Faculty of Engineering
Department of Textile Engineering

STUDY ON INDUSTRIAL ENGINEERING TECHNIQUE OF A KNIT GARMENTS INDUSTRY

Course Title: Project (Thesis) Course Code: TE4214

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A Thesis submitted in partial fulfillment of the requirements for the degree of **Bachelor of Science in Textile Engineering.**

Advance in Apparel Manufacturing Technology

LETTER OF APPROVAL

12 September 2021

To

The Head

Department of Textile Engineering

102, Shukrabad, Mirpur Road, Dhaka 1207

Subject: Approval of Project Report of B.Sc. in TE Program.

Dear ma'am ,

I am just writing to let you know that this project report titled as study on Industrial Engineering has been prepared by the student bearing **Md.Selim Mondal** (191-23-5519),**Md.Masud Rana**(191-23-5524) and **Md.Jobaer Hossain** (191-23-5547) are completed for final evaluation. The whole report is prepared based on the proper investigation and interruption through critical analysis of empirical data with required belongings. The student were directly involved in their project 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 project report and consider it for final evaluation.

Yours Sincerely,

.....

Ms. Mst. Murshida Khatun

Assistant Professor

Department of Textile Engineering

Daffodil International University

DECLARATION

We are declare that the work which is being presented in this report entitled, “Project Report” is original work of our, 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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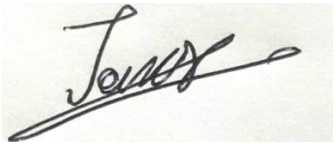

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ACKNOWLEDGEMENT

First, I express my heartiest thanks and gratefulness to almighty Allah for his divine blessing makes me possible to complete this Project successfully. I feel grateful to and wish my profound my indebtedness to **Ms. Mst. Murshida Khatun (Assistant Professor)**, Department of Textile Engineering, Daffodil International University. Deep knowledge and keen interest of my supervisor in the field of garments manufacturing influenced me to carry out this project. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior draft and correcting them at all stage have made it possible to complete this project.

I would like to express our heartiest to the authority of the **Knit Valley Fashion Ltd** For their kind help to finish my project. Special thanks to **Depok Das (Sr. Executive IE), Md. Eng. Maruf (IE Manager)** who guided me in the factory and entire employees and workers who gave their valuable time for me.

Also to other faculty member and the staff of Textile engineering department of Daffodil International University.

I would like to thank our entire course mate in Daffodil International University, who took part of this discuss while completing the course work.

Finally, I must acknowledge with due respect the constant support and patients of my parents.

ABSTRACT

This thesis paper contains the overall procedure of SMV and operation bulletin of the garments industry. Have visited to knit valley Fashion Ltd. collecting the SMV and its related data. Completed in time study, production, capacity study, Operation bulletin, Target, Efficiency.

After applying all those, we have compare before and after situation, labor productivity and line efficiency. Finally proposed production layout has been modeled and ensure a better productivity.

In this paper, discussed some procedure about time, Capacity, Target, SMV, and production study and analysis of different method and discussed about operation breakdown and other tools and technique, which consists of different experimental discussion, experiment result and discussion this analysis we can know about the different item SMV.analysis three items operation bulletins. Achieved result of product SMV for SHORT PANT 3.71, T-SHIRT 5.58, T-SHIRT 6.85, and GIRLS T-SHIRT 7.53.

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CHAPTER - 1:

1.1 Introduction:

Present techno economic scenario is marked by increasing competition in almost every sector of economy. The expectation of customers are on the rise and manufacturers have to design, and produced well in as many variety as possible (concept of economies of scale is no more talked off) to cater to the demand of customers. Thus, there is a challenge before the industries to manufacture goods of right quality and quantity and a right time and at minimum cost for their survival growth. This demand the increase in productive efficiency of the organization. Industrial Engineering is going to play a pivotal role in increasing productivity. Various industrial engineering technique are used to analyze and improve the work method, to eliminate waste and proper allocation and utilization of resource. Industrial Engineering is a profession in which a knowledge of mathematical and natural sciences gained by study, experience and practice is applied with judgment to develop the ways to utilize economically the materials and other natural resources and focus of nature for the benefit of mankind.

1.2 The nature of the work in IE is as follows:

Industrial engineers find out is how to use the basic factors of production — people, machines, materials, information, and energy – to manufacture or process a product in the most efficient way possible. Develop a product or provide a service they serve as a link between managerial objectives and operational realities. Performance. They are more focused with boosting productivity through better management of resources. Engineers in other specialties are more knowledgeable about people, business techniques, and technology than engineers in other areas. Who are more concerned with product or method.

Industrial engineers work to solve organizational, production, and related challenges in the most efficient way possible:

1. Research the product and its specifications.

2. To achieve product requirements, use mathematical methods.

3. Create manufacturing and data processing systems.

4. Create financial planning and cost analysis management control systems.

5. Create production planning and control systems to ensure that activities are coordinated and product quality is maintained.

6. Figure out which factory location offers the optimum mix of raw material availability, transportation, and pricing.

7. Create mechanisms for calculating wages and salaries, as well as job evaluation programs.

1.3 Objective of this project:

- To improve the productivity of the garment industry.
- For a better working environment in the apparel sector.
- To improve layout in many lines of the clothes business.
- To improve the inventory management system.
- Sewing floor equivalence.
- All-around balancing for nonstop productivity.

1.4 Importance of this project:

In numerous articles, documents, and calculations, we combine our general education line with practical life.

- Around (80-85%) of foreign currency are earned by the garment and textile business.
- The textile and it sub-sector employs a high number of industrial engineers.
- I expect that the project will provide opportunities for tech industrial engineers who will help to lead our textile and garments sector in the future.
- Bangladesh is a developing country, and as such, it is heavily reliant on foreign cash.

1.5 Scope of this project:

- Huge potential to do anything in IE department of a garment industry.
- Now a day IE demanded for increasing production.
- Almost all RMG manufacturers are aware of the importance of IE in enhancing output.
- The RMG business has many chances to create IE strategies and procedures to boost productivity.
- It is such a fascinating subject that practically every industry is investing in IE research in order to boost efficiency.
- The creator of RMG industries can recognize the true need for IE sector in order to increase their sales.

CHAPTER – 2:

LITERATURE REVIEW

2.1 Definition:

Industrial engineering is a discipline of engineering that focuses on the improvement of complex processes, systems, and organizations. Industrial engineers aim to decrease non-value-generating waste of time, money, materials, person-hours, machine time, energy, and other resources. They build technical processes and systems that increase quality and productivity, according to the Institute of Industrial and System Engineers.

2.2 Concept of IE:

Global competitiveness, rising production costs, lower productivity efficiency, workforce attrition, and other reasons are all posing significant problems to the garment manufacturing and exporting business. The fact that our country has enormous human resource strength in and of itself motivates us to conduct such an investigation. We will need industrial engineering skills to overcome these challenges.

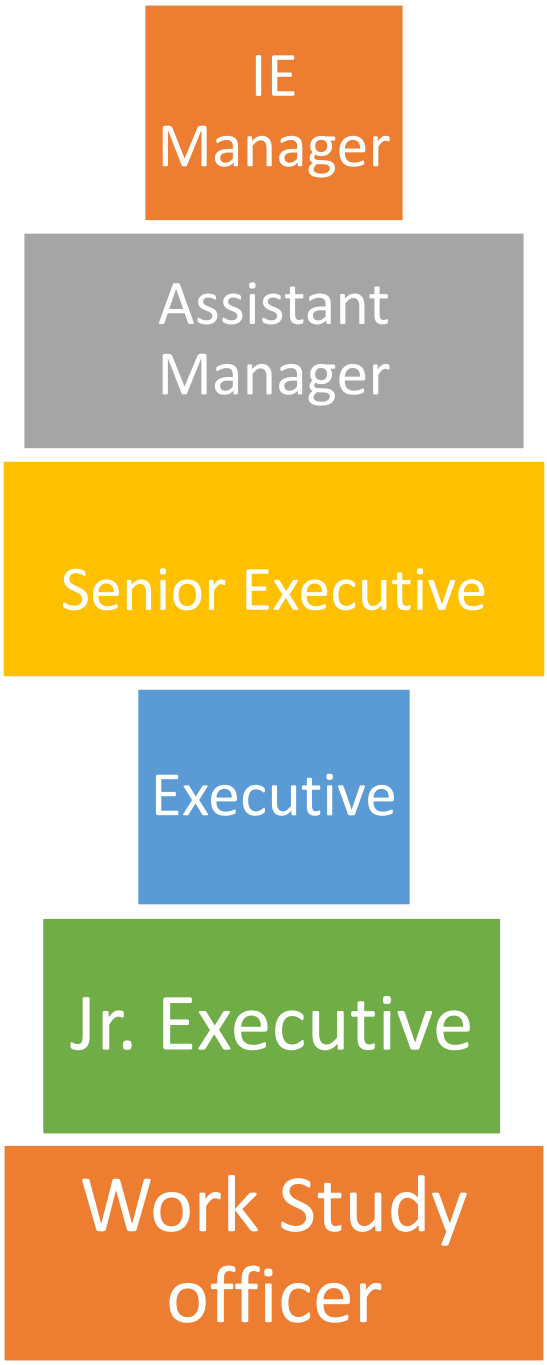
2.2.1 Objective of IE:

- To improve productivity.
- Motion reducing improves the method.
- Reduce the work in progress (WIP) and eliminate the bottleneck.
- Improve the quality of service.
- Reducing the human-machine ratio.
- Improving the price, waste, and rejection processes Waste and faults should be minimized.
- Fill in the major performance indicator for the target.
- Keep the workplace and surroundings safe.
- Output planning and execution.

