Minimization of Defects in the Sewing Section of Apparel Industry

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Abstract
This article is inspired by many unavoidable issues in rejection of huge number of finished apparel products after shipment due to quality control failure in apparel manufacturing. The fast changing economic conditions, such as global competition, declining profit margin, customer demand for high quality product, product variety and reduced lead-time etc. play a major impact on apparel manufacturing industries. The demand for higher value at lower price is increasing and to survive, apparel manufacturers need to improve their operations through-producing right first time quality. This paper discusses the quality and productivity improvement in apparel manufacturing by minimizing reworks that usually occur in the production process. The application of this paper improves the process performance of the critical operational process, leading to better utilization of resources, decreases variations and maintains consistent quality of the process output. The outcome of this observation reflected that an industry may gain higher productivity and profitability with improved quality product by minimizing defects. It also minimizes cost and improves internal throughput time. A general overview over the development is given in this paper that suggests how to handle these issues and bring down rejection rate to minimum.

Keywords: Apparel Defects, Cost reduction, Productivity, Profitability, Product Quality, Reworks.

Introduction
As the global economic condition changing in a rapid motion, generally in an industry more focus is given on profit margin, customer demand for high quality product and improved productivity. In garment manufacturing, it is usual that there will be few rejected garments after shipment. Reasons are most of the manufacturers believed that garments are soft goods and non-repairable defect may occur due to low quality raw materials or faulty process or employee casual behavior. However, factory must have check points to control over this issue. There is no ready-made solution that can reduce rejection percentage overnight. Each order is unique. But this paper work suggests how to handle such problems and bring down rejection rate to minimum with quality production. As we see a lot of rejected garment after shipment, most of the organization termed these garments as rejected because those garments can’t be repaired by any means. Reworks in the garments industry is a common works that hampers the smooth production rate and focus poor quality products having an impact on overall factory economy. Minimization of reworks is a must in quality and productivity improvement. Reworks are a vital issue for poor quality product and low production rate. Reworks are the non productive activities focusing on any activity that customer are not willing to pay for. Non productive activities describe that the customer does not consider as adding value to his product. By reacting quicker in minimization of reworks to make a product as per customer demand with expected quality, the company can invest less money and more costs savings. Therefore, a study was carried out in the garment industry named Opex and Sinha Textile Group located at Mirpur, Dhaka, Bangladesh at sewing section to identify reworks so as to eliminate them for saving time, cost and improved product quality.

Problem Statement and Methodology
To be effective in defects and rejection reduction, it is essential to establish and maintain clear, complete and current written records of inspection and test procedures for each operation. These records should identify criteria for acceptance/rejection. In the Apparel Manufacturing Industry, main raw material is fabric; others are different types of trimming and accessories. Operational wastages in the Apparel manufacturing process are-top surface rework, printed label rework, sewing defects, pinhole rework, fabric defects, improper fly shape, and other reworks. To achieve the overall objective in minimizing defects and rejection of finished products it is needed to establish document and maintain a system capable of ensuring that products conform in total to standards specifications. This will be required at every stage of manufacture. Records must be maintained to give objective evidence that the specified requirements have been met. Also need to appoint a management representative preferably independent of other functions to be responsible to oversee the total control system and inspection at each stage of manufacture. The person appointed should have the necessary authority to execute any action related to achieving the desired standard of product. To be effective the system requires planned periodic review by senior management to ensure that its effectiveness is maintained. The general methodology followed to minimize defects rate is given in figure 1.
**Methodology approach in defects and reworks minimization**

1. **Step 1**: Review of the existing quality system in the company
2. **Step 2**: Identification of defects in the various departments by collecting data from old and present records
3. **Step 3**: Analysis of data collected in order to identify majorly occurring defects
4. **Step 4**: Categorization of defects as per different section
5. **Step 5**: Development of a model in Quality Inspection System
6. **Step 6**: Implementation of check sheets to capture defects in different departments
7. **Step 7**: Training on concepts of quality, usage of the collected data to analyze and solve quality issues
8. **Step 8**: Training personnel like QC’s, supervisors and checkers on filling in the format identify Cause & Effect
9. **Step 9**: Analysis of defects in the check sheets implemented in various dept. & devising suggestions to improve
10. **Step 10**: Spreading of Inline inspection to other lines
11. **Step 11**: Tracking of improvements and comparing them with previous situation in different departments
12. **Step 12**: Visual communication of performance
13. **Step 13**: If ok then maintain and establish the standard for ongoing production process.

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**Figure-1**

Review of factory existing Quality System

**Figure-2**

Review of Existing Quality System
Categorizations of Defects

Sewing Defects: These defects are usually caused by errors arising from wrong functioning of sewing machines.

