

Research on data management and interaction technology of automobile brake disc production process based on B/S architecture

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Abstract

in order to realize the optimal control of automobile brake disc production line, the data management and human-computer interaction technology of automobile brake disc production process are studied. The process retrieval, new creation and derivation, cutting parameter optimization, manufacturing resource database management, user management and windows window program completion management system are proposed to realize the interaction from data management to interface. The research shows that the data management and interaction technology based on B / S architecture can meet the intelligent demand of automobile brake disc production line, improve production efficiency and maximize the benefits of enterprises.

Keywords

Automobile brake disc; production line; data management; interactive technology.

1. Introduction

With the rapid development of China's economy, facing the opportunities and challenges of the information age, it is undoubtedly an effective way to use scientific and technological means to improve enterprise management. Computer management can maximize the accuracy, speed, efficiency and other functions, and provide strong support for the coordination and management of the company. Therefore, the use of new computer network and production management system has become an important means to improve the company's management efficiency and coordinate the company's operation. In a sense, the informatization of production management system has become one of the important symbols of modern manufacturing management. Production process data management and interaction technology has developed multi production mode, multi production line, multi department, multi personnel coordination [1] [2] to meet the needs of enterprise production management. It integrates and parallels the production related machinery and equipment, work center, process technology, manufacturing process, etc., avoiding idle and waste of resources, and then integrates through data management. At the same time, it comprehensively cooperates with the production plan, without any problems Limit division, BOM, MRP and BOM automatic matching accounting, data management plays an important role [3] [4]. Not only data management, but also interaction technology is a very important part. In the production process data management and interaction technology, the company's management personnel can grasp the overall production progress from the order dimension at any time through the production Kanban, so as to avoid the occurrence of late delivery in enterprise production, and also provide the workshop management personnel with the control of progress from the dispatch dimension, so as to dispatch the overall resources Maximize the efficiency, so that the workshop team leaders can master the production execution in real time from the production line, station and

other dimensions, realize the reasonable use of equipment, and avoid the delay phenomenon [5]. Workshop real-time management and monitoring, which can display the plan, target and progress of dispatching and production line on the workshop electronic display screen. These data are supported by interactive technology, and need to be reasonably arranged for data classification display [6], so as to reduce employees' working time, greatly improve workshop production efficiency, and reduce errors and time waste. According to the requirements of production process management of automobile brake disc production line, modular design idea is adopted to design human-computer interaction interface to assist employees' work and production, and then a general class library file is established to integrate the production plan, equipment, process, order, warehouse and other data of the workshop [7] [8] [9] to assist the management of the workshop.

2. Analysis of automobile brake disc production line

The brake disc manufacturers are more concerned about the organization of production, and advanced theories and methods such as QTC, LP, CE and AM have emerged, combined with advanced computer systems such as CAM, CAD, CAPP, FMS and CIMS, the production management is promoted to develop towards system integration and high efficiency and agility. It starts to pay attention to and emphasizes the integration of management, and views the whole production and operation process from the perspective of system, attach importance to the overall operation of cooperation and joint, fully integrate and utilize resources and reduce waste [12].

In terms of data management of brake disc production line, the production line of automobile brake disc has static data, dynamic data and intermediate data. The data to be prepared before production activities, data constantly generated and constantly changed during production, static data, dynamic data and various reports generated by business logic provide management personnel analysis and decision-making. The system is very strict in the accuracy and standardization of production data information. The irregular and wrong data information may lead to the failure of system implementation.

In terms of the interactive technology of automobile brake disc production line, the application of standard module is used to improve the working efficiency and management efficiency of the enterprise staff and create more profits for the enterprise. The research on the process design of human-computer interface of software system: through scientific method, through the analysis of production management task and staff of software enterprise, combined with the characteristics of the enterprise in their own industry, the human-computer interface of software system in line with the enterprise is designed by using the technology of user demand analysis, information architecture design and GUI design. The quality of human-computer interface will directly affect the quality of the human-computer interface. Sound the use efficiency of software, good interactive interface will improve the efficiency of enterprise management and production [14] [15].

