Research on Material Workshop System under Intelligent Sorting Manufacturing in Digital Workshop

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Abstract. With the continuous development of science and technology level and management thought, the current manufacturing enterprises are also undergoing a change involving technological processes and management methods. With the rapid introduction of scientific and technological means, it is transforming from the traditional experience-based management mode to the information-based management mode, that is, the integration mode of two industries supported by informationization, pursuing sustainable development and adhering to scientific development. Digital workshop technology is one of the key technologies of digital manufacturing technology, which is an important application of digital manufacturing technology in manufacturing field, and has become the realization basis of advanced manufacturing technology in the actual manufacturing process. In this paper, an integrated management system structure of digital manufacturing workshop under networked manufacturing environment is proposed. According to the management requirements of modern digital workshop, wireless mobile communication technology is introduced, and a digital workshop intelligent sorting and manufacturing cutting workshop system is constructed.

1. Introduction
With the continuous development of modern manufacturing industry, the collaboration and cooperation among various departments of manufacturing enterprises is particularly important. A single technological advantage can not ensure that enterprises win the competition [1]. Only through the good combination of people, organization and technology, and through the computer network to integrate them together, can the best overall benefits of the enterprise be brought into full play [2]. Automation is an indispensable part of China's professional technology field, and now the development of China's manufacturing industry is extremely in need of automation and digital technology [3]. In the development process of manufacturing workshop, after experiencing the stage of manual manufacturing and small-scale production line, it takes advanced information technology as the main body. Digital workshop technology is one of the key technologies of digital manufacturing technology. It is an important application of digital manufacturing technology in the field of production and manufacturing, and has become the realization foundation of advanced manufacturing technology in the actual manufacturing process [4]. As an effective means to improve the traditional manufacturing industry by using information technology, digital manufacturing has become a key technology to shorten the product development cycle and reduce production costs [5]. Digital workshop construction has become the main
direction of manufacturing workshop reform. Through the use of various advanced information technology, combined with advanced management ideas, under the premise of reducing manufacturing costs, improve production efficiency, and then promote the development of social economy [6].

The rapid development of economy and science and technology is of great significance to the promotion of productivity, but at the same time, the promotion of productivity also has an important impact on the development of economy and science and technology [7]. As a digital platform for manufacturing industry, digital production workshop can express and process all kinds of manufacturing information in complex production system in a digital way, and realize the interaction, sharing and multi department collaboration of a large number of manufacturing information on the integrated platform [8]. Advanced information technology is used in the construction of manufacturing workshops. Taking information as the basis of workshop management, it sorts out the resources of the whole workshop, and constantly optimizes the process of workshop management, thus improving the efficiency and ability of manufacturing workshops as a whole [9]. Manufacturing workshop is the key to improve the ability of enterprises. After going through the stages of manual workshop and assembly line scale production, it relies on information technology [10]. Practicing the digital workshop construction of the integration of industrialization and industrialization has become the development direction of the current manufacturing workshop. With the application of various digital technologies as the means, integrating advanced management ideas, improving production efficiency, reducing enterprise costs, and effectively improving the workshop management level [11]. In this paper, an integrated management system structure of digital manufacturing workshop in networked manufacturing environment is proposed. According to the management requirements of modern digital workshop, the wireless mobile communication technology is introduced, and the intelligent sorting manufacturing blanking workshop system of digital workshop is constructed.

2. The content of digital workshop construction in manufacturing industry

With the deepening of industrialization, the management mode of information aided production has gradually exposed some shortcomings, the most obvious is reflected in the combination and unification of industrial field control. For a long time, the development of industrial technology and information technology has presented two single development routes within the enterprise. They are only one-way driving and promoting relationship, and failed to give play to the good effect of mutual promotion and driving of industrialization and information technology. Before the emergence of big data concept, many manufacturing enterprises have carried out a comprehensive analysis, and many enterprises have been quite mature and produced good benefits. With the support of high-performance computer and high-speed network, digital workshop technology adopts computer simulation and digital reality technology, and works in groups. It summarizes all aspects of modeling and Simulation of real manufacturing world objects and activities. In the construction process of manufacturing digital workshop, we should have a certain understanding of the development process of manufacturing workshop. With the continuous development of science and technology and management ideas in China, manufacturing workshops have undergone several major reforms. Workshop production is a complex and uncertain system. It is unrealistic to realize workshop digital manufacturing only by computer and automation technology.

