

GARMENT MANUFACTURING PROCESS –DEFECTS

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ABSTRACT

The garment industry is facing a major challenge due to the presence of defects in their products, which negatively impacts productivity. This research highlights the importance of understanding different types of garment defects such as fabric defects, cutting & spreading defects, sewing defects, and finishing defects. It is crucial for those involved in the apparel industry to be aware of these defects to easily identify them and maintain required quality standards. The responsibility lies with the manufacturers to ensure that their products meet the required quality standards. Proper training, implementation of standard procedures, and use of technology can help reduce and eliminate defects, leading to improved productivity and customer satisfaction.

KEYWORDS: Seam puckering, stitch, trim, needle, garment.

1. INTRODUCTION:

In the garment industry, quality control is practiced right from the initial stage of sourcing raw materials to the stage of final finished garment. Garment manufacturing involves many varied operations and a very large number of operators. Operations, with some exceptions, are largely controlled by the operator and not machine-controlled. Fabric types and garment styles are being increasingly diversified in a great way. Methods, trimmings and machinery are being continual changed. All these facts may contribute to garment defects of varied type, size and intensity. This paper emphasizes on garment defects occurring in various garment manufacturing process.

2. DEFECT:

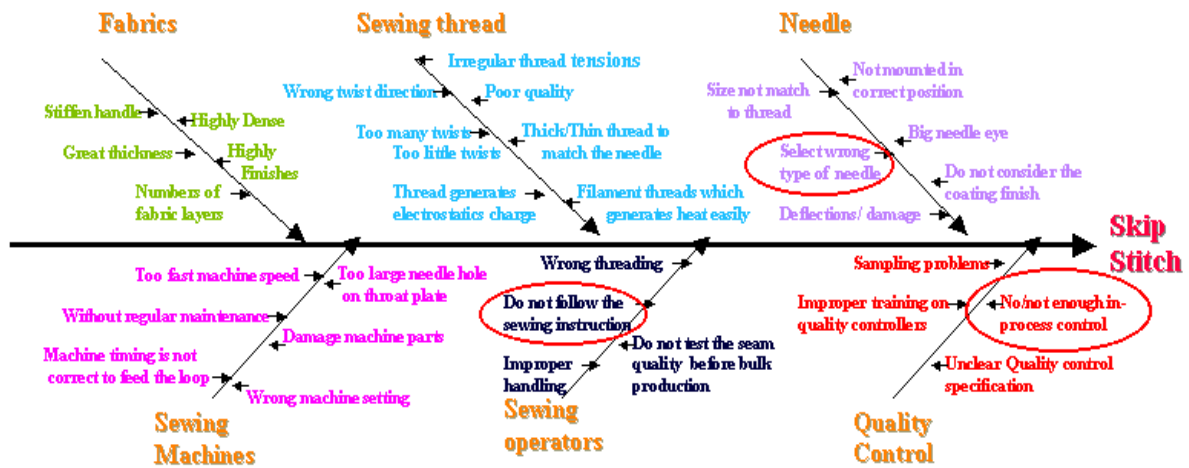


Fig No: 1 Cause and Defect Diagram

A fault that would reduce the expected performance of the fabric or if it appeared in a prominent position in an article made from the fabric, would readily be seen and rejected by a prospective purchaser.

3. CLASSIFICATION OF DEFECTS:

3.1. NATURE OF DEFECT-CRITICAL/MAJOR/MINOR:

- ❖ **Critical Defects:** Defect which could result in hazardous or unsafe condition for individuals using or maintaining the products as well as defects contriving legal regulations
- ❖ **Major Defects:** Defects which reduce the usability as solidity of product as well as obvious visual defects reducing sales value of the products
- ❖ **Minor Defects:** Defects that are unlikely to reduce the use of products but nevertheless may influence the sale

3.2. ORIGIN OF DEFECT-MANUFACTURING DEFECTS:

Broad classification of the Manufacturing defects as:

1. Pre-Production Processes (Pre-Sewing)
2. Production (Sewing)
3. Post Production Processes (Post Sewing)

4. PREPRODUCTION PROCESSES (PRE-SEWING):

1. Pattern Making & Grading
2. Marker making
3. Spreading
4. Marking
5. Cutting
6. Bundling & Ticketing
7. Fusing

4.1. DEFECTS IN MARKER MAKING PROCESS:



Fig No: 2 Marker Making Defects

- ❖ Size Mixing. Components not correctly labelled in marker.
- ❖ Patterns facing incorrect direction on napped fabrics.
- ❖ Patterns facing in different direction (either way) on a one-way fabric.
- ❖ Garment Components omitted during marker making
- ❖ Patterns misaligned with respect to the fabric grain.
- ❖ Line definition poor (e.g., too thick chalk, indistinctly printed line) leading to inaccurate cutting.
- ❖ Mismatched checks and stripes.

4.2. DEFECTS IN SPREADING PROCESS:



Fig No: 3 Spreading Defects

- ❖ Not enough plies to cover quantity of garments required. Plies misaligned, resulting in garment parts getting cut with bits missing in some plies at the edge of the spread.
- ❖ Narrow fabric, causes garment parts at the edge of the lay getting cut with bits missing. Incorrect tension of plies, i.e. fabric spread too tight or too loose. This will result in parts not fitting in sewing, and finished garments not meeting size tolerances.
- ❖ Not all plies facing in correct direction (whether 'one way' as with nap, or 'one way either way' as with some check designs). This happens when fabric is not spread face down, face up, or face to face as required.
- ❖ Unacceptable damages in the garment parts. Parts not fully included owing to splicing errors.
- ❖ Spread distorted by the attraction or repulsion of plies caused by excessive static electricity.
- ❖ Plies are not spread accurately one above another for cutting. This results in mismatching checks.

4.3. DEFECTS DUE TO IMPROPER CUTTING PROCESS:

- ❖ Inaccurate cutting - Distorted garment parts. Top and bottom plies of different size
- ❖ Notches- Misplaced, too deep, or omitted
- ❖ Drill marks- Misplaced not perpendicular through the spread.
- ❖ Frayed edges, fused edges- Caused by a faulty knife, not sharp enough, or rotating at too high a speed.
- ❖ Marker incorrectly positioned on top of spread.
- ❖ Slits opened inaccurately or omitted.

- ❖ Mixed plies resulting in Shaded Garment parts when assembled
- ❖ Mixed Size parts resulting in uneven appearance

4.4. DEFECTS IN BUNDLING AND TICKETING PROCESS:

- ❖ Numbering: Pasting of a number sticker on all the components of all the garments. The number acts as the identification of the component and the lot from which the component is cut.
- ❖ Bundling: Assembling the cut components in small batches of pre defined number as per the requirements of production system.
- ❖ Ticketing: The process of attaching a ticket to all the bundles that provides basic information about the bundle and the components in the bundle.

4.4.1. POINTS TO NOTE WHILE TICKETING:

- ❖ Numbering should be done on wrong side of fabric only.
- ❖ Numbering of a ply twice or skipping of a ply should not occur
- ❖ The information on bundle tickets must be accurate
- ❖ Care must be taken to avoid mixing of components of different sizes in a bundle.
- ❖ Sewn on Shade marking tickets falling off, damaging Fabric, omitted, misplaced or wrongly numbered
- ❖ Adhesive Shade marking tickets falling off or sticking too hard , omitted, misplaced, wrongly numbered
- ❖ Bundles or boxes not stacked in box, or rolled in correct order in bundles or rolled or folded too tightly causing creases
- ❖ Work tickets, coupon payment tickets or progress tickets omitted , misplaced or mixed makes both quality and quality control difficult

4.5. DEFECTS DUE TO IMPROPER FUSING PROCESS:

Discoloration after fusing:



Normal Fused fabrics



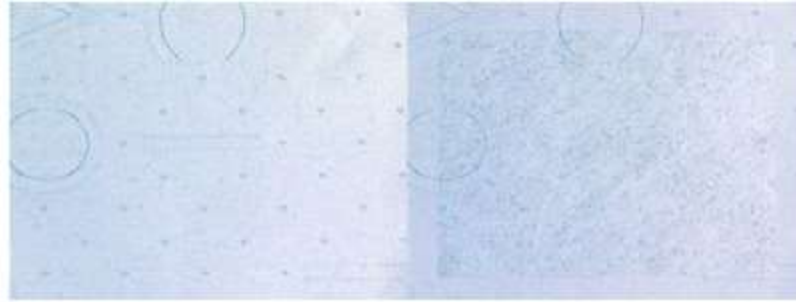
Discoloration after Fusing

Fig No: 4 Fusing Process

The temporary or permanent change in shade, color of a fabric caused by the action of heat on certain dyes during fusing.

