RMUTP Research Journal: Special Issue 2014
The 4th RMUTP International conference: Textiles and Fashion

SETTING-UP AN OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM IN A TEXTILE TESTING LABORATORY

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Abstract: Competing in a global market arena, with increasing quality demands and price-sensitive competitions, has highlighted the awareness of continuous improvements and breakthrough in quality to achieve competitive advantages. Many organizations have been taking their initiatives with adopting the ISO 9000 quality assurance system toward total quality management (TQM). Moreover, the increasing awareness and importance of the environmental and safety compliance requirements also imposed pressures on the organizations. This paper reported a local case of how the top management of a commercial textile testing laboratory in Hong Kong realised that other than "quality", how "safety and health" is also played an important role to the business and the actions taken. In this paper, the story of developing and implementing an occupational safety and health management system were revealed.

1. Introduction

Performance measurement is an essential part of the Occupational Safety and Health Management System implemented in a textile testing laboratory in Hong Kong. It is also a key way to provide information on the effectiveness of the Occupational Safety and Health Management System. Both proactive and reactive monitoring could be used in any performance measurement system to monitor the extent to which the policy and objectives are being met. Proactive monitoring is used to check compliance with the laboratory's occupational safety and health activities while reactive monitoring is used to investigate, analyse and record Occupational Safety and Health Management System failures. The proactive and reactive monitoring are also played complementary roles in the control of specific risks. The proactive data (e.g. from workplace and documentation inspection) are used to monitor compliance with risk controls. They should also be used in subsequent risk assessment. The reactive monitoring data (e.g. hazardous event investigation report) help to make subjective estimates of the likelihood and consequences of hazardous events, and select appropriate risk controls. Evidence from both proactive and reactive monitoring (and from operational experience and local knowledge) should be fed back and used to review and, if necessary, improve implementation of controls. In the establishment of the Occupational Safety and Health Management System in the laboratory, accident rate and working day loss are being used as reactive, monitoring data which as direct indicators of the occupational safety and health performance. The safety inspection, status review and safety audit are being used as proactive measurement for the occupational safety and health performance. This paper shares an experience on implementing the statutory elements of an occupational safety and health management system model in the working environment of a textile testing laboratory in Hong Kong.

2. Accident Rate

A total of 24 accidents were recorded in 2008 for the whole laboratory. When comparing with the total of 26 accidents in 2007 in which the Occupational Safety and Health Management System was just in the preparation stage and not yet implemented, there was decrease of 7.7% in the number of accident in 2008. The summary of the accident figures in 2007 and 2008 and the distributions of the accidents happened in 2008 were shown in Table 1.

Table 1: *Accident Figures in Year 2007 and 2008*

Number of accident	2007	2008
TFH Division	16 (61.5%)	12 (50%)
T & F Division	9 (34.6%)	6 (25%)
CA Division	1 (3.9%)	1 (4.2%)
F & A Division	0 (0%)	2 (8.3%)
Inspection (INSP) Division	0 (0%)	2 (8.3%)
Equipment Services (ES) Division	0 (0%)	1 (4.2%)
Total	26 (100%)	24 (100%)
Average number of employees	673	725
Accident Rate	38.63	33.10

The accident rate is the figure which shows the number of accidents per every 1000 employees, this rate was commonly used in the Labour Department of the Hong Kong Special Administrative Region Government and could be used for comparison purpose. It calculated from the following formula:

$$Accident.Rate = \frac{Total.Number.of.Accidents}{Total.Number.of.Employees} \times 1000$$

In 2008, the accident rate of the Laboratory was 33.10 which showed a 14.3% reduction when comparing with the accident rate of 38.63 in 2007 in which the Occupational Safety and Health Management System was not in place.

As revealed from Table 1, over 75% of the accident in 2006 was contributed from the three main testing divisions namely, TFH Division, T & F Division and CA Division. This fact matched with the relatively large size of the division and the high potential risk of the operation when comparing with other divisions in the laboratory. So, the accident rate of these three divisions were then calculated from the past available accident figures starting from 2005 as shown in Table 2.

