CUTTING ROOM SOFTWARE: ENHANCING EFFICIENCY IN GARMENT PRODUCTION

ARSOY, RAŞIT*

Kafkas University, Fine Art Faculty, Department of Textile and Fashion Design, 36000, Kars, Turkey

ABSTRACT

The rapid growth of the ready-to-wear industry has created a need for continuous improvement, along with the necessity to shorten production times and increase quality. The processes in this industry comprise a series of sequential activities carried out by machines and workers in a specific order. Particularly before cutting, checking model information is critically important. However, the various document formats used in the industry and the software employed to manage this data can complicate the work for personnel. In this context, there is a need for user-friendly software to enhance operational efficiency and minimize errors. This research aims to develop software focused on cutting processes. The developed software allows users to quickly and effectively access model and fabric information, measurement charts, and warehouse data, while simplifying complex processes. Additionally, its simple interface enables use without the need for special training and allows for the remote management of processes. As a result, the software aims to increase operational efficiency while reducing errors and workload.

KEYWORDS

Software; Cut Order Plan; Wastage; Depot.

INTRODUCTION

The rapid growth in the apparel industry has created a need for manufacturers to increase production speed, ensure product quality [4] [10], and reduce material waste [7] [17], particularly in the cutting process, leading to a demand for advanced approaches aimed at operational efficiency [20]. In this context, cutting, as a fundamental phase of the clothing production process, has a decisive impact on direct material usage, labor costs, and the quality of finished products [6] [24] [25].

Efficient cutting operations require the accurate and integrated management of technical drawings, model specifications, fabric details, measurement charts, and cut order plans (COP). However, this data is often stored in disconnected formats such as Excel sheets, PDFs, and JPEGs, and is delivered to the cutting room as physical files, which complicates efficient data sharing among departments.

These traditional methods can lead to inefficiencies, fabric waste, increased labor demands, and cost-increasing delays that jeopardize product standards, often relying on manual measurements, basic planning tools, and isolated data storage [18]. To overcome these issues, automation has emerged as a key solution for enhancing accuracy and efficiency [5] [12].

In particular, the use of computer-aided software in garment production allows for the optimization of sewing room operations, machinists, cycle times, and the order of processes. These software solutions have the capacity to identify potential problems and test various scenarios to enhance production efficiency [2]. Moreover, cutting optimization systems supported by advanced algorithms create automatic cutting plans that reduce costs, minimize errors, and increase overall management efficiency [22].

However, while some manufacturers prefer to use comprehensive production management software [3] [16], these systems often contain dense data and require extensive training for operators [1]. This complexity limits the ability to access and modify task-specific data quickly, particularly considering the needs of the cutting room. The lack of software specifically tailored for cutting rooms has further highlighted the need for automation solutions that cater to the unique requirements of this department.

Software designed exclusively for cutting room operations resolves these issues by enabling operators to quickly access technical data, fabric information, measurement and layout details, inventory updates, and order changes. Such a system not only reduces the likelihood of human error but also allows the cutting department to rapidly adapt to changing production demands. The software

* **Corresponding author:** Arsoy R., e-mail: *rasit.arsoy@kafkas.edu.tr*

contributes to an integrated structure of business processes by facilitating information connections among different departments. This enables rapid and effective communication of data across departments, allowing them to work in coordination rather than in isolation. This structural integrity enhances communication efficiency while simplifying access for all employees in every department.

This user-friendly, centrally managed data interface, accessible from any internet-connected device, reduces workforce requirements, increases productivity, and helps operators make timely, informed, and effective decisions. The use of software systems in cutting rooms not only provides better control over the production process but also contributes to significant improvements in quality and efficiency in the apparel industry by ensuring consistency and coherence in production.

MATERIAL AND METHOD

In this study, a system has been developed to model the use of software before and after the cutting process in the ready-to-wear industry. Through this system, technical information about models and fabrics, measurement charts, and COP can be viewed, warehouse data can be entered, and calculations for fabric waste can be made. The information conveyed to the cutting room is organized by the production planning department, and access to this data is provided through a touch monitor located in the cutting room via the developed software. This integrated data/information system supports cutting room management processes by strengthening interdepartmental coordination and contributes to the effective management of resource utilization in production processes. The necessary operations in the study were performed using the Microsoft Visual Studio C# programming language. The reason for selecting this language is its widespread use and compatibility with Windows.