3. Function analysis of automobile brake disc production data management and interaction system

3.1. Process planning system of automobile brake disc production line

The process planning system of automobile brake disc is mainly for the process planning and design personnel of manufacturing enterprises. Considering the data management and interaction technology research of automobile brake disc production line, based on the demand of production line function, the process planning system should have the following five functions. As shown in Figure 1.

3.1.1 Retrieval, creation and derivation of automobile brake disc production line process

The production system of automobile brake disc first meets the most basic work needs of technologists - searching and creating new process information. In addition, in order to improve the efficiency of process development, the system provides the function of deriving process information.

3.1.2 Cutting parameter optimization of automobile brake disc production line

When the process designer formulates the process plan, the cutting parameter selection of step information will be involved in the production line of automobile brake disc. Therefore, the system has the function of cutting parameter optimization to assist the technicians to determine the relevant cutting parameters.

3.1.3 Manufacturing resource database management of automobile brake disc production line

The brake disc production system should be able to provide the function of manufacturing resource data management, update the manufacturing resources of the enterprise in time, so as to facilitate the process personnel to prepare the process plan.

3.1.4 User management of automobile brake disc production line

The user management function of automobile brake disc system is used to set permissions for users of different roles. Users can be divided into three different roles: system administrator, process designer and tourist. Users with different roles have different browsing and operation permissions, among which visitors only have process retrieval permissions; process personnel have process retrieval, process creation, process derivation and cutting parameter optimization permissions; system administrators have all the above permissions.

3.1.5 Windows window program completion management system

Windows form program completes the management system and realizes the interaction from control to message processing and then to interface.

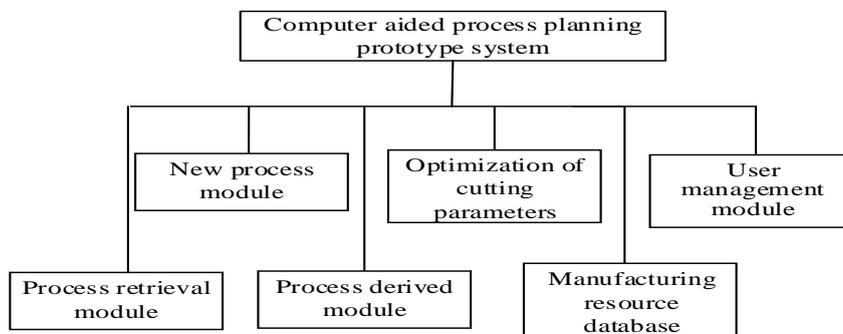


Fig. 1 System function structure

3.2. Working mode of automobile brake disc production line based on B/S architecture

The production line of automobile brake disc adopts the B / S three-tier architecture working mode. The system development work is divided into three parts: display layer, business logic layer and data layer. In Figure 2, the display layer is the user interface part of the system, which is responsible for the interaction between users and the system. It presents web information based on the browser, realizes the input and output of information, and has no business processing ability. The business logic layer is the technical core of the system, which is responsible for realizing the specific business logic function of the system, mainly through cutting parameter optimization method, data interaction technology and related programming Technology, improved NSGA-II-IM algorithm and other theories provide technical support for the function realization of the system; the data layer is composed of multiple databases, which is mainly responsible for receiving and implementing the data operation requests put forward

by the business logic layer, and timely feedback the results to the business logic layer after the operation processing is completed. Then, the user management interface of automobile brake disc production line is established through the B/S three-tier architecture, and the human-computer interaction is realized. The data table is mainly created by SQL server, the data model is established by power designer, and the data model is created by visual C # programming tools directly connect to the database, connection as the database connection class, the establishment of the form manager, windows form program to complete the management system, realize the interaction from the control to the message processing and then to the interface. as shown in Figure 2.

