



DEVELOPMENT AND IMPLEMENTATION OF QUALITY CONTROL METHODS IN TEXTILE PRODUCTION

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ABSTRACT: The importance of planning, monitoring and controlling textile production determines the efficiency, quality and allocation of resources, so that it is compared to earlier procedures, which depended on raw material bases, production technologies and the involvement of people, while modern processes increasingly rely on information technologies and connected supply chains. The inclusion of sensors, RFID, tags, software and analytical programs allows to achieve qualitative indicators for the most acceptable textiles, which meet the demands of consumers as well as certified bodies for sustainable materials. The production of textiles is carried out in factories, but without standardized processes of material transfer, processing and control, it is not possible to achieve the set goals, among which the monitoring of raw materials, the use of resources, before, during the transformation and after the use of textiles, plays a significant role, considering the ecological perspective. The paper presents the analytical-methodical procedure of applying existing methods of textile quality control, along with scientific methods that suggest the use of modern technologies, software and tools.

Keywords: quality control, methods, modern technologies, testing, textiles.

RAZVOJ I IMPLEMENTACIJA METODA KONTROLE KVALITETA U PROIZVODNJI TEKSTILA

APSTRAKT: Važnost planiranja, praćenja i kontrolisanja proizvodnje tekstila uslovljava efikasnost, kvalitet i raspoređivanje resursa, tako da se upoređuje sa ranijim postupcima, koji su zavisili od sirovinskih baza, proizvodnih tehnologija i uključenosti ljudi, dok se u savremenim procesima sve više oslanja na informacione tehnologije i povezane lance snabdevanja. Uključenost senzora, RFID, tagova, softvera i analitičkih programa omogućava da se ostvare kvalitativni pokazatelji za najprihvatljiviji tekstil, koji odgovara zahtevima potrošača kao i sertifikovanih tela za održive materijale. Proizvodnja tekstila se obavlja u fabričkim pogonima, ali bez standardizovanih procesa prenosa materijala,



obrade i kontrole nije moguće postizanje zadatih ciljeva, među kojima značajnu ulogu ima praćenje sirovina, upotreba resursa, pre, u toku transformacije i nakon upotrebe tekstila, s obzirom na ekološku perspektivu. U radu se predstavlja analitičko-metodički postupak primene postojećih metoda kontrole kvaliteta tekstila, uz naučne metode kojima se predlaže korišćenje savremenih tehnologija, softvera i alata.

Ključne reči: kontrola kvaliteta, metode, savremene tehnologije, ispitivanje, tekstil.

1. INTRODUCTION

Production activity is complex because it consists of the preparation of production, the execution of production and the control of production. Production preparation includes technical preparations and organization for the normal course of the production process. The measure of preparation includes design, construction, innovation and reconstruction, as well as the specification of the technological process. The production itself should include the process of transformation of input elements into output elements, which includes the control of the receipt of raw materials, and finally the control of the output, i.e. the final product.

The quality of the product should meet the standards as well as the expectations of the user. Through control, defects are noticed, which were caused by the wrong elaboration of the technological process, wrong construction, with the wrong built tool or the use of materials. In the past, quality control was administrative and included the scope of work within the set technical characteristics, the method of control with the help of a measuring tool and the organization of an independent controller. The key position in the quality policy is in the development function. In order to achieve the highest possible level of product quality, the greatest value is the area of development, process planning and finally production. Although it is the most important development function, its costs amount to 10-20% of revenue, and the impact on profitability increases to 80-90%.

Production quality control planning involves defining key parameters that ensure that products meet the prescribed standards. Control planning includes determining the place and time of control (input raw materials, intermediate stages, finished product), choosing methods and instruments, defining the scope of control (sampling or 100% control) and the holder of control activities.

The development of quality control in production has evolved from passive verification of finished products to modern, automated systems. Today, this process focuses on error prevention and optimization. The key stages in development are verification (focus on end product inspection and scrap removal), statistical process control (SPC - monitoring of parameters during production using statistical methods), integrated management systems (TQM, ISO 9001 - quality is the concern of the entire organization), Industry 4.0 - application of digital technologies, artificial intelligence (AI) and computer vision for automated detection of errors in real time.