Main Interface

The program named Ready- to-Wear Cutting Room Plan (RWCOPlan), shown in Figure 1, consists of three main sections: New, Open Folder, and Quit. The program provides access to product model and fabric information, measurement charts, and COP, allowing for the entry and tracking of warehouse data. Additionally, the program has the capability to perform calculations for fabric waste.

When the "New" section in the interface is clicked, a window opens for adding and calculating new product data, consisting of six stages: general model, fabric sample, COP, measurement chart, waste, and warehouse. In this section, product data entered by the user is calculated by the software. The "Open Folder" section is for loading previous data, while "Quit" is used to close the software.

Model Interface Section

In the Model section of the program, model information is entered into the system in the first step. At this stage, technical drawing information is also included in the system. The technical drawing of the garment is typically defined as a projection reflecting the correct proportions, lines, and silhouette details, often presented in a frontal or isometric view. These critical drawings convey the silhouette, structure, and design elements of the garment with clear and precise lines [15]. The cutting room staff can access the technical report of the model to be sewn, accurately understanding the product's proportions, stitching layout, finishing lines, and model details. A schematic of a new product model is shown in Figure 2.

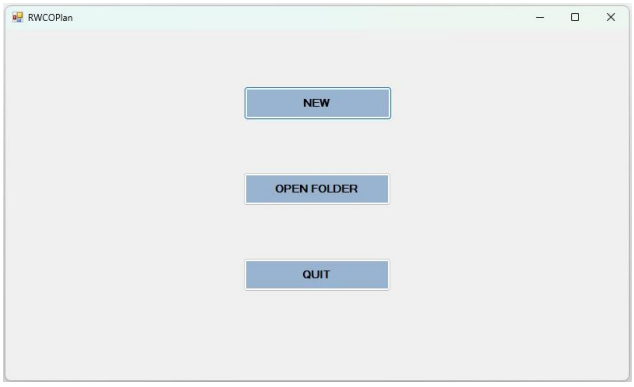

Figure 1. RWCOPlan programme's splash screen.

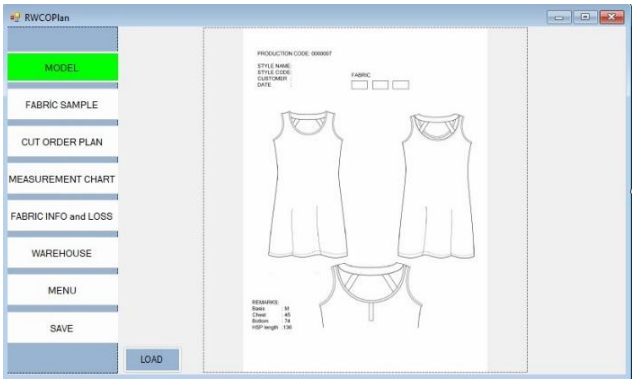

Figure 2. Technical drawing information interface page.

Figure 3. Fabric sample section of the interface.

Figure 4. Cut Order Plan section of the interface.

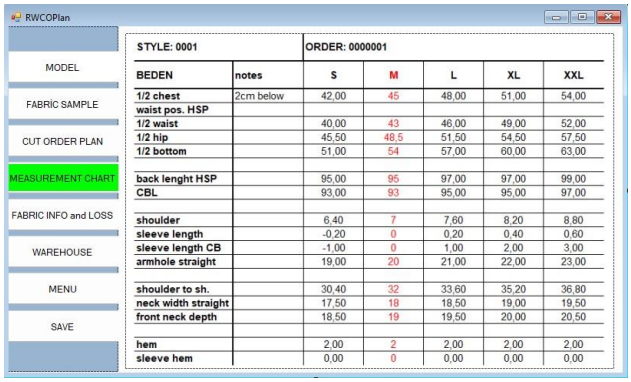

Figure 5. Measurement Chart section.

