Faculty of Engineering

Department of Textile Engineering

PROJECT REPORT ON

STUDY ON SMV AND CAPACITY CALCULATION

Course Title: Project (Thesis)

Course Code: TE-4214

STUDY ON SMV AND CAPACITY CALCULATION

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This Thesis presented in partial fulfillment of the requirements for the degree

Bachelor of Science in Textile Engineering

Advance in Apparel Manufacturing Technology

LETTER OF APPROVAL

To

The Head

Department of Textile Engineering Daffodil International University

102, Sukrabad, Mirpur Road, Dhaka 1207

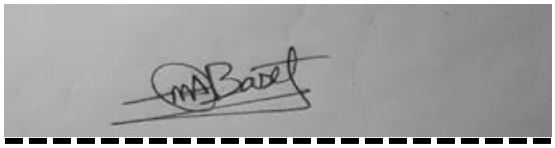
Subject: Approval of Thesis Report of B.sc in TE Program.

Dear Sir,

I am writing to let you know that this thesis report titled as **"Study on SMV and Capacity Calculation"** has been prepared by the students bearing ID 171-23-4936, 171-23-4931 is completed for final evaluation. The whole report is prepared based on proper investigation and understanding though critical analysis of empirical data with required belongings. The students were directly involved in their thesis activities and the report becomes vital to spark of many valuable information for the readers.

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

Yours Sincerely,



Mohammad Abdul Baset

Assistant Professor

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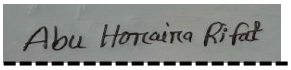
DECLARATION

We hereby declare that, this Thesis report has been done by us under the supervision of **Mohammad Abdul Baset**, Assistant Professor, Department of Textile Engineering, Daffodil International University. We also declare that neither this thesis report nor any part of this report has been submitted elsewhere for award of any degree.

Submitted by



Abu Horaira Rifat

ID: 171-23-4936

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DEDICATION

This thesis paper is dedicated to

- The sake of almighty Allah for giving us this opportunity to prove ourselves. Without Almighty helps nothing would be possible. And we want to thanks to our honorable teacher Mohammad Abdul Baset (Assistant Professor), Department of Textile Engineering, Daffodil International University whose most contribution behind on our success.
- Then we want to dedicate our loving parents whose hard fatigue helps to reach final destination.
- Then finally we want to dedicate our friend **"Late Kamrul Hasan"** may Allah grant him Jannah and dedicate to all well-wisher.

ACKNOWLEDGEMENT

First, of all, we would like to express our sincere gratitude to Allah for his divine blessing makes me attainable to complete this project with success. And also, gratitude to our advisor **Mohammad Abdul Baset (Assistant Professor)**, Department of Textile Engineering, Daffodil International University. for the continuous support of our Thesis work, for his patience, motivation, enthusiasm, and immense knowledge. His direction helped us in all the time of research and writing of this thesis paper.

We would like to express our heartiest to the authority of the **Esquire Knit Composite Ltd. And Opex and Sinha Textile.** For their kind help to finish our project. They guided us in the factory and entire employees and workers who gave their valuable time for me.

And also, to other faculty member and the staff of Textile engineering department of Daffodil International University.

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

Finally, we 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 Breakdown of the garments industry. We visited to Opex and Sinha Textile & Esquire Knit Composite Ltd. Collecting the SMV, production target, Efficiency% Line capacity and its related data. We completed in time study, production, capacity study, Operation Breakdown, Target, and Efficiency.

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

In this paper, we discussed some procedure about time, Capacity, Target, SMV, and production study and analysis of different method and also 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. We are analysis five items operation bulletins. We achieved result of product SMV for Polo T-Shirt is 12.02, Accelerator T-Shirt is 18.48, Ladies Short Sleeve T-Shirt-Shirt is 11.32, T-Shirt is 5.6 and Polo T-Shirt is 10.11. And also achieved the result of product of Polo T-Shirt is 1747, Accelerator T-Shirt is 950, Ladies Short Sleeve T-Shirt-Shirt is 1550, T-Shirt is 2300 and Polo T-Shirt is 2300.

Table of Contents

List of Table

List of Figure

List of Chart and Figure

CHAPTER 1: INTRODUCTION

1.1 Introduction

Present techno monetary situation is set apart by expanding rivalry in pretty much every division of economy. The expectation of consumers is on the increase and makers need to style, and created smart in as many types as attainable (concept of economies of scale is not a lot of talks off) to cater to the demand of consumers. therefore, there's a challenge before the industries to manufacture merchandise of the right quality and amount and the right time and at minimum value for his or her survival growth. This demands a rise in the productive potency of the organization. engineering science goes to plays a crucial role in increasing productivity. varied engineering science techniques are accustomed analyze and improve the work methodology, to eliminate waste and correct allocation and utilization of resources.

Industrial Engineering may be a profession within which data of mathematical and natural sciences gained by study, expertise, and application is applied with judgment to develop the ways in which to utilize economically the materials and alternative natural resources and focus of nature for the good thing about the man.

1.2 Nature of the work in IE

Industrial Engineers confirm better effective ways in which an organization to use the fundamental factors of production – individuals, machines, materials, info, and energy – to create or method a product or manufacture a service. they're the bridge between management goals and operational performance. they're additionally involved with increasing productivity through the management of individuals, strategies of business concern, and experience than area unit engineers in alternative specialties, UN agency typically work additionally with product or method.

1.3 Objective of the project

Project objectives are what we plan to achieve by the end of our project. This maybe includes deliverables and assets, or more intangible objectives like increasing productivity or motivation. Our project objectives should be attainable, time-bound, specific goals we can measure at the end of our project.

Some are listed below:

- For growing productivity of a garments industry.
- For better work place in garments industry.
- For improvement of layout in different line of a garments industry.
- For improvement of inventory control system.

1.4 Importance of the project

- A large number of foreign currencies are earned by garments and textile sector around (80-85) %.

- There is a large number of industrial engineers working in textile and its sub sector.

I hope that the project will give a way to tech industrials engineers which will help

- in the future to lead our textile and garments sector.
- Bangladesh is a development country and a developing country largely depends on foreign currency.

1.5 Scope of the project

- Huge opportunities to do something in IE department of a garments industry.
- Now a day IE demanded for increasing production.
- Almost all of RMG factories and understand the role of IE for increasing production.
- RMG industry is given so much opportunities for developing IE techniques and methods for increasing productivity.
- It is an interesting topic so that almost all industries are giving change for researching about IE to increasing productivity.
- RMG industries author can realize the actual demand for IE section for increasing their produce.

CHAPTER 2: LITERATURE REVIEW

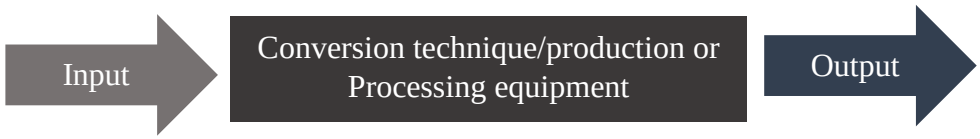
2.1 DEFINATION

Industrial Engineering is a branch of Engineering which is basically related to the effective use of machines, materials, optimization of complex processes and most importantly human resource during the production time. Industrial Engineering concerned with the improves the current system to better one and maximize the efficiency of the system as well as ensure better output.

2.2 Concept of IE

This term industrial engineering is composed of two words which given the basic concept of industrial engineering. Industrial engineering is related to industry, which means a complete process of converting input resources into final products.

It is represented as follows



2.3 Function of industrial engineering

Industrial Engineering field represents the area where every activity of an industrial system involves an element that bring diversification of activities and without which all acts would be ineffective and non-productive

Basically, industrial engineers have to perform following area:

- Planning
- Organizing
- Controlling
- Staffing

A uniform working environment is developed to bring the adjustment among the various elements of plan for the execution of organized scheme

2.4 Activities of IE

Some activities are listed

- Develop techniques to improve the productivity.
- To study the equipment replacement probability.
- To help the determination of economic lot size and the work in process requirement for each step of operation.
- To analyze the plan production schedules and inventories.
- To help the preparation of details specification for every work and assess them.
- To analysis of big project by utilizing CPM and PERT technique.
- To reduce man machine ratio.

2.5 Line Balancing

Every operator has to work equally. No one else can sit for one's work. One's work should not be a burden to another. If not, then line balancing is fine.

Line balancing is an important task which, if not done at the right time, makes production difficult.

Without line balancing, the same amount of production cannot be obtained from each operation. In some operations the goods will be stored in piles and in some operations less goods will be stored which makes production difficult. To overcome this problem, line balancing is done at a planned target in each operation of the line.

2.5.1 The Objectives of Line Balancing

The objectives of the line balancing is to minimizing the workloads on the line while meet a require a output. The objectives of the line balancing are given below:

- To improve productivity.
- Minimize production cost.
- To determine space of bottleneck and eliminate bottleneck.
- To maximize the production.
- To distribute the work among the worker to the production line.

2.5.2 Advantage of Line Balancing

- To get uniform rate of the production.
- Less material handling.
- Effective utilization of man and machine ratio.
- Easy production control.

2.6 Bottleneck

Bottleneck is the extreme point in production where production is hampered from normal flow. In production floor bottleneck lowest production by this reason a company lost profit. Actually, this word is forming the upper portion of the bottle is called neck that resist anything from large portion through narrow portion of neck.

2.6.1 Reason of Bottleneck

- Wrong worker selection.
- Wrong work distribution.
- Wrong workplace design.
- Wrong method.
- Unskilled worker.
- Material not ok.
- Absenteeism.
- Worker unrest.

2.6.2 Eliminate of Bottleneck

- Method improvement
- Better operation allocation
- Workplace improvement
- Work overtime
- Work sharing

2.7 SMV (Standard Minute value)

The number of minutes require for an ideal worker to perform a task in the ideal environment is called SMV of that task.

SMV = Basic Time + (Allowance x Basic Time)

2.7.1 Factors of SMV

SMV of the same operation or product may be different based on working condition as well as fabric behavior. Some of

- Using a different machine. Like Auto & Manual Machine for same process.
- Sewing a bigger component of same process.
- Operator sews a stripe or check/plaid fabric.
- Operator using attachment and work-aids when sewing a garment.
- Most importantly, movement and motions involved in performing a task

2.7.2 Uses of SMV

- To find garments costing and lead time
- SMV find out require time for a given task
- To find line target
- To find pitch time
- To find monthly capacity
- To calculate require man and machine.

2.8 Basic Pitch Time

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

Pitch time is used for calculate individual time for the garment and further use for balancing the line and calculating production target for the line.

$$\textbf{Pitch Time} = \frac{\text{SMV of garment}}{\text{number of manpower}}$$

2.9 Rating

The concept of rating is fundamental in time study. The ability to rate effectively distinguished a qualified time study practitioner from a novice.

