

ANALYSIS OF THE MODERN TYPOLOGY AND CLASSIFICATION OF INDUSTRIAL ARCHITECTURE IN EUROPEAN URBANIZED CITIES

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Summary

The article deals with the actual problems of industrial architecture in the urbanized cities of European countries. In a context of article the analysis of the modern typology of industrial architecture in European urbanized cities has been carried out. In the frame of classification of modern industrial architecture in European urbanized cities the most widespread types of industrial buildings have been defined and classified. The methodology of the analysis of industrial buildings as well as industrial heritage, assumes the analysis of modern industrial infrastructure of urbanized cities concerning the number of developed criteria: period of establishing, position in the city system, functionality, modern state, economic influence, operation type, architectural styles, planning arrangement, number of storeys etc.

Keywords: modern typology, classification of industrial architecture, industrial heritage.

1 Problem statement

According to present conditions of big and largest urbanized cities' industrial architecture, as well as industrial heritage, it is possible to assert that architectural industrial infrastructure demands a new experimental level that means the level of conversion into new sustainable social functions: cultural, administrative, entertaining, residential, recreational etc. Today it is important to make scientific research of features of modern industrial architecture in a context of conversion into new sustainable social functions.

Relevancy of the present research is defined by aggravating environmental situation in industrial cities because of industrial component that has negative influence on health improvement, psychic and emotional state of people and demographic indices [1, 2]. In a context of present problem it is important to analyse the modern typology of industrial architecture in European urbanized cities, to consider and study the most widespread types of industrial buildings, their features and the basic characteristics.

It is defined that classification of modern industrial architecture in European urbanized cities is the important theoretical stage for research of problems of industrial architecture conversion into new sustainable social functions.

Research in the field of problems of city environment and architecture protection, including the research of actual problems of industrial heritage, today carried out by prof. Ing. arch. Tomáš Šenberger, PhDr. Benjamin Fagner, prof. Ing. arch. Petr Urlich, CSc. and Mgr. Lukáš Beran (CTU in Prague) Prof. Hafizula Benai, DrSc. and Doc. Igor Lobov, Csc. (DonNACEA), Prof. Mykola Bezv (Lvivska politechnika), Prof. Mykola Dyomin (KNUCEA) and etc.

The **purpose** of the present research work: to research the modern typology of industrial architecture for future research of problems of industrial architecture conversion into new social functions.

The **object** of the research: operating and nonoperating industrial buildings.

Research area: industrial buildings in the urbanized cities of European countries (Prague, Kladno, Ostrava, Plzen in Czech Republic and other urbanized cities in Poland, Slovak Republic, Belgium, Hungary Austria, Germany, Ukraine, Russia and etc.).

2 Basic material

2.1 Modern industry as the major branch of the national development

It is defined that industrialization is the important historical process which started in England in XVIII century. As a result, after the global "step" in society development the industrialization covers all important spheres of the cities: social, professional, demographic structure of the population, life style, culture etc. [1–4]. Industrialization influence on development of various social and economic formations; the basic achievements of civilization are connected with industrialization processes in the cities as well as countries [2, 3]. This period defines emergence of new type of architecture – industrial buildings.

It is defined that modern industry today is a system of different enterprises (factories, mines, plants etc.) with production the instruments for industry as well as for other branches of national economy. Modern industry is the major branch of the national development [5].

2.2 Widespread types of industrial buildings

According to results of analytical work in a context of present research work all industrial buildings in the urbanized cities of European countries have been classified in five general groups:

- production buildings (highly tailored, specialized, wide specialized);
- subsidiary industrial buildings;
- energy industrial buildings;
- transport buildings;
- storage facilities buildings and warehouses [6].

It is defined following seven types of **production buildings**:

- mining, ore-dressing and processing enterprises (enterprises that producing iron and polymetallic ores, coal, oil, gas, shale, peat, table salt etc.);
- enterprises of petrochemical and chemical industry (petrochemical, oil-processing, superphosphate, soda, nitric, chloric, chemical fibers, coke (fig. 1), synthetic rubber, paint and varnish and rubber industry enterprises);
- mechanical engineering enterprises (heavy, average and light engineering works (fig.), shipbuilding and railway enterprises);
- instrument making and radio electronics enterprises, enterprises of woodworking industry and pulp and paper plants (timber mills, integrated house-building factories, furniture factories, match factories etc.);
- construction companies, enterprises of textile and light industry (shoe, leather, knitted and sewing goods factories) [1, 5, 6].



