



Annual

Report

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Preface

The Institute of Occupational Safety and Health is under the jurisdiction of the Council of Labor Affairs, Executive Yuan, as most important occupational safety and health research unit. Its main task is to use scientific technology to investigate and analyze the hazardous factors in the workplace and then bring forward countermeasures for improvement.

Recently, the continuous development of our national economy, increase of employed workers, introduction of new technologies and protection techniques as well as use of hazardous substances and bigger-and-bigger machinery and equipment, and complication of production process, have caused more and more occupational accidents. To take an example of the year 2004, totally 38,483 person-times of occupational accidents (excluding traffic accidents) took place, and averagely 4.39 workers were injured, got disabled or died on job every hour, causing innumerable direct and indirect economic losses. This suggests that future researches and efforts are required to reduce occupational accident. With the transition of the industrial development of our country, the issue of labor safety and health will be more complicated in future. Faced by the international political and economic development, the work of labor safety and health will play a more important role in the development and sustainable operating of enterprises. The Council of Labor Affairs, Executive Yuan (hereinafter referred to as the CLA) brought forward [Work Safety] on May 21, 2004 as the goal in the following four years so as to go on ensuring the labor career safety suffering occupational disaster and establish safe and comfortable working environment for the labor.

This annual report comprises all key business and achievement from

January 1, 2004 to December 31, 2004. It is expected that this annual report can enhance all sections have a deep understanding of the IOSH besides that it cooperates with the goal [Work Safety] of the CLA and summaries all business and activities in 2004.

Institute of Occupational Safety and Health,
Council of Labor Affairs, Executive Yuan

Director

Contents

Preface	
Contents	
Annual Report.....	1
Section 1 Outline of the CLA's Tasks	1
Section 2 Annual Key Researches & Achievements	4

Annual Report

Section 1 Outline of the IOSH's Tasks

The Institute of Occupational Safety and Health, Council of Labor Affairs, Executive Yuan (hereinafter referred to as the IOSH) was established in August in 1992. At the early stage after its establishment, those persons who prepared have already defined the tasks, goals and development direction in accordance with the organizational ordinance as follows:

1. Provide the academic foundation for the safety and health decision-making and administrative measures;
2. Provide countermeasures against the key labor safety and health problems;
3. Provide the reference for researching and emending key labor safety and health regulations, standard and management system;
4. Improve technology level of safety and health and inspection;
5. Provide the information for labor safety and health training and consultant service.

The labor insurance payment data indicate that the proportion of low back and upper limbs etc. musculoskeletal disorders and the occupational diseases is 43%, 48%, 64% and 58% from 2001 to 2004 respectively, also indicate that the muscle and bone injury possibly is very common. In order to prevent that effectively, the relations of the diseases and work should be identified and mastered well. Recently the

biotechnology industry springs up day by day, and the biotechnology are used widely during the courses of preparation, research and development etc.. In addition the widely integrated local databases are lacking to prevent and control the biological hazardous factors in the workplace; the researches are effected by the new research technology on health and diseases and new occupational diseases; although the advanced biology effect monitoring and analysis techniques are available, the domestic health examination is short of preventive health evaluation index; and the development of disabled labor measurement and occupational assistance technology is not be carried out; they have been the new studying problems to research and develop overstrain and work pressure evaluation technology, and the proper safety and health risk management and performance evaluation tools and technology. There are many researches and achievements on new occupational fields, comparatively the domestic databases should be established and integrated continuously.

The correct evaluation of labor exposure volume and health hazard degree, effective improvement of working environment and completely implementation of hazard prevention measures depend on the establishment of technologies for working environment measure, biological monitoring and exposure hazard risk evaluation etc. so as to promote the effective mastering real situation of hazardous substances exposure of the labor.

Take the case of USA, it uses updated science and technology to develop the ventilation system of low cost and high efficiency endlessly, further to improve the working environment for the labor. And use the

filtering materials of high efficiency to improve the performance of respiratory protective device and enhance the efficiency of labor protection. Recently the USA, Japan and Sweden etc. countries use largely exposure and health examination database to estimate the occupational health hazards and take up with the development of chemical toxicity estimation mode's risk evaluation etc. techniques. And the developed countries also use the reliable risk management evaluation system to develop relevant safety monitoring products endlessly and develop toward the integration.