The feasible and best mode of workshop digital manufacturing is to introduce wireless mobile communication technology, and create a new mode of human-machine cooperation which can give full play to human intelligence and machine intelligence. With the emergence of big data solutions, new analysis methods emerge, especially in the aspects of predictive and normative analysis. The content of digital workshop construction should include all aspects of workshop business, and then through the advanced information management mode, realize the connection between each link of manufacturing workshop, improve the linkage of manufacturing workshop business, and then improve the production efficiency of manufacturing workshop. Since industrialization, with the continuous development of science and technology and management ideas, the processing and manufacturing industry has experienced several changes in technology application and management mode. From the actual development point of view, each change has brought about a significant improvement in the level of
industry, which explains the leading role of the technological revolution in industrial development and reflects the application management at the workshop level. From the perspective of the law of technological development, the bottleneck of the previous stage directly leads to the technological change of the next stage, and the concept of integration of industrialization and industrialization emerges at the historic moment to meet the needs of industrial development. The scientific development mode of informatization driving industrialization and industrialization promoting informatization has become the development direction of enterprises. Using the existing technology to establish a mechanical design and manufacturing environment of artificial intelligence, the operation process of intelligent design is shown in Figure 1.

![Figure 1. operation process of intelligent sorting in Digital Workshop](image)

In the construction content of digital workshop, it is only necessary to change the original equipment-based management mode by using human resources, realize the control and management of production equipment in manufacturing workshop, optimize the production process of manufacturing workshop and integrate various resources in manufacturing workshop through advanced information technology. In the design and planning stage of digital workshop, different types of personnel care about different levels, so the simulation strength of digital workshop is divided into different levels, so that different personnel can get different simulation strength at different stages [13]. Every technological change will bring about great progress in industrial development, and the digital workshop that fully practices the concept of integration of two industries is no exception. Through the construction of digital workshop, the integration of two industries in the core links of enterprises can be solved, and the advantages of information technology and industrial technology can be brought into full play to promote and develop together. In the construction content of digital workshop in manufacturing industry, the combination of industrialization technology and information technology should be strengthened on the basis of the original, and scientific and reasonable construction content should be formulated according to the basic situation of own workshop, so as to gradually develop towards digital workshop.
3. Methods of digital workshop construction in manufacturing industry

3.1. Formulate a reasonable construction system

In the process of digital workshop construction, we must make a scientific and reasonable development direction according to the development of our own workshop, and then form a practical digital workshop construction system. After the digital workshop has become the construction direction of manufacturing enterprises' workshops and serves as the carrier of technological progress and management upgrade, how to combine the characteristics of enterprises to make the construction practical, and fully improve the production efficiency and management level. The construction process of digital workshop is to build a real production workshop for processing products, not just a theoretical model. Therefore, in formulating the digital construction system, we should make use of the industrialization and information management mode and seek truth from facts to formulate and issue targeted digital workshops. The construction of digital workshop is to build a real production workshop for actual processing and manufacturing, not a certain theory or a certain model concept. Therefore, the construction of digital workshop must seek truth from facts and adjust measures to local conditions. On the basis of practicing the construction theory and management thought, and combining with the actual situation of enterprises, it is necessary to build a digital workshop that conforms to the actual situation of enterprises and has application value [14]. In the process of building the digital workshop model, the corresponding advanced information technology should be fully integrated, the use of manpower and material resources should be minimized, and then the characteristics and advantages of the combination of industrial technology and information technology should be brought into play to improve the production efficiency of the digital workshop.

In the construction of digital workshop, we should give full play to the advantages of information technology and industrial control technology, aiming at building a manufacturing workshop with high automation and intelligence, and reducing manual participation as much as possible. In the construction system of digital workshop, network construction is the guarantee of cooperation between the whole workshop. When the sensor recognizes that the preset target objects with different characteristics are delivered to the air valves at corresponding positions, the air valves are controlled to push the target objects into their corresponding slide rails, and the sorting process of the target objects is completed. Figure 2 shows the structure of visual recognition system.

