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RESEARCHUNG THE METHOD OF DESIGNING SPECIAL CLOTHING FOR WORKERS OF METAL-WORKING ENTERPRISES

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ABSTRACT

Due to the increase in production volumes in the metallurgical and metalworking industries, the need for personal protective equipment for metallurgical workers has significantly increased. The development of special clothing is dealt with by the Central Scientific Research Institute of the Garment Industry, but scientific developments and experience were in limited demand. one state-owned enterprise that would be engaged in research and development of the creation of clothes.

KEYWORDS: *Working Conditions, Combustion Processes, Thermal Destruction Processes, and Metalworking Industries, Flame Retardant*.

INTRODUCTION

The objects of the study were the working conditions of workers in the metallurgical and metal working industries; existing special suits for metallurgists; a wide range of active flame retardant fabrics.

RESEARCH METHODS AND TOOLS

The work uses: the general methodology of a systematic approach to the design of work wear; methods of mathematical statistics and the theory of solving problems in the field of kinetics of fracture of materials; theory of combustion processes; methods and means of thermal destruction processes, high-speed and video filming of the flight of a molten metal drop; original methods and tools for studying a number of properties of materials and a package of clothing; computer programs Microsoft Word, Coat.

SCIENTIFIC NOVELTY OF THE WORK

The article proposes a new concept for designing work wear based on the development of the theoretical foundations of combustion processes and the methodology for designing new types of fire retardant materials from domestic raw materials that provide high performance properties of special clothing for workers in the metallurgical industry.

However, the interaction of incandescent metal sparks arising in the process of electric arc welding with a protective material differs significantly from the nature and essence of its interaction with the mass of molten metal. Differs from the action of a mass of molten metal In this case, the difference is that the processes of oxidation and gasification of the material proceed under different conditions. There is free access of air to the flame, and when the molten metal comes into contact with the surface of the material, the access of air to it is difficult and limited.

The general principles of forming the assortment of special clothing consist in its rapid growth based on the development of single products, which leads to duplication of developments, the lack of products for a specific functional purpose, the heterogeneity of products, etc. Norms for the issuance of personal protective equipment (PPE), in particular special clothing, in the form lists of working professions, do not provide an opportunity to objectively assess the degree of its compliance with real-life requirements.

Many natural and synthetic materials are known that can withstand high temperatures without decomposing, melting or igniting These include asbestos fabrics, fabrics made of carbon fibers, fabrics of silicon dioxide, fabrics of metallic, refractory titanium and various oxides. Their properties are known in detail. considered However, for various reasons, many of them cannot be used for clothes of metallurgists Some - due to high cost, others - scarcity, and others - due to excessively high surface density and low friction resistance The main reason is that all the listed materials have high adhesion to molten metal’s, which is inevitable leads to the destruction of their surface when removing metal particles after cooling. When creating materials for protective clothing for metallurgists, this important sign of destruction for some reason has always been ignored.

As can be seen from the data presented, the particle sizes of the reagents are commensurate with the sizes of the pores and through holes of the tissues under study and, therefore, can fully ensure the fulfillment of the above conditions. The working temperature of the ash and slag reagent is significantly higher than the temperature of molten copper and, consequently, meets the requirements for thermal stability. , then it is conditional and can change with a change in the moisture content and particle size The thermal conductivity of the reagents of the indicated density is very close to the thermal conductivity of the tissues under study Coating the front side of the silica fabric with an aluminum layer makes it possible to make the fabric as smooth as possible surface, which is one of the conditions for minimizing damage to the suit by drops of molten metal.

Studies of working conditions and the study of the existing range of materials for overalls at metallurgical enterprises have shown that the list of general industrial hazardous factors is much wider than the identified groups. Each function can be provided not by one type of material, but by a group of materials For example, protection functions against splashes of molten metal’s can be provided with fabric both natural and synthetic fibers in different composition options.

A necessary condition for the perfect organization of the assortment of products for workers in the metallurgical industry is the development of a system of principles and concepts related to the grouping of products by purpose, nomenclature and type.

Human performance directly depends on thermal conditions. Thus, an increase in the temperature of the environment by 1-2 "C above the permissible level leads to a decrease in labor productivity by 4-8%, and when the temperature reaches 30-32 * C, productivity decreases by 25-50%. during smelting work, such phenomena are unacceptable, since work in extreme conditions causes tension in the nervous system and a change in the emotional state of a person, and the severity of the work performed requires from a person of colossal health and work capacity Under the influence of heat in the human body, the functions of the neuroendocrine system, immunobiological reactivity change, and work capacity also decreases. A decrease in work capacity in this situation is unacceptable; therefore, constant measures are required to limit the time and intensity of heat! On the impact on the human body;

The nomenclature of indicators of corporate requirements for special clothing, specifications for special fabrics with a chemical fiber content of over 50%, include a number of indicators characterizing the protective properties of a fairly large group of general-purpose special clothing, including: specific surface electrical resistance, oil resistance, low resistance. At the same time, the control of quality indicators that determine the well-being of the worker during the shift (for example, air permeability, free formaldehyde content, specific surface electrical resistance, vapor permeability), lasting at least 6 hours a day, is no less important task. The indicator "specific surface electrical resistance", which performs both protective and hygienic functions, is one of the criteria for the electrical properties of textile materials.

In the course of scientific research, new provisions, conclusions and recommendations have been formed, the most significant of which are as follows:

-Theoretically substantiated the possibility of economic feasibility of using new composite materials that increase the operational reliability of overalls,

-A new approach to the process of designing special clothing has been developed with the use of theoretical and practical provisions on thermophysical phenomena at the boundary of environments that arise in the working conditions of metallurgists,

-The mechanism of interaction of the surface of workwear materials with the main harmful, damaging factors (OVPF) is disclosed,

-Developed classification signs of hazardous and harmful production factors affecting the metallurgist, allowing streamlining the structured description of various types of impacts on the worker,

-Geometric and algorithmic models for the formation of an assortment of special clothing have been developed, which ensure the functioning of an integral multi-level system for the design of protective suits,

-It was established theoretically and experimentally verified that in the process of contact between the molten metal and the surface of the material, processes of thermal destruction occur,

-The theoretical foundations for the design of composite materials for special clothing have been developed.

CONCLUSION

The technology for obtaining prototypes was tested in laboratory conditions. chemical spraying of aluminum on the front side of the fabric The use of an inorganic composition as a heat-resistant component for impregnating a silica fabric is justified by the fact that this creates conditions for minimal adhesion of molten metal droplets to the surface of the material, and when heated, the composition does not emit toxic gases and a large amount of smoke, in contrast to known organic impregnations, how the task is solved.

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