

Anthropogenic Conditions of Production Areas

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Abstract: The Industrial facilities directly or indirectly are used for production of various goods. Besides basic facilities for manufacturing (preparation, production, packaging), here also includes storages (storage for raw materials, warehouse for finished products), technical and administrative, and ancillary facilities. The range of production ranges from intensive heavy industry until "Smart" highly automated, light industry with relatively few harmful substances. Accordingly, there are different requirements of the project: if traditional factory hall is no longer an object of production is enough to keep "corporate identity" by recognizing the values and establishing cute workplace-oriented communication. Shaping the space and the performance of the composition of the industrial complex is a product of aesthetic imagination or creativity particular architecture. The composition of the industrial complex must have a clear reflection of the strict and properly placed over the technological process of production, and must be a synthesis solution of industrial organization, a (primary) side and the architectural composition from another.

Keywords: composition, industrial facilities, industry, manufacturing, shaping.

I. INTRODUCTION

Modern industrial production processes materials across a multitude of operating procedures in order of intermediate or raw material, the processing to obtain the desired final product. The material on the road from raw material warehouse through preparation and processing to final product goes through various operational stages. A number related phases mutually classified by industrial-organizational aspect of the working classes, and several such workshops or classes represent a certain technological process. Invariably, the production is a complex process associated with multiple secondary or parallel processes, which means that during the production process is highly branched. For example, in manufacturing industry tools, the basic production process is the formation of high-quality steel, while in secondary processes include tempering, sharpening, forging and examination. Another characteristic example in the automotive industry where the basic process is more complex secondary processes in parallel: making the engine, making the bodywork and chassis, etc. All these major secondary processes in parallel followed by upholstery plants, locks, electric, painting and varnishing, etc., in order to end product to be incorporated in the final editing. Each production branch in the whole technological cycle has its own specificity in the production features and characteristics of the work environment. There are cases in which workers depart the secondary processes are separated by their needs and special units. Great diversity of operations of technological procedures, resulting in a separate grouping of related business processes into separate entities. On the other hand, every industry has a need for multiple tracking services, workshops, garages, administration, handy warehouses, laboratories and the like.

Defining the basic premise is a classic starting point in the construction of the plant. In preparing the draft of the base to define and systematize various parameters of the planned production facility. The project is processed in different degrees (conceptual sketch, trial design, rough design and final design). One aspect of planning is based space program as standardized functional scheme of the planned system, which serves as the basis of the draft - the project of the building. The design of the facility has developed specific. Due to the increased number of non-specific projects (egg. A founding centers) while developing production and manufacturing systems, design increasingly becomes the basis of the project, as opposed to flexible concepts that remain in the background.

II. NEEDS OF INDUSTRIAL ZONES

- Basics of design: The design of industrial facilities subject to numerous laws, ordinances, directives and regulations. Despite public construction law here primarily includes environmental protection, safety at work and fire protection. In addition, it must take into account applicable laws of each country, as well as additional specific provisions imposed by production.
- Life cycles: Analog of the life cycle of a product, industrial facilities subject to specific economic life stages (fig.1).

Product						5 years
Creating market		Introduction	Market growth	Maturity	Market saturation	Falling market
Idea	Projecting	Construction	Usage		Conversion	Demolition
Facility						25 years

Figure 1 - Product life cycles (above) and objects (below)

Anything shorter production cycles (5-7 years) contradict the lifetime of the usual facilities. Aspects reallocated, issuing rent and value in re-selling to a large extent, determine the design of industrial facilities

- Typologies: From typological aspect differentiates additive and integrative structures. Additive in buildings, the individual functional units appropriate shape according to the needs and added forming a flat or simple compositions (often in terms of area access). Units may separately to expand, develop and change. In integrated buildings, functional units are built in neutral building structure (Fig.2).