In order to prospect the occupational injury and disease information, and establish localized safety and health database and popularize the safety and health science and technology combining the civil resources, based on the popularization of research achievements on safety and health and in accordance with the CLA's mid-term administration plan (2002-2005) taking the [Establishment safe and healthy environment] and [Strengthening the researches on safety and health] as the priority development subjects the IOSH assist the enterprises to establish internationalized safety and health standard, and strengthen safety and health management, popularize safety and health science and technology under the cooperation of civil resources, establish localized safety and health databases and reduce the death rate and disabled rate of occupational disease and occupational disaster of high-risk industries and high-hazardous factors so as to avoid the labor from being involved in occupational injury and diseases and enhance their body and mind' s health and reach the level of the advanced countries.

This annual report covers research activities from January 1, 2004

to December 31, 2004, with the completion of 90 projects. All results are open to the public through presentation of research results, technology transfer, publications, theses, Internet on-line searches, exhibitions, and various seminars and conferences, including issuing periodical, research report and various technical series etc. 96 publications, 5 exhibitions, 35 academic seminars, 73 research theses issued on domestic magazines and 69 for domestic academic conference. The IOSH has already obtained 7 patents, besides assisting to investigate the occupational injury and diseases and providing the instrument calibration service for the inspection units etc..

Section 2 Annual Key Researches & Achievements

In order to realize the foregoing administration plans made by the IOSH, the key administration tasks in this year include: to master the status quo of occupational disasters and strengthen safety and protection technology; to enhance hazard exposure evaluation and develop measurement and identification technology for the labor working environment; to strengthen the investigation of hazardous factors in special working environment and develop the technology to improve working environment safety and health; strengthen the research on epidemic and establish occupational disease monitoring and control system; and to innovate, exhibit and popularize the safety and health science and technology under the coordination of civil safety and health relevant organizations and institutions.

The key performance indexes are: to evaluate and investigate the working environment and collect the data on labor exposure

concentration; to research and develop safety and health facilities for the enterprises; research and provide the reference for the emendation of the IOSH's laws and regulations and the improvement of the relevant systems; research and develop new technology and provide the data for the enterprises; collect data and establish perfect national occupational disease notification system in line with the international practice; to popularize the application of the research achievements; to use the research achievements in a proper way and provide toll-free browse and unloading the data in the IOSH' s website; and expand safety and health participation and deal with exhibition tour on safety and health education with vehicles and exhibition hall combining with the civil resources.

The real output contents are as follows according to the performance index:

1. Assist to establish management system aimed at the high-risk industries so as to reduce the spreading of population resources in the workplace, and cooperate with the examination institutions to establish safety and health management system and strengthen the protection of the labor health. In 2004, the evaluation and investigation for crystal and free silicon dioxide etc. high hazard in the workplace of the construction industry have been accomplished, aimed at those have high exposure concentration, the IOSH guided them to improve that situation. Totally 2,000 environment exposure investigation data have been created as the reference to improve the working environment so as to accord with the standard specified in the

relevant laws and regulations and benefit tens of thousands of labor.

- (1) In which assist to reduce storage battery, lead powder and high blood lead, reduced by 34%; assist the synthetic leather, soaked cotton (TDI) and adhesive tape (toluene) etc. high-hazard industries to improve ventilation and occupational health management (including hands' cleanliness monitoring technology), and the labor hazardous substances exposure concentration is reduced by 40%, toxic metabolic substance in urine by 68% (skin absorption), and the hazard cognition rate and application rate of protective devices exceed 90%. There are tens of thousands of labor benefited from that. In addition, examination technology instructions are compiled so as to improve the supervision and examination technology level.
- (2) In the printed circuit board industry, the Diethylene Glycol Monobutyl exposure has been reduced to 0-8% (average 2.5ppm) after the improvement from 32% before the improvement (average value 87ppm and maximal 860mm), and 40% labor involved in abnormal health have been recovered.
- (3) In the manganese steel manufacturing, it is found that there are 6 cases of occupational poisoning and number sub-clinical findings. The manganese exposure before the improvement is 29 mg/m³, reduced to 0.004 mg/m³ greatly after the improvement. And no new case is found again.

