Lecture 1.

Legislative and organization basis of occupational safety and health. Hygiene and physiology of labour, its significance.

The apex health and safety agency, the Health and Safety Executive (HSE), has developed a methodology to calculate the costs of workplace accidents and ill health to:

- individuals;
- employers;
- society as a whole.

➢ Variations in performance

There are significant variations in occupational health and safety performance between:

- countries;
- economic sectors; and
- sizes of enterprise.

➢ The main goal of occupational safety

can be expressed by the following formula:

OS = OAOD + SHWC + HaD + IP + PES,

where

OAOD – prevention of occupational accidents and occupational diseases;
SHWC – creation of safe and harmless working conditions;
HaD – health and disability;
IP – increasing productivity;
PES – prevention of emergency situations.

➢ Labour protection

is a system of legal, socio-economic, organizational-technical, sanitary-hygienic and medical-prophylactic measures and means aimed at health preservation and human performance at work.

➢ Definition of occupational health

The main focus in occupational health is on three different objectives:
(i) the maintenance and promotion of workers' health and working capacity;
(ii) the improvement of working environment and work to become conducive to safety and health and
(iii) development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings.

➢ International and European OSH documents:

- United Nations (UN): Universal Declaration oh Human rights, Agreements, Conventions, Declarations.
- International Labour Organization (ILO): conventions and recommendations.
- World Health Organization (WHO): conventions.
- Council of Europe (CE): conventions, charters.
- European Union (EU): charters, constitution.

➢ Fundamentals of Ukrainian legislation in the field of labour protection

Labour protection legislation in Ukraine is regulated by:

- ❑ government (High Council (Verkhovna Rada), Cabinet of Ministers, Ministry of Labour and Ministry of Public Health),
- ❑ trade union organizations and other institutions and public organizations.

➢ Occupational safety laws of Ukraine

are a system of independent laws and regulations in the field of occupational safety and health.

Basic laws which reflect OSH regulations are:

- ✓ The Constitution of Ukraine
- ✓ The Labour Code of Ukraine
- ✓ Laws of Ukraine
- ✓ Employment Laws
- ✓ Law of Ukraine "On provision of sanitary and epidemic safety of the population"
- ✓ Legal acts, rules and instructions
- ✓ Labour unions and their rights and guarantees
- ✓ Law "On Fire Safety", etc.

➢ Constitution of Ukraine guarantees:

"everybody has right to work…, to safe working conditions. It is forbidden to use the labour of women and adolescents at dangerous for health works" (Article 43);

"Everybody who works has the right to rest. This right is guaranteed by half day work for the workers of a number of professions and productions that are determined by the law, and by working time reduction at night…" (Article 45);

"Everybody has the right to health protection, medical care and medical insurance" (Article 49) etc.

➢ HYGIENE OF WORK

is the section of hygiene studying influence process of work and harmful professional factors on an organism of the working person and developing preventive actions for decrease and prevention occupational diseases.

➢ PHYSIOLOGY OF WORK

is the boundary section of hygiene and the physiology, studying influence process of work on an organism of the person and developing actions for increase serviceability and the prevention development of early exhaustion.

➢ The CLASSIFICATION of KINDS of WORK:

1. Physical work - demands the big physical activity and energy expenses (work of the loader etc.)
2. The mechanized work - needs significant muscular activity, but energy expenses are less (work of the turner, etc.)
3. Automated work - demands smaller energy expenses, but is characterized by monotony (the serviceman, the weaver etc.)
4. Work on the conveyor - the monotony, the imposed rhythm of work.
5. Intellectual kinds of work.

On size energy expenses work shares on the following groups

1) Work with significant muscular activity (energy expenses 4000-6000 Kcal)
2) Work on the conveyor, mechanized work (3000-4000 Kcal)
3) The automated work, intellectual kinds of work (2000-2400 Kcal)

Physical work divide on Static (works only one group of muscles, blood supply is worsened, the exhaustion faster develops), Dynamic (work different muscles -

work more favorably).

Classification work by a degree of weight and intensity.

Weight of work is used for estimation physical work, is characterized by amount of moved cargoes in kg and capacity (size of work for a unit of time). Degrees weight of work are easy, average, heavy, very heavy.

Intensity of work is characterized intellectual, operator work, is estimated under requirements to attention, a nervous - emotional pressure, monotony, etc.

Degrees of intensity are not intensive work, enough intensive, very much intensive work.

Quantitative assessment of intensity of physiological functions

1. ENDOGEN:

1. diseases and prepathological states;
2. defects development bodies and systems;
3. poor or non-optimum feeding (food);
4. the negative attitude to work.

2. EXOGEN:

INFRINGEMENT HYGIENIC WORKING CONDITIONS:

1. non-optimum microclimate;
2. non-optimum irradiating;
3. stimulated position of a body;
4. overstrain bodies and systems;
5. high level of the professional harmful factors.

NON-OPTIMUM PSYCHOLOGICAL - EMOTIONAL WORKING CONDITIONS:

1. a poor moral climate in collective;
2. the negative attitude to work.

NON-OPTIMUM ORGANIZATION OF WORK PROCESS:

1. very long work;
2.the very serious and intensive work;
3.monotony of work;
4.non-observance regimen of work and rest.

- Tiredness

  is temporary loss of strength and energy resulting from hard physical or mental work.

Exhaustion

is a state of extreme mental or physical fatigue.

Fatigue

is reduction in ability to sustain a physical or mental function as a consequence of the intensity and/or duration of the effort.

- Tiredness

is a reduction of working ability, which is caused by the fulfilment of certain work.

Objectively, the process of tiredness expresses in reduction of working capacity and *subjectively* into feeling tired.

