UDC 687

SYSTEMATIZATION OF TECHNOLOGICAL DEFECTS FOR QUALITY CONTROL OF PRODUCTS OF OUTSOURCING SEWING COMPANIES

СИСТЕМАТИЗАЦИЯ ТЕХНОЛОГИЧЕСКИХ ДЕФЕКТОВ ДЛЯ КОНТРОЛЯ КАЧЕСТВА ПРОДУКЦИИ АУТСОРСИНГОВЫХ ШВЕЙНЫХ ПРЕДПРИЯТИЙ

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ABSTRACT

GARMENTS, TECHNOLOGICAL DEFECTS, DATABASES, OUTSOURCING PRODUCTION

The stability of the garment production and the flexibility of the production cycle are affected by the seamless supply of textiles and accessories. The developed European fabric industry is focused on the luxury segment, and fast fashion products use not expensive materials produced in Asia, mainly in China. Therefore, despite the new geopolitical models, customers will still place the production of fast fashion clothing at outsourcing enterprises in Asia in the near future. The article describes the characteristics of modern outsourcing sewing production specializing in the manufacture of fast fashion clothing.

АННОТАЦИЯ

ОДЕЖДА, ТЕХНОЛОГИЧЕСКИЕ ДЕФЕКТЫ, БАЗЫ ДАННЫХ, АУТСОРСИНГОВОЕ ПРОИЗВОДСТВО

На устойчивость швейного производства и гибкость производственного цикла влияет стабильность поставок текстиля и комплектующих материалов. Развитая европейская индустрия тканей ориентирована на Luxury сегмент, а для изделий Fast Fashion используют недорогие материалы, произведенные в Азии, преимущественно в Китае. Поэтому, не смотря на новые геополитические модели, в ближайшее время заказчики по-прежнему будут размещать производство одежды быстрой моды на аутсорсинговых предприятиях Азии. В статье представле-

To improve the quality of products, digital control is proposed based on the use of databases and scales for assessing technological defects.

на характеристика современного аутсорсингового швейного производства, специализирующегося на изготовлении Fast Fashion одежды. Для повышения качества продукции предложен цифровой контроль, основанный на использовании баз данных и шкал оценки технологических дефектов.

The globalization of the world economy has contributed to the formation and development of outsourcing in the clothing industry as a universal tool for reducing the cost of products and increasing the competitiveness of companies. Outsourcing in the industry is based on the division of labor and the involvement of third-party, mainly foreign clothing companies into the production process. Since the 1960s, many of the world's leading brands in Europe and America have moved their clothing and footwear production to Asian countries (China, Bangladesh, Vietnam, Pakistan, and India) [1]. The investment and equipping of outsourcing companies with advanced technological equipment and a large number of cheap labor has allowed many companies to present large quantities of clothing products at affordable prices on the market. The advertising campaign of branded clothing, the scale of orders of production batches contributed to the saturation of consumer demand and economic growth in countries with outsourcing enterprises. According to the monitoring conducted by the European Chamber of Commerce, since 2016, the interest of top managers from the EU in placing orders at clothing enterprises in China has gradually faded [2]. The reason for this was an increase in the cost of labor and a decrease in the quality of clothing products [3]. Retailers have begun to shift production to less developed countries neighboring China. For example, the European retail chain H&M explained the relocation of business to Myanmar by the possibility of round-the-clock loading of production equipment and attracting low-skilled labor with a minimum wage.

The current level of technological development has brought a new direction to the clothing market – the presentation of industrial collections to consumers through social networks and online stores [4]. Multimedia retailers and products advertising over the Internet not only put pressure on traditional brands but also form a new production model – customization (modernization) of the basic catalog models, taking into account the customers' wishes and anthropomorphic characteristics [5]. In addition, the fashion market is filled with fast fashion

products, the six-month cycle of development of a new style has been replaced by a six-week one [6]. Cost-effective for the markets of Europe and the United States is the production of clothing of simple cut and simplified technology with a minimum share of manual labor [7]. Cooperation with Asian countries in the production of large quantities of clothing is becoming less profitable due to the increased expenses for delivering products to customers. Transporting goods by sea from Asia to Europe takes about 30 days on average, the cost of air transportation is continually increasing, which affects the final cost of products, and geopolitical tensions make customs clearance difficult. Market analysis has shown that most manufacturers who left the Chinese market and moved their production to other Asian countries are gradually returning to China due to insufficient resources in these countries.

