Design and Development of Manufacturing Quality Management Information System for Auto Parts Enterprise

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Keywords: Manufacturing process, Quality management, Information technology.

Abstract. At the current auto parts manufacturing quality management present situation, this paper analyses the problems existing in the informatization, put forward from the specification quality data, and sets up quality management information platform, development and quality management information system development countermeasure, to help enterprises improve quality management level.

I. Introduction

Entering the 21st century, the rapid development of China’s car market, has become the world’s largest car manufacturing and consumer market, in this huge market, customers for car performance, such as security, fuel consumption and driving comfort, demand is higher and higher, especially in recent years worldwide recall number increasing year by year reflects consumers’ demand for higher quality. In the face of fierce market competition and the overall level of ascension manufacturing, product and service quality become the focus of the next round of competition. The tradition of automobile manufacturing enterprise internal quality management approach there is a quality information acquisition and processing the lack of information sharing, quality traceability; Quality process control efficiency is low; Quality decision-making and analysis of information, such as not timely problem restricting the further development of the enterprise. At the same time, along with the enterprise research and development, production, procurement and sales process informatization degree rise, quality management has become more and more urgent to the quality of digital information system to assist in the quality management, and communicate with other departments to realize informationization.

For an auto parts enterprises, the quality of the manufacturing process information management is an important link in process quality control, it is found in the process of manufacturing defects and deviations in time, the effective control to ensure the process quality play a very important role. Manufacturing engineering quality of the quality of work is mainly by the production site to embody. Play a key role on the quality in the process of manufacturing factors are: the operator (Man), machinery and equipment (Machine), raw materials (Material), craft (Processing), operation (Manipulation), detection Method (Method), environment (Milieu). The above factors can be summarized as 6M1P, grasp the quality of work in the manufacturing process, is to control these factors to ensure the quality of the product.

The quality in the process of manufacturing engineering refers to the quality of the product in the process of producing the real-time control and management, from the horizontal, it includes system strategic planning, resource allocation and other activities, such as quality planning, quality assurance, quality control and other activities; From the vertical, it includes the quality policy, quality objectives and quality system. Auto parts manufacturing process, to strengthen the integrated function of manufacturing quality, manufacturing technology, in order to keep the quality and cost of the two bottom line, achieve the goal of “low cost, high quality”.
II. The Problem of Manufacturing Quality Management Informationization

In auto parts manufacturing industry competition environment, the current automobile manufacturing enterprises from the infrastructure, such as hardware, network coverage to its various subsidiaries for a variety of software product purchase and custom development of information management software system, have made considerable achievements.

However, with the rapid development of automobile industry, the global car production volume rising, especially vehicles more than 18 million cars in China in 2010, these are for the user provides a rich arrive, diversification, characteristic and individualized demand model and configuration poses challenges for every car manufacturers, how to quickly produce customer satisfaction of high quality and low cost models are problems we need to think about. After the company internal and external quality related parties were investigated, and the problems existing in the current enterprise in quality management information summarized as follows:

A. Quality information acquisition methods and methods do not have a high level of automation

Quality information collection is the basis of the quality information work, in the process of automobile spare parts manufacturing, is directly related to the quality of information, including auto parts in the process of production and the quality of the raw materials of quality data, outsourcing product inspection data, vehicle performance test data, the end user’s ride the evaluation results, etc. In addition, also includes some indirect quality data, for example, in order to ensure to produce qualified auto parts products, and the status of the monitoring of pipeline equipment and tooling data, and so on. From the collection of data type, with numerical data, such as the size of the parts, material composition, there is also a state data, such as parts of qualified and unqualified, good or bad, normal and abnormal, and so on. At present most of the enterprises in the automobile manufacturing process or in the manual collection is given priority to, part of the process with semi-automatic acquisition method, have not reached the extent of the highly automated. Because there is no unified planning, different departments and workshops each data to collect the data format is not unified, cause data inconsistency and redundancy, makes it difficult to scattered information integration play a role of a higher quality.

B. The quality of information processing and analysis ability is weak

Quality information analysis and processing ability is the main basis for quality control and improvement. In the auto parts manufacturing enterprise, it is necessary to timely analysis of the various quality information every day and statistics, find out the quality problem of the current main and core, and analyzes the reasons, which targeted quality improvement measures are put forward. In addition, the quality of information processing and analysis also provide support for the annual quality management level summary, is used to describe the direction of the enterprise quality management and quality improvement direction of future. At present most enterprises exist in the process of automobile spare parts manufacturing quality information analysis, using the ability is insufficient, lack of competitors to understand the quality information, quality information sharing; Second, the big four quality management modules, each module in the quality system there is a self driven lifting capacity is insufficient, low ability of process quality control, quality management level is difficult to get effective improvement and continued ascent; Finally, the quality cost model of rough, leading the quality analysis report data accuracy is not high, difficult to really accurate to understand related quality cost, cannot effectively guide the quality improvement.