4.5.1. STRIKE THROUGH:

Strike through means that the adhesive resin is appeared on the outer surface of the fabric being fused.



Ideal fusing in a fabric

Strike-through in a fabric

Fig No: 5 Strike through

4.5.2. STRIKE BACK:



Ideal Fusing

Strike Back

Fig No: 6 Strike Back

Strike back means the adhesive resin is appeared on the non-adhesive side of the fusible interlining after fusing.

4.5.3. SHINE / GLAZING AND DISCOLORATION



Fig No: 7 Discoloration

The temporary or permanent change in shade, color of a fabric caused by the action of heat on certain dyes during fusing.

4.5.4. FUSING DISTORTION:



Fig No: 8 Distortion

Fusing distortion means garment panels are distorted during the fusing process. This problem should be prevented as distorted garment panel after fusing cannot be corrected other than discarded as waste.

4.5.5. FUSING DELAMINATION:



Fig No: 9 (a). Bubbling and rippling



Fig No: 9 (b). Ideal Fusing

Fusing delaminating, sometimes appear as bubbling or rippling is the complete break down of bond between fusible interlining and the fabric surface. It is normally found after the garment has been dry-cleaned or washed.

5. DEFECTS IN PRODUCTION PROCESSES (SEWING):

5.1. STITCH DEFECTS:

- ❖ **Broken stitches-** Arising from too thick a thread for the needle, too thin a thread, needle heat, operator working unrhythmically, or too tight tension
- ❖ **Skipped stitches:**

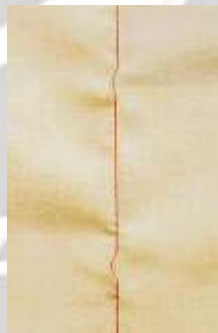


Fig No: 10 Skipped stitches

Due to the hook irregularly failing to pick up the loop of thread from a needle's eye.

5.2. SEAM GRINNING:

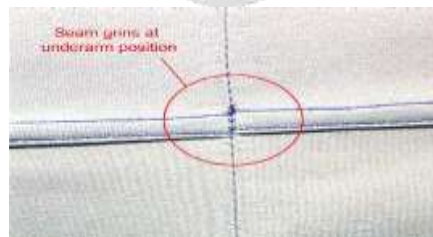


Fig No: 11. Seam Grins at underarm position

The Seam itself may open and produce a Gap between two pieces of fabric Arising from too loose a tension or too large stitch length or use of a wrong stitch type.

5.3. UNBALANCED STITCH:

Arising from unbalanced tension of needle thread and bobbin/looper thread.

5.4. BLIND STITCHING:



Fig No: 12 Stitches on face side

Showing on Face Side or not securely caught inside due to improper bender

5.5. STAGGERED STITCH:



Fig No: 13 Staggered stitch is like Zig Zag Stitch

Arising from faulty feed motion, incorrect needle, Incorrectly adjusted machine parts.

5.6. DEFECTS RELATED TO SEAMING:



Fig No: 13 Seam Defects

- ❖ **Irregular or incorrect shape of sewing line:** Badly Set Guide, Handling Error.
- ❖ **Twisted seams:** Caused by improper alignment of fabric parts, mismatched notches, components off grain
- ❖ **Sewing of Reversed Garment Parts:**



Reversed garment parts where part is sewn with the face outside opposite from specification

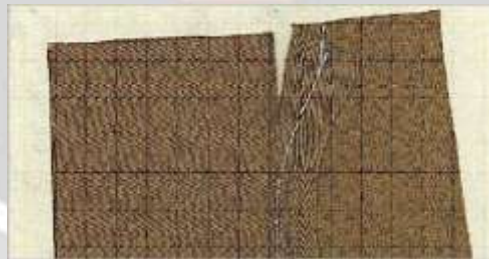
Fig No: 14 Reversed garment parts

(Where Part is sewn with the face outside opposite from specification)

Whole Garment has been assembled inside out- Operator's fault in handling the fabric parts during sewing

❖ Insecure back stitching:**Fig No: 15 Insecure back stitching**

When subsequent rows do not cover the first row of stitching- Manual error

❖ Uneven width of inlay:**Fig No: 16 Uneven Width**

Arising from bad handling by operator, incorrectly set guide, incorrectly set folder. May lead to visible raw edges, exposed notches, open seams etc.