Table 2: *Accident rate (accident per 1000 employees) for different divisions*

Accident Rate	2005	2006	2007	2008
TFH Division	62.0	75.0	93.0	73.2
T&F Division	5.5	20.8	45.9	26.4
CA Division	-	0.0	9.9	10.2

Remarks: "-" means no statistical data available

From Table 2, one could observe that the accident rate was decreased significant for TFH Division and T&F Division in 2006 where the Occupational Safety and Health Management System was established and implemented. The accident rate for CA Division in 2008 was insignificantly decreased due to the decrease in the number of employees while keeping the

number of accident to one only. Although the accident rate for TFH Division was the highest among the other divisions in 2008, however, there was already 21.3% decrease in this year which was quite satisfactory improvement. For T&F Division, there was 42.5% decrease in the accident rate in 2008 which was a great improvement.

Knowing the accident rate, it was important to analyse the causes of accidents so that corrective and preventive actions could be executed in order to avoid recurrence. The causes of accident are being divided into the following categories:

- Sharp object – cut by sharp objects such as cutters, scissors, broken glassware, etc.
- Machinery – injured by the operated machinery
- Eye injury – eye injured by chemical splash
- Falling object – injured by objects falling from height
- Fire / heat burn – injured by fire or other hot object
- Striking against object – hitting or bumping into protruding objects during travel or movement of body parts
- Slips and trips – injured by lost of balance due to slips or trips

The causes of the 24 accidents in 2008 were analysed and shown in the Figure 1. As shown in Figure 1, the main causes of accident were "sharp object" and "fire / heat burn" which contributed to nearly 60% of the total accident. However, "falling object" and "striking against object" were also the causes of accident which needed to pay special attention.

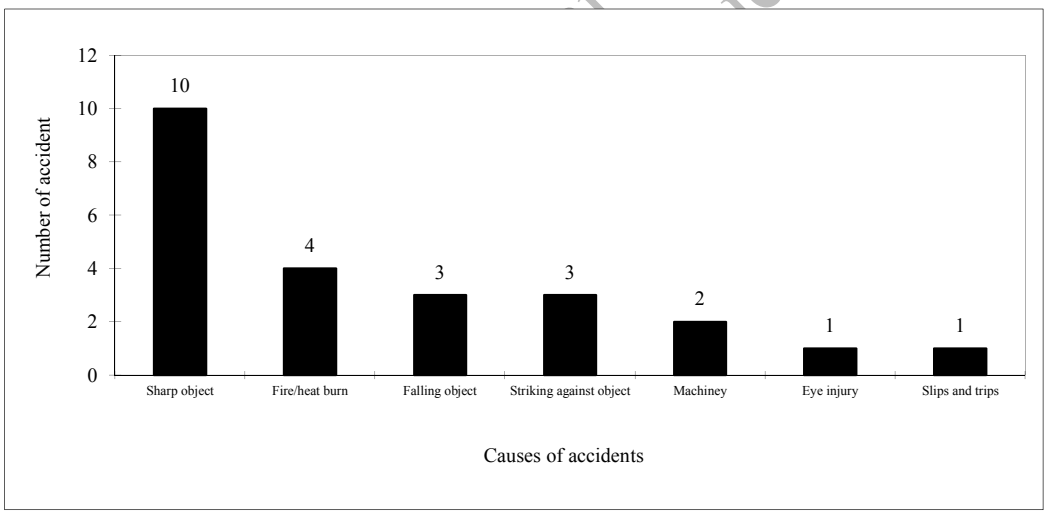

Figure 1: *Analysis of Causes of Accidents in Year 2006*

3. Working Day Loss

Almost every accident would lead to sick leaves for the injured person. In other words, the laboratory would suffer a loss in working days which directly affect the productivity. Since over 75% of the accidents were happened in the three main testing divisions, so the average working day loss per accident was calculated according to the following formula for the three divisions' results showed in Table 3:

$$Average.working.day.loss = \frac{Total.number.of\ .working.day.loss}{Total.number.of\ .accident}$$

Table 3: *Average working day loss per accident for different divisions*

Average working day loss	Year			
	2005	2006	2007	2008
TFH Division	5.25	3.75	4.75	3.17
T&F Division	5.24	9.00	7.11	2.67
CA Division	-	0.00	2.00	1.00

Remark: "-" means no statistical data available

From Table 3, one could observe that the average working day loss per accident was decreasing in T&F Division. An average loss of 2.67 days in 2008 which showed a big improvement of having 62.4% reduction in the average loss when comparing with 2007. For TFH Division, the average working day loss per accident was also decreased but in a slow pace with fluctuation. However, an average loss of 3.17 days per accident in 2008 reflected that there was a33.3% reduction when comparing with 2007. Moreover, there was also 50% reduction in the average working day loss for CA Division in 2008. With the reference to the number on the average working day loss in 2008, one could conclude that the establishment of the Occupational Safety and Health Management System is really the contributing factor for the reduction of the average working day loss.