- (4) The water-soluble hexavalent chromium the cement caused plasterers' hypersusceptibility skin disease reaches 20ppm. The content of water-soluble hexavalent chromium can be reduced to the safety dosage less than 2ppm and still can maintain the cement's former intensity and physical and chemical properties after adding 3.5% ferrous sulphate under the IOSH's suggestion.
- (5) In the ABS plastic production industry, the tank cleaners have 1,3-diene-exposure concentration up to 60ppm before the improvement, 20% have exceeded the standard (10ppm). The all exposure concentration is lower than 2ppm after the improvement.
2. Research and develop safety and health facilities for the enterprises:

The occurrence rate and consequence of the occupational accidents in the construction industry are always at the top in all industries. Therefore, the construction safety is one of the IOSH's key occupational disaster prevention works at this stage. The falling, collapse, and other construction accidents related prevention technology, construction safety facilities and the researches on engineering improvement and safety monitoring technology, and etc. should be strengthened. Construction safety situation survey and the researches on safety management and evaluation technology will be conducted in order to reduce the occupational accidents of the construction industry. The labor inspection annual reports in the past years

indicated that the amount of the lost work days caused by occupational incidents in manufacturing industry in 2003 is 242,498 days, disabled injuries 3,669 person-times, topping all industries. Based on injury type analysis, collision, clipped, cut, scalped, and scratch are the main injury types. The unsafe machinery causes most occupational incidents. In addition, more than 50% of the machines are still semi-automatic in manufacturing industry, and interface exists between the machine and operators. Lack of good design of this interface may cause occupational incidents. The IOSH has developed many protective devices to improve the safety stability and reliability. IOSH has obtained many patents, such as safety clamp for plate lift, and these protective devices were transferred to the manufacturers.

(1) Bring forward [Safety clamp for plate lift] and [flexible pipe position device] (Figure 1), [dynamical conversion device for winch] (Figure 2), [tension sensing starting unit for winch] and [integration device of computer, pointer and controller].



Figure 1 Flexible pipe position device

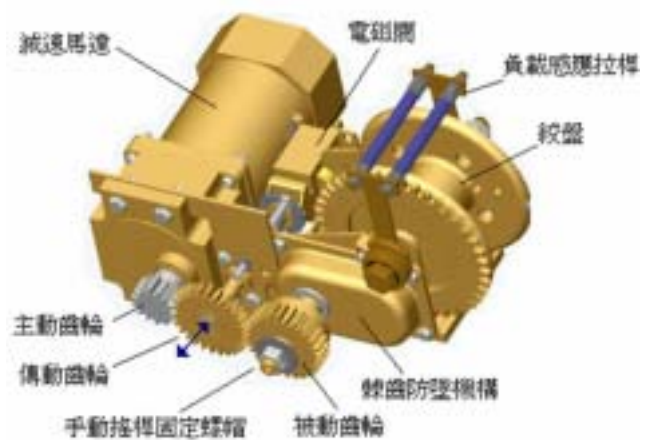


Figure 2 Dynamical conversion device for winch

And apply for patents and transfer these technologies to the manufacturers.

- (2) Accomplish high-voltage thermograph check and measurement, hazard prevention of runaway batch reaction of high explosive, monitoring system for construction work, fatigue behavior analysis of steel pipe shoring, and hazard prevention for contractors working in petrochemical industry. In addition, popularize the new powder sampler continuously, infrared labor working mode test system etc. facilities technology and technical manual and data etc. such as three-level particle sampler (Figure 3). The weight of respiratory dust, thoracic dust and inhalable dust can be calculated after sampling respectively, propitious to the judgment of the particles' hazards in the air for enterprises.



