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Hygienic Characterization of the Chemical Factor in Mechanical Engineering Enterprises

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Abstract All factors of the working environment, as well as the organization of work, which directly or indirectly may cause impairment of the health or performance of persons working in these conditions. To identify harmful factors, it is necessary to study working conditions and environmental parameters in production premises and directly in the work area, comparing them with accepted hygienic standards. The results of the analysis of air pollution of the main working areas show that a high concentration of the chemical factor was observed to be generated during the work process of the electric gas welding as well as the test drive. The reason for the high chemical factor in this enterprise under research is the installation of a non-rational ventilation system in workplaces and workshops, as well as the lack of rational use of the local intake system, low ventilation efficiency.

Keywords Machinery enterprises, Working conditions, Chemical factor

1. Introduction

The who's global strategy aimed at protecting workers 'health is aimed at protecting workers' health in the workplace, maintaining and strengthening workers ' ability to work in enterprises and organizations, organizing working conditions in accordance with health and safety requirements, taking measures to improve the health of employees in the workplace [2,6,7,12]. All factors of the working environment, as well as the organization of work, which directly or indirectly may cause impairment of the health or performance of persons working in these conditions. To identify harmful factors, it is necessary to study working conditions and environmental parameters in production premises and directly in the work area, comparing them with accepted hygienic standards [1,4,13].

The most important technical significance for characterizing the state of the air environment in workshops is its contamination with vapors of aromatic hydrocarbons and organic solvents. Workplaces are constantly exposed to highly concentrated vapors of organic solvents in various combinations, and in some workplaces also pigments, the effects of which are multidirectional and have not been sufficiently studied. It is known that the concentrations of organic solvent vapors in the air are often [3,8,11,15,16].

Another study found that 68.2% of esa machinery industry workers were exposed to lubricating and cooling fluids, 24.3% chemicals, 14.4% heavy metals, 14.4% high temperature, 66.2% noise, and 40.1% local vibration. According to the analysis of the authors in it, the health of workers in the mechanical engineering industry is most influenced by chemical factors, causing negative changes in the respiratory organs. Next, the central nervous system and reproductive system are affected by this factor [5,9,10,14].

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2. Results

The purpose of the study: To study the leading chemical factor of working conditions from harmful factors and give hygienic assessment at the Enterprise “Tashkent mechanical plant” in the field of mechanical engineering industry.

Research method. The concentration of chemical factors on plots where harmful factors are formed in the air of workplaces was determined using the express method through “Identification of harmful and dangerous factors in laboratory tests for assessing working conditions” (2013) and an analysis was carried out according to the state standard “General sanitary and hygienic requirements for the air in the working area” No. 12.1.005-88. In the production environment, the assessment of working conditions on harmful substances with two or more multidirectional effects at the same time in the composition was carried out as follows (Sanitary Rules and Regulations No. 0141-03).

Thus, during the operation of technological equipment in the production shops of a machine-building enterprise, there is a more difficult and intense nature of production operations, closer contact of workers with chemical factors of the production environment, etc. In this regard, there was a need to study working conditions in modern machine-building

production. In the conditions of production, there are many harmful factors that affect the chemical composition of the air in the rooms. Ensuring the cleanliness of the working space air to create its optimal conditions in the mechanical engineering industry is one of the main problems of the present time. During the research carried out, when the production activity was organized, it was determined that as a result of the technological process in the main workplaces of the enterprise, various harmful factors were emitted, from which the chemical factor was considered as the leading factor.

The main place of work of the tester - driver at the machine-building production enterprise contains nitrous oxide from chemical factors, these workers are dangerous for the respiratory system and have corrosive properties. The high concentration of nitrous oxide when analysed using samples from workplace air is 4.98±0.18 mg/m^3, which should be 2 mg/m^3 concentration of nitric oxide under state standard 12.1.005-88 "General sanitary hygienic requirements for workplace air" (Table 1).

The next workplace of the technological process was Electrocutioner, whose study of gasification of workplace air found nitrogen dioxide - 5.40±0.11 mg/m^3, carbon monoxide - 22.0±0.34 mg/m^3, iron algomerate - 4.70±0.20 mg/m^3, and that these capacitors were greater than the amount allowed. Thus it was found by analysis that nitrous oxide averaged 2.17 times rem, carbon monoxide 1.5 times Rem, and iron algomerate 1.175 times (Table 2).

