

Application of Virtual Sample Technology in the Field of Engineering Machinery

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Abstract

In the context of global economic integration, the competitive pressure of industrial machinery product market is increasing. At this time, in order to guarantee product quality and application performance and reduce the research cycle and cost of actual development and design, it is necessary to rationally use virtual prototype technology in the field of industrial machinery. In this way, not only can the virtual design method be used to clarify the performance of the product at the initial stage of design, but also on the basis of specifying optimization parameters, reduce the risk of product development and improve product performance. Therefore, on the basis of understanding the concept of virtual prototype technology, the application direction in the field of construction machinery is clear, and the development prospect of virtual prototype technology is clear.

Keywords

Virtual prototype technology; Construction machinery; Development process; The overall structure.

1. Introduction

Nowadays, in the face of more and more kinds of construction machinery, relevant products are under increasing competitive pressure in the market. At this time, enterprises need to pay attention to the development and application of new products and technologies if they want to occupy an important position in the market construction. Especially in the era of big data, with the comprehensive promotion of computer technology, construction machinery industry emerged a new technical force. Therefore, the rational use of virtual prototype technology can not only reduce the application risk of product development, but also simplify the application cost of actual production design, and promote the construction machinery products to meet the diversified needs of the market.

To put it simply, virtual prototyping technology, as a new technical concept integrating multiple disciplines, can provide a research platform with computer virtual reality as the core for product design research on the basis of constructing mathematical model of mechanical system [1]. Therefore, virtual prototype is also called digital functional prototype. The application of virtual prototype technology in the field of construction machinery can not only serve as a new mechanical product design concept, but also promote the application of computer technology.

2. Application of virtual prototype technology in construction machinery field

2.1. Basic Connotation

Below our country engineering machinery sector development trend analysis shows that the development of new type construction machinery would be affected by product performance, but in the virtual design environment can directly use of the unique advantages of visualization,

integration design technology, structural analysis, component assembly, let the designers system analysis of the overall look of engineering machinery product design and various constraints, Focus on the combination of product functions, geometric dimensions, interactive rapid modeling and analysis, directly modify the product model, the corresponding data can also be used for many times. As a new design concept, mechanical virtual prototyping technology has more application value than traditional simulation technology. On the one hand, virtual prototype technology pays more attention to the design and analysis of the overall system, and will effectively integrate virtual solicitation and environment to evaluate and analyze each design scheme of the product, so as to obtain the best scheme in optimization and improvement. On the other hand, although the traditional simulation system design presents the relevance and interaction of the product, there are many loopholes in the actual design, which can only be gradually discovered in the later stage of product development, which will inevitably waste more resources. By using virtual prototype technology, multiple subsystems can be designed and studied to ensure that mechanical products can be completed simultaneously in parallel design. At the same time, potential problems can be identified early in the design process, and the corresponding system test analysis can be seen as the main driving force of the overall product design.

Chart 5: Analysis of highway construction objectives in China during the 14th Five-year Plan period	
road	A concrete analysis
The highway	We will expand and renovate congested sections of the Beijing-Shanghai, Beijing-Hong Kong-Macao, Changzhou-Shenzhen, Shanghai-Kunming and Lian-Huo Expressways, speed up the construction of parallel and connecting national expressways, and advance the construction of expressways in the Beijing-Xiongan New Area and other areas. A total of 25,000 kilometers of newly upgraded expressways were built
Rural roads	By 2035, a rural highway transportation system with "reasonable scale and structure, high-quality facilities, effective governance and high-quality transport services" will be formed, and the high-quality development pattern of "four good rural roads" will be basically established

FIG. 1 Current development scale of Construction machinery in China

2.2. Architecture

Construction machinery belongs to the representative integrated application equipment at present. Virtual prototyping technology is used to construct the corresponding architecture in practical operation, which can be regarded as a content composed of multiple parts, including visual environment, virtual engine, product model and support platform. The operation flow chart is shown in the following figure. Taking the support platform of collaborative design as an example, it can build a collaborative design environment for construction machinery design, and has a number of tools such as project management and integration platform. The product model includes control subsystem model, mechanical subsystem model, product master model and so on, which is mainly used for modeling and analyzing the hierarchical design and appearance function of the product.^[3,4]

