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SCIENTIFIC JUSTIFICATION OF MEASURES TO ENSURE SAFE WORKING CONDITIONS FOR EMPLOYEES ENGAGED IN MODERN ALUMINUM PROFILE PRODUCTION

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Abstract
Based on the conducted research, a set of preventive measures has been developed to optimize working conditions and preserve the health of workers engaged in modern aluminum profile production.

Keywords: Occupational hygiene, industrial risk assessment, artificial intelligence in public health, harmful production factors.

Introduction

Hygienic assessment of working conditions has important social significance due to the necessity of timely evaluation of safe work experience under harmful exposure, determination of the frequency of medical examinations, provision of benefits and compensations for working in hazardous conditions, and identification of priority directions for modernization of equipment and technological processes [1, 3]. Aluminum profile production is characterized by working conditions that may adversely affect workers' health and performance capacity [2], which served as the basis for this study.

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Materials and Methods

Enterprises specializing in the production of aluminum profiles are characterized by a combination of workplace environmental factors such as dust and gas contamination of the working zone air, high air temperature, radiant heat, and noise, which negatively affect workers.

Sources of adverse workplace factors included technological operations leading to increased dust formation (equipment cleaning with compressed air, sorting cooled alloy, assembling electrode casings); equipment and transport generating increased noise and vibration levels; electric furnaces creating high levels of thermal radiation; and irrational placement of artificial lighting sources. Contributing causes included imperfect organization of certain technological processes, architectural and structural features of industrial buildings, and inadequate sanitary-technical systems.

Results and Discussion

Measures to improve working conditions at aluminum profile production enterprises should include modernization of technology and equipment considering ergonomic requirements; improvement of microclimate and lighting; workplace ventilation; noise reduction; optimization of work-rest schedules; and improvement of sanitary and domestic conditions. When improving technology and equipment, attention should be focused on mechanization, maximum automation of monotonous conveyor operations, and rational workplace design. The most effective measures to limit the impact of dust and chemical exposure include reducing emissions at their source (sealing, continuous humidification) and removing them using local exhaust ventilation. The suction airspeed at the working opening should be at least 3–4.5 m/s for dust and 0.6–1.5 m/s for gases. To ensure optimal thermal comfort, hygienic microclimate regulations should comply with SanPiN RUz No. 0324-16 “Sanitary and Hygienic Norms for the Microclimate of Industrial Premises” (Table).

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Table. Optimal and permissible microclimate standards in the working zone of industrial premises

Season	Indicator		
	Air temperature, °C	Relative humidity, %	Air velocity, m/s
Warm period	Optimal 23-25^{0}C Permissible 22-30^{0}C	40-60	not more than 0,3
Cold period	Optimal 18-20^{0}C Permissible 17-23 ^{0}C	40 (not more than 75)	not more than 0,2

Lighting at workplaces must comply with hygienic requirements of KMK 2.01.05-98 “Natural and Artificial Lighting,” considering the category of visual work performed. It is recommended to use local fluorescent lamps above work surfaces during aluminum profile cutting. To reduce noise intensity at its source, damping gaskets made of rubber or fiber should be installed on impact surfaces. In large rooms, sound-absorbing barriers suspended above noisy equipment are effective. Workers in pressing sections should be provided with personal hearing protection such as earplugs (“Berushi”). To relieve psycho-emotional stress, psychological relaxation rooms should be arranged in each workshop. For prevention of occupational diseases and reduction of general morbidity, preliminary and periodic medical examinations must be organized according to Order No. 200 of the Ministry of Health of the Republic of Uzbekistan.

All workers must be provided with special clothing and personal protective equipment in accordance with “Standard Sectoral Regulations for the Free Issuance of Special Clothing, Special Footwear, and Other Personal Protective Equipment.” Workers in aluminum profile drying areas should be supplied with drinking facilities such as cooled green tea and carbonated water.

Conclusion

Based on the conducted research, a comprehensive set of preventive measures was developed to optimize working conditions and preserve the health of workers engaged in modern aluminum profile production.

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