

Faculty of Engineering Department of Textile Engineering

Study on Capacity Study to Find Bottleneck Problem with Probable Solution

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Study on Capacity Study to Find Bottleneck Problem with Probable Solution

LETTER OF APPROVAL

To

The Head

Department of Textile Engineering

Daffodil International University

Daffodil Smart City, Ashulia, Savar

Subject: Approval of Thesis Report of B.Sc. in TE Program Dear

Sir

I am just writing to let you know that this report titled as "Study on Time Study and Line **Balancing to Find Bottleneck with Probable Solution**" has been prepared by the student bearing ID: 191-23-5619, 191-23-5543 and 191-23-5584 is completed for final evaluation. The whole report is prepared based on the factory data with required belongings. The students were directly involved in their thesis activities and the report become vital to spark of many valuable information for the readers.

Therefore, it will highly be appreciated if you kindly accept this report and consider it for final evaluation.

ii.

Yours Sincerely

Assistant Professor

Department of Textile Engineering

Faculty of Engineering

Daffodil International University

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DECLARATION

We hereby declare that the work which is being presented in this thesis entitled, "**Study on Time Study and Line Balancing to Find Bottleneck with Probable Solution**" is original work of my own, has not been presented for a degree of any other university and all the resource of materials uses for this thesis have been duly acknowledged.

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This is to certify that the above declaration made by the candidate is correct to the best of my knowledge.

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ABSTRACT

The global competitiveness in the apparel industry consists of cost reduction, increased productivity, and enhanced quality. Industrial Engineering is concerned with maximizing production, quality, and waste reduction. Therefore, an industrial engineer has a fantastic potential to contribute to the garment manufacturing industry by implementing all engineering tools for this industry's growth. IE team works in cutting, sewing, and finishing to reduce personnel and WIP, set up line Layout (operation breakdown), and improve work efficiency and productivity. Forecasting demand and creating new designs Develop Design, Utilize Various Quality Tools Bend product and seasoning development, Efficiency, Wage and income calculation, CNC machine operation, Scheduling, Capacity analysis, Line balance, Kaizen, Kanban, Production planning, Calculate NPT, Bottleneck elimination, etc.In this work, we examined several procedures regarding time, capacity, target, including experimental discussion, experiment results, and discussion of this analysis. Different item SMV information is available. We analysis 10 capacity study of different item and give the probable solution of them.

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Study on Capacity Study to Find Bottleneck Problem with Probable Solution

CHAPTER 1 INTRODUCTION

Time study is the main way to determine the capacity of a swing line. Bottleneck in a swing line can easily identified by time study. This bottleneck is the biggest curse in the production of a line. A running line's production target is not acquired for this bottlenecks. By finding out this bottleneck through time study we can now find its solution

1.1 Background of the Study

An Industrial Engineer perform many task for increasing the profit of the industry. They try to gain maximum output by using minimum input. They utilize man, machine and material properly and earn maximum profit. In the production floor, we observe many problem. Many department is working to solve this problem. In sewing line bottleneck is a common phenomena. Industrial engineer's one of the main concern is to balance the line and solve the bottleneck of the sewing line. Bottleneck really hampers the production line. For this problem, the maximum output cannot come out from the line. Body parts gather near the operator. We did 10 different sewing line time study and balanced the line. After that, we found out the bottleneck. We solved the bottleneck by using different techniques. This solution will help the industry hopefully for minimization the bottleneck. An opportunity was given to us to doing the intern of Liz Fashion Industry Limited and completed this research work. We did our research and game out with the probable solution. This study will help the industry and the people we are trying to overcome this problem. The final production will be more as a result, the country will earn more profit.

1.2 Objective of the study

General Objectives

> To analysis the reason of bottleneck and way of solution of bottleneck.

Specific Objectives

- > To identify how bottleneck find by time study.
- > To compare about the bottleneck and line balancing.
- > To analysis the way of bottleneck solution to line balancing.
- > To analysis the data of 10 sewing line and solve the bottleneck and do line balancing.

1.3 Significance of the Study

By reading this article, general people will able to know about the IE activities to solve the bottleneck. They will get clear idea about line balancing and way of finding bottleneck with solution. Those who are curious about solution of bottleneck process, they can minimize their curiosity briefly or shortly by reading this article

Students can collect knowledge from here and can get clear idea about industry. They can relate this work with their theory and can enrich their knowledge.

We will do a production study later on the process in which the bottleneck will be created. So that we can verify the authenticity of the bottleneck process. Also we can know about an operator issues creating bottleneck. To solve the problem we can fix the operator's motion and do process sharing in case of over production. We can also remove bottleneck by adding a method. Sometimes an operator takes more time to complete a job. Then IE add a method with that process so that the process take less time than previous. This is called method study. By doing all above study we can eliminate the bottleneck. The experts can find what young engineers are thinking to solve this huge problem. They really get a clear idea whether this method is effective or not also they can take necessary step for the welfare of this sector.

We took 10 time study for 10 sewing line. After taking 10 time study, we found out 10 bottleneck in 10 sewing line. Now as an IE, we should remove these bottleneck from sewing line and make sewing line balance. In case of solution, we will do 10 production study for 10 line and will be able to know about the main problem of those operator whom are creating bottleneck. We will fix the problem and make a solution by adding method, perfect motion and job sharing.

Industry will get clear idea of their IE officer's necessary step to solve this huge problem. Industry authority can get the idea how they will lead their IE team to solve the bottleneck and line balancing problem.

1.4. Limitations of the study:

- Limitation of time to research this topic.
- Limitation of accurate data.
- ➢ IE officers are sometimes very busy.

Study on Capacity Study to Find Bottleneck Problem with Probable Solution

CHAPTER-2 LITERATURE REVIEW

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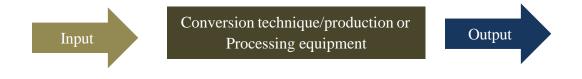
2.1 Definition

Industrial Engineering is a discipline of engineering that focuses on the efficient utilization of machinery, materials, complicated processes, and, most significantly, human resources throughout production.

Industrial Engineering is focused with improving the current system to a better one, maximizing the system's efficiency, and ensuring improved output.

2.2 Concept of IE

Industrial Engineering is a discipline of engineering that focuses on the efficient utilization of machinery, materials, complicated processes, and, most significantly, human resources throughout production. Industrial Engineering is focused with improving the current system to a better one, maximizing the system's efficiency, and ensuring improved output.



2.3 Responsibility of industrial engineering

1. Safety precautions.

- 2. Each row is the same length
- 3. Perfect process tampering

4. Training—teaching new workers how to do their jobs. 5. Operator productivity—keeps a surplus of efficiency and makes it easier for low-level operators to do their jobs.

6. Loss manipulation - off-general loss reduction

- 7. Waste management for products, materials, and tools
- 8. Usual language: inside the machinery at the factory while sewing.

As a leader, it can be a great example of how everyone should act. Each manager stands for the company, and everything he or she does is a reflection of the company.

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2.4 IE's Activities

Several pursuits are listed

- Develop ways for enhancing production.
- Examine the probability of equipment replacement.

• Assist in determining the optimal lot size and work in process requirements for each step of an operation.

- Analyze the planned production schedules and stock levels.
- To aid in the formulation of detailed job specifications and evaluate them.
- Analyze a large project using CPM and PERT methodology.
- To lower the man-to-machine ratio.

2.5 Line Balancing

Each operator must work the same amount. Nobody other can perform one's work. Work should not be a burden for others. If not, line symmetry is adequate.

Line balancing is a crucial activity that makes production difficult if it is not completed at the appropriate time.

Without line balancing, it is impossible to acquire the same quantity of output from each process. In some businesses, commodities will be stacked, while in others, fewer things will be stored, making production more challenging. In order to address this issue, line balancing is performed during each line operation at a predetermined target.

2.5.1 Line Balancing's Objectives

The purpose of line balancing is to reduce the burdens on the line while maintaining the required output. Listed below are the aims of line balancing:

- To enhance productivity
- Minimize production cost.
- To identify the bottleneck space and eliminate it.

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- \cdot To increase the output.
- To divide the labor among the workers on the assembly line.
- 2.5.2 Perks of Line Balancing
- To obtain a consistent output rate.
- Less inventory management.
- Efficient man-to-machine ratio utilization.
- Simple control of production.

2.6 Bottleneck

The production bottleneck is the point at which production is impeded to the greatest degree. In production floor bottleneck, output was at its lowest, resulting in a loss of profit. In actuality, this word forms the bottle's neck, which resists anything from the bottle's widest to its narrowest portions.

2.6.1 Cause of the Impasse

- Erroneous employee selection.
- Incorrect allocation of work.
- Erroneous office layout.
- Wrong technique.
- Unskilled laborer.

Not acceptable material.

- Absenteeism.
- Worker unrest.

2.6.2 Get Rid of the Bottleneck

- Method enhancement Operation allocation enhancement
- Improvements at work
- Work extra time
- Collaboration

2.7 SMV (Standard Minute value) (Standard Minute value)

The number of minutes required for an ideal worker to complete a task in an ideal environment is referred to as the SMV of the task.

SMV = Standard Time + (Allowance x Basic Time)

2.7.1 SMV Elements

Depending on operating conditions and fabric behavior, the SMV of the same operation or product may vary. Certain

• Using a separate machine. Similar to both an automatic and a manual machine for the same task.

- Sewing a larger component of the identical procedure.
- The operator sews striped or checkered/plaid cloth.
- Operator uses attachments and work aids to sew a garment.
- Movement and actions involved in executing a task are of the utmost importance.

2.7.2 SMV Application

• To determine the cost and lead time for garments; • To determine the required time for a specific task using SMV; • To determine the line target; • To determine the pitch time; • To determine the monthly capacity; • To determine the amount of manpower and machinery required.

2.8 Time to Basic Pitch

Basic pitch time (BPT) is a ratio of SMV of garment and number of workers to be specified for the style.

Pitch time is used to compute the individual time for each garment, as well as for balancing the line and determining the production goal for the line.

2.9 Work Study

Work-study is a systematic strategy for conducting experiments that aids in enhancing the manner in which tasks are carried out and the utilization of resources.

2.9.1 Work-Study Objectives

• Facilitates the task and aids in the reduction of extraneous work. • Contributes to the enhancement of production and productivity.

- Assists in establishing the optimal timing.
- Costs are reduced when inputs are utilized most efficiently.
- Aids in improving the condition.
- Contributes to the enhancement of the quality management system; evaluates human labor.

2.9.2 Work Study Functions

After entering the garment sector, Work-Study plays a significant role in enhancing the level of production.

Line chiefs, supervisors, and production managers are typically occupied with production matters throughout the day. Their attention is solely on input, production, and delivery, and they are unable to prioritize productivity enhancement. To increase production, the garment sector need the work-study department. Without work-study, it is impossible to boost productivity.

2.9.3 Strategy for Work-Study

In work-study, there are two sorts of strategies:

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- 1. Method Study and
- 2. Observational Study
- 3. Analysis of Work

2.9.3.1 Method Study

Method Study is a study that methodically evaluates all the specifics and criticisms in depth and so helps to improve the work in a simple and elegant way.

2.9.3.2 Workload Calculation

Work measurement refers to the employment of technology to measure work.

2.9.3.3 Time Study

Time Study is a method of measuring work in which the time spent on a task is recorded. A Time Study is an investigation of whether or not all components of a task are functioning properly to complete a particular activity or under specified conditions.

2.9.3.4 Studies of Capacity

Capacity Study is a study in which a comprehensive picture or concept of how much work a machine operator can perform per hour is available. Working on this capability greatly improves the circumstance.

2.10 Materials and Procedures

Operations management is a powerful tool for making management decisions on the factory floor and is widely used in today's production management practices. Many difficult challenges related to controlling and scheduling assemblies can be resolved with the help of these methods. One of the methods used to achieve this is the Assembly Line Balancing (ALB) system. In order to better understand the workload distribution and bottleneck related problem, a case study was conducted at Envoy Textile Limited in Savar. When compared to the current system, the experimental results demonstrate a notable increase in output and production line efficiency.

Researchers discovered that 12 different types of procedures were performed on a standard T- shirt sewing line.

A significant bottleneck developed in a sewing assembly line process. The efficiency of the process is being decreased by this bottleneck operation. Researchers used the line balancing

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method to reduce bottleneck operations from sewing or production lines in order to increase efficiency.

2.10.1 ALB Technique

ALB (Assembly Line Balancing) is a common manufacturing method in which interchangeable components are successively added to a final product. Henry Ford and his engineers initially utilized the assembly line concept. According to Adeppa (2015), ALBs with diverse purposes are divided into three categories:

ALB-I reduces the number of workstations required for a given cycle time.

ALB-II: Reduces cycle time for a specified number of work stations.

2.10.2 Determination of Cycle time via Time research

Time study is the most common and widely employed strategy for line balancing and solving bottleneck issues. The Hawthorne Effect was a significant challenge for researchers during this investigation. They discovered that employees alter their behavior when aware that their actions are being monitored.

2.10.3 Bottleneck Evaluation

A bottleneck is a point of obstruction in a process or assembly line that happens when workloads arrive too rapidly for the operation to handle. In this investigation, researchers identified a few bottleneck points that were resolved via line balancing. [1]

Study on Capacity Study to Find Bottleneck Problem with Probable Solution

CHAPTER-3 METHODOLOGY

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Time study is a process which is help to find out the capacity of an operator. Is is also used to calculate the line balancing ratio. Again we can find bottleneck of a line by doing time study. We did 10 different time study for 10 different items. We found 10 bottleneck process of each time study. We can remove the bottleneck process by applying different types of techniques. By doing time study which bottleneck we found in line, we will remove that bottleneck process by applying different technique.