4. Status Review Result

Initial status review was conducted before normally establishing the Occupational Safety and Health Management System by making use of a self-assessment questionnaire in which the implementation status of the key elements of the Occupational Safety and Health Management System were reviewed. It was found that the average score obtained was 17.25 which implied that there was a poor safety and health program and help was needed. After establishing and implementing the Occupational Safety and Health Management System, the same self-assessment questionnaire was being used for reviewing the implementation status so that comparison could be done. Totally 40 questionnaires were sent out to the same people as in the initial status review which include top management, all divisions heads and also some supervisors. The average scores for the 40 completed questionnaires were calculated and summarized in Table 4. From Table 4, one could observe that the average total score obtained after the implementation of the Occupational Safety and Health Management System was 44.64 which indicated that a sound safety and health program was in place [1, 2]. The "Percentage (%) achieved" column showed the degree of attainment when comparing with the maximum score for each key elements. As revealed from the figures, the total percentage achieved was increased from 34.5% to 89.3% after implementing the Occupational Safety and Health Management System. There was an increment of 54.8%. From the "Percentage (%) increased" column, one could observe that there was a great improvement of 96.4% and 75.0% in the "Safety and Health Committee" and "Safety Records" elements respectively. The individual percentage achieved for each key elements before and after the implementation of the Occupational Safety and Health Management System was shown in Figure 2.

Table 4: Summary of status review scores

	Maximum Score	Before Implementation		After Implementation		Percentage (%) increased
		Average Score	Percentage (%) achieved	Average Score	Percentage (%) achieved	
Management Commitment	4	1.00	25.0	3.79	94.6	69.6
Safety Inspection	4	0.96	24.1	3.64	91.1	67.0
Safety Training	5	1.00	20.0	4.36	87.1	67.1
Safety Rules	4	1.00	25.0	3.18	79.5	54.5
First Aid	4	1.04	25.9	3.96	99.1	73.2
Safety and Health Committee	4	0.00	0.00	3.86	96.4	96.4
Fire Prevention	6	2.86	47.6	5.46	91.1	43.5
Health and Welfare	5	2.93	58.6	4.07	81.4	22.9
Safety Promotion	3	0.93	31.0	2.57	85.7	54.8
Personal Protective Equipment	4	2.54	63.4	3.57	89.3	25.9
Safety Records	2	0.54	26.8	2.00	100.0	73.2
Accident Investigation	5	2.46	49.3	4.18	83.6	34.3
Total	50	17.25	34.5	44.64	89.3	54.8

Since the percentage achieved for each key elements was different; some elements had high percentage while some had lower. However, the element having low percentage was actually the area needed to be improved. The percentage achieved after implementation for the key elements were plotted in ascending order as shown in Figure 3. It could be shown from Figure 3 that almost all the key elements were achieved 80% of the maximum scores or above. Half of the elements were even over 90%. However, for those elements having less than 85% were really the areas which required for improvement. There include “Safety Rules”, “Health and Welfare” and “Accident Investigation”.