![Figure 2. Visual recognition system](image)

After wavelet transformation and filtering optimization, the topological structure of computer vision has been greatly optimized. See table 1 for computer vision performance parameters before and after optimization. The process of generating feature descriptors is shown in Figure 3.

|                      | Before optimization | After optimization |
|----------------------|---------------------|--------------------|
| Number of rows       | 121                 | 138                |
| Number of columns    | 99                  | 117                |
| Monitoring points    | 11979               | 16146              |

Table 1. Performance parameters of computer vision image structure before and after optimization
Figure 3. Schematic diagram of feature point descriptor generation

Nowadays, the Internet has become the main way for people to communicate with each other. Of course, the production equipment in the digital workshop is also connected and cooperated with each other through the Internet. Digital workshop is a combination of technical means and management ideas, in which technical means is the foundation of digital workshop construction, and the application of advanced and reasonable technical means is the guarantee of digital workshop operation. To discuss the available technologies for building digital workshop, we should consider the network environment, hardware equipment, information technology and management means. Through the construction of the network in the digital workshop of manufacturing industry, the connection between industrial technology and information technology is realized, and then the perfect combination between the two is realized, and the construction of the digital workshop is completed. According to the own situation and basic characteristics of manufacturing workshops, the corresponding digital workshop construction system is formulated to realize the integration of information technology and industrial technology and improve the production efficiency of manufacturing workshops. The construction of digital workshop is not only the inevitable result of the development of science and technology and industry, but also the only way to realize the sustainable and scientific development of industry.

3.2. Pay attention to the cooperation of manufacturing operation management

The blueprint for the construction of digital workshop should meet the actual needs of industrial development, improve the working environment and industrial processes by scientific means, and make the whole workshop work as man-machine integration, linkage synchronization, quick response, safety and stability as much as possible. In the construction of digital workshop, all the production processes are completed by advanced computer equipment, which requires powerful equipment and hardware to support the production pressure. Therefore, in the construction of digital workshop in manufacturing industry, we should pay strict attention to the hardware configuration. As the objective carrier of scientific and technological development in industrial application, digital workshop is the concrete embodiment of productivity development promoting industrial progress, and the construction of digital workshop will greatly promote the industrialization process [15]. In the process of digital workshop construction, the integration of advanced technology is the driving force of manufacturing workshop reform, so the corresponding matching problem should be considered in the application of advanced technology. To build a digital workshop, we should do a good job of on-the-spot investigation. Everything should be based on the current situation of the enterprise and proceed from the reality of the enterprise. We must not blindly copy and dogmatism.

Technical means is the foundation of building digital workshop, and the application of technical means should not only conform to the law of scientific development, but also respect the fact of enterprises and the feasibility of technology, so as to maximize the effect by the most reasonable technical means. Let designers plan and design plant design, production line layout and various logistics
by visual method. At this stage, it is necessary to establish the basic framework of its software and the simulation models of various workshop objects. In this paper, we should abstract classify all kinds of equipment and articles that have direct or indirect relationship with production in the workshop, and establish corresponding object classes. In the process of constructing the blueprint of manufacturing digital workshop, we can combine the corresponding blueprint samples to analyze and summarize the problems that need to be paid attention to, and then solve or avoid the corresponding problems reasonably and perfectly in the construction of our own blueprint, so as to realize the perfect integration of industrialization and information technology and promote the progress of manufacturing digital workshop construction. The development of technology is not static, so is the digital workshop, which is a process of continuous development and innovation with the updating of scientific and technological means.

4. Conclusions
Digital workshop is not only an idea, but also a model, which has broad application prospects. It is not only suitable for manufacturing industry, but also can be popularized and applied to many industries of national economy according to local conditions. It is necessary to develop digital workshop in manufacturing enterprises, which is the main way for enterprises to develop rapidly. The development of technology is not static, so is the digital workshop, which is a process of continuous development and innovation with the updating of scientific and technological means. In the process of digital workshop construction, manufacturing enterprises take scientific and rational reform methods, gradually apply information-based management mode and combine advanced information computer technology to continuously improve the production efficiency of manufacturing workshops. In the process of digital workshop construction, the integration of advanced technology is the driving force of manufacturing workshop reform, so the corresponding matching problem should be considered in the application of advanced technology. To build a digital workshop, we should do a good job of on-the-spot investigation. Everything should be based on the current situation of the enterprise and proceed from the reality of the enterprise. We must not blindly copy and dogmatism. Most enterprises can adopt the information management mode to gradually improve their own economic development, and then promote the development of China's overall economy and enhance the overall level of the national economy.

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