Rating is the process used by the industrial engineer to compare the actual performance of the operator with his / her mental concept of normal performance.

The rating is the numerical value used to denote the rate of working. In order to rate there must be a defined level of performance to compare with an average level

2.10 Work-study

Work-study is a systematic system through which experiments are conducted and helps to improve the method of conducting activities and the effective use of resources.

2.10.1 Objectives of Work-Study

- Makes the job easier and helps reduce unnecessary work.
- Helps to increase production and productivity.
- Helps to determine the ideal time.
- Using input most effectively helps reduce costs.
- Helps to improve the condition.
- Helps to improve the quality system.
- Evaluates human work.

2.10.2 Functions of Work Study

The Work-Study plays an important role in improving the level of productivity of the garment industry after entering the garment industry.

Usually, line chiefs, supervisors, and production managers are busy with production issues throughout the day. Their focus is only on input, output, and delivery but they cannot focus on improving productivity. Therefore, the work-study department is needed in the garment industry to improve productivity. And it is not possible to improve productivity without work-study.

2.10.3 Work-study strategy

There are two types of strategies in work-study which are

1.Method Study

2.Work Measurement

2.10.3.1 Method Study

Method Study is a study that systematically examines all the details and critiques in detail and in this way helps to improve the work in a simple and beautiful way.

2.10.3.2 Work Measurement

The application of technology to measure work is called work measurement.

2.10.3.3 Purpose of measuring work

- To work / to measure the content of work.
- Scheduling
- The main condition is to conduct work measurement in a scientific way.

2.10.3.4 Benefits of measuring work

- Helps determine line target.
- Helps to calculate efficiency.
- Helps to determine the amount of cost.
- Allocate manpower as per requirement.
- Planning and controlling production

2.10.3.5 Time Study

Time Study- is a technique of measuring work where work is done by recording time. A Time Study is an analysis of whether all components of a task are working properly to perform a specific task or under certain conditions.

2.10.3.6 Capacity Study

Capacity Study is a study where a complete picture or idea of how much work a machine operator can complete per hour is available. Working on this capacity helps to improve the situation a lot.

CHAPTER 3: EXPERIMANTAL DETAILS

3.1 EXPERIMENTAL DETAILS

We were collecting this operation breakdown sheet like Polo T-Shirt, Accelerator T-Shirt, Ladies Short Sleeve T-Shirt, T-Shirt, Polo T-Shirt from Esquire Knit Composite Ltd & Opex and Sinha Textile. And we observed this sheet carefully and completed report by following steps like SMV, Efficiency, production target, pitch time, etc.

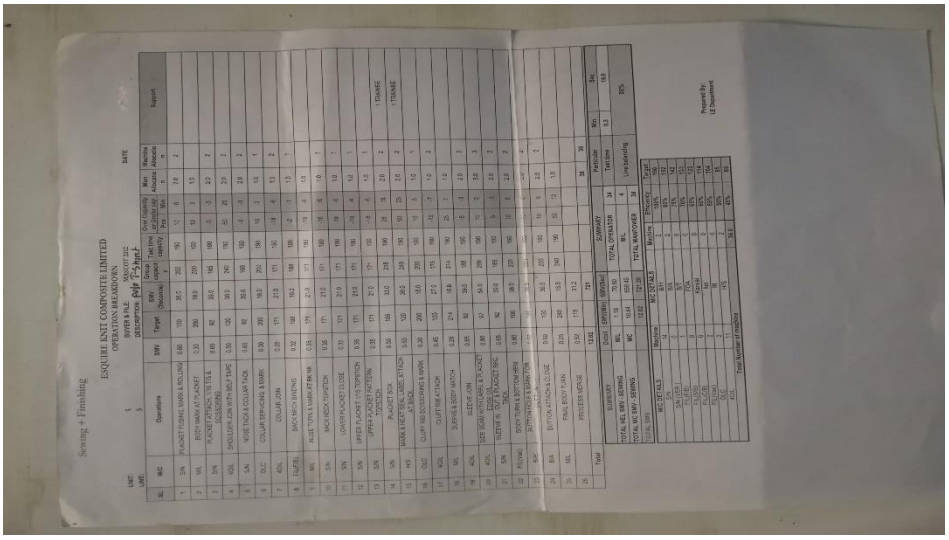
3.1.1 Operation breakdown

A garment makes of many parts and elements. When a manufacturer goes to make a garment, it is mandatory to join every part step by step. Operation Breakdown means writing down the whole part, all operations as per the process sequence with the entire garment.

3.1.2 Why need Operation Breakdown

At the point when we get a plan of the pieces of the garment, we don't have any idea the number of parts is in the pieces of the garment. if we don't have any idea about the all-out no. of parts or activities to finish the piece of garment, it is hard for us to make the piece of garment. That's the reason we need to study the garment pieces so that we can know how many parts in the garment and how many times required for the garment and process sequence.

3.2 Operational Breakdown for Polo T-Shirt



Esquire Knit Composite Ltd

Figure 3.2.1 Operation Breakdown for Polo T-Shirt

Buyer name & file: MASCOT2212

Description: Polo T-Shirt

UNIT:5

LINE:5

SL	OPERATIONS	M/C	SMV	TERGET/HOUR	GROUP CAPACITY	MAN ALLOCATION
1	Placket, fusing, mark and rolling	S/N	.60	100	200	2
2	Body mark at placket	M/L	.30	200	200	1
3	Placket attach,1/16 t/s and scissoring	S/N	.65	92	185	2
4	Shoulder join with self-tape	4O/L	.50	120	240	2
5	Nose tack and collar tack	S/N	.65	92	185	2
6	Collar service and mark	OLC	.30	200	200	1
7	Collar join	4O/L	.35	171	171	1
8	Back neck binding	F/L	.32	188	188	1
9	Nose turn and Mark	M/L	.35	171	171	1
10	Back neck T/S	S/N	.35	171	171	1
11	Lower placket close	S/N	.35	171	171	1
12	upper placket 1/16 T/S	S/N	.35	171	171	1
13	upper placket pattern T/S	S/N	.35	171	171	1
14	Placket box	S/N	.55	109	218	2
15	Mark& Heat seal level attach	H/S	.50	120	240	2
16	Cluff Rib scissoring mark	OLC	.30	200	200	1
17	Cluff Rib attach	4O/L	.45	133	173	1
18	Sleeve and body match	M/L	.28	214	214	1
19	Sleeve join	4O/L	.65	92	185	2
20	Side seam with level & placket edge O/L	4O/L	.90	67	200	3
21	Sleeve in out placket sec. tack	S/N	.65	92	185	2

22	Body turn & Bottom hem	F/l(vac)	.60	100	200	2
23	Button hole and Mark for Button	B/H	.60	100	200	2
24	Button attach and close	B/A	.60	100	200	2
25	Final Body turn	M/L	.25	240	240	1
26	Process merge			115		
	Total		12.02			38
	Summary					
	Total operator	**34**				
	M/L	**4**				
	Total Manpower	**38**				

Table 1: 3.2.1Operation Breakdown for Polo T-Shirt

Total garment SMV: 12.02

Daily Target:1747

Target/Hr: 174

Total man power	38
Efficiency	68%
Daily working hours	10

Theoretical Description

Above the operation break down sheet for **Polo T-Shirt** of ESQUIRE KNIT COMPOSITE Ltd. Above this sheet represents the Buyer name and file no. MASCOT-2212, Unit 5 and Line 5, in above the sheet we found 36 machine and 38 workers is used to make a polo T-Shirt and also found what type of machine is used like No. of 4OL machine is 11, No. of F/L(F/B) machine is 1, No. of F/L(vac) machine 2, No. of OLC machine 2, No. of B/H machine 2, No. of B/H machine 2, No. of H/S machine 2., No. of helper 4. This sheet shown that individual SMV for individual operations and also shown that the machine wise individual and group capacity per hour and the line target is 1747pcs where the line efficiency is 68%. Here I will calculate the Line Target by using different efficiency like 65%, &70%, 85%,90% and where the daily working hour is 10hr.

Mathematical Analysis

Target Calculation

Here,

Total manpower = 38

SMV = 12.02

Working hour = 10

When Efficiency is 65%

We know

$$\text{Line Target} = \frac{\text{Total man power x working hour x 60 x efficiency}}{\text{SMV}}$$

$$= \frac{38 \times 10 \times 60 \times 65\%}{12.02}$$

= 1233 pcs/day

When Efficiency is 70%

$$\text{Line Target} = \frac{38 \times 10 \times 60 \times 70\%}{12.02}$$

= 1328 pcs/day

When Efficiency is 85%

$$\text{Line Target} = \frac{38 \times 10 \times 60 \times 85\%}{12.02}$$

= 1612 pcs/day

When Efficiency is 90%

$$\text{Line Target} = \frac{38 \times 10 \times 60 \times 90\%}{12.02}$$

= 2047 pcs/day

Efficiency	60%	70%	85%	90%
Target per day	1233	1328	1612	2047

SMV CALCULATION:

As we know SMV (standard minute value) is the time require for an ideal worker to work smoothly to an ideal environment.

SMV = Basic time + Allowance of basic time

where,

Basic time = Rating x Observed time

Observe time = Average time/60

Above given sheet is not contain rating and cycle time. so let we consider cycle time and operator rating and calculate SMV

Let the cycle time = 19 sec

Observe time = 19/60 =.31sec

Rating = 85%

S0, Basic time = Rating x Observe time

= .85 x .31

= .26 sec

= 15.6 min

Let, Allowance 17%

SMV = Basic time + Allowance of Basic

= 15.6 + (15.6 x 17%)

= 15.6+ 2.6

= 18.1 min

Pitch time:

Here the total operation = 26

Total SMV = 12.02 min

So, Pitch time = No. of operation /SMV

= 26/12.02

= 2.16

EFFICIENCY CALCULATION:

Here, total production pcs = 1747

SMV = 12.02

Total Manpower = 38

Working hour = 10

SO,

$$\text{Efficiency (\%)} = \frac{\text{Total production x SMV x 100}}{\text{Total manpower x working hour x 60}}$$

$$= \frac{1747 \times 12.02 \times 100}{38 \times 10 \times 60}$$

$$= .92 \times 100$$

$$= 92\%$$

LINE CAPACITY

We know

$$\text{Line Capacity} = \frac{\text{Total man power x working hour x 60 x efficiency}}{\text{SMV}}$$

$$= \frac{38 \times 10 \times 60 \times .92}{12.02}$$

$$= 1745 \text{ pcs}$$

Target	1747
SMV	18.1 min
Efficiency	92%
Line capacity	1745
Pitch time	2.16 min

3.3 Operational Breakdown for Accelerator T-Shirt

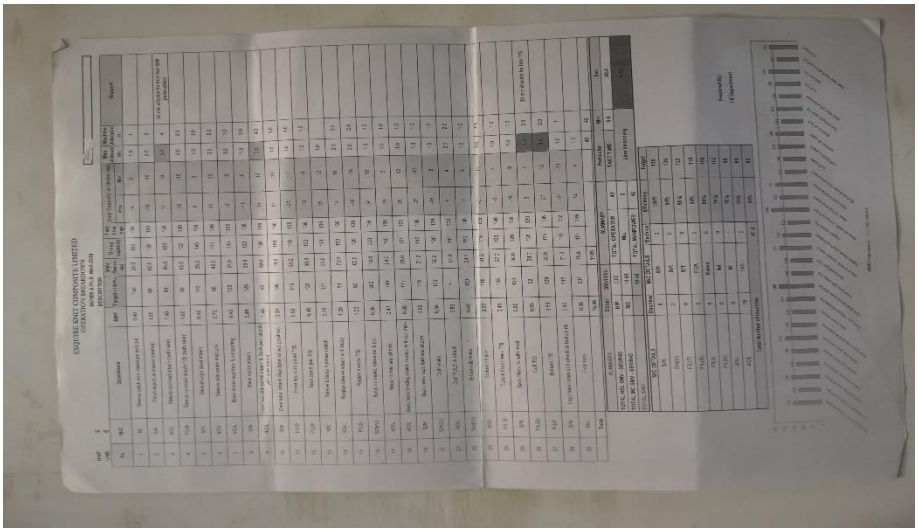


Figure 3.3.1 Operation Breakdown for Accelerator T-Shirt

Esquire Knit Composite Ltd

Buyer name & file: MASCOT2219

Description: Accelerator T-Shirt

UNIT:5

LINE:6

SL	OPERATIONS	M/C	SMV	TERGET/HOUR	GROUP CAPACITY	MAN ALLOCATION
1	Sleeve patch iron, measurement and cut	IR	.40	150	150	1
2	Patch attach at slv contrast	S/N	1.0	60	120	2
3	Slv contrast attach (both side)	4O/L	1.40	43	150	3
4	Slv contrast attach T/S both side	F/L	1.0	60	120	2

5	Slv logo lbl attach	S/N	.42	143	143	1
6	Slv side seam and turn	4O/L	.70	86	171	2
7	Back moon overlock and scissoring	4O/L	.45	133	133	1
8	Back moon attach	S/N	.48	125	125	1
9	Front two side panel attach & Back part attach with side panel	4O/L	1.40	43	150	3
10	Care label attach (two label at two position)	S/N	.32	188	188	1
11	Front two side panel T/S	F/L	.52	115	115	1
12	Back panel join T/S	F/L	.50	120	120	1
13	Slv and body number match	M/L	.35	171	171	1
14	Raglan slv attach with body	4O/L	1.20	50	150	3
15	Raglan slv T/S	F/L	1.0	60	120	2
16	Neck Rib make measure and cut mark	S/N	.30	200	200	1
17	Neck rib fold and attach	4O/L	.40	150	150	1
18	Back neck binding make measure and cut mark	4O/L	.35	171	171	1

19	Back neck tape fold and attach	S/N	.52	115	115	1
20	Cuff make	S/N(v)	.50	120	120	1
21	Cuff fold and attach	4O/L	.85	71	141	2
22	Cuff rib make	S/N(v)	.40	150	136	1
23	Bottom rib join	4O/L	.52	115	115	1
24	Turn & Front neck T/S	F/L	.45	133	133	1
25	Back neck T/S with lbl	S/N	.50	120	120	1
26	Cuff T/S	F/L	.65	92	138	2
27	Bottom T/S	F/L	.55	109	164	2
28	Logo label mark and attach at bottom rib	S/N	.52	115	115	1
29	Final Turn	M/L	.26	231	151	1
	Total		18.48			42
	Summary					
	Total operator	40				
	M/L	2				
	Total Manpower	42				

Table 2: 3.3.1 Operation Breakdown for Accelerator T-Shirt

Total garment SMV: 18.48

Daily Target:950

Target/Hr: 90

Total man power	42
Efficiency	61%
Daily working hours	10

Theoretical Description

Above the operation break down sheet for **Accelerator T-Shirt** of ESQUIRE KNIT COMPOSITE Ltd. Above this sheet represents the Buyer name and file no. MASCOT-2219, Unit 5 and Line 6, in above the sheet we found 41 machine and 42 workers is used to make a Sweat T-Shirt and also found what type of machine is used like No. of 4OL machine is 19, No. of F/L(S) machine is 2, No. of F/L(C) machine 8, No. of S/N machine 8, No. of S/N(V) machine 3, No. of IR machine 1., No. of helper 2. This sheet shown that individual SMV for individual operations and also shown that the machine wise individual and group capacity per hour and the line target is 950pcs where the line efficiency is 61%. Here I will calculate the Line Target by using different efficiency like 63%, &72%, 87%,91% and where the daily working hour is 10hr

Mathematical Analysis

Target Calculation

Here,

Total manpower = 42

SMV = 18.48

Working hour = 10

When Efficiency is 63%

We know

$$\text{Line Target} = \frac{\text{Total man power x working hour x 60 x efficiency}}{\text{SMV}}$$

$$= \frac{42 \times 10 \times 60 \times 63\%}{18.48}$$

= 859 pcs/day

When Efficiency is 72%

$$\text{Line Target} = \frac{42 \times 10 \times 60 \times 72\%}{18.48}$$

= 981 pcs/day

When Efficiency is 87%

$$\text{Line Target} = \frac{42 \times 10 \times 60 \times 87\%}{18.48}$$

= 1186 pcs/day

When Efficiency is 91%

$$\text{Line Target} = \frac{42 \times 10 \times 60 \times 91\%}{18.48}$$

= 1240 pcs/day

Efficiency	63%	72%	87%	91%
Target per day	859	981	1186	1240

SMV CALCULATION:

As we know SMV (standard minute value) is the time require for an ideal worker to work smoothly to an ideal environment.

SMV = Basic time + Allowance of basic time

where,

Basic time = Rating x Observed time

Observe time = Average time/60

Above given sheet is not containing rating and cycle time so we consider the rating and cycle time and calculate SMV.

Let Average cycle time = 17

Observe time = 17/60

= .28 sec

Rating = 85%

S0, Basic time = Rating x Observe time

= .85 x .28

= .23 sec

= 14.28 min

Let, Allowance 17%

SMV = Basic time + Allowance of Basic

= 14.28 + (14.28 x 17%)

= 14.28 + 2.24

= 16.70 min

Pitch time:

Here the total operation = 29

Total SMV = 18.48 min

So, Pitch time = No. of operation /SMV

= 29/18.48

= 1.56

EFFICIENCY CALCULATION:

Here, total production pcs = 900

SMV = 18.48

Total Manpower = 42

Working hour = 10

SO,

$$\text{Efficiency (\%)} = \frac{\text{Total production x SMV x 100}}{\text{Total manpower x working hour x 60}}$$

$$= \frac{900 \times 18.48 \times 100}{42 \times 10 \times 60}$$

= .66 x 100

= 66%

Line Capacity

We know

$$\text{Line Capacity} = \frac{\text{Total man power x working hour x 60 x efficiency}}{\text{SMV}}$$

$$= \frac{42 \times 10 \times 60 \times .66}{18.48}$$

= 900 pcs

Target/day	950
SMV	16.70 min
Efficiency	66%
Line capacity/day	900
Pitch time	1.56 min

3.4 Operational Breakdown for Ladies Short Sleeve T-Shirt

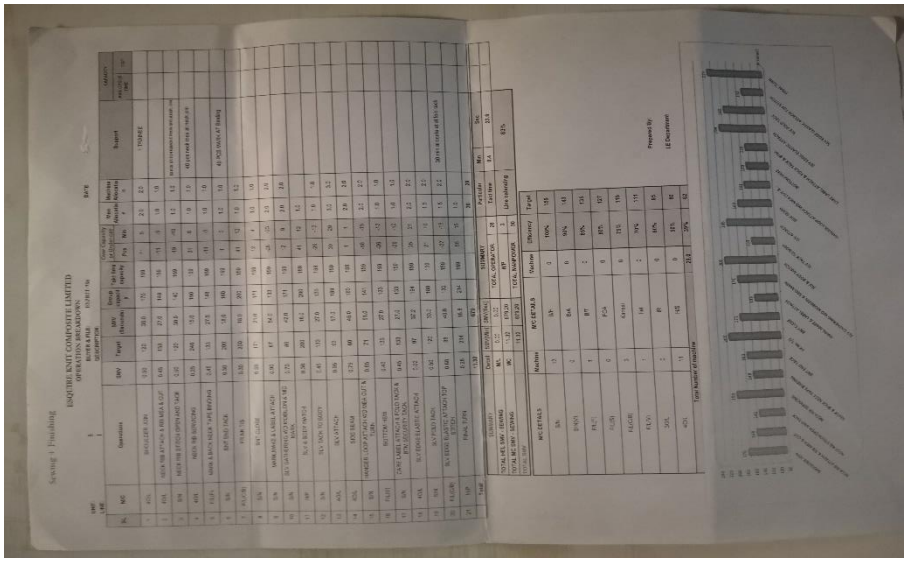


Figure 3.4.1 Operation Breakdown Ladies Short Sleeve T-Shirt

Esquire Knit Composite Ltd

Buyer name & file: ESPRIT-758

Description: Ladies Short Sleeve T-Shirt

UNIT:5

LINE:1

SL	OPERATIONS	M/C	SMV	TERGET/HOUR	GROUP CAPACITY	MAN ALLOCATION
1	Shoulder join	4O/L	.50	120	170	2
2	Neck Rib Attach and Rib make and cut	4O/L	.45	133	148	1
3	Neck Rib stitch open and tack	S/N	.50	120	140	1
4	Neck Rib servicing	4O/L	.25	240	190	1
5	Mark & back tape binding	F/L(F)	.45	133	148	1
6	BNT End Tack	S/N	.30	200	160	1
7	Front neck T/S	F/L(C/B)	.30	200	200	1
8	BNT close	S/N	.35	171	171	1
9	Mark make lbl attach	S/N	.90	67	133	2
10	Slv gathering with mobilon and mid mark	S/N	.70	86	171	2
11	Slv and body match	H/P	.30	200	200	1
12	Slv Tack to body	S/N	.45	133	133	1
13	Slv attach	4O/L	.95	63	189	3
14	Side seam	4O/L	.75	80	160	2
15	Hanger loop attach with	S/N	.85	71	141	2

	make and turn					
16	Bottom hem	F/L(V)	.45	133	133	1
17	Care lbl attach and fold tack and BTM security tack	S/N	.45	133	133	1
18	Slv edge elastic attach	4O/L	.62	97	194	2
19	Slv fold tack	S/N	.50	120	180	2
20	Slv edge elastic attach top stitch	F/L(C/B)	.68	88	132	2
21	Final Turn	H/P	.28	214	214	1
	Total		11.32			30

Summary	
Total operator	28
M/L	2
Total Manpower	30

Table 3: 3.4.1 Operation Breakdown for Ladies Short Sleeve T-Shirt

Total garment SMV: 11.32

Daily Target:1550

Target/Hr: 175

Total man power	30
Efficiency	90%
Daily working hours	10

Theoretical Description

Above the operation break down sheet for **Ladies Short Sleeve T-Shirt** of ESQUIRE KNIT COMPOSITE Ltd. Above this sheet represents the Buyer name and file no. ESPRIT-758, Unit 5 and Line 1, in above the sheet we found 28 machine and 30 workers is used to make a **Ladies Short Sleeve T-Shirt** and also found what type of machine is used like No. of 4OL machine is 11, No. of F/L(F/B) machine is 1, No. of F/L(vac) machine 1, No. of F/L(vac) machine 3, No. of S/N machine 13, No, No. of helper 2. This sheet shown that individual SMV for individual operations and also shown that the machine wise individual and group capacity per hour and the line target is 1750 pcs where the line efficiency is 81%. Here I will calculate the Line Target by using different efficiency like 68%, &77%, 86%,89% and where the daily working hour is 10hr.