5.7. LININGS TOO FULL, TOO TIGHT:



Fig No: 17. Bottom of the Garment

Showing below the bottom of the Garment, Twisted, Incorrectly placed and so on-Operators twisted or stretched extensively during Sewing.

5.8. UNEVEN STITCH DENSITY:



Fig No: 18. Uneven stitch Density

Operator causes the m/c to snatch and does not allow the m/c to control fabric feeding.

5.9. WRONG STITCH DENSITY:



Fig No: 19. Defects due to wrong Stitch density

Too high SPI give rise to Jamming and rupture of fabric, too low SPI give rise to weak seams and seam grinning.

❖ **Pleated seams :**



Fig No: 20. Pleated seams

Operator failing to ease out the fullness evenly

❖ **Mismatched seams:**



Fig No: 21. Mismatched Seams

Edges of the upper and lower fabric parts not matched during Sewing, Causing the Seams to shift

❖ **Loose Stitch/ Unbalanced Seam:**



Fig No: 22. Loose Stitch

Loose stitch occurs due to improper Sewing thread tension.

❖ **Extraneous part caught in the seam:**

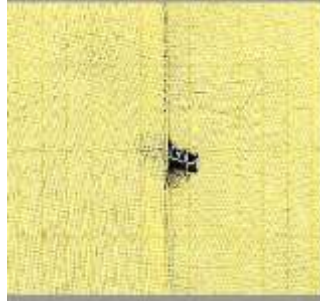


Fig No: 23. Handling Error

An unrelated part showing through the seam- Handling Error

❖ **Garment parts Cockling, Pleated, Twisted, Showing Bubbles:**



Fig No: 24. Defects due to Garment part Twisting

Handling Error, Usage of Wrong Interlining/Fusing under Improper conditions

❖ **Seam Slippage:**

Caused due to insufficient thread tension, low count, unbalanced weave and filament yarns. More common in seams running parallel to warp.



Fig No: 25. Seam Slippage

To reduce Seam Slippage:

- Usage of Fusible Interlinings,
- Lapped Seams, Twin needle
- Felled Seams Etc

5.10. Thread Breakage:

Caused due to improper m/c settings, Incorrect threading, excessive needle heat, incompatible needle, thread and fabric, damaged m/c parts. Serious implications in case of complex seams, using folders, multiple lines of stitching

5.11. Yarn Severance:

Breakage of fabric yarns while sewing (Serious problem in case of knits) Caused due to incorrect needle point, damaged needle, high m/c speed.

5.12. Seam Puckering:

Fig No: 26. Seam Puckering

Seam Pucker is the deformation or wrinkling of a fabric along a sewing line.

Main Causes:

1. Tension Pucker
2. Feed Pucker
3. Puckering due to Differential Shrinkage.

❖ Puckering due to Structural Jamming:

Fig No: 27. Structural Jamming

- Thick Thread
- Densely woven fabric
- Stitch type

Use of relatively thick needles/larger needles to finely woven/ knitted fabrics
High Stitch density: Too coarse threads with high friction.

Possible outcomes of Improper Needle Selection and setting:

- Skipped stitches
- Poor stitch uniformity
- Yarn severance
- Puckering
- Thread breakage

Needle Damage: Mechanical Damage due to usage of Large Needle for Sewing

Remedies:

- Use of Needle finishes (Nickel finish, Chrome finish, Teflon Coating)
- Fabric and Thread Lubricants
- Smaller Needle Sizes
- Needle Cooling devices

6. DEFECTS IN POST SEWING PROCESSES:

6.1. THREAD CUTTING:

- Use of proper cutting equipment
- Thread end of chain stitches, overlocks (if not back latched or crossed over) and button attach (if chain stitch is used) should not be cut too close to the seam end.
- Care should be taken to avoid cutting of fabric during thread cutting.