Table 1. Class of working conditions depending on the composition of harmful factors in the production Air

Harmful factors	**Working conditions class**					
	Allowed - Class 2	**Harmful 3 classes**				**Particularly dangerous, extreme - 4**
		1 degrees 3.1	**2 degrees 3.2**	**3 degrees 3.3 - harmful heavy**	**4 degrees 3.4 - especially harmful, especially severe, dangerous**	
Danger harmful substances of Class 1-2	< MPC	1.1-3	3.1-6	6.1-10	10.2-20	>20
Harmful substances of Class 3-4 by safety	< MPC	1.1-3	3.1-10	>10		
Harmful substances of Class 3-4 by safety	< MPC	1.1-2	2.1-4	4.1-6	6.1-10	>10
Allergen	< MPC	1.1-2.0	2.1-3	3.1-10	>10	
Long-acting carcinogens, mutagens, etc.	< MPC	1.1-3	3.1-6	6.1-10	>10	
Mainly aerosols with fibrogenic effects	< MPC	1.1-2	2.1-5	5.1-10	>10	
Mainly aerosols with fibrogenic effects					XX	
Narcotic-analgesics				XX		

Table 2. Mechanical engineering industry composition of harmful chemical factors in working environment air g/m^3

Sampled workplace	**Number of samples taken**	**SiO_2 10-70% (PC- 2,0 mg/m^3)**	**Nitrogen dioxide (PC 2 mg/m^3)**	**Carbon monoxide (PC 20 mg/m^3)**	**Iron algomerate (PC 4,0 mg/m^3)**	**Working condition class**
Tuning machines and manipulators with software control (guillotins)	10	-	1,82±0,38	3,06±0,67	-	2
Mehanik yeshg affairs slesori	20	0,62±0,08	1,15±0,07	4,90±0,28	0,60±0,03	2
Tester-driver (tractor driver)	10	-	4,98±0,18	7,10±0,38	-	3.1
Metal, bulk, products and parts cleaner (fine cleaning)	15	1,44±0,07	0,82±0,13	1,24±0,17	-	2
Inker (with spray)	10	-	1,92±0,14	1,36±0,07	-	2
Transporter (car hauler)	10	-	1,70±0,12	1,80±0,10	-	2
Laboratory of chemical analysis	20	0,66±0,04	1,3±0,17	1,70±0,12	0,40±0,03	2
Electropayvander	20	-	5,40±0,11	22,0±0,34	4,70±0,20	3.1
Operator (fine detail cleaning machine	10	0,84±0,05	1,80±0,06	2,60±0,06	-	2

Is a complex of chemical factors that affect the air of the workplace, the one-sided effect of several harmful substances occurs at the same time, and the actual amount (K1, K2, ..., Kn) the REM (REM1, REM2,..., REMn) of each substance in the air should not exceed one.

According to the technological process, the summing coffits in the electropayvander workplace basin were determined by 3 chemicals to 5, the summing coefficient in the driver-tester workplace air was determined by 2.8 equals.

Depending on the content of harmful factors in the production air at the machine-building enterprise, the working conditions were determined by the level of noise in the Working Areas of Sangvam "permissible sanitary norm" class 0141-03 of Uz Res 0325-16. In this case, a driver-Tester and an electrician from the owners of the main profession were found to belong to Class 3 1, and in the rest of the professions to Class 2, due to the fact that chemicals in the air of the workplace are several times higher than in the REM.

3. Discussions

Thus, the chemical factor of the production environment can play a certain negative role, aggravating the effect of an already existing set of harmful production factors. The reasons for the high air pollution in the working area at this enterprise are the irrational ventilation system and the lack of local exhaust ventilation to combat the resulting chemical aerosols.

We can see that the harmful chemical factor norms in the air of the working environment "General sanitary hygienic requirements for the air of workplaces" less than the permissible amount of state standard 12.1.005-88-i.e. fully comply with the requirements of this standard.

Mechanical engineering as an industry requires a well-functioning ventilation system. Workshops require a rational ventilation system, represented by a general supply and exhaust system with mechanical drive. The influx of clean air and the exhaust of air with chemical vapors are carried out by fans connected to the air duct system.

4. Conclusions

When organizing technological processes, it is necessary to give preference to automated, continuous and hermetic processes and equipment. Maximum isolation of technological processes accompanied by the formation of industrial hazards should be provided. Technological and auxiliary equipment that generate increased levels of noise and vibration must be installed on separate foundations. Technological processes, equipment, raw materials used, materials and other factors must ensure the production of high-quality products that are safe for the health of consumers.

The results of the analysis of the air pollution of the main working areas show that a high concentration of the chemical factor was observed to be formed during the work process of the electrogazpayvander as well as the test drive. The reason for the high chemical factor in this enterprise under research is the installation of a non-rational ventilation system in workplaces and workshops, as well as the lack of rational use of the local taker system, low ventilation efficiency.

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