Construction of Safety Production Standardization Information System of Ninggang

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Abstract. Different from other enterprises, the complexity of the production process and production environment of iron and steel enterprises has led to a very serious safety situation, which not only endangers the lives of many workers, but also has an extremely bad impact on society. It is very necessary to put forward higher requirements on safety management for iron and steel enterprises. Based on the standardization of enterprise safety production, this paper builds a safety production standardization information system with Ningbo Iron and Steel Grid Company Limited. (hereinafter referred to as Ninggang) as an example, combined with Internet intelligent tools, to assist enterprises to complete the construction of safety production standardization and improve the safety management efficiency of iron and steel enterprises.

Keywords: steel industry, safe production, standardization, information system.

1. Introduction

The iron and steel industry is the material basis for the development of the national economy and national defense construction [1]. While generating huge economic benefits, there are very serious security problems hidden behind it. Compared with several high-risk industries such as mining, the total number of iron and steel accidents is not large, but the situation of iron and steel production safety is still very serious. Society has had an extremely bad influence, and the serious consequences and social effects caused by the accident far exceed the accident itself. The safe production of iron and steel enterprises is not only related to the life and death of the enterprise itself, but also the safety of many workers. It has an important impact on social stability and the development of the national economy [2]. Safety issues in iron and steel enterprises cannot be ignored.

To thoroughly implement the safety issues of iron and steel enterprises, we should first start with the issue of enterprise safety management, thoroughly implement the " Basic norms for enterprise safety production standardization " and the " Measures for the Administration of the Review of Work Safety Standardization Construction of Metallurgical and Other Industrial and Trade Enterprises ". Secondly, the rapid development of Internet technology provides a platform for data management. It has become urgent to integrate information technology into the standardized operation of enterprise safety production [3-8].

Based on this, this paper builds a safety production standardization information system with Ningbo Iron and Steel Grid Company Limited. (Hereinafter referred to as Ninggang) as an example, combined with Internet intelligent tools, to assist enterprises to complete the construction of safety production standardization and improve the safety management efficiency of iron and steel enterprises.

2. Importance of Standardization Construction of Safety Production in Iron and Steel Enterprises

"Measures for the Standardization of Work Safety in National Metallurgical Industry and Trade Enterprises", the document puts forward clear requirements for the standardization system of iron and steel production safety. Iron and steel production safety standardization grades are divided into first, second, and third grades, of which the first grade is the highest. The grades corresponding to the assessment shall meet both the standardization score and safety performance requirements, and the lower grade shall be taken to determine the final standardization grade (see the table below).

Table 1. Score sheet

Assessment Grade	Normalized Score	Safety Performance
Level 1	≥90	Within one year before the date of application for review, no major production safety accidents have occurred in large enterprise groups or listed group companies, and more than 90% of the member companies of the group have no fatal production safety accidents; listed companies or industry-leading companies have no fatal production safety accidents.
Level 2	≥75	Within one year before the date of application for review, no major production safety accidents have occurred in large enterprise groups or listed group companies, and more than 80% of the group's member companies have no fatal production safety accidents; no more than one person has died in the enterprise
Level 3	≥60	The cumulative number of deaths in production safety accidents within one year before the date of application for review shall not exceed two

2.1. Build the overall structure and enhance the safety concept

Taking the "human" mistakes in accidents as the management center, shifting from accident handling to advanced prevention, from simply managing people to focusing on the management of organizations, starting from people's basic safety concepts, so that everyone can deeply understand. When it comes to safety issues, every employee can sublimate from "I want to be safe" to "I want to be safe".

2.2. Strengthen behavior management to prevent human errors

When accidents occur in man-machine-environment systems, human factors play a decisive role. Human physiology and psychology make human behavior at a certain moment in the system not only dominated by system tasks but also affected by external environmental factors[9]. Therefore, the human errors of accidents are accidental, disordered, diverse, and sudden. Human errors are common, but not necessarily all of them will inevitably lead to system failures, thus failing to attract people's full attention. However, once these potential risk factors are triggered, they will combine in subtle ways and affect the system's defense, resulting in catastrophic damage. Through long-term behavior management, Ninggang regards the prevention of human error as an important link, conducts safety behavior observation, promotes the investigation and management of hidden dangers with strict management and a zero-tolerance attitude, and plays an important role in cutting the accident chain.

2.3. Standardize safety management and improve system guarantee

Carrying out the standardization construction of safety production in depth can further regulate the safety behavior of employees, improve the level of mechanization and informatization, promote the investigation and management of various hidden dangers on the site, and link the standardization creation with "intrinsic safety", and firmly grasp the safety production work. the fundamental core. Through the creation of safety production standardization, the unsafe behavior of people, the unsafe state of things and the environment, and the defects in management can be eliminated. Promote the construction of a long-term mechanism for safety production management, effectively prevent and

resolutely curb the occurrence of accidents, and continue to stabilize and improve the production situation of Ningshan Iron and Steel.

3. System Architecture Analysis

The safety production standardization information system adopts a layered design mode, which is divided into three layers: business presentation layer, system business logic layer, and system data storage layer [10]. The system architecture is shown in the figure.