2. SPECIFICS OF TEXTILE PRODUCTION AND STANDARDIZATION

Textile products are made from various raw material sources, so fibers, yarn, thread or fabrics, are used to make finished products. Natural fibers have no major use, while man-made fibers dominate the nonwoven industry with a 90% share of use [1, 2, 3]. Wearable textiles include classic and fashionable items for intimate purposes, sports or protective equipment [4], and for these reasons are the basis for checking for harmful substances, colors and odors. Non-wearable textiles are used as bedding, tablecloths or pillows, which come into contact with the body, while technical textiles do not have a direct impact on humans. Textile production is a complex activity that causes harmful effects on the environment and then on humans. By 2030, the global textile industry is expected to use 50% more water, emit 63% more carbon dioxide and produce 62% more waste than in 2015. It is estimated that by 2050, with the current trend of textile production, population growth, and the discarding of non-recycled clothing, there will be major problems with solid textile waste [6].

All textile products that are manufactured must rely on strategic intentions to meet the needs and meet quality standards in the receipt of raw materials, processing and control of finished products. Textile products in the fashion industry have the ability to assess quality through the fineness of the material, applying standards for storage, ironing, maintenance, long-term use and potential recycling. In the control processes, the characteristics of bleaching agents, hand or machine washing at a defined temperature, ironing, selection of clothes by composition, duration of washing, length of drying, etc. are considered. Consumers want there to be uniform rules that apply to the maintenance of clothing or treatment with different chemicals. In order for textile products to be placed on the EU market, fibre composition labels are required. National authorities check the conformity of textile products with labels at the stages of the chain from the submission of the request for customs clearance to the storage of distributors in wholesalers or smaller retail chains.

The General Product Safety Regulation (GPSR) covers consumer products and mandates that safe products can be placed on the EU market. There are several standards related to textile products, such as EN 14682, EN 13209-1 and EN 13209-2, which relate to the safety of children's clothing, childcare products (frame carriers) and child care products (soft carrier). The Global Organic Textile Standard (GOTS) provides a credible guarantee to consumers from the collection of raw materials, environmentally and socially responsible production to labeling. The Fair-Trade Textile Standard includes an innovative approach to insurance to address weaknesses in the conformity audit model for the textile industry, with guaranteed fibres that are within the framework of the schemes for the environment, socio-economic criteria and the scheme management system. OEKO-TEX® STANDARD 100 is a label for textiles tested for harmful substances. ASTM Textile Standards provide specifications for the physical, mechanical, and chemical properties of textiles, woven fabrics, and woven fabrics, as well as natural and man-made fibers. ECO Textile - ECOMark® is the world's leading standard for the processing of textile products made from organic fibers. It defines environmental protection criteria throughout the organic textile



supply chain, respecting social criteria [7]. Consumers must be sure that the textile item is safe to use and meets the required standards.

3. THE NEED FOR MEASUREMENT AND CONTROL

Ensuring accurate measurement results implies timely organization of activities, but the basis is the correct measurement equipment. It is necessary to calibrate or verify the equipment at the selected time, so that it is monitored, before, during and after use. According to the assessment, the measuring equipment is adjusted, and the identification is enabled by the calibration status. In the end, protection is done so that the results are not wrong, and then it also protects against damage.

Manufacturing companies should plan and monitor processes, measurements and improvements to demonstrate product compliance, ensure the compliance of the quality management system, and continuously improve the effectiveness of the quality management system.

In order to improve the characteristics of the product, it is necessary to have reliable information, human resources that are trained, and know how to use methods for analysis and decision-making, there are programs that support BigData analytics in the use of modern methods and techniques of continuous improvement.

3.1 Monitoring product characteristics

In production, there is technical documentation, which provides insight into the level of quality and reliability of the product. When the product has the intended properties from the documentation, then the planned level of quality has been achieved. The ratio of the desired quality for the user and the one that is consistent with the manufacturer's projection depends on influential factors such as raw materials, means of work, method of work, production conditions and the human factor [8]. In the case of textile products, as an area that is variable due to trends in clothing, there must be a correspondence between the expected and actual characteristics of the material. As a raw material in textile products, it is necessary to test and assess quality at the entrance, because the transformation of a bad raw material will place a garment of poor quality.

