shade)

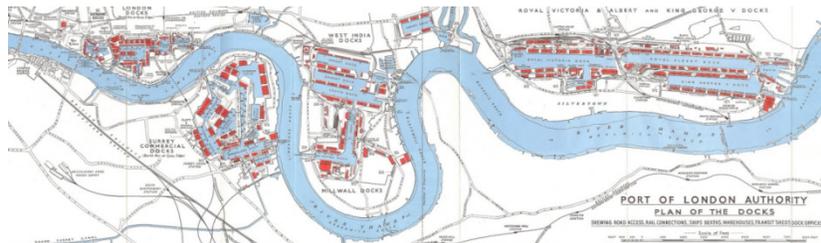
### 1.1. Warehouses

The major changes from the industrial revolution which generated the large scale industrial production had as consequence the delivery of great quantities of raw materials, products and fuel which required the arrangement of storage buildings that would answer to the new demands.

During the industrialization period the distribution warehouses evolved simultaneously with the production buildings and the progress made in transport.

The storage buildings around the ports (docks) mainly thrived, the commerce on sea being initially the most efficient and accessible, until the land transport spread. The most efficient system of storage in wide spaces was to be found in the layout of docks.

Consequently, the docks spread and the waterfronts expanded through the development of inner channels and basins (fig.4, fig.5, fig.6). Maximum economic and land occupation efficiency were the base ideas of the planning, resulting areas of spectacular structure, with buildings in linear arrangement – warehouses along the artificial channels or lagoons with heights imposed by the level of the building technology and manipulation techniques for the products. One of the widest and most interesting docks spreading in the system of channel network is seen in Hamburg port (fig.5). London docks are included in the same category (fig.4).



**Fig. 4 - Plan of the London docks from 1964**



**Fig. 5 - Hamburg in 1910**



**Fig. 6 - Liverpool in 1836**

## 2. Water proximity as a convenience for industrial building conversion

The success of the urban development through the conversion of the deserted docks, supported by the authorities from the USA and UK during the 1980s proves the interest shown by the population and the business environment to reuse these places.

Beside the practical opportunity of accessibility which, under the new conditions, could be helpful to the civil programme functions, the natural element presents an obvious special psychic component which is interesting to the beneficiaries. Hence, some companies prefer to place their headquarters close to water, taking advantage of the high visibility and an underlined architectural image due to the water reflection effect, creating on one hand a favourable working environment (Warman, 1990) and on the other hand, an attractive spot for the clients, and for the product advertising (fig.7, fig.8, fig.9).



**Fig. 7** - Offices designed in the former docks in Hamburg



**Fig. 8** - Layout of the channels from the industrial areas in Birmingham



**Fig. 9** - offices in former docks - Bristol

Built under special technical and economic conditions, prohibitive for the civil architecture but necessary to the efficiency required by the industrial process, the docks and mills are objectives of high interest in the architectural conversion. The water surface brings in the congested and often rigid modern town design, an element of contrast due to the impression of an immaterial world, of permanent change and vibration. The subtle qualities of the water, its ability to reflect, its continuous movement and the living creatures it attracts, all these features become active parts in the complex perception of the architectural ensemble.

”It is the lure of water, its spells, its reflection, its endless movement and change, that best captures man’s imagination and provides a variety of applications from business to recreation, from calm to passive activities, the water’s edge is where life is most diverse and unique” (Torre, 1989).

### 3. Significant examples

The Bankside building, built between 1947 and 1963, is impressive due to its monumentality and expressivity of the volume.



**Fig. 10** - Outside image by night



**Fig. 11** - View from the inside

The massive aspect, the symmetry and the dominant chimney give a distant personality to the building, visible from the opposite bank of the Thames. The special position on the river quays was a decisive argument for the conversion of the industrial building into a gallery of modern art. The change in function is announced by the extensions of luminous volumes on the roof and the chimney which are reflected on the Thames at night (fig.10). The same effect is desired for the interior, in a replica of the outer image of the water mirror, which is a clear proof given by the designers for its important presence, by suggesting the natural element in the architectural work (fig.11).

Through the minimum changes made during the conversion of the Menier chocolate factory from Noisiel-sur-Marne, France, there are underlined the aesthetic qualities of the buildings and of the natural environment, water being a dominant element in the landscape and a linking element for the buildings in the

ensemble, built along the times, in different styles and with different personalities (fig.12, fig.13, fig.14).



**Fig. 12** - Menier chocolate factory, Noisiel-sur-Marne. Archive image before the conversion



**Fig. 14** - Menier chocolate factory, Noisiel-sur-Marne after the conversion



**Fig. 13** - View of the factory from Marne river

Also, most docks from the big ports are in full conversion process, as it is the case of the Liverpool docks, converted for the Tate Gallery, or the more recent example of the Hamburg Philharmonic.

## CONCLUSIONS

The industrial building, a dwelling for the machine, was a machine itself, placed in the environment so as to directly use the resources, ignoring any other kind of relationship with it. The close connection between the water and the industrial buildings proves to be not only an example of the practical inclusion of the building in the context, but also a major advantage to conversion. Through adapting these places to new functions, new meanings are born. The building changes from machine into a living organism, populated by people who give it a new personality. The meaning of the water is transformed from a merely technological element to an aesthetic object. At the same time, the area around the converted building changes significantly. Those industrial urban areas which divided the city from the water are now conquered by the public space and a new equilibrium is reached.

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