METHOD OF ENGINEERING MEN'S PROTECTIVE OVERALLS

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Abstract

The development of technology in the modern world directly affects a person's need for overalls. Every year the machines in the workshops are becoming more powerful, working at ever higher speeds. Not only careless work with industrial machines can lead to serious injuries, but also just being in the shop without protection, since such places are high-risk zones. To reduce the risk of industrial injury, enterprises oblige workers to use personal protective equipment.

The modern range of protective men's overalls is very diverse. Protection from harmful and dangerous factors for the health of an employee in the workplace is achieved by using innovative materials in clothing, its package, and design and technological solutions. Workwear differs both in the type of protection and in the class of protection.

The analysis of the modern market of men's protective overalls was carried out. The designed product will consist of one item of clothing, and will belong to protective clothing with fire protection of the first class.

The main idea of the project is to develop working men's clothing with enhanced ergonomic qualities that meets safety requirements and preferences of the target audience.

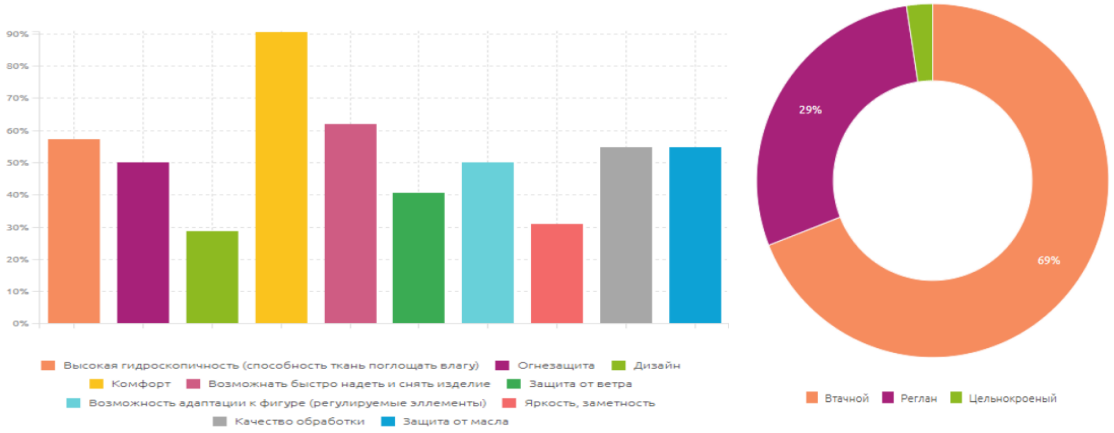
The process of creating the image included an analysis of the modern design of working men's overalls, as well as well-known images wearing overalls. A lot of important factor was the preference of consumers in choosing the cut, functional and decorative elements, as well as the color of the product.

Keywords: workwear, protective clothing, overalls

1. COLLECTING INFORMATION

To identify the most important characteristics of the designed product, a social survey was conducted in the "Questionnaire" program [1]. The survey was conducted among people working in the car service industry.

After analyzing the collected data, the first idea of the designed product was obtained. This will be a protective men's jumpsuit with increased comfort, a side zipper, with a classic sew-in sleeve, with a high hygroscopicity index and resistance to fire and oils. And all decorative elements must be flat, and not interfere with work. The survey results are shown in Figure 1.



Picture 1 – Results of consumer surveys

2. MATERIAL SELECTION

The choice of the material was based on the results of a consumer survey. Despite the fact that the most common materials in the manufacture of clothing with fire protection are aramid and arcelon fabrics, fabric with refractory impregnation MADEIRA FR #128-11 will be used as the main material. This material has much lower flowability and density in comparison with the above fabrics, therefore it will be easier to assemble the product. Also, the fabric has a natural base, therefore it will be more comfortable to interact with the worker's skin, and as for fire protection, it confidently holds for 10 seconds under the pressure of an open flame, which is suitable for the chosen goal, because this time is enough to have time to take off the inflamed jumpsuit.

The main parameter to the choice of accessories is that it can withstand breaking loads. Metal buttons, a tractor zipper can be selected as accessories.

As an assembly element, a thread with a core made of seated high–strength synthetic fiber having a shell made of natural cellulose fiber treated against ignition was selected.

