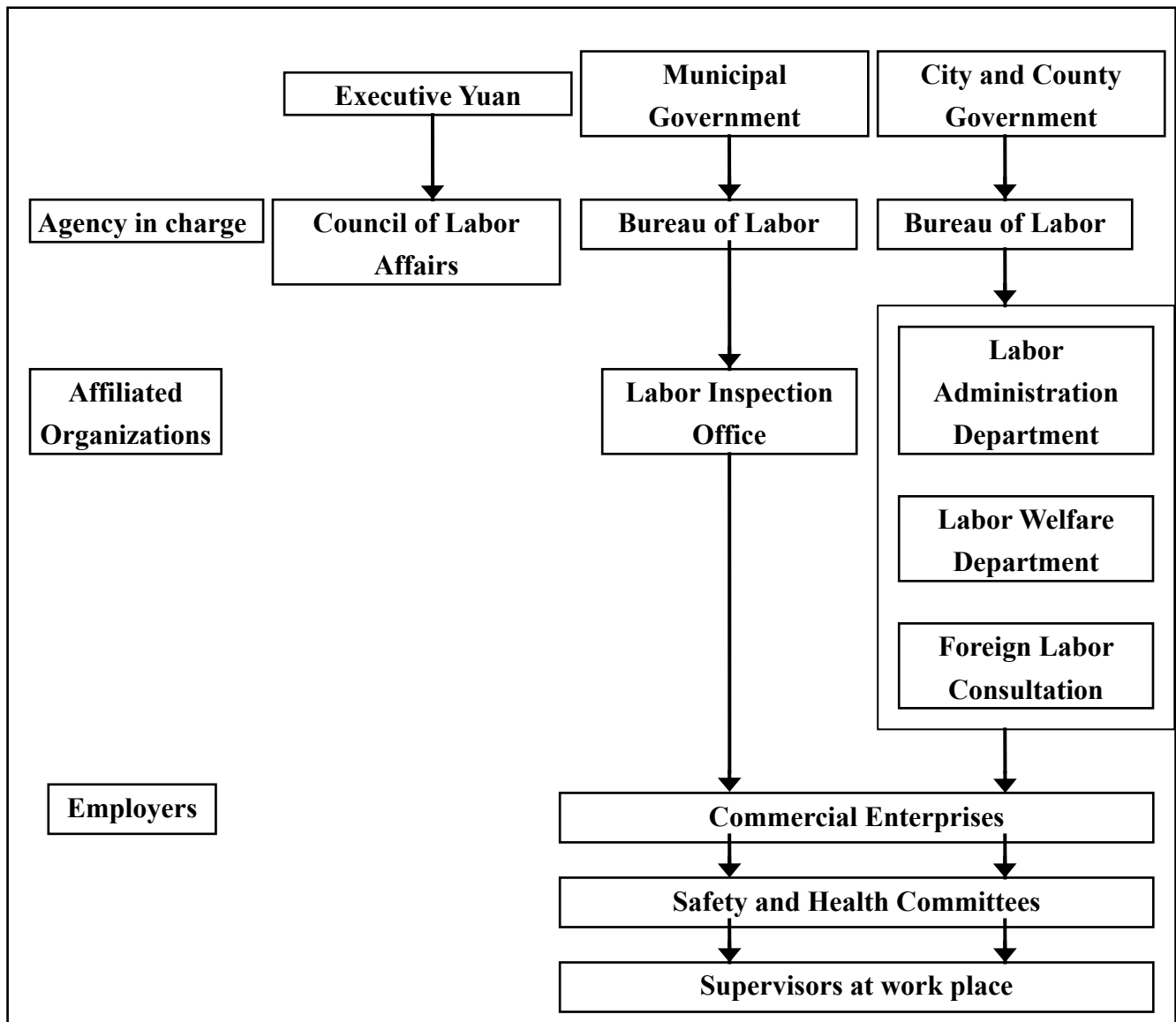


# Occupational Safety and Health Information for Foreign Workers in Taiwan- Petrochemical Industry



**Topic 1: Introduction of the competent labor safety and health agencies in Taiwan, fundamental principles of occupational safety and health management and types of accidents in the respective industries.**

