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CURRENT ENVIRONMENTAL AND HYGIENIC PROBLEMS AND THE MAIN RISK FACTORS FOR WORKING CONDITIONS IN CARPET PRODUCTION

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Abstract: The aim of this present work became the ecology-hygienic characteristic of carpet manufacture by the example of "Vitebsk carpets" and development of recommendations on optimization of working conditions. decrease of case rate and maintenance of medicine-technological safety. In work the basics are considered professional the harm. Working on an organism of workers. It is established. that the dust allocated in air exceeds maximum concentration limit in 1.7-18.5 times at various stages of technological process of carpet manufacture.

Keywords: Working Conditions, Microclimate, Dust, Occupational Hazards.

Introduction

The prevalence of occupational respiratory diseases among workers in various sectors of the textile industry is much higher than among the population not employed in these areas, accounting for more than 50% of all cases. Therefore, the issues of studying the influence of environmental conditions and professional activity on the health and performance of workers in order to increase the efficiency of their work and reduce morbidity are currently of particular urgency. OJSC "Vitebsk Carpets" is the only enterprise in the CIS that produces all types of carpet products. Therefore, it is of practical interest to study the working conditions of workers at a carpet enterprise, which combines various areas of the textile industry and uses various types of raw materials. The purpose of the work was the environmental and hygienic characteristics of the production environment of carpet production.

Methods

When studying working conditions, industrial hazards and the health status of workers at Vitebsk Carpets OJSC, sanitary materials were used - hygienic , clinical and cytological research methods, socio-hygienic and epidemiological studies were carried out.

To assess environmental and hygienic working conditions, the microclimate, dust and bacterial air pollution, the concentration of chemicals, the state of workplace lighting and production noise levels were studied in accordance with generally accepted methods.

Results and Discussion

A hygienic assessment of the production process showed that the technology of carpet weaving is accompanied by the impact of a number of unfavorable factors on the body of workers.

The air temperature in the main production workshops is within the range of 22.5-24.30 C in the cold season and 23.3-34.50 C in the warm season. In the cold and transitional periods of the year, the air temperature in the spinning shop is 22250C, and in the weaving shop 20-230C, in the warm period of the year, 26-280C and 24-260C, respectively. Thermal load causes the formation of diseases of the respiratory, digestive and cardiovascular organs. - vascular system .

Air mobility and relative humidity in both period of the year were within hygienic standards. The relative air humidity in the spinning shop was 55-60%, and in the weaving shop - 65-70%. An increase in temperature and air humidity in the working area contributes to the growth and development of industrial microflora on dust and wool as a nutrient medium [1].

The highest bacterial air pollution was observed in the preparation workshop (12,396 colonies per cubic meter , of which 4,510 were hemolytic). In other workshops, the total number of colonies during warm and cold periods did not exceed the hygienic norm, but a high content of hemolytic microflora was also found. A significant reduction in bacterial air pollution in summer is explained by better aeration of industrial premises due to the supply of clean atmospheric air; in winter, supply ventilation operates on the principle of recirculation [3]. The qualitative and quantitative composition of microflora depends on the type of processed raw materials .

In carpet production, good lighting of workplaces is required, since in a number of technological operations the work involves significant eye strain. Illumination at workplaces should be 500-700 lux. The surveyed workshops have combined fluorescent lighting. Illumination of workplaces during the day and at night was recorded below normal. In addition, there is a large unevenness of lighting in the same operations, which is due to insufficient power and irrational placement of lighting devices. A study of the state of the visual apparatus of workers showed a significant decrease in visual acuity in people with extensive work experience, especially in weavers [3, 8].

One of the unfavorable factors in carpet production is the noise produced during the operation of spinning and weaving equipment. High-speed rotating machinery and weaving looms produce broadband noise with a predominance of frequencies from 1000 to 4200 Hz. The noise level in the working area reaches 90-98 dBA, which is 10-18 dB higher than the norm for noise of this frequency. Carpet workers are exposed to noise 87-90% of the time they work. Noise up to 90dBA (86dBA) was recorded in the hardware and spinning shops and over 90dBA (92-96dBA) in the spinning and weaving shops. Vibration velocity levels in the spinning shop range from 98 to 108 dB, in octave bands with geometric mean frequencies of 63-250 Hz.

At the industrial enterprise under study, increased levels of noise and vibration occur during the operation of ventilation systems, carding and twisting machines, and weaving machines. According to the results of a polyclinic examination, the largest number of functional disorders of the nervous and cardiovascular systems, cases of hypertension and peptic ulcers, as well as decreased hearing acuity are recorded among workers of wool spinning and weaving shops with the highest level of industrial noise.

The potential of static electricity on working surfaces in the spinning and weaving shops is insignificant and amounts to 0.03-0.19 kV.

All workshops are equipped with fresh air ventilation with full air recirculation during the cold period. Supply and exhaust ventilation operates only in the preparation, dyeing and finishing shops, where the most unfavorable microclimatic conditions are observed (emission of dust and influx of toxic substances). For example, in the preparation workshop, where wool and artificial fiber are loosened and dedusted on machines that do not have shelter and rational exhaust devices, a significant

emission of dust is observed. The same is observed during the operation of carding, spinning, reed-twisting machines and weaving machines.