Sometimes the same machine does not contribute to the production of an equally high-quality product, because it needs to be maintained. In dealing with technology, there are many methods of work, but companies need to find the most optimal methodology. The best effects in production are achieved in ambiently decorated spaces, halls with air conditioning, illuminated and safe, which as a condition of work contributes to satisfaction. In the textile industry, air humidity has a greater impact than in the production of Tetra Pak products. If the work is done in the morning, it can be of better quality compared to the work done at night or at the end of the week. Man has a specific attitude towards work, and his qualities affect the quality of work, production and all the mentioned groups of factors. Figure 1 shows a model of the operational phases of quality control, starting with the input control, all the way to the control of work equipment.

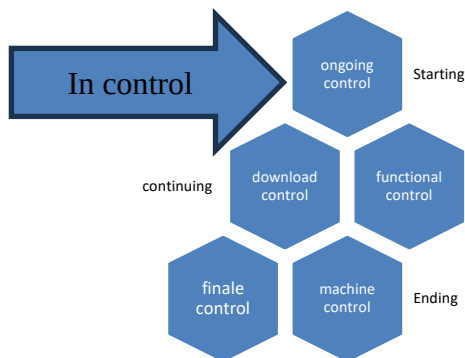


Figure 1: Model of Operational Phases for Quality Control

In complex production processes, there is a need for final control to take place when moving to the second technological stage. Some manufacturing industries have three processes, some five or ten, so each must have process quality control and final quality control. Final quality control is carried out in the case of checking the functionality of products, in expensive products, in products intended for human health and safety, as well as in the case of expected non-conformities or in individual production. Statistical control is performed in all other cases.

Quality is checked by internal or external auditors by focusing attention on the quality system or some segment of it. Verification includes regulations about what needs to be done, what is currently being done and what needs to be done.

Product quality assurance relies on records and documents of results. Verification through results refers to the design phase when models are calculated and made, simulations, as well as in the implementation phase when there are many measurement results of parts of assemblies, etc. Verification in relation to resources, used to strengthen qualities such as people, equipment and methods.

According to ISO 9004, there are tools for improving quality systems in numerical areas such as control charts, histograms, Pareto diagram (ABC) and scatter diagram. These tools are graphically represented to diagnose the problem and suggest an appropriate computational approach in the statistical diagnosis of the problem.

As in the technological world and the latest Industry 5.0, it is implied by the use of sustainable work methods and the application of BigData and RFID technologies, we recognize that the Japanese style of quality control is profiled with the achievement of all results with 100% effects. The new concept of quality in Japan consists of: 1) Kanban – visual record; 2) Hoshin-Kanri – policy management; 3) Kaizen – promotion.

In addition to these, there are also 5S (seiri-organization; seiton-orderliness; seiso-purity; seiketsu-standardization; Total Production Maintenance-TPM, Quality-Managed Circulars-QCC, Quality Function Development-QFD, Cause & Effect Diagram-CE, Just-in-time Production Management System.



The key stages of the implementation of quality control methods include:

1. Raw material control: Analysis of fibers, yarns and fabrics in laboratories (testing for color fastness, wear resistance and tear resistance).
2. Process control: Monitoring of production parameters (machine adjustment, control of thread tension and seam evenness) in order to detect defects in time.
3. Statistical Methods (SPC): The application of scientific and statistical methods for the analysis of samples at the various stages of garment making.
4. Final Inspection: A thorough check of the final garments against industry standards (e.g. AQL tables for an acceptable level of quality).

Upon receipt of purchased goods, there is quality control at the entrance that examines raw materials, semi-finished products, finished products and devices. After the input control, we move on to ongoing or inter-phase control that examines the quality during the manufacturing process. The final or control of the takeover is carried out after the completion of the technological phase of work. Functional control checks the functionality of the product in addition to assembly. Output quality control is the final check of the joining, packaging and shipping of finished products. Control of work equipment is important because of the production and exploitation of work equipment.