**1-1 Competent agencies of labor safety and health management**



**1-2 Prevention is the best policy**

The fundamental principles of occupational safety and health management : The two major causes of occupational injuries are “**unsafe acts**” and “**unsafe conditions**”. According to the **data from the Bureau of Employment and Vocational Training**, the most recent injury data caused by unsafe acts are as follows :

1. Negligence and recklessness

2. Violating restricted rules
3. Not following the SOPs
4. Not using personal protective equipment
5. Poor physical conditions

However, the percentage of occupational injuries caused by inevitable causes is 3%, by unsafe conditions or equipment is 24%, and by unsafe acts is 73%. To prevent occupational injuries, the effective way is to **avoid the manifestations of unsafe acts or behaviors as listed above.**

### 1-3 Population distribution of foreign workers in Taiwan by industry

Nationality Industry	Thailand	The Philippines	Indonesia	Vietnam	Mongolia	Malaysia	Grand total
Manufacturing	80,955	58,753	7,828	22,336	20	11	169,903
Caretaker	2,286	27,940	74,675	46,474	16	0	151,391
Construction	9,608	1,361	45	730	0	1	11,745
Fishing crew	13	833	1,773	703	0	0	3,322
Domestic helper	32	1,167	902	293	0	0	2,394
Grand total	92,894	90,054	85,223	70,536	36	12	338,755

(data from the Bureau of Employment and Vocational Training, Council of Labor Affairs, Executive Yuan in 2006)

### 1-4 Types of injuries of the respective industries

Manufacturing (including Electronics and Fabricated Metal Products)	<ol style="list-style-type: none"> <li>1. Rolling-up, pinches</li> <li>2. Cuts</li> <li>3. Stumbling</li> <li>4. Improper acts</li> <li>5. Hit by object</li> <li>6. Contact with hazardous substances</li> <li>7. Falling</li> <li>8. Hit by falling objects</li> <li>9. Crashing or bumping</li> <li>10. Collapsing objects</li> </ol>
Electronics	<ol style="list-style-type: none"> <li>1. Cuts</li> </ol>

	<ol style="list-style-type: none"> <li>2. Crashing or bumping</li> <li>3. Contact with chemicals</li> <li>4. Leaking gases</li> <li>5. Eye sight and hearing loss</li> </ol>
Fabricated Metal Products	<ol style="list-style-type: none"> <li>1. Rolling-up, pinches</li> <li>2. Stabbing, cutting and chafing</li> <li>3. Stumbling</li> </ol>
Petroleum and Coal Products, Rubber Products and Plastic Products	<ol style="list-style-type: none"> <li>1. Rolling-up, pinches</li> <li>2. Cuts</li> <li>3. Stumbling</li> <li>4. Improper acts</li> <li>5. Hit by objects</li> <li>6. Crashing or dashing</li> </ol>
Construction	<ol style="list-style-type: none"> <li>1. Stumbling</li> <li>2. Hit by falling objects</li> <li>3. Treading</li> <li>4. Hit by collapsing objects</li> <li>5. Contact with extreme temperatures</li> <li>6. Falling and rolling</li> <li>7. Rolling-up, pinches</li> <li>8. Crashing</li> <li>9. Improper acts</li> <li>10. Crashing or dashing</li> </ol>
Transportation Equipment	<ol style="list-style-type: none"> <li>1. Rolling-up, pinches</li> <li>2. Stabbing, cutting and chafing</li> <li>3. Explosion</li> </ol>

(Yearbook of Labor Statistics of 2005)

### 1-5 Occupational Safety and Health Training

The primary objective of occupational safety and health training is to prevent accidents. To achieve this goal effectively, employers must take relevant and proper measures on employees' safety awareness and facility safety, and provide workers with adequate understanding and knowledge of occupational safety and health to prevent accidents from occurring.