Fig. 1 Donetsk by-product coke plant, Ukraine (photo: © Oleksandr Chabaniuk, 2009)

The group of **subsidiary industrial buildings** is divided in following five types:

- factory works management buildings;
- offices (fig. 2, 3);
- amenity units;
- nutrition units;
- medical centres.

Energy industrial buildings as a general group of industrial buildings, assumes following four types:

- boiler buildings and water towers (fig. 4);
- electric power stations;
- gas-producing stations;
- compressed air plants.

It is defined following three types in group of **transport buildings** in the urbanized cities of European countries:

- garages (fig. 5);
- depots (fig. 6);
- parking sites.



Fig. 2 The Spittelau Waste Treatment Plant in Vienna, Austria (photo: © Oleg Fetisov, 2012)



Fig. 3 Office building of the Umicore industrial zone in Hoboken, Belgium [7]



Fig. 4 Obukhov factory water tower in St. Petersburg, Russia [8]



Fig. 5 Volkswagen's Transparent Factory in Dresden, Germany (photo: © Oleg Fetisov, 2013)

The group of **storage facilities buildings and warehouses** is divided in following four types:

- buildings for raw materials
- half-finished products
- final product
- other materials storage.



Fig. 6 Depot of the Moscow Monorail Transport System, Russia [9]

2.3 Analysis of modern industrial architecture

The methodology of the analysis in the frame of classification of industrial architecture of industrial buildings (as well as industrial heritage), assumes the analysis of modern industrial infrastructure of urbanized cities of European countries concerning the number of developed criteria.

The first stage of analysis of modern industrial architecture assumes the **general group** of criteria:

- period of establishing;
- position in the city system;
- functionality;
- modern state;
- economic influence;
- operation type.

According to *period of establishing* it is defined two types of industrial buildings: industrial and post-industrial. According to *position in the city system* – in the city area, on the city borders and outside the city [6]. It is defined following two types according to *functionality*: production and service buildings [10]. It is defined that modern industrial buildings according to *modern state* criteria assumes following three types: secular industrial buildings, reconstructed industrial buildings (reconstructed buildings with modernization of previous industrial function, reconstructed buildings with modified industrial function and reconstructed buildings with modified industrial function to new social) and nonoperating industrial buildings. Concerning the *economic influence* are defined three types of industrial objects: main object with powerful influence on economic

system of the city, industrial object, that has a insignificant influence on the economy of the city and autonomous industrial objects. It is defined following three types of industrial objects according to *operation type*: industrial buildings with regular operation, periodic and seasonal operation.

The second stage of analysis of modern industrial architecture assumes the **architectural group** of criteria:

- architectural styles;
- planning arrangement;
- size of a total area;
- number of storeys;
- solidity;
- special status.

In the frame of present research work it is defined that studied examples of industrial architecture was built in following *architectural styles*: classicism, art nouveau, rationalism and functionalism. Concerning the *planning arrangement* criteria four types of industrial buildings have been defined: compact, blocked, perimetritic and with complex configuration. Concerning the *size of a total area* – small, average and large [10]. According to *number of storeys* four types of industrial buildings have been defined: one-storeyed, two-storeyed, multi-storeyed and industrial buildings with different number of storeys. It is defined following two types according to *solidity*: permanent and temporary industrial buildings. It is important to note that some industrial buildings can be under the *special status* "industrial heritage".

3 Conclusions

It is defined that classification of modern industrial architecture in European urbanized cities is the important theoretical stage for research of problems of industrial architecture conversion into new sustainable social functions.

The analysis and classification of the modern typology of industrial architecture in European urbanized cities has been carried out for the first time. In the frame of classification of modern industrial architecture in European urbanized cities the most widespread types of industrial buildings have been defined and considered: seven types in production buildings group, five types in subsidiary industrial buildings group, four types in energy industrial buildings group, three types in transport buildings group and four types in group named storage facilities buildings and warehouses.

The analysis of industrial buildings of modern urbanized cities concerning the number of developed criteria (six in general group and six in architectural group) has been carried out.

The results of present research work have a great scientific value in the field of architecture and typology of industrial buildings and served as a basis for further research in this direction.

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