Figure 3 Embryo of the three-level particle sampler

- (3) Accomplish the detail design, manufacture and performance test of the safety clamp for plate lift so as to provide a low-cost, high-safety and simple device for the construction

industry; for the falling prevention and emergency aid tripod hoist (Figure 4) we have obtained three patents including [flexible pipe position device] (Figure 1), [dynamical conversion device for winch] and [tension sensing starting unit for winch]; structure and preparation method of electrochemical type chlorine sensor; [integration device of computer, pointer and controller]; labor's exposure time monitoring method; macro-reticular diffusion denuder etc. seven patents have been obtained and the relevant technology has been transferred to the domestic operators. In addition the embryo of the three-level particle sampler has been finished, and its functions would be validated in following days.



Figure 4 Falling prevention and emergency aid tripod hoist

(4) The blood lead electrochemical detection device (Figure 5) has been accomplished, which can measure the lead

content in the blood with a drop of blood within several minutes, and may be used to screen the blood lead. It is good for the prevention of lead poisoning. The IOSH will apply for the patent in the next year.



Figure 5 Blood lead electrochemical detection device

It is better way to exhaust and pump out the hazardous substances in the air. However for the effects by the cover's forms and obstruction, the IOSH will particularly discuss the encircling cover in this year, and bring forward some suggestions on that the turbulence of the conventional chemical gas cabinet possibly causes reducing the exclusion of foe. For the health hazard caused by noise, vibration and (non-) mobile radiation etc. physical factors, the exposure evaluation and investigation, and the researches on relevant protective technology would be conducted. The relevant investigation results indicate that noise as the [health hazardous factors the

labor thinks much of] and [the safety and health problem needs to be solved] tops other factors in the workplace. It is the key research items for the IOSH to research some methods to improve the noise and provide the consultant for the engineering improvement in the industries. In addition, in order to know the occupational ultraviolet radiation exposure overview in the workplace, and find out the most hazardous places and proper protection method, the IOSH also has laid out relevant researches on the ultraviolet radiation so as to master the exposure situation of the domestic working environment, create exposure data to different the severe exposure from the common one; it is the basic work to develop monitoring technology of dangerous factors of muscle and bone occupational disease in the workplace, long-time monitoring technology applied to spot application, further based on the injury and disease information regard it as the basis for the judgment whether the improvement is required for the working environment as the reference. In this research, the IOSH uses the developed monitoring instrument to create three common upper limbs repeated work ergonomics exposure data including frequency, muscle force proportion and joint's angle etc. as the reference for evaluation of upper limbs' work and improvement for the enterprises. The foregoing researches on biological and physical hazards and safety and health machine and tools etc. may be as reference for the relevant enterprises. And partial criterions would be the Announcement of Newly

Approved National Standards of PR China for their implementation.

(1) For the SARS affairs and coordinating the prevention of infectious disease, the IOSH uses crosswind proof technology to research and develop new cover and mobile negative mobile pressure isolation chamber (Figure 6) conforming to the safety and health conditions, biological protective body bag (Figure 7), encircling cover design criterion, sterilization technology of *Legionella pneumophila* etc. as the reference for the qualified safety and health design of medical college hospitals, biological pneumatic cabinet manufacturing factories and labs etc..



Figure 6 Mobile negative mobile pressure isolation chamber



Figure 7 Biological protective body bag

(2) Accomplish bone and muscle (Figure 8), Ergonomics examination, lighting and illumination, biological pneumatic cabinet operation, pinprick, respiratory protective devices, hearing protection, hearing loss risk evaluation, vibration hazard prevention etc. technological instructions, all above mentioned would be publicized on the IOSH's website for the relevant academic units and enterprises to use.



Figure 8 Self-developed interactive analysis software for the quantitative evaluation of musculoskeletal disorders

- (3) Research and develop auxiliary work tools for the disabled (including computer desk, swing wheelchair, mouse and phonic input system etc.) and provide them to the social service units such as Eden Social Welfare Foundation free of charge.
3. The purposes of monitoring occupational diseases and analyzing health data are to know the present situation and trend of occupational diseases. Based on the interlinked analysis with occupational disease notification system and relevant databases (such as labor health protection and examination databases), the occurrence of occupational diseases can be known well, further the corresponding prevention strategies can be made so as to prevent the supervision of the occupational diseases. Hereby, the IOSH has collected health insurance and hospitalization, labor insurance payment data, labor prevention occupational disease and health examination data, hospitalization payment data for occupational diseases etc. in succession, and publicize the labor health insurance relevant data, instructions and analysis results on the website as the reference for the public and workers according to the created and arranged generations of labor exposure data. The collected data would be as the basis for the establishment of network monitoring system. In 2004, the IOSH established hearing, blood lead, pinprick and abnormal air pressure monitoring systems, in which for the pinprick, the international EPINet