Mathematical Analysis

Target Calculation

Here,

Total manpower = 30

SMV = 11.32

Working hour = 10

When Efficiency is = 68%

We know

$$\text{Line Target} = \frac{\text{Total man power x working hour x 60 x efficiency}}{\text{SMV}}$$

$$= \frac{30 \times 10 \times 60 \times 68\%}{11.32}$$

$$= 1081 \text{ pcs/day}$$

When Efficiency is 77%

$$\text{Line Target} = \frac{30 \times 10 \times 60 \times 77\%}{11.32}$$

$$= 1224 \text{ pcs/day}$$

When Efficiency is 86%

$$\text{Line Target} = \frac{30 \times 10 \times 60 \times 86\%}{11.32}$$

$$= 1367 \text{ pcs/day}$$

When Efficiency is 89%

$$\text{Line Target} = \frac{30 \times 10 \times 60 \times 89\%}{11.32}$$

= 1415 pcs/day

Efficiency	68%	77%	86%	89%
Target per day	1081	1224	1367	1415

SMV CALCULATION:

As we know SMV (standard minute value) is the time require for an ideal worker to work smoothly to an ideal environment.

SMV = Basic time + Allowance of basic time

Where,

Basic time = Rating x Observed time

Observe time = Average time/60

Above given sheet is not containing rating and cycle time so we consider the rating and cycle time and calculate SMV

Let Average cycle time = 12.5

Observe time = 12.5/60

= .21 sec

Rating = 85%

S0, Basic time = Rating x Observe time

= .85 x .21

= .18 sec

= 10.8 min

Let, Allowance 17%

SMV = Basic time + Allowance of Basic

= 10.8 + (10.8 x 17%)

= 10.8 + 1.8

= 12.6 min

Pitch time:

Here the total operation = 21

Total SMV = 11.32 min

So, Pitch time = No. of operation /SMV

= 21/11.32

= 1.85

EFFICIENCY CALCULATION:

Here, total production pcs = 1650

SMV = 11.32

Total Manpower = 30

Working hour = 10

SO,

$$\text{Efficiency (\%)} = \frac{\text{Total production x SMV x 100}}{\text{Total manpower x working hour x 60}}$$

$$= \frac{1650 \times 11.32 \times 100}{30 \times 10 \times 60}$$

= .88 x 100

= 88%

Line Capacity

We know

$$\text{Line Capacity} = \frac{\text{Total man power x working hour x 60 x efficiency}}{\text{SMV}}$$

$$= \frac{30 \times 10 \times 60 \times .88}{11.32}$$

= 1399 pcs

Target	1550
SMV	12.6 min
Efficiency	88%
Line capacity	1399
Pitch time	1.85 min

3.5 Operational Breakdown for T-Shirt

Sinha Knitting Limited (GD)
Operation Bulletin (Layout)

Buyer	Levi's									Day Target 10 Hour	2300
Style	Mens T Shirt									Hourly Target 85%	230
Item	Mens SS T Shirt									SMV	5.76
Date	28-Nov-20									Manpower	26
SL/NO	Process name	SMV	TGT	M/C	Operator	Helper	QC	Remark			
1	Set Front & Back	0.24	250	Hel		1					
2	Shoulder Joint	0.20	300	O/L	1						
3	Trims & set	0.20	300	Hel		1					
4	Rib Tack	0.20	300	S/N	1						
5	Neck Rib Attach	0.44	136	O/L	2						
6	Label Attach	0.24	250	S/N	1						
7	Neck Tape Attach Slde To Sldr	0.40	150	F/L	1						
8	Mark For Main Label Attach	0.20	300	HEL		1					
9	Label Make	0.24	250	S/N	1						
10	Main Label Attach	0.40	150	S/N	2						
11	Sleeve pair With body	0.24	250	HEL		1					
12	Sleeve Attach	0.45	133	O/L	2						
13	Trims & set	0.24	250	HEL		1					
14	Side Seam	0.50	120	O/L	3						
15	Trims & set	0.24	250	HEL		1					
16	Sleeve Hem	0.40	150	F/L	2						
17	Care Label Attach At Side	0.24	250	S/N	1						
19	Bottom Hem	0.45	133	F/L	1						
21	Trims & set	0.24	250	HEL		2					
22											
23											
24											
25											
	Total SMV	5.76			18	8					

Machine Summary	
S/N	6
O/L	8
F/L	4
BAR TACK	
BHOLE	
TOTAL	18
HEL	8
G.Total	26

Figure 3.5.1 Operation Breakdown for T-Shirt

Sinha Knitting Ltd

Buyer name: Levi's

Description: T-Shirt

Date:28-Nov-20

SL	OPERATIONS	M/C	SMV	TERGET/HOUR	Operator	Helper
1	Set Front and back	Hel	.24	250		1
2	Shoulder Joint	O/L	.20	300	1	
3	Trims and set	Hel	.20	300		1
4	Rib Tuck	S//N	.20	300	1	
5	Neck rib attached	O/L	.44	136	2	

6	Label attached	S/N	.24	250	1	
7	Neck tape attached	S/N	.40	150	1	
8	Main label mark	Hel	.20	300		1
9	Label make	O/L	.24	250	1	
10	Main label attached	S/N	.40	150	2	
11	Sleeve pair with body	Hel	.24	250		1
12	Sleeve attached	O/L	.45	133	2	
13	Trims and set	Hel	.24	250		1
14	Side seam	O/L	.50	120	3	
15	Trims and Set	Hel	.24	250		1
16	Sleeve hemp	F/L	.40	150	2	1
17	Care label attached	S/N	.24	250	1	
18	Bottom hemp	F/L	.45	133	1	
19	Trims and set	Hel	.24	250		2
	Total		5.76		18	8

	Summary	
	Total operator	**18**
	HEL	**8**
	Total Manpower	**26**

Table 4: 3.5.1 Operation Breakdown for T-Shirt

Total garment SMV:5.76

Daily Target: 2300

Target/Hr: 230

Total man power	26
Efficiency	85%
Daily working hours	10

Theoretical Description

Above the operation break down sheet for T-**Shirt** of SINHA KNITTINNG Ltd. Above this sheet represents the Buyer name LEVI'S and above the sheet we found 18 machine and 26 workers is used to make a T-Shirt and also found what type of machine is used like No. of OL machine is 8, No. of F/L machine is 4, No. of OLC machine 8, No. of S/N machine 6, No. of helper 8. This sheet shown that individual SMV for individual operations and also shown that the machine wise

individual and group capacity per hour and the line target is 2300pcs where the line efficiency is 85%. Here I will calculate the Line Target by using different efficiency like 65%, &70%, 85%,90% and where the daily working hour is 10hr.

Mathematical Analysis

Target Calculation

Here,

Total manpower = 26

SMV = 5.76

Working hour = 10

When Efficiency is 65%

We know

$$\text{Line Target} = \frac{\text{Total man power x working hour x 60 x efficiency}}{\text{SMV}}$$

$$= \frac{26 \times 10 \times 60 \times 65\%}{5.76}$$

$$= 1760 \text{ pcs/day}$$

When Efficiency is 70%

$$\text{Line Target} = \frac{26 \times 10 \times 60 \times 70\%}{5.76}$$

$$= 1896 \text{ pcs/day}$$

When Efficiency is 85%

$$\text{Line Target} = \frac{26 \times 10 \times 60 \times 85\%}{5.76}$$

$$= 2302 \text{ pcs/day}$$

When Efficiency is 90%

$$\text{Line Target} = \frac{26 \times 10 \times 60 \times 90\%}{5.76}$$

= 2437 pcs/day

Efficiency	60%	70%	85%	90%
Target per day	1760	1896	2302	2437

SMV CALCULATION:

As we know SMV (standard minute value) is the time require for an ideal worker to work smoothly to an ideal environment.

