UDC 677.055

ANALYSIS OF TRANSPORTATION OBJECTS IN SEWING MANUFACTURING

K. Bilashov, M. Rubanka, Yu. Kovalov
Kyiv National University of Technologies and Design

The operation of a sewing manufacturing enterprise requires coordinated interaction between technological and transport-logistics flows, particularly during the movement of materials, semi-finished products, and finished products between work areas. To ensure high productivity, it is important to optimize the transportation system, minimize time losses during loading and reloading operations, and ensure the integrity and proper identification of transportation objects. Solving these tasks requires an understanding of the properties of the objects to be transported [1]. Given growing requirements for production efficiency, the objective of this study is to analyze types and characteristics of transportation objects in the sewing industry and to assess their impact on the organization of production and transportation processes. Transportation objects in sewing manufacturing are characterized by a wide range of physical and mechanical properties, dimensions, storage conditions, and transportation requirements. Taking into account stages of the production cycle, they can be classified into five main groups.

1. Fabrics and roll materials. These are the primary raw materials supplied to the enterprise in form of rolls weighing up to 60 kg and measuring up to 1600 mm in length. Typical examples include suiting fabrics (wool and half-woolen fabrics), shirt and blouse materials (cotton, viscose, and polyester), lining materials (satin, taffeta, non-woven), insulating materials (synthetic winterizer and thermofiber), and fusible interlinings (spunbond, dublerin, and non-woven fabric on an adhesive basis). For efficient organization of roll-material transportation, it is important to consider parameters of the rolls, including their mass, geometric dimensions, surface density, and other characteristics. Materials differ significantly in terms of surface density and roll mass, which affects the selection of transportation equipment, as well as storage and stacking methods. Wool and half-woolen fabric rolls have the greatest mass and therefore require transportation solutions with increased load capacity and protection against deformation. Lightweight materials, such as non-woven and spunbond, can be transported in large volumes while imposing minimal loads on the equipment. Special trolleys or rail systems are used for their transportation [2]. From a logistics perspective, these objects require careful handling to prevent deformation or material contamination.

2. Cut product components. After fabric spreading and cutting operations, individual components or bundles of components are transported and grouped according to sewing type, size, or model (front and back trouser panels, fronts, backs, sleeves, pockets, and small components such as cuffs, collars, and shoulder pads). Cut components are stacked and transported in rigid or flexible containers. A typical container is a plastic tray with smooth walls measuring 600 × 400 × 200 mm. Flexible packaging, such as fabric bags and polyethylene bags, is also used; however, it is less convenient for automated handling. A characteristic feature of this group of objects is their susceptibility to deformation, displacement, and loss of identification. Therefore, it is important to ensure that each bundle is properly labeled, the stacking height is limited, and the position of the components remains stable.

3. Sets of parts for assembly processing. At certain stages of production, components are assembled into sets for processing individual sewing units, such as pockets, waistbands, facings, and cuffs. For example, in jacket production, sets may include upper and lower collars, two patch pockets with flaps, as well as fasteners and loops [3]. The sets are placed in cassettes, boxes, or reusable containers equipped with labels. RFID tags or QR codes are used for automated inventory management and tracking movement of these sets.

4. Finished products and semi-finished products during finishing operations. After assembly of the main components, sewing proceeds to the stages of wet-heat treatment, finishing, and quality control. Both assembled sewings and partially completed products are transported at this stage. Examples include jackets without lining before final pressing, trousers before the installation of tapes or loops, and coats after preliminary wet-heat treatment. Metal hanging racks, roller trolleys, and rail-mounted overhead conveying systems are used to transport this group of objects [4]. These products are sensitive to mechanical impact; therefore, it is important to minimize number of contacts and ensure appropriate environmental conditions during transportation.

5. Finished products. The final transportation object is product ready for packaging and shipment. Typical examples include shirts folded into packages, suits placed on hangers in protective covers, and underwear packed in boxes or polymer packaging. Finished products are transported to the warehouse. To protect them from dust, moisture, and other contaminants, cardboard boxes, plastic containers with lids, strapped pallets, and specialized rails with protective transport wrapping are used.

Conclusions. Transportation objects in sewing manufacturing are highly diverse in terms of their shape, dimensions, and physical and mechanical properties. Efficient transportation depends on their proper classification according to dimensions, mass, strength, and resistance to loads. Particular attention should be paid to instability of mass center, load asymmetry, and material stiffness. The implementation of container-and-conveyor transportation systems at manufacturing enterprises makes it possible to reduce time losses associated with inter-operational movement and decrease the level of fabric damage. Standardization of transport containers and the development of flexible automated systems contribute to increased overall productivity and reduced production costs.

REFERENCES

1. K. Bilashov, Yu. Kovalov, L. Bilotska. Analysis of Transportation Objects in Sewing Manufacturing. Herald of Khmelnytskyi National University. Series: Technical Sciences, no. 355(4), 2025, pp. 22–26.

2. M. Rubanka, Yu. Kovalov, A. Rubanka. Innovative technologies in the production of sewing products: preparation department equipment. Technologies and Engineering, no. 4(15), 2023, pp. 38–52.

3. S. Bereznenko, O. Vodzinska, L. Bilotska, S. Donchenko, Fundamentals of Experimental and Preparatory-Cutting Production Technologies: Textbook. Kyiv: KNUTD, 2017, 171 p.

4. L. Khomenko, Sewing Manufacturing Equipment: Educational and Methodological Manual. - Uman: Publishing and Printing Center “Vizavi”, 2011, 132 p.