3.1 Methodology of T-Shirt

3.1.1 T-Shirt (Buyer: Signet)

Figure 1 : Time study of T-shirt

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Table 1 Time study of T Shirt

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5 L48279 Mokhlesina Back yoke join OL 85 87 88 85 86 41 116 6 Liza Back yoke join OL 100 104 103 104 102 103 34 7 L56346 Golapi Back yoke join OL 87 86 87 89 86 87 41 8 L317168 Nur-Nahar Neck rib servicing PM 42 43 44 43 44 383 9 L57097 Golapi Neck rib match HP 22 25 23 22 25 23 156 10 L33003 Salema Neck rib join OL 27 29 27 28 29 28 128 11 L317183 Sabana Neck rib join PM 18 20 19 21 20 0 180 12 L317221 Kulsum Neck tap stitch FL 30 31 216 116 13 130 116 130	3	L317184	Anjuara	Sleeve side join	OL	61	60	62	60	61	61		59	
6 Liza Back yoke join OL 100 104 103 104 102 103 34 7 L56346 Golapi Back yoke join OL 87 86 87 89 86 87 41 8 L317168 Nur-Nahar Neck rib servicing PM 42 43 44 43 44 83 9 L57097 Golapi Neck rib match HP 22 25 23 22 25 23 156 10 L3003 Salema Neck rib join OL 27 29 27 28 29 28 128 11 L317183 Sabana Neck rib join PM 18 20 19 21 20 20 180 12 L317221 Kulsum Neck rib stitch FL 30 31 116 13 L35482 Laki Sleeve hemming FL 34 33 32 34 35 34 105 14 L3607 Bilkis Sleeve hemming<	4	L315214	Shipra	Join side seam	OL	47	46	46	47	46	46		78	119
7 L56346 Golapi Back yoke join OL 87 86 87 89 86 87 41 8 L317168 Nur-Nahar Neck rib servicing PM 42 43 44 43 44 43 83 9 L57097 Golapi Neck rib match HP 22 25 23 22 25 23 156 10 L33003 Salema Neck rib join OL 27 29 27 28 29 28 128 11 L317183 Sabana Neck rib join PM 18 20 19 21 20 20 180 12 L317221 Kulsum Neck tap stitch FL 30 32 34 31 30 31 116 13 L35482 Laki Sleeve hemming FL 31 30 31 29 31 30 116 14 L34607 Bilkis Sleeve hemming FL 34 33 32 34 35 34 105	5	L48279	Mokhlesina	Back yoke join	OL	85	87	88	85	86	86		41	116
8 L317168 Nur-Nahar Neck rib servicing PM 42 43 44 43 44 43 83 9 L57097 Golapi Neck rib match HP 22 25 23 22 25 23 156 10 L33003 Salema Neck rib join OL 27 29 27 28 29 28 128 11 L317183 Sabana Neck rib join PM 18 20 19 21 20 20 180 12 L317221 Kulsum Neck tap stitch FL 30 32 34 31 30 31 116 13 L35482 Laki Sleeve hemming FL 31 30 31 29 31 30 116 14 L34607 Bilkis Sleeve hemming FL 34 33 32 34 35 34 105 15 L56567 Nur-Nahar Security tack PM 24 23 24 23 25 24 <td< td=""><td>6</td><td></td><td>Liza</td><td>Back yoke join</td><td>OL</td><td>100</td><td>104</td><td>103</td><td>104</td><td>102</td><td>103</td><td></td><td>34</td><td></td></td<>	6		Liza	Back yoke join	OL	100	104	103	104	102	103		34	
9 L57097 Golapi Neck rib match HP 22 25 23 22 25 23 156 10 L33003 Salema Neck rib join OL 27 29 27 28 29 28 128 11 L317183 Sabana Neck rib join PM 18 20 19 21 20 20 180 12 L317221 Kulsum Neck tap stitch FL 30 32 34 31 30 31 116 13 L35482 Laki Sleeve hemming FL 31 30 31 29 31 30 116 14 L3607 Bilkis Sleeve hemming FL 34 33 32 34 35 34 105 15 L56567 Nur-Nahar Security tack PM 24 23 24 23 25 24 150 16 L137366 sonia Lable make PM 38 39 41 43 36 39 92	7	L56346	Golapi	Back yoke join	OL	87	86	87	89	86	87		41	
10 L33003 Salema Neck rib join OL 27 29 27 28 29 28 128 11 L317183 Sabana Neck rib join PM 18 20 19 21 20 20 180 12 L317221 Kulsum Neck tap stitch FL 30 32 34 31 30 31 116 13 L35482 Laki Sleeve hemming FL 31 30 31 29 31 30 116 14 L34607 Bilkis Sleeve hemming FL 34 33 32 34 35 34 105 15 L56567 Nur-Nahar Security tack PM 24 23 24 23 25 24 150 16 L137366 sonia Lable make OL 24 22 22 23 24 23 156 18 L56167 Laboni Security tack PM 41 42 42 40 41 41 87	8	L317168	Nur-Nahar	Neck rib servicing	PM	42	43	44	43	44	43		83	
11 L317183 Sabana Neck rib join PM 18 20 19 21 20 20 180 12 L317221 Kulsum Neck tap stitch FL 30 32 34 31 30 31 116 13 L35482 Laki Sleeve hemming FL 31 30 31 29 31 30 116 14 L34607 Bilkis Sleeve hemming FL 34 33 32 34 35 34 105 15 L56567 Nur-Nahar Security tack PM 24 23 24 23 25 24 150 16 L137366 sonia Lable make PM 38 39 41 43 36 39 92 17 L37409 Rohima Lable make OL 24 22 22 23 24 23 156 18 L56167 Laboni Security tack PM 41 42 40 41 41 87	9	L57097	Golapi	Neck rib match	HP	22	25	23	22	25	23		156	
12 L317221 Kulsum Neck tap stitch FL 30 32 34 31 30 31 116 13 L35482 Laki Sleeve hemming FL 31 30 31 29 31 30 31 116 14 L34607 Bilkis Sleeve hemming FL 34 33 32 34 35 34 105 15 L56567 Nur-Nahar Security tack PM 24 23 24 23 25 24 150 16 L137366 sonia Lable make PM 38 39 41 43 36 39 92 17 L37409 Rohima Lable make OL 24 22 22 23 24 23 156 18 L56167 Laboni Security tack PM 41 42 42 40 41 41 87 19 L35759 kadija Attach label PM 35 34 36 35 34 35 <t< td=""><td>10</td><td>L33003</td><td>Salema</td><td>Neck rib join</td><td>OL</td><td>27</td><td>29</td><td>27</td><td>28</td><td>29</td><td>28</td><td></td><td>128</td><td></td></t<>	10	L33003	Salema	Neck rib join	OL	27	29	27	28	29	28		128	
13 L35482 Laki Sleeve hemming FL 31 30 31 29 31 30 116 14 L34607 Bilkis Sleeve hemming FL 34 33 32 34 35 34 105 15 L56567 Nur-Nahar Security tack PM 24 23 24 23 25 24 150 16 L137366 sonia Lable make PM 38 39 41 43 36 39 92 17 L37409 Rohima Lable make OL 24 22 22 23 24 23 156 18 L56167 Laboni Security tack PM 41 42 42 40 41 41 87 19 L35759 kadija Attach label PM 35 34 36 35 34 35 102 20 L317422 Mohsina Join side seam OL 85 86 88 85 86 41 21 <t< td=""><td>11</td><td>L317183</td><td>Sabana</td><td>Neck rib join</td><td>PM</td><td>18</td><td>20</td><td>19</td><td>21</td><td>20</td><td>20</td><td></td><td>180</td><td></td></t<>	11	L317183	Sabana	Neck rib join	PM	18	20	19	21	20	20		180	
14 L34607 Bilkis Sleeve hemming FL 34 33 32 34 35 34 105 15 L56567 Nur-Nahar Security tack PM 24 23 24 23 25 24 150 16 L137366 sonia Lable make PM 38 39 41 43 36 39 92 17 L37409 Rohima Lable make OL 24 22 22 23 24 23 156 18 L56167 Laboni Security tack PM 41 42 42 40 41 41 87 19 L35759 kadija Attatch label PM 35 34 36 35 34 35 102 20 L317422 Mohsina Join side seam OL 85 86 88 85 86 41 21 L31715 Rumana Encess threed cut HP 30 31 34 32 31 32 1112 H	12	L317221	Kulsum	Neck tap stitch	FL	30	32	34	31	30	31		116	
15 L56567 Nur-Nahar Security tack PM 24 23 24 23 25 24 150 16 L137366 sonia Lable make PM 38 39 41 43 36 39 92 17 L37409 Rohima Lable make OL 24 22 22 23 24 23 156 18 L56167 Laboni Security tack PM 41 42 42 40 41 41 87 19 L35759 kadija Attatch label PM 35 34 36 35 34 35 102 20 L317422 Mohsina Join side seam OL 85 86 88 85 86 41 21 L31715 Rumana Encess threed cut HP 30 31 34 32 31 32 112 Highest cycle time: Bottleneck process name: State State State State State State State State Stat	13	L35482	Laki	Sleeve hemming	FL	31	30	31	29	31	30		116	
16 L137366 sonia Lable make PM 38 39 41 43 36 39 92 17 L37409 Rohima Lable make OL 24 22 22 23 24 23 156 18 L56167 Laboni Security tack PM 41 42 42 40 41 41 87 19 L35759 kadija Attatch label PM 35 34 36 35 34 35 102 20 L317422 Mohsina Join side seam OL 85 86 88 85 86 41 21 L31715 Rumana Encess threed cut HP 30 31 34 32 31 32 112 Highest cycle time: Bottleneck process name: State	14	L34607	Bilkis	Sleeve hemming	FL	34	33	32	34	35	34		105	
17 L37409 Rohima Lable make OL 24 22 22 23 24 23 156 18 L56167 Laboni Security tack PM 41 42 42 40 41 41 87 19 L35759 kadija Attatch label PM 35 34 36 35 34 35 102 20 L317422 Mohsina Join side seam OL 85 86 88 85 86 41 21 L31715 Rumana Encess threed cut HP 30 31 34 32 31 32 112 Highest cycle time: Bottleneck process name: State State <td>15</td> <td>L56567</td> <td>Nur-Nahar</td> <td>Security tack</td> <td>PM</td> <td>24</td> <td>23</td> <td>24</td> <td>23</td> <td>25</td> <td>24</td> <td></td> <td>150</td> <td></td>	15	L56567	Nur-Nahar	Security tack	PM	24	23	24	23	25	24		150	
18 L56167 Laboni Security tack PM 41 42 42 40 41 41 87 19 L35759 kadija Attatch label PM 35 34 36 35 34 35 102 20 L317422 Mohsina Join side seam OL 85 86 88 85 86 41 21 L31715 Rumana Encess threed cut HP 30 31 34 32 31 32 112	16	L137366	sonia	Lable make	PM	38	39	41	43	36	39		92	
19 L35759 kadija Attatch label PM 35 34 36 35 34 35 102 20 L317422 Mohsina Join side seam OL 85 86 88 85 86 41 21 L31715 Rumana Encess threed cut HP 30 31 34 32 31 32 112 Highest cycle time: Bottleneck process name:	17	L37409	Rohima	Lable make	OL	24	22	22	23	24	23		156	
20 L317422 Mohsina Join side seam OL 85 86 88 85 86 41 21 L31715 Rumana Encess threed cut HP 30 31 34 32 31 32 112 Highest cycle time: Bottleneck process name:	18	L56167	Laboni	Security tack	PM	41	42	42	40	41	41		87	
21 L31715 Rumana Encess threed cut HP 30 31 34 32 31 32 112 Highest cycle time: Bottleneck process name:	19	L35759	kadija	Attatch label	PM	35	34	36	35	34	35		102	
Highest cycle time: Bottleneck process name:	20	L317422	Mohsina	Join side seam	OL	85	86	88	85	86	86		41	
Bottleneck process name:	21	L31715	Rumana	Encess threed cut	HP	30	31	34	32	31	32		112	
	Highe:	st cycle ti	me:											
How to improve bottle neck process (details):	Bottle	neck prod	ess name:											
	How to	o improv	e bottle neck	process (details):										

We collected the data from Liz 3 building of Liz Fashion Industry Limited. The line number was LC 103. The data was about time or capacity study of that line which is used to find out the initial balance percentages of the line. Here in the first column of the time study contains the serial number. The second column contains the card number of every operator. Again next row is about the name of the worker. After that, we can see the individual process name. We took five cycle times of each process. We did average and got average cycle time. Next portion is about the capacity of the worker. We calculated the capacity by 3600/ average cycle time. We found that 'Join side seam' process has lowest capacity (41). The output of the line will be 41. The Line Balance ratio was 29%. We can calculate the LBR by 60*SMV*Bottleneck process man power*100/ Total Manpower*Bottleneck process average cycle time.

3.1.2 T-Shirt (Buyer: Peak Performance)

	24.105	L amounted	PPF			arre			84		99%		1909-22
		Bieseer		340	1111010-	9666			6.179	_	internet.	1- 5hd	1
4	Nixon .	111	Operation Destation	Type	844	Del	the state	-	14		depend	- Fagenda	127-1464
	soura	147129	Altech side	FP	68	66	67	66	67		67	55	
	Neama	130315	n	FD	61	62	61	62	62	_	EZ	与史	
	protiva	230467	Attach sleeve "	PP	68	66	er	62	67		68	62	
đ	kol pena	1498 72	.^	m	64	15	65	66	54		69	1000	
	Being	2624582	Netthe sung make 9	PM.	귀족	45	44	41	42		43		
1	Broleps)	153906	arek soch	ol_	31	32	28	31	12		32	112	
	Beauty	142161	9 wees ture all	Fm	92	33	11	33	54		99	109	-
	Tehtu Ja	1917285	coop fack '	pm	35	鄄	95	93	72	1	34	106	1
	fehuna,	296416	F- week T19	FZ-	28	1.9	2.9	28	2.8	1	78	129	1
•	mahmuda	196231	hemminas alacare	FL	50	41	47	48	47	-	90	103	-
đ	RUPPANG	14679	8 week 119	P/M	1.4.4	33	36	521	59		3,7		1)
	12hoolizor	195797	herming boltom	FL-	22	21	7.3	22	24	1-	29	156	F
1	ebenen	199693	label soin	pm	30	11	\$1	192	51	-	31	116	
	Runa	142919	grewry feel	pm	28	29	29	30	51	-	90	120	
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Figure 2 Time study of T-shirt

Table 2 Time study of T-shirt

						ity Study Sh me: Floor:							
	style	: G785666	Item: T-shirt	MP: 18	SMV: 6.27	3 Line: L	C105 D	ate: 29-09-	22 Line E	Balance:	Capacity	/: 84	
SL No	Card no	Name	Operation description	M/C type	1st	2nd	3rd	4th	5th	AVG	Actule	Capacity	Remarks
1	L57129	Jorina	Attatch side	FD	68	66	67	66	67	67		53	
2	L30313	Resma	Attatch side	FD	61	62	61	62	62	62		58	
3	L30467	Protiva	Attatch sleeves	FD	68	66	68	68	67	67		62	
4	L43872	Kolpona	Attatch sleeves	FD	64	65	65	66	64	65		35	
5	L624582	Rima	Neck ring make	PM	45	43	44	41	42	43		84	
6	L53906	Golapi	Neck join	OL	31	32	33	31	32	32		112	
7	L42161	Beauty	Attatch neck tape	PM	32	33	31	33	34	33		109	
8	L317285	Fahtuja	Loop tack	PM	33	34	35	33	32	33		106	
9	L56416	Tohura	front neck top stitch	FL	28	29	27	28	28	28		129	
10	L56231		Hemming sleeve	FL	50	51	49	48	47	49		72	
11	L43562	Rumana	Back neck top stitch	PM	34	35	36	34	35	35		103	
12	L64572	Khadija	Hemming bottom	FL	22	21	23	22	24	22		156	
13	L65373	Obiron	label join	PM	30	31	31	31	31	31		116	
14	L64722	Runa	security tack	PM	28	29	29	31	31	30		120	
15													
16													
17													
18													
19													
20													
21													
Highest cy													
Bottleneck	process na		()										

How to improve bottle neck process (details):

The Item was T-Shirt of Peak Performance Buyer. There were total 18 manpower worked for PPF. The SMV was 6.273 min. We took a time study for that line. After took the capacity of that line we saw that that lowest capacity of the line is 84 pcs. That means the line will give only 84 pcs per hour. During took the time cycle of an operator, we faced a lot of difficulties. The main difficulties was the unnecessary motion of an operator. We took 5 time cycle for each process. Then we took the average of the time cycles. In this time study we found the lowest capacity average time was 43 sec. and that is why we made the capacity only 84 pcs. That was our bottleneck process. By that information we made the LBR%. The line balancing rate was 49% that was so low balance. The bottleneck process was neck ring make. The time cycle of the bottleneck process that means neck ring making process was 45, 43, 44, 41, 42 sec. The time should be less. We know the standard time for neck ring make is 10-15 sec. But the operator needed average 43 sec. Except the bottleneck process, other operator did their work by their achievable capacity. Their capacity didn't hampered in the line balance. So neck ring make process made the barricade for standard line balance.

