

## Enhancing Efficiency and Productivity of Garment Industry by Using Different Techniques

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### Abstract

In earlier days, the basic necessity of clothing was to cover and protect the body from climatic changes. But, today people became more solicitous about the comfort of wearing and also the durability of the garment. In a day, one want different wears at different times. Therefore, garment industry started thinking of application of modernization, various engineering tools and techniques in garment manufacturing for increasing the productivity & efficiency. This work focused on time study, visual management and work standards techniques for improving the productivity and quality. While conducting this study first identify the factors affecting on productivity and quality and by reducing these factors can easily achieve quality as well as the production in sewing line. By implementing the above stated tools the efficiency significantly increased by 8.07%.

**Keywords:** Efficiency, Garment Productivity, Work Environment, Time Study, Visual management.

### I. Introduction

Assembling apparel is arduous process since sewing line contains number of operations. Therefore working capacity frequently goes vary from person to person. The first step for improving the productivity and quality is to identify the factors affecting and by reducing these can easily achieve quality as well as the production in sewing line. As we know the economic condition changing very fast it becomes more important to focus on initial investment as high competition in the industrial area [1]. Productivity is evaluated by achievement toward established goals based on relationships between inputs and outputs of industry [2]. The performance of an operational plan for enhancing efficiency was understood by a mathematical analysis. Since, on shop floor, there may be hundreds of machines, employees and thousands of bundle subassemblies all simultaneously active. The manager is responsible for optimizing throughput and making use of employee and machine and keeping the work in progress. Failure mode and effects analysis (FMEA) technique is one of the effective tools which can helps for prevention, identification, control and elimination of possible errors occurred in Apparel industry. This can be implemented by collecting the data from apparel industry and implemented by FMEA and then, improvability of production efficiency is analyzed by using simulation-based optimization technique. This technique show drastically decrease in product defects, rework, and total production cost in garment industry [3]. Time study is the solid tool used for balancing the sewing line as well as solving the bottlenecks in apparel industry [4]. An assembly line is a censorious job which is joint together by a transport mechanism and given to a set of workstations by specifying how the assembling process flows from one work station to another [5]. The apparel industry is recognized for buyer-driven industry, so the apparel production make more extreme force by global competitive market. To remain alive in this competitive world the industry should work more efficient and competent way [6]. Apparel industry is divided into number of processes with different operations. An operation is one of the steps in a process sequence which must be completed to convert materials into a finished garment such as cutting, sewing and finishing a garment, component or style [7]. Skilled workers are required for high production rate. Accurate production method and processes, proper training and supervision are essential to achieve the optimum improvements on productivity [8, 9]. Time study is a very effective tool in improving the existing situations and enhancing the productivity in sewing line [10]. Work study and work measurement facilitates to the user to augment their performance during the manufacturing operations. After the introduction of new Textile Policy of removing the apparel industry from the small scale industry list, drastic change found of industry in the competitive market. Since efficiency and productivity are the solid tool in enhancing the competitiveness of any firm [11]. Industrial Engineering is another factor in garment industry to upgrade work nature and work method. The use of I E (Industrial Engineering) techniques in apparel unit like method engineering, work study, capacity study, line plan and other operations management systems are ultimately leads the industry to timely delivery of garments with high profit. By implementing this technique operation efficiency is significantly improved [12]. As per customer demand and market trend the clothing enterprises have gone through rapid changes in transitional processes and basically due to which industry face three challenges: the instability of the trading environment, changing currency exchange rates and an increasing energy rate. Now in apparel industry new strategies have been developed, such as focusing on quality instead of quantity [13, 14, and 15]. A smart inspection system, comprising three components, namely a smart hanger, a stitching-workmanship defect classification unit as well as a shade variation detection unit, is introduced for the textile industry [16]. There is a wide scope to improve the productivity of garment industry with existing industry set up by improving the flap design. By Conventional flap design only one pocket flap can be done, but with change in flap design, the double flap can be produced at less time along with minimizing

the waste in the flap manufacturing [17]. Line balancing is the key factor for enhancing efficiency & productivity is the balancing of production line, or any assembly line. The main objective is to give out the task over the each work station so that idle time of labor of machine can be minimized [18, 19].

In present study T-shirt and Pant was analyzed and sewing line was visited several times for realizing the actual production scenario. In this study techniques like time study, visual management and work standards were used for enhancing the productivity & efficiency. The actual technology of a sewing system is only one factor in achieving higher productivity. Mass-customization (MC) is a hybrid of mass production and customization which is a greater solution for problems in garment industry and correlated with high level of productivity [20].

## II. Material and Method

The specification of the material selected for proposed work is shown in table no. 1.

**Table No. 1: Fabric Specification**

Fabric Type	Waffle (Plain Weft knitted)
Style	T-Shirt & Pant
Material	Polyester / Cotton
GSM	185

## III. Work Methodology

There are various types of techniques in work environment to decide the time required for performing single operation and total output given by each operator in a specified period of time. These techniques commonly implemented on shop floor are time and motion study, work study, allotted target to each operator, used past performance record and method adopted to produce work [11]. It gives approximate time to do a skillful work.

In present study following three work measurement techniques were used.

### 1. Visual management

This type of management is work on giving the current scenario details to workers and management persons in the form of target of the various performed operations as well as various work pieces in a clearly visible manner [12].

