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Organizing The Operator's Workplace In Railway Transport

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ANNOTATION This article examines the issue of organizing the operator's workplace in railway transport. Further, the issue ofworkplaces in which it must be adapted for a specific type of work, taking into account the anthropometric and psychophysiological characteristics and features of a person. In addition, the operator's work activity must be carried out in conditions that meet sanitary and hygienic requirements.

Keywords: Workplace, chair, overview, operator, type of work, work activity. The workplace must be adapted for a specific type of work, taking into account the anthropometric and psychophysiological characteristics and features of a person. In addition, the operator's work activity must be carried out in conditions that meet sanitary and hygienic requirements.

INTRODUCTION.

When designing workstations, general and specific ergonomic requirements for them and their elements must be taken into account. In this case, an appropriate working posture (sitting, standing, sitting-standing); types of indicators and controls, their arrangement on panels and rational placement of panels must be selected. Also, an optimal view of the workstation must be provided, space for legs when working sitting and sitting-standing and space for short-term rest when working standing, space for installing communication equipment, organizational equipment and storage of working materials.

The position of the body during work and the working posture of a person are the most important factors that support the system of interaction of neuromuscular structures in a state of readiness and the performance of precise motor acts. The ability of a person to perform a variety of movements is associated with the posture. An uncomfortable posture can negatively affect the accuracy of movements associated with the selection of signals, with the performance of complex movements in terms of coordination, i.e. with the reliability of the operator's work.

An irrational posture can lead to excessive static loads on the spine, neurotic conditions and pathological disorders of the musculoskeletal system and internal organs. A normal working posture is considered to be a posture in which the worker does not need to bend forward more than 10-15 degrees. Backward and sideways bends are undesirable. Straight posture is the main requirement for a working posture. The choice of a working posture (sitting, standing, sitting-standing) is determined by the physical difficulty of the work. With efforts of no more than 50 N, work can be done while sitting. With efforts of 50-100 N, work can be done with the same physiological effect both standing and sitting. With efforts exceeding 100 N, it is recommended to work while standing.

Standing work is advisable when constant movement is required to adjust equipment. It creates maximum opportunities for visibility and

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free movement. However, when working standing, the load on the muscles of the lower extremities increases, muscle tension increases due to the high location of the center of gravity, and energy costs increase by 6-10% compared to a sitting position. Working in a sitting position is more rational and less tiring, since the height of the center of gravity above the support area decreases, body stability increases, muscle tension decreases, and the load on the cardiovascular system decreases. In a sitting position, it is possible to perform work that requires precision of movement. However, in this case, congestion in the pelvic organs, difficulty in the functioning of the circulatory and respiratory organs may occur.

Changing your posture leads to a redistribution of the load on muscle groups,
improve the conditions of blood circulation, limit monotony. Therefore, where it is compatible with the technology and production conditions, it is necessary
provide for the performance of work both standing and sitting, so that workers can change their body position at their own discretion.

The optimal position of the worker is achieved by regulation.

When performing work while sitting:

-height of the work surface, seat and legroom;

- the height of the seat and footrest (if the height of the work surface is not adjustable). If the worker is short, the height of the work seat and footrest is increased by the required amount. This amount should be equal to the difference between the existing height of the work surface and the height that best suits the height of the particular worker.

When performing work while standing:

- height of the working surface;

- footrests if the height of the work surface is not adjustable.

If the worker is short, the height of the footrest is increased. The organization of the workplace and the design of the equipment must ensure a straight and free position of the worker's body or a forward tilt of no more than 15°.

The formation of the working posture in a sitting position is affected by the height of the working surface, determined by the distance from the floor to the horizontal surface on which the work movements are performed. The height of the working surface hп is recommended to be selected depending on the nature, accuracy of the work and the height of the person in accordance with Figure 1. Dependency 1 - very precise work. Dependency 2 - precise work. Dependency 3 - light work that does not require high accuracy; 4 - work on typing text information.

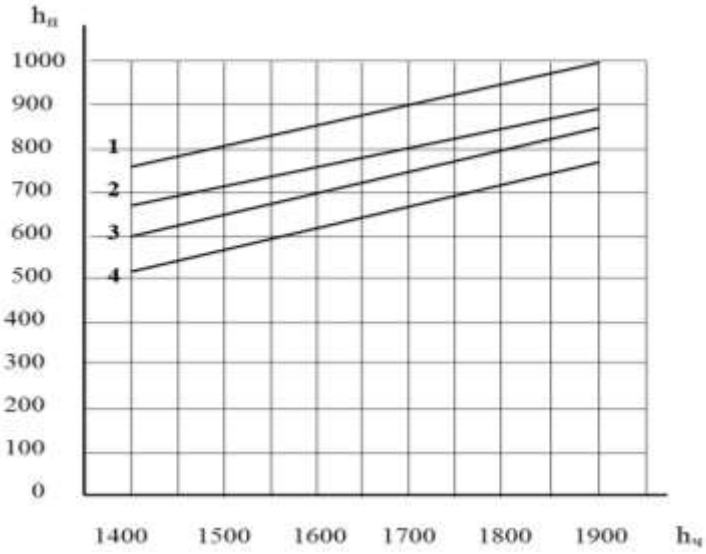

Fig. 1 Nomogram of the dependence of the height of the working surface for different types of work performed in a sitting position on a person’s height:

The shape of the working surface can be rectangular, have a cutout for
worker's housing, recesses or other surfaces for office equipment, etc.

