Research on Information Management of Production Workshop Based on MES System

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Abstract. with the progress of science and technology, information technology is in rapid development, production manufacturers are under tremendous pressure, for modern production mode, the information management is an important part of constantly promoting the process of our modernization and informatization in recent years, the use of MES system make it possible to production management informationization, MES technology plays an important role in the process of enterprise informatization, this article mainly introduced the content of MES technology and its application in production management.

Keywords: MES technology; production management; research and application; information management.

1. Introduction
With the development of modern science and technology, product design, production and sales began to develop toward the trend of globalization, consumer demand for products to personalized, diversified development, so that the competition between industrial enterprises is more intense. In order to provide the overall market competitiveness, industrial enterprises urgently need to improve the production efficiency and comprehensive quality of products, reduce the production and operation costs of enterprises, which put forward higher requirements for the production of industrial enterprises. Automated production equipment has stronger system characteristics, so it requires more advanced production management information system for production management. A comprehensive grasp of the enterprise scope of real-time production equipment operating conditions and costs, improve the utilization rate and rate of return of automation equipment, can be better for workshop production, so that managers for the entire plant resources of the unified planning, promote the long-term sustainable development of the enterprise.

MES is a management companies in the United States in the 1990 s in enterprise information system puts forward a new concept of English full name is the Manufacturing Execution System. MES can optimize the management of the whole process of a product from the order to the factory. For emergencies in the production process, MES can quickly react which link has a problem, report the incident according to the production data, and process it with accurate and data. This kind of quick response can reduce the internal useless production activities, effectively guide the production process, and improve the production efficiency of the enterprise .For production enterprises, MES can
effectively guide the circulation capacity of materials and improve production efficiency. Key task information related to product behavior can also be provided within the enterprise and throughout the product supply chain through MES. Therefore, it is important and urgent to design an agent-based system that can integrate PLC and interact with MES in a real-time way. The device integration framework based on agent technology can not only replace the function of the upper computer, but also realize the real-time sharing of production data on the manufacturing shop-floor. The agent integration framework to integrate MES is as shown in the figure1.

Table 1. MES architecture of the integrated agent

2. Mes System

2.1. Meaning of MES
In the whole automatic production line, MES system as its technical support has a strong application value. The effective integration of MES system and automatic production can enable the production workshop to realize automatic production even when no one is in the situation, which can effectively save labor resources. In the process of automatic production, the production equipment can carry out the corresponding operation by itself under the pre-edited instructions and procedures, effectively avoiding the mistakes that often occur in the traditional workshop production. The products produced by this method have the characteristics of standardization, which helps to guarantee their quality fundamentally. Automated production effectively liberates the labor force, enabling workers to free themselves from the dangerous and physically demanding work, and to devote themselves to the creative work that can better reflect the value of human work. Now MES technology has been widely used in various fields. With the advantage of improving production efficiency and expanding people's perception ability, it provides strong technical support for enterprises to solve all kinds of problems. If an enterprise can achieve the improvement of production efficiency, it is bound to save production costs, so that the enterprise can achieve the enhancement of core competitiveness in the fierce market competition. But at the same time, the enterprise should also start from the actual situation, to analyze the adverse factors, including product quality problems, automatic production in the quality of the limitations, so it is necessary for enterprises to carry out technical upgrading and equipment transformation work, in order to effectively control the quality of products.

2.2. Functions of MES
MES is not a set of system management software, but a series of management functions, MES can be understood as a series of production management software collection. MES the practice of the
international federation of by its members has carried on the induction, the function of MES are mainly the following the function of the eleven aspects, respectively is: the production process of scheduling, resource allocation, control unit allocation management, document management, production management, production quality management, maintenance management, production management, human resource management, product tracking and inventory management, performance analysis, and data collection. The actual MES may contain only one of these management modules or several of them. An agent-based manufacturing execution system can obtain real-time data from a registered programmable logic controller by sending a message through an MQ server to a broker system with a header name property of ReadRequest. The agent system receiving the message will indirectly obtain the real-time data of the device through the read-write module. After the agent system gets the data in the programmable logic controller, it sends a message through the MQ server to the manufacturing execution system with the header name property ReadResponse. Therefore, MES only needs to start a timing task to obtain the latest production data in MQ and save it to the database to realize the collection of real-time production data. Similarly, the manufacturing execution system can control the device by sending message commands from the MQ server. The data flow chart is shown in the figure 2

![Data flow](image)