The goals	To keep workers healthy, to increase work productivity and to avoid occupational accidents and diseases.
Facets in safety	1. To anticipate the existence of hazardous factors and prevent

and health	<p>accidents from happening.</p> <ol style="list-style-type: none"> <li>2. To understand the underlying hazards in the workplace.</li> <li>3. To evaluate the degrees of hazards or risks in the workplace.</li> <li>4. To prevent hazardous events from occurring or aggravating.</li> </ol>
Relevant regulations	The Labor Safety and Health Law and the enforcement rules.
The common hazard factors	<ol style="list-style-type: none"> <li>1. Chemical: inhaling or skin contact with dust, vapor, smoke and drops of metal, non-metal, hydrocarbon and toxic gases.</li> <li>2. Physical: working under extremely high or low temperature environment, non-ionizing and ionizing radiation, noise, vibration and unusual air-pressure.</li> <li>3. Ergonomic: poor lighting, injuries from portage and tools.</li> </ol>
Measures in controlling occupational injuries	<ol style="list-style-type: none"> <li>1. Engineering control: to replace the operation modes, isolate hazardous substances, automate operations, adopt wet-type operations and provide efficient ventilation.</li> <li>2. Administrative control: to reduce the time of exposure, establish and maintain safety and health procedures, provide protections, put up warning signs, provide safety information, conduct regular emergency response drills.</li> <li>3. Health surveillance: to conduct employee physical examination.</li> </ol>
Why is safety and health training necessary?	H.W. Heinrich indicated that unsafe acts or behaviors accounted for 88% of occupational injuries, unsafe conditions accounted for 10%, while the causes in some cases can be both. Therefore, occupational safety and health education and training are provided to prevent unsafe behaviors and improve the working environment.
Purposes of training	To provide workers with the knowledge and competence of preventing occupational injuries, to develop the awareness and habits of paying attention to safety and health; to understand the underlying hazards in the workplace and to design and implement necessary measures to prevent accidents from occurring.
Regulations to follow	According to the Labor Safety and Health Law, the workers, the occupational safety and health staff and the managers are required to take the training.
Targets of safety and health	<ol style="list-style-type: none"> <li>1. The safe and health staff</li> <li>2. Managers in charge of safety and health activities.</li> </ol>

training	<ol style="list-style-type: none"> <li>3. Operators of dangerous machinery and equipment.</li> <li>4. Staff designated with specific tasks</li> <li>5. General staff</li> <li>6. Staff designated with monitoring the working environment</li> <li>7. Construction safety review personnel</li> <li>8. Process safety review personnel</li> <li>9. First-aid personnel</li> <li>10. New hires or employees with new work assignment</li> </ol>
The schedules and contents of the training	There are training schedules and courses for respective training subjects.
Principles of analysis	To find out all superficial and underlying causes, to investigate the root causes and take appropriate measures.
Prevention of occupational accidents	To prevent occupational accidents from occurring, the organization must follow the steps of hazard identification, evaluation and control in the workplace. As for hazard identification, the organization must recognize the presence of all possible hazards and their characteristics. In evaluation, the organization must examine the degree of exposure, the number of employees exposed to a specific hazard and the degree of compliance with relevant regulatory requirements concerning exposure control. As for the control of hazard, the organization must control the hazard at the source, the dispersion route of the hazard, the exposed workers and design precautionary operating procedures.
Emergency measures after occupational accidents	According to the Protection for workers Incurring Occupational Accidents Act, employers must apply for labor insurance upon employment to ensure workers' security. In addition, after occupational accidents, employers shall provide compensation to injured workers. Employers will be fined if they fail to apply for labor insurance on behalf of their employees or fail to provide compensation to injured workers.

