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Risk Management of Electrical Fires in China

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Abstract

The occurrence of fire caused by electricity is not only in China but also in various countries. In order to clarify the main causes of electric fires in China, we have visited over 300 factories and warehouses to evaluate the risk and evaluate the risk. As a result, it was possible to obtain the effect of reducing the payment insurance payment in the electric fire as the insurance company.

1. Introduction

There are many factories in China that have been in business for more than 30 years. Factories that have been in operation for more than 30 years are in a situation where electrical equipment is aging and the risk of electrical fires is high. Therefore, in this study, we surveyed the electrical equipment of more than 300 companies and conducted a quantitative risk assessment of the electrical equipment. Then, we took measures against the cause, and verified the effects by following up with the surveyed companies. The knowledge gained by this research aims to prevent electrical fires.

2. Current situation of electrical fires in China

As shown in Figure 1, fire statistics in China were announced in 2018.(1) Among others, electrical fires account for 34% at the maximum, which is on the rise compared with about 31% in 2016. In addition, about 75% of major fires in China, which mainly occurred in commercial facilities (fires with more than 10 deaths or more than 50 injured persons, or fires with physical losses of more than 50 million yuan), are caused by electrical fires. This is an urgent issue for disaster prevention activities.

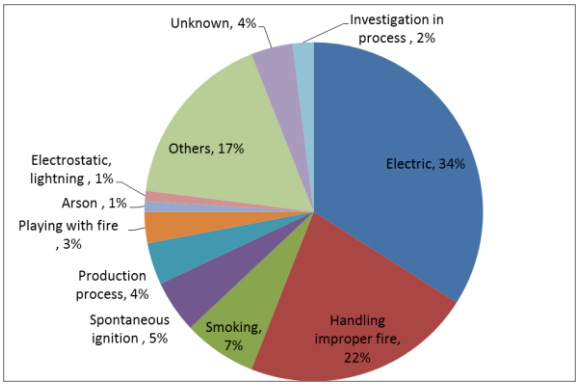

Figure1 Statistics of cause of fire in China (2018)

3. Electrical Equipment situation of companies in China

3.1 Survey of China Electrical Equipment

In order to understand the cause of China's electrical fires, we conducted an electrical equipment survey mainly among the Japanese companies. Quantity trend of the survey conducted each year is shown as the Figure 2.

Implementation	2016	2017	2018
Number of implementations	40	112	164

Figure2 The Number of electrical equipment surveyed yearly

3.2 The main problems of electrical fires in Chinese enterprises

The purpose of 2016 was to understand the condition of electrical equipment. After 2017, we have focused on problem classification. The main problems found in the survey since 2017 are shown in Figure. 3.

Important problem items	Number of instances in 2017 (Occupancy rate)	Number of instances in 2018 (Occupancy rate)
Equipment high temperature part	86 (76.8%)	114 (69.5%)
Capacitor failure	79 (70.5%)	104 (63.4%)
Large current flows through Protected Earth lines	69 (61.6%)	74 (45.1%)

Figure 3 Transition of important problem items

4. Quantitative risk assessment of electrical fire

The major problems found in the survey are classified into four categories (I → II → III →IV). For each category, by making an analogy between the frequency and loss scale of electrical fires that occurred from each problem, the fire cases in the

past, and by adding a four-stage weight for each problem, a checkpoint was created. Using the checkpoints, we quantified the electrical equipment evaluations (8 categories for each total score) of the surveyed companies. We created comparison tables shown in Figure 4,5 and made a discussion.

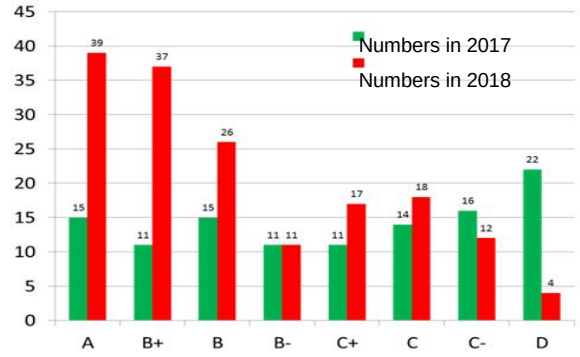

Figure 4 Classification evaluation distributions by year (part 1)

Classification evaluation distribution by year (part 1)			2017	2018
A	>=	80	13.1%	23.8%
B+	>=	70	32.1%	45.1%
B	>=	60		
B-	>=	55		
C+	>=	50	35.7%	28.7%
C	>=	40		
C-	>=	30		
D	>=	30	19.1%	2.4%

Figure 5 Classification evaluation distributions by year (Part 2)

5. Electrical fire countermeasures and their effects

Regarding the extracted problems, we visited the company again, explained the problems, and urged their improvements. As a result, as shown in Fig. 6, the total amount of claims for electrical fires decreased significantly from 2016 to 2018 in our customer group.

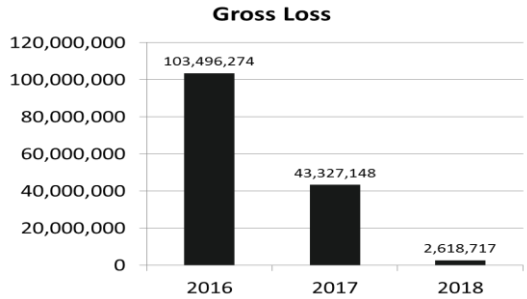

Figure 6 Total annual payment of electrical fire insurance (Currency unit: RMB)

6. Summary

In this study, we were able to clarify some of the causes of electrical fires in China.

In addition, we were able to partially verify the effectiveness of countermeasures against the problem.

On the other hand, the Office of Work Safety Committee under the State Council published “Notice of Self-Checkpoints and Checklist for Comprehensive Maintenance of Electrical Fires” on June 1, 2017. In addition, “Guidelines on Self-Inspection for General Maintenance of Electrical Fires” and “Checklist for General Maintenance of Electrical Fires” were established. [(2)]

From the viewpoint of legal compliance in China, it is also necessary to revise the checkpoint that was originally developed by referring to the checklist.

The cause of electrical fires in China may be due to the complex intertwinement of various factors. In this study, the problems which are not mentioned such as poor quality of the electrical equipment itself ,improper use of electrical equipment, and current flow problems over 300 mA of PE lines may occur due to different connection methods with Japan (incorrect wiring of N-PE lines) [(3)], Leakage current problem and other problems caused by deterioration of machines due to aging, will need more detailed investigation.

Reference

(1) Home page of Bureau of Fire Suppression and Rescue under the Ministry of Emergency Management of China
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(2) Home page of the Office of the Work Safety Committee under the State Council of China
http://www.chinasafety.gov.cn/awhsy/awhbgswj/index_15.shtml

(3) Junichi Matsuda, Naoki Tanoue, Tomoyuki Sawada, Hiroshi Saito:Issues and Countermeasures in China's power supply situation Panasonic electric Vol 59 No.3, 2013
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