**Figure 2. Data flow**

3. **The production management system based on mes**

By analyzing the working characteristics of the production workshop, a production management system based on MES is put forward. The production management system mainly has three layers of structure, which are field control system, manufacturing execution system and resource planning system. The control layer mainly collects and summarizes the field data in the production process, and manages the automatic control in the production process. The executive layer is mainly responsible for production scheduling, on-site real-time monitoring and data analysis. MES system is mainly composed of MES software, database, dispatching platform, and job display screen in workshop. It is connected with each other through the Internet and centralized in the central node, so that the central node can better carry out network maintenance and resource allocation. If one of the nodes fails, the isolation maintenance check will be carried out on the node, so as to avoid the collapse of other nodes one after another, so that the whole MES system can still run. The connection mode of network nodes can also be used for production monitoring and management. The planning layer, mainly for managers to carry out resource planning, production planning, and other relevant decisions, focusing on the construction of ERP management platform. From the point of view of most enterprise information structure, MES is mainly applied in the upper ERP management system and field control system. From the point of view of function, MES should carry out the purpose of production coordination and production management. As shown in Figure 3, there are three layers of enterprise integration model, namely, the planning layer facing the customer, the execution layer facing the workshop and the control layer facing the production operation site.
3.1. Information management strategy of production workshop based on MES system
At present, China's modernization and informatization process is gradually advancing, and information technology has been widely used in various fields. For modern enterprise manufacturing management, it is also necessary to integrate information technology, so as to improve the efficiency of production management. Flexible application of MES system can optimize the information management level of the production workshop, and help the production workshop to achieve the management objectives efficiently.

3.2. Workshop Information Management
The workshop information management program refers to the use of MES system to carry out the workshop production integrated management, material management, quality management and production management together effectively, to build a comprehensive and systematic production business management system, in order to provide the necessary information technology to support the workshop production management work. If you want to efficiently carry out the information management of the production workshop, it is necessary to build the corresponding MES workshop information network, the flexible application of the "ring + star" structure, the core switch is placed in the energy management center of the production workshop, the joint workshop monitoring platform server, together to form the internal ring network of the system. In the process of laying out the production monitoring network in the workshop, the staff should try to use the "star" structure, so that the switches of each workshop can be connected to each monitoring platform respectively, so as to gather all kinds of production information efficiently. Production workshop in the construction of the network, should be unified to do a good job of the corresponding office monitoring network layout work, this can let the office management personnel can smoothly get the relevant workshop production information needed, and then provide necessary data information support for the information management of the production workshop. In the process of building MES system, the staff should consider the actual situation of network layout and deploy corresponding upper and lower MES equipment respectively. For the office service area and the production workshop, the staff should set up the equipment cabinet and network cabinet, and then implement the distribution of information points by means of comprehensive wiring, so as to achieve the purpose of full coverage of the production management information network.

3.3. Workshop personnel performance management
In addition to strengthening the information management of production quality, the staff should also carry out the management of workshop staff performance based on MES system, and effectively improve the production efficiency of the workshop. In the actual work process, the use of MES system can be clear workshop all kinds of production information, in order to achieve information workshop staff performance management. In essence, performance management refers to that the staff can
establish quantitative performance assessment indicators for the production staff in the workshop, including learning and growth, field management, quality and production efficiency, etc., and carry out the inspection of all the production team members in the workshop to improve the cohesion and combat effectiveness of the team. The staff can make the implementation of performance appraisal more streamlined and standardized through MES system. At the same time, publishing the results of performance appraisal in the workshop system can make the production staff more clear about their own problems and deficiencies, thus improving the subjective initiative of the work and improving the production efficiency of the workshop. In addition to this, the workshop staff to carry out the informatization of performance management, staff must be taken into account comprehensively the specific position and role of information, and on this basis to endow them with different system management permissions, user information management authority gives workshop management personnel, can facilitate the entry examination result, complete classification of good workshop staff management. For the ordinary staff, to check the basic information can be, including workshop team performance and individual performance, in the horizontal contrast clear the relationship between the floating compensation and performance target, and starting from the differences of team a specific, corresponding to reinvent work, improve workshop staff work efficiency and work quality.