3.1.3 T-Shirt (Buyer: Signet)

			Time 5 d	and the lot of the second s						The second second	Dute	13-16	22
Une :	1019	Buyer	generet	Style	3797	10	5.N	LOF	11:29	y .	Rem	7- 04	_
SI NID	Mame	ID	Operation Description	M/C Type	111	Ind	Sed	Ath	519	Average	Actual	Constant	Total capacity
1	FERIDA	6635= 29	Names type altout	学成组织		1			1				-Subscrift.
2			Bret Punch	# press	32	17	34	15	114	72		109	
1	states	13/7271	stone panel lasta	PM	37	48	44	4.9	4.2	48		109	100
4	1270	119790	gloove panel at	of	53	48	49	47	NE	49	12-1-	72	
5	Kalpana	196246	s score all	0 <u>/</u>	54	-95	-95	44	90	59		69	
6.	P130	1317028	Regard them all of the		56	57	50	47	56	5.7	1	79 65 63 58 37	1
T.	NURA D'ANUN	156567	prograd nitte all al B proof	P	62	61	62	161	62	62		54	-
8.	Sah mart	244267	side panel all	6 . 1	川琴	115	-117	718	119	118	-	31-	241
2	milo.	13/2190	n	101-11	70	12.1	1214	11.178	1.79	0.3	-	1.36	141
10	Qubrd o	1977992	side anom all	4/	72	-71	70	79	71	72.		P	-
11	maynyma	1967 65	Robern Jack	1 R. 1	21	st	62	50	al	62	-	51	
12	Problem (Bridger (B))	162.9603	Man Jarn	PPM	50	191	92	33	12	37	-	113	-
13	Rottel	TWEDEE	Strik suite make	pm	49	1119	99	46	49:	119	-	80	
1.6	Saynab	155929	WYEN SACK	01.	96	\$7	92	86	. 17	37	-		-
15	managene	195,200	Martin TORE -11	100	42	46	49	4.8	49.	48	-	75	-
16	I Deka	155150	they all and Tup shillow	pm	60	6L	61	115	61	GZ_	-		-
17	Althe	1.912914	proving glaque	FL	50	11.8	11.9	98	118	49	-	73	-
18	WOMEN.	1561110	NCEN TIS	12	78	2.9	7.8	27	27	12	-	149	-
15	Paterna	12-237241	+ commany bullars	14	32	32	12.13	179	35	113	-	84	-
20	Reise	7449977	Flag later all	着712	. 47	4.15	42	45	42	63	-	68	-
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22	Toudan	1.0.00.00					-	-	-	-	-	-	-
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23						-	-	-	-	-	-	-	
24							-	-	-		-		
25		-			-	1	-	-		-	-	-	
26						-	-	-	-	-	-		-
27					-	-	-	-	-		-		-
38		-		1	1	_	-	-		-	-	-	-
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			LBR			-		M				ton	

Table 3Time study of T-shirt

А	D	C	U	C	F	U			J	N	L	IVI	IN
					Capacity	Study Shee	t						
					IE Name	: Floor: lia	1						
	sty	le: 28578	Item: T-shirt MP: 21	SMV:	11.397 I	Line: LC104	Date: (03-11-22	Line Bala	nce: 42%	Capacity:	50	
SL No	Card no	Name	Operation description	M/C type	1st	2nd	3rd	4th	5th	AVG	Actule	Capacity	Remark
1	L56954	Nirmola	Bemis tape attach	Iron	10	11	9	9	10	10		360	
2	L317372	Komola	Heat punch	HP	32	33	34	33	34	33		109	
3	L317184	Morium	Sleeve panel tack	PM	51	48	47	49	48	49		75	
4	L315214	Golopi	sleeve panel overlock	OL	50	48	49	47	48	48		73	
5	L48279	Tanzila	Back panel attach	OL	54	53	55	54	56	54		65	
6	L56346	Jannati	regnal sleeve attch front	OL	56	57	58	57	56	57		63	
7	L317168	Sunia	regnal sleeve attch back	OL	62	61	62	61	62	62		58	
8	L57097	Shimu	Side panel attach	OL	115	118	117	118	119	117		31	61
9	L33003	Sharifa	Side panel attach	OL	120	121	119	118	119	119		30	01
10	L317183	Rumi	side seam	OL	72	71	70	73	71	71		50	
11	L317221	Shahida	Bottom join	OL	62	61	62	60	62	61		58	
12	L35482	Sonali	Moon join	PM	30	31	32	33	32	32		113	
13	L34607	Pervin	Neck ring make	PM	45	44	43	46	43	44		80	
14	L56567	Momtaz	Neck join	OL	36	37	38	36	37	37		97	
15	L137366	Ratna	Neck tape attach	PM	46	48	49	48	49	48		75	
16	L37409	Yasmin	loop attach & top stitch	PM	60	62	61	63	61	61		58	
17	L56167	Golezon	Hemming sleeve	FL	50	48	49	48	48	49		73	
18	L35759	Monika	Neck top stitch	FL	28	29	28	27	27	28		124	
19	L317422	Tahmina	Hemming bottom	FL	32	32	33	31	33	32		109	
20	L31715	Akhi	Patch label attach	BT	42	43	42	43	42	42		84	
21	L56167	Mahmuda	Label attach & security tack	PM	51	52	53	53	54	53		61	
lighest c	ycle time:												
ottlenec	k process n	ame:											
low to in	nprove bott	le neck pro	ocess (details):										

This is another item we took the capacity. This is also a T-Shirt item. The buyer was Signet. The SMV was 11.397 min. We took the time study for this line. By the stopwatch we took the time for all the process. There were total 21 manpower for the total process. We took 21 time cycle for 21 process. We took 5 time for each process. We just checked the capacity and the LBR% of the line through the time study. After took the time study we saw that the capacity of that line was 50 pcs per hour. The time cycle of that process was 72, 71, 70, 73, 71 sec. Average time was 72 sec. The process was side seam process. This was our bottleneck process for that line. We then made the line balancing rate for that line. The LBR% was 45% only. That was very low for the signet buyer line.

3.1.4 T-shirt (Buyer: GS)

Figure 4 Time Study of T-shirt

FLIPVE	ER: Grs		STYLE: AZAYP AVE	APACI		UT att	CG.I		DATE	02-1	2-22	LINE: 07	SMV: C
	in ms	-		-		-	BSERVED	THEFT		TOTAL	AVG	CAPACITY	remarks
SI,	OF NAME	ID	OPERATION NAME	MC	100	0.000	10110000	17	10	70	TIME 14	231	
1	Helena O		Boddy ARMAnge	HIF.	14	16	13 31	1	46	170	39	26	
121	Shapmit (22		SLD J7H	OV/L		29		90	33	102	38.4	84	
3	Jasna 2		4	- 41	34	40	46	10		43	8.6	376	-
- 41	TRANIN 3	1		SNIL	08	10	08	Contraction and	07 35	135	27	120	
5	Shahanaz (4	_	NECK JOH	OV/L	45	22	26	27	10000		21	164	
. 6.	ARIT (4		ч	4	21	23	21	18		105		2.57	
7.	Resma (6)		Back take Int	FIL	12	12	13	13	13	63	12.6	192	
6	RUNG Q		In Possition tack	SNIL	18	16	16	17	18	84	16.4	197	
9	RUPA D RUPA D Sathi D ARSINA D		Back TIS & MAINE	1	15	18	17	17	15	82-	de la construcción de la constru	126	_
50	sight QL		4 4	4	31	23	2.5	24	26		26.6	66	_
11	ARTINA Q		sleeve Jnt	OVIL	43	62	48	61	60	244	48.5	31	_
12	Pamaan Q		4	- He	36	38	41	42	43	199	63.8	60	
13	suchana @		. 4	1:	56	73	66	62	62	226	-	71	
14	SUM1 (9)		Side seam	4	43	46	44	47	46	and the second	1.10	-	-
15.	RODA D		И	W.	49	54	and the second second	50	48	246	492	66	
16	somi (2)		4	ů.	49	43	45	50	42	236	47.2	and the second second	-
17	Shining (0)		LADEL MAKE	- 4	08	07		07	07	37	7.4	437	-
18	Shepeli D		Label Int	SNIL	12	12	13	12	16	64	128	253	-
19	Monshede (12)		Boddy Size & sticker M	HIP	21	21	2.4	23	20	109	21.8	148	-
20			sleeve Hem	F12	28	28		31	26	141	28-2	100	-
21	sadam (12) salma (12)		4	. 4	35	36	33	34	35	173	34.6	and the second se	-
	JOSTIA (14)		Boddy size	HIP	12	13	13	12		-62	-12-4	261	-
22	Alkech (162		Bettom Hem	FIL	16	16	17	16	17	82			
23			R	1	36	00	33	39	\$5	173	39.6		-
24	Neyon (16) Sabine (16)	-	Boddy size	HIP	10	09	10	00	10	48	9.6	337	1

Table 4 Time Study of T-Shirt

		style	a: A4A2P Item: T-shirt MP: 22		EName: F .55 Line:		:02-12-22	Line Bala	ance: 24%	Capacity	: 197		
SL No	Card no	Name	Operation description	M/C type	1st	2nd	3rd	4th	5th	AVG	Actule	Capacity	Remark
1	Jm317421	Murshida	Match all cut parts	HP	14	16	13	17	10	14		231	
2	Jm317422	Rejina	Shoulder join	OL	26	28	31	40	45	34		95	179
3	Jm317423	Rojina	Shoulder join	OL	34	40	46	39	33	38		84	1/9
4	Jm317424	Nisita	Rib tack	PM	8	10	8	10	7	9		376	
5	Jm317425	Mousimi	Neck join	OL	25	22	26	27	35	27		120	
6	Jm317426	Mim	Back tape join	FL	21	23	21	18	22	21		154	
7	Jm317427	Eti	In position tack	PM	12	12	13	13	13	13		257	
8	Jm317428	lily	Back top stitch and main label	PM	18	16	15	17	18	17		192	389
9	Jm317429	Nipa	Back top stitch and main label	PM	15	18	17	17	15	16		197	565
10	Jm317430	Rajia	sleeve join	OL	31	23	25	24	25	26		126	
11	Jm317431	Setu	sleeve join	OL	43	52	48	51	50	49		66	273
12	Jm317432	Soniya	sleeve join	OL	35	38	41	42	43	40		81	
13	Jm317433	Roshida	Side seam	OL	56	73	66	62	62	64		50	
14	Jm317434	Sweety	Side seam	OL	43	46	44	47	46	45		71	
15	Jm317435	Hosneyara	Side seam	OL	49	54	45	50	48	49		65	186
16	Jm317436	Roksana	label make	OL	8	7	8	7	7	7		637	
17	Jm317437	Morium	label join	PM	12	12	13	12	15	13		253	
18	Jm317438	Purnima	Trim excess thread	HP	21	21	24	23	20	22		148	
19	Jm317439	Tahmina	Sleeve hem	FL	28	28	28	31	26	28		114	
20	Jm317440	Akhi	Sleeve hem	FL	35	36	33	34	35	35		93	207
21	Jm317441	Roksana	bottom hem	FL	16	16	17	16	17	16		197	
22	Jm317441	Mahmuda	Trim excess thread	HP	10	9	10	9	10	10		337	
ighest cy	cle time:												
ottlenec	k process n	ame:											

This time study for JM Fabrics Ltd. The buyer was GS. Item was T-Shirt. Total manpower 25 person. We saw that total 25 manpower did the 16 processes. We took the time cycle for each process for each manpower. We found that the time cycle of the bottleneck process was 56, 73, 66, 62, 62 sec. Average time was 64 sec. And the capacity of that line was 50 pcs per hour. The process was sleeve join. This process was done by three manpower. But three manpower could not fulfill the line balancing capacity. They produced total 197 pcs per hour that was very less for the production. For that the daily efficiency was down. We calculated the line balancing rate for that line. The LBR% was 24% only.