pinprick notification system was introduced so as to hold educational training and safety acus etc. pinprick prevention plan, further to compare with the overseas data and collect the relevant theses on occupational injury and disease monitoring system in world countries as the reference for the establishment of the domestic integrated occupational injury and disease monitoring system. In addition, used the labor insurance cask payment and occupational disease prevention health examination data, and annual statistics to find out various high-risk groups that would be listed as the key examination industries by the examination units; used the hospital cases and labor insurance payment data to discuss the relations of work forms and cardiovascular disease; and invited the scholars and experts to establish [overstrain problem] task to provide some suggestions and plans for the relevant policies and researches; and referred to the research results and Japanese relevant identified standard and data to assist to research and lay out the suggestions for the emendation of the 「diagnosis and identification norm of occupational acute circulatory diseases」, which has been authorized for promulgation by the IOSH.

4. Research and provide the reference for the emendation of the IOSH's laws and regulations and the improvement of the relevant systems

In order to meet the demands for policy researches, the annual research achievements should be provided for the emendation of the laws and regulations, labor examination

strategy and policy, establishment of the labor health insurance data, making prevention strategy, safety and health policy planning, establishment of exposure database and announcement of the sampling analysis reference methods etc for the IOSH. In addition, the research achievements assist the Department of Health to make the relevant criterion and which has been announced as a newly approved national standard.. In the chemical industry, chemical disasters such as runaway reaction, leakage, fire and explosion during the transportation, loading and unloading, storage and manufacturing process occur once in a while in Taiwan. It is mainly due to operators are short of safety knowledge and poor process safety management. Moreover, develop the domestic technology data regarding gas or dust explosion-protected electrical apparatus, guidelines and research report, and the occupational safety and health management system, and enhance the safety and health management technology for the domestic enterprises, and research and development of new index of occupational disasters and management technology so as to improve the labor and employers' safety consciousness, further bring forward the trend report based on the type of the occupational diseases, regional distribution and labor's personnel factors etc so as to support decision making; investigate the employee's cognition on safety and health status quo of the working environment, and their direct, subjective opinions on safety and health without the employers' effects, and master cognition

information of all labor so as to know the most severe hazard factors, the factors that need urgent improvement, work pressure, body status quo and work satisfaction etc. as the reference for labor administration and relevant researches.

(1) Complete the status quo of investigation on the high-pressure gas equipment safety technology, hazards prevention measures during construction of High-Rise Building, Nano industry and the safety culture management index, and etc. technology information in the manufacturing (Figure 9); and provide some suggestions for the feasible scheme of the domestic type test for explosion-protected electrical apparatus, foster the risk-based inspection technology in the petrochemical industry, enhance the efficiency up to NTD100 million every year and reduce the economic and social loss.



Figure 9 Safety culture management index measurement website

(2) Bring forward the inclined ground criterion (Figure 10), investigate the employees' cognition on safety and health of the working environment, and know the most severe hazard factors, the factors that need urgent improvement, the operation of the intervention for special hazardous working environment, physiological costs for manual carrying etc. and discuss the relevant criterion.



Figure 10 Evaluation and researches of inclined ground's effects on slide

Due to rapid industrial and commercial development in Taiwan in recent years, complex production technologies and various new chemical substances have continually been applied in the work place. Workers are exposed to more and more complex working environment, leading to the emergence of various occupational diseases. Thus, the purposes of this research lie in the surveying of occupational diseases to gain an understanding on the current situation of occupational diseases, establishing various epidemiological data on occupational diseases. Because the hazardous substances may invade the human body by many ways, we must monitor their existence situation in the human body with biological medicine technology

as the important index to assess the labor's health hazards. Therefore we can use the biological medicine technology to research the biological monitoring index, and the epidemic diseases and nosogenesis for the hazardous factors so as to realize the goals of early monitoring and real-time prevention and provide the reference for making the allowable exposure concentration.

