

Rainer Müller (1992): INDUSTRIAL HEALTH AND SAFETY

Health and safety at work used to be called the health and safety of workers and became necessary because of industrialization and technicalization in the last century. Workers in the factories were to be protected from the dangers arising from the increasing use of technology and chemicals. Since then technology and chemicals affect nearly all areas of work and life generally. Not only the workers in the factories are in danger but also all employees. Thus the health and safety of workers became health and safety at work.

Industrial health and safety today mean protecting the life and health of people from the dangers arising during or through work.

Industrial health and safety are one of the social components of industrialization and technicalization. They are supposed to humanize not only technology and chemicals but also the whole working situation.

Technology, chemicals and industrial safety are inseparable. The status of industrial health and safety in a country is therefore determined to a large extent by the degree of industrialization and technicalization.

The status is a good indicator for the social, political, democratic and cultural standard of the state or society.

There are about 32 million people in employment in Germany. Many of them are subject to special strain during their work - some are exposed to several different types simultaneously (multiple strain) - which over the years can result in damage to the health.

Of those in employment

- 15 % do night and shift work
- 23 % carry and lift heavy loads
- 21 % work under cold, wet or hot conditions
- 15 % work in an unnaturally cramped position
- 9 % are in constant or regular contact with chemicals
- 25 % are exposed to high levels of noise
- 31 % work under monotonous conditions
- 44 % have psychological stress.

After all almost one in three employees are forced into early retirement through disablement. It is interesting to note that 66 % of those taking out pensions each year can be diagnosed according to the following three categories:

- circulatory diseases
- musculoskeletal diseases
- psychiatric illnesses.

In epidemicological perspective you have also to consider that there will be also early death-cases caused by occupational diseases.
In Germany we have no statistic about this.

The protection of health and safety at work is necessary to reduce special strains and thus minimize the number of early retirements through disablement and early deaths.

INDUSTRIAL HEALTH AND SAFETY REGULATIONS IN GERMANY

They are the most important source of information for employers, works council, work safety experts, company doctors, security personnel and employees.

The regulation and rules contain the orders and prohibitions concerning industrial health and safety.

Industrial safety regulations are not only important for companies, however. They are also the working principles for supervisory authorities and test departments.

In Germany there are two kinds of regulations on industrial health and safety:

- state regulations (laws and ordinances) and
- the accident protection regulations of employers' liability insurance associations.

The legal system regarding industrial health and safety comprise the following six special areas which are logically interconnected:

1. Trade Regulation Act, Ordinance on Workplaces

The first requirement of work is suitable premises including toilets, washing facilities, changing rooms, break rooms etc.

2. Technical Plant and Equipment Act, Ordinance on Steam Boilers, Ordinance on Medical Equipment

In workshops the workplaces must be properly set up and the equipment installed (machines, equipment systems which are required for the work).

3. Ordinance on Dangerous Substances, Chemicals Law

Often not only machines, equipment and technical systems but also dangerous chemicals are used.

4. Ordinance on Working Hours, Shop Closing Law, Baker's Working Time Law,

Drivers' Law

After the technical prerequisites have been installed people come into the workplace to work on the machines, equipment and technical systems. They should not be allowed to work night and day until their health suffers and they become a burden on society.

5. Maternity Protection Law, Youth Employment Protection Law, Home-Work Law

In addition to the men and women who are able to work to full capacity in factories and offices there are also pregnant women and young people who may need special protection.

6. Industrial Health and Safety Law, German Social Insurance Code

Last but not least there must be people who are familiar with the wide and complicated field of industrial health and safety and can organize it in the company.

As already explained the technology sector is very extensive, highly sophisticated and complicated. This is reflected in the two codes of regulations.

Industrial safety regulations and accident prevention regulations reflect the state of the art and must contain regulations on thousands of different types of machines and workplaces.