## Topic 2: The occupational safety and health information of the petrochemical industry

### 2-1 Characteristics of the petrochemical industry

The workers in the petrochemical industry face higher carcinogenic risks than workers of the other industries, because in the petrochemical industry most of the chemicals produced are volatile organic compounds such as polyethylene, chloroethylene, benzene, etc. and can cause air pollution. The most common hazards encountered in the petrochemical industry are chemical, physical and ergonomic in nature as described below:

1. Chemical: inhaling or skin contact with the dust, vapor, hydrocarbon and toxic gases
2. Physical: working environment of extreme temperatures, non-ionizing and ionizing radiation, noise, vibration and unusual air-pressure.
3. Ergonomic: poor lighting, injuries from portage and tools.

Table 2-1 indicates the relationship between injury types and media

Table 2-1 The media and general injury types

Injury types	Media	Injury and death in all industries	
		Number	Percentage (%)
Pressing, scrolling	general power machines, power transmission apparatus, power carrying machines	114	20.80%
Cutting	general power machines, material, labor-powered machines and tools	51	9.30%
Contact with extreme temperatures	high-temperature steam and other chemical substances	30	5.47%
Fire	the management of inflammable dust and other dangerous substances, tanks, oil drums	19	3.47%
Contact with hazardous substances	injurious gases, steam, dust, or other harmful substances	8	1.46%

## Case Studies

The petrochemical industry is an industry that is high in risks, energy consumption, and pollution. The working environment in which accidents often occur are annual maintenance, electronic instrument installation, operation of scaffolds, maintenance of pipelines, cleaning of storage tanks and confined-space entry, etc. There are accidents such as falling, pressing, object dropping, electric shock, lack of oxygen, explosion, collapsing of trench, which normally result in severe property damage and pollution, and protests from neighboring communities. In the petrochemical industry, especially the manufacturing factories of crude petrochemical materials are with large production rates, and the manufacturing processes often involve exothermic chemical reactions. The equipment, operation, storage facilities, warehouses and the utilities can result in explosion or fire due to spills of chemicals. The importance of occupational safety and health of the petrochemical industry is illustrated with the following cases.

### Case study 1: Pressing or scrolling

**The incident:** Death resulting from being pressed of warping machine by cleaning warped beams.

The victim	Female, an operator of cleaning warped beams
The task	cleaning warped beams
Date	At 2:30 PM in a December
Workplace	The workplace of cleaning warped beams
Equipment or media causing injury	Transmission shaft
Scheme	The supervisor who has witnessed the accident and helped the victim on that day said: "I helped the victim to clean the warped beams at about 2:30 PM. I moved the warped beams to be handled to the warping machine with the transporting vehicle and then installed them to a fixed position. The victim stood at the right side and I helped her at the left. She used the warping machine to make the warp beam run. We were holding a bundle of PE silks in each hand and pulled out PE silks in the direction of warped beams. (Illustration 2.1) Suddenly, her leg was wound by the PE silks. She pressed immediately the emergency stop button to stop the warping machine. But she was scrolled up, first the legs then other parts of the body. I rushed to the



	warping machine and tried to stop its spinning. The warping machine finally stopped as one of my legs was scrolled up by PE silks. I untied the PE silks around my leg and hurried downstairs for help. When the factory director arrived, we unwound the PE silks around her body together. We sent her to the hospital, but she died because of severe injury at 3:00 PM”	
Analyses	layer of cause	Description
	Surface cause	1. The company did not set up the protective shields at the proper position of the warping machine. (unsafe environment) 2. The company did not set up a clear sign at the proper position on the warping machine for emergency stop. (Illustration 2.2)
	Underlying cause	Automatic inspection plans were not established, thus automatic inspection was not put into practice.
	Root cause	1. The safety and health education needed for the task and the training for damage prevention are not provided to the workers. 2. The workers lack awareness about safety.
Suggestive strategies	<ol style="list-style-type: none"> <li>1. Provide the workers with education and training that are necessary for their work to enhance their knowledge of safety and health to prevent similar accidents in the future.</li> <li>2. Upon the processes that might be dangerous such as cleaning of the machines, adding oil, examination, repairing or adjusting, the machines should be stopped from operating. To prevent other people from operating the starter of the machine, it should be locked or labeled, and some safety devices should be set up to avoid dropping things. When the preceding works have to be done during operation, the employer should set up protective shields in the dangerous zone. Finally, we must re-design the distribution of human sources.</li> <li>3. Members responsible for the safety and health tasks should establish plans for occupational injuries and accidents prevention, emergency plans, and conduct the related departments of the practice.</li> </ol>	