- (1) Analyze the domestic labor insurance cash payment, labor health examination data, enterprises' occupational disasters statistics and the Department of Health's notification data on suspected occupational disease; know the difference of those four kinds of data and find out the industries and working places involved in the frequent occurrence of occupational diseases as the reference for making the examination strategies.
- (2) Accomplish the comparison of work types and cardiovascular diseases, tracing the labor's health hazards in low-temperature working environment, common occupational hazards of electric welders; and creating the data on the reliability and validity of the localized disabled work sample evaluation tools etc.
- (3) In addition, accomplish literature review of the allowable concentration standard under laws for chromium etc. five hazardous substances, bring forward the suggested value for the emendation, and establish and validate sampling and analysis methods for the respirable powder etc. five hazardous substances, assist the inspection institutions to

analyze the 1,000 pieces of data on toluene, foamed cotton TDI and artificial leather DMF etc. examination samples in the adhesive tape industry as the reference for the emendation of the IOSH's laws and regulations on safety and health and making prevention strategy or the suggestion for the announcement of sampling and analysis methods.

- (4) The biological technology would be the important industry that needs to be developed domestically. At present a completed law, regulation and management system on the occupational and biological hazards are not available, therefore we should focus on this aspect to research and investigate the potential occupational diseases and biological hazards in the biotechnology industry as the reference for the administrative department in the future. In 2004, the IOSH assisted the Center of Disease Control, Department of Health to make [Safety rules for the Grade C Labs on Biological Safety], and carried out the biological safety cabinet authentication system with the draft of the Chinese National Standard-biological safety cabinet performance examination system.
5. Research and develop new technology and provide the data for the enterprises:

Not only does occupational health concern with the prevention of occupational diseases and hazards, it is also involved in the active promotion of a healthy, safe, and

comfortable working environment. Other objectives of occupational health include maintaining workers' physical fitness and productivity, developing human resources through reshuffling of work assignment and improving the production environment, delaying the actual age at which workers retire, and appropriately introducing potential workers into the job market. This way, productivity may increase through hiring workers that are highly experienced as well as those who will stay on the job, and the health of the workers may be maintained through the prevention of occupational diseases and hazards and the promotion of and evaluation of physical fitness in the work environment; Meanwhile, for the research on vulnerable groups, we should research and develop new technology to assist the disabled labor assess to the employment market, and provide employment evaluation and media cooperation database as the reference for the popularization and application of training centers around the countries so as to increase the employment changes for the disabled.

(1) Research and develop special computer desk, computer workstation, swing wheelchair, mouse and phonic input system etc. for the disabled, and accomplish 100 sets of input auxiliary hardware and tools. In addition, the auxiliary tools' technology popularization centers have been established in the north and south Taiwan, besides the popularization plans carried out.

(2) The employment evaluation tools and employment media cooperation databases have been provided for the occupational evaluation teachers in the vocational training centers and employment centers and special education tasks of the Ministry of Education; for the application and popularization of the occupational assistance evaluation tools for the disabled, the integration of occupational assistance evaluation tools for the psychological tests of the disabled including limbs, hearing, psychosis, vision and intelligence has been finished. In addition, the painting and statistic functions are added and provided to the Bureau of Employment and Vocational Training and the vocational training and assistance units for popularization and application so as to add their practicability and enhance the success rate of media cooperation as the reference for the enterprises. (Figure 11)



Figure 11 The disabled work computer database seminar

Establish 3D anthropometry, respirator test qualitative fit

technology, cement neutralisation agent, localized work pressure evaluation meter and labor health and physical performance evaluation method and data etc. as the reference for safety planning and design and the labor's self-evaluation. The research achievements have been transferred to the relevant industries, such as the field application of safety guardrail; on the purpose to promote the occupational health, the pressure evaluation meter and health promotion etc. data are loaded on the IOSH's website for free-unloading for the labor; establish 3D anthropometry database (including measuring 173 pieces of 3D dimension and establishing 200 representative working places and 100 designs on work attitude) as the reference for the safety planning and design of facilities, environment and human-computer interface in working place. At present, the databases have been adopted by the enterprises (such as the safety guardrail, emergency switch and protective device design etc.).