The height of the working surface hп, when performing work standing, is recommended to be

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selected depending on the type of work and the height of the person in accordance with Figure 2. Dependency 1 - constant work with VDT with visual control of other technical means. Dependency 2 - predominant work with VDT with simultaneous servicing of other electronic devices. Dependency 3 - occasional work with VDT with constant work using physical effort.

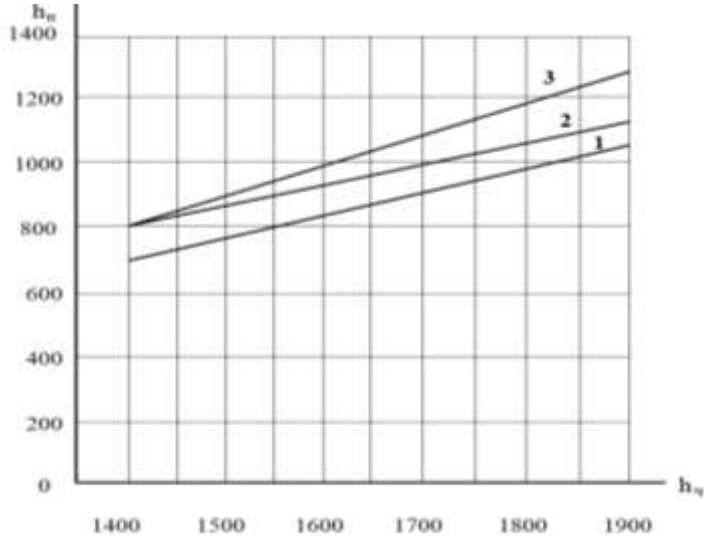

Fig. 2 Nomogram of the dependence of the height of the working surface for different types of work performed in a standing position on a person's height:

Workplace space with placed display facilities information, control bodies and other technical means, in in which human motor actions are carried out in the process of labor, is called the motor field. In the motor field of the operator's workplace three zones are distinguished: the reachable zone, the easy reach zone, and the optimal zone.

The reach zone is limited by arcs described by the maximum with arms extended while moving them in the shoulder joint, the zone of light reach - with relaxed arms when moving them in the shoulder joint, the optimal zone of the motor field - with forearms when moving in the elbow joints with support. The sizes of the zones of the human motor field are shown in Figures 3 and 4.

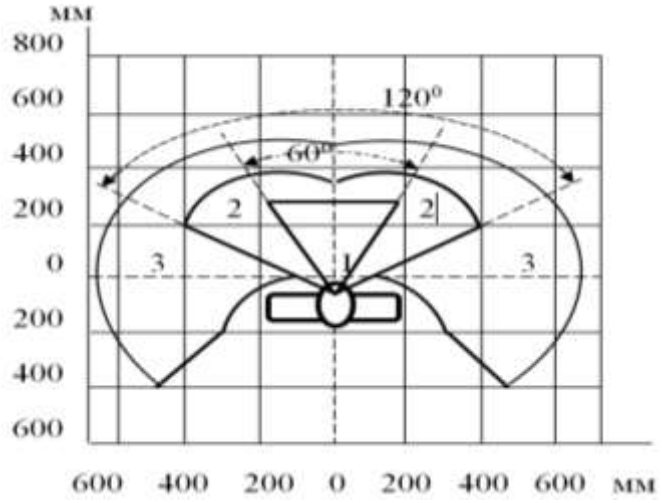

Fig. 3. Zones of the motor field of the operator's workplace in the horizontal plane when the operator works in a sitting position;

