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Research on Artificial Intelligence Fusion of Machining Design and Manufacturing

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Abstract: With the continuous research and development and progress in the field of science and technology in our country, mechatronic engineering has been widely used in various industries. Traditional mechatronic engineering has been difficult to meet the needs of emerging industries with rapid development. Under the background of information technology application, mechatronic engineering is also developing in the direction of informatization and intelligence. At present, the integration of artificial intelligence technology into the application of mechanical and electronic engineering has become a key research and development project of related technologies. Take more complete optimization measures, so that the effect of mechanical design and manufacturing can be comprehensively improved. The mechanical design industry is an important foundation for my country's social and economic development, and it has brought new development prospects for the mechanical design and manufacturing industry under the background of the advent of informatization.

Keywords: Artificial Intelligence, Machining Design, Manufacturing

1. INTRODUCTION

With advancements in information and intelligent technology, traditional mechanical engineering has undergone significant improvements. With the research and development of information technology, artificial intelligence came into being. Following the pace of the times, artificial intelligence is also integrated into mechanical and electronic engineering. In the past, there was a problem of unclear model calculation in mechanical design and manufacturing. To improve the overall design and manufacturing effect, artificial intelligence technology should be used to solve this problem. Make the entire network environment more secure and efficient, speed up information and data processing, and establish matching design schemes based on network searches, so that the level of mechanical design and manufacturing can be comprehensively improved to meet the development needs of modern industries. In the traditional mechanical design and manufacturing process, many links require manual trial and error before the design can be finalized and put into large-scale production.

In the whole process, labor consumption is very large, and the possibility of error due to manual operation is also very high. The integration of emerging electronic technologies and mechanical engineering has played a crucial role in its development. In many aspects of mechanical design and manufacturing, based on powerful intelligent technology and information systems, more scientific and reasonable precise design and testing can be achieved. No longer requires too much manual participation and operation.

Due to the characteristics of nonlinearity, adaptability, concurrency and storage, neural network technology has the following functions artificial intelligence has emerged as a result of research and development in information technology. To overcome the issue of unclear model calculation in mechanical design and manufacturing, artificial intelligence should be employed to improve overall design and manufacturing: (1) It can conduct large-scale information and data induction processing on products, and screen out useful Valuable information and store it to facilitate the latter to learn and inherit; (2) Because of its strong intelligence and automation characteristics, it is often used in mechanical fault diagnosis to automatically conduct in-depth analysis and reasoning on problems in mechanical faults , can accurately diagnose the cause of the fault; (3) can reasonably control the positioning of the machine tool, reduce errors, and realize automatic control and processing; (4) can automatically identify targets, have strong anti-interference ability, and perform working condition detection and control wait.

The mechanical and electronic products obtained through the integration of mechanical technology and electronic technology have a relatively simple basic structure, which can minimize the volume of the product, comprehensively improve the functional characteristics of mechanical engineering products, and change the complex and cumbersome structure of traditional mechanical products. pattern. Take more scientific solutions, and can handle them automatically, skipping the link of manual operation and review, and comprehensively improve work efficiency and accuracy. In actual work, relevant R&D personnel need to do a good job in technical research and combine different technical solutions according to actual production needs and industry development standards to comprehensively improve the overall design effect.

2. THE PROPOSED METHODOLOGY

2.1 The application role and development prospect of artificial intelligence technology in mechanical manufacturing

In the application of intelligent technology, the requirements of energy conservation and environmental protection should be considered to avoid certain impacts on the surrounding environment, to optimize the overall working mode and process. The application in mechanical design and manufacturing is to convert the data analysis and processing results into mechanical operation instructions after fast and accurate processing of relevant data information, and automatically complete mechanical operation tasks. The third is that the so-called neural network technology imitates the

nervous system of the human body to a certain extent. Based on the neuron reflection characteristic skills of this technology, the extraction and processing of data analysis results can be realized automatically, and the preservation and protection of data information can also be realized. , just like our human body, based on our huge nervous system, can perceive instructions, accept instructions, and perform corresponding operations according to instructions, and remember instructions.

