

## Spot Check of Automotive Spray Booth Using

Guoliang Dong<sup>a</sup>, Fujia Liu<sup>b</sup>, Shuquan Xu<sup>c</sup>

Research Institute of Highway Ministry of Transport, Beijing, China

<sup>a</sup>GL.DONG@rioh.cn, <sup>b</sup> Fujia.LIU@rioh.cn, <sup>c</sup>Shuquan.Xu@rioh.cn

**Keywords:** Automotive Spray Booth, Spot Check, Comprehensive Evaluation, Check Contents, Sampling Method

**Abstract.** The safety of automotive spray booth is relative to the social security and people's life property safety. Spot check of automotive spray booth can find the potential safety hazard and supervise the vehicle maintenance enterprise to strengthen the management and reduce the risk of fire accidents. Use the spot check method to inspect the situation of the automotive spray booth. Discuss the work contents while spot checking. The method has been applied in a city and proved to be effective.

### Introduction

Metal products business has been developing rapidly in recent years. As the increasing of automotive spray booths, they play an important role in the car maintenance [1].

With the ages increasing, the performance of the spray booth is decreasing year by year. Improper operation and maintenance [2] will deteriorate the situation of the spray booth and result in fire accidents [3,4] and other safety hazards harmful for the society security and personnel safety [5]. The comprehensive evaluation system which has been applied for many years has been proved to be a good mean for the safety of the spray booth. The fire accidents reduce enormously [6] and the security awareness is rising greatly. It is necessary to spot check the automotive spray booth in order to evaluate the comprehensive evaluation quality of the third-party and the situation of the security system in the vehicle enterprises.

### Sample Size and Sampling Method

The population of automotive spray booth is 2000 in a city. Considering the factors of the checking cost and the labor-time, set sample size as 50 to be assigned to districts by their amount of the spray booths.

Assign each spray booth a natural number starting from 1. Use a random generator to generate a number. If the district samples the number belonged is less than the sample size, the sample spray booth corresponding with the number is valid. Otherwise, the number is aborted. Repeating the process until the sample size for each district reach the quantity. After selecting the sample booth, give each sample an exclusive number in order to conveniently manage them.

### Determine the Check Contents

The spot check contents include the management items and the technical items [7]. The management items are material files including management files, records, personnel requirements, environments and emergency system.

The technical checking items are determined obeying the rules listing as bellow.

**Mainly Manual Inspection.** The spot check is to check and verify the current safety situation of the spray booth, and the results of the comprehensive evaluation by the independent third-party organization. The main purpose is to check. It is not necessary to disassemble the frame main body. Simple test and manual inspection are the main means.

**Highlight the Important Factors.** Consider the main safe source and its risk level [8]. Mainly check the items which is easier to result the fire accidents and affect the usage safety of the automotive spray booth [9]. The main safety sources are list in Table 1.

Table 1. The high risk sources of the automotive spray booth

Items		Risk description
Fan and drive motor		No dust cover or dust cover broken for interior motor
		Paint residue, dirt and lumber on the shell of the air-flushing motor
		Motor wire aging or broken, no insulating sheath while cable going through the holes
		Paint residue, dirt and lumber on the shell of the extracting motor
Air Inlet		No grid guard
(Oil/Gas) Heating System	Oil/Gas Supply Equipment	No dedicated oil tank
		Gas or oil leak, no one-way valve for oil inlet
	Heat Exchanger	Defects on the heater such as open weld, broken, distortion etc.
		No pressure relief device or relief area inadequate
		Paint residue on the shell
Electric Heating System	Heating Unit	Paint residue
	Cable	Not high-temperature wire, cable broke or aging
		No grid guard
Air Cleaner		Air cleaner blocking by paint mists, dust or residue
		Ceiling filter not flame-retardant
Air Dust		Paint mists, dust or residue
Control System		(Oil/Gas) Heating system is working before air supply system is not working
Electric Protection		No overload protection ,no open-phase protection, or the functions are invalid
Cable		Not high-temperature wire for lighting system
		No insulating sheath for the main lighting cable
		Cable broke or aging, no insulating sheath while cable going through the holes

**Less Interfere with the Enterprises.** Checking all the technical items will interrupt the normal production and take 1-2 work days which will affect the normal activity of the enterprise and increase the coast both for the enterprise and the spot check work group.

**Problem Orientation.** Based on the experience of the previous comprehensive evaluation, the common problems of the previous evaluation will be mainly checked and verified. The technical checking items are list in Table2.

Table 2. The contents of technical check

No.	Name	Check contents
1	Equipment information	Check the equipment information
2	Management files	Safety production management files
3		Labor protection system
4		Maintenance plans
5		Laws, rules and standard
6	Records	Training records
7		Equipment ledger
8		Operation records
9		Maintenance records
10		Repair records
11	Staff	Management staff
12		Operation staff
13		Maintenance staff
14	Environment	The situation of the booth
15		No flammable and explosive materials in the booth
16	Safety and emergency	Fire accident emergency system
17		emergency plan for fire accident
18		the investigation and handling for fire accident
19	Technical requirement	Cable
20		Air supply system and extracting system
21		Heating system(oil/gas/electric)
22		Lighting system
23		Control system(control cabinet, electric protection equipment)
24		Security protection(safety door, security identifier)

## Conclusions

The results of the spot check proves that the vehicle enterprises have a high security awareness and have been effectively applying the safety system. The third-party organization can justly carry out the comprehensive evaluation and help the enterprises to find out the risk hazards. The comprehensive evaluation system has been working well.

## References

- [1] Gao Zhong-wei. Improve the safety and energy saving of the automotive spray booth by technical innovation[J]. For Repair & Maintenance, 2014(4)59.
- [2] Gao Zhong-wei. The safety use of the automotive spray booth[J]. For Repair & Maintenance, 2015(8)92.
- [3] Chen Xiang, Chen Cui-ping. The resulting thought of the fire accidents of the automotive spray booth[J].Transportation Enterprise Management, 2011(10)40-41.
- [4] Wu Qing-bin. The investigation and the cause analysis of fire accidents of the automotive spray booth[J]. China New Technologies and Products,2011(16)250.
- [5] Kan You-bo. The cause analysis of fire accidents of the spray booth[J]. Motor for Repair & Maintenance, 2006(4)69-70.
- [6] Lu Cheng-gang, Wang Pei-zi, Li Yi. Improve use safety by improving the heating system of the automotive spray booth[J]. Plant Maintenance Engineering,2015(10)61-62.
- [7] Wen Er-xia. The safety of the electric spray booth[J]. For Repair & Maintenance,2015(7)78.
- [8]Wen Er-xia. Safety operation of the electric automotive spray booth[J]. For Repair & Maintenance, 2015(7)80.
- [9] Xia hai-bo, Chen xu. Discussion on security of painting room for locomotive & rolling[J]. Modern Paint & Finishing,2015(5)40-42.