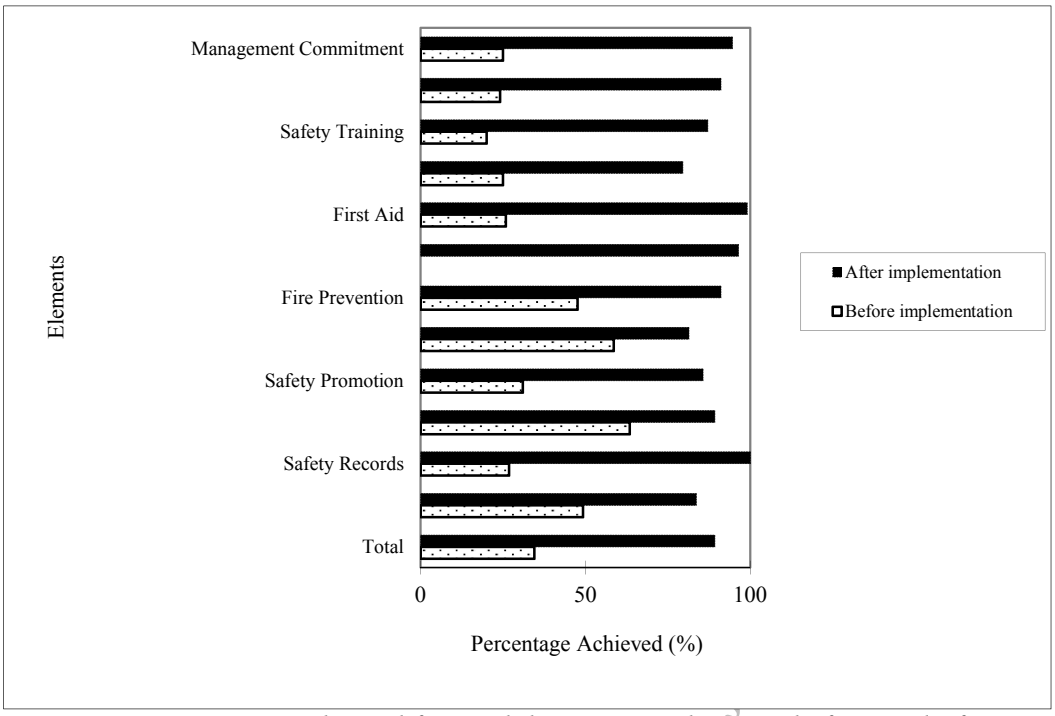

***Figure 2**: Percentage achieved for each key system elements before and after implementation of the Occupational Safety and Health Management System*