The application of artificial intelligence technology to machinery manufacturing has made the machinery manufacturing industry digital, automated, and intelligent, which has promoted the production efficiency and quality of the machinery manufacturing industry to a certain extent, and then promoted the development of the manufacturing industry. To better apply artificial intelligence technology to machinery manufacturing and make it serve human beings, we must rationally deploy technical personnel, strengthen the research level of artificial intelligence technology, optimize, and improve the manufacturing process with scientific knowledge, and realize artificial intelligence. The perfect combination of technology and machinery manufacturing promotes the development of machinery manufacturing.

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2.2 Specific application of artificial intelligence technology in mechanical design and manufacturing

The fault diagnosis system includes a fault case library and a fault reasoning library, etc., and innovates the overall construction and manufacturing scheme based on model diagnosis and case reasoning to ensure the accuracy and efficiency of the design. In actual operation, the designer needs to check the entire mechanical design and manufacturing plan through the man-machine interface, and quickly complete the information entry. The system needs to check the design plan by searching the corresponding information in the database according to the analysis and judgment functions. Whether it is very scientific and feasible, and then combine the adjustment results with similar cases to analyze the scientific nature of the current mechanical design scheme. In the end, a lot of suggestions are provided to the relevant designers, and the design scheme is enriched to improve the overall design effect. After the artificial intelligence automatic identification technology is applied to by enhancing the network environment's security and efficiency, accelerating information and data processing, of the corresponding parameters of the electromechanical equipment. Once abnormal parameters are detected, the alarm mechanism of the system will be automatically triggered, and automatic shutdown will be realized at the same time.

When the staff received the alarm, they immediately cut off the power supply for inspection. It not only ensures that the staff can work in a safe environment, but also ensures the timely discovery and processing of abnormal data information. Artificial intelligence technology has achieved important development at an extremely fast speed in mechanical manufacturing, which is of forward-looking and innovative significance. As we all know, talents are the core competitiveness of a country and a local development, and as an important supporting force for the development of machinery manufacturing, the number and level of talents determine the industrial level of a country to a large extent. In this case, whether it is an enterprise or a country, it is necessary to pay attention to the cultivation of relevant talents, establish a sound assessment mechanism, and provide stronger support for the application of artificial intelligence technology in the field of machinery manufacturing. In the actual application process, the mechatronic engineering system is a relatively complex engineering system involving many fields, and a single simple linear system cannot express the mechatronic engineering.

However, accurate mathematical expressions have difficult solutions in the nonlinear expression process and can only analyze and solve the most basic simple systems. Therefore, integrating artificial intelligence technology into mechanical and electronic engineering systems can be very good. solve this difficult expression. Secondly, in the current mechanical design and manufacturing, it is inevitable that there will be complex dynamic models. It is difficult for some mechanical engineers with poor adaptability to make basic judgments and find hidden safety hazards in manufacturing. Therefore, in actual work, it is necessary to ensure the smooth progress of follow-up design work through the scientific use of artificial intelligence technology and reduce the probability of safety accidents through the supervision and management of the whole process, and developing matching design schemes based on network searches, mechanical design and manufacturing can be comprehensively improved to meet modern industry's development needs. Manual trial and error in several links of the traditional mechanical design and manufacturing process is necessary before finalizing the design for large-scale production, analysis, summary and memory of relevant fault information and cases in mechanical design and manufacturing, which improves the speed and accuracy of fault warning and fault retrieval. The application operation of the fault diagnosis system in mechanical manufacturing design is generally: the user sends a real-time monitoring instruction to the system through human-computer interaction; after the system receives the instruction, it conducts accurate analysis and judgment on the instruction information combined with the data information in the database; and then According to the diagnosis results, the system will automatically realize the reference and comparison with the relevant case information in the database, and determine the fault problem based on accurate diagnosis. In terms of the effectiveness of mechanical and electronic engineering processing, artificial intelligence can take a greater advantage. Processing various aspects of data has gradually replaced traditional mechanical engineering.