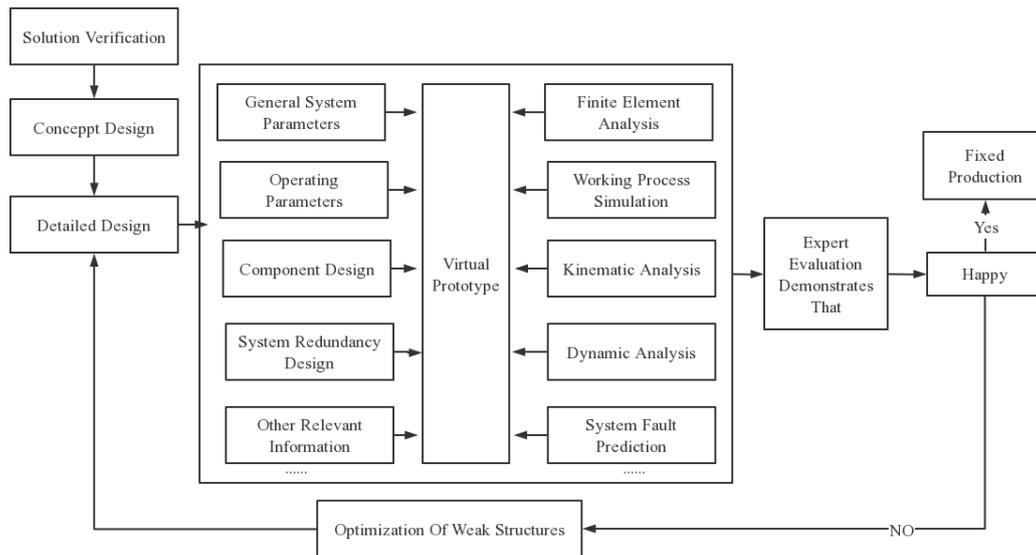


FIG. 2 Operation flow chart of virtual prototype technology

2.3. Development Process

The development and design of virtual prototype technology should start from the whole process of product demand to evaluation and test, and design virtual prototype in virtual environment by using related product development tools. From the overall point of view, this is a gradual operation process. Starting from the requirements of product development, select appropriate simulation tools to study the performance and function of virtual prototype, simulate and analyze the behavior of virtual prototype, and optimize and improve the modeling content of the whole life cycle of the product according to the simulation analysis results, and finally obtain the virtual prototype that meets the expected goals of the product.

2.4. Overall Structure

The application of practical engineering technology should start from the global point of view, and the relationship between all parts of the virtual prototype project should be accurately judged for the global problems of the system, so as to ensure the coordination of the operation of each subsystem, and then realize the overall goal jointly on the basis of sharing information resources. Generally speaking, the virtual prototyping technology in the field of construction machinery is divided into the following contents: first, the preliminary design scheme should be clarified; second, the detailed design content should be clarified on the basis of mastering the design concept; finally, the design structure should be improved and optimized in the simulation analysis. It should be noted that all parts of the work should be handled by professionals [2]. Due to the dependence of functional activities among various parts, in order to ensure the collaborative development of product development teams in the field of construction machinery and the exchange and sharing of various information and data, it is necessary to monitor and adjust the overall design process, so as to form a suitable parallel design working environment.

2.5. Development Prospects

In the continuous development of social economy, virtual prototype technology is more and more widely applied in the field of construction machinery, and will be improved in the following aspects in the future: First, virtual prototype technology effectively controls the whole cycle of product research and development, promoting the updating speed of enterprise products more and more quickly; Secondly, the application of virtual prototype technology in

the field of construction machinery can build a virtual environment, prompting enterprises to first define customer groups on the basis of mass production, so that not only can have more flexible choices in the market competition, but also can find more valuable information; Finally, the dynamic alliance is constructed. Product digitization can make enterprises use the Internet to quickly exchange product information, and on the basis of effective integration of information resources, strengthen the competition level of industrial operation.

3. Conclusion

To sum up, the development of science and technology has accelerated the economic level of industrial machinery field, prompting a large number of new processes and technologies to be applied in product design and production and manufacturing, effectively improving the application function of construction machinery. Therefore, while paying attention to virtual prototype technology, construction machinery enterprises should scientifically predict product performance and function according to their own long-term development goals, get rid of the limitation of traditional mechanical design mode, and gradually optimize their own application technology level, so as to adapt to the development needs of modern industrial machinery more quickly.

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