The world's Latest Mechanical Design Concepts

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Abstract: According to scholars at home and abroad to carry out mechanical design product design features of the main ideas, product design method of the program summarized as systematic, modular structure, based on product characteristics of knowledge and wisdom. The characteristics of these methods and their organic connection between them and put forward to achieve the computer product design direction.

Key words: Mechanical Product Design Method

Development Trends Design documents will be Semantic Web as a design tool in the design of its Semantic Web activity of the development of ASK, using nodes and lines to describe the design a network, nodes that components of the cell (such as design tasks, functions, components or processing equipment, etc.), used to adjust the lines and definitions between nodes of different semantic relations, thus the design process all the activities and results of pre-built models so that the definition of the early design requirements to the specific description of each structure can be defined by the relationship between the expression, achieved a computer-aided design process, the leap from the abstract to the concrete.

A systematic design method

The main features of a systematic design method are: the design as designed by a number of elements of a system, the independence of each design elements, each element of an organic link between the existence of, and is layered, with all the design elements , you can design systems to achieve the required task.

Systematic design idea in the 70's by the German scholar Professor Pahl and Beitz, the system based on the theory they developed a general pattern of the design,

advocacy design work should have organized. German Engineers Association, on the basis of this design concept to develop a standard VDI2221 technology systems and product development design methods.

1. The user needs functional characteristics as a product concept, structure design and part design, process planning, job control, etc. based on the macro from the product development process of starting the use of quality function deployment method and system to user demand information reasonably and efficiently converted to the various stages of product development, technical goals and operational control procedures method.

2. The level of the product life of the organism as a system, and means of living systems theory, the product design process can be divided into successful hierarchy of needs to achieve the functional requirements of the conceptual level and product level of the specific design. At the same time life-support systems used to express the abstract icons of the product functional requirements, system structure formation of product features.

3. The mechanical design of the application of systems science into two basic questions: First, to be designed as a system dealing with the products, the best way to determine its component parts (modules) and their mutual relations[1]; is the product design process as a system, according to design objectives, a correct and reasonably determine the various aspects of the design work and various design stage.

Because each designer's point of research questions and to consider the question of emphasis, to design a specific research methods used is also different. Here are some representative of the systematic design methods.

4. Design Element Method

With the five design elements (functions, effects, effects vector, shape, elements, and surface parameters) describe the "product solutions" that a product to determine the value of the five design elements, the product of all the features and characteristics of the value of i.e. determined. Scholars in China have adopted similar methods designed to describe the product's original understanding.

5. Graphic modeling method

And developed a "design analysis and guidance systems" KALEIT, with the level of clear graphic description of a product's functional structure and its associated abstract information, to the system structure and function relationship of graphical modeling, and functional connection between the layers [2].

Assistance will be designed to be divided into two aspects of methodology and exchange of information using the Nijssen Information Analysis Method can be used graphic symbols, with a rich semantic model structure, can be described as integration conditions, can be divided into types of constraints can be achieved in relations between any combination of characteristics , the design method to solve integration and information technology to realize the design process of information between different abstraction layers between the graphical modeling.

6. "Concept" - "Design" method

Product's design is divided into "concept" and "design" in two stages. "Concept" phase of the task is to find, choose and mix to meet the requirements of the original understanding of design tasks. "Design" stage of work is a concrete realization of the original understanding of the conceptual stage.

Of the program's "idea of" specific described as: In accordance with the appropriate functional structure, seeking to meet the design requirements of the original understanding of the task. The functional structure of the sub-function is performed by the "structural elements" to achieve, and "structural elements" of the physical connection between the definition of a "feature vector", "feature vector" and "structural elements" further the interaction between the formation of the functional diagram (mechanical diagram). The program "design" is based on functional diagram, the first qualitative description of all of the "feature vector" and "structural elements", and then quantitatively describe all the "structural elements" and the connection parts ("feature vectors"), the shape and location to be structure diagram [3]. Roper, H. using graph theory, by means of which he defines as the "total design unit (GE)", "structural elements (KE)", "functional structural elements (FKE)", "connect structural elements (VKE)", "Structural Parts (KT)", "structure element part (KET)" concepts, as well as describe the structure element size, location, and transmission parameters of the

interactions between a number of kinds of schematics, the intuitive design professionals have done a formal design method a description of the formation of an effective application of existing knowledge, methods, and applied to "ideas" and "design" stage.

7. Bond Graph Method

Function of the composition of system components will be divided into produce energy, consumed energy, changing energy forms, such as various types of energy transfer, and to use bond graphs to express the function component solution, hoping to function-based model and bond graph combine to achieve functional structure the automatic generation and functional structure with the bond graph automatic conversion between the search for bond graph generated by a number of design methods.

To promote the product on the basis of functional analysis, the product has some features broken down into one or several modular basic structure, by selection and combination of the basic structure of these modular form into different products. These basic structures can be parts, components, or even a system.

The structure should have a standardized interface (connection and co-operation department), and is serialized, universal, integrated, hierarchical, agile, economic-oriented, with interchangeability, compatibility and relevance. China's combination of software component technology and CAD technology, variant design combined with the modular design, according to modular principle of classification, will be divided into descending Machining Center Machine Tool product level, component level, component level and component level, and use expert knowledge and CAD technology to combine them into different species, different specifications of functional blocks, and then by the combination of these functions into different modules of the overall program processing center.

To design a directory as an alternative variation of the mechanical structure of the tool, the solution proposed by the design elements of a complete, structured layout, the formation of the solution set design catalogs. And in the solution set designed to comment on each one listed in the directory solution additional information, is very

beneficial to design engineers select solution elements.

The vigorous development of network technology, collaborative design and manufacturing, as well as the product from the user's functional requirements → design → processing → assembly → finished product of this realization of concurrent engineering possible. However, an important prerequisite to achieve these goals one of the conditions is to realize the effect of product design three-dimensional visualization. To this end, three-dimensional graphics software, more and more intelligent design software programs used in the product design, virtual reality technology and multimedia, hypermedia tools for product design is also its first debut. At present, Germany and other developed countries are focused on research hypermedia technology, product data exchange standard STEP, as well as standard virtual reality modeling language based on a standard exchange format for virtual environments) in the product design applications.

Mechanical product design is moving in computer-aided realization of intelligent design and to meet the needs of distributed collaborative design and manufacture of direction, due to the computer product design Study on the implementation started late, not yet mature, to achieve the above objectives program design tools [4]. Author believes that the integrated use of paper, four types of design method is an effective way to achieve this goal. Although the integrated use of these methods are more involved in the field, not only with the mechanical design of the field-related knowledge, but also to the systems engineering theory, artificial intelligence theory, computer hardware and software engineering, network technology areas such as domain knowledge, it is still product design must be working for. Abroad in research in this area has achieved initial success, our scholars have been aware of CAD design technology and the importance of international exchange and cooperation, and its measures to be taken.

Feature-based design methodology of knowledge The main features are: using a computer can identify the language to describe the characteristics of the product and its design experts in the field of knowledge and experience to establish the appropriate knowledge base and inference engine, re-use of stored domain knowledge and the

establishment of the inference mechanism to bring computer-aided product design.

The mechanical system design is mainly based on the characteristics of a product, and design experts in the field of knowledge and experience to push volume and decision-making, the completion of body type, the number of synthesis. To achieve this stage of computer-aided design, must study the automatic acquisition of knowledge, expression, integration, coordination, management and use. To this end, the design and scholars at home and abroad program for the mechanical system design knowledge of the automated processing done a lot of research work, the approach can be summarized into the following several.