

Styles of Prototyping ... Prototyping and about Layout

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Abstract. *The article contains information on the technique of prototyping and modeling objects in architectural design. Specific functions of prototyping, classification, prototyping operations and compliance with regulatory rules in design are considered.*

The materials and equipment required for making three-dimensional models are indicated.

Keywords: *aerodynamic, layout, texture, functional.*

Introduction. Implementation of the artistic concept at the object is called prototyping and the result is the same as appearance of an industrial product. Unlike drawings, pictures, and others, the model (layout) gives a complete appearance of the item being created. The layout can be seen in different ways by turning different direction or changing the observer standing. The layout can be separated into the details resembling a real object and re-collected them again.

The layout can be controlled by imitating the operator`s actions with the real object.

The main advantage of the layout is not to just to picture the design on a flat surface, but in volumes that are convenient in designing. Certain parts, errors which are connected with mutual arrangement of objects and some shortcomings can be eliminated before giving it to production.

The layout clearly shows the information about the mutual position of some parts of the item, its compliance with ergonomic requirements and so on, it also allows you to solve constructional and technological issues economically and purposefully. Prototyping reduces the process of creating a new product significantly compared to a blueprint – production time is almost halved and the quality of the project is significantly improved.

The layout ensures the effectiveness of the implementation of the developed project due to the fact that labor costs and time required to eliminate defects in the layout are disparately reduced in comparison with experimental samples of products made from real materials. Layout allows workers and experts to study a future production facility during the design process long before its experimental prototype is ready.

Thus, it allows to carry out prototyping activities (formulation and implementation of ideas, fulfillment of technical specifications and requirements of standards, identification of options and so on) and apply its results (determining the feasibility of ideas and proposals, taking into account of experts) simultaneously.

No matter how interesting every idea or every proposal at first glance, it cannot be implemented until its layout is designed.

These advantages of the layouts have been known for a long time. For centuries, inventors have not known any other form of presenting their ideas other than through a layout. It is difficult for an inventor to understand what will come out of his idea without working on a layout. Successful testing of the layout will be the basis for the issuance of drawings. In addition, the model allows to define the technology for the production of the product additionally.

During the manufacture of handicrafts, layout is rarely used in connection with the design of items.

Only in the 18th-19th centuries, due to the need to increase the scale of production and reduce the timing of their production, it was necessary to introduce a different, current procedure for design work.

First, a design drawing of the product was developed and its main dimensions were analytically determined, and then working drawings were prepared. Layouts are designed to study specific issues such as aerodynamic properties of objects, construction and operation of structures that are difficult to calculate analytically.

The layout of the created product is rare and it is made on the basis of ready-made working drawings. This layout made it possible to identify some of the shortcomings of the design work, make some changes to the drawings, but did not affect the quality of the consumption of goods.

This arrangement meant that the layout was forgotten, creating uncertainty about the practical benefits of layout.

With the advent of artistic design as a design activity, prototyping has become an integral part of it, and layout has become an integral part of a completed project.

Basic section. Layout - from Italian "macchina" - means a draft design. This is a reduced copy of an architecturally designed or existing structure, ensemble or architectural complex. Layouts are made from such products as plaster, wood, plastic, cardboard, keeping their original appearance. Layouts are used for inspection and revision of architectural projects. It is also a key part of the architectural museum exhibit.

The period of making layouts and their use was mainly developed when the construction of buildings, large-scale buildings - palaces, temples, parks.

Prototyping is a method and process of volumetric construction of objects, their parts and details. The layout gives the designer-constructor visual information about the product being created, allowing him to draw conclusions about the design process, its intermediate and final results in accordance with the project assignment. Prototyping is a form of project-related simulation. It allows you to gain additional knowledge about the object being created, to carry out the design in such a way that its results meet the requirements of the highest level.

A layout is a large-scale material image that provides information about specific aspects of the designed object (dimensional-spatial structure, type and texture of surfaces, dimensions and proportions, etc.). The layout is fully or partially made from special materials. Layouts differ depending on the degree of approximation to the real product, the ratio (scale), materials used. A layout that best represents (imitates) the appearance of an industrial product and some of its functional qualities is often called a model in engineering and design practice. The concept of a model has a wide meaning both in the field of design and beyond it (a graphic representation of a product, the requirements for it are also called models). Therefore, it is appropriate to call all volumetric material images used in design as "layouts". The model can simulate one or another quality of an industrial product according to the terms of the project assignment.

