

# The Impact of Quality Assurances and Quality Control in the Apparel Industry

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## ABSTRACT

Both quality assurance and quality control are intricate components of the garment industry's quality management. First of all, quality control is a component of quality assurance, not the other way around. Every stage of the manufacturing process, from designing through production and beyond, is enhanced by quality assurance. In general, quality control refers to inspecting things for quality after they have been made and divided into acceptable and unacceptable categories. Quality checks are done on clothing, accessories, and other textile products throughout preproduction, production, and a final inspection when the product is finished. A clothing company's program can be enhanced by quality assurance, which can help to boost customer satisfaction. Additionally, it also helps the companies to save time, money, and resources in production.

**Key Words :** Apparel Production, Clothing, Designing, Evaluation, Inspection, Quality Control, Quality Assurance

## INTRODUCTION

Quality is defined as usability, conformity and achievement of excellence. Although the concept of quality has existed since early times. Quality assurance and quality control are intricate areas in the apparel industry. First, quality assurance is not quality control, but quality control is part of quality assurance. Quality assurance is "the process of designing, manufacturing, evaluating, and evaluating products to determine if they meet the level of quality desired by the company in its target market" (Keist, 2015).

Quality assurance is the process of monitoring a product's quality from its initial design to its final sale. Generally, quality control is the process of assessing the quality of a product after it has been manufactured and divided into categories of acceptable and unacceptable. It is expensive for companies to adopt a quality assurance approach, as it only looks at the product from the perspective of quality control; however, quality is a broad term that can be used to describe the degree to which a product or service has desirable intangible or physical

characteristics (Kadolph, 2007, Das, 2009, Mehta, 2004).

Textile products like apparel, accessories, and other textile products are checked for quality before production, during production and after production, with a final check after the product is finished.

### Pre-production quality control phase:

In this stage, every part of the garment is tested before it is put together. From the fabric, to accessories, to closures, to interlinings, to sewing threads, and everything in between, every design element is tested before the garment is put together in the pre-production quality control phase to save time and money in the long run.

### Fabric:

Fabric quality plays an extremely important role in the overall quality of clothing and textile products. No matter how well a product has been designed or manufactured, if the fabric quality is poor, the consumer will not like the product. Fibres are the foundation of all

clothing and textile products, and it is essential to start with high-quality fibres whether they are natural, made, regenerated or synthetic. Fabric can also be evaluated for comfort, color-fastness and durability as mentioned below :

- **Comfort** : Comfort is all about the physical properties of materials and how they interact with the human body. It is concerned with how the functional environment of the body can be extended. This is done by examining the characteristics of the fabric, such as the length and elasticity of the fabric, the ability of the fabric to absorb and release heat, the absorbency of moisture, the repellency of water, the waterproofness of the material, the contact of the fabric with the skin, the drape of the fabric, and the permeability of air (Nayak *et al.*, 2009).
- **Color-fastness** : Color-fastness is an aspect of appearance retention that is related to the manner in which consumers use textile products. It is characterized by the presence of factors that can cause colorants to alter their color or to switch between different materials. The study of color-fastness is conducted by exposing the material to a variety of conditions, such as acids and alkalis, crocking, environmental conditions, frosting, heat, light, sweat, and water. Depending on the condition of the material, the analysis is conducted using one of three approaches: color change, color transfer, or a combination of color change and transfer (Kadolph, 2007).
- **Durability** : Durability is the assessment of the ability of different materials in a product to withstand various conditions. It is used to evaluate the strength, abrasion resistance, pilling resistance, snagging resistance, dimensional stability, and more. Fabric durability is measured by testing the warp and weft yarn of a fabric until it fails (Nayak and Padhye, 2014).

#### **Inspection of other accessories:**

The inspection of apparel accessories is conducted in accordance with the same procedures as those applied to other textile or apparel products. Fashion accessories encompass a variety of design elements, such as closures, interlining, sewing thread, elastic waistbands, and more. It is essential that these accessories meet the standards of care and maintenance that have been developed for

apparel (Nayak and Padhye, 2014).