The tasks of quality control of the input material include all purchased raw materials, which requires their own laboratories or contracted relationships for testing. In the case of input materials, it is expected to control the quality of raw materials, materials, semi-finished products and finished parts coming from the side, testing of chemical composition, spectrometric or physical properties, testing by defettoscopic methods, quality testing under thermal and surface treatment, improvement of laboratory testing, cooperation with state authorities and health services, maintaining professional relationships with suppliers.

The tasks of production quality control are:

- quality control (QC) during the production of the product.
- control of the discipline of technological processing,
- timely notification of anomalies in production.
- control of the correct storage of finished products,
- QC of assembly,
- QC of completion, packaging and shipping,
- monitoring the level of quality of finished products,
- QC of means of operation and determination of the capabilities of machines,
- monitoring the quality of work resources and more.

4.1.1 Quality testing of raw materials for textiles and textile products

Textile fibers are tested by various methods, in relation to the adopted standards in the organization, as well as business strategies on the placement of goods on the global market. Measurement of inputs (raw materials) in the textile industry involves checking the quality and dimensions before the start of production. This prevents mistakes and waste. The basic parameters to be measured include the physical and chemical properties of the material. Laboratory devices and testing systems are used to check the most important parameters. The most important parameters are:



1. The fineness of the fibers, determined by the thickness of the strands. It is measured by precise weighing (mass per unit length) or acoustic methods.
2. The length of the fibers, affects the strength of the yarn. It is measured manually or with automatic optical instruments.
3. Strength and stretchability. It is measured by the tearing force on special dynamometers. It shows how durable the material is.
4. The moisture content of the raw material, as the textile fibers absorb water. It is measured by drying samples or electronic moisture meters.
5. Color fastness. It is checked how the raw material reacts to washing, light and friction.

The methods of measuring inputs in textile production are divided into laboratory (destructive and non-destructive) and process (line) methods, which are presented participatorily in Table 1. They ensure that the fibers, yarns or fabrics meet the standards before entering the plant.

Table 1: Test methods of fibers, yarns and fabrics, knitwear

Methods	Sub-method	Explanation
<i>Fiber tests</i>	Microscopy	Determination of the longitudinal shape and cross-section of fibers under a microscope to identify the composition.
	Gravimetry	Accurate measurement of the mass of the sample before and after drying to determine the actual moisture.
	Micronaire (air flow)	Measurement of the fineness of cotton fibers through the resistance to the passage of air into the compressed sample
	Photo-electro	The use of optical sensors to measure the length and length distribution of fibers, e.g. fibrograph
<i>Yarn tests</i>	Method of Winch and Scale	Winding a standard length of yarn on a winch and weighing to determine fineness
	Constant increment of force/length	Testing on dynamometers where the yarn is stretched to breaking
	Black table-visual method	Winding the yarn on a black backing to spot knots, thickenings, impurities
	Capacitive method (Uster test)	Passing the yarn through the measuring field of the capacitor to electronically register the unevenness of the mass
<i>Fabric and knitwear tests</i>	Cutting samples with a circular cutter	Sampling of the exact area (100 cm ²) and gram weighing to determine the surface mass (g/m ²)
	Optical Counting Method	Using a magnifying glass with a scale or digital drills to determine the density of wires
	Hydrostatic pressure method	Measurement of the resistance of materials to the penetration of water under pressure (in water-repellent and technical textiles).

4.1.2 Measurement of quality during the production of textile products

Methods of quality measurement in the production of textiles itself (during the process of processing and production of the finished product) focus on the early detection of defects, the stability of the machines and the control of the final characteristics of the product (Table 2). These methods combine visual, mechanical, automated, and statistical approaches.