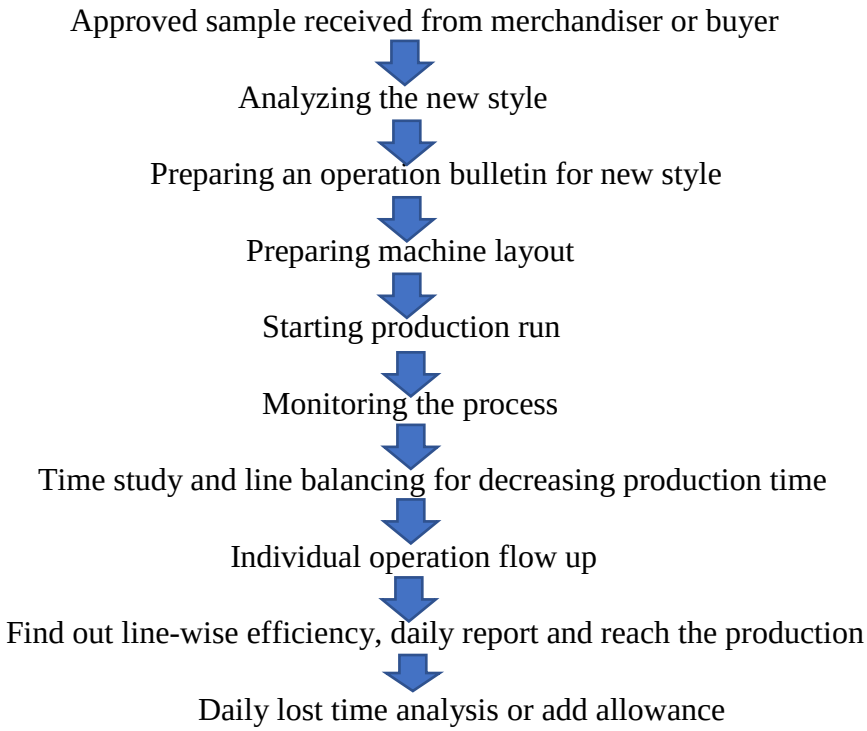
2.2.2 Functions of IE:

- Developing the most basic work procedures and determining the best strategy to complete the task.
- Using established approaches to establish performance standards (Standard Time).
- To create a solid salary and incentive structure.
- To assist in the conception and implementation of a solid inventory control system, as well as the calculation of a cost-effective lot size and work-in-process for each step of production.

2.2.3 Organogram of IE Department:



2.2.4 Procedure or flowchart of work-study:



2.2.5 Activities of IE:

- Time, cost, and performance requirements are all being developed.
- Selection of processes and assembly methods, as well as tool and equipment design.
- Plant location, building layout, machine and equipment design are all part of the facility design.
- Raw materials and completed goods storage facilities are part of the materials handling system.
- Design and enhancement of production, inventory, and control planning and control systems
- Quality control, plant maintenance, and distribution systems are all important.
- System for controlling costs.
- Statistical and mathematical analysis
- Evaluation of performance.

2.3 Industrial Engineering Tools:

- Lean manufacturing.
- 5S.
- JIT (just in time).
- KAIZEN

2.3.1 Lean Manufacturing:

Lean manufacturing, also known as lean production, is a systematic technique to minimizing waste in factory or plant operations in order to achieve high efficiency.

- **Transportation:** occurs throughout the manufacturing process, from the supply chain through the distribution of commodities, as well as inside specific industrial areas.
- **Inventory:** Finished goods, substructures, raw materials, office supplies and repairs, maintenance and repair, and service are the five key categories (MRO).
- **Motion**: This includes bending, reaching, height, and walking. The ease with which they may be used as tools across workstations will result in a lot of needless mobility.
- **Excess processing**: This occurs when time is spent on items that have no bearing on component functionality. Painting a portion that is not visible, for example, is non-essential and superfluous if it still functions well without it.
- **Defect:** Rework/salvage and scrap will add to defects. It is, without a question, the most expensive type of waste, particularly if the buyer receives a defective product.
- **Overproduction:** It creates more things than are ordered, perhaps causing an inventory deficit and squandering time that may be put to better use elsewhere.
- **Waiting:** comes in a variety of forms. The most noticeable may be a line shutdown while components or equipment is being replaced. Finally, there is in process, in process, in-process waiting that occurs when an employee must wait for a computer to process before proceeding to the next stage in the process.

2.3.2 5S:

5S is a method for organizing a work place especially a shared place. This methology originates originate from a Japanese housekeeping idea.

- **Seiri(Short):** Clear unnecessary materials and remove unused materials. Remove idle equipment.
- **Seton (Set in order):** Ensure good housekeeping this includes arrange the right material at right place for quick access and disposal.
- **Seiso (Shine):** Keep Cleaning the machines and workplace.

- **Seiketsu(standardize):** Follow the same practices throughout all shifts to ensure higher efficiency.
- **Shitsuke (Sustain):** Processes should be placed in place to ensure that the other 4 are still pursued and not a one-time project.

2.3.3JIT (just in time):

Just in time management is a management method for reducing inventory levels and improving manufacturing process performance by monitoring inventory movements to and from an organization. The goal aims to structure raw material command such that items are only ordered for manufacture when they are essential.

2.3.3.1Advantage of JIT:

- Keeping excess production at bay.
- Reduced transit prices and wait times.
- Tied up capital reductions.
- Allow yourself to be free of the inventory commitment.
- The number of product faults has decreased.

2.3.4 KAIZEN:

Kaizen is a Japanese term that means "constant improvement." Kaizen is defined by two Japanese terms: kai, which means'shift,' and z, which means 'good.' Toyota introduced the Japanese concept for the first time in the 1980s, and hundreds of firms throughout the world have since adopted it. This little improvement fosters a change-oriented culture that gradually improves quality, productivity, and profitability

2.3.4.1 Kaizen Advantages:

1. Respectable goals: Kaizen is not just beneficial to the company as a tool for transformation. It also benefits employees, clients, and the entire organization.

2. Increased coordination: One of the main advantages is better coordination. Kaizen is a quality management platform that is driven by a group of people.

3. Kaizen develops leadership skills: Each kaizen team requires a team leader. The kaizen team's execution is organized and directed by the team leader.

4. Increased efficiency: One of the most important kaizen advantages is increased quality. Kaizen improvements improve service efficiency.

5. Elimination of waste: Kaizen was used to reduce waste from company operations. Another significant advantage of kaizen is that it reduces waste. Everyone is responsible for kaizen.

2.4 Line Balancing:

To eliminate bottlenecks and surplus capacity, line balancing levels the workload across all operations in a cell or value stream.

Line balancing is defined as the methodical layout of machines, work assignments, and sewing lines to achieve a consistent production and reduce idle time. The balance of the line in the textile sector is categorized according to the style and design of the stitching machines. The type of garment it produces governs the line structure of a sewing machine.

2.4.1 Important of line balancing:

- Determine systematic work procedure, which is important for smooth production.
- Determine exact number of machine and operator in a line.
- It helps to make ideal work plan.
- Reduces cost of production
- Help to determine labor requirement in a line.
- Increase productivity
- Increase profitability
- Reduce fault in finished good.

2.5 Efficiency:

While efficiency measurements are more helpful and understandable than productivity measurements, they are another way of expressing productivity. Efficiency metrics show how well we do in comparison to a selected for analysis goal. The efficiency is simple to calculate since the aim is defined as a time per garment or a needed level of output. Targets are typically established at a 100 percent performance level, so if an operator meets his or her goal production, his or her efficiency will be 100 percent. Similarly, if an operator only achieves 75% of his or her goal, his or her efficiency is 75%.

