

MATERIAL SUBSTANCE OF CONTEMPORARY INDUSTRIAL ARCHITECTURE



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Summary

Present time from the point of view of material substance of architecture we can characterise as a conservative when considering bearing structures and on the other hand as the boom period of diversified system of coating and partition structures and materials emphasising the energetic effectiveness and aesthetic-creative function of structures and materials. Form appearance of architectonic work is the result of searching and application of author's creative intentions into compositional unit. Connectivity of architectonic form and material is possible only by means of construction, where together with material it becomes inseparable part of architecture.

Keywords: Materials, architecture of industrial building, bearing structures, coating structures

1 Introduction

The historical development of architecture tells us that the material substance and the level of the scientific knowledge have been the driving force of architectural development. As regards the material substance of architecture, the present period can be characterized on the one hand from the viewpoint of the load bearing structures and on the other hand according to the development of new cladding and separating construction systems and materials with the emphasis on energy efficiency and aesthetic and visual impression. The coherence of the architectural form and material is only possible by means of a construction, where the form becomes an integral part of the architecture together with the material, (Fig. 1, 2).

2 Design and materials

The prerequisite for a good architectural design is the use of quality materials with adequate technical properties. Nowadays, the desirable parameters of materials fall within

the cyclical process of the **3 RE – energy reduction, recycling and reanimation of the material**. In the construction industry, this cycle supports tendency to utilisation of indigenous materials and at the same time of those materials, whose main parameters dominate their choice: technical properties (load capacity, thermal resistance, fire resistance), the alternativeness (durability, health-friendliness – biocompatibility) and the aesthetic qualities. The abovementioned parameters also determine the utilisation of material in any given construction or architectural aspect.



Fig. 1 Construction and material – an integral part of the architecture, Zlin, CZ



Fig. 2 Conectivity of architectonic form and material, Car industry Bánovce, SK

From the viewpoint of value creation, the current trends in industrial architecture can be divided into the following patterns:

- Ephemerality (deliberate rationality) – the choice of material is subject to cost-effectiveness and simplicity of construction (**Fig. 3, 4**),
- “Smart design” – designs are based on the dominating position of the human user of a building (human-oriented – to make life easier, better, the energy efficiency is in the first place), (**Fig. 5, 6**),
- Originality (extravagance) – the architectural expression dominates (**Fig. 7, 8**)



Fig. 3 The ephemerality and aesthetic, Production of the plastic, Poprad, Slovakia



Fig. 4 The ephemerality and simplicity, Poprad – Matejovce, Slovakia

2.1 Layout of materials interpretation

From the viewpoint of architectural work, the choice of material can be perceived at three basic levels:

- Material of the load bearing constructions – evaluation of material properties in the technical parameters
- Material as the “cladding modelling substance” – as a part of articulation of the architectural form
- Material in the interior – the starting point and a part of the creation of working environment (**Fig. 9, 10**).



Fig. 5 Positive value of hall architecture, Packing of dried fruit, Hlohovec, SK



Fig. 6 Transformation of “smart design” to the light industry building, Kežmarok, SK



Fig. 7 Original architectonic expression and modern materials in industrial building



Fig. 8 The architectural expression dominates - entrance

The abovementioned levels are presented in a whole array of typological construction types, while a certain degree of transposition of the construction systems and of the expressive elements among the individual construction types is obvious. This fact brings on the one hand advancement and improvement in the construction and properties of materials and on the other hand an original architectural expression [1]. Analogously with a human being, it is possible to create the “DNA of an industrial building”, which helps us understand the architectural and construction system by means of material characteristics. In this way, the material becomes an expressive element of architecture. As regards industrial constructions, there is a certain particularity in terms of greater cohesion with the construction of the building and with the application of logical links related to the utility of buildings.



Fig. 9 Sterile working environment and materials, food production



Fig. 10 Original wood construction, Wine industry, Spain

3 Game with material expression

We can say that materials are similar to notes in music. If we compose them according to certain composition principles, a valuable “harmonious” architecture with a traditional or a non-traditional modern expression comes to being.

The traditional expression is characterised as follows:

- in the construction aspect – use of ferro-concrete constructions suitable especially for the heavy industry. The light industry is oriented predominantly on steel assembly structures, (Fig. 11, 12,
- in the cladding aspect – brick filling or ferro-concrete panels represent the traditional way of construction (Fig. 13, 14).

Logically, the traditionalism is mostly associated with brick, which combines the power of the fire and the earth. This natural material is typical for countries surrounding the Mediterranean. The red brick is likewise a synonym for the English and Dutch vernacular architecture (the Dutch school), while more than a century ago, the brick symbolised the industrial architecture. In the period of modernism in our region, the brick was inherently associated with Baťa’s architecture both in the Czech Republic and in Slovakia.



Fig. 11 The traditional ferro-concret construction, building process, Car industry, Trnava, Slovakia



Fig. 12 The steel constructions is predominated in light industry



Fig. 13 Traditional expression and brick materials, Wine industry, Hungary



Fig. 14 Traditional way of construction – interior of car industry, Trnava, SK

The non-traditional, modern expression reflects the local and international trends:

- in the construction aspect – steel, wooden and combined constructions provide an opportunity for creation of original details. The dry method of construction and the elimination of heavy mechanisms have placed the wooden constructions among the most favourite ones (**Fig. 16**),
- in the cladding aspect – sandwich panels with a polyurethane core, use of glass, metal-plastic jacketing, wooden casing (**Fig. 15**).

The largest group of present-day industrial buildings is represented by universal halls, for which the new light materials and systems of “Lego hall assembly structures” are designed. **The modernism** in expression is characterised by simplicity and compactness, precision in detail, elegance, optimum combination of materials and colours and by transformation of regional expression elements, which provide the architecture with an original appearance. **The timelessness** could be paraphrased by the abovementioned “smart design”, which integrates research and its results into the everyday life. It is through the application of modern materials and their use in intelligent facades that we can shape the “new expression of the philanthropic industry”. Not only the form, but also the technical aspect of work must be new, with the properties of composite materials being upgraded and modified [3].



Fig. 15 Interesting combination of materials



Fig. 16 Modern wood construction and coating structures, Wood store, Austria

4 Conclusions

Apart from the aesthetic qualities, the use of suitable materials has an impact on the living and working environment, influences the well-being of the user (worker) and his health.

The ecological aspect cannot be neglected either – through the use of available domestic raw materials and through the utilisation of particularities of the individual materials and modern construction methods, it will become part of the persuasive architectural modelling, which envisages the creation of a sustainable quality architecture for industrial production.

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