Distinguish tiredness, which quickly develops (by reason of unusual or very hard physical work),

and

tiredness, which develops slowly (secondary) and is accompanied by some changes in organism, conditioned though and usual, but by the long work

Tiredness, that develops quickly,
can appear by reason of big physical efforts or execution of work task, which is not suitable for functional organism possibilities.
Such tiredness characterizes by:

- violation of functions coordination of central nervous system and
- beginnings of hearths of special disorders.

The difference of tiredness that quickly develops is a fast organism functions renewing after suppression of work.
Tiredness, which develops slowly, characterizes by gradual capacity reduction by reason of usual, but extremely long or monotonous work. Under this braking develops slowly, it is unsteady, superficial and gradually acquires disposition stage.
There is observed:

- *some weakening of reception functions*, specially of visual and auditory analysers, and
- *some violations of motion coordination*

➢ EXHAUSTION, theories of the mechanism of its development.

Among many theories (more than 20) development exhaustion till now is not present universal. Now is most recognized central - nervous theory by Sechenov, Uchtomski, Vvedenski. The basic role in exhaustion is played decrease serviceability cells of a brain, so balance of excitation and braking in CNS are broken.
Thus proof centers of excitation or braking are in CNS formed - the theory of disbalance. Last years this theory is added with the theory reticular formation - frustration communications between supreme and lowest departments CNS.

➢ The basic directions of prevention exhaustion:

1. SCIENTIFIC SUBSTANTIATION and KEEPING HYGIENIC DEMANDS to WORKING CONDITIONS

(Demands to a microclimate, irradiating, areas of workstation, absence exceeding MPC of the harmful professional factors)

2. SCIENTIFIC (RATIONAL) ORGANIZATION OF LABOUR PROCESS

(Keeping regimen of work and rest, restriction duration, gravity and intensity of work, translation static physical work in dynamic etc.)

➢ The basic directions of prevention exhaustion:

3.TECHNICAL MEASURES ON ENRICHING WORKING CONDITIONS ON WORKSTATION:

(Usage ERGONOMICS - science about relation of the man and devices, industrial art).

4. PSYCHOLOGIC MEASURES:

(Psychology of work - industrial psychohygiene, psychological selection on particular occupations, optimization psychological climate in collective).

Concepts "exhaustion" and "tiredness".

Tiredness is subjective feeling, as a rule, accompanying development exhaustion. It depends from psychological conditions of work, degree of interest in work.

Exhaustion is complex objective changes in an organism as a result of the work, shown in decrease of work ability

If the exhaustion does not pass before the beginning of the following cycle of

work, it gradually collects and gives overfatigue - proof decrease of work ability, pathology CNS, cardiac system, immunodepression, growth of a traumatism.

Concept "work ability".

Work ability is ability of the person to long work without decrease qualitative and quantity indicators (with high efficiency of work).

Work ability depends on such reasons as state of health, hygienic conditions of work, organization of work process, psycho-physiological factors.

Early decrease of work ability is indicator of influence of these factors, therefore study its dynamic is important for estimation health of working and working conditions.

Dynamics work ability during work process.

During work allocate 3 stages of work ability

1) In-work period - gradual increase of work ability
2) Working excitation - a maximum level of work ability
3) Beginning exhaustion - gradual decrease of work ability

Dynamics work ability after work:

1) After working excitation - after very heavy or hard work
2) After working braking - sharp decrease of work ability
3) Restoration work ability. At sufficient duration of this stage the level of work ability comes back to initial and there is no overfatigue.

Methods studying work ability.

There are a lot methods of estimation of work ability or exhaustion. They are psycho-physiological or only physiological tests.

For brainwork (intellectual work):

1) Corrector test - crossing out concrete letters or figures in special tables during 60 seconds Estimation results of the test fulfilled under formula Hartndg - by amount of the processed information in bits / sec.
2) Verbal - associative experiment - estimation speed and degree of association between setting words
3) Definition stability of attention (for schoolboys)
4) Definition time of hearing - motor and visual - motor reaction with the help chronoreflexometr (for operator work)

For any work - chronometric (timing) researches:

• Selective timing work elements
• Fixing distraction of the attention (at school)
• Phototiming

For physical work:

• Definition physical force with the help of a dynamometer
• Study a tremor (trembling) hands (with the help of tremometr) - for exact works

Changes in an organism during work. Changes in CNS.

The first system reacting to work - CNS - is marked stimulation. At adequate work favorable changes of nervous processes are observed, latent time of reactions is reduced, at very hard work time improvement of parameters CNS is replaced by their deterioration -easing reflexes, premature exhaustion.

Changes of breath.

At work breath of fabrics of organism increased. Increasing delivery of oxygen

to fabrics and removal CO_2 is reached by increase frequency and deepening of breath (in rest frequency of breath 7-22 times in minute, at work - 50 and more times, the volume lung's ventilation raises in 5 - 10 times).

Maximal receipt O_2 with breath - 3-4 l/min - it is oxygen ceiling. Receipt of oxygen in an organism increased gradually and in the beginning of work the oxygen duty (debts) is created, during which collect non- oxidazed products of exchange. At heavy inadequate work the oxygen duty very big and need some days for full oxidation metabolites formed in fabrics.

Phenomenon Lingard. German physiologist Lingard has established, that at heavy static physical work after the ending of work the need for oxygen again raises due to exit non-oxidazed products of exchange from fabrics in blood that causes stimulation gas exchange.

Changes of cardiovascular system.

The increased metabolism in working fabrics demands strengthening blood circulation. At work increase frequency of cardiac contractions, systolic volume of heart, therefore the minute volume of blood is increased. At trained people it is increased due to increase systolic volume, at untrained - due to increase of a pulse rate.

Arterial pressure, especially maximal, also raises, that conducts to growth pulse pressure After adequate work the arterial pressure through 5-10 minutes comes back to norm.