3.1.5 Fem Dirt T-Shirt (Buyer: Peak Performance)

Figure 5 Time study of Fem dirt T-shirt

000 Hr N317 Y2 1 [19 R29] 15 54469 15 7119 1317 892 15171 97 1650 63 1979 574 1459 61 1817 876	Ninemala Ninemala Romista Monium GistaPi Sanzita Tarinati Sunga Shimu Shopila	Attality 5.00 houtwalk (went Pap) Attality 5.00 houtwalk (went Pap) Attality might stay wells (pen) Anrich might stay wells form March point with finant Pant find Pant Jon (Pant) (min) Pant Jon (Pant) (min) Pant Jon (Pant) Match bock and (pen) pant Abouthy Join Side Sam Join	Mitteen Pint 10 10 10 10 10 10 10 10 10 10 10 10	世行るがないい	47	49 52 45		14 48 48 49 50 2 47	49 99 50 10	新ノー 	22 keruiti
1254091 1554429 157119 13174992 1517497 1425523 1319574 145941	Komsla Monium GislaPr Sanzila Tarinali Sunga Shimu Shapila	Allach region sized with form And the region block with sent pant from point with sent pant from point you (1975) (min) Point you (1975) Match bock and low part About they Join	TO TO TO TO WF	新鮮なりりに	49 49 21 44	49 52 45	99月19日	450 20 47	19 99 50 20 44	74 73 72 72 72 72 72 72 72	
157469 15719 1317892 1517892 1517892 1625583 1517974 145941	Monium GislaPi Mittile Tarinali Sunga Shimu Shapi (a	And the material stand with better match part with frent part freed Part for (Plant) (ment Part for (Plant) Match bock and Josef part About the Join	ID INP FD TD NF	外が 44 44 44 44 44 44 44 44 44 44 44 44 44	49 21 43 44	190 145 HA	与19	50	50 20 46	72	
157113 1317472 1517175 1425523 1317574 145941	GidaPr MilaPr Mila Tannah Sunga Shimu Shapi (a	Match Denit with Incel Pant Fews Pant Jon (Pigns) (min) Pane Jon (111) Match bock and Jawl Dant Shouther Join	TD TD NF	14	21 48 44	91 45 44	131	20	20	125	
1317692 1317197 1625543 1319574 185561	Sanzila Tannali Suniga Shimu Shopila	Frend Parts John (Profil) (ment Pares John (11/1) Match back and Jawal parts Shouthing John	FD TD NF	444	48. 444	45	44	47	I.g.Kan	72	
1517197 1625583 197574 195941	Tannaki Suniya Shimu Shabi (a	(nul Pani) Sun (11/1) Match berk and Jow! pant Shouthing Join	TD. WF	山	44	44					
1425043 197574 185541	sung= shimu shopi (a	Maten book and Jow! Dan! Shouldin Join	HF	40			115	lite !	-lie	0.0	
1917574 145941	shimu shabila	shouting Join			the l				11		
195941	shoni la		10		1.28	45	Let.	36	41	22	
	and the second s	Side gam Thin	and the second second	31	32	33		314		114	
1913434			FD	80	81	84	10	81		44	97
	Rumi	14.	FD	83	22	21	104	12	83	43	1
15403	Statuda	Nex ming making (similar)	PM	3%	144	m.	145	44	143	SL.	
1124491	Sanali		PM	-	31	23	22_	30	30	112.0	-
E2-244443	Panvin	Malah Milk ving with body manth	MP	24	22	22	2.1	24	2.9	14.7	
1917194	Momi+2	When we we will all all wear	PM	22	72	22	22	31	122	1497	
1121757	Raina	Jam mark ming with meak	DL.	Lis.	47	42	47	115	45	180	
156140	3'esmin	Attath back new lope	FL	28	140	628	37	19/20	40	92	
53740	Gonzon	Taki lark at new imp and loop attaining	pm.	36	42	38	37	4-	39	91	
35723	Pranika	Frank and top stricts of news	TL	35	32	410	30	38	38	35	
317364	Tahmon	Tap Stilleh On Bask Park Lam (Briand)	pm	45	46	145	10	43	1 44	81	
1111	and the second se	Better humming	82	I.fr	140	H3	44	14	43		
the second s	all control of the second s	Aller Thank Plan	EL	45	46	64	1	1 to	55	557	1
Contract of the			-	1.5		-24	10		111		
to Dates.		Superison Induction	20			7	TW	2	- N		
	1,244444 51,7194 1,121457 1,54140 5,3720 35720 317344 317344 317344 5,4251 2000	2244143 Danvin S17194 Momtez 221757 Ratna 256140 Yesmin 53730 Garzon 35322 Monika 317364 Tahmina 317364 Tahmina 317364 Manmuda 26231 Manmuda	1244143 Danvin Match netk ming with body god 317194 Montez Attalia netk wing with body god 1221957 Ratna Jam Merk wing with 1984 154140 Yeamin Attalth back netk 1998 53720 Ankeon Tak Tenk al net in and top attalen 35720 Makeon Tak Tenk and the stillen at ness 317364 Tahmina Tap Stillen on Bas mus top (brief) 317364 Manmuda Steve Namining 56851 Manmuda Steve Namining 56851 Manmuda Steve Namining	1.244ius Parryin Match Milk mick pring twith body on the second	A 244 Hus Darryin Match Nettering With Body on Him 24 S17194 Martin 2 Attality network origoids at new Mr. 11 S17194 Martin 2 Attality network origoids at new Mr. 11 S4140 Yearnin Attality Back new 1998 FL 18 S3720 Arkson Tak and new 1998 FL 18 S3720 Arkson Tak and new 1998 Attality Attal 3522 Monika Mark and 19 Stiles at new 1998 FL 33 317364 Takening Tap Stiles on Darries Internet 1998 HS 317364 Takening Tap Stiles on Darries Internet 1998 HS S17364 Martin Battan hamming 13 S17364 Manmuda Staur Premining FL 48 S17364 Manmuda Staur Premining FL 48 State State Manmuda Staur Premining FL 48	1.244ius Party in Match nith to ing out the body on the solution of	$ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c}$	1.244141 Darryin Malah mitk ming with body one it in 24 21 23 21 917194 Mamiez Attalia mitk angoldgent men PM Ft 32 24 23 917194 Mamiez Attalia mete angoldgent men PM Ft 32 24 23 1271957 Ratin Jam Mitk ming with men PM Ft 32 24 23 1271957 Ratin Jam Mitk ming with men PL PL 14 40 154140 Yesmin Attalia men Imp 1002 DL 14 40 14 53720 Inskinn Jak fee at new one loop attalian PL 98 46 44 St 35720 Inskinn Jak fee at new one loop attalian PL 98 126 44 St 317364 Tahmina Tap Stille On base met tam (brow) PM 152 410 20 St 317364 Tahmina Tap Stille On base met tam (brow) PM 145 45 44 64 St 317364 Tahmina Tap Stille On base met tam (brow) PM 145 46 64 Q 317364 Tahmina Tap Stille On base met tam (brow) PM 145 46 64 Q 3173164 Tahmina Stap Stille On base me	2.244141 Party in Match mith mith mind on the body on the part of the body on the body on the body of	1.244141 Party in Match mith raing with body on a state of galaxies HP 24 21 21 21 24 23 S17194 Mambe z Attach mith originalizes PM 51 32 21 24 23 S17194 Mambe z Attach mith originalizes PM 51 32 21 24 23 S17194 Mambe z Attach mith originalizes PM 51 32 21 24 23 S17194 Mambe z Attach mith originalizes PM 51 32 21 24 23 S17194 Mambe z Attach mith originalizes PL 128 24 21 11 24 S17194 Mambe z Attach mith originalizes PL 28 24 21 11 24 S17194 Mambe z Attach mith originalizes PL 28 24 21 11 24 S17194 Mambe z Attach mith originalizes PL 28 24 21 11 24 S17140 Yesmin Attach one intermition originalizes PL 28 24 24 23 23 24 24 S17300 Mambe z Mate originalizes PL 28 24 24 23 27 23 28 27 44 33 S17304 Tankene z Mak ond Tep stitch of bask mets top (bask) PL 25 12 40 32 32 32 33 32 32 S17304 Tanken	2.244141 Party in Match mith mith ming out the body on the body of the body o

Table 5 Time study of Fem dirt T shirt

					city Study ame: Floo								
st	tyle: FEM D	ART T-SHIR	T Item: Fem Dart T-shirt MP:18		IV: 8.195	Line: LC1	101 Da	ate: 15/11/	22 Line	Balance:	32%	Capacity: 5	5
SL No	Card no		Operation description	M/C type	1st	2nd	3rd	4th	5th	AVG	Actule	Capacity	Remarks
1	L317421	Nirmola	Attatch side level with front part	PM	117	48	52	48	50	63		74	
2	L25491	Komola	Attatch regian sleeve with front	FD	50	49	47	49	48	49		73	
3	L55469	Morium	Attatch regain sleeve with basic	FD	48	49	50	51	50	50		72	
4	L57119	Golopi	Match pane witth front part	HP	18	21	22	19	20	20		180	
5	L317092	Tanzila	Front panel join(right)	FD	44	48	45	46	47	46		78	
6	L317197	Jannati	Front panel join(left)	FD	42	44	46	42	44	44		82	
7	L625083	Sunia	Match back and front part	HP	40	42	43	41	38	41		88	
8	L317874	Shimu	Shoulder join	FD	33	32	33	32	30	32		116	
9	L43962	Sharifa	Side seam join	FD	80	82	84	82	81	82		44	
10	L317375	Rumi	Side seam join	FD	83	82	81	84	82	82		43	
11	L56208	Shahida	Neck ring making	PM	38	41	42	43	44	42		86	
12	L624696	Sonali	Join edge of neck ring to make circuler	PM	28	31	29	32	30	30		120	<u> </u>
13	L624441	Pervin	Match neck ring with body and mark	HP	24	22	23	21	22	22		157	
14	L317194	Momtaz	Attatch neck ring edge at neck	PM	21	22	23	22	21	22		164	
15	L621757	Ratna	join neck ring with neck	OL	45	47	46	44	43	45		80	
16	L56140	Yasmin	Attach back neck tape	FL	38	40	41	39	40	40		90	
17	L53720	Golezon	Fold tack at neck tape and loop attatch	PM	36	42	38	39	40	39		92	
18	L35920	Monika	Mark and top stitch at neck	FL	35	38	40	36	38	37		95	
19	L317364	Tahmina	Top stitch on back neck tape	PM	45	46	43	44	43	44		82	
20	L317314	Akhi	Bottom hemming	FL	41	42	43	44	42	42		84	
21	L56231	Mahmuda	Sleeve Hemming	FL	65	66	64	68	65	66		55	
Highest cy	cle time:												
Bottlenecl	c process n	ame:											
How to im	prove bott	le neck pro	ocess (details):										

This time study was taken from the buyer of Peak Performance. The item was Fem Dirt T-shirt. We did the time study of the line LC 101. By analysis this report, we found the bottleneck. The bottleneck process was sleeve hemming .The bottleneck process capacity was 55. The second bottleneck process was attach reglan sleeve and the capacity was 72. The SMV of this item was 8.195 and 21 man power was used in this item. Whenever we calculated the LBR we found that the LBR% was 32%. The LBR% is very low and there was a huge scope to develop this production line.

3.2 Methodology of Sewing vest

3.2.1 Sewing Vest (Buyer: George UK)

Figure 6 Time study of Sewing vest

Tal	Here Lenny Here Dereney 1 Lanard	Barne	new Accession West and E.G. man. 1	4.434	lie .	10.10	1			Caster -	14 1		105	
	1 1549-42	Munipicia	Phateman har and hand Dave	In p	-	. 84	Þr	-	34	AVE]	Artual	-	Amata	
T	= 111789L	RESIDE	STOR ACAR J BIT WATE HUT	E.	8	100		40	8	2		Lp.D		
F	1317139	and the second se	-0	OL	ETU .	-(3	42	Loig	49	49	-	the second se	356	
F	1317169	Misita	24	OL	Lin	HI.	43	let.	11	HS		影		1
t.	1917416	Min	Binding at ness	TL.	122	25				43		NG-	_	Į.
F	1517331	ET(Shouldon Jein (Oni sin)	DL	14			20			-	159		t
t.	The second secon		Hangin jasp	PH	112	14	13		10	19		119		4
1-	1317391	17114	Attato, Diana a Lawers, Deschent	12.	43	野				40		73	-	ł
-		NIPA		52		44				144		51.7	231	đ
3.0	and a start of the	RETTA		FIL.	44		46			47	1	TR.		đ
-11	1317.101	Stitu	strouten ; on (Arothin side)	OL	17	K	17	16	15	16:	1	215	1	T
H	1517564	Spriga	Folding law on thousand laim.	PH	55	53	48	53		53	-	450	194	
- 23	1317897	Roshida	Ealding Hark an should missi from)	PM	21	27	24	22	3-	2.8		112	1	
- 14	1624514	SAMETS	Timm Pater frances	HP	39	34	31	31	34			PS		
15	1317983	Hosegona	Make V Shape	pro	27	27	22		187	4 23		152		
36	1317410	Passene	ROMONE SYRIAS HAMMEN	HP	17	20			13	唐	-	一世		
21	1317106	Monium	bollom hem	11	14	10	31	18	12	92	3	UP	1	
10	1919140	Furshim+	Toim Thuisd	HP.	34.	36	3	4 33	15	、全	5	197		
19	-1-1-1-				1	1	1	1						
					-		10		1	-	4			
20								1						
21	rcle time:		A		-			-11	1					

Table 6 Time study of Sewing vest

					oacity Stud Name: Flo								
	style: 6	5114	Item: Swing vest MP:18	SMV: 4.434	Line:	LC102	Date: 16/	11/22	Line Balan	ce: 50%	Capaci	ity: 124	
SL No	Card no	Name	Operation description	M/C type	1st	2nd	3rd	4th	5th	AVG	Actule	Capacity	Remarks
1	L317113	Murshida	Matching front part and back part	HP	8	9	8	10	8	9		400	
2	L55248	Rejina	Side seam join with level	OL	41	43	42	44	42	42		88	
3	L317396	Rojina	Side seam join with level	OL	44	42	43	45	42	43		88	256
4	L317399	Nisita	Side seam join with level	OL	48	46	45	42	44	45		80	
5	L317169	Mousimi	Binding at neck	KL	22	23	24	22	23	23		157	
6	L317415	Mim	Shoulder join(one side)	OL	18	19	18	20	19	19		189	
7	L317393	Eti	Hanger loop	PM	12	13	12	14	13	13		277	
8	L56910	lily	Attatch binding at armhole,back part	FL	49	50	47	49	50	49		73	
9	L317391	Nipa	Attatch binding at armhole,back part	FL	45	42	43	44	45	44		82	231
10	L52689	Rajia	Attatch binding at armhole,back part	FL	46	48	46	46	47	47		76	
11	L317321	Setu	Shoulder join(another side)	OL	17	16	17	16	15	16		225	
12	L317366	Soniya	Foding tack on shoulder and trim	PM	55	53	58	55	56	55		65	
13	L317397	Roshida	Foding tack on shoulder(no trim)	PM	28	27	28	29	30	28		129	
14	L624614	Sweety	Trime excess thread	HP	34	36	33	34	36	35		103	
15	L317383	Hosneyara	Make V shape	PM	23	24	22	24	24	23		157	
16	L317410	Roksana	Remove excess thread	HP	17	20	21	22	17	19		189	
17	L317406	Morium	Bottom hem	FL	28	29	31	28	29	29		124	
18	L317140	Purnima	Trim thread	HP	32	36	34	35	36	35		102	
19													
20													
21													
Highest cy	cle time:		<u>.</u>			-							
Bottleneck	process r	name:											

How to improve bottle neck process (details):

This capacity study data was taken from the line LC 101. We found that 18-man power was used in this process. We found first bottleneck, which was 124 pieces. The capacity of the line was 124 pieces. We found that bottom hem process took more time. The cycle time of this process is 32, 36, 34, 35, 36. The second bottleneck process was binding at neck. The cycle time of this second bottleneck process was 22, 23, 24, 22, 23. Here the maximum capacity of this line is 124 and LBR% is 50%. If we solve this the capacity of the line will be increased.