TRADE REGULATION ACT: THE BASIC LAW OF INDUSTRIAL HEALTH AND SAFETY

Provisions for industrial health and safety became necessary in the last century, when, with the introduction of steam engine, the process of technical development began which brought with it considerable danger for the working population.

In 1891 § 120a was included in the Trade Regulation Act which today still forms the basis of industrial health and safety in factories. The regulation outlines the responsibilities of the employer to equip and maintain the premises in which employees work, the operating tools, machines and facilities, and to organize the factory so that the workers are protected against danger to their lives and health, within the limits of the type of factory concerned, either by applying specific procedures, providing personal protection equipment or by taking other suitable measures.

Within the framework regulations all the basic requirements are listed which the employers must fulfil in order to ensure the safe running of his business.

In particular the employer must

- provide sufficient light, air space and air circulation and remove the dust, fumes, gases and waste caused by the work;
- protect the employees against the danger of touching dangerous machines, equipment and technical systems and arising from fires by providing special facilities to prevent them;
- lay down regulations on the organization and conduct of employees, ensuring safe running of the factory;
- provide break rooms and separate changing rooms, wash rooms and toilets for men and women.

The framework regulations outline the factors determining the type and extent of the responsibilities which the employer must fulfil by protecting his employees against danger in the company.

Like all state industrial health and safety regulations, they are valid for the general public and represent responsibilities towards the state above all. The employer can neither ignore them nor can the employee renounce the protection afforded to him by the law.

The Trade Regulation Act enables the framework regulations to be supplemented by more concrete legal ordinances. In the last few years, in particular, increasing use has been made of this possibility. The ordinance on workplaces and dangerous substances are based on the provisions of the Trade Regulation Act.

Another sector covered by the Trade Regulation Act concerns plants which require special monitoring because of the danger they cause, for example steam boilers, hoists and pressure tanks. These are designated as plants requiring monitoring control.

The scope of the Trade Regulation Act also includes provisions for free Sundays and holidays and exceptions to the rule, for example electricity, gas and waterworks, transport industry, hospital and the hotel and restaurant trade.

All provisions contained in or based on the Trade Regulation Act which concern industrial safety are called "classic industrial safety".

With the beginning of 1993 the German safety and health regulations and organisations will have a transformation by the regulations coming from the European common market.

All 12 countries in the European common market have to fit their national regulations into the framework of the EC-regulations.

In some principal rules and norms the EG-regulations have a more advanced standard; also in the case of Germany. But in the whole the structure will be as I will tell you.

MODERN INDUSTRIAL HEALTH AND SAFETY

Modern industrial safety does not begin when machines, equipment and technical systems and working materials are used, but earlier, during the manufacturing and circulation process. Modern industrial health and safety, therefore, not only obliges the employer to comply with industrial health and safety regulations but also manufacturers and importers and also, to a certain extent, retailers. Thus the scope of modern industrial safety extends beyond the Trade Regulation Act and classic industrial safety.

This extension of industrial health and safety to include production and circulation, which began about 10 years ago, has given it new impulses, integrating all stages of production and trade:

- Planning and design
- Manufacture
- Imports
- Display
- Circulation
- Operation and use

It can be seen that the present-day regulation system for health and safety work is characterized by both classic and modern industrial safety principals.

1. Workplaces including welfare facilities

Industrial health and safety begin with the conditions and equipment of workplaces. To regulate these issues the ordinance on workplaces came into force in 1976.

The term "workplace" is very wide. It includes

- workrooms in buildings
- workplaces in the open air on the company premises
- building sites
- sales stands in the open air
- vessels and floating plants on inland waters.

Workplace guidelines are attached to the Ordinance on Workplaces. They give further details of general orders and prohibitions in the Ordinance on Workplaces. To date 30 workplace guidelines have been published concerning for instance:

- ventilation
- room temperature

- size of rooms
- lighting
- noise and vibration

2. Machines, equipment and technical systems

In this area a distinction must be made between

- precautions to be taken against danger, for which the manufacturers, importers and retailers are responsible and
- industrial safety measures, for which the user or operator is responsible
- with precautionary measures against danger it is a question of whether the machines and equipment which leave the factory as end products to be put on the market are safe.
- Company health and safety measures are concerned with whether machines and equipment involved in production are safe.