Illustration 2.1 The warping machine



Illustration 2.2 The protection and emergency devices

**Case study 2: Contact with heat and coldness**

**The incident:** Burning resulting from EG on cleaning EG trough

Operator	Male, the operator who cleans EG troughs
Responsibility	Cleaning EG troughs
Time	At 13:30 in April
Workplace	The workplace of EG troughs
Equipment or media causing injury	EG

Scheme	<p>A witness said: The vacuum system was clogged by gathered things at about 11:50 AM. Mr. Tung called me and other five people to deal with this situation. We finished the cleaning it at 13:30. When Mr. Tung, Mr. Lin and Mr. Jing were doing the cleaning, a great deal of EG let out, which spurted their legs and they were sent to the hospital right away. (Illustration 2.3) Mr. Su and I were not spurted; Mr. Tu was just a little injured, and he returned to the factory after some remedy. The system pressure was about 1010 millibars. The temperature of EG was about 82°C. During the operation, all three victims were wearing protective clothes, but they do not cover the legs, their ankles were thus burned. EG is saved in cold condensed implement, in which the pipe is about 15 meters high. The maximum capacity of EG is about 100-150 kilograms. Although we can not estimate the exact quantities of spurting EG, they may be no more than 150 kilograms. Because this work was temporary, there was no SOP.</p>	
Analysis	layer of cause	Description
	Surface cause	When cleaning EG trough, the company did not provide effective and protective equipments for the workers. The workers did not discharge remained EG of the trough before the cleaning. (Illustration 2.4) (unsafe environment)
	Underlying cause	When there were hot materials falling down, the company did not evacuate workers. In addition, the workers did not use proper and secure protective equipments.
	Root cause	<ol style="list-style-type: none"> <li>1. The evaluation of operation danger was not put into practice.</li> <li>2. No standards for safe operation were drawn up and applied.</li> </ol>
Suggestive strategies	<ol style="list-style-type: none"> <li>1. When there is hot substance falling down, the company should evacuate workers. In addition, the workers should use proper and safe protective equipments.</li> <li>2. Standards for safe operation were drawn up and applied.</li> </ol>	



Illustration 2.3 EG troughs



Illustration 2.4 protective equipments

**Case study 3: Fire**

**The incident:** Death resulting from the heat of fire on operating drier

Operator	Male, The worker operating the drier to unload products
Responsibility	Operating the drier
Time	At 11:50AM in August
Workplace	The workplace of the drier
Equipment or media causing injury	Chemical goods