Dust formation is accompanied by all technological operations of carpet production. However, during the preparation processes, including carding, and in the blending department of the spinning plant, much more dust is generated than during subsequent stages of fiber processing. The dust content of the air in the preparation shop in the working area of scooping, plucking and support machines averaged 74 mg/m in the cold season and 58 mg/m in the warm season. In the main workshops, dust content is about 8-10 mg/m (MPC = 4 mg/m) . During various technological processes, the concentration of dust in the air of the working area exceeded the standard indicators: 1) 1.7-5.0 times (spinning production); 2) 1.9-2.8 times (sorting shop); 3) 14.5-18.5 times (preparation shop); 4) 2.9-4.2 times (team of ventilation unit cleaners); 5) 2.8-3.2 times (weaving production).

Wool dust contains a variety of bacterial and fungal microflora (molds and actinomycetes), which, together with impurities of animal origin, constitute a complex protein-antigenic complex that has a pronounced allergenic effect on the respiratory system [11, 14, 15]. It has been proven that wool dust, having stronger sensitizing properties than cotton and linen, can be an etiological factor in the occurrence of allergic rhinitis, bronchitis and bronchial asthma [4, 12, 13]. When exposed to any industrial dust in In the upper respiratory tract, dystrophic processes of varying prevalence and severity develop, and the pathomorphological picture of these changes is not specific to any type of dust, with the exception of those with allergenic properties. In addition, wool dust mixed with dust from synthetic fibers (nylon, lavsan) can have an irritating effect on the mucous membrane of the upper respiratory tract . To reduce dust in the working area of weaving machines, local suction is equipped, which, however, has already exceeded its service life and is either in a quarantine state or does not function at all.

A study of the chemical composition of wool dust showed that it consists of organic (animal and plant) and mineral (soil) substances. The mineral part of the dust contains free silicon dioxide. The greatest amount is contained in the dust of the preparatory, blending, carding and hardware shops, and the smallest in the spinning and weaving shops. At the beginning of the technology, dust contains more free silicon, and as it approaches the end of processing, its amount decreases. The content of free silica in wool dust ranges from 8.1-8.3% when processing dirty wool and 4.6-5.6% when sorting clean wool.

Several factors contribute to the persistence of a dust aerosol, one of which is the shape of the dust particles . Most often, these are convoluted, thin plates that split off from the fibers and are capable of being suspended for a long time and easily moving with air currents. Significant air mobility in work areas has an even greater impact on dust volatility. Convection currents rising upward from machines, horizontal currents and currents of other directions from ventilation units allow even large dust particles (up to 10 microns or more) to remain suspended for a long time.

Dust in weaving shops is, as a rule, finely dispersed, up to 70% consists of dust particles 2-5 microns in size, which helps to retain it in the mucous membranes of the upper respiratory tract. In the dust of synthetic fibers, the size of the bulk of particles was less than 5 μm. The pathogenic properties of synthetic fiber dust are due to its complex organomineral composition and high penetration into the respiratory tract .

At the enterprise, the concentrations of industrial aerosols used exceed the maximum permissible concentration: 1) abrasive containing aerosols; 2) aerosols of metals and their alloys (1-1.2 times); 3) welding aerosol (1-2 times); 4) silicon-containing aerosols (3.5 times). The inhalation effect of industrial aerosols on the respiratory organs of workers occurs through the upper respiratory

tract [9]. Industrial contact even with relatively low concentrations of gases that irritate the respiratory tract plays a significant role in the development of chronic bronchopulmonary pathology . There are a number of chemical hazards in production that affect human health. For example, in a number of areas of the plant the standard concentrations of chlorine and its compounds were exceeded (3.7-4.5 times), manganese and its compounds (1-2.2 times) . to the belt. sulfur and their compounds. The presence of styrene was detected in the finishing department . n exceeding the maximum permissible concentration at certain workplaces. 1.5-4 times.

Acid and disperse dyes are widely used in carpet production. Dye vapor concentrations . to alkalis and alkalis in the air do not exceed the maximum permissible concentration. However, upon contact with the mucous membrane of the bronchial tree, these substances cause inflammation . leading to atrophic processes. which is accompanied by an increased flow of tissue metabolites into the blood. stimulating the production of antibodies.

It should be noted . that the simultaneous impact of two or more unfavorable labor factors (even those not exceeding the maximum permissible concentration) can lead to overexertion. potentiation of unfavorable changes in the functional state of the main systems of the body and further disruption of adaptation mechanisms with the subsequent development of pathology [6].

Conclusion

1) Wool dust and synthetic fiber dust released into the air exceeds the current MPC (4 mg/m) by 1.7-18.5 times at various stages of the carpet production process.
2) The main occupational hazards in carpet production are increased levels of industrial noise . dustiness and air microflora. use of dyes. content of various chemicals in the air. unsatisfactory microclimate in some technological areas.
3) In the conditions of carpet production, the respiratory system of workers is affected by a whole complex of chemicals of a diverse spectrum (irritating . t toxic. sensitizing) actions.

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