Seaming defects: These defects are usually caused by errors arising from the interaction of the operator and machine in the handling of garment.

Placement Defects: These defects are usually caused by errors arising in marking and cutting as well as sewing operations in the sewing room or a combination of these

Fabric defects: These defects are caused by errors arising from the fabric processing like knitting and dyeing.

Embroidery defects: These defects are caused by errors arising from the embroidery processing of the garments.

Formats introduced in various departments
To carry out the observation and find out the defects we introduced different formats such as

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**Figure-3**
Defects category-wise D.H.U in the sewing department
### Table-1
Defect category-wise and percentage defectives in the sewing department

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<th>Slip stitch</th>
<th>Broken stitch</th>
<th>Miss matched sewing thread</th>
<th>Repling</th>
<th>Wrong Interlining placement</th>
<th>Packing</th>
<th>Improper Fly shape</th>
<th>Improper Rolling part</th>
<th>Teasing shining marks</th>
<th>Button Attachment defects</th>
<th>Uneven Fly shape</th>
<th>Uneven Top Stitch</th>
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### Results and Discussion

**Experimental results and discussions on defects reduction in sewing department:** Sewing percent defective reduced approximately to 80%. In finishing, stitching D.H.U. came down to approximately 8% from 16% as earlier, uncut thread D.H.U. came down to approximately 10% from 22% as earlier. Reworks increased the cost of the different work categories between 2% to 15%. However, some best practices to control defect generation within the factory were suggested as:

- Make the workplace clean – from fabric store to cutting to sewing to washing and finishing.
- Place quality control system in proper place. This refers to sufficient number of checkers, trained checkers, checkers making report while checking, analysis of reports and take action based on the quality check reports. Conduct training programs for the checkers on how to check piece correctly to capture defective pieces. Train personnel to make garment checking reports. Run quality awareness program for your employees. Quality standard must be understood by each employee and everybody have to work to meet quality goal. No low standard work should be accepted by the concerned department. In sewing line don’t allow operators to keep bundles open and each bundle must be completed before forwarding to the next. It will help you track missing pieces. It is usual experience that operators throw pieces under tables when they make mistakes or receive defective (incomplete) garments from previous operator. Nobody keeps track of those missing pieces until you found shortage of garments in finishing. Set standard operating procedures (SOP) for each task performed by your employees. SOP for quality control system for each department. Set audit teams to audit your quality system in a regular interval. These recommendations were suggested to the individual department. The defective percentage reduced after implementing the given suggestions is shown here below.
Recommended suggestions to reduce defects and reworks in sewing section: A manufacturer stays in business only as long as his product quality satisfies his customers at the price they are prepared to pay. Failure to maintain an adequate quality standard can therefore be disastrous. However, the suggestion recommended to sewing section of apparel industry to minimize defects and reworks are highlighted here- Prepare garment description with sketch/photograph. Strictly should follow the sample garment properties. During working procedure in the sewing line three quality controllers at in-line and two quality controllers at output table are strongly suggested to identify the causes and defects and to provide proper solution. Records of check list for inspection of accessories and packing material, records of swatch cards of approved accessories, records of production swatch, records of daily QC report, records of cutting problem report, records of inspection report during embroidery as well as others all records should be followed properly. Record all faults found at final inspection for immediate correction and to identify need for preventative action at a specific stage of production. Measure all relevant seam properties e.g. stitches per cm, extensibility, seam strength. Decide on sequence of assembly operations, decide on seams and threads to be used and check machine availability, consider alternatives if machines are not available. Check of finished garment. Examine for appearance and compare with sketch/photograph. Check all technical aspects for any fabric faults, sewing thread, seaming faults, etc. Record all faults found at final inspection for immediate correction and to identify need for preventative action at a specific stage of production. These recommendations were suggested to the individual department.

Conclusion

The suggestive tools developed in this article play a vital role and cover a series of aspects in minimizing defects and reworks in the sewing section of apparel industries by ensuring quality production. The importance of the textile industry in the economy of Bangladesh is very high. The explosive growth of the RMG industry in the country has not been enough supported by the growth of backward linkage facilities. So manufacturing the quality product is mandatory to sustain in this global competitive market. Quality is ultimately a question of customer satisfaction. Good quality increases the value of a product, 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. The perceived quality of a garment is the result of a number of aspects, which together help to achieve the desired level of satisfaction for the customer. However, we should bear in mind that 1% defective product for an organization is 100% defective for the customer who buys that defective product. In the long term, clothing with a high level of comfort and best quality finished product is preferred. Finally, a joint effort is highly expected from every related personnel in minimizing defects and reworks and hence to add value, enhance quality and provide the greater levels of service to customers through “Right first time, right on time, right every time.”

References

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