3.3 Methodology of Long Pant

3.3.1 Long Pant (Buyer: LIDL)

Figure 7 Time study of Long pant

(with) (with) \$13416		ment Lowing pands a men - = 22 surv 7.		and the second second	c 1	a 🗲 🗄		- 16		397, Casely	A COLOR
			MAY YADA	141	Int	111	en.			tusi Capacity	Arrows
4.3.2223.2	Sharla.	Fride) reise 3010	OL	28	(C) ()	28	30	1912 3	2.7	193	
		Back rise Jain	OL	31	30	29	the state of the second se		31	116	
317922	Mensena	Matching Front and back rise	HP	15	17	18	1000	1000	17	211	
817 324	Shova	Milder I moleing	PM	29	26	30	29	26	-	133	
and a support of the second	and the second se	Laber many page	OL	48	49	45	49	47	47		149
and the second s		Sive seam with most	OL	50	52	49	58	56	53	101	143
	the state of the s	444 () () () () () () () () ()	oL	56	52	43	53	59	53	and the second se	1
	and the second sec		OL		52	56	49	50	51	100 A 100	1137
317424	and the second se	100 million	and the second second	21	20	23	21	19	20	180	1
317423				52	48	53	49	50	50	72	
57108	and the second se	Waish band masting		10000	98				99	36	í
313224	and the second se		- Contraction	1000	10.000	a second	-		62	58	394
55768			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	127.000	1 1 1 A 1 4	48	140	42	43	83	
317253	Kohimuri	waist band top stron		-	1	-	-	28	33	100	
317286	Razia	this except thread from band		10000	a section	1.0000	10000	-	and the second	150	1
917330	Mitu	5000 new energ theory minister		-	1000	-		Call Service	Contraction of the local distance of the loc	95	6
35969	Anchon a	would be wind to have been action	-	10.00	-	20 Bineter		200	121	44	389
and the owner of the owner.	BRISHY	.00	-	-		100	-				100
	Papiya		-	1000	10000		-				
Company of the local division of the local d		Took ad inseam area	-	_	1000	1000	123	C1.2 2 2 2 2	Contraction of the local division of the loc	-	1010
		Leg hemming	-	1000	and the	1111	and the second				
	PARTY IN COLUMN AND ADDRESS OF	this excent thread from body	HP	141	2 3	7 3	5 4	23	2 33	1 23	-1-
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	317426 517428 517428 43962 317424 317423 57108 317224 65768 317253 317286	317926 Msgna 317426 Baudi 317426 Baudi 317428 Afroia 317428 Afroia 317424 Jognob 317423 Kajoj 57108 Nima 317224 Jamob 5768 Shamima 317255 Kohinuri 317286 Razia 317286 Razia 317286 Razia 317030 Baisaj 317546 Papiya 43522 Surama 317384 Bidhi 17384 Bidhi	317926 Mogria Label making 317426 Gravit Siike Seam with Level 317429 Africota 39 439 62 Sharrifa Inseam 317424 Solonob 39 317424 Solonob 39 317429 Kajoj Elaostie mawing 317429 Kajoj Elaostie mawing 317224 Japob Attatched elastic band waling 317224 Japob Attatched elastic band with waist band 55768 Shamima 39 317255 Kolunun Waist band top Stitch 317286 Razia Inim except thread from band 317330 Mutu making waist band with bady 317330 Mutu making waist band with bady 317986 Razia Inim except thread from band 317986 Razia Inim except thread from band 317330 Mutu making waist band with bady 359 67 Anchona waist band yoin with bady 3179846 Papiya Labet Joining 31522 Summa Tack at inseam area 35622 Alamin Leg hemming 317324 Bithi Inim except thread from bady	317926 Mogria Label making PM 317426 Braids Sike Seam with Label OL 317429 Atroja B OL 317429 Atroja B OL 317424 Jognob B OL 317424 Jognob B OL 317423 kazos Elaobie mawing PM 57108 Nima Waish band making PM 57108 Nima Waish band making PM 5768 Shamima B 33 PM 5768 Shamima B 33 PM 57768 Shamima B 34 PM 57768 Shamima B 34 PM 57768 Shamima B 34 PM 57768 Shamima B 35 PM 57768 Shamima B 34 PM 57768 Shamima B 35 PM 57768 Shamima B 35 PM 57768	317926 Magnia Label making PM 28 317425 Gravits Sike Seam with Label OL 48 317429 Africosa 30 OL 50 430 62 Shartifa Inseam och 56 317424 Sognob 30 OL 51 317423 kajos Elaoste mawing PM 21 317423 kajos Elaoste mawing PM 52 317224 Sagnob Attathes elastic band waking PM 52 317224 Sagnob Attathes elastic band with waist band PM 35 5768 Shamima 32 PM 61 317255 Kolunuri Waist band top Stitch KS 45 317286 Razia Inim except thread from band HP 36 317330 Mutu making OL 73 31730 Autu making With Waist band HP 36 317330 Mutu making Waist band with bady OL 73 31736 Parchona wist band soft band with bady OL 73 317346 Papizza Inak at inseam area 87 315622 Alamin Leg themming FL 55 317324 Bidu Itim except thread from body HP 45	317925 Mozina Label making PM 22 26 317426 Gravit Sike Seam with Label OL 48 49 317426 Gravit Sike Seam with Label OL 48 49 317427 Atmosia B OL 50 52 137424 Sognob B OL 55 52 317424 Sognob B OL 55 52 317424 Sognob B Labelie making DM 21 20 57108 Nima Waish band making DM 52 48 317224 Sagnob Attathed elantic band with waist band DM 52 48 317255 Kahimuri Waish band Attathed elantic band with waist band PM 52 48 317255 Kahimuri Waish band Attathed elantic band with waist band PM 52 48 317286 Razia Itaish band Attatashand hop shith badi OL <	317926 Magina Label making PM 21 26 20 317428 Gravit Sike Seam with Jabel OL 48 49 45 317429 Africola 30 OL 50 52 49 430 62 Shartifa Inseam OL 50 52 49 317429 Africola 30 OL 50 52 49 317424 Sognob 30 OL 51 52 56 317424 Sognob 30 OL 51 52 56 317423 Kajol Elaodie making PM 21 20 23 317424 Sognob 30 OL 51 52 56 317423 Kajol Elaodie making PM 21 20 23 317224 Jamob Attatakad elantic band making PM 52 48 55 317224 Jamob Attatakad elantic band with waist hand PM 35 36 317255 Kahimuri twaist band top shitch KS 45 43 48 317286 Razia Aruin except thinsad from band HP 21 25 28	313925 Magnia Label making PM 21 26 25 27 317425 Graudij Sike Seam with Jabel OL 48 49 45 49 317426 Africola B OL 50 52 49 58 317429 Africola B OL 50 52 49 58 317429 Schritting Insceam OL 50 52 49 58 317429 Schritting Insceam OL 51 52 56 49 317423 kajoj Elacite mauing PM 21 20 23 21 577108 Nima Waish band making PM 52 48 55 49 317224 Samob Attistickal elandic band with waist band PM 52 48 55 49 317224 Shamima 53 PM 61 63 62 60 317256 Kazia	317925 Magina Label molding PM 21 26 20 20 317425 Gravit Silke Seam with Label OL 48 49 45 49 47 317429 Africola B OL 50 52 49 58 56 93062 Shartifa Inscent OL 56 52 45 53 59 937424 Sognob B OL 56 52 45 53 59 9373423 Kajol Elaodie mauling PM 21 20 23 21 19 57108 Nima Woish band making PM 52 48 55 49 50 37224 Jamob Attistical diantic band with waist band PM 95 98 102 105 52 49 50 92 5768 Shamima 95 PM 61 63 62 66 65 53 59	317925 Mogena Label making PM 28 26 27 27 47 317425 Graved I Sike Seam with Label OL 48 49 95 43 47 47 317426 Graved I Sike Seam with Label OL 50 52 49 56 53 937625 Shartifa Insceam OL 50 52 49 56 53 937625 Shartifa Insceam OL 56 52 49 50 57 9377224 Sognob 30 OL 51 52 56 49 50 50 57108 Nima Woist band making PM 51 52 48 50 52 53 317224 Jamob Attataked lande tond with woist hand PM 35 98 103 105 52 53 49 50 50 57768 Shamima 33 33 34 34	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$

Table 7 Time study of long pant

					pacity Stud Name: Flo								
	style:	409314-22	07 Item: Long pant MP: 21	SMV: 7	.276 Li	ne: LC-107	Date: 1	9/11/22	Line Bala	ance: 39%	Capac	ity: 69	
SL No	Card no	Name	Operation description	M/C type	1st	2nd	3rd	4th	5th	AVG	Actule	Capacity	Remarks
1	L317416	Shapla	Front rise join	OL	28	27	28	30	26	28		133	
2	L317422	Monesa	Back rise join	OL	31	30	29	32	33	31	Ī	116	
3	L317394	Shova	Matching front and back part	HP	15	17	18	16	19	17		211	
4	L317426	Moyna	Lable making	PM	28	26	30	29	26	28		133	
5	L317425	Beauty	Side seam with label	OL	48	49	45	49	47	48		76	143
6	L317428	Afruja	Side seam with label	OL	50	52	49	58	56	53		67	145
7	L43962	Shorifa	Inseam	OL	56	52	49	53	59	54		67	137
8	L317424	Joynob	Inseam	OL	51	52	56	49	50	52		70	157
9	L317423	Kajol	Elastic making	PM	21	20	23	21	19	21		180	
10	L57108	Nima	Waist band making	PM	52	48	53	49	50	50		72	
11	L317224	Jaynob	Attatch elastic band with waist band	PM	95	98	107	103	92	99		36	94
12	L55768	Shamima	Attatch elastic band with waist band	PM	61	63	62	60	65	62		58	94
13	L317259	Kohinur	Waist band top stitch	KS	45	43	48	40	42	44		83	
14	L317286	Raziya	Trim excess thread from band	HP	38	36	32	33	28	33		109	
15	L317330	Mitu	Matching wast band with body	HP	22	25	28	20	27	24		150	
16	L35969	Archona	Waist band join with body	OL	79	80	78	80	82	80		45	
17	L317030	Bristy	Waist band join with body	OL	83	80	82	79	83	81		44	89
18	L317346	Papiya	Lable joining	PM	38	35	39	32	36	36		100	
19	L43522	Summa	Tack at inseam area	BT	34	35	30	32	36	33		109	
20	H15622	Alamin	Leg hemming	FL	52	50	56	49	53	52		69	
21	L317384	Bithi	Trim excess thread from band	HP	42	37	35	42	39	39		92	
ighest cy	cle time:		·										-
ottleneck	process na	ame:											
ow to im	prove bottl	e neck prod	cess (details):										

The item was short pant and we did the capacity study of that production line. By time study, we found the bottleneck which hampering the production flow of that line. We found that several helper is used in particular process. Two operator was used for avoiding bottleneck but still bottleneck was the common scenario of sewing floor. We found that lowest capacity was leg hemming process and that process's average cycle time was 52 and capacity was 69. Again, we found that here 21 man power was used and whenever we calculate the Line Balancing Ratio we found that the ratio was 39%. If we work with this bottleneck, we sure that the capacity of the line will be more and we'll able to reduce the bottleneck. Here the item was long pant and it's SMV was 7.276

3.4 Methodology of Girl's Hipster

3.4.1 Girl's Hipster (Buyer: Handcraft)

Figure 8 Time study of Girl's hipster

		'. Study Sheet								Enetes	07-02-	23
LBEDG	Hoyers	Handenakt	Stylet	TONY	08790	8.8	LV	1:65		Item	Grinta	Hipodan
Name	10	Operation Decription	NI/C Type	1.01	and	3rd	4134	(649+	Average	Actual	Capacity	Total
ZODUTE	T 301413	Albech tonen a orden sunal Backhard	(# c3/63/1)	(A)	22 1	24	24	23	2216	1597		U.S.S.S.S.S.S.S.S.S.S.S.S.S.S.S.S.S.S.S
Science #1	したを見るの見し	A CARGE AND	1	「日日」	16	142	1.6	15	1.5 - 49	233		7 2 4 4
Latrice	TAUS 0122	11 and 11	17 July 1	2.2	12.54	2.0	4,9	RA	21.2	1. 16 2 11		1
Nupul's	6-624810	11.4	1	. 14	1347-0	16	110	また	14.6	L17-1	6	4
Finwana	162 1971	"Altach elastic to the Long (LIDD)		9		8	9	8	212	437-	18	-
Lizo	1623971	but the elandic friendes to check		1.7	G ,	10	- 44	4	7.6	473-7		8.48
MINETIAM	15226753	Attach elevitic to the leg (242)	1000	8	13	a.	10.	57	818	40.900		746
Anwana	1625012	But the election financia to chock	-	6	9	8	8	7	++ G	47.32	1.00	
Sammi	1522876	gain Right side area		19	18	1.0	8	192	818	19:019	1	1.
Malika	148452B	14		8	1.4	29	-25	1.02	814	428		1934
Renna	1.583223	Altach elastic to waist	112-11	14	6	41	9	19	1.6	740		782
JAYOBE	12484811	Meaning & trim waint electric	1	1 2	1. 18	A. A.	197	10	13:6	1000		1000
Lipti	1.622600	Jain 44 side asim Colouse side	States and	10	11	11	711		1010	2223	- for	1656
Rina	1520113	 In the second s Second second s Second second s Second second se		1.1.8	1.0	11	12	11		383		(108 - 51-52)
Bithiko	1523641	Banteek to legilates a write		10	.10	11	1.0	14	10.2	3787		692
Sahida	L58 3798	 In the second s Second second s Second second s	-	1.2010	10	11	10.	12	The wat	3 Y. M. J		6 7 H
- now more re-		Cut the excin thread	-	-		-	1	11	_	-	-	10000
			1	-	1	-	-	-	-	-	-	-
10-10 T (10-10-10-10-10-10-10-10-10-10-10-10-10-1			1	-	14	-		-	-		1 .	-
	1.	and the second sec	-	-	-	-	-	-	-		-	
			-	-	-	-	-	-	-			
	The second second second second		-	-	-	-	-	-	-			
	- 1 ((()))		1	-	1	14	-	1.		-		
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			4	100	1	100	-	-	10 M	-		_
						-					and the second	
						1	2. 01					
and the second second			1				1.11	1		11		
	and the second s			- Cr 1				-		and the second second		

Table 8 Time study of girl's hipster

SL No	Card no	Name	Operation description	M/C type	1st	2nd	3rd	4th	5th	AVG	Actule	Capacity	Remarks
1	L321413	Zohura	Attatch inner and outer gusset to front and bach part		21	22	16	23	23	21			
2	L523525	Somapti	Attatch inner and outer gusset to front and bach part	:	15	16	15	16	15	15		774	
3	TW520122	Limu	Attatch inner and outer gusset to front and bach part	:	22	24	20	22	21	22		//4	
4	L624810	Nupur	Attatch inner and outer gusset to front and bach part	1	16	17	16	17	17	17			
5	L420631	Anwara	Attatch elastic to the leg(I&R)		7	9	8	9	8	8		848	
6	L523971	Liza	Attatch elastic to the leg(R&L)		7	6	10	8	7	8		040	
7	L522693	Anguri	Cut the elastic from the leg & check		8	9	8	10	9	9		946	
8	L6255012	Anwara	Cut the elastic from the leg & check		6	9	8	8	7	8		540	
9	L522876	Sammi	Join right side seam		9	8	10	8	9	9		837	
10	L523528	Maleka	Join right side seam		8	8	9	8	9	8		057	
11	L523263	Rekha	Attatch elastic to waist		4	5	4	4	5	4		782	
12	L684811	Jayeda	Measure & trim waist Elastic		3	3	4	4	3	3		1000	
13	L522606	lipti	Join left side seam		10	11	11	12	10	11		666	
14	L522113	Rina	Join left side seam		12	10	11	12	11	11		000	
15	L523641	Bithika	Bartack to leg and waist		10	10	11	10	12	11		692	
16	L523743	Sahida	Bartack to leg and waist		9	10	11	10	13	11		052	
17			cut the exces thread										
18													
19													
20													
21													
Highest cy	ycle time:												
Bottlenec	k process	name:											
How to im	nprove bot	tle neck p	rocess (details):										

