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# Research on the Development and Application of Intelligent Manufacturing Technology

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## Abstract

This paper introduces the background of intelligent manufacturing technology, analyzes the process of intelligent manufacturing, puts forward the application of new technology in the process of development of intelligent manufacturing technology, and analyzes the development of intelligent manufacturing technology.

## Keywords

Intelligent manufacturing technology; Process; New technology; the development.

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## 1. The Propose of Intelligent Manufacturing Technology

Manufacturing industry is the basic industrial sector of national economy and one of the decisive factors of national development level. The development history of manufacturing involves manual manufacturing, machinery manufacturing, automated manufacturing, flexible manufacturing, integrated manufacturing, concurrent design manufacture and so on. With the explosive growth of manufacturing information and much information of work to deal with, the manufacturing system display greater intelligence. But the shortage of the lack of professional people and specialized knowledge, the development of manufacturing industry restricted in developing countries. In developed countries, the domestic technical force is empty due to the manufacturing enterprises to the third world. All this problems require manufacturers higher alertness and intelligence in production activity. At present, the appliance of "the automation isolated island" connection, the problem of global optimization and the unity of regional standards, datum and the man-machine interface promote the appearance of intelligent manufacturing technology.

In all aspects of manufacturing industry, intelligent manufacturing technology uses computer to simulate human experts making intelligent activity with a highly flexible and highly integrated way. Manufacturing problems also can be analyzed, judged, reasoned, imagined and decided. Intelligent manufacturing technology is aimed to extend or replace part of the mental work in manufacturing environment. And it collects, storages, perfects, shares, inherits and develops manufacturing intelligence of human experts. Intelligent manufacturing technology is a new manufacturing technology developed by integrating traditional manufacturing technology, computer technology, automation and artificial intelligence.

## 2. The Process and Characteristics of Intelligent Manufacturing

In the process of intelligent manufacturing, information acquisition, real-time communication, dynamic interaction and decision analysis and control of each link should be realized by its core information equipment. The intelligent manufacturing equipment of industry system includes new sensor, intelligent control system, industrial robot and automatic production line. Intelligent manufacturing is a more flexible and more automated manufacturing technology. The data model of manufacturing process is established according to the knowledge of manufacture and process.

According to comparing the theoretical value the reading valve of processing model, intelligent manufacturing calculates the relevant adjustment quantity, drives actuator movement, adjusts the processing condition automatically, and then processes operations according to a given the constraints. Features of intelligent manufacturing technology: ability of self-discipline; man-machine integration; virtual reality technology; self-organization and super flexibility; learning ability and self-optimization ability; self-healing and strong adaptability.

### **3. The Development of Intelligent Manufacturing Technology**

#### **3.1 New Technologies in the Field of Intelligent Manufacturing**

Nine new technologies of intelligent manufacturing, namely: industrial internet of things, cloud computing, big data, industrial robots, 3 d printing, knowledge work automation, industrial network security, virtual reality and artificial intelligence. Industrial internet of things on behalf of the connection and integration of global industrial system, intelligent sensor technology, advanced computing, big data analysis and internet technology. The core three elements including smart devices, advanced data analysis tools, human-device interface.

Cloud computing is central nervous system virtual brain of internet. It will unify the core of internet hardware layer, core software layer and the Internet information to provide support and service for the virtual nervous system on the internet. Cloud computing can even allow you to experience 100000 billion calculations per second, simulate nuclear explosions, predict climate change and market trends.

Industrial big data is based on the background of the development of emerging technologies, which extend the industrial data through industrial sensors, radio frequency identification, bar code, industrial automatic control system, enterprise resource planning, and computer aided design technology. Industrial big data is a kind of unstructured data produced by machines, which runs at high speed on the production lines of industrial enterprises.

Industry robots is an industrial machine device with multi-joint manipulator and more degrees of freedom. It can automatically perform the work under own power and control ability. The industrial robot consists of three basic parts: main body, drive system and control system. It can be commanded by human beings, and it can also be run according to pre-programmed procedures. Modern industrial robots can also act according to guidelines formulated by artificial intelligence technology.

3D printing is the nature of material manufacturing technology, based on computer aided design, big data, cloud computing, computer aided manufacturing, internet of things, and virtual reality technology. By using the method of piling up layer by layer, the digital computer model is directly into 3D object of manufacturing process. The mainstream technologies of 3D printing include extrusion molding, optical polymerization molding, granular material forming, etc.

Knowledge automation will play a central role in intelligent society, intelligent industry, intelligent manufacturing and industry 4.0 and industry 5.0. The main methods and technologies of knowledge automation include intelligent control, artificial intelligence, machine learning, man-machine interface, and management based on big data. The conversion between the automation of physical processes and the automation of virtual spaces is important.

Virtual reality technology is a kind of computer simulation system creating and experiencing the virtual world, which uses the computer to generate a simulation environment. The user immersed into the environment by multi-source information fusion of interactive 3D dynamic visual and physical behavior of the system simulation. Virtual reality is a combination of various techniques, including real-time 3D computer graphics, a wide-angle stereo display technology, tracking technology of head, eyes and hands, and tactile and kinesthetic feedback, stereo, network transmission, such as speech input and output technology.

### 3.2 The Development Trend of Intelligent Manufacturing Technology

Intelligent manufacturing technology is an integrated technology of manufacturing, automation, system engineering and the mutual penetration of subjects such as artificial intelligence. It gradually forms driven by market demand and science technology, namely in the changing market demand, manufacturing production scale has developed to the direction of many kinds of batch flexibility; At the same time, driven by the development of information science and technology, the resource allocation of manufacturing industry has developed towards the direction of intensive information. At the same time, driven by the development of information science and technology, the resource allocation of manufacturing industry has developed towards the direction of intensive information. It is no longer a simple manufacturing process and product design, but an integrated activity and system from the product concept system to the final product. It is a functional system and information processing system.

### 4. Conclusion

Intelligent manufacturing technology integrates manufacturing, information and intelligence features, and it is significant development direction of high-end manufacturing industry in the future. The development of new technology will promote greater breakthroughs and progress in intelligent manufacturing technology.

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