- **Closures**: The strength and longevity of closures play a critical role in the construction of garments and in the satisfaction of consumers. Apparel and textile products can be closed with a variety of closures, including zippers, button closures, hook closures, snap closures, draw closures, hook and loop closures, and more.
- **Interlinings**: Interlinings, commonly referred to as interfacing, are non-woven fabrics that provide structural and body reinforcement to garments such as collars, button-plackets, waistbands and cuffs. They may be either fusible or sewn-on. Interlinings are designed to be durable and are essential for garment construction. A fusible interliner is evaluated for its ability to remain securely attached to the fashion fabric during wear and cleaning.
- **Sewing threads** : A yarn known as sewing thread is used to join two or more pieces of fabric together in order to produce apparel, accessories, and other textile-related products. The majority of the pressure and tension from movement are transferred to thread, thus it must be resilient and long-lasting. Construction (diameter and fineness), strength and elongation, shrinkage, twist, twist balance, and color are essential quality inspections for sewing threads (Nayak *et al.*, 2010).
- **Elastic waistband** : The elastic waistband is subjected to a fit and retention test. The fit of the waistband is determined by the amount of force required to stretch the elastic waistband approximately 2" wider than the hip measurement and return to the waist measurement.

A tensile testing machine can be used to measure the force, which is a simulation of the condition that exists when the garment is put into place. The durability of the waistband can be determined by stretching it by 50%, and measuring the force required to stretch it. The waistband is then laundered three times according to a specified standard, and the force is again measured to stretch it further by 50%. In both cases, the loss of force must be less than 10%, to be considered acceptable. If the loss of force exceeds 10%, then the elastic waistband is loose, as the elasticity

has been lost (Keist, 2015).

### **Quality control during production phase:**

The production of apparel products involves a variety of stages, each of which is essential for the overall quality of the product. A lack of attention to detail, particularly when sewing, can have a significant impact on other components or subsequent assembly. These stages include cutting, assembly, pressing, and other finishing processes, as well as final inspection. During each stage of apparel production, garments are evaluated for quality.

### ***Spreading and cutting defects:***

In order to avoid any errors during the spreading process, it is essential to adhere to the major parameters, such as the alignment of the ply, the tension of the ply, and the splicing of the ply. Additionally, the patterns must be aligned with the grain of the fabric, or else they may not be able to fit, hang or drape correctly.

Cutting is a critical step in the manufacturing process. Yards of fabric are laid out in multiple layers, with the marker positioned on top. It is essential to be precise in order to ensure that the pieces will fit together correctly during the assembling process. Deficiencies that can occur during the cutting process are frayed edges, ragged edges, misaligned notches, and inadequate drilling. The causes of frayed, fuzzy, serrated, scorched, or fused edges are due to a defective knife, a knife that is not sharp enough, or a knife operating at an excessive rate of speed. If the marker is incorrectly placed on top of a lay, the garment parts may be missing bits at the edge. Notches that are misaligned, too deep or shallow, angled or of the wrong type to match the fabric type are notch faults (Mehta, 1992).

### ***Defects in assembling:***

Once the pattern pieces are cut, they need to be put together. During the sewing process, there may be issues and defects with both the stitches and seams. Possible stitching defects may include needle harm, feed damage, skipping of stitches, malfunctioning of stitches, misaligned stitch density, balloon stitch, broken threads, blocked stitches, hangnails, and misaligned stitches. Seam defects may include a seam grin, a seam pucker, an irregular or misaligned width, irregular or misaligned shape, an insecure back-stitch, a twisted seam, a mismatched seam, additional material caught in a seam, a reversed garment part, an incorrect seam type used, a slip seam, and an

incorrect thread used (Mehta, 1992).

