

## A study on intelligent industrial equipment repair system

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**Keywords:** Equipment repair; Monitoring system; knowledge base; repair process; Intelligent maintenance system

**Abstract :** In order to solve the production of equipment failure, repair is difficult, inconvenient maintenance, positioning and lack of knowledge base of intelligent judgment system, and put forward a method of intelligent industrial equipment repair. The method is by machine system, broadcasting system, lighting equipment and repair initiated monitoring system, according to electronic information, equipment information, voice signals and monitoring information generation repair processes, through the intelligent knowledge base judgment, rapid positioning to solve the problem. To achieve fast and efficient enterprise equipment maintenance, and the formation of an information flow, voice flow, intelligent signal flow integrated repair platform.

### Introduction

With the development of science and technology, automation technology has become the lifeline of enterprises, With the automation of enterprises, a large number of equipment increases, The equipment fault frequency equipment repair increasing , Equipment repair and repair is difficult, tedious, long waiting time and repair, equipment maintenance inconvenience , The problem of inaccurate positioning and lack of intelligent judgment of knowledge base. Intelligent equipment maintenance system with automatic or manual trigger repair initiated repair.

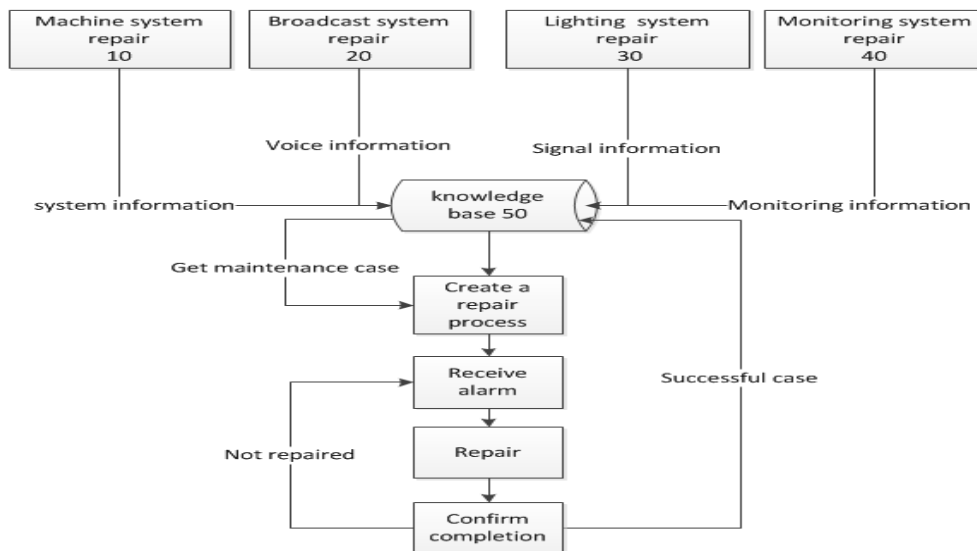


Figure 1: a system repair method and equipment of industrial intelligent structure

### The status of the industrial equipment repair

The industrial equipment repair line and the next line, At present, The line repair requires the user to fill in the paper after repair, leaders at all levels to confirm the signing after repair ; Line repair

is the use of ERP system to open repair after the repair, There are two kinds of this repair process cumbersome, long time waiting for repair, maintenance programs cannot share problems.

**The solution and method of intelligent equipment industry system repair**

**Repair method and system solutions including intelligent equipment industry:**

**Machine repair system**<sup>[1]</sup> , The machine for the equipment failure, the operator manually click the device repair button, automatically repair machine numbering system, address and repair, fault types, fault phenomenon and fill, submitted to the repair information center database , As shown in Figure 1-1 ;