2.5.1 Formula of Efficiency:

Efficiency,

$$= \text{Total output per day} \times \text{SMV} \times \text{Efficiency} / \text{Total Manpower} \times \text{Working Hour}$$

2.6 Cycle checks:

A cycle check is a rapid time study that is used to quickly set a target or determine whether an operator can fulfill a standard time.

The cycle time is the time it takes an operator to complete one cycle of an operation, i.e. the time between pick-up and disposal.

Perform a cycle check by following the steps below:

- Select the operation or operations to be studied and complete out an appropriate form with the necessary information.
- Observe five cycles of each procedure while keeping track of the time for each.
- For each operation, determine the average cycle time.
- Compare the given basic time with the cycle time.

2.7 Standard Minute Value (SMV):

SMV is defined as the quantity of time allotted to do a task properly. It is usually stated in minute value. Standard Minute Value is the entire definition of SMV. In the garment manufacturing business, the word MV is commonly used. Standard Allocated Minute (SMV) is another name for SMV (SAM). A merchandiser needs a good SMV set up in the garment factory floor for a successful and timely shipping of an export order. The standard minute value is the amount of time it takes to execute any given task using the best techniques available at a standard level of performance.

2.7.1 Factors of Standard Minute Value in Garments:

- Garments of various types.
- Fabrics come in a variety of sizes.
- Size of the garments
- Garment design is a term that refers to the design of clothing.
- The process's difficulties.
- Machines come in a variety of shapes and sizes.
- There are many types of technology.

2.7.2 SMV Calculation in the Garment Industry:

SMV calculations in the garment industry vary depending on the number of operations, type of fabric, number of workers, machine performance, and so on.

SMV Formula,

SMV=Basic time +Allowance

Basic Time= Observe time× Rating

Observe Time = Total cycle Time / Number of cycle

Allowance= Personal Allowance + Machine Allowance + Bundle Allowance

Rating=Performance rating is the speed and performance of a worker

2.8 Bottleneck:

A bottleneck occurs when a single or small number of items or resources limit the overall performance or capacity of a system. The neck (opening side) is the top short piece of the front, and it is a barrier to getting from the big portion of the bottle to the narrow area of the neck. It's a figurative scenario of a production sector impediment.

2.8.1 Reason of bottleneck:

- Bundling mistake
- Wrong issue supply
- Pattern problem
- Accessories delay
- Input delay
- Quality problem
- Wrong operator supply
- Line balancing not proper
- Machine problem
- Operator sick

2.8.2 Bottleneck Eliminate techniques:

- Method improve
- Better operator allocate
- Share capacity
- Add manpower and machine
- Overtime
- Use time saving tricks
- Improve workstation layout

2.9 Pitch Time:

Pitch Time is a ratio of the total SMV of the garment to the number of operations to be established for the style in industrial engineering.

Pitch Time= Garments SMV / Number of Operation

Pitch time is used to setup the line and calculate the line's production target

2.10 Rating:

In time study, the idea of rating (sometimes known as grading in the United States) is crucial. A qualified time study operator can tell the difference between a trainee and a qualified time study practitioner by their ability to rate well.

The industrial engineer uses rating to compare the operator's actual performance to his or her theoretical image of typical performance.

The rating is a numerical figure that represents the pace at which someone works. There must be a specified level of performance to compare to an average level in order to rate.

2.11 Work study:

Work Study is the systematic examination of the methods of carrying on activities so as improve the effective use of resources and setup standards of performance for the activities being carried out.

2.11.1 Objective of work-study:

- Increase production and productivity and improve mood of worker.
- To find the best method and time required for each operation.
- Increase efficiency.
- To improve working process.
- Modify the operation to reduce unnecessary work.
- Reduce cost by most effective usage of input.
- Improve quality.
- Evaluation of human work.
- Setting on standards.

2.12 Method Study:

Method study is the systematic recording and critical examination of way of doing things in order to make improvement.

2.12.1 Objective of method study:

- Simplify the task.
- Eliminate unnecessary motion.
- Reduce inherent work content.
- To study existing work process and proposed work process.
- To finding new method of increased production and reduction cost.
- Install of new method
- Better movement and of goods and materials.
- Selection of work to be studied.

2.12.2 Procedure of method study: Select the job to be studied.

- Record by collecting data or direct observation.
- Examine by the challenging purpose, place sequence, and method of work.
- Develop new method drawing on concerned.
- Evaluate result of different alternative solutions.
- Define new method and present it.
- Install new method and train persons in applying it.
- Maintain and establish control production.

2.13 Time Study:

Time study is a work measuring method for documenting the time required to complete a given job or a component of a job under specified conditions and evaluating the data to determine the amount of time, it takes for an operator to complete it at a predetermined rate of performance.

2.13.1 Time study tools:

- A stopwatch.
- Time study format.
- One pen or pencil.
- Clipboard
- Eraser
- Calculation

CHAPTER – 3

EXPERIMENTAL DETAILS:

Knit Valley Fashion Ltd provided me with operation bulletin sheets for SHORT PANT, T-SHIRT, and Girls T-SHIRT. The date of collection was November 6, 2021. In addition, I carefully examined those sheets before completing the report by following steps such as line capacity, SMV, production target, pitch time, and efficiency calculation, among others.

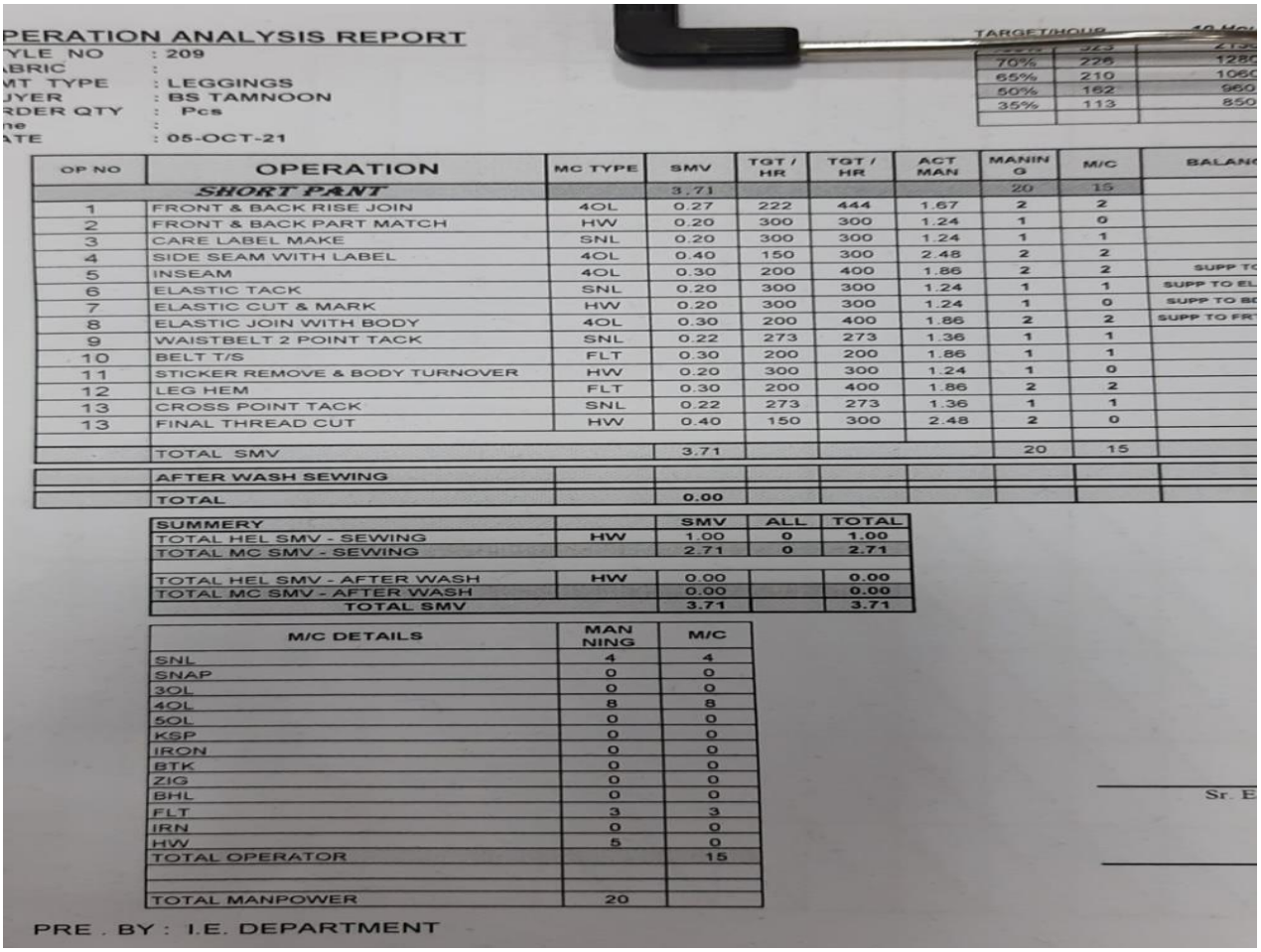
3.1 Operation bulletin of Short Pant:

Knit Valley Fashion Ltd.