To increase efficiency from the introduction of flexible fashion production at outsourcing firms with an increased frequency of changing new models, it is necessary to automate all stages of the production cycle as much as possible. The approach to the digitalization of product quality control will depend on the type of activity of the enterprise and the cycle of the production process. Research [6] has shown that the most common in outsourcing are cooperative clothing companies, whose business functions are focused on a single type of activity. Low qualification of personnel in small sewing enterprises leads to the introduction of simplified technology for manufacturing products of simple shapes from materials that are easy to process, usually from jersey fabric. The purpose of the study was to prepare initial information for digital quality control of finished clothing products produced in the conditions of outsourcing. For digital product quality control, software based on digital databases [8] and the principle of predicting possible technological defects of products that depend on model features are proposed. The experiment was conducted at the small outsourcing company in China on the example of a jersey T-shirt, as a popular product manufactured at the outsourcing companies in Asia. The product in question has a straight silhouette, short sleeves; the garment's length is to the hip line. The neck is processed with a basic material label. There is décor in n the center of the front. The décor is attached by a high-temperature press. Based on the model features and technological processing of the product, a forecast-classification of possible technological defects was developed.

Analysis of the processing technology showed that special sewing machines with a differential mechanism for moving the material (208, 1208 KL, etc.) were used to connect the parts. They perform three- or four-thread chain stitches that are highly stretchable with a strong connection. The flat-stitch machines of three-thread chain stitch with a sleeve platform (474 KL, GK1500-01Typical, etc.) were

used for processing the bottom of the product and the bottom of the sleeves. An automatic pneumatic thermopress with one or two work tables (WTJ 82x32 Aurora, etc.) was used to attach the décor to the front part. An iron table Cs-394K1+395/11 or SU with a steam iron up-3 were used for ironing.

Analysis of the working conditions in the small Chinese company showed that, due to the increased frequency of changes in the assortment, most of the employees are hired for temporary work with piecework or hourly wages. The workers are not motivated to make a high-quality product because the main task is to do a daily output. It is determined that the outsourcing company does not have an operating technology; the product is sewn by one or two employees. The introduction of automated quality control of manufacturing of clothing products at enterprises of this type will allow to track the causes of defects at the inter-operational stages and prevent the return of batches for rework.

Systematization of technological defects allowed to develop a range [8] for evaluating the quality of manufacturing products by a technical means of identification. The criticality of defects was evaluated in a ten-point range. The maximum score corresponds to the maximum degree of manifestation of the defect. The range allows predicting of the probability of defects, the possibility of their elimination at the finishing stage of the production.

The developed database allows to optimize the stage of confection of the model, improve the technological process, reduce material consumption, reduce labor costs, and completely or partially eliminate the corresponding defects in the manufacturing process of clothing. Based on the information obtained by automated control of production batches of clothing products through the database, the customer decides to accept the finished product or return it to the factory. Since outsourcing companies are located far from the customer, the proposed model of final inspection of finished products significantly reduces the time for processing information, preparing a report, and waiting for a response from the customer. It is experimentally determined that the time for decision-making can be reduced from one or two days to several minutes, which optimizes the delivery time of products to the final consumer. Given the complexity of the transport and logistics supply chain, where a shipment delay in a day can increase the delivery time by a week or two, prompt decision plays a vital role in ensuring that collections arrive in stores on time.

It is noteworthy that recently the demand for fashion clothing among consumers in Asia has been growing, which is reflected in the import-export balance in the industry – many Chinese manufacturers have increased their output of clothing products for the local market [3]. Therefore, the introduction of digital control at

the stages of manufacturing clothing products will fill the clothing market with quality products.

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