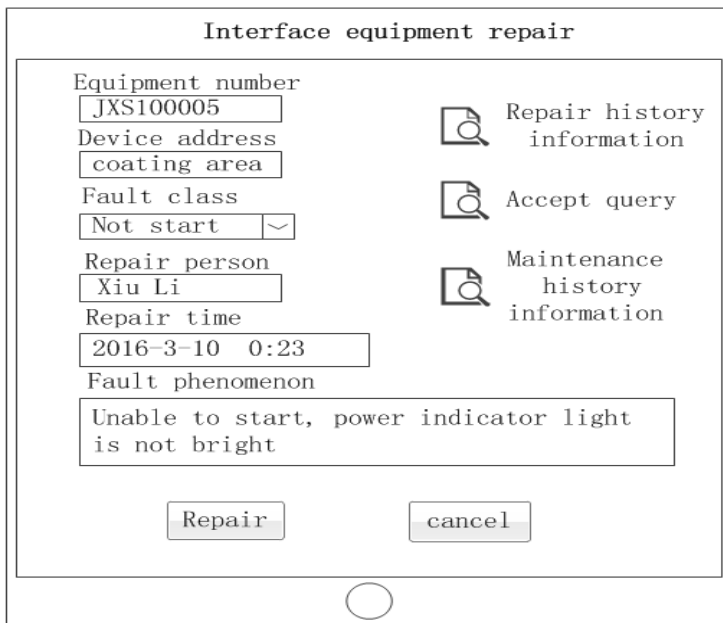


Figure 1-1: Schematic diagram of the machine repair system structure

**Broadcast system repair**<sup>[2]</sup> , **When a device in a remote area is not supported by a network or machine system , The operator through the broadcasting system initiated repair factory**

o The description of broadcasting system repair include: voice recording (broadcast own) - voice transmission - voice receiving speech analytic information into the central database, Figure 1-2 ;

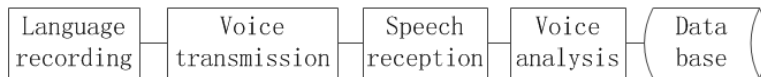


Figure1-2 :Schematic diagram of structure repair broadcasting system

**Lighting equipment repair , For the equipment failure by taking a stop button initiates repair lighting equipment.**

Including the lighting equipment repair system: A client (device with switch), A signal input device, A signal output device, A signal client (equipment comes with traffic lights), Figure1-3: The equipment failure, press the red button on, The signal is connected to the input device through the RS232 serial port, the input information will be written to the central database, while the output device through the RS232 serial port to the signal output to the client end, the red light.

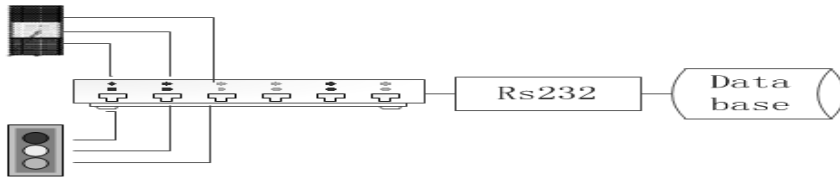


Figure1-3: Lighting equipment repair structure diagram

**Monitoring system repair** <sup>[3]</sup>, Used in harsh environments, such as high temperature or low temperature, failure or chemical environment equipment by monitoring system call. Preferably, the description includes network equipment IP address monitoring parameter threshold setting module and monitoring module. The monitoring parameters of the device are collected every second. When the monitoring parameter value is greater than the threshold value, the alarm is written into the central database;

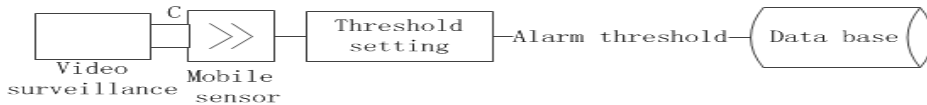


Figure1-4: Schematic diagram of repair structure monitoring system

**The knowledge base is used to store information, repair and maintenance of successful push.** Used to repair the unfinished handheld terminal through the mobile phone, PDA, machine system, LED board display, record and manage repair problems.

**A kind of intelligent industrial equipment repair method, which comprises the following steps,As figure 2:**

- S1 equipment repair, By setting up machine system , Broadcasting system , Lighting equipment , Monitoring system Initiate repair.
- S2 repair process, According to the generation of repair process repair information in S1.
- S3 equipment maintenance, The maintenance personnel according to the repair process in S2 equipment maintenance.
- S4 knowledge archiving, The equipment manager records and confirms the S3 maintenance plan.

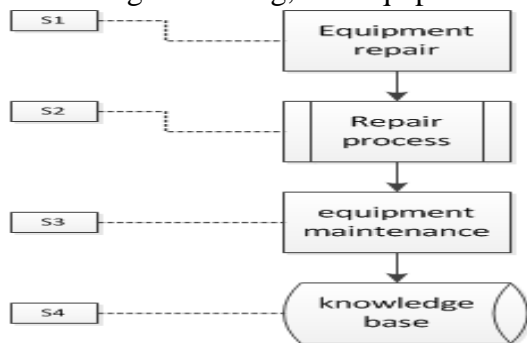


Figure 2 Flow chart of equipment repair procedure

**Repair method and system has the advantages of intelligent equipment industry:**

Using a variety of ways, repair scheme of multi path to solve the problem of repair process cumbersome, repair is not timely;

The implementation of process control, repair schedule tracking and tracing;

The knowledge base management, to provide the fastest and most direct repair guide scheme.