The area "Machines, Equipment and Technical Systems" consists of four sections for which special regulations exist.

- Section 1: Technical Plant and Equipment Act
- Section 2: Ordinances on Systems Requiring Monitoring
- Section 3: Ordinance on Special Incidents
- Section 4: Accident Prevention Regulations

In the meantime the Single European Act came into force on July 1st, 1987. The creation of a single European market is planned for 1992. The realization of this plan depends to a considerable extent on removing trade barriers due to the differing technical requirements of member states for products. In its resolution of May 7th 1985 the EC Council of Ministers approved the guidelines of a new concept for technical harmonization and standardization and a structure of basic principles and elements which would form the core of the guidelines in this area.

Any proof and checking of the compliance of a machine with these principles is to be based on harmonized standards which will be passed by the CEN (European Standardization Committee).

In the production and use of machines, equipment and technical systems the following factors have particular importance for safety for instances:

- materials
- stability
- moving parts

- dust, fumes, gases and vapours
- noises and vibrations
- heat and cold
- factory supplies and dangerous substances
- electrical power
- ergonomic design

Technical Plant and Equipment Act

The law on technical devices (Technical Plant and Equipment Act), which was passed in 1968 and extended in 1979, has added a new perspective to precautionary measures against hazards and thus also industrial health and safety in the Federal Republic of Germany.

The realization that safety aspects must be considered as early as in the design and production phase, if effective protection was to be guaranteed, gave a decisive impetus to the law being passed.

The scope of this law is wide, ranging from the technical devices used in industrial, craftsmen's and agricultural enterprises as well as in the many different branches of administration, to machines and equipment for private use in the household, leisure, games and sport, which are of equal status to the technical work devices.

In the private sector there used to be no obligation at all to prevent accidents. The buyer could be offered anything, even machines and equipment which were technically dubious. Only the Technical Plant and Equipment Act included this sector in its provisions for accident prevention.

3. Dangerous Substances

In workplaces not only are machines, equipment and technical systems set up and installed but very often dangerous substances are also used in them. "Dangerous substances" are the most complicated area of industrial safety.

The most important regulations are

- the Ordinance on Dangerous Substances and
- the Law on Chemicals.

In the middle of the 19th century the chemical industry began to develop. The industrial large-scale production of chemical substances - chemicals - became increasingly possible.

It is impossible to imagine a modern industrial society without chemicals. It is estimated that, world-wide, over 100.000 different chemicals are used in production.

In spite of the great significance of dangerous work materials for modern industrial society, it was not possible until 1971 to issue regulations which covered the whole area with clear regulations without any gaps.

On October 1, 1986 the Ordinance on Work Materials, was replaced by the new Ordinance on Dangerous Substances. The term "work materials" was replaced by "dangerous substances" in order to make clear that the regulations and provisions contained in the ordinance were also valid for areas outside work (e.g. identification, delivery of dangerous substances). The passing of further directives by the EC and a drastic simplification and a reassessment of regulations already existing necessitated a complete revision of the ordinance.

A substance or a preparation is dangerous if it has one or several of the following characteristics:

- very toxic
- toxic
- harmful
- corrosive
- irritant
- explosive
- oxidizing
- extremely flammable
- highly flammable
- flammable
- carcinogenic
- harmful for embryos
- harmful for genotype
- dangerous in other ways to humans.

The organization of the ordinance

The Ordinance on Dangerous Substances consists of two parts. One concerns the making available, the other the handling of dangerous substances.

Making available substances is the transferring of dangerous substances to others, not within a company but outside.