Scheme	<p>One day at about 11:50 AM, two workers were unloading the products on the 1st floor under the reflecting troughs (on the 3rd floor). They did the unloading with 25 kilograms of transparent plastic bags which covered the drier. (Illustration 2.5) When unloading the last bag, there was a burst of black smoke on the products surface of the product in the plastic bag. There were some sparks that scurried out the plastic bag immediately, and the plastic bag soon melted. The flame burned the first floor. The fire spread and burned the driers on the first and second floor. Also, the reflecting trough on the third floor and other equipments on the fourth and fifth floor were smoked. The worker on the second floor was shocked because of the heat. He could not escape and eventually died.</p>	
Analyses	layer of cause	Description
	Surface cause	There were not facilities to eliminate static electricity nearby the reflecting troughs and driers. (Illustration 2.6) (unsafe environment)
	Underlying cause	<ol style="list-style-type: none"> <li>1. No executives in charge of the workers' safety and health affairs.</li> <li>2. No automatic inspection plans established to accomplish automatic inspection.</li> </ol>
	Root cause	<ol style="list-style-type: none"> <li>1. No safety and health education and accidents prevention training processed.</li> <li>2. There is no safety and health tasks regulations established.</li> </ol>
Suggestive strategies	<ol style="list-style-type: none"> <li>1. If the equipments can explode or burn from static electricity, we should use ground connection, electric pharmaceutical or humidification to avoid such accidents.</li> <li>2. There should be executives assigned to be in charge of worker safety and health.</li> <li>3. Automatic inspection plans should be established and executed.</li> <li>4. There should be education and training to provide workers the ability of operation and accidents prevention, and the knowledge about safety and health.</li> <li>5. The corporation should work with the worker representatives to establish the safety and health task regulations, and report it to the inspection institute and execute the regulations.</li> </ol>	



Illustration 2.5 the reflecting troughs and driers

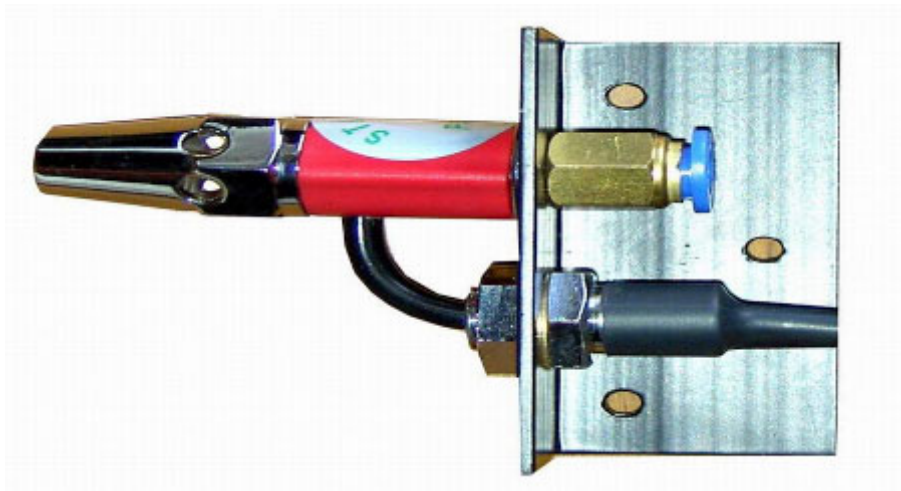
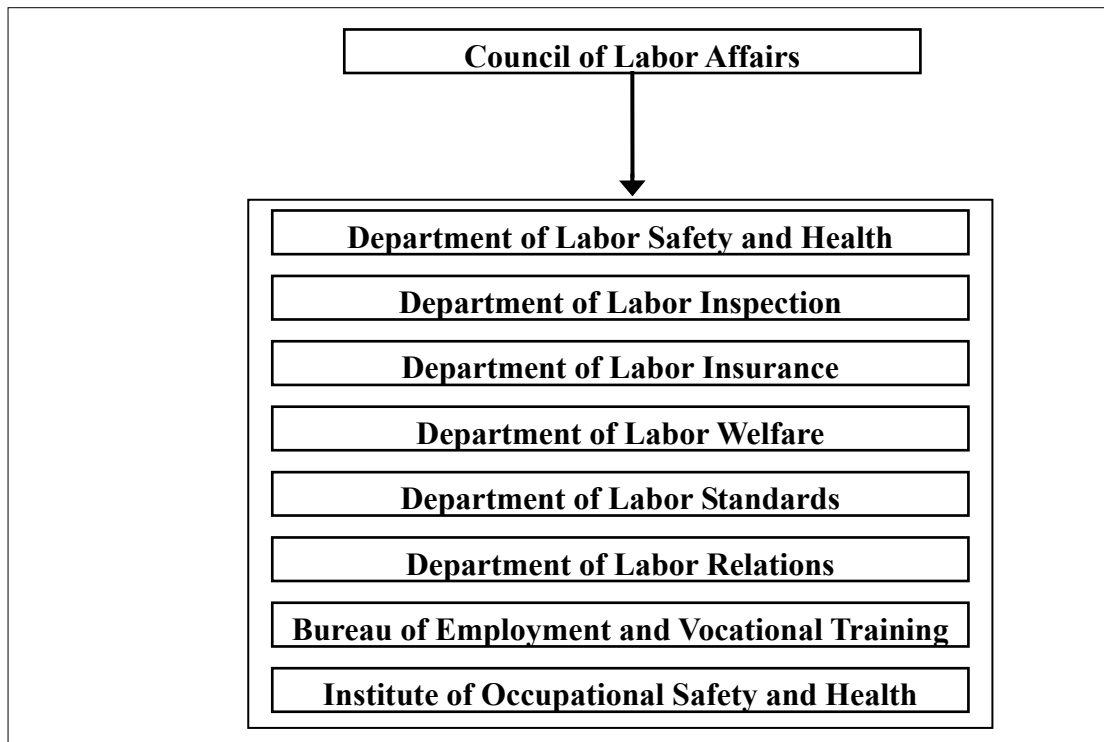


