Journal of Industrial Engineering and Applied Science
ISSN Pending | Vol. 1, No. 1, 2023

Mechanical CAD Development History and Outlook

Fanfen LI [1*], Qianli MA [1], Yonglin SHI [1]

[1] Chengdu Shudi Scientific Research Institute, Chengdu, 610000, China

**** Fanfen LI is the corresponding author, E-mail: fanfenli220@qq.com***

Abstract: China's CAD-assisted drafting career development is relatively late, but in recent years while developing the process of practice, China's level of CAD mapping, whether from the platform or from the software, drawing hanging techniques have made great strides in the development and significant step by step, in the visible near future, China's CAD-assisted drafting will be towards the direction of CADVCAM collaborative work, and further realize the Computer-aided design and manufacturing integration of the beautiful vision.

Keywords: Mechanical Drafting, CAD, Technology, CAM, Integration.

DOI: https://doi.org/10.5281/zenodo.8392618

1. Introduction

CAD technology, that is, computer-aided design technology, it is as an application of science and technology appeared in the public eye, the birth of its purpose is to simplify the current complicated manual drawing operations, to help designers to reduce the unnecessary workload and reduce the duplication of labor. Thus, we can think that the function of CAD technology is to help designers to design products and engineering, and in the design process to reduce manual labor, improve the efficiency of the design work, in order to reduce the cost of the design; at the same time, the large-scale application of CAD technology in production also helps to accelerate the development of the whole industrial chain, through these advanced design and manufacturing technology, we can use more advanced, more CAD computer-aided design technology, was born in the 1950s, after the rapid development in recent years, within the scope of the mainland of China, CAD technology has been used by most factories (the use of the degree of technical content and there are obvious differences), it can be said that CAD technology has blossomed in our country, with an unstoppable trend of rapid development. An unstoppable trend of rapid development.

2. The Limitations of the Traditional Mechanical Drawing

Before the emergence of CAD technology, we use the means of drawing called traditional mechanical drawing means, through the ruler drawing or other special drawing instruments to drawings. In the traditional mechanical drawing period, the constraints on productivity is the accuracy of the drawing problem.

We often encounter the same original drawings, after several imitation, imitation and original drawings produce large differences, and may appear fatal errors, which is the key factor leading to the traditional mechanical drawing, the quality of the drawings is not high, in order to avoid this kind of error, the designers must spend a lot of time to repeat the labor, which slows down the development of new products and product improvement.

The development of new products and product improvement. At the same time, confined to the traditional paper drawings of technical expertise, in the link from design - drawings - production, there must always be people who know the drawings of the whole process, which greatly improves the cost of production and production requirements, may result in overstaffing or slow down the progress of the development of these are not conducive to the development of an enterprise. From an objective point of view, the traditional mechanical drawing due to the use of tools is more backward, not capable of completing the task of complex blueprints within the specified time limit, that is, in the current social context, the mechanical industry, the product or production tool structure is becoming more and more complex.

That is, in the current social context, the mechanical industry's products or production tools are becoming more and more complex structure, through the traditional means of drawing the time consumed will be doubled or even geometrically increased, and even, some areas of the drawing is impossible to complete by hand (such as integrated circuits).

3. The Emergence of CAD Technology

At the end of World War II, in order to carry out

missile ballistic calculations, the United States developed a computer, in the aftermath, with the rapid development of computer technology, computers are used in science, industry, daily life in various fields, in the process, CAD technology was born quietly into people's line of sight.CAD technology development stage can be roughly divided into three generations: the first generation, single-function CAD technology, this generation of CAD function is relatively single, it is the core idea of the entire mechanical product design process is divided into several modules and then correspond to each module.

The first generation, single-function CAD technology, this generation of CAD functionality is relatively single, its core idea is to divide the entire mechanical product design process into several modules and then correspond to each module has the corresponding CAD software or technical means, and these modules are independent of each other is not common.

The second generation, based on the document management approach to multifunctional CAD, at this time, CAD manufacturers and users are no longer satisfied with the low efficiency of single-function CAD, seeking a way to link the various functional modules, so they use the data conversion method, the various individual modules of the CAD system into a multifunctional CAD system!

The third generation, based on the engineering database of the integrated CAD system, due to the second generation of CAD systems are still in use in the process of occupying resources is too high, too much redundancy, engineers need a more concise and efficient CAD system, so after a long time of exploration and experimentation, engineers have established an engineering database as the core and the basis of the integrated CAD system, that is, the system we use the prototype of the system now! We use the prototype of the system.

4. Today's CAD Systems

Today, we are in the market of common CAD systems can be graded as follows.

1. 2D interactive drawing system. The technology has been developed over a long period of time has been more mature and widely used.

2. Solid model-based CAD/CAM integrated system. The system will be three-dimensional wireframe modeling, surface modeling, solid modeling, three-dimensional assembly, two-dimensional drawing, engineering analysis, institutional analysis, CNC programming and other modules integrated together, can provide a powerful design and analysis capabilities. The technology has also matured, the mainstream CAD software on the market belongs to this type of system.

3 to feature modeling, parametric, variable design as a characteristic, can support top-down design, with internal unified data model of the CAD / CAM integrated system, this system is also relatively mature, but its specific features need further improvement.

4. In accordance with the STTP standard, a unified product data model as the core to product data management as a platform to Inter net and WEB technology for the integration of the environment of the advanced CAD/CAM integrated system, such systems have become a current research hotspot, but many of these technologies are not yet perfect, the need for a long time to improve and optimize.

5. For the Future Prospects of CAD Technology

The future of CAD technology, in the foreseeable future, will be in the CAD system database on the basis of the development of a more integrated, networked, intelligent, standardized CAD system, CAD technology will be with other CAX technology, and gradually formed from the design, manufacturing, quality assessment, process management, a systematic computer-aided industrial design and manufacture of a production process control and detection of a large integrated system, which will be used in the design, manufacturing, quality assessment, process management. The huge integration of the system, and thus comprehensively improve the production efficiency of the factory, reduce costs.

6. Conclusion

China's mechanical CAD technology after more than a decade of development, has rapidly occupied half of China's manufacturing industry, and will be more quickly popularized to a wider range of deeper levels of industrial manufacturing system, which requires us to be able to more systematic establishment of a CAD technology management system and production specifications to help CAD technology, healthy and rapid development.

Acknowledgments

The authors thank the editor and anonymous reviewers for their helpful comments and valuable suggestions.

Funding

Not applicable.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Author Contributions

Not applicable.

About the Authors

At the request of the author, it will not be disclosed.

References

[1] Ge Changcheng, Wang Ming, Mu Xuan. Analysis of the Application of Digital Design Technology in Agricultural Machinery Design. Southern Agricultural Machinery, 2023, 54(20): 84-86.

[2] Chen Xiaoyan. Research on the Application of CAD Technology in Mechanical Drawing. China Equipment Engineering, 2023(17): 241-244.

[3] Cheng Jin, Ye Huqiang, Tan Jianrong, et al. Research Progress and Development Trends of Three-Dimensional CAD Technology. Journal of Mechanical Engineering: 1-28 [2023-09-29].