The handling of dangerous substances concerns in-company procedures, including

- manufacture
- recycling
- destruction

- storage
- filling
- transfer

Identification marking

If dangerous substances are made available they must be marked with the following identification on the packaging:

1. Name of the preparation
2. Names of the constituents in the preparation
3. Name and address of the manufacturer, importer or distributor of the substance
4. The danger symbols and danger description
5. Nature of the special risks attaching (R - instructions).
6. Safety advice (S - instructions).
7. Special marking for
 - specific preparations such as leaded paints and varnishes
 - adhesives based on cyanacrylates.

HANDLING

If dangerous substances are handled the employer must comply with

- the provisions of Annexes II, III IV, V
- the regulations on industrial safety and accident prevention relevant for him
- the generally recognized rules concerning technical safety, industrial medicine and hygiene
- varified industrial scientific findings.

In the EC alone 100.000 substances are registered as waste substances. New ones are added to the list each year. The latest scientific findings reveal the acutely and chronically damaging effects of specific substances, in particular those with carcinogenic and genotype-changing characteristics.

The purpose of the Law on Chemicals is to protect human life and the environment better from the effects of dangerous substances.

The scope of the law extends beyond industrial health and safety and comprises the entire field of environmental protection and general health protection.

Obligation to test and duty of registration

The law focuses on an obligation to test and a duty of registration. Every manufacturer and importer wanting to market a new substance is obliged to test this substance under

his own responsibility to determine any dangerous characteristics and to register it.

4. Working time arrangements

Regulations concerning working time arrangements are included in, for example,

- Ordinance on Working Time
- Trade Regulation Act
- Shop Closing Law
- Law on Working Time in baker's and confectioners' shops
- Ordinance on Working Time in nursing homes
- special regulations on the working time of drivers

Only details of the most comprehensive regulations are given in this following: the Ordinance on Working Time and Trade Regulation Act.

5. Protection of specific groups of people

Two laws will be dealt with here which are of particular importance for industrial health and safety:

- the Maternity Protection Law, including educational grants
- Youth Employment Protection Law.

6. The organization of industrial health and safety in companies

The following are involved in the organization of industrial health and safety in companies:

- employers
- work councils
- work safety experts and company doctors
- safety officers
- employees
- industrial health and safety committee

The employer is responsible for implementing industrial health and safety measures. He is obliged by law to carry out measures in the following areas of industrial health and safety, to ensure the protection of employees:

- 1 Workplaces including welfare facilities
- 2 Machines, equipment and technical systems
- 3 Dangerous work materials

- 4 Working time regulations
- 5 Protection of specific groups of people
- 6 Organization of industrial health and safety in the company.

A consequence of the speed of technical development will be that the technology and organization of safety will become more and more comprehensive and sophisticated. In addition attempts are increasingly being made to humanize work. All this means that experts will be required to solve the problems of industrial health and safety in companies.

As a result of this insights a law has been passed 1974 concerning company doctors, safety engineers and other experts, for work safety (work safety law). According to this law the employer must employ company doctors and safety experts to ensure that the regulations concerning industrial health and safety and accident prevention are applied, taking into account the particular conditions in the company, and that the measures taken are effective as possible.

One of the important duties of the employer with regard to industrial health and safety is his legal obligation to inform and instruct employees.

A further measure which the employer must take to ensure health and safety and accident prevention is to set up a work safety committee or safety committee.

All those who can contribute to reducing the risks of accidents and dangers to health in the company must cooperate. The works councils have a special responsibility in this since they represent the interests of those who voted for them in the company. The works council is particularly committed to intensifying industrial health and safety protection in the interests of the workforce they represent.

The employees' representatives have been granted rights and obligations by the Industrial Constitution Law which enable them to act as equal partners in the prevention of accidents and protection of health.

According to the Industrial Constitution Law the works council is responsible for the following aspects of industrial health and safety

- duty to monitor
- duty to organize
- right of co-determination
- duty to assist authorities
- right to information and participation.