In addition to these errors, there may also be other errors related to the stitch and seam process, such as incorrect seam type or stitch choice, incorrect shade of thread chosen, oil spots or stains on the fabric during the sewing process, and blind stitching which may occur during the manufacturing process.

– ***Some other faults*** : Furthermore, there are several faults that can emerge during the assembling which are not related to the stitches and seams are discussed below:

- 1) Finished garment may not be in proper size due to incorrect patterns, inaccurate marking or cutting, shrinkage or stretch, etc.
- 2) There may be shade variation due to mixing of different batches
- 3) The accessories such as buttons, zippers are damaged during their attachment
- 4) Interlinings and linings are attached incorrectly, twisted, too tight, visual from the bottom of the garment.

### ***Defects during pressing and finishing:***

After making clothes, there are some last-minute things that need to be done. These last-minute things include pressing the garment to help set the seams and make sure it's the right shape. Things that can go wrong during the pressing and finishing process include burning the garment, getting water spots, changing the original color, flattening the surface or napping, creases that aren't properly formed, not having the fabric of the finished garment smooth, edges that are stretched or ripped, pockets that aren't smooth, not having the right shape, and getting shrinkage from the moisture and heat.

This stage of apparel production may also involve the addition of finishes. These may be either temporary or permanent, with temporary finishes necessitating reapplication and including starching and certain waterproofing finishes. Permanent finishes alter the chemical composition of the fibre, and cannot be altered back to its original state. A case in point is mercerization applied to cotton. The efficacy of finishes can be adversely affected during the cleaning process (Mehta, 1992).

### ***Final inspection:***

Once a product is made, it's tested to make sure it meets performance standards, looks good, fits right, and

is properly sized and fit. This can be done by measuring the garment's size or by putting it in a manikin or even a live model. It's also looked at visually to make sure there aren't any issues during the manufacturing process. That's why the stitching, joining, and accessories of the garment are checked.

There are a lot of things that can go wrong in the apparel industry, like fabric that's off-grain, bad or uneven stitching, plates or stripes that don't match up, stuff stuck in seams, and seams that are uneven along the hems.

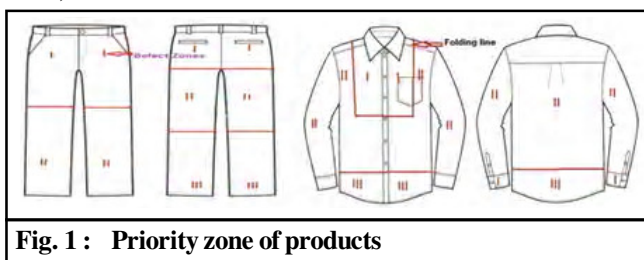
### Categorial defects of assessment:

In apparel industry, companies categorized all the defects on the basis of their quality requirements as critical, major, and minor defects.

- A **critical defect** results in a flaw that produces an unsafe or hazardous situation like a hole in a latex glove that would compromise the safety of the wearer.
- A **major defect** is a flaw that often contributes to product failure or lack of usability for a product. Examples of a major defect could be a broken zipper, broken stitches, or tears in the fabric.
- A **minor defect** is a flaw that does not reduce the usability of a product, but still deviates from standards and specifications. Examples of minor defects could be an unclipped thread, untrimmed seam allowance, or slubbed yarns in the fabric.

### Priority zone of products:

During the inspection process, certain components of a product are deemed to be more susceptible to defects than others. As there is no industry-wide standard, each company has its own definition of product zones and incorporates them into its specifications. Generally, the highest priority zone is identified as the zone that is most likely to be visible during a face-to-face conversation, while the interior of a garment is less critical in terms of permissible defects. Examples of priority zones include: - Zone I; Zone II; Zone III as shown in Fig. 1 (Keist, 2015).



**Fig. 1 : Priority zone of products**

### General requirements for final inspection:

The following points should be taken care for the final inspection.