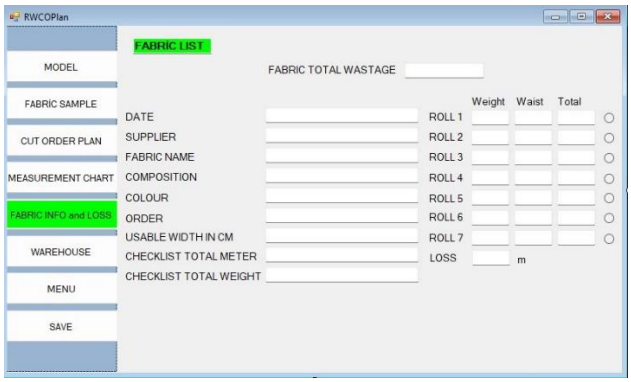

Figure 6. Fabric Info and Loss section.

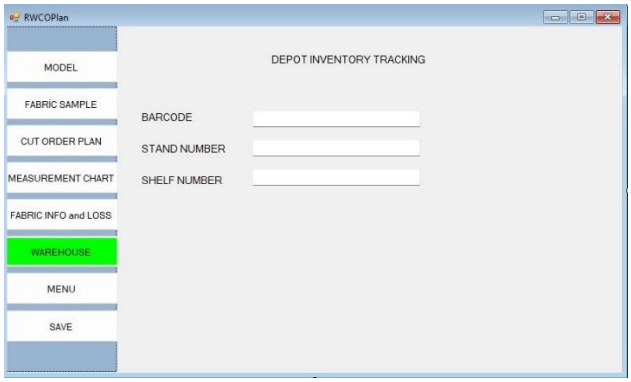

Figure 7. Warehouse section.

Fabric Sample Interface Section

At this stage, information regarding fabric visuals related to the product is entered into the system. The pattern information page is shown in Figure 3.

Cut Order Plan Interface Section

The spreading length, ply and layer counts, and size distribution for each layer can be tracked from the COP created in the software. This report includes information such as the amount of fabric in the warehouse, total usage needs, and consumption values. This allows the operator to make the correct fabric selection, check the cutting quantities for ply, and conduct pre-cut pattern checks. COP is one of the challenging aspects of garment production and can be significantly improved through automation. The primary goal of COP is to optimize fabric usage, which generally constitutes 50% of production costs [23]. COP involves the layout design of garment parts and is carried out considering variables such as fabric properties and production volume. The intuitive algorithms used in this process provide optimized cutting plans that reduce material waste, cutting time, and cost [14] [19]. Traditional COP methods are labor-intensive and prone to errors, potentially leading to unnecessary fabric waste. It is vital for the cutting room operator to verify COP data and compare it with the patterns on the fabric to minimize waste.

Measurement Chart Interface Section

In the next stage, measurement data is entered into the system. The measurement information from the technical file is shown in Figure 5. The creation of ready-to-wear products requires the formation of patterns according to standard sizing, measurement charts, and grading guidelines based on body measurements of the model [21]. The cutting room operator needs this data to verify pattern measurements on the fabric when necessary.

Fabric Info and Loss Interface Section

At this stage, fabric information is entered, and the weight information obtained from the rested fabric rolls is recorded in the system. The difference in meterage indicated on the technical documents of fabric rolls and the meterage after resting is identified by the cutting room staff [8]. After the data is entered, the system automatically calculates the actual meterage. The values of waste such as fabric errors during spreading and cutting, excess fabric pieces, roll ends, and scraps are entered by the operator, allowing the total fabric loss to be calculated [9] [11] [13].

Warehouse Interface Section

In the final stage, warehouse codes and numbers are entered to easily locate the fabric's position in the warehouse. Efficient use of the workspace is

essential for successful production. Organizing the shelves allows for easy access to fabric rolls and other materials, providing quick access during production. Software systems regulate inventory management by tracking the usage of fabric rolls in cutting rooms and ensure a workflow compatible with all production stages.

CONCLUSION

In this study, it is aimed to create a software that enables the management of the information of the ready-to-wear enterprise with the support of an integrated data / information system within the scope of cutting room management and at the same time provides inter-departmental control.

The cutting room management software developed in the study stands out as a powerful tool that enables the effective fulfilment of critical functions such as planning, raw material selection, waste management and monitoring of production activities in garment production. Unlike complex general-purpose production software, this software responds to the specific needs of cutting departments by offering a user-friendly and comprehensive interface. In particular, it allows operators to make quick adjustments by providing easy access to basic data such as cutting orders, fabric specifications and warehouse management. The simplicity and clarity of the interface is expected to not only increase productivity but also contribute to the operators to be more agile and responsive in the production process by minimising errors.

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