The buyer was handcraft and the time study was taken from the line of LB 506. The item was Girl's hipster. The SMV of this item was 1.65. By studying of this time study we find that join left side seam is the bottleneck process and capacity is 666. The LBR percentages is 91.6%. Here 17 man power is used. We can increase the capacity and minimize the bottleneck

3.5 Methodology of Men's Boxer

3.5.1 Men's Boxer (Buyer: GS)

Figure 9 Time study of Men's boxer

BUYER 2			-		APACI	E				DATE	03-07-		LINE 02	SMV.6.3
SL OP NAME III Debat in Num OVER Sectivity 24 120 24 120 24 120 24 135 2 AKhi C Security Tack, CN/L 02	BUYE	R AS						ALC: NO. OF PROPERTY	TAN	1	TOTAL	11999.000		remarka
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	SL.	OF NAME	10			211				194	120			
2 AKhi E2 Security Tack CML 02 07 09 70 66 338 67.6 47 3 Anjuara 9 Panel Trl OWL 66 67 69 70 66 338 67.6 47 4 Tanjila 3 Panel Trl OWL 66 67 69 70 66 338 67.6 472 4 Tanjila 3 Panel Trl Security Tack 60 4 Tanjila 3 Panel Trl Security Tack 60 5 Anumul 9 Panel Trl Security Tack 60 22 24 22 20 166 21.2 162- 5 Anumul 9 Panel Trl Security Tack 60 20 24 22 20 166 21.2 162- 6 Pesma 0 Label Make oull 07 08 02 02 08 38 7.6 426 7 Pesma 0 Label Make 111 12 13 16 12 14 66 13.2 246 8 Tesma 0 Label Marged Hill 12 13 12 14 24 133 24 23 <td< td=""><td>1</td><td>AShamon O</td><td></td><td>Dark Servicing</td><td>OV/L-</td><td>71</td><td>in the second second</td><td>and the second</td><td>2.2</td><td></td><td></td><td>8.4</td><td></td><td>-</td></td<>	1	AShamon O		Dark Servicing	OV/L-	71	in the second second	and the second	2.2			8.4		-
3 Anjuara (3) Panel Jnf Out. Ce of 07 07 52 72 324 642 60 4 Tanjila (3) 4 4 64 63 70 52 72 324 642 60 5 Anamul (9) Panel T/S F/L 20 20 84 22 20 106 21.2 162 5 Anamul (9) Panel T/S F/L 20 20 84 22 20 106 21.2 162 6 Pesma Uabel JIT Anke OIL 07 08 08 08 7.6 426 7 Pesma Uabel JIT Anke OIL 13 16 16 17 14 76 15 216 7 Pesma Uabel JIT Anke OIL 13 16 16 17 14 76 15 216 8 Jasna Uabel JIT Anke OIL 13 16 12 14 66 132 246 9 Pekha Uabel JIT Anke OIL 13 16 12 14 66 132 246 9 Pekha Uabel JIT Anke OI 20 07 02 07 02 07 37 37 37 4437 9 Pekha Uabel Zig2AP 2/2 12 12 13 12 12 12 13 62 12 4 437 II 4374 10 Rekha Uabel Zig2AP 2/2 12 12 13 12 12 14 26 27 129 24 133 II 14110 12 24 133 10 Rekha Uabel Zig2AP 2/2 12 12 27 26 23 22 119 23 8 136 II 14110 12 14 12 24 133 11 Helman Naist Elestic Tris FiL 22 27 26 23 23 22 30 33 16	2	AKhi CZ			And and a state of the state of	the second s		and the second				67.6	47	
4 TONJIL (3) 4 4 64 62 22 22 106 21.2 162- 5 Mumuil (4) Panel T/S FIL 20 20 20 22 22 106 21.2 162- 5 Mumuil (4) Panel T/S FIL 20 20 20 06 07 08 38 7.6 426 6 Resma (2) Label MAKE 0/L 07 06 07 08 38 7.6 426 7 Resma (2) Label JJT 4/L 13 16 16 17 17 75 15 216 8 Jasna (2) Elashe JJT 12 13 16 12 14 42 132 24 132 24 249 249 249 249 249 24 133 24 24 24 24 24 24 24 24 24 24 24 24 24 23 22 25 26 </td <td>3</td> <td></td> <td></td> <td>Louis North</td> <td></td> <td>and the second division of the second divisio</td> <td></td> <td>1</td> <td></td> <td></td> <td>A State of the Association</td> <td>64.2</td> <td>50</td> <td></td>	3			Louis North		and the second division of the second divisio		1			A State of the Association	64.2	50	
5 Aniamul (4) Panel 7/5 Pre-20 Pre-20 <td>4</td> <td></td> <td></td> <td></td> <td>And the Party County</td> <td></td> <td></td> <td>Acres 1000</td> <td>1.5.1.000</td> <td>1</td> <td>and the second se</td> <td>21.2</td> <td>152</td> <td></td>	4				And the Party County			Acres 1000	1.5.1.000	1	and the second se	21.2	152	
6 Respine Shining G Label Make Null 13 16 16 17 14 75 15 216 7 Resma E Label JPH SWIL 13 16 16 17 14 76 132 246 8 Jasna E Boddy Manarel HIP 12 13 16 12 14 66 132 246 9 Rekha E Elashe cot BLT 07 08 07 08 07 08 27 14 432 249 10 Rekha Elashe cot BLT 07 08 07 08 27 12 13 62 124 432 24 249 24 242 135 10 Rekha Ø Hashe cot SNIL 23 22 24 26 27 171 249 25 24 249 135 11 Helima IB Vasist Elashe tack shit 23 22 25 26 27 127 23 23 167 334 97 12 Helima	5	Anamul (4)		and the second se	and the second second	the second second	And in case of the local division of the loc	The second second	A Contractorio	1 C 1		7.6	426	
7 Resma C Label JIII MILE IZ IZ <thiz< th=""> <thiz< th=""> <thiz< th=""> <thiz< th=""></thiz<></thiz<></thiz<></thiz<>	6	Respire Shining (6)	-	Are and a second		- F	and the second	-	D	-		15	216	-
PREKNA D Elastic Cut B/LT 07 0.8 07 0.2 07 0.2 17.4 <t< td=""><td>7</td><td>Resma (6)</td><td></td><td></td><td>51112</td><td>C. P. State of the second</td><td>A second second</td><td></td><td>12</td><td>14</td><td></td><td></td><td>245</td><td></td></t<>	7	Resma (6)			51112	C. P. State of the second	A second second		12	14			245	
9 Rekha (2) Elastic COT BILI 02 02 02 02 12 12 13 62 124 4924 26 10 Rekha (2) Elastic ZioZa92 2/2 12 12 13 62 12 124 4924 26 10 Rekha (2) Elastic ZioZa92 2/2 12 12 13 62 124 26 27 121 242 133 11 Helima (2) Waist Elastic tack shill 23 22 26 26 24 120 247 135 12 Halma (2) (2) 22 27 26 23 22 119 23 8 136 13 Humkon (2) (2) 27 27 26 23 22 119 23 8 136 14 Kabit A (2) (2) 442 27 27 26 23 22 119 23 8 136 15 Humkon (2) (4)65 Elastic T/S F/L 22 27 26 23 22 119 23 8 136 16 Kabit A (2) (4)65 TT SNU 35 37 32 30 33 167 31 9 97 16 Kabit A (2) (4)65 TT SNU 35 37 32 30 32 33 167 31 9 103 17 Nul 13 (1) (1) (1) (1) 18 Koki 14 (1) Main Label Athen SNU 16 17 18 19 20 90 118 180 180 18 Koki 14 (1) (1) (1) 20 10 18 Nczmin Nahan (1) Tack ofen HIP 14 15 12 14 15 70 14 25 14 231	8	TOSAL C			and the second second	and the second second								
11 Halima 16 Waist Elastic tack tack skill 23 22 24 12 12 12 14 17 12 24 136 13 14 14 23 22 25 26 24 120 24 135 12 Halima IR 4 4 23 22 25 26 24 120 24 135 13 Hamkon IV Vaist Elastie TIS FIL 22 27 26 23 22 119 23.8 136 13 Hamkon IV Vaist Elastie TIS FIL 22 27 26 23 22 119 23.8 136 14 Kabita III Gauess Tint SNUL 35 37 32 30 33 167 31.4 103 15 Dulali III III IIII IIII 130 32 28 30 28 112 14 103 16 Kokita IIII IIII IIII IIIII IIIIIIIIII	9	Rekha (E)		Free Life Co		and the second second	and the state of the	12	12	13			4324	26]
11 Waist Unstre tack sine us of 22 25 26 24 120 24 135 12 Halma 12 Maist Instre tack sine us of 22 25 26 24 24 120 24 135 12 Halma 12 Maist Instre tack sine us of 22 25 26 23 22 119 23.8 136 13 Humkon 11 Maist Eldsfill TTS Fill 22-27 25 23 23 22 119 23.8 136 13 Humkon 11 Maist Eldsfill TTS Fill 22-27 25 23 23 22 119 23.8 136 14 Kabita 12 Auest Trot SWL 35 37 32 30 33 167 31.4 103 14 Kabita 12 Inseam T/S F/D 30 32 80 32 33 167 31.4 103 15 Dulal 13 Inseam T/S F/D 30 32 80 32 33 167 31.4 103 15 Dulal 13 Inseam T/S F/D 30 22 80 32 23 167 31.4 103 16 Kok, 14 14 15 12 20 00 18 1800 16 Kok, 14 14 15 12 14 15 70 14 25.8 112 17 Nun Islam 15 Leg Hem 14 15 12 14 15 70 14 231 18 NcZmin Nahan (16) Tack offen Hif 14 15	10		-	Letter to the first	and the second se	and the second s				27	12/	- and the second se		- =1+1
13 Humkon W Wall Halfle ITS HL 25 37 32 30 33 167 33.4 97 14 Kabita G2 Guess Tm1 SNL 35 37 32 30 33 167 33.4 97 14 Kabita G2 Guess Tm1 SNL 35 37 32 30 33 167 33.4 97 15 Dulali G2 Inseam T/S F/D 30 32 30 32 33 167 31.4 103 16 Kokita G2 Inseam T/S F/D 30 32 30 28 30 28 112 14 103 16 Kokita G2 Hem F/L 30 28 28 30 28 112 144 28.8 112 17 NUR Islam G5 Leg Hem F/L 30 28 28 30 28 144 28.8 112 18 NG2min Nahan (16) Tack often HIP 14 15 12 144 15 30	11	Halima (1)		Waist Elestic tack	and the second se		and the second second	- l	26	24	120	24	135	
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Table 9 Time study of Men's boxer

						ipacity St Name:	udy Sheet Floor: liz							
	sty	le: A4A3T	Item: Men's Boxer	MP:	21 SM\	/: 6.35	.ine: 02	Date: 03-	11-22 L	ine Balanc	e: 26%	Capacity: 9	97	
SL No	Card no	Name	Operation description		M/C type	1st	2nd	3rd	4th	5th	AVG	Actule (Capacity	Remarks
1	lm317421	Murshida	dart servicing		OL	2	. 24	26	25	24	24		135	
2	Jm317422	Rejina	security tack		PM		3 7	8	9	10	8		385	
3	Jm317423	Rojina	panel join		OL	6	67	69	70	66	68		47	97
4	Jm317424	Nisita	panel join		OL	64	63	70	52	72	64		50	57
5	Jm317425	Mousimi	panel top stitch		FL	20	20	24	22	20	21		152	
6	lm317426	Mim	label make		OL		8	8	7	8	8		426	
7	lm317427	Eti	label join		PM	1	15	16	17	14	15		216	
8	lm317428	lily	match cut parts		HP	1	13	15	12	14	13		245	
9	lm317429	Nipa	elastic cut		B/LT		8	7	8	7	7		437	
10	lm317430	Rajia	elastic zigzag		ZZ	1	13	12	12	13	12		261	
11	lm317431	Setu	waist elastic tack		PM	2	22	24	25	27	24		133	268
12	Jm317432	Soniya	waist elastic tack		PM	2	22	25	26	24	24		135	200
13	lm317433	Roshida	waist elastic top stitch		FL	2	27	25	23	22	24		136	
14	Jm317434	Sweety	Gusset join		PM	3	i 37	32	30	33	33		97	
15	Jm317435	Hosneyara	inseam T/S		FD	30) 32	30	32	33	31		103	
16	Jm317436	Roksana	main label attach		PM	10	i 17	18	19	20	18		180	
17	Jm317437	Morium	leg hem		FL	30	28	28	30	28	29		112	
18	Jm317438	Purnima	tack open		HP	14	15	12	14	15	14		231	
19	Jm317439	Tahmina	thread trim		HP	6	60	59	58	59	60		60	
20	Jm317440	Akhi	thread trim		HP	54	60	61	63	64	60		60	171
21	Jm317441	Roksana	thread trim		HP	6	64	60	59	61	63		51	
Highest c	ycle time:													
3ottlenec	k process i	name:												
low to in	nprove bot	tle neck pro	cess (details):											

This time study for GS buyer. The item was Men's boxer. SMV of the item was 6.35 min. There were 17 processes done by 21 manpower. We took the time study for the line. Around 5 time cycle we took for each process. Then we took the average time cycle and made the capacity of that line. We found that the capacity of the line was 47 pcs per hour that was so low capacity. The time cycles were the bottleneck process was 66, 67, 69, 70, 66 sec. Average time was 68 sec.

We noticed some unnecessary motion used by the bottleneck process operator. That is why the hourly production hampered by only that process. Then we checked the line balancing rate of that line. The line balancing rate was only 26% for that line.