Artificial intelligence uses fuzzy reasoning or neural network system simulation construction. In terms of data and information storage, through the rules of fuzzy reasoning, the distribution of neural networks is the main method, combined with the establishment of fuzzy neural network models, and different data in mechanical and electronic engineering are processed. Efficient processing effectively achieves rapid

analysis and transmission of mechatronic engineering data. Due to the complexity of the mechanical manufacturing process, if there is a deviation in a certain link, it will affect the smooth progress of the overall work, and there will be many influencing factors. Therefore, in actual work, it is necessary to cooperate with artificial intelligence technology to ensure on-site safety. Management will kill the influencing factors in the cradle and improve the safety factor of the site. In specific work, artificial intelligence technology can be used to carry out scientific testing of on-site operation links, which can not only reduce the workload of relevant personnel, but also help to ensure the safe operation of personnel, effectively improving the current safety management effect.

3. CONCLUSION

To sum up, with the continuous development of modern informatization and science and technology, there is a situation of mutual integration with information intelligence technology in various industries, and mechanical and electronic engineering is no exception. Engineering opens new fields of development. Continuously improve the overall design scheme, realize the supervision and management of the whole process, and then provide important suggestions for on-site production and manufacturing through artificial intelligence technology, so that the mechanical design and manufacturing industry can develop in the direction of modernization.

4. REFERENCES

[1] Wang Biao Dou Junlin Design of Physical Education Li Lilei, Wu Hongliang. Research on the relationship between mechanical and electronic engineering and artificial intelligence [J]. Theoretical Research on Urban Construction: Electronic Edition, 2016, 000(011): 4121-4121.

[2] Xia Jing. Application of artificial intelligence technology in large-scale machinery manufacturing [J]. Electronic Technology and Software Engineering, 2019(17): 2.

[3] Zou Xiang. Design and Implementation of Machining Collaborative Collaboration Platform [J]. Digital Communication World, 2018, No.157(01):207.

[4] Wang Gaochao. The necessity of establishing a new undergraduate major of material forming and control engineering and the conception of talent training mode.

[5] Zhang Yuan, Li Mingfu, Li Yulin, et al. The research progress of artificial intelligence in the technological upgrading of pepper processing equipment [J]. Modern Agricultural Equipment, 2014(3):4.

[6] Zhang Jianfeng. Analysis on the characteristics and application of automatic machining technology [J]. Nanbeiqiao, 2019, 000(022):76.

[7] Xia Xiaoyun. Research and implementation of key technologies for health status monitoring of CNC machine tools [D]. University of Chinese Academy of Sciences (Shenyang Institute of Computing Technology, Chinese Academy of Sciences).

[8] Jiang Congshou. The characteristics of modern automobile manufacturing technology and miniature automobiles [J]. Automobile Research and Development, 1994.

[9] Song Lijun; Intelligent monitoring and organizational regulation of additive manufacturing of metal materials [C]// Intelligentization and precision of special processing technology - the 17th National Special Processing Academic Conference. 2017.

[10] Xi Qihai. Evaluation of the third-line construction from the perspective of combining history and reality [J]. Research on Chinese Economic History: Beijing, 2015.

[11] Intelligent Manufacturing Network - Helping China's Manufacturing Innovation - idnovo.com.cn. Analysis of Several Mainstream Rapid Prototyping and Rapid Manufacturing Technologies [J]. Intelligent Manufacturing Network - Helping China's Manufacturing Innovation - idnovo.com:cn.

[12] Han Liguang, Cao Wenxing. An Artificial Intelligence Type Machining Production Line: CN109249265A[P]. 2019.

[13] Wang Shangyin, Jia Jun, Sun Ruixia. Research on Artificial Intelligence Machining Center Robots [J]. China Information Technology, 2019(10):4.

[14] Tang Yiqing. The application of artificial intelligence in mechanical processing and automation [J]. Hunan Paper, 2022(002):051.

[15] Tao Lu. An automatic testing equipment for mechanical processing based on artificial intelligence: CN112683659A[P]. 2021.