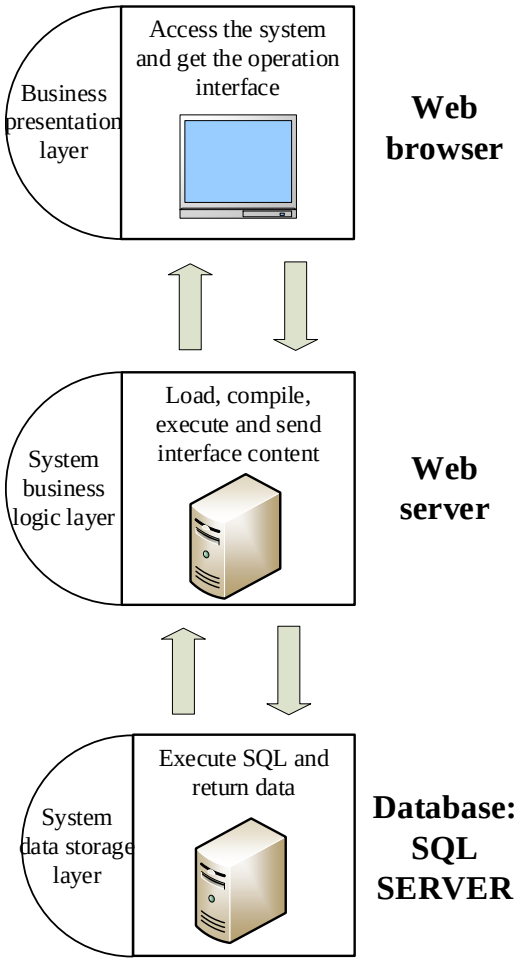

Figure 1. Layered architecture diagram

3.1. Business presentation layer

The presentation layer, also known as the presentation layer UI, is located at the top layer of the three-tier architecture and has direct contact with the user, mainly the web browsing page in the B/S information system. As a web browsing page, the main function of the presentation layer is to realize the input and output of system data. In this process, the data can be transmitted to the BBL system for data processing without the need for logical judgment operations, and the processing results will be fed back after processing. into the presentation layer. In other words, the presentation layer is to implement user interface functions, transmits feedback on user requirements, and uses BLL or models for debugging to ensure user experience.

The business presentation layer is responsible for interacting with the client and is the highest layer of the application. This layer provides a visual interface for interacting with users, sends and receives user requests through the front-end control layer, and submits the requests to the system business logic layer for actual processing. The system business logic layer returns the processing result to the business presentation layer and returns the final result to the user in a visual way through the business

presentation layer. In this system, the business presentation layer mainly provides a visual interface for users at all levels to access the system.

3.2. System business logic layer

The function of the business logic layer BLL is to make logical judgments and perform operations on specific problems. After receiving user instructions from the presentation layer UI, it will connect to the data access layer DAL. The access layer is located in the middle of the presentation layer and the data layer in the three-tier architecture. At the same time, it is also a bridge between the presentation layer and the data layer. It realizes data connection and instruction transmission between the three layers. It can logically process the received data, realize functions such as data modification, acquisition, and deletion, and feedback the processing results to the presentation layer UI, realize the software function.

The system business logic layer acts as a separate layer that controls the functionality of the application by performing detailed processing. In this system, the system business logic layer implements the business logic processing of the system, performs data logic checks and verification, generates business entities, and provides data logic access. It is responsible for receiving all requests from the business presentation layer and calling the interface to the system data storage layer to query and store the database.

3.3. System data storage layer

The data storage layer DAL is the main control system of the database, which implements operations such as adding, deleting, modifying, and querying data, and feeds back the operation results to the business logic layer BLL. In the process of actual operation, the data access layer has no logical judgment ability. To realize the rigor of code writing and improve the degree of code reading, general software developers will write Data Access Common in this layer to ensure the DAL data processing function of the data access layer.

The system data storage layer includes interfaces to data storage systems, such as database systems, file systems, or other types of data sources. It responds to requests from the business logic layer of the system, accesses data, and returns results.

4. System function realization

On the functional modules, realize safety production goals, organizational structure, and responsibilities, safety investment, laws and regulations and safety management system, training and education, production equipment and facilities, operation safety, hidden danger investigation and management, hazard source monitoring, occupational health, emergency rescue, accident The function of registering and amending related documents such as report investigation and processing. The following briefly lists the implementation functions of the key management modules.

4.1. Create standardized functions

Create standardized rules and regulations and norms for enterprises, sort out safety management work plans and provide them in the form of templates and intelligent record forms, and provide standardized system document preparation guidance for enterprises' safety production standardization construction; at the same time, collect basic information on safety production management. This function provides the basis and theoretical guidance for the operation and performance scoring of the standardized system. Specifically, it includes standardized creation, task tracking reminder, system template and form management, file release and reminder, and other module contents.

4.2. Standardized scoring function

The standardized performance scoring subsystem uses intelligent analysis technology to automatically evaluate the construction effect of each element, and output a self-assessment report that

meets the application requirements. It is convenient for business leaders to understand the operation of the standardization system of the enterprise at a macro level, and provide targeted guidance according to the results of relevant data reports. Opinion. Specifically, it includes modules such as evaluation index management, expert evaluation, statistical summary, and report output.

4.3. Safety production knowledge base

The production safety knowledge base is an auxiliary function of the system, which is convenient for enterprise employees to query and refer to materials during work or emergency rescue. Realize the release of all the document systems in the process of creating safety standardization, and become a file release platform within the enterprise, which is convenient for employees to download and browse, so that each employee is familiar with the enterprise system and job responsibilities, and fully participates in the construction of enterprise safety production standardization. The contents include safety production knowledge base, standard hidden danger base, safety inspection base, laws and regulations knowledge base, etc.

5. Concluding remarks

The application of information technology to safety production management is the relevant national policy requirement and the inevitable trend of the development of advantageous enterprises. Its fast, efficient, advanced, and practical characteristics will be more and more attention and widely used [11]. Since the establishment of the safety production standardization system, it has been applied by many iron and steel enterprises to guide the safety production management work [12]. However, the application of information technology in the safety production management of my country's iron and steel enterprises is not much. Building a standardized management information system for safety production and applying it to iron and steel enterprises, it has a good effect on improving management level, improving work efficiency, reducing operating costs, and improving corporate image.

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