### system implementation

#### Equipment repair

The realization of the repair system is based on the actual Shanghai Yanfeng automotive equipment repair business, from machine repair system, broadcasting system repair, lighting

equipment repair, repair monitoring system in 4 aspects, the system realization process. Repair business process as shown in figure 3.

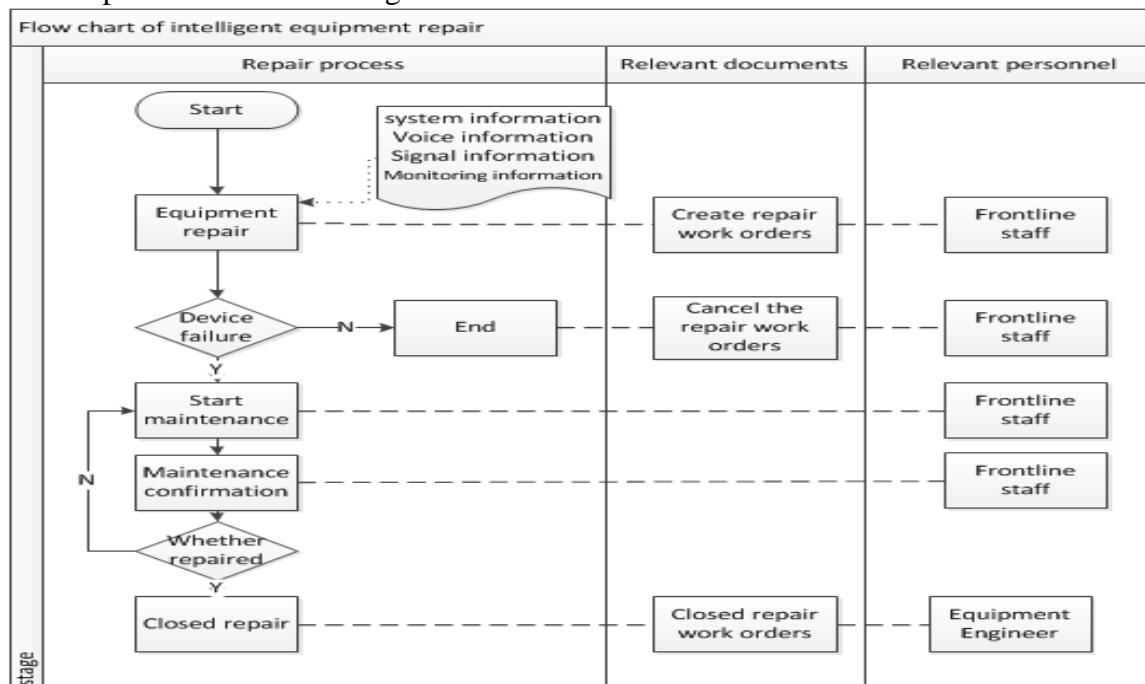


figure 3.: Flow chart and system repair method of intelligent equipment industry

The received repair process, Frontline staff to confirm whether maintenance, If not repair, select the non equipment fault cause shutdown process, If maintenance is required, the process system is automatically transferred to the maintenance engineer to repair the equipment, And record the cause of equipment fault and solutions, after confirmation of closed repair equipment engineer.

### knowledge base

knowledge base<sup>[4]</sup> Storage and sharing, Storage repair process information flow, voice information, monitoring information. Sharing is the case of query and push, through the fuzzy description of the query knowledge base to obtain a successful solution.

### Conclusions

Equipment failure is the main factor of the production line shutdown, Equipment maintenance system to play an important role in manufacturing enterprises, The system and method of equipment repair industry quickly completed intelligent equipment repair, And through the electronic information flow tracking problem solving, Finally, the knowledge sharing is achieved through the knowledge base, which greatly improves the equipment maintenance rate, To reduce the time to stop the line to a minimum, to achieve the efficiency of enterprises.

### Acknowledgements

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### References

- [1] Lei Lei; Jian Hu Zhang; Fu Li Liu; Xin You Cui; Wei Peng; One Equipment Maintenance Support Platform Based on Virtual Repair Technology Applied Mechanics and Materials 2013-271
- [2] CHOI WON YOUNG;CHOI, WON YOUNG ALARM SETTING SYSTEM AND VOICE ALARM SETTING METHOD FOR WIRELESS TERMINAL BY SENDER 2010
- [3] Shih-Wei Yang; Chern-Sheng Lin; Shir-Kuan Lin; Yung-Chin Tseng; AUTOMATIC INSPECTION SYSTEM FOR DEFECTS OF PRINTED ART TILE BASED ON TEXTURE FEATURE ANALYSIS Taylor & Francis 2014

[4] Liu Wen Regular Expression Based Online Aided Decision Making Knowledge Base for Quality and Security of Food Processing Cybernetics and Information Technologies 2015-6