Table 2: Methods of quality control of textiles during the process

Methods	Sub-method	Explanation
<i>In-process control</i>	Automated Optical Inspection (AIO)	High-resolution cameras and sensors are mounted on a loom or knitting machine. In real time, the material is scanned and the machine is stopped if there is a break in the wire, knot or hole.
	Electronic Tension Control	The tightness of the warp and weft due to weaving or yarn during knitting is constantly measured. Uniform tension prevents deformation of the structure of the textile.
	Control of finishing parameters (Online sensors)	Constant measurement of pH, chemical concentration, drying temperature and percentage of application during staining. Recognizing deviations allows for engagement and quick response.
<i>Laboratory quality control</i>	Wear resistance test (Martindale method)	The sample is subjected to circular friction under pressure to measure the resistance to clumping and abrasion
	Spectrophotometry (Measurement of Color Fastness and Difference)	The device measures the reflection of light from the surface of the fabric. A value of color deviation from the standard is obtained by computer, so that color melting and coloring are prevented.
	Dimensional Stability Test	Testing after a standardized wash-and-dry cycle (in %) to measure the shrinkage and expansion of the material.
	Tear and Puncture Test (Dynamometry)	Using the Elmendorf method and using a steel ball, the force required to split or puncture a material is measured.
<i>Final inspection and sorting</i>	Overview on light tables (Viewing tables)	Controllers manually release the fabric over an inclined backlit table. They are visually found and marked defects in weaving, dyed or with stains.
	Error scoring system (4-Point System)	ASTM D5430 standard that from 1-4 scores errors as penalty points depending on the length. If the linear meter exceeds the permissible number of points, the fabric receives a lower category (scrap or other class).



	Statistical quality control (SPC)	A control chart (X-bar and R charts) is used to track deviations in grams or roll width over time. The goal is to spot the awnings before the product comes out of the tolerance values.
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4.1.3 Measurement of quality after the production process

Post-production quality measurement methods (final control) focus on confirming that the finished product meets technical specifications, aesthetic requirements, and safety standards before it is packaged and delivered to the customer (Table 3). These methods are applied to finished material (meters) or to finished garments/textiles.

Table 3: Methods of quality control after the production of textile products

Methods	Sub-method	Explanation
<i>Visual methods and classification of errors</i>	Overview on control tables	Fabric or knitwear is passed over illuminated vertical or inclined tables. The controller visually identifies errors in weaving, dyeing, printing, or finishing.
	A system of scoring or ASTM D5430, 4-Point System	Each visual error is awarded penalty points (1 to 4) based on length or size. The total number of points per 100 square meters determines whether the material is "first class" or scrap.
	Inspection of finished garments	Checking the symmetry of seams, the correctness of zippers, buttons, labels and the cleanliness of the entire product on mannequins or tables
<i>Laboratory Performance Test Methods</i>	Dimensional stability (washing and drying method)	The exact change in dimensions (shrinkage or expansion) is measured as a percentage after a standardized wash (usually according to the ISO 6330 standard).
	Pilling and abrasion resistance (Martindale & Pilling Box)	The pattern of the finished textile is rubbed against a standard woolen fabric. The number of cycles until the threads are torn or the level of formation of annoying "lumps" (peeling) is measured.
	Strength of seams and materials	Dynamometers measure the force required to break the seam or the material itself at the point of connection.
<i>Methods of Verification of Stability and Chemical Safety</i>	Spectrophotometry (shade control)	Digital measurement of light reflection to ensure that there is no color deviation (ΔE) between different rolls or pieces from the same series.
	Color fastness	Testing of samples for rubbing (dry and wet by means of a <i>crometer</i>), on light (xenon lamps) and on sweat, so that paint does not pass on skin or other clothes.
	Environmental and chemical control (OEKO-TEX/REACH)	Chemical analysis for the presence of prohibited substances (formaldehyde, heavy metals, azo dyes) that can cause allergies or be toxic.

<i>Geometric and Functional Methods of Measurement</i>	Dimension Control (Measurement Board)	In the case of finished clothing, the key points (chest circumference, sleeve length, waist) are measured with stencil rulers and ribbons and compared with the permissible deviations (tolerances) from the technical documentation.
	Functionality testing	Checking specific properties such as water repellency (spray test), vapour permeability (material breathability) or flame resistance (in protective clothing).