SMV = Basic time + Allowance of basic time

where,

Basic time = Rating x Observed time

Observe time = Average time/60

Above given sheet is not containing rating and cycle time so let we consider the rating and cycle time and calculate SMV

Let Average cycle time = 35 sec

Observe time = 35/60

= .58 sec

Rating = 85%

S0, Basic time = Rating x Observe time

= .85 x .58

= .19 sec

= 11.4 min

Let, Allowance 17%

SMV = Basic time + Allowance of Basic

= 11.4 + (11.4 x 17%)

= 11.4 + 1.9

= 13.3 min

Pitch time:

Here the total operation = 26

Total SMV = 5.76

So, Pitch time = No. of operation /SMV

= 26/5.76

= 4.51

EFFICIENCY CALCULATION:

Here, total production pcs = 1747

SMV = 5.76

Total Manpower = 38

Working hour = 10

SO,

$$\text{Efficiency (\%)} = \frac{\text{Total production x SMV x 100}}{\text{Total manpower x working hour x 60}}$$

$$= \frac{1747 \times 5.76 \times 100}{38 \times 10 \times 60}$$

= .92 x 100

= 92

LINE CAPACITY

We know

$$\text{Line Capacity} = \frac{\text{Total man power x working hour x 60 x efficiency}}{\text{SMV}}$$

$$= \frac{38 \times 10 \times 60 \times .92}{12.02}$$

= 1745 pcs

Target	1747
SMV	13.3 min
Efficiency	92%
Line capacity	1745
Pitch time	2.16 min

3.6 Operational Breakdown for Polo -Shirt

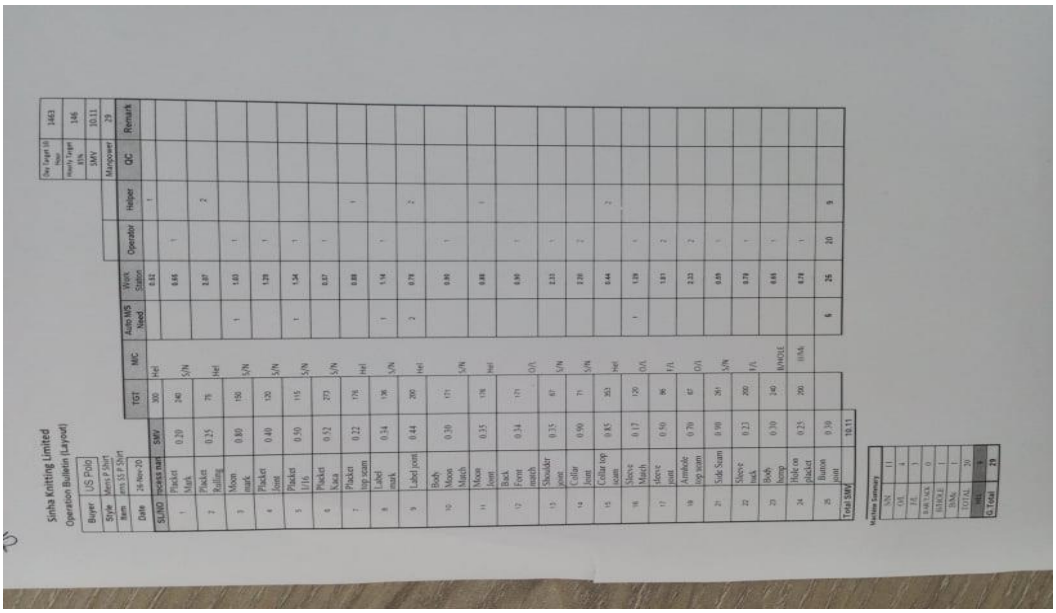


Figure 3.6.1 Operation Breakdown for Polo T-Shirt

Sinha Knitting Ltd

Buyer name: US Polo

Description: Polo-Shirt

Date:26-Nov-20

L	OPERATIONS	M/C	SMV	TERGET/HOUR	Operator	Helper
1	Placket Mark	Hel	.20	300	0	1
2	Placket Rulling	S/N	.25	240	1	
3	Moon mark	Hel	.80	75		2
4	Placket Joint	S//N	.40	150	1	
5	Placket 1/16	S/N	.50	120	1	
6	Placket Kaca	S/N	.52	115	1	
7	Placket top seam	S/N	.22	273	1	
8	Label mark	Hel	.34	176		1
9	Label joint	S/N	.44	136	1	

10	Body Moon Match	Hel	.30	200		2
11	Moon Joint	S/N	.35	171	1	
12	Back Fornt match	Hel	.34	176		1
13	Shoulder joint	O/L	.35	171	1	
14	Collar Joint	S/N	.90	67	1	
15	Collar top seam	S/N	.85	71	1	
16	Sleeve Match	Hel	.17	353	2	2
17	sleeve joint	O/L	.50	120		
18	Armhole top seam	F/L	.70	86	1	
19	Side Seam	O/L	.90	67	2	
20	Sleeve tuck	S/L	.23	261	2	
21	Body hemp	F/L	.30	200	1	
22	Hole on placket	B/H	.25	240	1	
23	Button joint	B/M	.30	200	1	
	Total		10.11		20	9
	Summary					
	Total operator	**20**				
	HEL	**9**				
	Total Manpower	**29**				

Table 5: 3.6.1 Operation Breakdown for Polo T-Shirt

Total garment SMV: 10.11

Daily Target: 2300

Target/Hr: 146

Total man power	29
Efficiency	85%
Daily working hours	10

Theoretical Description

Above the operation break down sheet for **Polo-Shirt** of SINHA KNITTINNG Ltd. Above this sheet represents the Buyer name US Polo and above the sheet we found 20 machine and 29 workers

is used to make a Polo-Shirt and also found what type of machine is used like No. of OL machine is 4, No. of F/L machine is 3, No. of B/M machine 2, No. of S/N machine 11, No. of helper 9. This sheet shown that individual SMV for individual operations and also shown that the machine wise individual and group capacity per hour and the line target is **2300**pcs where the line efficiency is 85%. Here I will calculate the Line Target by using different efficiency like 65%, &70%, 85%,90% and where the daily working hour is 10hr.

Mathematical Analysis

Target Calculation

Here,

Total manpower = 29

SMV = 10.11

Working hour = 10

When Efficiency is 65%

We know

$$\text{Line Target} = \frac{\text{Total man power x working hour x 60 x efficiency}}{\text{SMV}}$$

$$= \frac{29 \times 10 \times 60 \times 65\%}{10.11}$$

= 1119 pcs/day

When Efficiency is 70%

$$\text{Line Target} = \frac{29 \times 10 \times 60 \times 70\%}{10.11}$$

= 1205 pcs/day

When Efficiency is 85%

$$\text{Line Target} = \frac{29 \times 10 \times 60 \times 85\%}{10.11}$$

= 1463 pcs/day

When Efficiency is 90%

$$\text{Line Target} = \frac{29 \times 10 \times 60 \times 90\%}{10.11}$$

= 1549 pcs/day

Efficiency	60%	70%	85%	90%
Target per day	1119	1205	1463	1549

SMV CALCULATION:

As we know SMV (standard minute value) is the time require for an ideal worker to work smoothly to an ideal environment.

SMV = Basic time + Allowance of basic time

where,

Basic time = Rating x Observed time

Observe time = Average time/60

Above given sheet is not containing rating and cycle time so let we consider the rating and cycle time and calculate SMV

Let Average cycle time = 35 sec

Observe time = 35/60

= .58 sec

Rating = 85%

S0, Basic time = Rating x Observe time

= .85 x .58

= .19 sec

= 11.4 min

Let, Allowance 17%

SMV = Basic time + Allowance of Basic

= 11.4 + (11.4 x 17%)

= 11.4 + 1.9

= 13.3 min

Pitch time:

Here the total operation = 26

Total SMV = 12.02 min

So, Pitch time = No. of operation /SMV

= 26/12.02

= 2.16

EFFICIENCY CALCULATION:

Here, total production pcs = 1747

SMV = 12.02

Total Manpower = 38

Working hour = 10

SO,

$$\text{Efficiency (\%)} = \frac{\text{Total production x SMV x 100}}{\text{Total manpower x working hour x 60}}$$

$$= \frac{1747 \times 12.02 \times 100}{38 \times 10 \times 60}$$

= .92 x 100

= 92%

LINE CAPACITY

We know

$$\text{Line Capacity} = \frac{\text{Total man power x working hour x 60 x efficiency}}{\text{SMV}}$$

$$= \frac{38 \times 10 \times 60 \times .92}{12.02}$$

= 1745 pcs

Target	1747
SMV	13.3 min
Efficiency	92%
Line capacity	1745
Pitch time	2.16 min

CHAPTER 4: RESULT AND DISCUSSION

4.1.1 Analysis of SMV for Different Operation from data 3.2

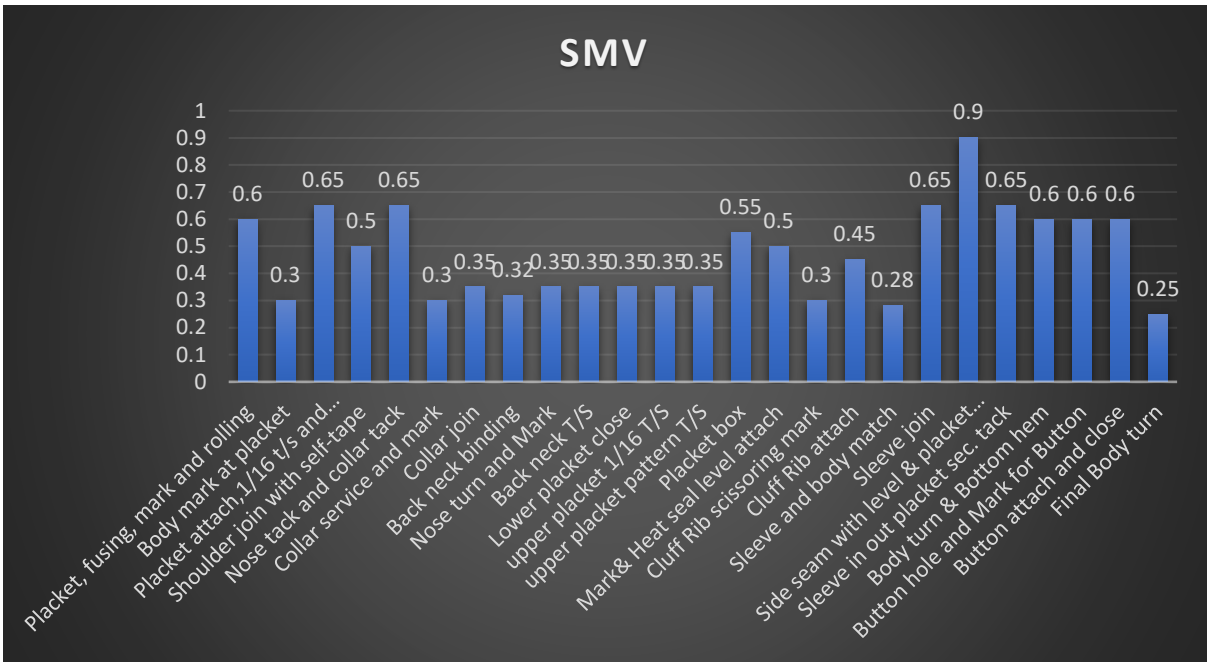


Figure 4.1.1 Analysis of SMV for Different Operation from data 3.2 by the help of Bar chart

Analytical Description of SMV for Different Operation by the help of Bar chart:

In this bar chart we showed the different SMV needed for diverse operation for a **Polo T-Shirt**. First of all, we calculated SMV for different operation. By the help of this result, we make a chart. This chart contains information about the name of operation and their SMV. Where the higher SMV is Side seam with level & placket edge .9 and the lower SMV is Final body turn is .25