3.5.2 Men's Boxer (Buyer: Next)

BUY	ER: NEXT		STYLE: 675888	GAR PR	IE:	UDY SE	10.0.1		DATE	2-12	22	LINE: 01	SMV #
SL.	OF NAME	10	OPERATION NAME	I MIC		M/C C	USERVE	D TIME		TOTAL	AVG.	GAPACITY	remarks
1	Alkacs		Waist Belt JAT	FIL	2.6	12.7	24	2.6	24	TIME 126	TIME	128	remares
20	Nayon		4	4	38	40	38	32	28	176		-92	-
3.	AKRAM		Les Hen	4	21	21	20	20	23	\$105	21	164	
4	HUSDA		Label Jost	SN/L	and the second second	16	17	17	18	23		195	-
5	Rubina		TACK open	tHP.		21	11	17	22		16 8	122	
6	NAZMA		Thread Thim	#11	66	69	68	68	71	342	65.4	distant statements	
7	Hamida		4	4	63	84		63	32	Statistics in the second		and the second second	-
8.	Tanik		4	4	83	60	52			361	72.2		
9	RESMA		waist Belt Make	211	12	11	14	80	75	359	71.8	45	-
10	MUKTA		Delt Many	HIP	29	26	20	the second s		64	12.8	263	-
tt	SUMI		Waist Belt Fack	SNIL		19	20	23	30	143	28.6		-
12	REKING		H H	- W	16	10	20	16	17		17.4	186	-
13				-	1.00	12	20	18	19	92	18.4	176	12
14				-		-	-	-	-		-		
15					-			-	-		_		-
16					-	-							
7	Rubina EL		TACK open	HIP	- 01	0.0	10		13	1471			
8	NAZMA (22)	-	The Thread Thim	9111 V	21	22	13	11	17	84	16.8	192	1
9	Hamida 22		the Incent hom	4	180	78	90	75	60	383	76.6	42	
1	Tania (22)	-	Gr.	1	32	53	46	48	51	250	50		
1	trans (-	4	le	66	51	63	61	60	301	60.2	53	
+		-		12 10 10			-				-		
+		-	Contraction of the second					-		1			1
1-		-		0	-			1				1.987/100	

Figure 10 Time study of Men's boxer

Table 10 Time study of Men's boxer

	st	yle: 675888	Item: Men's Boxer	MP: 12	IE Name: SMV: 5.7	: Floor: liz Line: 01		12-22 Lir	ne Balance:	: 27% Ca	apacity: 1	19	
SL No	Card no	Name	Operation description	M/C type	1st	2nd	3rd	4th	5th	AVG	Actule	Capacity	Remark
1	Jm3176564	Jorina	Waist belt join	FL	26	5 27	24	25	24	25		128	
2	Jm3176565	Resma	Waist belt join	FL	38	40	38	32	28	35		92	220
3	Jm3176566	Protiva	leghem	FL	21	21	20	20	23	21		154	
4	Jm3176567	Kolpona	label join	PM	15	16	17	17	18	17		195	
5	Jm3176568	Rima	tack open	HP	13	21	11	17	22	17		192	
6	Jm3176569	Golapi	thread trim	HP	66	69	68	68	71	68		47	
7	Jm3176570	Beauty	thread trim	HP	63	84	59	63	92	72		40	132
8	Jm3176571	Fahtuja	thread trim	HP	83	60	61	80	75	72		45	<u></u>
9	Jm3176572	Tohura	waist belt make	ZL	12	11	14	14	13	13		253	
10	Jm3176573	Mahmuda	belt mark	Нр	29	26	29	29	30	29		119	
11	Jm3176574	Rumana	waist belt tack	PM	15	5 19	20	16	17	17		186	362
12	Jm3176575	Khadija	waist belt tack	PM	16	i 19	20	18	19	18		176	
ghest c	ycle time:												
ottlene	ck process na	me:											

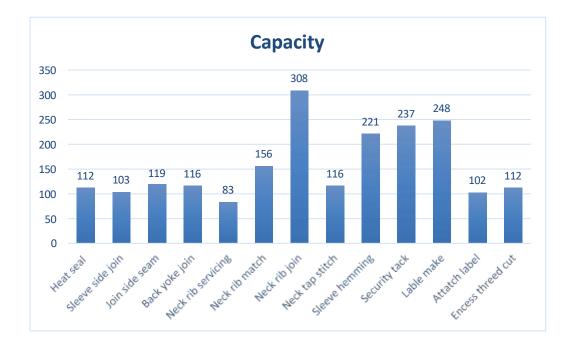
We did another time study for NEXT buyer. The item was Men's boxer. SMV fix for the item was 5.7 min. We saw that there were only 10 processes done by 16 manpower. Then for making the capacity we took the time study for the line. We took around 5 time cycle we took for each process. Then we took the average time cycle and made the capacity of that line. We noticed that the line capacity was 42 pcs per hour. We identified that thread cut process was our bottleneck process. Time cycle for the bottleneck process was 80, 78, 90, 75, 60 sec. Average time was 77 sec. For thread cut process we saw that hourly production was. After that we calculated the line balancing rate of that line. The line balancing rate was only 27% for that line.

CHAPTER-4 RESULT & DISCUSSION

4.1 Result & Discussion of T-Shirt

4.1.1 Analysis of capacity study of T-shirt

Figure 11 Analysis of capacity study to find bottleneck



In this chart we saw that, we found the lowest capacity as bottleneck process named neck rib servicing. We saw that this process output was only 83 pcs per hour. That was so less production of that line. There the operator took lot of unnecessary time for complete the process. If the operator took the standard time to complete then the operate maybe capable to give 100 over pcs and the line will be balanced. To complete the process the operator took 43 average second. There were another two bottleneck process we found that will be another curse of that line. That were Label attach & sleeve side join. The two process took 35 & (81+61) second. We used the data to make Line balancing rate and found the rate was 57%. So we should increase the LBR% of the line

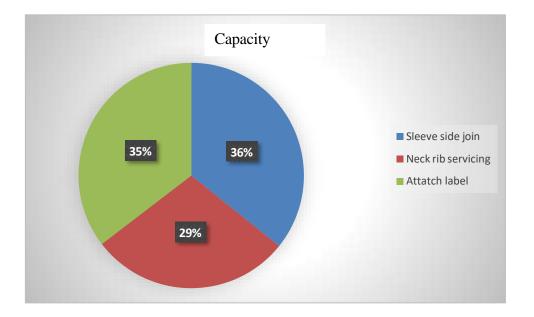


Figure 12 Comparison of first three bottleneck process

In this pie chart we saw that, Neck rib servicing process produced only 29% production that was so less for the line. The input was 112 pcs per hour. But for neck rib servicing process the output was 83 pcs per hour. So we can say that the percentages was so less than the input production percentages. The other bottleneck process that was attach label that was produced 35% production. The another bottleneck process was sleeve side join that was produced 36% production. Here we can solve the bottleneck process by using some techniques. The solution is given below:

4.1.1 Probable solution

We can solve the problem of Neck rib servicing process by process sharing method or method improvement process. We noticed that there were another process which capacity was very high like security tack & label make process. If we share the neck rib servicing process with security tack or label make process then we can increase the production. And if we add one operator extra for this process, we can increase the productivity of the line. This is how we can solve the bottleneck process.

4.1.2 Analysis of capacity study of T-shirt

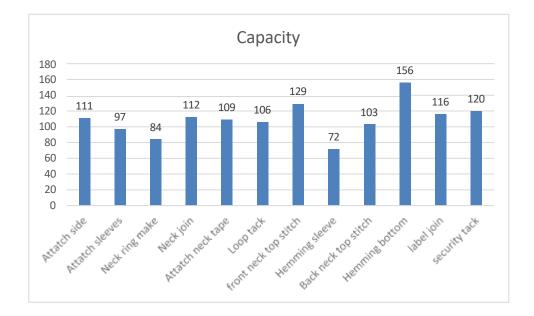
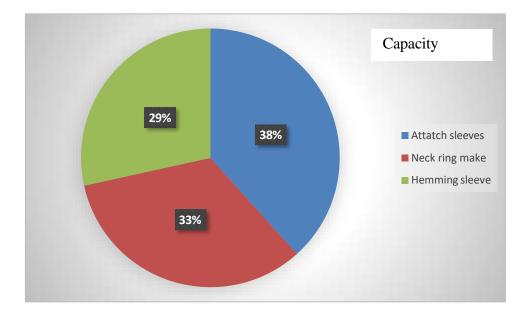


Figure 13 Analysis of capacity study to find bottleneck

Here we find that hemming sleeve has lower capacity, which is 72. Second lower capacity process name is neck ring make. It has 84 capacity. Third bottleneck process is back neck top stitch and it has 103 capacity. By analysis, we find this three bottleneck. We will describe how to solve this bottleneck.

Figure 14 Comparison of first three bottleneck process



4.1.2 Probable Solution

Here we see that 111 pieces input is inserted the line. The output is only 72 pieces though. All the capacity is over hundred. Only two are them are below hundred. So, if we take some necessary step, we can easily solve the bottleneck.

Process share: Here we see that hemming bottom has 156 pieces capacity and hemming sleeve has only 72 pieces capacity. If we share these two process, then bottleneck will be solve. After

doing 100 pieces of hemming bottom in an hour, the operator will do hemming sleeve rest of the time of that hour. This is called process sharing and by doing that we can easily solve that.

Motion and method study: By developing motion and method of bottleneck process we can increase the capacity and gradually remove the bottleneck.

4.1.3 Analysis of capacity study of T-shirt

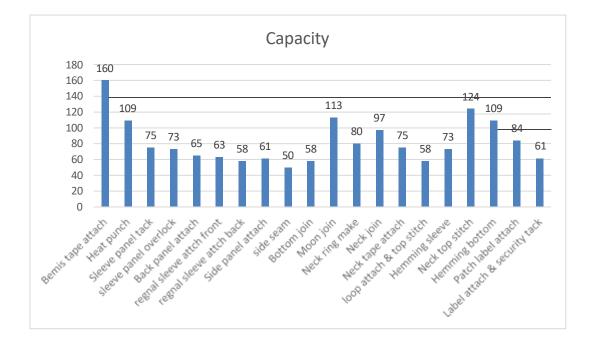
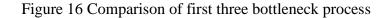
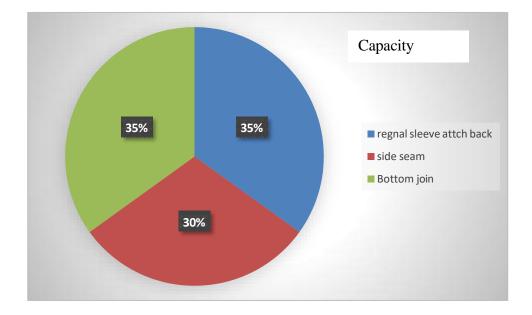


Figure 15 Analysis of capacity study to find bottleneck

In this chart we saw that, side seam join process produce less production of that line. So side seam join process was the bottleneck process of the line. We saw that side seam join process took highest average cycle time that was average 72 second. We also saw that the input entered in that line was 74 pieces. But at the end the production was only 55 pieces. Middle of the line delivered more then 50 pieces, and final check process output was 50 pieces for the side seam join process. So side seam join process was the bottleneck process we found. There the operator did the process and having also some unnecessary motion. That's why the production was so much less.





In this pie chart we saw that, side seam process produced only 30% production that was so less. This 30% production was so less than the input production. The other bottleneck process that was raglan sleeve join back part & bottom join produced 35% both. Here we can solve the bottleneck process by using some techniques. The solution is given below:

4.1.3 Probable solution

We can solve the problem of side seam join process by adding some improvement like motion improvement or method improvement or adding one machine. We also increase production by reduce the unnecessary motion of the side seam operator. If we reduce the unnecessary body movement of that operator we can reduce some time and production will increase. Besides we can share the process with bemis tape attach process. Because bemis tape attach process capacity was 160 pcs. per hour. That can be benefited for the line and line production will increase. This is how we can solve the bottleneck process.

4.1.4 Analysis of capacity study of T-shirt

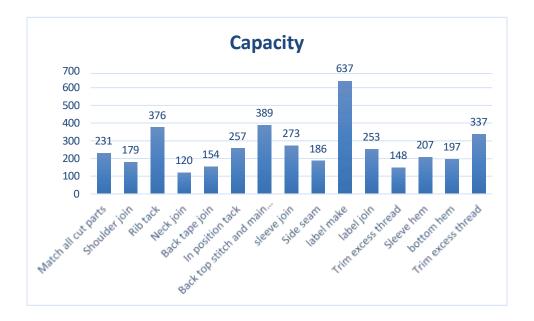
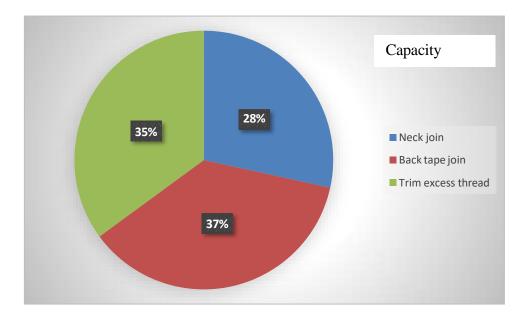


Figure 17 Analysis of capacity study to find bottleneck

Here we find that, neck join has less capacity. Here only 120 capacity is noticed. The second bottleneck is trim excess thread, third bottleneck is back tape join, and their capacity is 120 and 148 & 154 respectively. Here 231 pieces input is inserted to this line but only 120 pieces output can be possible. Here we notice that some process has over 400 capacity which is wastage. So we need to balance the line and minimize the bottleneck.

Figure 18 Comparison of first three bottleneck process



4.1.4 Probable Solution

4.1.4.1 Motion Improvement

We know that body motion is 6 types:

- Pick up
- Put under pressure foot
- Align
- Stitch
- Remove from pressure foot
- Dispose

We can improve these motion of the bottleneck operator and increase the capacity of her. Here neck join process operator's motion can be developed.

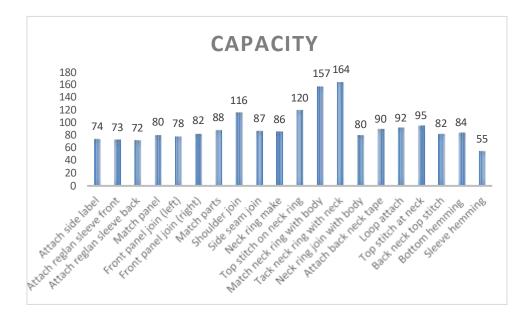
4.1.4.2 Add machine with or without operator

We can add overlock machine with or without operator. We see that back tape top stitch has too much capacity. We give there a multi skill operator and asked her to do both neck join and neck tape top stitch by sharing the time of an hour.

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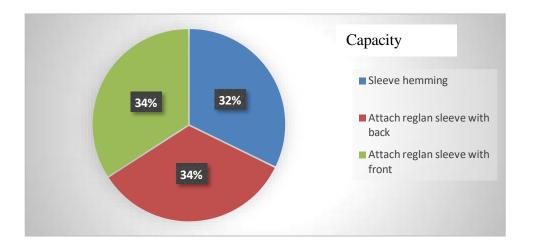
4.1.5 Analysis of capacity study of Fem dirt T-shirt

Figure 19 Analysis of capacity study to find bottleneck



Here we observed that sleeve hemming process has lower capacity. Only 55 pieces garments are output from here. On the other hand we observed that 74 pieces body is inserted to the line which is not sufficient. We must need to increase the line input from beginning. If we do so then sufficient body will be gathered near the operator .After that too much production will possible.

Figure 20 Comparison of first three bottleneck process



Here we see that sleeve hemming process has lower capacity and then attach reglan sleeve with back and attach reglan sleeve with front. This is the first three bottleneck. We need to solve this.

4.1.5 Probable solution:

Process share: Here sleeve hemming operator has 55 pieces capacity and bottom hemming operator has 84 pieces capacity. We can share these two process. Bottom hemming operator will do bottom hemming in 40 minutes and rest of the 20 minutes she'll do sleeve hemming. By this process, the final output will increased.