In the case of a laboratory method of performance testing or a destructive method, it should be emphasized that samples are taken from the finished batch and tested under laboratory conditions.

6. MODERN TOOLS AND SOFTWARE SUPPORT FOR QUALITY CONTROL

In today's textile industry, there is no single software that performs all the measurements on the machines on its own. There are two groups of software solutions that cover all three processes (before, during, and after production):

1. specialized textile ecosystems that connect laboratory hardware and production sensors,
2. MES/QMS systems, as well as software for production and quality management.

Specialized textile software comes from the manufacturer of the measuring equipment and communicates directly with the measuring instruments in all three phases. Table 4 shows the most commonly used software that have demonstrated advantages in terms of features and scope of benefits.

Table 4: Overview of specialized software to support textile quality control

Software	Process	Explanation
<i>Uster Quality Expert (Uster Technologies)[10]</i>	Pre-production	Analyzes data from <i>Uster Tester</i> and <i>Uster Fiberget</i> devices. It measures the fineness, length, and moisture of fibers and yarns before they enter the process.
	During the production	It connects to yarn cleaners on machines (online sensors). It monitors tension, interruptions and detects errors in real time.
	After Production	Generates final reports on the quality and uniformity of the finished yarn or fabric, defining its class.
<i>BMSvision (Manufacturing Execution Systems for Textiles) [11]</i>	Pre-production	The <i>QualiMaster module</i> receives data on the quality of the received raw materials from the database and plans their allocation to the machines.
	During the production	Monitors the operation of looms and knitting machines in real time using sensors. Detects a

<i>Barco Textiles (Sedo Treepoint / Barco)[12]</i>		decrease in efficiency and technical errors in weaving.
	After Production	Software runs and manages automatic or manual viewing desks. Records error maps on rolls and automatically calculates points (4-Point System).
	Pre-production	Manages the formulations of dyes and chemicals in the laboratory and verifies the spectral data of the input material.
	During the production	Monitors the dyeing, finishing and drying processes via sensors on the machines (pH, temperature, time)).
	After Production	Integrated with spectrophotometers, the software measures the ΔE (color deviation) of the finished textile and performs a software inspection of the fabric.

The second group of software, which is textile MES and QMS packages of quality data management programs. They collect, digitize, and analyze quality data from all three processes through digital lists, tables, and integration with measuring devices (Table 5).

Table 5: Overview of the MES/QMS program to support textile quality control

Software	Process	Explanation
<i>Pivot88 (Leading cloud software) [13]</i>	Pre-production	Digital input of material sample testing results (lab-dips, shrinkage tests, raw material composition check).
	During the production	The <i>In-line Inspection</i> module allows controllers to enter sewing or weaving errors via the tablet on the lines, creating real-time Pareto charts.
	After Production	It covers Final Inspection and AQL (Acceptable Quality Limit) statistical sampling of finished garments prior to packaging.
<i>Inspectorio Sight [14]</i>	Pre-production	Verification of the quality of fabrics and materials before cutting through digital laboratory reports.
	During the production	Monitoring operations in the plant and early detection of repeated errors on the sewing lines.
	After Production	Automated creation of quality certificates, inspection of finished goods based on images and data entered through the application, and risk prediction for future orders using artificial intelligence (AI).

The choice of software implies a good knowledge of the problems that occur, as well as a strategic basis for solving problems in defects in the textile industry. If the company carries out activities in the field of spinning, weaving or knitting, then the suggestion is to use Uster Quality Expert or BMSvision. The reason is the direct connection to the means of operation and the hardware for measurement. For companies engaged in ready-to-wear and

sewing of finished products, due to the digitization of the work of controllers and quality monitoring through all phases in the supply chain, the Pivot88 or Inspectorio program is shown.

6.1 Textile Testing and Quality Control Software Example

Textile testing and quality control software makes it possible to perform quality control in the apparel industry by automating complex processes and providing real-time insights. Tools such as the Tekmon QMS (Figure 3) allow manufacturers to conduct fabric tests, monitor production quality, and easily generate compliance reports. The advantage of this software is that formula-based validation and trend analysis reports are created. Thus, they help identify recurring problems, while mobile offline functionality from a distance ensures continuous inspections.