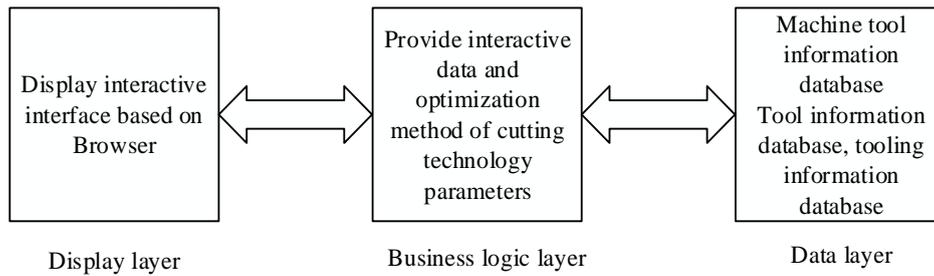


Fig. 2 Working mode of B/S three tier architecture

4. Data management and interaction technology of automobile brake disc production line

This paper studies the data management and interaction technology of automobile brake disc. In order to meet the actual use requirements of automobile brake disc production line, better complete the interaction between data and server, solve the unification of process data (data type and data format) and data model, complex process retrieval, creation of new and derived functions, and the determination of upper computer, control layer and communication protocol, so as to ensure the correctness of data in the process of up-down transmission, Solve the communication protocol and control layer of interactive transmission, ensure the efficiency and convenience of automobile brake disc production.

4.1. Data management of automobile brake disc production line

4.1.1 Process data of automobile brake disc production system

The demand analysis of automobile brake disc production line is carried out. The function demand, data demand, processing demand, safety and integrity requirements of automobile brake disc production line are analyzed, and the users and their business requirements are determined. Solve the problems of retrieval, creation and derivation of complex process. C # is used as the programming language and MyEclipse as the development platform. SQL server is used in the database system. When users query the process information, the system will first search the database for the corresponding data. If there is, the output results will be displayed on the query page. According to the actual needs of users, the process information will be modified to derive the new process information, and the new process information will be stored in the database; If not, the system provides users with the way to create new process information, and timely stores the data into the database when the creation is completed. The resource database management module of automobile brake disc mainly searches, restricts, modifies, queries, updates and maintains the machine tool information, tool information, workpiece material information, and encrypts and backs up the data. See table 1.

Table 1 Part information data sheet

Serial	name	Field name	data type	Data length
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1	Part drawing number	part_ Number	varchar	20
2	Part name	part_ Name	varchar	20
3	Operation card number	operation_ Number	varchar	20
4	Product model	product_ Model	varchar	20
5	Product name	product_ Name	varchar	20
6	Material grade	material_ TM	varchar	20

4.1.2 Automobile brake disc production line database

Data modeling and production management database establishment of production line processing. This topic further analyzes the processing technology of automobile brake disc in the production line of automobile brake disc. Through simulation analysis, processing test, detection, collection of existing data and other methods, the processing technology database of typical parts is established, and the data is managed. Solve the problem of data redundancy and data security. Solve the problem of data redundancy and data security. In the design of each data table, we should follow the principles of standardization and normalization. The processing of data redundancy needs to confirm the association of the data table before establishing the process database and data model. The relationship between the two entities is 1:1, 1:n or N: n. to determine the primary key in the table, there can only be one primary key in a database table, Generally, a data table also contains foreign keys, which are used for the association of another table to maintain the consistency of data, and the association between one table foreign key and another table foreign key. Reasonable use of these three relationships can effectively reduce the redundancy of the database. Data security is used to set permissions for different role users through the system user management function. Different role users have different browsing and operation permissions, so as to solve the problem of data redundancy and data security.

4.1.3 Data management system of brake disc production line

The system obtains the production order and feedback the production quality to some extent, and adopts the excel intermediate file integration method. The data management system and production management system are deployed on the same server, so the two databases can be merged and connected directly to the database. The production management system can directly operate the database controlled on site to release the production scheduling plan to the process level; the use of site resources and the processing status information of parts will be transmitted to FMS production management system in real time in the form of XML file, and then the corresponding database information will be generated through analysis. In order to improve the efficiency of the brake disc production line, the data information is classified and sorted, the attributes of the entity are combined, and each foreign key is connected to eliminate the data redundancy.

4.2. Interactive technology of automobile brake disc production line

The development of human-computer interaction should be based on the specific situation of the project, such as location, data, processing sequence, surrounding environment and other factors to establish the overall framework. The overall framework should be designed in detail, and each module should be tested separately to ensure the accuracy and integrity of each module.

