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Design of Industrial Computer Control System in Grease Production

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Abstract

In the actual production of grease, the design and application of industrial computer control systems can help to achieve intelligent management of various processes in grease production, thereby improving grease production efficiency and exerting positive impact. This paper will introduce the problems of industrial computer control systems design in grease production, analyze industrial computer control systems, and optimize the design plan and implement the system.

Key words: industrial computer control system, grease, design, grease production

1. Introduction

With the development of modern computer technology in China, intelligent management of the process of grease production can improve the modernization level of grease production industry . Moreover, the grease industry as an important part of China's grain, grease and food industry, to achieve modern control of grease production, helps to improve production efficiency and plays a positive impact . The following is a detailed analysis of this article.

2. Grease Production Process

In the production of grease, its main task is to extract grease from vegetable, refine and remove non-grease substances, obtain refined edible grease products, and produce various grease by-products . In the production of grease, the basic process is the grease obtained by pressing or leaching the grease, which needs to be refined to become an edible grease.

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3. System Design Needs Analysis

In this study, the design of an industrial computer control system based on grease production ensures that excess solvent gas in the air can be treated to eliminate the existence of explosion hazards [5]. In the production and processing of greases, the remote monitoring module in the process computer control system can be applied to carry out safety detection of dangerous environments in the process of grease production, and can automatically perform false alarms and process feedback alarm information, which can effectively strengthen the safety of the grease production environment in practice and avoid safety accidents in the production of grease, thus improving the usability of system design. At the same time, in the system designed this time, according to the user's requirements, the grease production parameters can be set in the main control computer, and the automatic control can be used to control all the temperature of the grease production and the digital technology can also be used according to the temperature data to change curve in the production process, optimize the prediction and set the automatic temperature parameter [6], ensure that all controlled parameters in the grease production process can be within the safe production range, and improve the automation, intelligence and modernization level of grease production. Optimizing the design of industrial computer control system, in the process of grease production, can use the system for integrated management of voltage report, power supply, handover time and status report in each period of grease production process. Using database method for management, can statistically mining important data in the production process of greases, so that the grease production management can understand the production status in time and ensure that they can know the information of the grease production site in time through the remote computer network service, obtain the production status of grease and ensure that the designed system can meet the actual application needs of users.

4. Design Industrial Computer Control System Based on Grease Production

4.1 System Structure Design

In the industrial computer control system designed this time, the isolated grease production mode can be intelligently and systematically managed using industrial computer control equipment. In this system design, it is necessary to comprehensively use the latest information technology and automation technology management methods to collect the existing local automation technology and independent production management system in the grease production plant, and be able to integrate distributed local automation control technologies organically using computer technology and related support software under the guidance of new management models and information technology processes, thus forming a complete industrial computer control system. The system structure is shown in Figure 1:

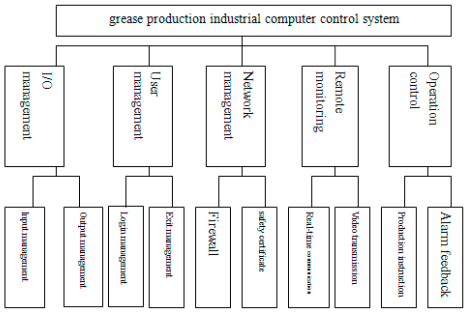

Figure1 The System Structure

In the industrial computer control system designed this time, it can effectively coordinate the material flow, information management, and monitoring the decision flow in the grease production process to ensure that the designed system can meet the actual grease production requirements and improve the grease productivity.

4.2 System Function Design

For system user control management, the main functions of this part include: IC card verification, residual grease display, the need to add grease input, grease production monitoring, and reliability considerations.