Illustration 2.6 facilities to eliminate static electricity

### 2-3 Conclusions

To prevent occupational injuries and accidents, one must first know the causes of accidents so that preventive solutions can be provided. The primary causes of accidents are unsafe acts and unsafe conditions in the workplace, and the root cause is the lack of safety and health management or management system failure. Therefore, to avoid occupational injuries and accidents, safety and health management must be improved, and operating companies are encouraged to pursue continual improvement. The statistics of occupational injuries and accidents and investigation of accidents are useful information to prevent occupational injuries and accidents from happening. The primary objective is to determine how and why the accidents happened. If one can make good use of the investigation findings, similar accidents or even more serious ones can be avoided.

### **Topic 3 : Introduction to protection of the rights of foreign workers and assistance programs**



#### **3-1 Labor safety and health**

According to the Labor Safety and Health Law, employers must guarantee safety and health in the work place. Additionally, personal protective equipment, occupational safety procedures, possible injury types, safety and health training, and precautionary training must be provided to protect laborers physically and mentally.

#### **3-2 Handling of disputes**

During the period of employment in Taiwan, every foreign labor is entitled to seek assistance from any of the labor offices in every city or county in the event of labor disputes.

#### **3-3 Access to related assistance**

During the period of employment in Taiwan, if there are disputes about the contract or the rights of both parties, the employees or employers can contact the local consultation service centers, which are listed below: (or the Toll-free Help Line provided by the Council of Labor Affairs: English: 0800-885885; Thai: 0800-885995; Indonesian: 0800-885958; Vietnamese: 0800-017858)

