

# Ergo-Design of Industrial Products

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## **Article Info**

**Volume 81**

**Page Number: 4427 - 4430**

**Publication Issue:**

**November-December 2019**

## **Article History**

**Article Received: 5 March 2019**

**Revised: 18 May 2019**

**Accepted: 24 September 2019**

**Publication: 21 December 2019**

## **Abstract:**

This article outlines the development of ergonomics, design in mechanical engineering, discusses the main role and importance of design and ergonomics in the integrated design of products and production in general. The tendencies of formation and new developments in this area are considered. The study of materials suggests that ergonomics, design are among the most important areas and functions in the machine tool industry.

**Keywords:** design theory, ergo-design, ergonomics, innovative technologies.

At present, industrial design can be understood as the activity of creating objects and forms of organization as a product of project activity. Industrial design is characterized by mass production of industrial products, therefore, mass consumption. In this regard, the design direction is

determined, which involves the introduction of computer technology, which is reflected in the diversity of product shapes.

The production includes such concepts as computer design, electronic environment design, interactive design.

Material production becomes automated, computerized, virtual, so the design turns into another area.

Today, the model of any machine or production environment can be represented as 3D - design, where various adjustments that relate to dimensions, materials, shape, texture, are reproduced virtually.

In certain programs it is possible to calculate the anthropometric features of a person. In this regard, we consider the role of ergo-design in the machine tool industry.

Developments in the field of ergonomics can help improve the efficiency of human activity in the "man-machine-subject of activity-environment" system, provided that the health of the person is preserved and the prerequisites for developing him as a person and subject of activity are created.

Design and production of quality high-tech competitive products that meet a variety of modern requirements are possible on the basis of advanced efficient technologies, including the use of the latest design and ergonomic achievements.

Such progressive technologies include ergo-design, which is a new type of project activity, different from the traditional ergonomic and artistic (design) engineering. Ergo-design as a scientific category is consistently asserted in the field of design and in the circles of ergonomists, which naturally reflects on the strengthening of its scientific and practical significance.

Currently, ergo-design becomes an integral part in the field of design development of industrial products. The design seeks to fit into the conditions of a market economy, where the degree of ergonomic factors primarily affects the demand for products.

Work on the product or environmental object should begin with an analysis of its purpose and operating conditions. After that issues with a design, a form and material are solved. Modern methods and design tools in industrial production

are based on the biological, physical, psychological, hygienic requirements of humans.

At all stages of development, design and ergonomics are combined into a single holistic system, that is, a systematic approach based on aesthetics and ergonomics. Here we note that the design of the industrial product is carried out taking into account the environment. Hence the following relationship: product - person - environment. Ergonomics in this context predetermines the design decision of the future product.

This implies the essence of ergo-design approach, which provides for the phased solution of problems due to:

- familiarization with the list of requirements for the designed facility and its operating conditions
- study of ergonomic requirements, as well as various factors, relationships and relations of the initial situation
- analysis of prototypes and analogues;
- experience with simulators;
- design modeling.

Ergonomics is inherently connected with design, one of the main aims of which is the formation of a harmonious objective environment that meets the material and spiritual needs of man. At the same time, not only the properties of the appearance of objects are studied, but also their structural connections, which give the system a compositional and functional unity [5].

On the basis of psychological, hygienic and other standards, the corresponding requirements for new items or equipment are developed, so that they ultimately turn out to be convenient and comfortable to use. Comfort, excellent functionality and attractive appearance - all these requirements for the created objects can be provided only with a competent combination of ergonomics and design [3].

As a result, the personal interpretation of the social meaning of the product and its

implementation, which ensures the functioning and aesthetic impact, is revealed.

Every object has a specific function, i.e. it is designed to meet the needs of users, in addition, the objects of the material environment stimulate the subject to act in accordance with certain value orientations, so the significance of the subject covers two principles - benefit and beauty, each has a technical and aesthetic foundation [4].

On this basis, the design encompasses the design of the subject of ergo-design research in all its aspects, including:

1. Analysis of the purpose, conditions and methods of using the product - functions, customer requirements, the environment.
2. Shaping, in the course of which the technical characteristics are determined - design, material, form, technology.
3. Market requirements.

In this work, I would like to focus on shaping in ergo-design.

The concepts of form, integrity, structure in design are integrated with the characteristics of industrial products. In order for an industrial product to be functional in the true sense of the word, it should, in addition to practical, utilitarian requirements, meet the requirements of semiotics, the requirements of conformity of the shape of the product, the cultural context of the environment.

Thus, the art form in design as an aesthetic appearance of a work can be viewed from several positions:

- the relationship of the structural and compositional elements of its external shape
- subject-expressive elements in space and the internal content of the function;
- dynamic interrelation of professional categories of empiricism, methodology and theory, simultaneously reflecting the subject and the designer's activities;
- a kind of spiritual and aesthetic synthesis that detects and reveals the functional

aspect of the form through the reflection of the beautiful [4].

The process of shaping in design is inextricably connected with the creation of the original image of a thing or the construction of a figurative series of forms of the designed environment. The choice of form is based on the function of an industrial product, its most important characteristics are ease of operation, ease of handling a thing, ease of maintenance, functional clarity and safety of operation, clarity in the information communicated by a thing. Based on the noted characteristics, such aspects of the form as structure, figurativeness, texture, color, etc. are solved. [1].

If the designer speaks about the beauty of the thing, he finds in it such volumes, surfaces and lines that are characteristic of many beautiful objects, and these forms are the carriers of this elusive beauty. This is how the stylization of form arises - an attempt to give it formally beautiful features that are not related to the function and material basis of the product [2].

The artistic form as an external shape of an object merges with the concept of an artistic language oriented towards specific sensual means: texture, dimensionality, proportionality, etc. Any theory or idea can be produced by the designer in the form.

The complexity of technical innovations in the modern era of high technologies initiates an active search for multivariate shaping methods, one of which is the transformation of structures. The use of computer technology enriches the possibilities of designers to a degree that cannot be achieved by other ways. The idea of man about the world and the processes occurring in it.

When organizing an optimal subject environment, the designer, in addition to knowledge in the field of design, must possess the theoretical foundations of social psychology and the psychology of work, be aware of the variety of forms of manifestation of human activity. Person-oriented design, ensuring the unity of

convenience, comfort and beauty of the means and conditions of life, is based on the modern design language using the latest computer technology [2]. If we consider the environment, then as an example, you can directly represent the workplace in production, which, for productive activities, should primarily correspond to ergonomic and anthropometric indicators. Convenience, practicality, safety, these factors determine the filling space. The calculation of functional occupancy depends on the type of workplace of a person in production, equipment, his movements in the process of work, taking into account the locomotor centers. Conducting research and making calculations, as a result with the help of ergodizayn we harmonize anthropometric and technocentric systems. As a result, productivity increases by reducing human fatigue [3].

In conclusion, we can conclude that ergodizin designates not only the form of activity, but also the image of thought, since it subordinated all the declared cultural values to its main link - the self-worth of the human personality. Accounting for human factors has become an integral part of the design of all environmental objects and consumer products, thereby having a positive effect not only on the culture of material consumption, but also on the culture of the individual and social consciousness of the population, that is, on the general level of quality of life [5].

And it can also be noted that the ergodic design of an industrial product should provide convenience, safety of the product on the one hand, and on the other hand, consideration of ergonomic indicators associated with anthropometry, human motor capabilities, the structure of the human body, visual perception and sensorimotor reaction.

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