(1) Establish respirator test norm, and the technology has been transferred to the three respirator test centers under the jurisdiction of the Center of Disease Control, Department of Health, and popularized in 8 hospitals. It is found that the qualified rate of the common respirators is only 40%, after the popularization it increases greatly. Therefore the technology would be expanded and popularized continuously.

(2) Publicize the prevention of occupational skin diseases for the

labor in the cement industry in Yilan, Changhua and Taoyuan, and invite the physicians to conduct the consultation for them (Figure 12), so as to let the labor know the causes of skin diseases, and how to use the cement neutralisation agent, reduce the sensitivity source of hexavalent chromium in the cement. The results after the publicizing indicate that the skin diseases of more than 84% labor after adding the neutralisation agent have been bettered obviously (Figure 13); In addition, all investigated labor agree that it can reduce the occurrence of the skin diseases after adding the neutralisation agent in the cement and using the protective gloves, and the cognition rate is 100%.



Figure 12 Publicize the prevention of occupational skin diseases for the labor in the cement industry and the physician Yu, Hsin-Szu are conducting the consultation for the plasterers' skin diseases in Taipei, Taichung and Tainan



Figure 13 Several plasterers' skin diseases have obvious improvement after adding the Ferrous Sulphate in the cement during the period of the construction

(Left picture is the hands' status before adding the Ferrous Sulphate and the right one is the hands' status after adding the Ferrous Sulphate)

- (3) Establish localized work pressure evaluation and pressure prevention manual. The relevant technology has been provided to various enterprises. In addition, the pressure evaluation for the labor's self-evaluation on web has been designed so as to make the labor know more about self-help of stress management; develop Chinese peer evaluation for burnout so as to assess the domestic labor's burnout; and discuss the distribution situation of the domestic high-risk groups and the relations of burnout and psychosocial factors in their work.
- (4) Establish health promotion and assistance task so as to provide consultant and services for the enterprises; establish labor health and physical performance evaluation methods

so as to assess the status of the labor's physical performance and popularize the health and physical performance activities and promotion plans at the working places so as to make the labor maintain their physical performance and health and improve the productivity; compile labor health and physical performance promotion technical handbooks, operational manual of occupational exercise for the professionals' use; and print labor health and physical performance promotion technical handbooks, popularizing teaching materials of occupational pressure resistance exercise and neck extension etc; and design health exercise on computer, driving and standing attitude etc. functional exercises and transcribe them into disc so as to provide various industries; hold main training programs to cultivate the promoters for the enterprises and provide occupational driving health physical performance program and prevention manual of occupational driving health hazards. In this year, the IOSH has finished the training programs on the occupational driving health promotion and education with the Ministry of Transportation, totally 17 times, in which more than one thousand people participated. The learners' satisfaction degree with the program subject, instructors' professional ability, contents and service are up to more than 90%. 99% learners think the program is beneficial, and 96% ones still require the relevant programs, and 52% would be like to promote the occupational health

On the safety monitoring research, provide technology information as the reference for all industries.

- (1) Apply the thermography to research the high-voltage switchgear predictive maintenance, and establish temperature abnormality and failure mode and predictive maintenance technology and finish high-voltage switchgear thermography inspection manual so as to provide uninterruptible inspection technology for the industries.
- (2) Quantify Prevention of runaway hazards in high explosive process as used to provide the considerations for the prevention and improvement measures against the possible runaway reaction or incompatible reaction hazards during the manufacturing, storage, and transportation process.
- (3) Research on construction disaster inspecting and monitoring performance technology and discuss the acoustic emission of the concrete and developed the safety monitoring technology for construction structure based on the acoustic emission monitoring and apply it to safety monitoring of the continuous wall or buildings' crack.
- (4) On the installation guidelines and practice for explosion-protected electrical apparatus of intrinsic safety (Figure 14), make intrinsic safety installation guideline, and training material with multimedia type as the reference for the industries.



Figure 14 Training material with multimedia type for the practice of intrinsic safety electrical apparatus.

