Development of Mechanical Design, Manufacturing and Automation

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Abstract. The technical level and scale of machinery manufacturing industry are one of the most important factors to measure a country's industrialization degree and comprehensive strength of national economy. In present, the rapid development of China has also undergone leapfrog changes in the development of machinery manufacturing and automation, however, the development trend of mechanical manufacturing and its automation has gradually developed from the previous manual work to the direction of network virtualization, machine miniaturization and industrial intelligence.

1. Introduction
The new documentary named <made in Shanghai> indicates that the development of mechanical manufacturing design and automation in China is moving towards high-tech, unmanned and independent research and development. In the documentary, the independent research and development of new shield machines for subway construction, the unmanned Baosteel factory and the design and manufacturing of large machinery such as China's large passenger plane C919 are all promoting the development of China's machinery manufacturing and automation.

2. Characteristics of Mechanical Design, Manufacturing and Automation

2.1. High Work Efficiency and Excellent Product Quality
Mechanical design, manufacturing and automatic manufacturing can optimize the disadvantages and deficiencies of manual production. In the past, manual production inevitably has the interference of subjective factors such as emotion and physical state, resulting in low work efficiency. At the same time, there are still many uncertain factors. Different standards and experience of each person will lead to different work efficiency and product quality. These disadvantages will fully be eliminated by mechanical design and manufacturing. Furthermore, High-precision processing equipment and automatic monitoring devices are adopted to reduce the scrap rate. At the same time, high-tech mechanical design and manufacturing can be produced 24 hours a day, so the natural work efficiency and product quality have been greatly improved.

2.2. Broad Development Prospects
No matter when it is, machinery manufacturing will never be out of date. On the contrary, it will follow the pace of the times and develop more vigorously. It can be seen from the development of any country that machinery manufacturing production plays an important role, especially in the development of modern aerospace. Machinery manufacturing production highlights the status of a
country. At any time, mechanical design and manufacturing and automatic production will be a top priority part of national development.

3. Significance of Mechanical Design, Manufacturing and Automation

3.1. Improving Work Efficiency
It is well known that human labor has been greatly liberated by the development of mechanical design, manufacturing and automation. Compared with the previous manual manufacturing, it can offset the waste of production time caused by human factors. At the same time, the development of mechanical design, manufacturing and automation can greatly shorten the auxiliary time in the manufacturing process. At the same time, a variety of high-precision processing equipment and automatic detection equipment are widely used in mechanical design, manufacturing and automatic production. Compared with manual production and manufacturing, it greatly reduces the interference of artificial factors, ensures the processing and assembly accuracy of parts, and significantly improves the work efficiency.

3.2. Saving Cost
The production area, the number of workers directly involved in production and the scrap rate are effectively reduced in mechanical design, manufacturing, automatic production and manufacturing. As a result, production cost is reduced simultaneously. At the same time, a large number of mechanized production can increase the production time and reduce the product production cycle without considering manual rest, so as to save cost and improve productivity.

3.3. Enhancing Security
There are many dangerous factors in the process of mechanical production. Many examples of safety problems in the process of production and manufacturing can be seen in many news reports. In the process of mechanical design and manufacturing and automatic production and manufacturing, machines can complete most heavy, difficult and even harmful work to human body. The process of transforming the manufacturing industry from pure human labor to mechanized production and then to automatic production. The possibility of safety accidents is reduced.

4. Development Tendency of Mechanical Design, Manufacturing and Automation

4.1. Tendency of Mechatronics
Mechatronics technology is a comprehensive combination of mechanical technology, electrical and electronic technology, microelectronics technology, information technology, sensor technology, interface technology, signal transformation technology and other technologies. Combining mechanical design, manufacturing and its automation technology with mechatronics technology can greatly improve the structure, materials and performance of mechanical design and manufacturing. At the same time, combined with mechatronics technology, under the guidance of control theory, carry out a series of operations such as system design, system simulation after design and on-site commissioning. It effectively improves the production efficiency of mechanical manufacturing. It can be seen that the integration of mechanical design and manufacturing and its automation technology with mechatronics technology is the inevitable trend of the development of mechanical design and manufacturing and its automation.

4.2. Tendency of Network Virtualization
As early as the 1990s, the outstanding achievement of computer technology was network technology. The rise and rapid development of network technology has brought great changes to science and technology, industrial production, politics, military, education and people's daily life. Nowadays, everyone's life is inseparable from the network. The development of mechanical design, manufacturing and automation will also be closely related to network virtualization. With the help of computer, the final scheme of mechanical design, manufacturing and automatic production can be determined through simulation. The work of machine tool is inseparable from computer network.
Through programming simulation, the production cost of mechanical design and manufacturing is greatly reduced. At the same time, the computer network drawing is more accurate, convenient and fast. In the process of realizing unmanned production, People can only realize remote control and guidance through computer network, and there will no longer be the phenomenon that mechanical engineers can not work normally due to failure problems.

4.3. Tendency of Machine Miniaturization
Mechanical design, manufacturing and automation are often giant machines covering a large area, which makes it very inconvenient to carry, overhaul and maintain. In addition, the large size will also cause unnecessary power loss and various maintenance losses, and will become a certain security threat. Therefore, the trend of miniaturization is inevitable, just like the development of computers. From the initial supercomputer to the current thin notebook computer, mechanical design, manufacturing and automation will also slowly develop towards the trend of machine miniaturization.

4.4. Tendency of Environment Protection
We have always called for "green water and green mountains are golden mountains and silver mountains", so mechanical design, manufacturing and automatic production should also be environmentally friendly. We can personally realize that the development of industry has brought great changes to people's life. On the one hand, the material is rich and the life is comfortable; On the other hand, resources are reduced and the ecological environment is seriously polluted. Therefore, protecting environmental resources and returning to nature is the inevitable trend of modern mechanical design and manufacturing and its automation development. We should strive to meet the specific requirements of environmental protection and human health in the process of mechanical design, manufacturing and automatic production, in the life process of its design, manufacturing, use and destruction, minimize the pollution of air, water and other environmental resources, establish a correct concept of development, and promote the common development of production and environment.

5. Conclusion
As mentioned above, the development of mechanical design, manufacturing and automation will develop towards mechatronics, network virtualization, miniaturization and environmental protection.

6. References
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