Virtual prototyping and its role in product design process

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Abstract:

At present, speed is a key factor in the design and development of industrial products, And In the light of modern technology, computer-based prototyping techniques have emerged in so-called advanced rapid prototyping as a solution to the modeling activity associated with design processes. But these technologies have disadvantages, such as the high cost of the models and the long time it takes for these models to be completed, The subject of the research came to the virtual prototyping as a modern technology through which the models associated with the design activity of industrial products, These models provide the speed required in light of the continuous evolution and changing requirements of the market, and also provide a low-cost solution suitable for adoption by major companies or small and medium-sized enterprises alike. The importance of these virtual models is evident when it comes to communicating as much information about design as possible with the simplest way and the lowest costs, Through these models can include everything related to the product of work theories and engineering drawings and three-dimensional models with physical properties that mimic the final product, Within the same application and this information induced by one of the images prepared on the computer programs, and thus we can share these models over the Internet and work on them remotely, which in turn contributes to shorten the time of the design process.

The importance of research is to shed light on the role of virtual prototyping as one of the basic elements in the process of design and development of industrial products, as the research aims to activate the role of virtual modeling in the process of product design and development and to include them in the design process as one of the basic stages' because of its usefulness, The hypothesis is that if virtual prototyping techniques and new technologies can be utilized in the process of designing industrial products in a creative manner, this ensures that the cost of model design and testing processes is reduced, as well as the opportunity to develop products periodically without incurring many expenses related to the production of physical models. The deductive approach was used to achieve this.

Keywords:

Virtual Prototyping, Products Design, Virtual Reality, Augmented Reality, Mixed Reality.

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An Introduction

Virtual modeling technology is one of the important technologies that shape the future for the field of design and manufacturing, however, many organizations, especially small and medium-sized companies, are confused when it comes to virtual modeling applications and the advantages it offers, as they think that this technology is complex and expensive for them. But as the cost of hardware and software continues to be reduced and technologies converge, virtual modeling is moving steadily towards reducing cost and finding the right application to suit the capabilities of small and medium-sized enterprises.

The term virtual modeling itself has been an element of the ambiguity surrounding what the technology is as it is already used in industry and describes many of the activities related to it. But the term virtual modeling is not limited to a program to simulate the behavior of a product as if it were real, but it is also a term to express the field of industrial product development, which exploits the capabilities of some technologies such as computer aided design (CAD) and the successful inclusion of remote communication technologies to build a stronger base To develop industrial products, which are based mainly on the existing cooperation between industrial designers, engineers, marketers and customers.

While virtual modeling technology can be described as a program in itself that achieves special goals, it is better conceptually to describe it as an amalgamation of virtual reality and computer-aided design technologies as they use the same technologies and interfaces, and these technologies in and of themselves have been available to industry since It has suffered for a long time and the problem of embedding and accreditation of it has suffered as a result of cost, complexity, integration problems with current systems, lack of experience and skills of designers, and lack of proper understanding of market requirements. Despite this, the growing interest in industrial applications of virtual reality and interest in computer-aided design to become a unified and global program for design, sheds light on the importance of including virtual modeling technologies and tools for what they have proven to achieve benefits for work and improve the competitiveness of institutions.

Research topic and problem:

The research problem revolves around the need to activate the role of virtual modeling in the product design process.

research importance:

The importance of the research is to shed light on the role of virtual modeling as one of the essential elements in the product design process.

Research goal:

The research aims to determine the strengths and advantages of virtual modeling technology in the process of displaying and modifying models, which helps to reduce the costs of model production during the design process.

Force search:

If it is possible to take advantage of virtual modeling techniques and technologies developed in the process of designing industrial products in a creative way, this guarantees reducing the cost of designing and testing models, in addition to providing the opportunity to develop products periodically without incurring many expenses related to the production of physical models.

Research Methodology:
The research follows the deductive method

Results

Through study and practical experience, the importance of virtual modeling in the process of designing and developing industrial products was confirmed. The results of research and experiment came as follows:

 The nature of the output for each type of virtual modeling differs in terms of including the physical reality and in terms of the degree and method of interaction with the product, so more than one type can be used in a single design process depending on the stage.

 Virtual models can replace the physical model and communicate the necessary information.

 Virtual models have more flexibility than physical models.

 The time taken to produce the virtual model is low compared to the physical model which has the same amount of detail.

 The form can be shared remotely by submitting the application and its target via the Internet.

 Virtual models preserve the privacy of companies as the design becomes inside the application instead of making a physical model.

 The default model can be downloaded with all its related explanations, drawings, video files and functional movements, and recalled when needed within the application.

Conclusion

Virtual modeling is a modern technology, based primarily on replacing physical models with computer ones and displaying them in more than one way, whether with augmented reality, mixed reality or virtual reality, and by including this technology in the product design process, it saves a lot of time, effort and costs related to creating industrial models.

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