STYLE NO: 209

GERMENTS TYPE: Leggings

BUYER: BS Tan moon



PERATION ANALYSIS REPORT

YLE NO : 209
BRIC :
MT TYPE : LEGGINGS
UYER : BS TAMNOON
RDER QTY : Pcs
ne :
ATE : 05-OCT-21

TARGET/HOUR		
70%	226	128
65%	210	106
50%	162	960
35%	113	850

OP NO	OPERATION	MC TYPE	SMV	TGT / HR	TGT / HR	ACT MAN	MANING	M/C	BALANC
	SHORT PANT		3.71				20	15	
1	FRONT & BACK RISE JOIN	4OL	0.27	222	444	1.67	2	2	
2	FRONT & BACK PART MATCH	HW	0.20	300	300	1.24	1	0	
3	CARE LABEL MAKE	SNL	0.20	300	300	1.24	1	1	
4	SIDE SEAM WITH LABEL	4OL	0.40	150	300	2.48	2	2	
5	INSEAM	4OL	0.30	200	400	1.86	2	2	SUPP TO
6	ELASTIC TACK	SNL	0.20	300	300	1.24	1	1	SUPP TO EL
7	ELASTIC CUT & MARK	HW	0.20	300	300	1.24	1	0	SUPP TO BE
8	ELASTIC JOIN WITH BODY	4OL	0.30	200	400	1.86	2	2	SUPP TO FR
9	WAISTBELT 2 POINT TACK	SNL	0.22	273	273	1.36	1	1	
10	BELT T/S	FLT	0.30	200	200	1.86	1	1	
11	STICKER REMOVE & BODY TURNOVER	HW	0.20	300	300	1.24	1	0	
12	LEG HEM	FLT	0.30	200	400	1.86	2	2	
13	CROSS POINT TACK	SNL	0.22	273	273	1.36	1	1	
13	FINAL THREAD CUT	HW	0.40	150	300	2.48	2	0	
	TOTAL SMV		3.71				20	15	
	AFTER WASH SEWING								
	TOTAL		0.00						

SUMMERY		SMV	ALL	TOTAL
TOTAL HEL SMV - SEWING	HW	1.00	0	1.00
TOTAL MC SMV - SEWING		2.71	0	2.71
TOTAL HEL SMV - AFTER WASH	HW	0.00		0.00
TOTAL MC SMV - AFTER WASH		0.00		0.00
TOTAL SMV		3.71		3.71

M/C DETAILS	MANNING	M/C
SNL	4	4
SNAP	0	0
3OL	0	0
4OL	8	8
5OL	0	0
KSP	0	0
IRON	0	0
BTK	0	0
ZIG	0	0
BHL	0	0
FLT	3	3
IRN	0	0
HW	5	0
TOTAL OPERATOR		15
TOTAL MANPOWER	20	

Sr. E

PRE . BY : I.E. DEPARTMENT

Figure 1 3.1 Short Pant

Knit Valley Fashion Ltd.

Table 1 3.1 Short Pant:

SMV	Man Power	Working Hr.	Line Target %	Daily Target	Efficiency
3.31	20	11	240	2592	65%

NO	Operation Name	Machine	SMV	Target per/hr.
	Short-Pant	**20**	**3.31**	
01	Front and Back Rise Join	OL	0.27	222
02	Front and Back Part Match	HP	0.20	300
03	Care Label Make	SNL	0.20	300
04	Side Seam With Label	OL	0.40	150
05	Inseam	OL	0.30	200
06	Elastic Tack	SNL	0.20	300
08	Elastic Cut and Mark	HP	0.20	300
09	Elastic Join with Body	OL	0.30	200
10	Waist Belt 2 Point Tack	SNL	0.22	273
11	Belt T/S	FLT	0.30	200
12	Striker Remove and Body Turnover	HP	0.20	300
13	Leg Hem	FL	0.30	200
14	Cross Point Tack	SNL	0.22	273
15	Final Thread Cut	HP	0.40	150

3.1.1 Description:

The T-shirt of Knit Valley Fashion Ltd are shown above the operation bulletin Sheet. Tanmoon is the buyers name on this sheet.15 machine and 4 helper used making for T-shirt. Machine are used Single needle machine 4, over lock machine 8 and flatlock machine 3. This sheet represented the SMV of several operations and calculated the total SMV, as well as the hourly capacity of various operations. 3.31 is the total SMV that has been calculated. Line efficiency 65% and working 11hr.

3.1.2 Calculation:

SMV Calculation:

Given that,

Cycle Time= 25, 26,24,22,27

Rating=80%

Allowance=15%

SMV=?

We Know,

SMV=Basic time +Allowance

Basic Time= Observe time*Rating

Observe Time = Total cycle Time / Number of cycle

= 25+26+24+22+27/5

= 24.8

Basic Time= Observe time*Rating

= 24.8*80%

= 19.84

SMV=Basic time+ Allowance

= 19.84+15%

= 22.81 Sec

=22.81/60

=0.38 minute

Target Calculation:

SMV	Man Power	Working Hr.	Efficiency
3.31	20	11	65%

Given that,

SMV = 3.31

Man power = 20

Working hr. = 11

Line Target =?

Daily Target =?

We know,

Target = Total Manpower × Total Working per day × efficiency / SMV

= 20 × 11 × 60 × 65 % / 3.31

= 2592 / 11

= 235

Per hour Target = 235

Per Day Target =2592

Pitch Time Calculation:

Given that,

No of Operation = 20

Garments SMV = 3.31

We Know,

Pitch Time = Garments SMV / No of Operation

= 3.31 / 20

= 0.16 min

Efficiency Calculation:

SMV	Man Power	Working Hr.	Daily Target
3.31	20	11	2592

Given That,

Total output per day = 2592

Total Manpower = 20

SMV = 3.31

Working Hour = 11

Efficiency =?

We know,

= Total output per day × SMV × Efficiency / Total Manpower × Working Hour

= 2592 × 3.31 × 100 / 20 × 11 × 60

= 64%

Target	2592 pcs
SMV	3.31 min
Pitch Time	0.16 min
Efficiency	64%

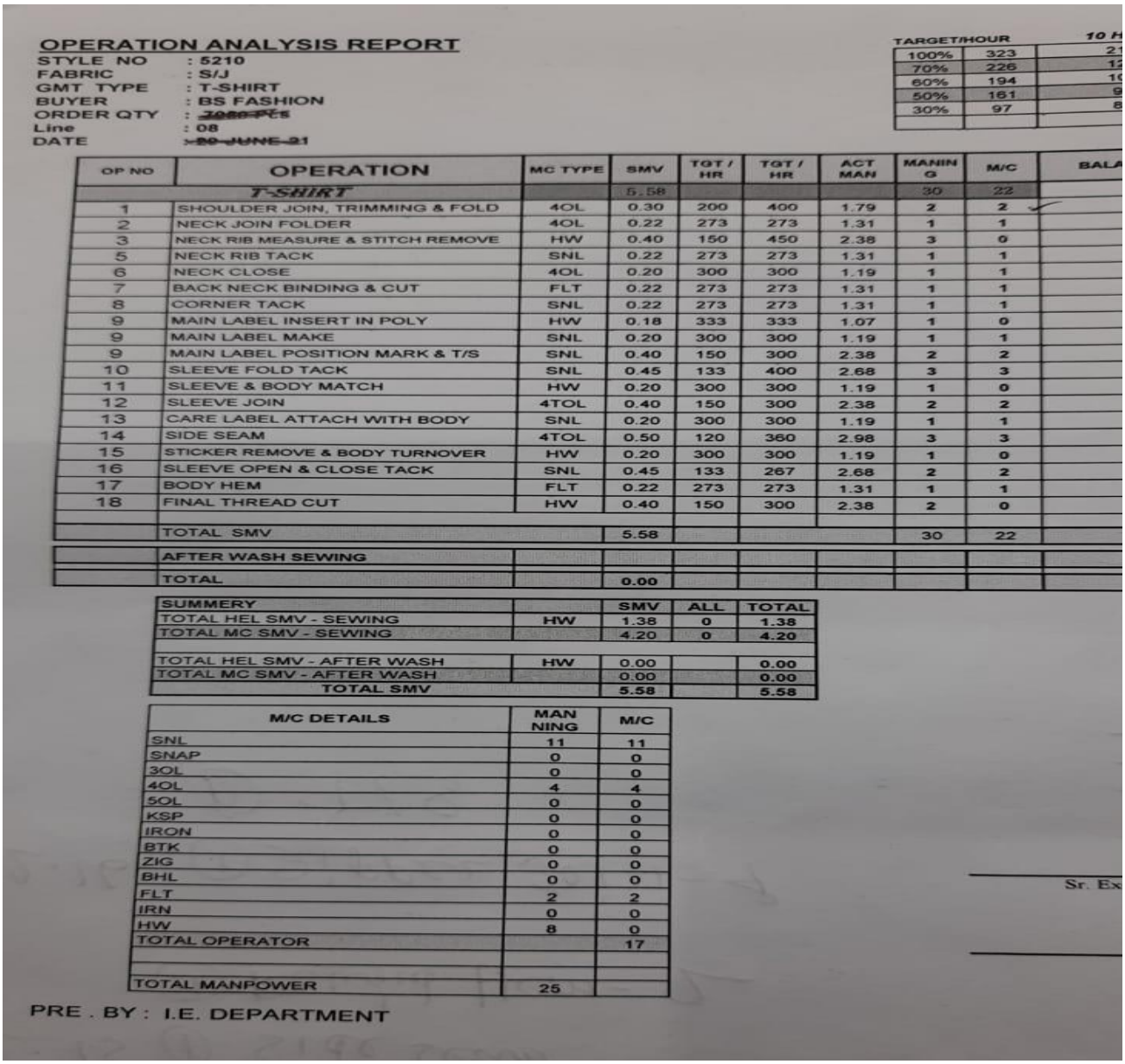
3.2 Operation bulletin of T-shirt:

Knit Valley Fashion Ltd.

STYLE NO: 5210

GERMENTS TYPE: T- Shirt

BUYER: BS Fashion



OPERATION ANALYSIS REPORT

STYLE NO : 5210
FABRIC : S/J
GMT TYPE : T-SHIRT
BUYER : BS FASHION
ORDER QTY : ~~7080 PCS~~
Line : 08
DATE : ~~30 JUNE 21~~

TARGET/HOUR		10 H
100%	323	2
70%	226	1
60%	194	1
50%	161	9
30%	97	8

OP NO	OPERATION	MC TYPE	SMV	TGT / HR	TGT / HR	ACT MAN	MANING	M/C	BALA
	T-SHIRT		5.58				30	22	
1	SHOULDER JOIN, TRIMMING & FOLD	4OL	0.30	200	400	1.79	2	2	
2	NECK JOIN FOLDER	4OL	0.22	273	273	1.31	1	1	
3	NECK RIB MEASURE & STITCH REMOVE	HW	0.40	150	450	2.38	3	0	
5	NECK RIB TACK	SNL	0.22	273	273	1.31	1	1	
6	NECK CLOSE	4OL	0.20	300	300	1.19	1	1	
7	BACK NECK BINDING & CUT	FLT	0.22	273	273	1.31	1	1	
8	CORNER TACK	SNL	0.22	273	273	1.31	1	1	
9	MAIN LABEL INSERT IN POLY	HW	0.18	333	333	1.07	1	0	
9	MAIN LABEL MAKE	SNL	0.20	300	300	1.19	1	1	
9	MAIN LABEL POSITION MARK & T/S	SNL	0.40	150	300	2.38	2	2	
10	SLEEVE FOLD TACK	SNL	0.45	133	400	2.68	3	3	
11	SLEEVE & BODY MATCH	HW	0.20	300	300	1.19	1	0	
12	SLEEVE JOIN	4TOL	0.40	150	300	2.38	2	2	
13	CARE LABEL ATTACH WITH BODY	SNL	0.20	300	300	1.19	1	1	
14	SIDE SEAM	4TOL	0.50	120	360	2.98	3	3	
15	STICKER REMOVE & BODY TURNOVER	HW	0.20	300	300	1.19	1	0	
16	SLEEVE OPEN & CLOSE TACK	SNL	0.45	133	267	2.68	2	2	
17	BODY HEM	FLT	0.22	273	273	1.31	1	1	
18	FINAL THREAD CUT	HW	0.40	150	300	2.38	2	0	
	TOTAL SMV		5.58				30	22	
	AFTER WASH SEWING								
	TOTAL		0.00						

SUMMERY		SMV	ALL	TOTAL
TOTAL HEL SMV - SEWING	HW	1.38	0	1.38
TOTAL MC SMV - SEWING		4.20	0	4.20
TOTAL HEL SMV - AFTER WASH	HW	0.00		0.00
TOTAL MC SMV - AFTER WASH		0.00		0.00
TOTAL SMV		5.58		5.58

M/C DETAILS	MANNING	M/C
SNL	11	11
SNAP	0	0
3OL	0	0
4OL	4	4
5OL	0	0
KSP	0	0
IRON	0	0
BTK	0	0
ZIG	0	0
BHL	0	0
FLT	2	2
IRN	0	0
HW	8	0
TOTAL OPERATOR		17
TOTAL MANPOWER	25	

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Figure 2 3.2 T-Shirt

Knit Valley Fashion Ltd.

Table 2 3.2 T-Shirt:

SMV	Man Power	Working hr.	Line Target %	Daily Target	Efficiency
5.58	25	11	188	2069	70%

NO	Operation Name	Machine	SMV	Target per/hr.
T-Shirt		**25**	**5.58**	
01	Shoulder Join and Trimming	OL	0.30	200
02	Neck Join Folder	OL	0.22	273
03	Neck Rib Measure Cut	HP	0.40	150
04	Neck Rib Tack	SNL	0.22	273
05	Neck Close	OL	0.20	300
06	Back Binding and Cut	FLT	0.22	273
07	Corner Tack	SNL	0.22	273
08	Main Label Insert In poly	HP	0.18	333
09	Main Label Make	SNL	0.20	300
10	Main Label Position Make and T/S	SNL	0.40	150
11	Sleeve Fold Tack	SNL	0.45	133
12	Sleeve and Body Match	HP	0.20	300
13	Sleeve Join	OL	0.40	150
14	Care Label Attach With Body	SNL	0.20	300
15	Side Seam	OL	0.50	120
16	Striker Remove and Body Turnover	HP	0.20	300
17	Sleeve open and Close Tack	SNL	0.45	120
18	Body Hem	FLT	0.22	273
19	Final Thread cut	HP	0.40	150

3.2.1 Description:

The T-shirt of Knit Valley Fashion Ltd are shown above the operation bulletin Sheet.BS Fashion is the buyers name on this sheet.17 machine and 8 helper used making for T-shirt. Machine are used Single needle machine 11, over lock machine 4 and flatlock machine 2. This sheet represented the SMV of several operations and calculated the total SMV, as well as the hourly capacity of various operations. 5.58 is the total SMV that has been calculated. Line efficiency 70 % and working 11hr.

3.2.2 Calculation:

SMV Calculation:

Given that,

Cycle Time= 45.44, 46.48.42

Rating= 85%

Allowance=20%

SMV=?

We Know,

SMV=Basic time +Allowance

Basic Time= Observe time*Rating

Observe Time = Total cycle Time / Number of cycle

= 45+44+ 46+48+42 /5

= 45

Basic Time= Observe time*Rating

= 45*85%

= 38 sec

SMV=Basic time+ Allowance

= 38+20%

= 45.6 Sec

=45.6 /60

=0.76 minute

Target Calculation:

SMV	Man Power	Working Hr.	Efficiency
5.58	25	11	70%

Given that,

SMV = 5.58

Man power = 25

Working hr. = 11

Line Target =?

Daily Target =?

We know,

Target = Total Manpower × Total Working per day × efficiency / SMV

= 25 × 11 × 60 × 70 % / 5.58

= 2069 / 11

= 188

Per hour Target = 188

Per Day Target =2069

Pitch Time Calculation:

Given that,

No of Operation = 25

Garments SMV = 5.58

We Know,

Pitch Time = Garments SMV / Number of Operation

= 5.58/25

= 0.22 min

Efficiency Calculation:

SMV	Man Power	Working Hr.	Daily Target
5.58	25	11	2069

Given That,

Total output per day = 2069

Total Manpower = 25

SMV = 5.58

Working Hour = 11

Efficiency =?