4.1.2 Capacity Study Analysis for Different Operation from data 3.2

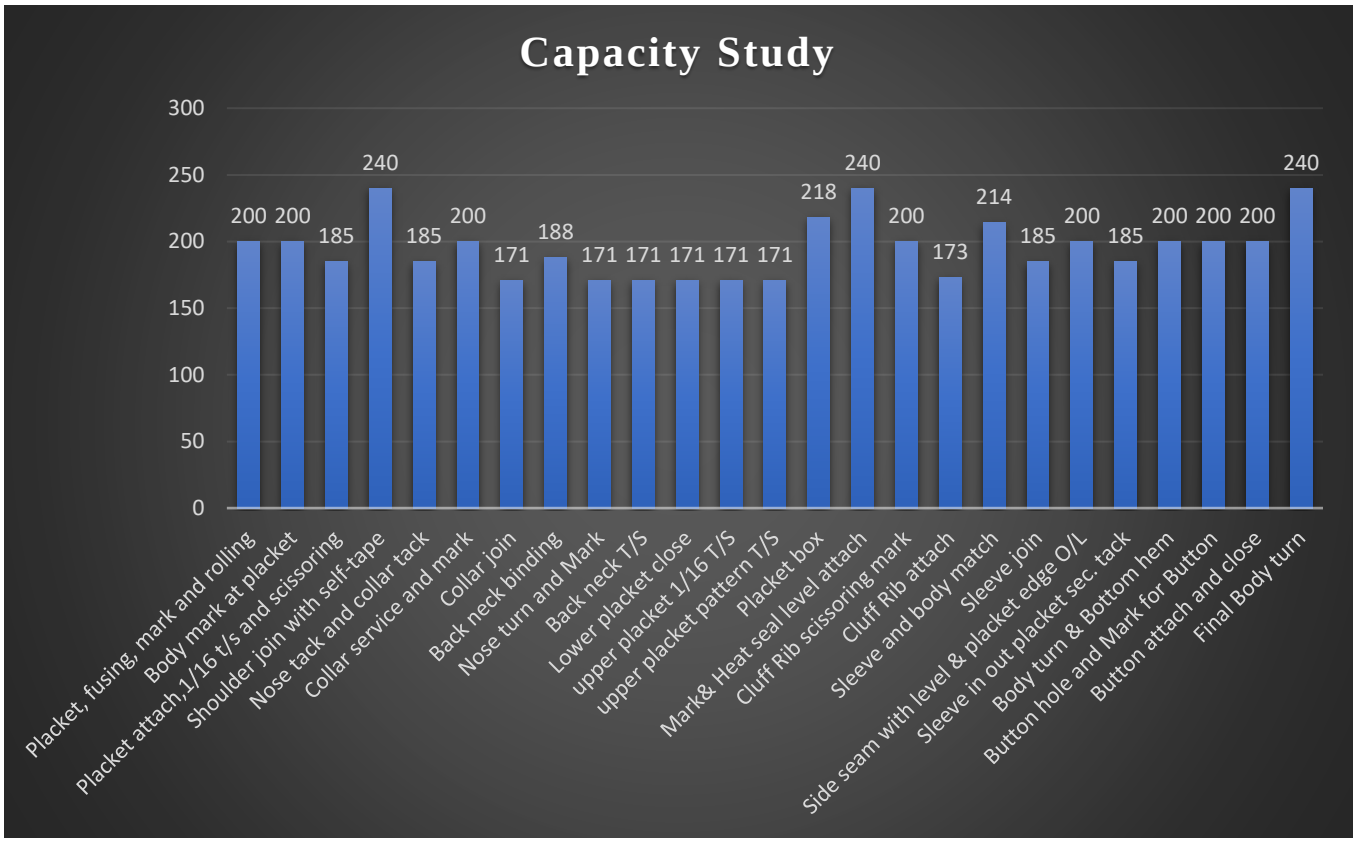


Figure 4.1.2 Analysis of Capacity S for Different Operation from data 3.2 by the help of Bar chart

Analytical Description of Capacity for Different Operation and Different SMV by the help of Bar chart:

In above this chart we showed the hourly group capacity for diverse operations where the efficiency is 90% and by the help of this information, we make a bar chart where it shows that higher capacity and lower capacity. Before make this chart, we calculated individual production capacity in chapter 3. This chart contains information about capacity per hour for diverse operation. Here we can see the highest potential capacity for the operations are Mark& Heat seal level attach, Shoulder joins with self-tape, Final Body turn and the lowest potential capacity for these operations are Collar join, Lower placket close, Cuff Rib attach. And others are comparatively same.

4.1.3 Comparison of higher and lower SMV of Different Operation from data 3.2

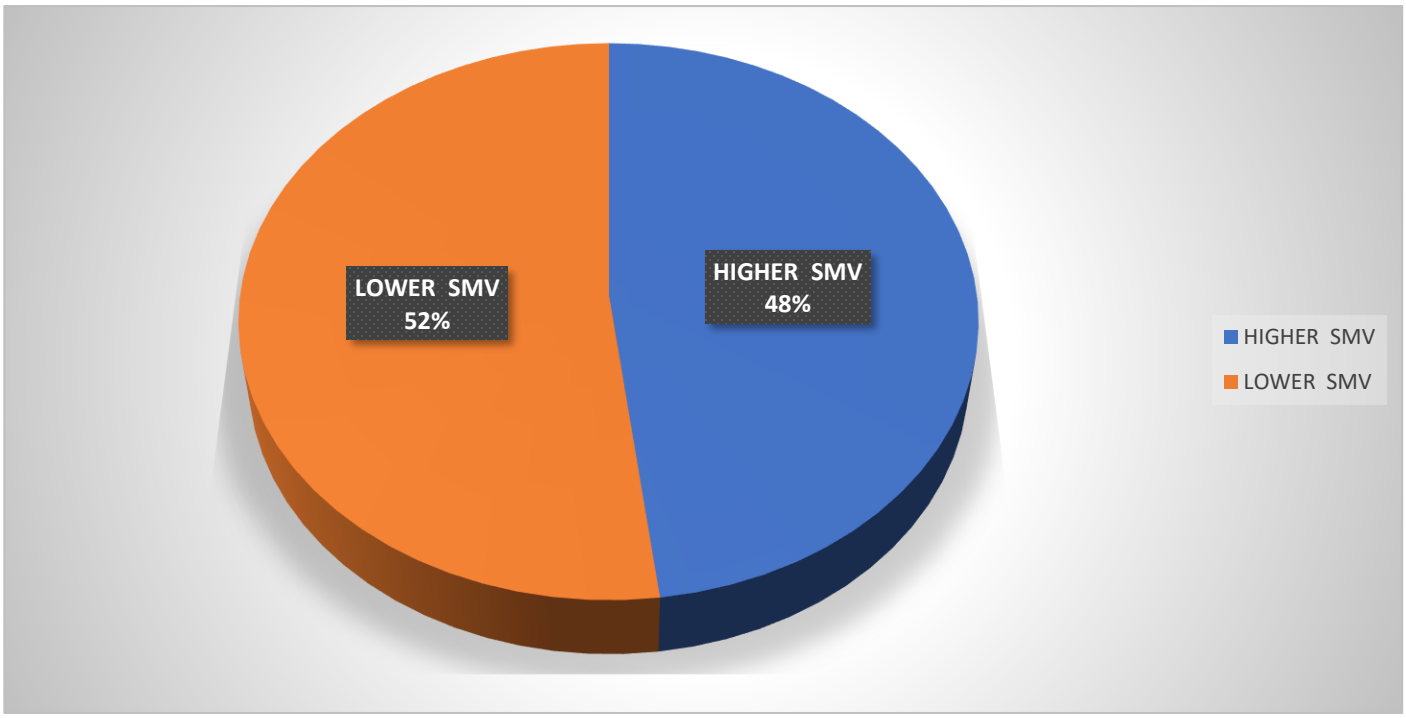


Figure 4.1.3 Comparison of higher and lower SMV of Different Operation from data 3.2 by the help of Pie chart

From above this PIE chart, we try to understand how many operations is contains higher SMV and how many operations is contains lower SMV. Here we found 14 operations which are combinedly make a percentage of higher SMV which is 48% and 15 operations which are combinedly make a percentage of lower SMV 52%.

4.2.1 Analysis of SMV for Different Operation from data 3.3

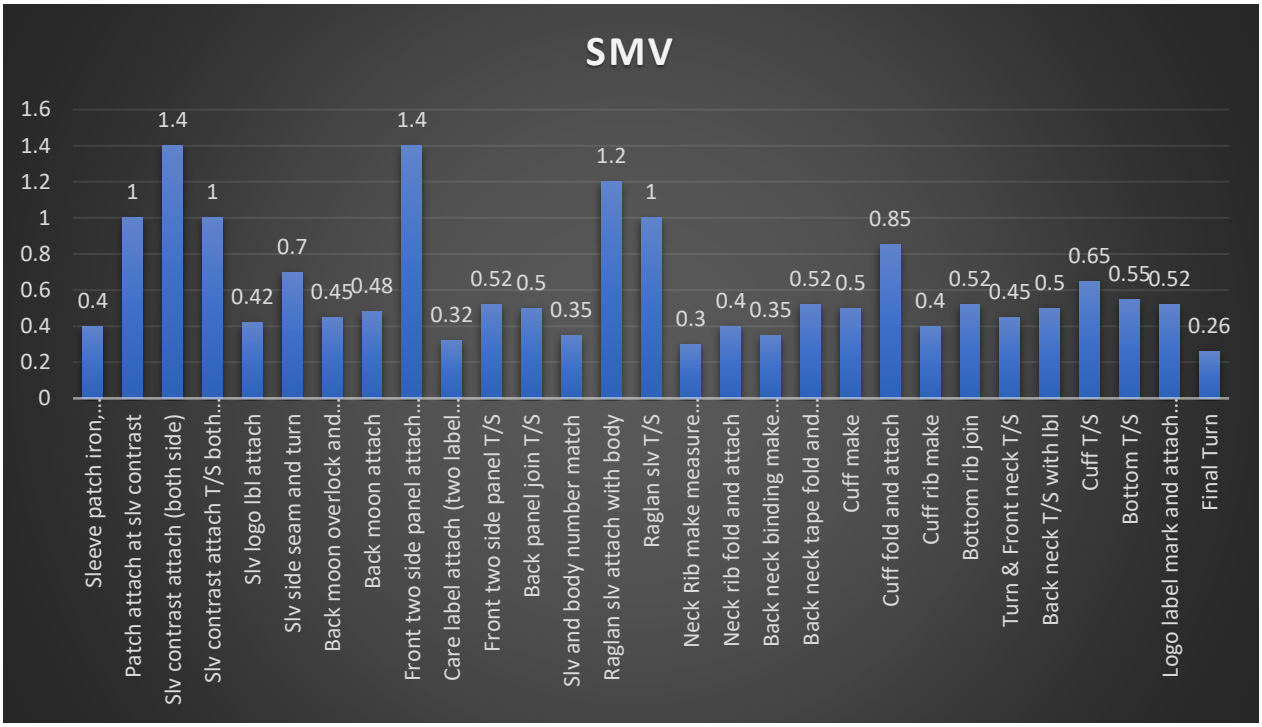


Figure 4.2.1 Analysis of SMV for Different Operation from data 3.3 by the help of Bar Chart

Analytical Description of SMV for Different Operation by the help of Bar chart:

In this bar chart we showed the different SMV needed for diverse operation for an **Accelerator T-Shirt**. First of all, we calculated SMV for different operation. By the help of this result, we make a chart. This chart contains information about the name of operation and their SMV. Where the higher SMV is Front two side panel attach & Back part attach with side panel I 1.4, Slv contrast attach (both side) is 1.4, Raglan slv attach with body is 1.2 and the lower SMV is Final Turn is .26, Neck Rib make measure and cut mark is .3, Care label attach (two label at two position) is .32.