6. Popularize the application of the research achievements:

In order to expand the popularization of the science and technology research achievements, we will provide fee-free data and publication to browse and unload on our website, and conduct the mobile occupational safety and health exhibition so as to promote the communication of the science and technology on safety and health.

(1) Accomplish electronic books for all publications of the IOSH in past years, and networks matters and provide them to all industries for unloading freely. Totally the data are browsed by one million person-times in 2004, and 71,182 person-times to unload the various data, expanded the popularization and communication of the IOSH's research achievements.

(2) The Volume 12 Number 1-4 of the quarterlies have been

published for 1,150 copies respectively, Number 63-68 of the newsletters 5,000 copies respectively, as the reference for research innovation, emendation of the laws and regulations, and for information inquiry and safety and health prevention etc. for the governmental units, enterprises and safety and health officials etc., so as to promote the communication of academic information.

(3) Hold the mobile occupational safety and health exhibition; From January 22, 2004 to February 8 cooperated with the National Museum of Natural Science to hold mobile occupational safety and health exhibition with the destination of the National Museum of Prehistory in Taitung City. Totally 37 exhibitions have been held since 2004 cooperated with the schools at all levels and enterprises, with the 47,000 person-times. In addition the exhibition at halls received 24,700 person-times, totally 71,700 person-times. That expanded the knowledge and research achievements on safety and health.

(4) Made the 3D cartoon [Good bye, virus] on occupational disaster prevention, afterwards made occupational news data image 15 rules and digital film, and accomplish the development of one set of safety and health multimedia online game and establish digitalized safety and health museum.

Cooperated with the Ministry of Education to hold many safety and health personnel education and training, and

strengthen the management of safety and health college/university labs, and hold the research achievements announcement meeting and some exhibitions with the local government so as to root the safety and health education into the grass and expand the civil participation in safety and health promotion.

- (1) Assist to cultivate the college/university safety and health personnel, totally 4 educational trainings held, with 244 persons; went to Tzu-Chi University etc. four universities to hold 7 trainings for cultivating reserve hierophants, totally 192 persons participated in. That further deepens the safety and health education concept, and assists the labs to normalize the safety and health management and strengthens the safety management of the labs in the colleges/universities.
- (2) Deal with regularly Ergonomics, vibration hazard, biological gas cabinet etc. seminars and popularize various research achievements and hold toll industrial ventilation seminars received warm welcome so as to improve the domestic industrial ventilation level
- (3) From February 26-27 the IOSH cooperated with the Tainan City Government to held the safety and health research achievement seminar (Figure 15), there are 80 representatives from the local labor unions; and cooperated with the Taoyuan County General Union to hold the safety and health exhibition on May Day (Figure 16), in which 640

representative of the labor union participated in; in addition, the Magistrate of Taoyuan County, Mr. Chu, Li-Jen run the convention on May Day, and the mobile occupational safety and health exhibition was assigned for the exhibition the square at front of the Taoyuan County Government on May 1, 2004 , so as to know the opinions from the labor at the local government and establish communication channel and carry out the research achievements step by step.



Figure 15 The director of the Bureau of Labor Affairs, Tainan City Government, Chen, Yao-Chie led the labor union's cadre and volunteers to visit the IOSH and interchanged opinions



Figure 16 Assist to the Taoyuan General Union to hold the May Day activities series

(The left picture is exhibition spot at the square at front of the Taoyuan County Governmetn while the right picture the Magistrate of Taoyuan County, Mr. Chu, Li-Jen visited the mobile occupational safety and health exhibition)

Transfer and popularize the yearly annual achievements to the practitioners for wide application so as to add the benefits of the science and technology fund and apply to the relevant researches and technology popularization.

- (1) Apply the patents for the [Security analysis, improvement and application of plane repairing platform] etc. five items, and establish the website and practice in the factories;
- (2) The annual benefits for the popularization and application of the [dichotomous sampler] and [safety coupling] etc. patents and techniques increased rapidly (2002: NTD 150,000; 2003: NTD 1,050,000; 2004: NTD 1,120,000), which would be used for the continuous relevant researches and the popularization of the achievements in the next year.