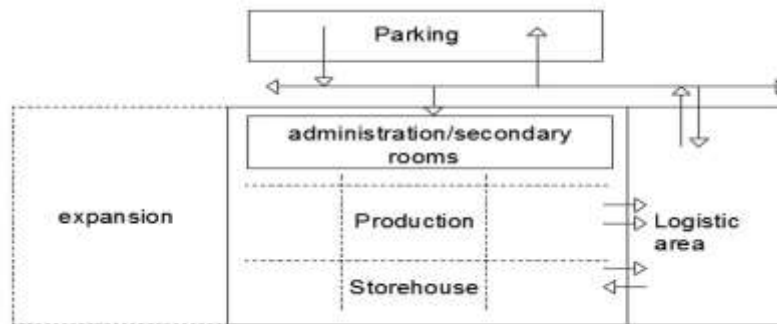


Figure 2 - Integrated typology: "open - work space" ("open -workplace")

The advantages lie in minimizing the areas to be covered, and the possibility of change. The possibilities for expansion must be provided in the conception of the architectural structure.

- **Production:** The production is a spatial / temporal use of labor and means of production to produce products and services. The required effect of production (work / unit time) is considered a material effect and consists of human labor (motor and Information Industry) and the effect of the machines. Throughout the production cycle, humans and machines complement. During production recognize various forms of production and design in the form of flow diagram. The human effect is not constant but subject to numerous internal and external facts (load - fatigue - rest, age, gender, health).

1. Foreign trade zones with greater flexibility, less costs, improved compatibility.
2. Reduced transportation costs.
3. More efficient production lines.
4. Flexibility on the market.
5. Protection of property rights.
6. Quality control and branding products.
7. Safety of products.
8. Delaying or cutting costs.
9. Improving communication.
10. Savings by reducing errors, reducing debris, loading and unloading, the return product.

III. ZONING OF THE INDUSTRIAL COMPLEX

By composing the industrial complex, actually is handled internally zoning of certain groups of facilities and installations with common technological characteristics and related purposes. The zoning is necessary not only to ensure the normal course of production with good organization of space, but also because by singling out certain groups enables the required isolation, which would prevent unwanted mutual influences or transferring risks (fig.3)

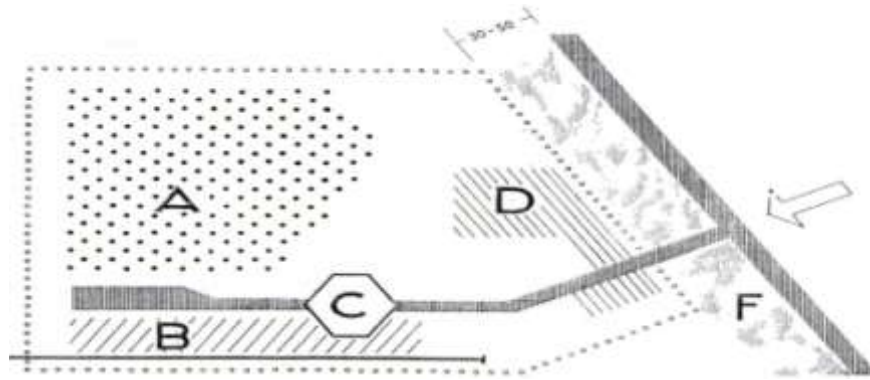


Figure 3 - The scheme of zoning of the industrial complex: **A.** Production zone **B.** Storage area **C.** Energy Zone **D.** Zone with accompanying facilities **E.** Green Belt. Isolation towards the main thoroughfare

Each industrial complex, regardless of the technology or capacity, contains four major zones or groups of objects:

A. Production Zone - the largest zone of built area and volume. This area comprises all areas of basic workshop production cycle, all primary and secondary technological flow of production.

B. Storage area - a group of buildings and open fields designed for storage of materials of any kind: raw materials, auxiliary materials, finished products, fuels and lubricants, spare parts, chemicals and packaging.

C. Energy Zone - objects which are produced or processed propulsion equipment designed to process materials from the basic technological process, as well as plants for heat production: boilers, thermal power plants, heating plants, gas generator halls, compressor stations, transformers, water towers, air conditioners and so on.

D. Zone with accompanying facilities - group of all other objects that do not belong directly to primary production, and include: services for the maintenance, management and protection of workers; administration, design and construction firms, laboratories, garages, workshops, lockers for workers, cafeterias, ambulance, access control and parking lots.

All areas of the industrial complex are clearly separated, especially the area of accompanying and support services, while others may be in contact, but never mingle and overlap. Because the order of fabricating cycle, the production work area is directly dependent on storage due to supply materials. Given that the work area receives material processing exclusively through the storage facilities it makes clear the fact that these two areas should be linked to the street for cargo vehicles. Some heavy industries such as metallurgy industry, such transport is included with regular wagon line, internally organized in the complex.