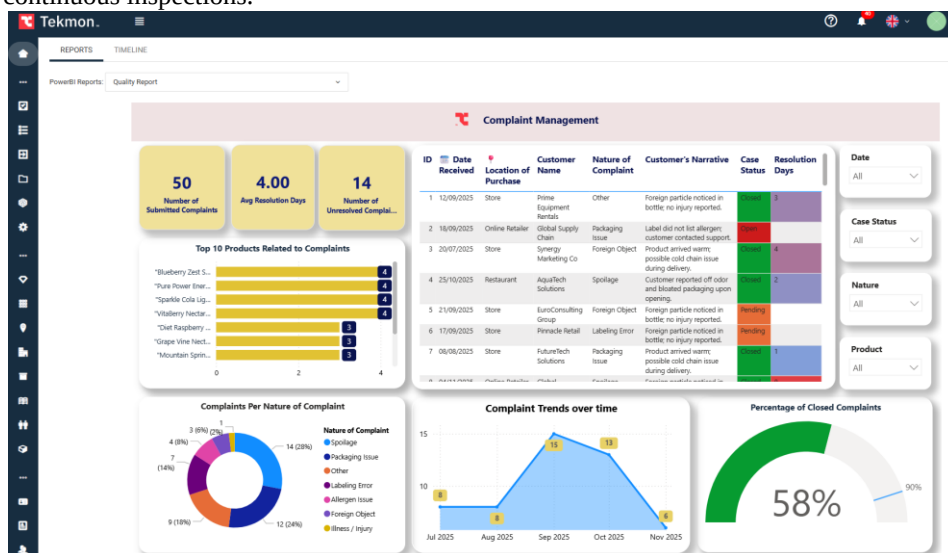


Figure 3. Layout of the Tekmon QMS package interface [15]

Manufacturers can streamline audits, manage supplier quality, resolve complaints, and ensure compliance with ease. With 15 key functionalities, Tekmon QMS - from real-time dashboards to customizable templates - empower businesses to improve quality, reduce costs, and maintain a competitive advantage.

7. CONCLUSION

The textile industry is a dynamic field in which quality control in the clothing industry is paramount. Ensuring high standards in clothing production not only meets customer expectations, but also complies with regulatory requirements and increases the brand's reputation. Quality control in the textile industry involves systematic processes to ensure



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that textile products, from raw materials to finished garments, meet predefined standards. In the context of quality control in the apparel industry, it includes testing, inspections and corrective actions to eliminate defects and maintain consistency. Unlike quality assurance, which focuses on process improvement, quality control confirms that products adhere to specifications.

The basic steps in the application of quality control include the control of raw materials (fiber, yarns and fabrics analysis), process control (machine adjustments, testing of thread tension and seam evenness) using statistical methods and final inspection (check of the final garments against industry standards).

The methods of measuring inputs in textile production are divided into laboratory (destructive and non-destructive) and process (line) methods, which provide fiber test, yarn test and Fabric and knitwear tests. The methods of quality control of textiles during the process are In-process control, Laboratory quality control and Final inspection and sorting with theirs sub-methods. The methods of quality control after the production of textile products are Visual methods and classification of errors, Laboratory Performance Test Methods, Methods of Verification of Stability and Chemical Safety, and Geometric and Functional Methods of Measurement.

In the apparel sector, quality control is vital to address issues such as fabric defects, sewing errors, or size inconsistencies. By integrating advanced tools and software, manufacturers can increase efficiency, reduce waste, and deliver superior products. The two groups of programs for the three control processes (before, during and after production) relate to specialized textile software, integrated throwing laboratory hardware and production sensors, and MES / QMS systems.

The most common software for apparel industry are Uster Quality Expert, BMSvision, and Barco Textiles in the first specialized group. In the second group of software are Pivot88 and Inspectoria Sight. We are present solution of Tekmon QMS, which allow manufacturers to conduct fabric tests, monitor production quality, and easily generate compliance reports.

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