We know,

= Total output per day × SMV × Efficiency / Total Manpower × Working Hour

= 2069 × 5.58× 100 / 25× 11 × 60

= 70 %

Target	2069 pcs
SMV	5.58min
Pitch Time	0.22min
Efficiency	70 %

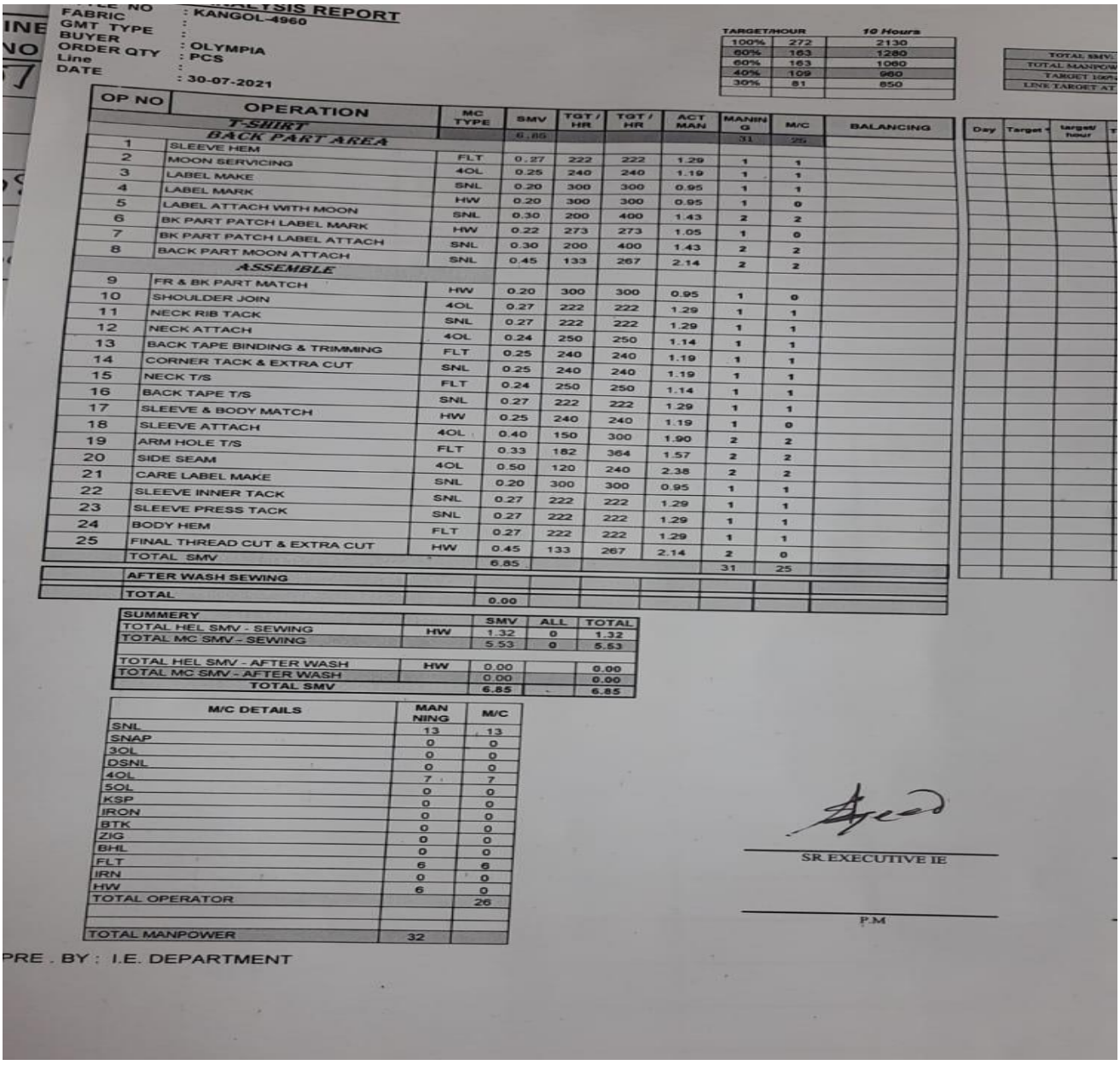
3.3 Operation bulletin of T-shirt:

Knit Valley Fashion Ltd.

STYLE NO: KANGOL-4960

GERMENTS TYPE: T- Shirt

BUYER: OLYMPIA



ANALYSIS REPORT

FABRIC : KANGOL-4960
GMT TYPE :
BUYER :
ORDER QTY : OLYMPIA
Line : PCS
DATE : 30-07-2021

TARGET/HOUR		10 Hours
100%	272	2130
80%	163	1280
60%	163	1060
40%	109	980
30%	81	850

OP NO	OPERATION	MC TYPE	SMV	TGT / HR	TGT / HR	ACT MAN	MANNIG	M/C	BALANCING
	T-SHIRT		6.85				31	25	
	BACK PART AREA								
1	SLEEVE HEM	FLT	0.27	222	222	1.29	1	1	
2	MOON SERVICING	4OL	0.25	240	240	1.19	1	1	
3	LABEL MAKE	SNL	0.20	300	300	0.95	1	1	
4	LABEL MARK	HW	0.20	300	300	0.95	1	0	
5	LABEL ATTACH WITH MOON	SNL	0.30	200	400	1.43	2	2	
6	BK PART PATCH LABEL MARK	HW	0.22	273	273	1.05	1	0	
7	BK PART PATCH LABEL ATTACH	SNL	0.30	200	400	1.43	2	2	
8	BACK PART MOON ATTACH	SNL	0.45	133	267	2.14	2	2	
	ASSEMBLE								
9	FR & BK PART MATCH	HW	0.20	300	300	0.95	1	0	
10	SHOULDER JOIN	4OL	0.27	222	222	1.29	1	1	
11	NECK RIB TACK	SNL	0.27	222	222	1.29	1	1	
12	NECK ATTACH	4OL	0.24	250	250	1.14	1	1	
13	BACK TAPE BINDING & TRIMMING	FLT	0.25	240	240	1.19	1	1	
14	CORNER TACK & EXTRA CUT	SNL	0.25	240	240	1.19	1	1	
15	NECK T/S	FLT	0.24	250	250	1.14	1	1	
16	BACK TAPE T/S	SNL	0.27	222	222	1.29	1	1	
17	SLEEVE & BODY MATCH	HW	0.25	240	240	1.19	1	0	
18	SLEEVE ATTACH	4OL	0.40	150	300	1.90	2	2	
19	ARM HOLE T/S	FLT	0.33	182	364	1.57	2	2	
20	SIDE SEAM	4OL	0.50	120	240	2.38	2	2	
21	CARE LABEL MAKE	SNL	0.20	300	300	0.95	1	1	
22	SLEEVE INNER TACK	SNL	0.27	222	222	1.29	1	1	
23	SLEEVE PRESS TACK	SNL	0.27	222	222	1.29	1	1	
24	BODY HEM	FLT	0.27	222	222	1.29	1	1	
25	FINAL THREAD CUT & EXTRA CUT	HW	0.45	133	267	2.14	2	0	
	TOTAL SMV		6.85				31	25	
	AFTER WASH SEWING								
	TOTAL		0.00						

SUMMERY		SMV	ALL	TOTAL
TOTAL HEL SMV - SEWING	HW	1.32	0	1.32
TOTAL MC SMV - SEWING		5.53	0	5.53
TOTAL HEL SMV - AFTER WASH	HW	0.00		0.00
TOTAL MC SMV - AFTER WASH		0.00		0.00
TOTAL SMV		6.85		6.85

M/C DETAILS	MANNING	M/C
SNL	13	13
SNAP	0	0
3OL	0	0
DSNL	0	0
4OL	7	7
5OL	0	0
KSP	0	0
IRON	0	0
BTK	0	0
ZIG	0	0
BHL	0	0
FLT	6	6
IRN	0	0
HW	6	0
TOTAL OPERATOR		26
TOTAL MANPOWER	32	

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Figure 3 3.3 T-Shirt

Knit Valley Fashion Ltd.

Table 3 3.3 T-Shirt:

SMV	Man Power	Working hr.	Line Target %	Daily Target	Efficiency
6.85	32	11	168	1847	60

NO	Operation Name	Machine	SMV	Target per/hr.
	T-Shirt	**32**	**6.85**	
01	Sleeve Hem	FLT	0.27	222
02	Moon Servicing	OL	0.25	240
03	Label Make	SNL	0.20	300
04	Label mark	HP	0.20	300
05	Label Attach with Moon	SNL	0.30	200
06	BK Part Patch Label Mark	HP	0.22	273
07	BK part Patch Label Attach	SNL	0.30	200
08	Back Part Moon Attach	SNL	0.45	133
09	FR&BK Part Match	HP	0.20	300
10	Shoulder join	OL	0.27	222
11	Neck Rib Tack	SNL	0.27	222
12	Neck Attach	OL	0.24	250
13	Back Tape Binding	FLT	0.25	240
14	Corner Tack& Extra Cut	SNL	0.25	240
15	Neck T/S	FLT	0.24	250
16	Back Tap Top Stich	SNL	0.27	222
17	Sleeve and Body Match	HP	0.25	240
18	Sleeve Attach	OL	0.40	240
19	Arm Hole T/S	FLT	0.33	182
20	Side Seam	OL	0.50	120
21	Care Label Make	SNL	0.20	300
22	Sleeve Inner Tack	SNL	0.27	222
23	Sleeve Press Tack	SNL	0.27	222
24	Body Hem	FLT	0.27	222
25	Final Thread Cut	HP	0.45	133

3.3.1Description:

The T-shirt of Knit Valley Fashion Ltd are shown above the operation bulletin Sheet.BS Fashion is the buyers name on this sheet.26 machine and 6 helper used making for T-shirt. Machine are used Single needle machine 13, over lock machine 6 and flatlock machine 6. This sheet represented the SMV of several operations and calculated the total SMV, as well as the hourly capacity of various operations. 6.85 is the total SMV that has been calculated. Line efficiency 60% and working 11hr.