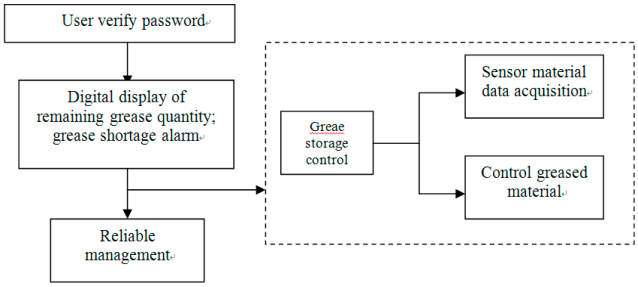

Figure.2 System function block diagram

The function of the I/O management module in the system: mainly includes two parts: the information input module and the output module. The design of the module needs to have the requirements of light shape, improved reliability and anti-interference ability, and the module is used as the intelligent I/O module in industrial computer control system which not only is responsible for transmitting analog signals between the grease production site and the industrial computer management workstation, but also accurately transmitting digital signals. Moreover, in the actual grease processing and production, the communication of various intelligent instrument data in the system can be realized, and the start and stop of the processing production equipment can also be adjusted by the progress of the industrial computer control system to ensure the grease can be made in the operation station. Processing equipment sends control commands, and then regulates equipment production and processing grease.

Operation industrial control function: applying industrial computer control system, through the man-machine interface in the system, can complete the control functions of multiple operations in the grease production process, such as adjusting the operation sequence of the grease processing equipment, setting the processing parameters of the equipment and automatically adjusting the grease processing production process. Similarly, in the system, the process parameter status of the grease production can also be displayed in the human-computer interaction screen of the system, and an alarm is issued for the failure in the production process, so the fault can be automatically reset, and the report is output to the system management work.

The function of managing the network security of the system: In the computer control system of the grease production industry designed this time, the signal between the grease production control station and the information chemical control system can be transmitted through the application of the network communication switch, and by applying a programmable logic controller (PLC), the data exchange information of the system is controlled, so it is necessary to ensure the security of the system data. In this regard, firewall technology and security authentication technology can be used to ensure the security of the network transmission data information in the system, and the system can be guaranteed to operate normally.

Remote monitoring function: It can remotely calculate the temperature, liquid level, material level, pressure and other data collected in the grease production site, which can be transmitted to the system through I/O equipment, so that the system administrator can remotely regulate the grease production process. In the system design, the data of the temperature transmitter, the ultrasonic leveler and the radar level positioner can be collected, and since most of these facilities are installed in the field, the on-site process point change signals are collected and transmitted to the staff remotely. When the operating condition of the grease production equipment is abnormal, the industrial computer control system will automatically switch the management interface of the system, simulate the fault point of the grease production operation, automatically adjust the fault, and also issue an alarm to notify the grease. The production site staff can adjust the production equipment in time to avoid grease production accidents and maintain the continuity of grease production in actual work. Similarly, in the design of industrial computer control system, it is also possible to simulate the start and stop of production equipment by simulating the flow of the grease production process, and at the same time automatically handle the system's overload protection, fault shutdown and

other drawbacks, and the whole process of grease production, thus conducting comprehensive tracking and monitoring.

4.3 System Hardware Design

BX200-5 plate heat exchanger is selected, whose unit heat exchange area is 5m2 and the number of plates is 26. This heat exchanger can satisfy the heating of grease from 25°C to 85°C, and can also satisfy the heating of 85°C to 90°C in the later process. Moreover, the secondary heat exchanger is non-fixed and can regulate the amount of heat exchange. Therefore, this type of plate heat exchanger is used for heating in all designs. The basic parameters of this BX200-5 plate heat exchanger are as follows:

Table.1 Parameter Table

Specification model	BX200-3	
Unit heat exchange area（m2）	5	
Number of plates	26	
structure size(mm)	L	161～149
	L1	461
	L2	631
	Dg	80
Dimensions（mm）	H	1180
	H1	800
	H2	250
	B	400
	B1	320
	B2	150

All components are mature products of first-class companies at home and abroad. As shown in Table 2 below:

Table.2 Component Table

PLC system	Siemens/AB
Low voltage electrical appliance	Siemens/Schneider/ABB
Transmission:	Siemens/Danfoss/ABB
Cabinet:	Rittal/BCC
Bus system	Wohner/Rittal
Terminal	Phoenix/Weidmueller
The electromagnetic valve	Festo/Burkert
SCADA:	Wincc/Intouch/iFix