### 2. Work standard

Work standards identify the best way of doing a job and it consists of set of documented policies, rules, directives and procedures fixed by the management for all major operations to enable employees to perform their jobs without mistakes and to enable management to minimize variations in output, quality, work-in-progress and cost. Three components of standardized work are take time study, work sequence and standard work-in-progress. The significant steps in implementing work standards are, identifying the issues in the running process, making corrective actions for improve the process, and implement the process and sustain the process [13]. Standard minute value (SAM) is the standard time, to accomplish any given task by using best possible work methodology at standard level of performance. [8]

### 3. Time study

The burning issue in front of apparel manufacturers and management is to produce quality garment as per customer demand at minimum time and cost in efficient way [15].

In time study, each operator's capacity for each operation is measured by Standard Minute Value (SMV). The random sampling is used for this analysis [14].

15 days' time study was taken on sewing floor department to stimulate the problems on shop floor during stitching. For this study we have used stop watch to measure the performance of each operator. Time required by each operator for Men's T- Shirt was recorded. Also noted name of the operators, different machine attachment used and type of machine used to perform operation. Then from cycle time standard Allowed Minute (SAM), production per hour was calculated. For higher production more balance line was arranged. For more lengthy operation we have arrange helper, for unskilled operators provide training facility for performing smooth operations. The work is also distributed between operators if the work load was increased on one operator. In this way maximum utilization of labor work increases their productivity efficiency which shows more balance line with higher productivity and quality.

## IV. Results & Discussion

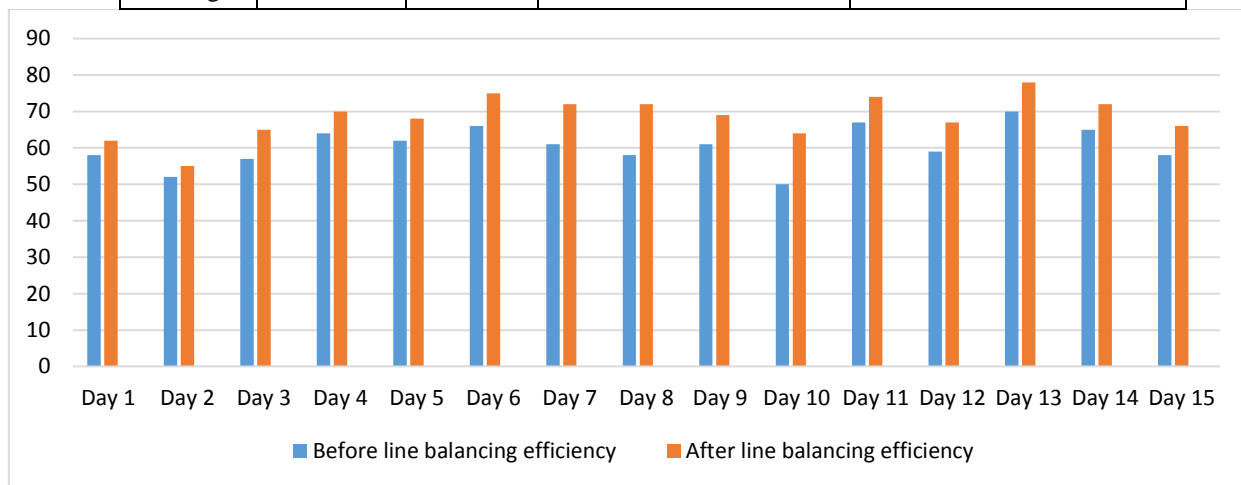
The Table 2 and Graph 1 delineate the line efficiency of 60.53% before taking any corrective actions in sewing line. Different measures of final results of assembly line balance are presented and final conclusions are given. This least line efficiency results found due to

1. Unavailability of maintenance operator during required time,
2. Operator took much more time to cuff folding operation,
3. Operator waste his production time to collect the thread waste and

4. The sequence of machine operation in such a way that cuff joint and sleeve attach having two and three machines respectively but for next operations like bottom attach and tucking operation have single machine in line therefore it reduced operation efficiency.

**Table No. 2 Line efficiency before and after taking corrective action**

Day	Line no.	SAM	Before balancing line Efficiency %	After balancing line Efficiency %
1	13	4.3	58	62
2	13	4.3	52	55
3	13	4.3	57	65
4	13	4.3	64	70
5	13	4.3	62	68
6	13	4.3	66	75
7	13	4.3	61	72
8	13	4.3	58	72
9	13	4.3	61	69
10	13	4.3	50	64
11	13	4.3	67	74
12	13	4.3	59	67
13	13	4.3	70	78
14	13	4.3	65	72
15	13	4.3	58	66
Average			60.53	68.60



**Graph no. 1 Line efficiency before and after taking corrective action**

By implementing following corrective actions, the efficiency significantly raised by 8.07%.

- Create awareness about the importance of maintenance work among the workers and sincerity to follow the maintenance schedule,
- Regularly checked maintenance work whether it is properly done or not by supervisor,
- One operator appointed for cuff folding operation due to that time can be save,
- One poly-bag attached at each sewing machine to collect thread waste, and
- Increased one bottom attached machine and also increased one tucking machine and reduced one machines of cuff joint and sleeve attached.

**V. Conclusion**

It is challenging work to find out the thrust areas in garment unit which affect the garment quality and productivity. This project work deals with shop floor problems based on the practical experimental result performed. During study it is

observed time and motion study, effective visual management system, supervision & adopted standard work procedure, motivation to operator for good work. All these tricks help for better productivity and quality in apparel industry with higher quality as per fashion trend. By better utilization of man, machine, material and method shows high production rate. By adopting proper quality tools, it is possible to point out the current status and subsequently analyze to achieve better target. Higher value of line efficiency indicates that the line has the approximately equal cycle time between operators along the line. Besides that, the workload between operators is also distributed equally which helps to achieve the target output without having overtime. The line efficiency is increased by applying time study and line balancing techniques by 8.07%.

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