4.2.2 Capacity Study Analysis for Different Operation from data 3.3

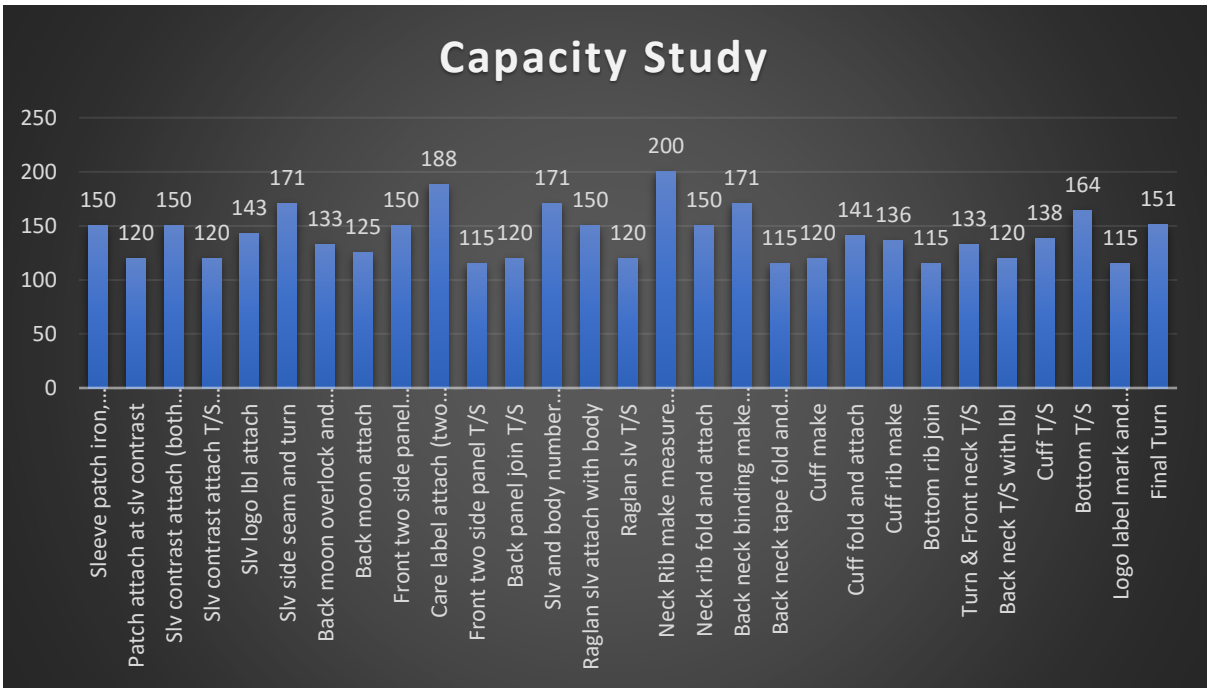


Figure 4.2.2:1Analysis of Capacity for Different Operation from data 3.3 by the help of bar chart

Analytical Description of Capacity for Different Operation by the help of Bar chart:

In above this chart we showed the hourly group capacity for diverse operations where the efficiency is 85% and by the help of this information, we make a bar chart where it shows that higher capacity and lower capacity. Before make this chart, we calculated individual production capacity in chapter 3. This chart contains information about capacity per hour for diverse operation. Here we can see the highest potential capacity for the operations are Neck Rib make measure and cut mark, Care label attach (two label at two position), Sleeve and body number match, Sleeve side seam and turn. and the lowest potential capacity for these operations are Logo label mark and attach at bottom rib, back neck tape fold and attach, Bottom rib join and others are comparatively same.

4.2.3 Comparison of higher and lower SMV of Different Operation from data 3.3

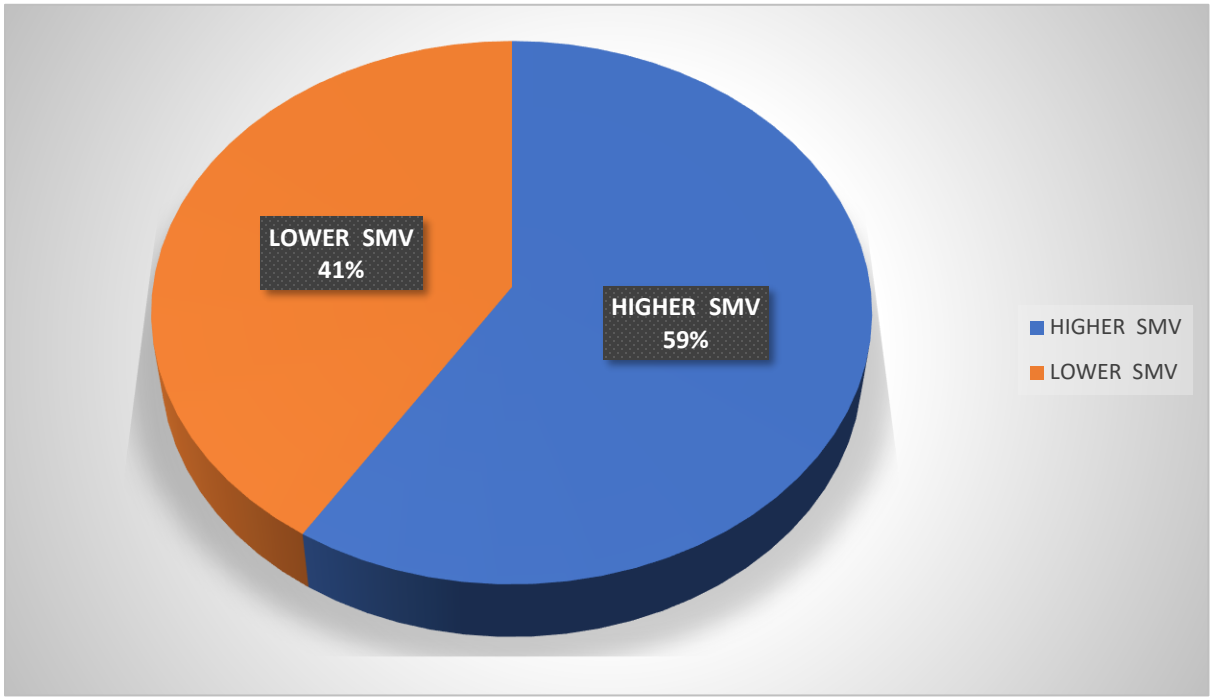


Figure 4.2.3: Comparison of higher and lower SMV of Different Operation from data 3.3 by the help of Pie chart

From above this PIE chart, we try to understand how many operations is contains higher SMV and how many operations is contains lower SMV. Here we found 17 operations which are combinedly make a percentage of higher SMV which is 59% and 12 operations which are combinedly make a percentage of lower SMV 41%.

4.3.1 Analysis of SMV for Different Operation from data 3.4

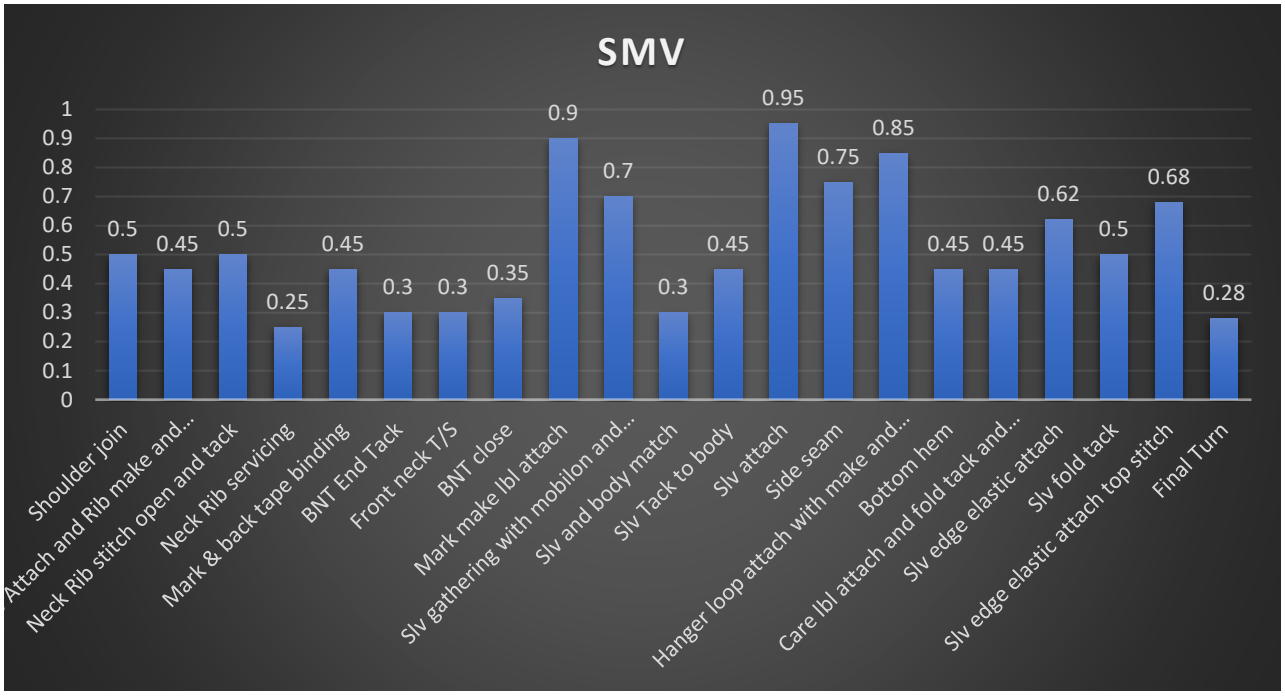


Figure 4.3.1: Analysis of SMV for Different Operation from data 3.4 by the help of Bar Chart

Analytical Description of SMV for Different Operation by the help of Bar chart:

In this bar chart we showed the different SMV needed for diverse operation for a **Ladies Short Sleeve T-Shirt**. First of all, we calculated SMV for different operation. By the help of this result, we make a chart. This chart contains information about the name of operation and their SMV. Where the higher SMV is Sleeve attach is .95, Mark makes label attach is .9, and the lower SMV is Neck Rib servicing is .2, Final Turn .25, Sleeve and body match is .3.