- Work area must be well lighted and the measuring table should be large enough to hold the entire garment spread out flat and buttoned
- Auditors should establish a routine for inspecting garments in order to eliminate the possibility of overlooking an operation
- The auditor must be aware of the specifications of the garment
- Tacks, shading, long threads, raw edges, skip stitches, and other defects must be checked in the final audit
- Garments with major defects are to be marked by colored tape and set aside for repair
- Detailed records of any defects should be recorded and major defects must be properly recorded with their code
- Cuts that have not passed a final audit should not be loaded on the truck
- After inspection, the remainder of the garments in the box must be counted and checked for size
- The label on outside of the box must reflect what is inside the box
- Garments that have passed the inspection must be returned to the box in the same manner that they were in when they were taken out.

### Post-production quality control phase:

In the apparel industry, post-production quality assessment involves wear testing for real-world reactions to everyday conditions, as well as testing with simulation studies when a consumer's dependability is in doubt.

Wear testing, also referred to as product testing, involves the provision of products to a limited number of consumers. These consumers are contractually obligated to wear the product according to specified requirements and then identify any problems with the product prior to the production of an entire batch of garments.

Simulation study testing is analogous to wear testing; however, the consumer's safety may be at risk. Companies would conduct a simulation study on items such as helmets before manufacturing a complete production lot. Other aspects of post-production quality assessment include appearance retention and care.

**Appearance retention:**

The retention of the original appearance of a textile product during storage, application, and maintenance is referred to as appearance retention (Kadolph, 2007). Factors that must be taken into consideration in order to maintain the appearance of the product include the recovery of wrinkles from creases; susceptibility to insect, fungus, bacterial, and chemical transfer; and dye transfer (Nayak and Padhye, 2014).

**Care:**

Care is “the process(s) recommended to return a dirty item to clean and as close to new as possible” (Kadolph, 2007). It’s measured in terms of how quickly it changes color, how long it retains its appearance during cleaning, and how long it lasts. Color-fastness is measured by looking at color loss as well as color transfer during cleaning. Attention retention during cleaning is looking at how a product maintains its original appearance during cleaning. The care labels on a garment describe the proper methods of washing, dry-cleaning, ironing to care for it.

**Future trends:**

The textile industry is always up-to-date with the latest technologies. Traditionally, the textile and clothing industry has relied on trained inspectors to inspect fabrics. But when you’re dealing with a process that’s mainly done by people, mistakes are bound to happen. Plus, physically inspecting fabric can be tiring and repetitive, which can make your eyes tired. Now, textile companies are installing machines that check fabric before it’s shipped out. With automatic fabric inspection, you can inspect 100% of your fabric. Machines that check the widths of fabric run on light and cameras, looking for things like slubbed Yams, color differences, holes, and more. Additionally, they use complex algorithms to figure out how many defects there are in the fabric (Keist, 2015, Banumathi and Nasira, 2012, Chan *et al.*, 1998).

**Conclusion:**

Quality assurance and quality control are the crucial, distinctive, and challenging aspect of the textile, apparel, and accessories industries. From the initial design concept to the marketing and sales of a product, quality must be included into every part of that product. Plenty of organizations, including AATCC and ASTM, concentrate on developing standards for the industry. Based on their target market and an examination of those criteria,

individual businesses establish their own requirements. In the clothing industry, quality is evaluated during the pre-production, production, and post-production phases. In the pre-production phase, fabric, accessories, closures, interlinings, sewing threads, and other design elements are tested prior to the construction of garments. The production of apparel products includes cutting, assembling, pressing and other finishing procedures, and final inspection. At each step of the production phase, garments are assessed for quality. Post-production quality evaluation includes wear testing and testing with a simulation. Fabric inspection is now an automated process, and can find defects in fabrics quicker, more accurately, and save money in the long run. A clothing company’s program can be enhanced by quality assurance, which may additionally contribute to increased customer happiness.

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