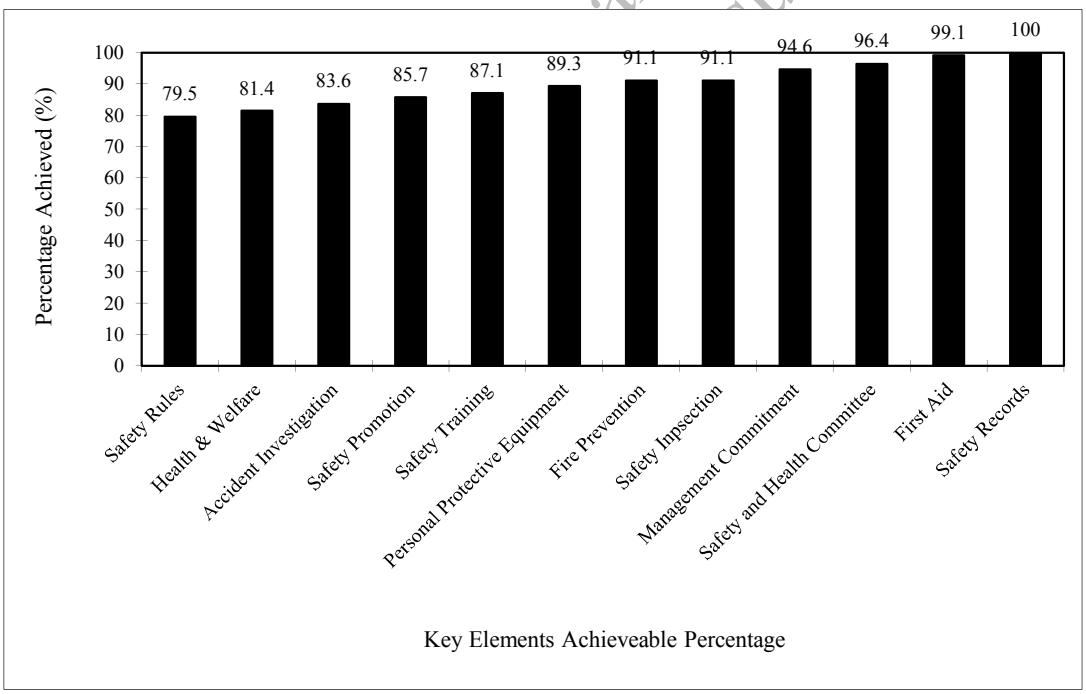

***Figure 3**: Percentage achieved for the key system elements in ascending order*

5. Safety Inspection

Systematic safety and health inspection of the workplaces, which plays a key role in the control of workplace safety and health hazards, has to be planned, organised and conducted. Such inspection can help to ensure that the workplace complies with all relevant safety and health legislation, standards and Code of Practice. Effective occupational safety and health inspection programs are one of the most important preventive measures that can be taken to ensure a good safety and health working environment. So, the Company Safety Committee has planned to conduct the safety and health inspection through cross-divisional method at least half yearly by the Company Safety Officer and Divisional Safety Officer in the following main areas: (1) Access and egress; (2) Housekeeping; (3) Fire prevention; (4) First Aid; (5) Electrical safety; (6) Personal protective equipment; (7) Machine Guarding; (8) Chemical storage; (9) Chemical spillage control; (10) Fume cupboard; (11) Boiler and pressure vessels; (12) Compressed gas; (13) Manual handling operation; and (14) Signage.

The safety and health inspection checklist for each inspected area was then developed and used during the safety and health inspection. The checklists were prepared with the reference to the booklet, namely (i) "Reference Manual for Inspections Reports on Factories and Industrial Undertakings (Other than Construction Sites)" [3] and (ii) "Reference Manual for Inspection Reports on Workplaces" [4] (both booklets were issued by the Occupational Safety and Health Branch of Labour Department, Hong Kong Special Administrative Region Government). The safety and health inspection schedule for all divisions in the Laboratory was formulated in Table 5.

Table 5: *Safety and health inspection schedule*

Division	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
TFH	A,B						C,D					
T & F		B,C						D,E				
CA				C,D						E,A		
Others						D,E						A,B

A = Divisional Safety Officer T & F Division; B = Divisional Safety Officer of CA Division;
C = Divisional Safety Officer of F & A Division; D = Company Safety Officer;
E = Divisional Safety Officer of TFH Division

The inspection report would then be prepared listing down the problematic or hazardous areas, the recommended corrective and preventive actions and its priority or urgency of the actions which need to be taken. The report was distributed to the General Manager and the Safety Officer of the corresponding division for co-ordinating the remedial actions. All the remedial actions will be verified in the next inspection. However, for the serious event noted in the inspection, warning letter would be issued to corresponding division so as to take immediate remedial follow-up action. Also the serious event would be re-inspect to ensure the condition was safe and health. The inspection reports were recorded and reviewed quarterly in the Company Safety Committee meeting. In fact, the most important concept of

the safety and health inspection was fact-finding instead of fault-finding so that the employees in the laboratory could work at a safe and healthy environment.

6. Safety Audit

A system for routinely monitoring of the occupational safety and health performance through accident rate, working day loss, status review and safety inspection as described in previous sections is insufficient in itself to ensure the effectiveness of the Occupational Safety and Health Management System, there is also a need for periodic safety audits that enable a deeper and more critical appraisal of all the elements of the Occupational Safety and Health Management System. To avoid compromising its aims, the safety audit has to be conducted by previous who are competent and as independent as possible from the activity that is being audited. This person can be drawn from within the laboratory or from outside bodies. Audits can be comprehensive or address selected topics according to circumstances. The results of audits have to be communicated to all relevant personnel and corrective action taken as required. The safety audit is planned to be conducted yearly in the laboratory according to the safety audit checklist which developed by the Company Safety Officer. The audit checklist will cover all the key elements: (1) Safety policy; (2) Safety organisation structure; (3) Safety training; (4) In-house safety rules and regulations; (5) Programme for inspection for identifying hazardous conditions; (6) Programme for identifying hazards and risk; and provide personal protection equipment; (7) Accident / incident investigation; (8) Emergency preparedness; (9) Evaluation, selection and control of sub-contractors; (10); Safety committee; (11) Job hazard analysis; (12) Safety promotion; (13) Process control programme and (14) Heath assurance programme [1,5].

7. Conclusion

After implementing the Occupational Safety and Health Management System in the Laboratory within years, the overall safety and health performance, reflected from the reduced accident rate and working day loss, of the Laboratory was improved significantly. In could conclude that the system provided a helpful tool for the Laboratory to get continual improvement in the occupational safety and health issue.

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