Center	Address	Tel/Fax
Taipei City Foreign Workers Consultation Service Center	8F, No.21, Section 1, Dihua St., Datong District, Taipei City	Tel : 02-25502151 Fax : 02-25507024
Taipei County Foreign Workers Consultation Service Center	7F, No. 161, Chung Shan Rd. Section 1, Panchiao City, Taipei County	TEL : 02-89659091 02-89651044 FAX : 02-89651058
Keelung City Foreign Workers Consultation Service Center	No. 1, Yi 1 <sup>st</sup> Rd., Keelung City	TEL : 02-24258624 02-24278683 FAX : 02-24226215
Taoyuan County Foreign Workers Consultation Service Center	8F, No.1, Hsien Fu Rd., Taoyuan City	TEL : 03-3344087 03-3341728 FAX : 03-3341689
Hsinchu City Foreign Workers Consultation Service Center	5F, No. 69, Kuo Hwa St., Hsinchiu City	TEL : 03-5319978 FAX : 03-5319975
Hsinchu County Foreign Workers Consultation Service Center	4F, No.10, Kuang Ming 6 <sup>th</sup> Rd., Hsienchiu County	TEL : 03-5520648 FAX : 03-5520771
Miaoli County Foreign Workers Consultation Service Center	No. 1121, Guohua Rd., Miaoli City, Miaoli County	Tel : 037-357040 Ext. 502 037-364548 Fax : 037-363261
Taichung City Foreign Workers Consultation Service Center	2F., No. 53, Sec. 2, Zihyou Rd., Taichung City	Tel : 04-22296049 0800-600088 Fax : 04-22296048
Taichung County Foreign Workers Consultation Service Center	6F, No. 36, Yang Ming St., Fengyuan City, Taichung County	TEL : 04-25240131 FAX : 04-25285514
Changhwa County Foreign Workers Consultation Service Center	8F, No. 100, ChungHsing Rd., Changhwa City	TEL : 04-7297228 04-7297229 FAX : 04-7297230
Nantou County Foreign Workers Consultation Service Center	1F, No. 660, ChungHsing Rd., Nantou City, Nantou County	TEL : 049-2238670 FAX : 049-2238853
Yunlin County Foreign Workers Consultation Service Center	No. 515, Yunlin Rd, Section 2, Touliu City, Yunlin County	TEL : 05-5338087 05-5338086 FAX : 05-5331080
Chiayi City Foreign Workers Consultation Service Center	No. 199, Chung Shan Rd., Chiayi City	TEL : 05-2231920 FAX : 05-2228507
Chiayi County Foreign Workers Consultation Service Center	No. 1, Sianghe 2 <sup>nd</sup> Road East Section, Tapao City, Chiayi County	Tel : 05-3621289 Fax : 05-3621097
Tainan City Foreign Workers Consultation Service Center	8F, No. 6, Yung Hwa Rd. Section 2, Tainan City	TEL : 06-2951052 06-2991111 FAX : 06-2951053
Tainan County Foreign Workers Consultation Service Center	7F, No. 36, Ming Chih Rd., Hsinying City, Tainan City	TEL : 06-6326546 FAX : 06-6373465
Kaohsiung City Foreign Workers Consultation Service Center	6F, No. 6, Chen Chung Rd., Chien Chen District, Kaohsiung City	TEL : 07-8117543 FAX : 07-8117548
Kaohsiung County Foreign Workers Consultation Service Center	No. 117, Ta Pi Rd., Wusung Town, Kaohsiung County	TEL : 07-7338842 FAX : 07-7337924
Ilan County Foreign Workers Consultation Service Center	No. 95, Tung Chin St., Ilan City, Ilan County	Tel : 03-9324400 Fax : 03-9356545 03-9314341
Hualien County Foreign Workers Consultation Service Center	No. 17, Fucian Rd., Hualien City, Hualien County	Tel : 03-8239007 Fax : 03-8237712
Taitong County Foreign Workers Consultation Service Center	No. 276, Chung Shan Rd., Taitong City	TEL : 089-359740 FAX : 089-341296



Center	Address	Tel/Fax
Pingtung County Foreign Workers Consultation Service Center	No. 17, Zihyou Rd., Pingtung City, Pingtung County	Tel : 08-7519938 Fax : 08-7515390
Penghu County Foreign Workers Consultation Service Center	No. 160, Dasian St., Makong City, Penghu County	Tel : 06-9212680 Fax : 06-9217390
Chinmen County Foreign Workers Consultation Service Center	No. 60, Minsheng Road, Chincheng Tzen, Chinmen County	Tel : 082-373291 Fax : 082-371514
Lienchiang County Foreign Workers Consultation Service Center	No.76, Jieshou Village, Nangan Township, Lienchiang County	Tel : 0836-25022 Ext. 13 Fax : 0836-22209



22143台北縣汐止市橫科里橫科路407巷99號

TEL : (02)26607600