4.4 System Software Code Design and Implementation

In this system design, we can optimize the use of current computer technology, and combine automated control technology to design and implement an industrial computer control system that controls the grease production process. In the system, it can integrate production operations, remote monitoring and decentralized management, plus remotely control and manage grease production. In terms of system software design, high quality PLC programming is applied. Structured and object-oriented programming ideas, good annotation and programming habits, and a proven library of basic function blocks greatly improve its reliability and maintainability. For the human-machine interface, in addition to ensuring the rationality, safety and convenience of operation, the information processing in the production process, maintenance personnel maintenance information, historical records, trend charts and other aspects have been fully processed. Part of the implementation code is as follows:

```
class C_LED : public CWnd
{
protected:
DECLARE_DYNCREATE(C_LED)
public:
CLSID const & GetClsid()
{
static CLSID const clsid
= { 0x6adfd0af, 0x1aaa, 0x11d4, { 0xa9, 0xac, 0xb7, 0x61, 0xe1, 0xff, 0xb4, 0x7a } };
return clsid;
}
virtual BOOL Create(LPCTSTR lpszClassName, )LPCTSTR lpszWindowName, DWORD dwStyle,
const RECT & rect,
CWnd * pParentWnd, UINT nID,
CCreateContext * pContext = NULL

{ return CreateControl(GetClsid(), lpszWindowName, dwStyle, rect, pParentWnd, nID); }

   BOOL Create(LPCTSTR lpszWindowName, DWORD dwStyle, )const RECT & rect, CWnd * pParentWnd, UINT nID,
CFile * pPersist = NULL, BOOL bStorage = FALSE,
BSTR bstrLicKey = NULL

{ return CreateControl(GetClsid(), lpszWindowName, dwStyle, rect, pParentWnd, nID, )pPersist, bStorage, bstrLicKey
; }
```

5. System Design Application Benefit Analysis

The research confirmed that in the actual production process, the entire production line is fully automated --- continuous feeding, alkali refining, neutralization, washing, discharging. The whole process is in continuous operation under the condition of stable process parameters, and the whole system has always maintained the best production status. In the actual grease production, the design and application of the industrial computer control system helps to realize the intelligent management of each process in the production, thereby improving the efficiency of gerase production and exerting a positive impact. The design of an industrial computer control system for grease production can improve the automation control level of the grease production industry, improve grease production efficiency, and ensure grease production safety. Its intelligent control avoids safety accidents, and plays an active design and application benefit. At the same time, in the industrial computer control system designed this time, applying it to the actual grease production will greatly improve the development technical strength in the actual grease processing plant, and use industrial computer control means to achieve energy saving for grease production. It can also reduce consumption and effectively promote integrated management of grease production. At the same time, the application of industrial computer control system can also improve the labor productivity of grease production workers, improve the traditional grease production conditions, improve the quality and efficiency of grease products, and exert positive influence.

6 Conclusion

In summary, in the production of greases, the industrial computer control system suitable for grease production is optimized, which can improve the automation control level of the grease production industry, improve the grease production efficiency, ensure the safety of grease production, and intelligently avoid safety accident and the design and application benefits are exerted. The system design method can be promoted and applied in practice.

7 References

1. Chen G, Yu G, Xiao P, et al. Physical Layer Network Security in the Full-Duplex Relay System[J]. IEEE Transactions on Information Forensics & Security, 2015, 10(3):574-583.
2. Liyanage M, Abro A B, Ylianttila M, et al. Opportunities and Challenges of Software-Defined Mobile Networks in Network Security[J]. IEEE Security & Privacy, 2016, 14(4):34-44.
3. Zhang Y. Research on the computer network security evaluation based on the DHFHCG operator with dual hesitant fuzzy information[J]. Journal of Intelligent & Fuzzy Systems, 2015, 28(1):199-204.