In the artistic design process, a variety of products are prepared, from a research layout, which gives an initial idea of the product being created, to a demonstration layout, which is the result of the design. Thus, the layouts capture the artistic design process, its intermediate and final results, reflecting the specifics of actions from the project idea to industrial design.

With the help of the layout, you can solve various problems such as creative (idea formation and development) and research (aerodynamics, durability tests, etc.). In the process of creating a layout,

calculated and normative data are used to bring it closer to an industrial product. In the process of creating a layout, calculated and normative data are used to bring it closer to an industrial product. To ensure the visibility of the layout, specialists from various fields are involved in the project team: ergonomics, astronomers, designers, technologists, economists and others. Unlike other materials of the project, there is the possibility of making changes, so any suggestions from experts can be quickly considered and taken into account in the design process.



Figure 1



Figure 2

Figure 1 The layout of the “Center of the Islamic Civilization”’s building in Tashkent.

Prototyping is inextricably linked with all professional means of artistic design. For this reason, prototyping and graphics are considered together in the developed art design tutorials.

The graphics are notable for the simplicity of the tools used, and at the same time ensures the speed of project research, allows you to quickly move from one idea to another, and most importantly, the project idea is expressed in the same way as it is formed in the designer’s mind. Under the influence of various factors, you can graphically dream up, change the idea of the project. Graphic models can be in the form of sketches, research drawings, demonstration drawings, design drawings. But closer to the artists is the study, which allows them to be convinced of the correctness and effectiveness of the solution found, reflecting the main aspects of the design idea for the goals and objectives of prototyping.

The most convenient material for such models is plasticine. It helps to reduce the time of the labor costs that is taken for preparing layout in selected scale and material, quickly complete the work, and also develop several versions of the layout for comparative analysis in a short time (**Figure 2**).

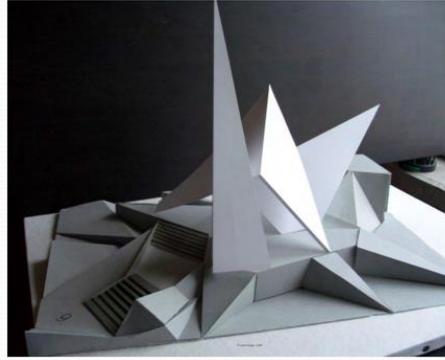
Unlike plasticine, it is recommended to make a layout from paper at a scale that allows its properties to express the features of a metal sheet (Figure 3). In addition to plasticine, paper, fomox, Finnish cardboard were used in the modeling.



Figure 3



Figure 4



Picture 4. Layouts made of paper

The layout gives clearly visible information, the presence of graphic conditions in the figures is inevitable, which are understandable only to the author himself, representing his creative style. Layouts allow the designer to graphically work on a product in real-life conditions, while maintaining precise proportions, perspective and lighting. It is necessary to draw according to layouts, because in art design, perspective drawings are not performed, as in architecture. Such images can present an object from its best side. Decorations are relatively large so they can be clearly seen from different angles.

However, achieving artistically finished results in design requires a transition from continuous layout to graphic work.

Conclusion. During the process of prototyping, planning, dimensional solutions, floor plans and sections, facades, interiors, etc. are developed, also the use of building materials and structural systems that meet the requirements of regional and climatic conditions is determined. Aesthetic (artistic) tasks are solved simultaneously and in accordance with functional and technical and economic tasks.

Layouts and ideas expressed by architects and engineers based on the project will be implemented during the construction process. The quality of the layout will be known when the buildings and structures are handed over for use.

Currently, project documentation is mainly made by using computer-aided design systems (computer and special computer programs, including Autodesk AutoCAD or Graphisoft ArchiCAD). Computer-aided design offers tools for working with two-dimensional (2D) and three-dimensional (3D) graphics. The concept of a virtual building allows you to present both the external appearance and the internal space of the future object directly on the display or with the help of a projector.

The benefits of introducing new computer technologies into modern design and layout require professionals to be able to work in complex software environments, which will require time and additional skills.

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