The Work Safety Law stipulates the appointment in companies of

- experts for work safety and
- company doctors.

The duty of the work safety experts and company doctors is to assist the employer in all questions concerning the protection of health and work safety and the humane organization of work.

Work safety experts and company doctors have the following detailed duties according to the law:

- to advise the employer and any other persons responsible for work safety and accident prevention, in particular in
 - planning, execution and maintenance of company plants and welfare and sanitary facilities
 - the provision of technical work devices and the introduction of work procedures and use of dangerous substances
 - the selection and testing of personal protection equipment
 - questions of work physiology, psychology and other ergonomic or welfare problems, in particular work rhythm, the organization of working time and breaks, the designing of workplaces, work flow and working environment
 - the organization of First Aid in the company
 - questions of workplace changes and the integration or reintegration of handicapped people in the work process
- to check the safety aspects of machines, equipment and technical systems before they are put into operation as well as work procedures and dangerous substances, before they are introduced
- to observe that industrial health and safety and accident prevention measures are carried out and, connected with this,
 - inspect the workplaces at regular intervals and report any detected faults to the employer or to the other persons responsible for industrial health and safety and accident prevention, propose measures to remove these faults and insist that they are carried out,
 - ensure that body protection devices are used,
 - investigate the causes of accidents at work, compile and evaluate results of the tests and propose measures to prevent accidents of this kind to the employer. In order to improve accident analysis the work safety experts increasingly make use of computer data.

- to insist that all employees in the company conduct themselves according to the requirements of industrial health and safety and accident prevention, in particular to instruct them about the risk of accidents and dangers to their health to which they are exposed during their work and inform them of the equipment and measures necessary to avert these dangers, and also to assist in the training of safety personnel.

The company doctors have the additional duty of examining employees, assessing and advising them on their fitness for work and compiling and evaluating test results. They also assist in planning the operation and training of First Aid helpers and auxiliary medical personnel.

Company doctors and work safety experts must therefore work together closely in order to achieve their aims, particularly by carrying out joint company inspections.

According to the German social insurance code there are safety officers in addition to the company doctors and work safety experts.

Safety officers are to be appointed by employers in companies with a workforce of more than 20. In medium and large-sized companies safety officers are to be appointed in each department, workplace or area under a foreman.

Industrial health and safety committee

The industrial work and safety committee is the headquarters of in-company industrial health and safety organization.

Industrial health and safety committees are to be created in all companies in which company doctors and work safety experts have been appointed. The following are represented on the committees:

- the employer or a person authorized by him
- two members of the works council chosen by the council
- company doctors
- work safety experts
- safety officers

The duty of the industrial health and safety committee is to advise on matters of industrial health and safety. It meets at least once every quarter.

In smaller companies, in which there are no safety experts nor company doctors, a safety committee is to be set up if more than three safety officers have been appointed. The employer should meet the safety officer or safety committee at least once a month, together with the works council, to exchange information.

Trade Board and employers' liability insurance associations

There are two kinds of regulations for industrial health and safety: the state health and safety regulations and the accident prevention regulations of the employers' liability insurance associations. There are also two supervisory authorities:

- the State Trade Board (state inspectorate) and
- the technical supervisory authorities of the employers' liability insurance associations.

It is the duty of both monitoring authorities to ensure that the orders and prohibitions laid down in the industrial health and safety regulations are complied with in companies.

The State Trade Boards are authorities of the individual federal states and are responsible for a specific district within a federal state. All companies which have their registered offices in the district are monitored, regardless of line of business.

At present there are 35 industrial employers' liability insurance associations, 19 agricultural employers' liability insurance associations and 41 recognized public accident insurance companies.

If the monitoring authorities discover that regulations are not being complied with in companies, they shall ensure through an inspector's report or order that the situation is rectified in accordance with the regulations.

In particularly serious cases workplaces, machines, equipment and technical systems can be shut down by the monitoring authorities and the use of the dangerous substances can be forbidden.