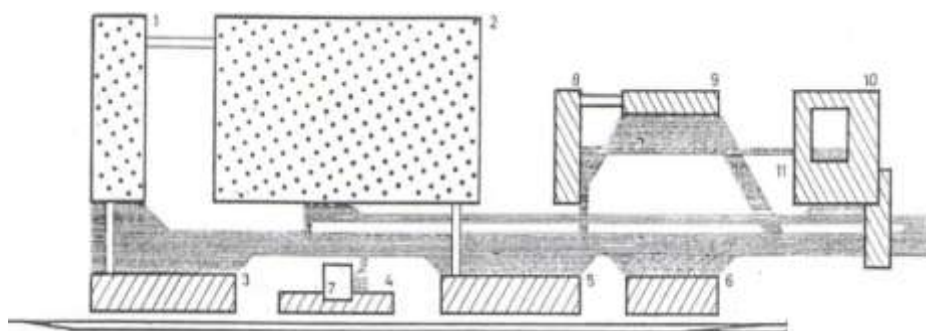


Figure 4 - Organization of complex industrial zoning

1. Preparation 2. Main processing 3. Raw warehouse 4. Warehouse for fuels and lubricants 5. Warehouse for finished products 6. Warehouse for technical material 7. Boiler room 8. Repair Shop 9. Garage and fire protection 10. Access control clinic 11. Administration - administrative building

The energy area is also correlated with the repositories, and often in its nearby area (or directly connected). The reason for this is the reduction of fuel consumption. Boilers, power plants and gas-generators halls are in direct contact with the storage of coal or fuel oil, as well as storage of waste incinerated. The need for connection of energy facilities and installations in the storage area should be strictly investigated and controlled, especially when it comes to processing industries where highly flammable materials. Boilers and

gas-generators plants are potential causes of fire hazard due to high operating temperatures, the possibility of arcing and possible explosions.

The items of auxiliary services, is the zone of accompanying facilities extending from the entrance to the industrial complex to the production area. At the entrance are situated the administrative building and access control (security rooms...), Laboratories and a design-construction bureaus, and penetration to the production area to locate facilities maintenance. Unique rooms, although fall into this group directly linked to the production area, the premises need of workers (wardrobes with toilets and shower rooms, cafeterias, mess hall).

Concessions exist in the storage area. The underground repositories often contain fuels, chemicals and flammable liquids are separated from the storage area and carried out in the most "lonely" place of the complex. Another concession represented and performance etc. mini warehouses, handy warehouses or part of the production area containing daily amount of supplies.

Discounts clearly grouped grade and technological zones occur in the production area and when during production their jobs with their features obstruct others or they represent some potential danger. Such work places or complete units with this feature peel of main gauge of the production area in a manner similar to the storage area for fuels and lubricants.

The ratio of the intensities of individual Zoning in the industrial complex, since the individual production branches are unequal. In all industries, a common feature is that the Group's production facilities has the greatest volume and usually is more than 50% of the total building area in the complex.

However, there are industries where this takes precedence storage area, for example, the timber industry needs a much larger area of storage warehouses and land than the production hall. Walter Henn, in his paper "*Industrienbau*" provides data on some of the largest industrial facilities and percentages of built space on a particular area of the same:

Industry	PRODUCTION ZONE (%)	WHEREHOUSE ZONE (%)	ACCOMPANAYING FACILITIES (%)
Bindery, Basel, Switzerland	73.3%	11.3%	15.4%
Radio-Industry, Hague, Netherlands	93.3%	1.4%	6.3%
Factory For Mining Machinery, Johannesburg, S. Africa	44.0%	32.0%	24.0%
Factory For Paints And Varnishes, Sasenhajm, Netherlands	52.2%	26.0%	21.8%
Chemical Industry, Rotterdam, Netherlands	69.4%	0.0%	30.6%
Cigarette Factory, Zevenar, Netherlands	77.3%	22.7%	0.0%
Tea Factory, Rotterdam, Netherlands	81.2%	0.9%	17.9%
Factory For Electropumps, Gateshead, U.K.	64.6%	14.6%	20.8%
Pharmaceutical Industry, Karlsruhe, Germany	57.2%	9.0%	33.8%
Automotive, Wolfsburg, Germany	50.7%	26.0%	23.3%
Milk Factory, The Hague, Netherlands	83.6%	0.0%	16.4%
Aero Labaratory, Amsterdam, Netherlands	61.5%	4.1%	35.1%