3.3.2 Calculation:

SMV Calculation:

Given that,

Cycle Time= 30, 32,29,30,28

Rating= 90%

Allowance=15%

SMV=?

We Know,

SMV=Basic time +Allowance

Basic Time= Observe time*Rating

Observe Time = Total cycle Time / Number of cycle

= 30+32+ 29+30+28 /5

= 30

Basic Time= Observe time*Rating

= 30*90%

= 27 sec

SMV=Basic time+ Allowance

= 27+15%

= 31 Sec

=31/60

=0.51 minute

Target Calculation:

SMV	Man Power	Working Hr.	Efficiency
6.85	32	11	60 %

Given that,

SMV = 6.85

Man power = 32

Working hr. = 11

Line Target =?

Daily Target =?

We know,

Target = Total Manpower × Total Working per day × efficiency / SMV

= 32 × 11 × 60 × 60% / 6.85

= 1849 / 11

= 168

Per hour Target = 168

Per Day Target =1849

Pitch Time Calculation:

Given that,

No of Operation = 32

Garments SMV = 6.85

We Know,

Pitch Time = Garments SMV / Number of Operation

= 6.85/ 32

= 0.21 min

Efficiency Calculation:

SMV	Man Power	Working Hr.	Daily Target
6.85	32	11	1849

Given That,

Total output per day = 1849

Total Manpower = 32

SMV = 6.85

Working Hour = 11

Efficiency =?

We know,

= Total output per day × SMV × Efficiency / Total Manpower × Working Hour

= 1849 × 6.85× 100 / 32 × 11 × 60

= 60 %

Target	1849 pcs
SMV	6.85 min
Pitch Time	0.21 min
Efficiency	60 %

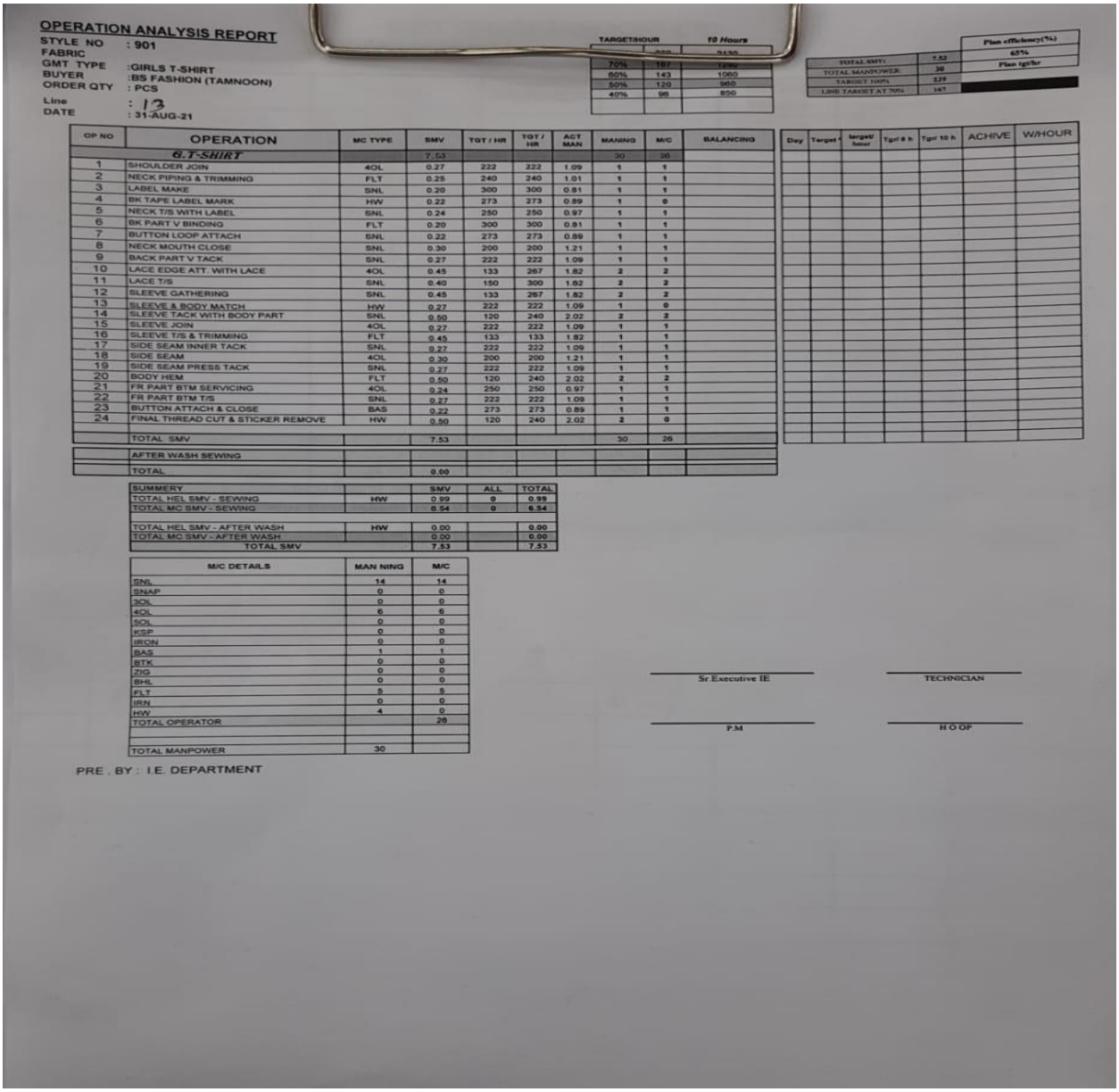
3.4 Operation bulletin of Girls T-shirt:

Knit Valley Fashion Ltd.

STYLE NO: 901

GERMENTS TYPE: Girls T- Shirt

BUYER: BS FASHION TANMOON



OPERATION ANALYSIS REPORT

STYLE NO : 901
FABRIC
GMT TYPE :GIRLS T-SHIRT
BUYER :BS FASHION (TAMNOON)
ORDER QTY : PCS
Line : 13
DATE : 31-AUG-21

TARGET/HOUR		10 Hours
70%	187	1870
60%	143	1060
50%	129	960
40%	96	850

		Plan efficiency(%)
TOTAL SMV:	7.53	65%
TOTAL MANPOWER:	30	Plan tgt/hr
TARGET 100%	229	
LINE TARGET AT 70%	167	

OP NO	OPERATION	MC TYPE	SMV	TGT / HR	TGT / HR	ACT MAN	MANING	M/C	BALANCING
	G.T-SHIRT		7.53				30	26	
1	SHOULDER JOIN	4OL	0.27	222	222	1.09	1	1	
2	NECK PIPING & TRIMMING	FLT	0.25	240	240	1.01	1	1	
3	LABEL MAKE	SNL	0.20	300	300	0.81	1	1	
4	BK TAPE LABEL MARK	HW	0.22	273	273	0.89	1	0	
5	NECK T/S WITH LABEL	SNL	0.24	250	250	0.97	1	1	
6	BK PART V BINDING	FLT	0.20	300	300	0.81	1	1	
7	BUTTON LOOP ATTACH	SNL	0.22	273	273	0.89	1	1	
8	NECK MOUTH CLOSE	SNL	0.30	200	200	1.21	1	1	
9	BACK PART V TACK	SNL	0.27	222	222	1.09	1	1	
10	LACE EDGE ATT. WITH LACE	4OL	0.45	133	267	1.82	2	2	
11	LACE T/S	SNL	0.40	150	300	1.62	2	2	
12	SLEEVE GATHERING	SNL	0.45	133	267	1.82	2	2	
13	SLEEVE & BODY MATCH	HW	0.27	222	222	1.09	1	0	
14	SLEEVE TACK WITH BODY PART	SNL	0.50	120	240	2.02	2	2	
15	SLEEVE JOIN	4OL	0.27	222	222	1.09	1	1	
16	SLEEVE T/S & TRIMMING	FLT	0.45	133	133	1.82	1	1	
17	SIDE SEAM INNER TACK	SNL	0.27	222	222	1.09	1	1	
18	SIDE SEAM	4OL	0.30	200	200	1.21	1	1	
19	SIDE SEAM PRESS TACK	SNL	0.27	222	222	1.09	1	1	
20	BODY HEM	FLT	0.50	120	240	2.02	2	2	
21	FR PART BTM SERVICING	4OL	0.24	250	250	0.97	1	1	
22	FR PART BTM T/S	SNL	0.27	222	222	1.09	1	1	
23	BUTTON ATTACH & CLOSE	BAS	0.22	273	273	0.89	1	1	
24	FINAL THREAD CUT & STICKER REMOVE	HW	0.50	120	240	2.02	2	0	
	TOTAL SMV		7.53				30	26	
	AFTER WASH SEWING								
	TOTAL		0.00						