Humanization of Working Life

The sixties and seventies (student revolution and socialdemocratic and liberal government) were a phase during which new ideas penetrated many aspects of society. This discussion was not something special to Germany but reflected in many instances developments in other countries, and focused on similar topics and aims. A constantly recurring idea was that certain areas should become more human. This even resulted in an inflation of the term "humanization" which was demanded in hospitals, universities, towns, prisons and last but not least in the work situation. Such discussions soon became part of the political debate and government programmes.

With respect to health and safety at work this involved further developing a system of statutory regulations and monitoring institutions which had existed for more than 100 years. These efforts were successful in certain areas: for example phrases such as "humane organization at work", "work-related disease", "verified industrial scientific

findings" and "ergonomics", appeared in industrial health and safety law. This represented a considerable extension of previous conceptions of industrial health and safety in which the main concern was the prevention of accident at work and occupational diseases normally resulting from relatively tangible causes such as noise, chemicals, electricity etc.

These new terms took industrial health and safety law beyond the realm of physical and chemical danger. It reflected the conviction that people are confronted with quite different strains and dangers to their health when working:

- A worker who has to carry out very simple manipulations within a short period of time day in, day out, dictated by the machine he is operating, suffers under his monotonous working conditions which present absolutely no mental challenge.
- Many modern machines and other work devices (industrial robots, program-controlled production machines, process-controlled systems in the chemical and electrical industries, office communication systems etc.) hardly require any physical effort on the part of the operating personnel any more, but, rather, stretch their mental and nervous energies. This has led to completely different stress situations and health dangers, which previously had not been the concern of industrial health and safety. Because of this no methods had been devised to cope with such working conditions.
- Another problem was that the world of work has been increasingly affected by highly developed technologies (catch word: micro-electronics) and the increasing use of chemicals. Employees were therefore increasingly exposed to a whole range of different stress factors. Neither science nor industrial health and safety have found the answer to the question of how these multiple strains affect human health and what should be done to protect it. It is important to remember that industrial health and safety were in the past concerned with reducing single strain factors; what is required, however, is an assessment of the total, working situation, i.e. an overall view of the stresses involved and the development of corresponding comprehensive health and safety concepts.
- A further development has been the claim for more democracy and co-determination for employees in their companies. At the beginning of the seventies new laws were passed which provided for numerous possibilities of involving employees, e.g. in arranging their working conditions. At that time there was no experience to fall back on.
- Finally the qualification of employees became more important since working with new technologies became ever more sophisticated and simple operating instructions, e.g. on a text processor, was no longer sufficient to ensure stress-free working conditions without the fear of personal failure.

Faced with this situation industrial health and safety has a twofold task:

- how to be more effective in solving traditional problems of industrial health and safety and
- how to master new stress factors and risk areas which had previously been neglected.

By 1974 the Federal German Government had already decided on a "Campaign to humanize working life", on the basis of which intense research has been carried out. In August 1989 the programme was transferred to the programme Work and Technology. At present DM 97,5 million are available annually for this research. The research programme has the following aims:

- health protection by reduction of dangerous strain and stress
- the design of technology and working condition in accordance with human needs.

A third basic aim of the research programme is to
 promote the application of research results in practice.

The aim is to extend industrial health and safety from the present level to a comprehensive system of health and safety precautions for employees.

This aim can only be achieved if one is prepared to follow new paths as well as using well-proven methods of industrial health and safety. The proposals can be summarized as follows:

- extend the scope of industrial health and safety
- develop a system-oriented point of view
- introduce more constructive ideas in the discussion on costs
- improve the qualifications of work safety experts
- partners to cooperate in in-company prevention measures beyond the scope of industrial health and safety
- motivate company management
- develop the work of monitoring authorities
- conclude collective agreements and plant agreements with the aim of preventing accidents.

Effective prevention in companies is only possible if it is understood, accepted and practised as an integral part of company policy.