6.2. COMMON PROBLEMS OF PRESSING/ FINISHING:

- Water Spots/Stains
- Gloss/ Shine marks
- Flattened Nap
- Creases not correctly formed
- Stretched/ Wavy edges
- Garments not thoroughly dried
- Lining showing Pleats, Wrinkles, Creases etc.
- Silhouette of the garment not properly formed
- Shrinkage due to heat and moisture.

7. CONCLUSION:

Quality is ultimately a question of customer satisfaction. Good Quality increases the value of a product or service, establishes brand name, and builds up good reputation for the garment exporter, which in turn results into consumer satisfaction, high sales and foreign exchange for the country. Defect free product is only solution to attain the customer satisfaction (i.e.) Quality.

8. REFERENCES:

- [1]. Ahmed, M., Islam, T., & Ali, M. D. S. (2019). Study on different types of defects and their causes and remedies in garments industry. *J. Text. Eng. Fash. Technol*, 5(6), 300-304.
- [2]. Choudhary, A. K., Sikka, M. P., & Bansal, P. (2018). The study of sewing damage and defects in garments. *Research Journal of Textile and Apparel*.
- [3]. Tahiduzzaman, M., Rahman, M., Dey, S. K., & Kapuria, T. K. (2018). Minimization of sewing defects of an apparel industry in Bangladesh with 5S & PDCA. *American Journal of Industrial Engineering*, 5(1), 17-24.
- [4]. Lemma, N. (2019). Minimize defects of products to improve quality by statistical quality control tools in garment. *International Journal of Engineering Technology and Scientific Innovation*, 4(6), 297-311.
- [5]. Risteski, S., Srebrenkoska, V., & Maksimov, S. (2020). Defects detection in the first manufactured module: Ensuring errors flow in the garment manufacturing process. *Tekstilna industrija*, 68(2), 18-23.
- [6]. Dastoor, P. H., Radhakrishnaiah, P., Srinivasan, K., & Jayaraman, S. (1994). SDAS: a knowledge-based framework for analyzing defects in apparel manufacturing. *Journal of the Textile Institute*, 85(4), 542-560.
- [7]. Patil, N. S., Rajkumar, S. S., Chandurkar, P. W., & Kolte, P. P. (2017). Minimization of defects in garment during stitching. *International Journal on Textile Engineering and Processes*, 3(1), 24-29.
- [8]. Uddin, S. M., Hasan, R., & Hosen, S. (2014, December). Defects minimization through DMAIC methodology of Six Sigma. In *International Conference on Mechanical, Industrial and Energy Engineering, Khulna-Bangladesh*.
- [9]. Islam, M. M., Khan, A. M., & Khan, M. M. R. (2013). Minimization of Defects in the Sewing Section of Apparel Industry. *Research Journal of Management Sciences*
- [10]. Keist, C. N. (2015). Quality control and quality assurance in the apparel industry. In *Garment Manufacturing Technology* (pp. 405-426). Woodhead Publishing.
- [11]. Mridha, J. H., Hasan, S. M. M., Shahjalal, M., & Ahmed, F. (2019). Implementation of six sigma to minimize defects in sewing section of apparel industry in Bangladesh. *Gobal J Res Eng*, 19(3), 1-8.
- [12]. Ahmed, T., Acharjee, R. N., Rahim, M. A., Sikder, N., Akther, T., Khan, M. R., ... & Saha, A. (2013). An application of pareto analysis and cause-effect diagram for minimizing defect percentage in sewing section of a garment factory in Bangladesh. *International Journal of Modern Engineering Research (IJMER)*, 3(6), 3700-3715.

- [13]. Gopalakrishnan, P. (2020). Analysis of sewing defects and control measures for apparel industry. *International Journal of Polymer and Textile Engineering*, 7(2), 18-24.
- [14]. Syduzzaman, S., Rahman, M., Islam, M., Habib, A., & Sharif, A. (2014). Implementing total quality management approach in garments industry. *European Scientific Journal*, 10(34).