4.2.1 Customer demand and optimization management of automobile brake disc production line

Based on the analysis of the main task elements and user elements of the human-machine interface in the warehouse module of ERP software system used in brake disc production, combined with the user environment, the design strategy of the human-machine interface design of ERP software for brake disc production enterprises is given, the human-machine interface architecture of the inventory management module with "task user" as the center is improved, the classified management of tasks by human-machine interface is optimized, and the management of tasks by human-machine interface is optimized; Strengthen the effective implementation of human-computer interface for tasks; increase the user experience requirements of human-computer interface. The menu interface is designed as a tree structure menu, and the tree structure is divided by the actual production environment. The control function includes the return control function from the second level menu to the first level menu, and the pop-up control from the first level menu to the second level menu; the structure of the sequential menu of the machine tool is consistent, and when the user selects, the key responds to realize the user's selection of the machine tool function.

4.2.2 Interactive prototype and fidelity interface of brake disc production line

The design strategy is proposed, which includes user research and analysis, functional information architecture design, various control design, etc. for the digital ERP inventory module, which presents sketch prototype, interactive prototype and fidelity interface. Combined with the different characteristics of the device, the human-machine interface of PC and mobile terminal is designed. In order to improve the success rate of ERP software system in printing industry, the human-machine interface of ERP software system used by production enterprises is designed. The interface adopts flat design, which removes various complicated 3D effects and mainly emphasizes the abstraction, simplification and symbolization of elements. In particular, after nearly two years of development, flattening has become the mainstream of interface design on both PC and mobile terminals. Simple graphics and colors are convenient for users to identify and give users a more intuitive and convenient operation experience, However, it is rarely used in industrial software system. Most of the industrial software is still using primitive and simple interface, which only provides its functions. The interface is monotonous, and does not match with the words of intelligent manufacturing. It does not pay attention to its use experience, and can't give people a sense of science and technology. The use of flat design, deepen the appeal to users, give users a better visual effect, easier and judge the function of the button, deepen the expression and information transmission, improve the efficiency of the system, give users a comfortable and convenient feeling. The specific process is shown in Figure 3.

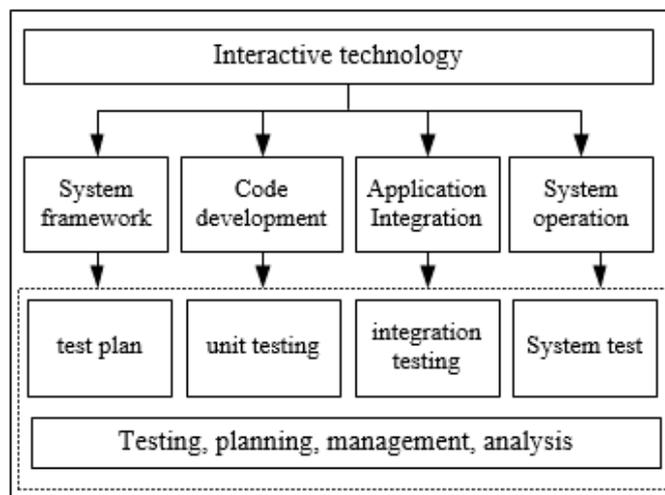


Fig.3 Flow chart of interactive technology

5. Experiment

The experimental results show that this research can achieve the production performance index of automobile brake disc production line. From the economic benefits of data management and information user interaction of automobile brake disc production line, it can better standardize the production process of automobile brake disc and speed up the development of automobile enterprise commodity funds. It is the key for an enterprise to obtain the best economic benefit to shorten the manufacturing cycle of brake disc and provide an important reference for future research.

6. Summary

The technology development of this subject conforms to the environment of our country, suitable for the mass production of small and medium-sized enterprises, can also be widely applied to enterprises, and has strong practicability. This research lays the foundation for the comprehensive network of automobile brake disc production data information management, and is also the core technology of enterprises. For the design of automobile brake disc production line, the establishment of process database has realized the part process management, and can better realize the user interface management function. From the processing technology of automobile brake disc to carry on the demand analysis, the design of automobile brake disc process database and the realization of user interface management function of small automobile brake disc production line, using the automobile brake disc production line based on B/S to replace the traditional production can make the enterprise benefit maximum. It's not easy.

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