C. Quality of information transmission and sharing scope is narrow

The quality information transmission timeliness and knowledge sharing is the quality management standard level of experience. First passed the quality information to runs through the whole lifecycle of product, the need to establish a unified quality monitor system, ensure the quality of information in a timely manner and free of traffic. In addition, the departments for quality problem solving case should form the case knowledge base, knowledge management in the field of
quality formation, the formation of the common knowledge of the enterprise, all employees can learn and use these to solve the quality problem in the field of knowledge. At present, most enterprises have not established based on the quality of the product life cycle information transmission system, the related process will appear disjointed and lagging situation, lead to hard to avoid some quality problem. For example, inadequate quality verification before new products put into production, design verification is not enough, lead to increased risk of potential batch quality accident. Manufacturing process change validation is insufficient, product quality tracking ability; The influence of cost, production of quality under the condition of high capacity, potential quality defects to market speed increase, etc. In addition, the company’s quality management system implementation is low.

III. Countermeasures of Manufacturing Quality Management Informationization Level

We solve these problems, from the quality problems, quality data and quality information three Angle is put forward to improve the current automobile manufacturing enterprise quality management informatization level of countermeasures and Suggestions for the development of information technology platform.

A. Standardization and normalization of quality data

Auto parts assembly process with the rapid increase of automobile product model and product configuration is more and more complex, the assembly of the mixed flow is very common, short assembly task, assembly cycle and high efficiency. Parts performance form element is very complex and diverse, the quality of the early warning of quality and quality problems of feedback control is difficult, the problem is the main reason for the formation of spare parts assembly quality of each link of the lack of data sharing, data transfer between the lack of timeliness, etc., so only full analysis of the existing quality data format, data correlation characteristics between departments, straightening out each link the data flow between each department and realize the standardization of quality data and standardization. Can solve the transmission of information in each link and finally Shared problems.

B. The quality of the open architecture of management information system

Quality management information system consists of three layers of C/S architecture, that is, by the client, application server and database server of 3 layers, are shown in Fig.1 below. Among them, in the workshop and office area adopts C/S (client, its function similar to IE browser, but more compact structure, to meet the demand of the production line fast response; By the application server and database server in the center of the network physical location separate layout, in the application server to the database server or a report server request, through the ODBC connection database and returns the result, and send the result to the client accordingly.

Figure 1. Three Layers of C/S Structure.
C. Quality of informatization construction of the hardware and software platform

Informatization construction planning work more, in addition to straighten out the quality data standardization and its flow between departments, to the overall planning of software and hardware platform construction is also very important. Process quality management informatization, will to vendors, manufacturing, monitoring and market information, such as the provision of unified management information integration interface, guarantee the quality of each department data independence, but also guarantee the coherency of associated data department, sharing and timeliness. In achieving the quality of data acquisition at the same time, combining with advanced quality management mode and technical tools, integrated enterprise quality policy and objectives, overall construction into zero defect theory, statistical process control techniques, total quality management and ISO quality certification system, implementation of quality data analysis, statistical analysis, diagnosis and decision. The specific function modules are shown in Fig.2 below.

![Figure 2. System Function Module Chart.](image)

D. The overall design process of quality management information system

Quality management information system design and development of related hardware and software supporting environment, hardware including computer systems, network cabling, and other computer peripherals and hand-held input device, etc., in addition to the operating system software, it also includes information on the computer system in system provide overall information integration support for production and service. Support environment based on computer hardware platform and software platform of the core operating system, on the basis of forming an open framework, in order to meet the various quality management application subsystem to support environment. The overall design are shown in Fig.3 below.
IV. Summary

Provide a unified quality information integration platform, the related business process quality management and modern combination of IT technology, through the study of digital system for quality information management process and related information technology application in the field of quality management, committed to achieving production process quality comprehensive digitization of information, to achieve the quality of the whole production process information sharing and real-time monitoring, promote quick feedback of quality problems and early warning capabilities. For auto parts enterprises leapfrog development premise condition and opportunity.

Acknowledgement

This research was financially supported by Guangxi autonomous region level and the National college students’ innovation and entrepreneurship training plan project: “Research on supply chain logistics information integration and innovation of intelligent multi-agent system based on auto parts enterprises” (Guangxi autonomous region level project number: 201410594088), (National project number: 201410594036).

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