3.4. Workshop production quality management
In the development of workshop informatization, it is necessary to strengthen the informatization management of production quality. Specifically speaking, it is necessary to use MES system to realize the comprehensive collection and arrangement of workshop product quality information, and determine the factors affecting product quality through analysis. Combined with the difference between the actual quality and the target quality, the key monitoring links of workshop production can be determined, the effective supervision of product production process can be realized, and the goal of improving workshop production quality can be achieved. In the actual workshop production, by configuring the VIN code for each product, and then the MES system server automatically scans and records the product information and station information, it can provide technical support for the product traceability with quality problems. When the product quality is found to be unqualified, the on-site production problems can be confirmed in time, and then the links with quality problems can be photographed and uploaded, so that the product quality problems can be fed back and solved as soon as possible, and the goal of strengthening the workshop production quality management can be achieved. In the process of production management, with the help of MES system monitoring platform, you can view the product production information at any time, so that the links affecting product quality can be corrected in time, and the product yield can be improved. According to the product production process, we can trace the historical data of product quality problems through the system, import the detailed information of product production, and provide the basis for the optimization of production process. Therefore, the implementation of MES workshop information management can collect the workshop quality information, ensure the management personnel to grasp the product quality, strengthen the quality control through data analysis, and meet the needs of workshop production management.

4. Process - based enterprise production management information needs
In terms of the current situation of China's economic development, the development of China's process production enterprises is gradually improved, and the cost of enterprises using this technology in production management is also gradually reduced. It can effectively utilize resources, reduce the waste of resources in production and maximize the economic benefits of enterprises. But if enterprises want to make good use of this technology, it is necessary to develop the information technology of production management of their own enterprises. If they want to develop the information level of enterprise management, they need to strengthen the equipment management of the life cycle of the enterprise and strengthen the supervision of the enterprise production and the monitoring of the production process.
4.1. Comprehensive production quality monitoring and tracking
Enterprises in production, supervise production can be timely grasp the enterprise in the process of actual production data, help enterprises to understand the scene of the production, in order to timely adjust production mode, reduce the impact of these problems to the enterprise economic benefit, help enterprise to achieve long-term sustainable development process.

4.2. Production process monitoring
In the production process monitoring, for enterprises in production need to ensure good product quality, so the enterprises to strengthen the monitoring in the process of production, to ensure that the production can proceed as planned in the production workshop, to ensure production parameters in the process of production of each product, to ensure good enterprise production the quality of the product, help enterprises to gain more economic benefits, to realize the economic sustainable development.

5. Shop scheduling management
Strengthening the production scheduling management is of great significance in the information management of the production workshop. The core content of some enterprises is production, so it is necessary to strengthen the production planning management on the basis of production information, and do a good job in the plan of the workshop, the production department and the operation plan.In the preparation of the corresponding workshop plan, the enterprise should also take into account the monthly plan and quarterly plan of the production plan, and decompose the production tasks on a daily basis. And on the basis of the production plan to do a good job in the production of all the preparation work, for the follow-up workshop smooth production to lay a solid foundation. Relevant management personnel of the production department can rely on MES system to timely understand the information issued by customers, and combine with the actual situation of the production site fed back by MES system to arrange the production plan, and then do a good job in production work. Workshop production management personnel can determine the production process and the production schedule stipulated in the production plan on the basis of product production information provided by MES system and the use of materials, clear the specific time of product production, and then reasonably arrange the delivery time of products. Workshop planner can draw on experience to understand the status of the workshop material inventory and products, and based on the in-depth analysis of the actual production ability, clear whether the workshop to finish the production task for the month, at the same time relevant personnel according to the actual feedback related situation, even to adjust all aspects of content, to enhance operability of workshop production plan. Production workshop management personnel can rely on monitoring platform, in the process of production plan execution confirmation product production schedule, if it is found that the progress is not consistent with the related production plan requirements, you should first delve into the actual reasons, unfold the scientific production scheduling, to ensure that the product can finish within schedule.

6. Conclusion
For now, the MES production management system basically meet the needs of the enterprise production management, MES can effectively improve the efficiency of enterprise production management, to a large extent save the consumption of raw materials, reduce unnecessary production activities, help enterprises to improve production capacity, is advantageous to the enterprise information construction, to strengthen the information management has important significance for production workshop, the application of MES system as a powerful technical support, can effectively enhance the production efficiency of workshop. Therefore, in the process of actual work, the relevant personnel should strengthen the understanding of MES system, and its application in production quality, performance management, material equipment and production scheduling, and so on, so as to improve the overall production management efficiency of the workshop. Can effectively improve the production efficiency of the workshop. MES in domestic research and development and application is
not yet mature, enterprises should choose the appropriate MES development tools according to their own needs.

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