Day	Target	target/ hour	Tgt/ 8 h	Tgt/ 10 h	ACHIVE	W/HOUR

SUMMERY		SMV	ALL	TOTAL
TOTAL HEL SMV - SEWING	HW	0.99	0	0.99
TOTAL MC SMV - SEWING		6.54	0	6.54
TOTAL HEL SMV - AFTER WASH	HW	0.00		0.00
TOTAL MC SMV - AFTER WASH		0.00		0.00
TOTAL SMV		7.53		7.53

M/C DETAILS	MAN NING	M/C
SNL	14	14
SNAP	0	0
3OL	0	0
4OL	6	6
5OL	0	0
KSP	0	0
IRON	0	0
BAS	1	1
BTK	0	0
ZIG	0	0
BHL	0	0
FLT	5	5
IRN	0	0
HW	4	0
TOTAL OPERATOR		26
TOTAL MANPOWER	30	

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Figure 4 3.4 Girls T- Shirt

Knit Valley Fashion Ltd.

Table 4 3.4 Girls T-Shirt

SMV	Man Power	Working hr.	Line Target %	Daily Target	Efficiency
7.53	30	11	179	1972	75

NO	Operation Name	Machine	SMV	Target per/hr.
	Girls T-Shirt	**30**	**7.53**	
01	Shoulder Join	OL	0.27	222
02	Neck Piping	FLT	0.25	240
03	Label Make	SNL	0.20	300
04	Back Tap Label Mark	HW	0.22	273
05	Neck Top Stich with Label	SNL	0.24	250
06	Back PART V Binding	FLT	0.20	300
07	Button Lop Attach	SNL	0.22	273
08	Neck Mouth Close	SNL	0.30	200
09	Back part V Tack	SNL	0.27	222
10	Lace EDGE Att. With Lace	OL	0.45	133
11	Lace T/S	SN	0.40	150
12	Sleeve Gathering	SN	0.45	133
13	Sleeve And Body Match	HP	0.27	222
14	Sleeve Tack With Body Part	SN	0.50	120
15	Sleeve join	OL	0.27	222
16	Sleeve T/S	FLT	0.45	133
17	Side Seam Inner Tack	SNL	0.27	222
18	Side Seam	OL	0.30	200
19	Side seam press Tack	SNL	0.27	222
20	Body Hem	FLT	0.50	120
21	Front Part Bottom Servicing	OL	0.24	250
22	Front Part Bottom T/S	SNL	0.27	22
23	Button ATTACH and Close	BA	0.22	273
24	Final Thread Cut And Striker Remove	HP	0.50	120

4.3.1 Description:

The T-shirt of Knit Valley Fashion Ltd are shown above the operation bulletin Sheet.BS Fashion is the buyers name on this sheet.26 machine and 4 helper used making for Girls T-shirt. Machine are used Single needle machine 14, over lock machine 6 and flatlock machine 5. This sheet represented the SMV of several operations and calculated the total SMV, as well as the hourly capacity of various operations. 7.53 is the total SMV that has been calculated. Line efficiency 75% and working 11hr.

4.3.2 Calculation:

SMV Calculation:

Given that,

Cycle Time= 39, 45,43,38,40

Rating= 65%

Allowance=20%

SMV=?

We Know,

SMV=Basic time +Allowance

Basic Time= Observe time*Rating

Observe Time = Total cycle Time / Number of cycle

= 39+45+43+38+40 /5

= 41

Basic Time= Observe time*Rating

= 41*65%

= 27sec

SMV=Basic time+ Allowance

= 27+20%

= 32 Sec

= 32/60

= 0.53 minute

Target Calculation:

SMV	Man Power	Working Hr.	Efficiency
7.53	30	11	75%

Given that,

SMV = 7.53

Man power = 30

Working hr. = 11

Line Target =?

Daily Target =?

We know,

Target = Total Manpower × Total Working per day × efficiency / SMV

= 30 × 11 × 60 × 75 % / 7.53

= 1972/ 11

= 179

Per hour Target = 179

Per Day Target =1972

Pitch Time Calculation:

Given that,

No of Operation = 30

Garments SMV = 7.53

We Know,

Pitch Time = Garments SMV / Number of Operation

= 7.53/ 30

= 0.25 min

Efficiency Calculation:

SMV	Man Power	Working Hr.	Daily Target
7.53	30	11	1972

Given That,

Total output per day = 1972

Total Manpower = 30

SMV = 7.53

Working Hour = 11

Efficiency =?

We know,

= Total output per day × SMV × Efficiency / Total Manpower × Working Hour

= 1972× 7.53× 100 / 30× 11 × 60

= 75 %

Target	1972 pcs
SMV	7.53 min
Pitch Time	0.25 min
Efficiency	75 %

Result and Discussion 04

Chart 4.1.1: Analysis of capacity study for different operation of SHORT PANT from Data.

This chart shows the hourly production capacity of SHORT PANTS various processes.

Because of making this graphic, we determined a 65 percent efficiency for various operations. First, we determined production capacity in Chapter 03, and then we used that information to create an effective chart. This chart contains information on several sorts of operations below the chart, as well as the various capacities of various operations on the left side of the chart. The operations with the highest capacity are Front and back part match, Care label make, elastic tack, elastic cut and mark, body turn over, (300), while the operations with the lowest capacity are side seam with label, final thread cut (150). The capacity of other operations is average.

Chart 4.1.2: Analysis of SMV for Different Operation of T-shirt from Data.

In this graph, we have shown the SMV of T-shirt's various operations. First, we estimated the SMV of several operations. As a result, we have created this graph. This chart contains information on several types of operations below the chart, as well as the SMV of various operations on the left side of the chart. Side seam has a greater SMV of 0.50, whereas main label insert in poly have the lowest SMV of 0.18.

Chart 4.1.3: Analysis of Capacity Study for Different Operation of T-SHIRT from Data.

This graph depicts the hour production capacity of T-SHIRT’s various operations. Here 60 percent efficiency determined diverse operation by the outcome of we make chart. First, we computed production capacity in Chapter 03, and then we used this information to create an effective chart. This chart contains information on several sorts of operations below the chart, as well as the various capacities of various operations on the left side of the chart. The operation with the maximum capacity is main label make, label mark (300), while the operation with the lowest capacity is side seam (120). The capacity of other operations is average.

Chart 4.1.4: Analysis of Capacity Study for Different Operation of Girls T-Shirt.

This chart shows the hour production capacity of Girls T-Shirt is various operations. Here 75 percent efficiency determined diverse operation by the outcome of I make chart. First, we computed production capacity in Chapter 03, and then we used this information to create an effective chart. This chart contains information on several sorts of operations below the chart, as well as the various capacities of various operations on the left side of the chart. The operation with the maximum capacity is Label make (300), while the operation with the lowest capacity is body hem (120). The capacity of other operations is average.

4.2 Analysis of Total SMV of Different item from Data 3.1, 3.2, 3.3, 3.4

Short Pant	3.71
T-Shirt	5.58
T-shirt	6.85
Girls T-Shirt	7.53

4.3 Analysis Efficiency% of Different item from Data 3.1, 3.2, 3.3, 3.4

Short Pant	65
T-Shirt	70
T-shirt	60
Girls T-Shirt	75

Conclusion 05

Conclusion:

KNIT VALLEY FASHION LTD. provided the SMV chart and operating bulletin information, which we used to complete my job. This assignment taught me about the manufacturing process, SMV time study formula, and their corrected method. We also believe that this report will assist me in learning more about garment industry industrial engineering. This project allows me to broaden my understanding of textile administration, production, planning, procurement, manufacturing process, and machineries, as well as educate me how to conform to the industry's daily operations. This section's working procedure was also revealed to me. We are hoping it will be beneficial to my professional career.

Reference 06

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