3. DESIGN AND TECHNOLOGICAL SOLUTION

The jumpsuit is a single covering of the entire area of the human body, respectively, it is quite difficult to ensure the comfort of operation of the product. Given the high density of the fabric, the design will require special nodes that provide sufficient mobility in the most stressed areas. To determine these zones, a mock–up of the basic design of the jumpsuit was made and a fitting was made, after which it became clear that there was not enough freedom at the bottom of the back of the jumpsuit in the position when a person squats. The same thing happens with the upper part of the backrest when a person stretches his arms forward. In these zones, tense folds arise, pulling back and constraining movement.

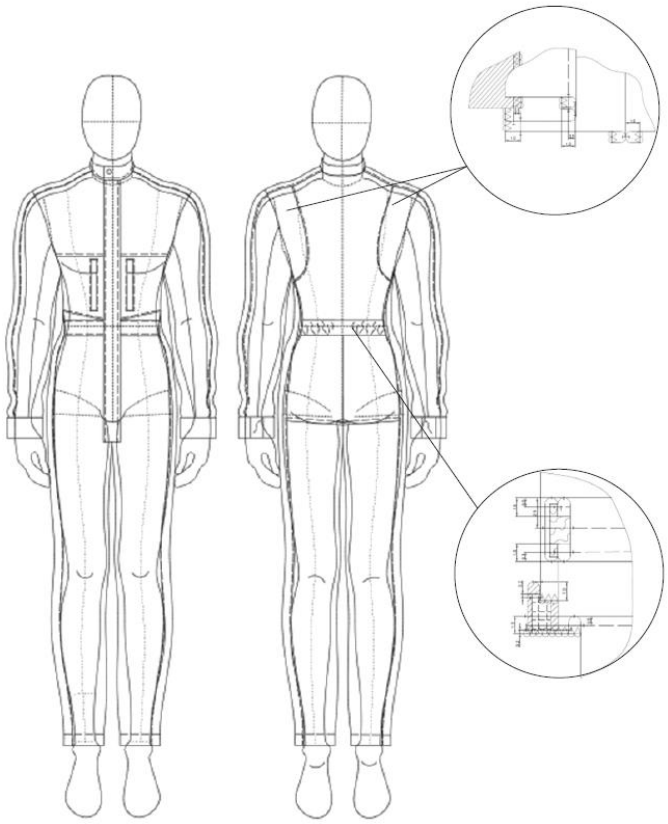
Solutions to this problem were found in the analysis of modern workwear. To increase the freedom in the armhole of the fitting sleeves, a special armhole knot of sports overalls for karting and leather motorcycle jackets – "kosukh" was taken as a basis. It was chosen for this node, as it provides high mobility of hands in products made of dense material with a two-seam fitting sleeve, which fully corresponds to the situation with the designed jumpsuit. This design is an extended armhole with an insert of the "accordion" type.

The problem with the freedom of the backrest was solved on the basis of patent No. RU 166148 U1 dated 09/15/2015 [2]. The document proposes to make the lower part of the backrest flyaway, which will be secured by the flyaway yoke of the upper part of the back half of the trousers. The yoke should be fastened on the front with buttons and a lock on the locking elastic belt.

After making a similar knot in the layout, a fitting was made, during which it was decided to insert an elastic material from the lower edge of the backrest to the yoke of the back half of the trousers. This is done so that the flying part of the backrest, after the worker gets up, returns to its original position. A technical sketch of a protective jumpsuit is shown in Figure 2.

4. CONCLUSION, DISCUSSION AND RECOMMENDATIONS

The developed version of the men's protective overalls meets the modern safety requirements of first-class fire-resistant clothing, as well as the ergonomic and aesthetic preferences of the target audience. Further work consists in the manufacture of product patterns, cutting and manufacturing of this product for market launch.



Picture 2 – Technical sketch of a jumpsuit with modular pockets of technological nodes

LIST OF SOURCES USED

1. https://ankt.cc/ypypCi

2. Patent № 166148 Russian Federation, IPC A41D13/00. Special-purpose overalls with improved ergonomic properties № 2015139223/12 application. 09/15/2015. publ. 11.20.2016 / Lebedeva Elena Olegovna