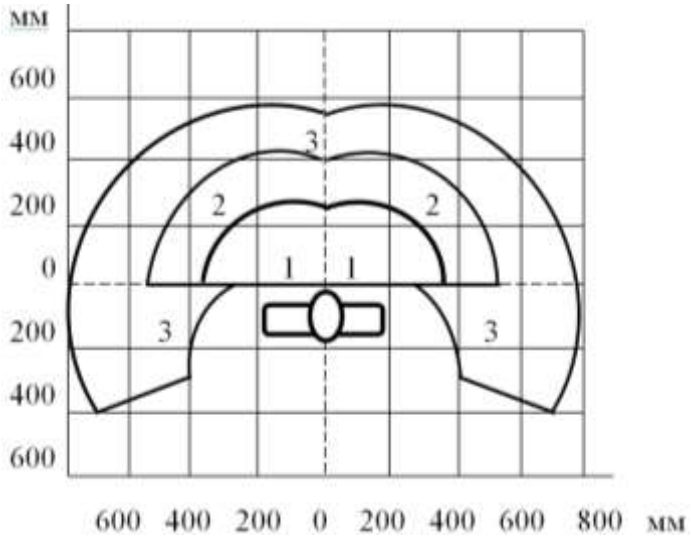

Fig. 4. Zones of the motor field of the operator's workplace in the horizontal plane when the operator works in a standing position;

Controls must be placed in accordance with the following requirements.

When performing work while sitting:

- in the horizontal plane: very frequently used and most important controls must be located in zone 1; frequently used and less important controls must

not be located outside zone 2; rarely used controls must not be located outside zone 3.

- in the vertical plane: controls may be placed above 1100 mm if, for technical reasons, it is impossible to place them below the specified level. Such controls should be used rarely.

When performing work while standing,very frequently used and most important controls must be located in zone 1, frequently used and less important controls must not be located outside zone 2, and in case of heavy work – higher than 1000 mm from the platform on which the worker stands, rarely used controls must not be located outside zone 3. Controls used up to 5 times per shift may be located outside the reach of the motor field.

When working with two hands, the controls are placed so that the hands do not cross. Operations that do not require precision and speed of execution can be "entrusted" to the foot controls. Emergency controls should be located within the reach of the motor field.

If information display devices that require accurate and fast readings are used very frequently, they are positioned vertically at an angle of ±15° from the line of sight and horizontally at an angle of ±15° from the sagittal plane (the “sagittal plane” (from the Latin sagitta – arrow) is a term used in animal and human anatomy to denote the plane that runs through the body in the anteroposterior direction).

An important element of the workplace in a sitting position is the chair operator. It must correspond to the anthropometric data of the person. The design of the work seat intended for long-term work must help maintain an ergonomically appropriate working posture, not hinder working movements and, if necessary, ensure a change of posture.

The design of work chairs can include the following adjustable parameters: seat height (within 350-500 mm), height backrest (up to 540-560 mm), backrest angle (back by 3-50), seat depth, armrest angle, headrest angle, headrest height. The seat width should exceed the operator's pelvic width by 25%.

Workplace space with placed display facilities information, control bodies and other technical means, in which human motor actions are carried out in the process of labor, is called the motor field. In the motor field of the operator's workplace, three zones are distinguished: the reach zone, the easy reach zone, and the optimal zone.

The operator's workplace must be designed taking into account ensuring the necessary conditions for maintenance and repair of equipment (inspection, adjustment, replacement of units and individual elements). The use of testing equipment, measuring devices and tools must be carried out without difficulties and violation of safety regulations.

The organization of the workplace should provide conditions for warning of incorrect actions (errors) of the operator. For this purpose, all primary and emergency controls must be easily identifiable (visually or by touch); there must be free space between controls, allowing easy manipulation or without touching adjacent controls; switching of discrete controls must be accompanied by a clearly audible click; controls, accidental action on which is unacceptable, must have special protection, the removal of which requires at least two movements.

Color solutions for interiors are often given secondary importance. Meanwhile, color is one of the most important sources of information. It is oversaturated with symbolic and emotional qualities and has such a strong influence on the mental and physiological state of a person that it is impossible to ignore its significance.

Warm colors have a stimulating effect, tone up, and increase efficiency. Cold colors expand space, help concentration and self-absorption.

Brown color helps improve executive functions, blue increases brain activity and reduces appetite, yellow and orange lift the mood and stimulate the emergence of non-standard solutions, green and blue calm and allow you to concentrate.

Long-term exposure to red causes excitement, turning into aggression, but its small accents will awaken the activity of employees.

Pink is extremely relaxing. Purple and black have a depressing effect on the psyche. White is neutral, but gives a feeling of purity.

It is also worth considering other subtleties. The higher the intellectual level of employees, the more complex shades they will prefer. The craving for calm colors increases with age. Features of temperament are also important. Phlegmatic people are toned up by accents of red and orange, choleric people will be calmed by blue-green colors.

With the help of color, you can change the perception of space and visual details ("visual noise"). A small production or office space can be visually expanded with light, cold tones - gray-blue, pearl, water-green. If the room is large and "visually noisy", then there are colors that can solve this problem. The so-called "quiet" range - unsaturated cold: light blue, gray-blue. A calm range of pastel colors will reduce fatigue.

When choosing a production color, you should not be guided only by personal tastes and preferences. It can solve many problems, but if used ill-considered, it can, on the contrary, create them.

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