Table 1

A necessary aspect in shaping the composition of the complex is a clear and visible difference on objects of different areas, achieved by diversification of shaping structural expression and assembly, and to allow relatively easy spatial differentiation of individual groups. At the same time, it is one more reason why you should avoid mutual overlaps in certain areas. Even when dealing with industrial architecture etc. block system, which sparks the storage and accompanying facilities are united into a single object, and all the functions are combined into a whole, the individual groups are intended to be completely isolated among themselves as physical and technical safeguards and secondary auxiliary devices. In these cases there is no difference in the architectural structure or form, because all uses are solved in a constructive system in the same shape and composition.

IV. PHYSICAL SHAPING OF INDUSTRIAL COMPLEXES

Based on the zoning, composition and organization of the complex can be performed in several ways, and in other common architectural and urban groups. However, regardless of system construction or compositional form industrial complex must always keep delineations of individual areas, whether they are freely spatially distributed and completely isolated, or their separation is performed with only the internal organization of space a facility. And the smaller industrial facilities, is when the building can be arranged in the ground or simply G + 1 (ground floor + one) decision rule on physical separation and grouping of four main functions: production, storage, tracking features and plants.

Spatial organization of industrial complexes and in shaping their compositional whole depends on several factors:

- The available area on the ground
- Placement of the technological process during production
- The design possibilities for shaping spaces
- The nature of the production cycle and belonging to a certain industry (extractive, heavy, energy and light manufacturing)
- Production capacity
- Similarity or heterogeneity of individual work environments
- The extent of the hazards and dangers of physical-chemical emanations of the individual stages of processing and installation
- Frequency of internal and external transport connection
- Static-dynamic effects of the machines
- Configuration features of the site
- Climatic characteristics of the region
- The degree of automation, programming and production control
- Investment and power amortization period depending on the value of products

There are cases where the above factors do not always strictly determining human some of the implementing systems and organizations of industrial areas, particularly when it comes to easy processing industry, where greater emphasis include architectural and construction issues and conceptual, compositional attitude of the architect, and when an important problem appearing ambient fit. In suburban complexes, or in production plants directly embedded in the very urban tissue, spacious and panoramic conception decisive factors for the selected system, sometimes even completely discarding the aforementioned factors.

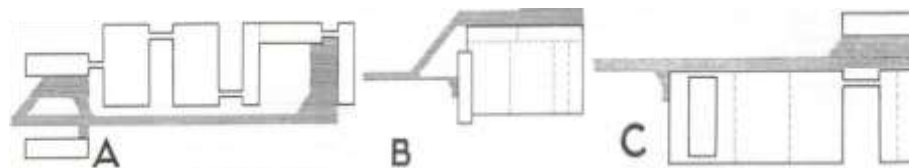


Figure 5 - Basic systems of spatial shaping industrial complex

Pavilion system B. Block system C. Mixed system All three schemes in fig.5 are assembled from the same components - seven used surfaces made variants of solutions in order to come to the desired combination. This proves great possibility for variation of the basic concepts to transition to a completely different compositional system of spatial organization, if it so permit or require certain technological processes of production.

V. CONCLUSION

Industrial complexes are planning organized groups of buildings and installation facilities optimally organized compositional spatial architectural whole.

Each industry itself represents a whole organism composed of multiple operational units that perform special services more efficient production of the final product. The most important service in any industry is the technical workflow of production or production plants, organized in special facilities - production halls. Logically, besides them there and support services that perform various roles that help in the success of the entire process, and that require special facilities or spaces. These are energy facilities, warehouses and storage areas, as well as overhead facilities which include service departments for all manufacturing processes separately.

Depending on the number, capacity and necessary area of the buildings and in correlation with the terrain is formed industrial complex, it can be developed pavilion type or compact, block-type system. The two main types of architectural organization of the complex have their advantages and disadvantages. Therefore, in most cases they used combinations thereof, which is in a mixed system of construction which optimally use the building plot and successfully perform all the necessary segments of the manufacturing cycle. Some heavier industries, the complex is organized as an open, machine installation, in which objects of classic type of performance only receive administrative and overhead areas.

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