4.2 Result & Discussion of Sewing Vest

4.2.1 Analysis of capacity study of sewing vest

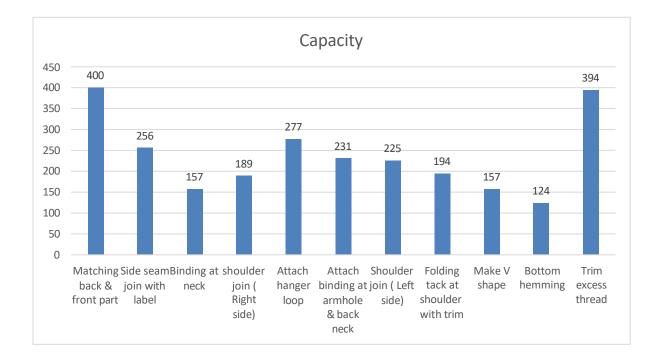
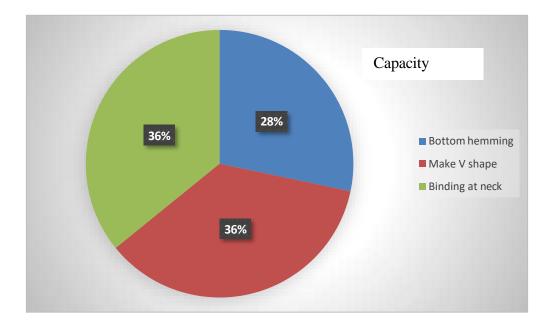


Figure 21 Analysis of capacity study to find bottleneck

In this chart we saw that, bottom hemming process produce less production of that line. So bottom hemming process was the bottleneck process of the line. We saw that bottom hemming process took highest average cycle time that was average 29 second. We also saw that the input entered in that line was 400 pieces. But at the end the production was only 124 pieces for bottom hemming process. Middle of the line delivered more then 150 pieces, and final check process output was 394 pieces capacity for trim excess thread process. So bottom hemming process was the bottleneck process we found. There the operator did the process and having also some unnecessary motion. That's why the production was so much less.

Figure 22 Comparison of first three bottleneck process



In this pie chart we saw that, bottom hemming process produced only 28% production that was so less. This 28% production was so less than the input production. The other bottleneck process that was Make V shape & binding at neck produced 36% both. Here we can solve the bottleneck process by using some techniques. The solution is given below:

4.2.1 Probable solution

We can solve the problem of bottom hemming process by adding some improvement like motion improvement or method improvement or adding one machine. We also increase production by reduce the unnecessary motion of the side seam operator. If we reduce the unnecessary body movement of that operator we can reduce some time and production will increase. Besides we can share the process with attach hanger loop process because of over capacity. Because hanger loop attach process capacity was 277 pcs. per hour. That can be benefited for the line and line production will increase. This is how we can solve the bottleneck process

4.3 Result & Discussion of Long pant

4.3.1 Analysis of capacity study of long pant



Figure 23 Analysis of capacity study to find bottleneck

Here we see that Leg hemming process has lower capacity (69). Here we see that 133 pieces is given to the line but the output is only 69 pieces. Something is wrong in the middle portion of the body. We observed three bottleneck and tried to solve these according to the various techniques of ours.

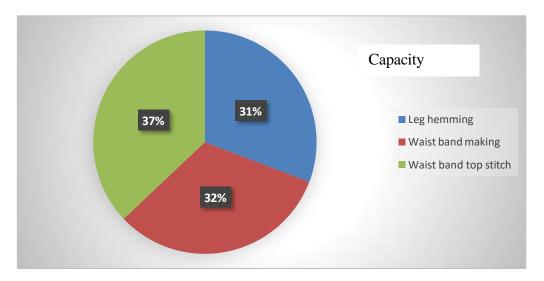


Figure 24 Comparison of first three bottleneck process

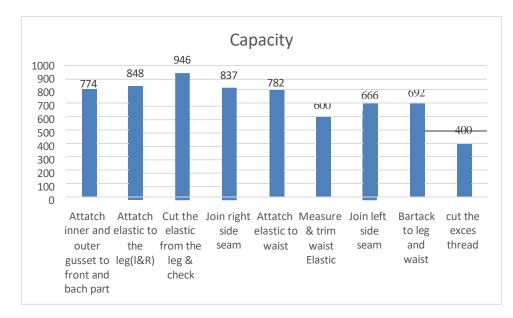
We observed here three bottleneck in this pie chart. We see that, Le hemming capacity is 31%, Waist band making capacity is 32% and waist band top stitch capacity is 37%. Here leg hemming is first bottleneck because it has lower capacity.

4.3.1 Probable solution:

Motion improvement: We can improve the motion of hemming process operator. We know that hemming is done by Flat lock machine. So, we can improve her motion.

Add machine without operator: Here we see that Elastic making process has higher capacity (180). This too much capacity is no need. We add here multi skill operator who can bot able to make elastic ring and also can do hemming process

4.4 Result & Discussion of Girl's Hipster

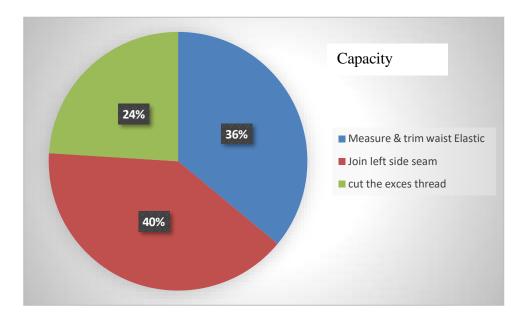


4.4.1 Analysis of capacity study of girl's hipster

Figure 25 Analysis of capacity study to find bottleneck

In this chart we saw that, cut the excess thread was the bottleneck process of the line. We saw that the input entered in that line was 774 pieces. But at the end the production was only 400 pieces. Middle of the line delivered more then 600 pieces, output was 400 pieces for the thread cut process process. We noticed something was happened in thread cut process. There only one operator did the process and having some unnecessary motion. That's why the production was so much less.

Figure 26 Comparison of first three bottleneck process



In this pie chart we saw that, the production of thread cut process was so less. Only 24% production achieved from thread cut process. The production of trim waist elastic & join left side seam 36% and 40% respectively. Here we can solve the bottleneck process by using some techniques. The solution is given below:

4.4.1 Probable solution

We can solve this problem by adding some improvement. It can be motion improvement or method improvement. If we reduce the unnecessary body movement of that operator we can reduce some time. Besides we can share the process with over capacity process. That can be benefited for the line and line production will increase. This is how we can solve the bottleneck process.

4.5 Result & Discussion of Men's Boxer

4.5.1 Analysis of capacity study of Men's boxer

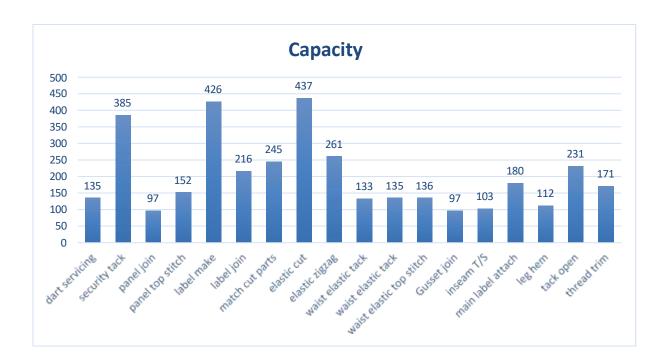


Figure 27 Analysis of capacity study to find bottleneck

In this chart we saw that, two bottleneck process we found. One was panel join & another was gusset join. We noticed that in panel join process there were two operator did that process. Two operator produced 97 pcs per hour. Another process was gusset join. Here also production was 97 pcs per hour. In panel join process total time took 33.3 sec. Besides gusset join process also took 33.3 sec. So here the both process was the bottleneck process. First bottleneck process was panel join and second bottleneck process was gusset join.

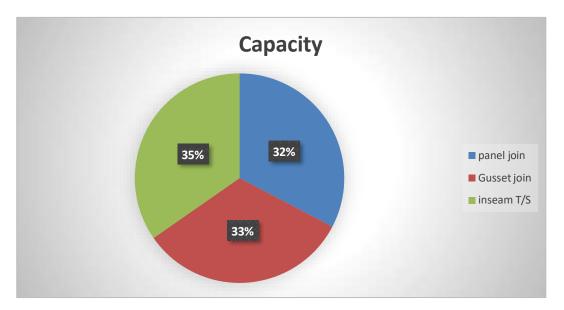


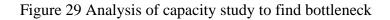
Figure 28 Comparison of first three bottleneck process

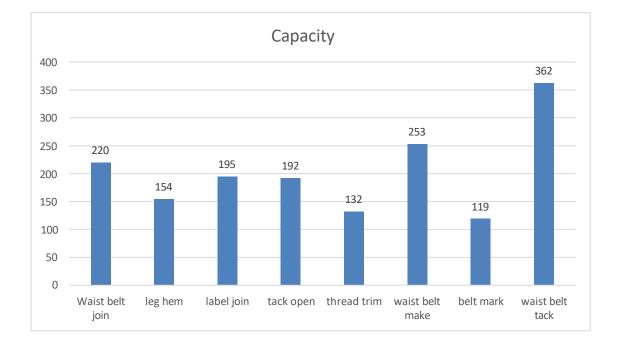
In this pie chart we saw that, Panel join process and gusset join process produced only 32% and 33% production that was so less. This percentages was so less than the input production. The other bottleneck process that was inseam top stitch that was produced 35% production. Here we can solve the bottleneck process by using some techniques. The solution is given below:

4.5.1 Probable solution

We can solve the problem of panel join process by body movement improvement like pick up, dispose, align etc. If we increase the production by reduce the unnecessary motion of the panel join operator then our first bottleneck process will be reduce. And If we increase the machine speed and balance the control of the operator then we will increase productivity. We also can share the panel join process with label make process and gusset join process can share with elastic cut process that can be benefited for the line and line production will increase. This is how we can solve the bottleneck process.

4.5.2 Analysis of capacity study of men's boxer





In this chart we saw that, waist belt mark was the bottleneck process. We noticed that in waist belt marking process there were only one operator did that process. The operator took 29 second to completed the process. That is why the operator gave only 119 pcs production per hour. So here the bottleneck process was waist belt mark. The other process went on smoothly.

Figure 30 Comparison of first three bottleneck process

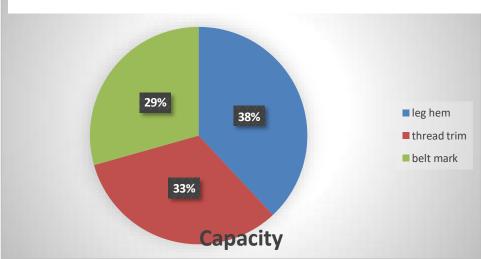


Figure 31 Comparison of first three bottleneck process

This pie chart we saw that, Waist belt marking process produced only 29% production that was so less for the line. This percentages was so less than the input production percentages. The other bottleneck process that was trim excess thread that was produced 33% production. The another bottleneck process was leg hemming that was produced 38% production. Here we can solve the bottleneck process by using some techniques. The solution is given below:

4.5.2 Probable solution

We can solve the problem of waist belt mark process by process sharing method. We saw that there were another process which capacity was very high like waist belt make process, waist belt tack process etc. If we share the waist belt marking process with waist belt tack or waist belt make process then we can increase the production. And if we add one operator extra for this process, we can increase the productivity of the line. This is how we can solve the bottleneck process.

CHAPTER-5 RESPONSIBILITIES, HEALTH, SAFETY, SOCIO-CULTURE AND ENVIRONMENTAL CONSIDERATION

Here, we will discuss if the work performed in our industries will have an adverse effect on the environment. environment. And what features are enhanced if we uphold these Health, Safety, and social responsibilities.

5.1 Codes and standards used

Liz Fashion Industry Ltd. is one of Bangladesh's prominent garment industries. Most purchasers of this industry are internationally renowned and environmentally aware. Therefore, adherence to all international norms of behavior is a must for their order. BSCI and CSR regulations must be adhered to. Zero tolerance for kid work, in order to avoid unexpected difficulties. Additionally, uphold ISO 9001, the international standard for quality management. The ETP procedure must be maintained. So that, beginning with sample manufacturing and continuing through mass production, the amount of water required has no negative impact on the environment.

5.2 Ethical principles and professional commitment

This industry's guiding concept and commitment is to preserve the health of the environment for future generations. Make an effort to develop eco-friendly goods. There is a common practice of using organic cotton yarn to construct clothing. Utilizing high-quality, non-hazardous dye chemicals. During working hours, avoid abuse and harassment. After completing one's primary responsibilities, one is not need to work part-time for an extended period of time. It is necessary to abolish gender discrimination.

At least once a month, perform a fire drill. And to ensure that all personnel exit the factory within six minutes

5.3 Impact on society, health, safety, legal and cultural issues

Keeping to the standards set by international organizations benefits everyone involved. Following BSCI guidelines is one example that guarantees worker advantages. After the end of a worker's shift, no additional hours can be worked. The BSCI standards include prompt payment of salaries, a ban on the employment of child labor, and stringent oversight of any instances of abuse or harassment of female employees. Most purchasers now insist that BSCI standards be met. This has a good social impact because it ensures that workers receive their correct benefits. Social responsibility initiatives are governed by the policies of yet another global body. Any imaginable societal problem is guaranteed to exist here. Women should be given paid time off and other benefits such as childcare subsidies, for instance. Build a mosque or a school near the manufacturing hub. Therefore, it contributes positively to society. Customers are receiving correct quality items as a result of adhering to ISO standards. Social audits are used to keep an eye on the security conditions in various industries. Industries therefore have fire alarms built in strategic locations, emergency exits constructed, and personnel on hand at all times to put out any blazes that may break out. The social audit also takes into account the cleanliness of the workplace and the availability of clean restrooms for the employees. Assuring both the workers' and the environment's safety is a top priority here.

5.4 Impact on Environment

The term "ETP" has become widely used in the textile industry in recent years. We are aware that the textile industry consumes vast quantities of water. Furthermore, if these waters are discharged without any changes from their previous use, it might have a devastating effect on the ecosystem. We've implemented the ETP Process to do away with that.

The water is cleaned up before being released back into the environment, so there's no harm done. The environmental benefits of this ETP technique are substantial. However, businesses are making an effort to provide environmentally friendly goods. It's being put through a dry wash in an effort to make it serviceable. The use of all-natural yarn. All of these efforts are improving the natural world in significant ways.

CHAPTER-6 CONCLUSION

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By collecting the Capacity study and bottleneck processes from Liz Fashion Industry Ltd and JM Fabrics Ltd, we concluded our project. This project enables us to comprehend the assembly, bottleneck analysis, time and motion study-related term and their suitable methodologies.

- After analysis, we find neck rib servicing is bottleneck process and we can share process with security tack and label make again, we can also by motion improvement.
- Sleeve hemming is bottleneck process. By sharing we made the to do bottom hemming in 40 minutes and rest of the 20 minutes sleeve hemming.
- We found that, side seam process produce less production of that line and we solve that by improving motion.
- Neck join is less capacity and reduced that by adding with or without operator.
- Here hemming sleeve was bottleneck and solved that by workload even distribution.
- We found that, bottom hemming process produce less production of that line and we solve that by improving motion of the operator also by sharing process with attach hanger loop.
- After analysis, we found that leg hemming operator has more work load that's why it is bottleneck process and we solve it by bottleneck solving method.
- Thread cut process was bottleneck because of extra motion of helper. Reduced that extra motion and solve that.
- We found panel and gusset join has lower capacity. We increased that by increasing the machine speed.
- We found waist-belt mark process was bottleneck and we did share belt mark process with waist belt mark process.

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