4.3.2 Capacity Study Analysis for Different Operation from data 3.4

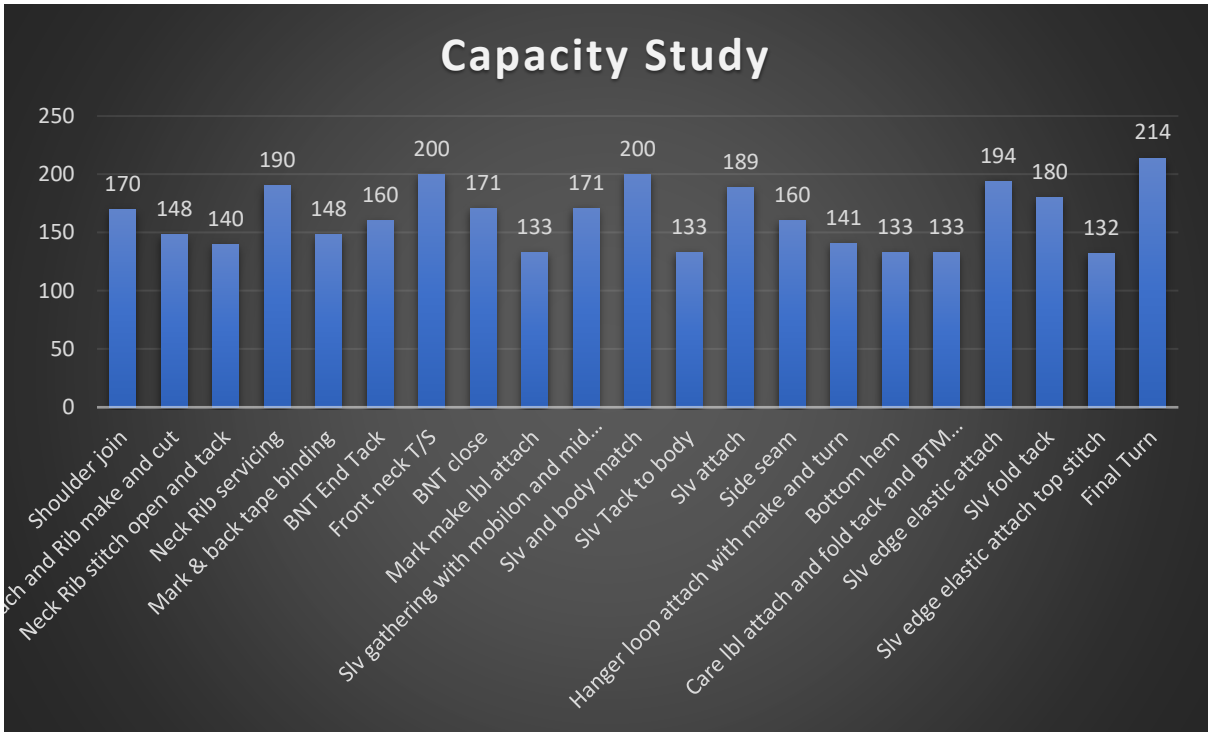


Figure 4.3.2: Analysis of Capacity S for Different Operation from data 3.4 by the help of Bar chart

Analytical Description of Capacity for Different Operation by the help of Bar chart:

In above this chart we showed the hourly group capacity for diverse operations where the efficiency is 83% and by the help of this information, we make a bar chart where it shows that higher capacity and lower capacity. Before make this chart, we calculated individual production capacity in chapter 3. This chart contains information about capacity per hour for diverse operation. Here we can see the highest potential capacity for the operations are Neck Rib servicing, Shoulder join, Sleeve attach, Sleeve edge elastic attach and the lowest potential capacity for these operations are Bottom hem, Care label attach and fold tack and BTM security tack, Mark makes label attach. And others are comparatively same.

4.3.3 Comparison of higher and lower SMV of Different Operation from data 3.4

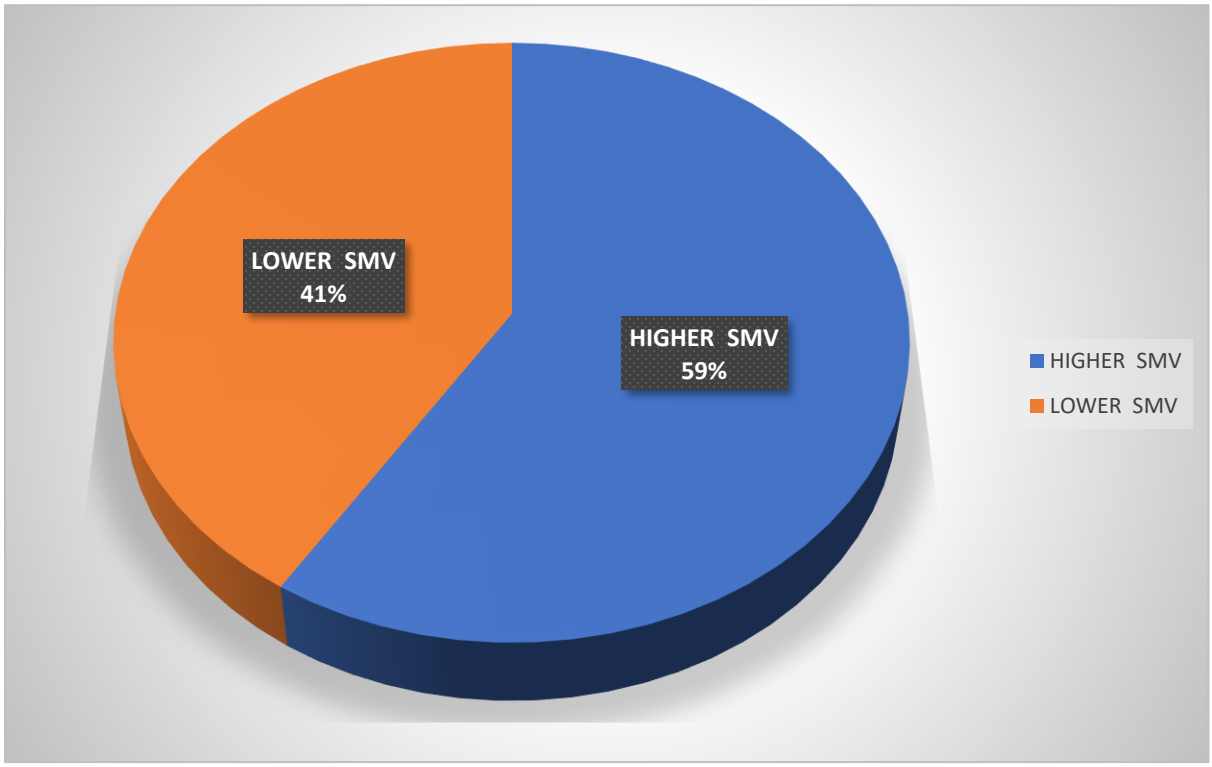


Figure 4.3.3: Comparison of higher and lower SMV of Different Operation from data 3.4 by the help of Pie chart

From above this PIE chart, we try to understand how many operations is contains higher SMV and how many operations is contains lower SMV. Here we found 12 operations which are combinedly make a percentage of higher SMV which is 59% and 9 operations which are combinedly make a percentage of lower SMV 41%.

4.4.1 Analysis of SMV for Different Operation from data 3.5

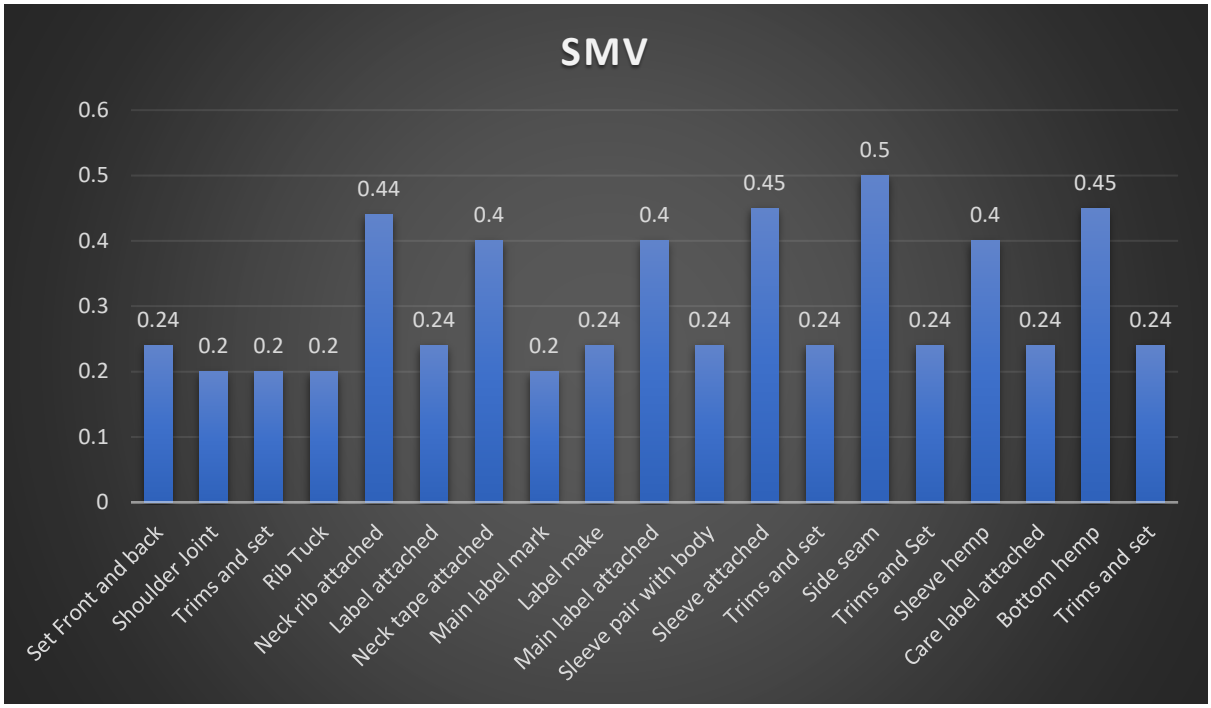


Figure 4.4.1: Analysis of SMV for Different Operation from data 3.5 by the help of Bar chart

Analytical Description of SMV for Different Operation by the help of Bar chart:

In this bar chart we showed the different SMV needed for diverse operation for a **T-Shirt**. First of all, we calculated SMV for different operation. By the help of this result, we make a chart. This chart contains information about the name of operation and their SMV. Where the higher SMV is Side Seam is .5, Bottom Hemp is .45, and the lower shoulder join, Main Label mark, Rib tuck is .2

4.4.2 Capacity Study Analysis for Different Operation from data 3.5

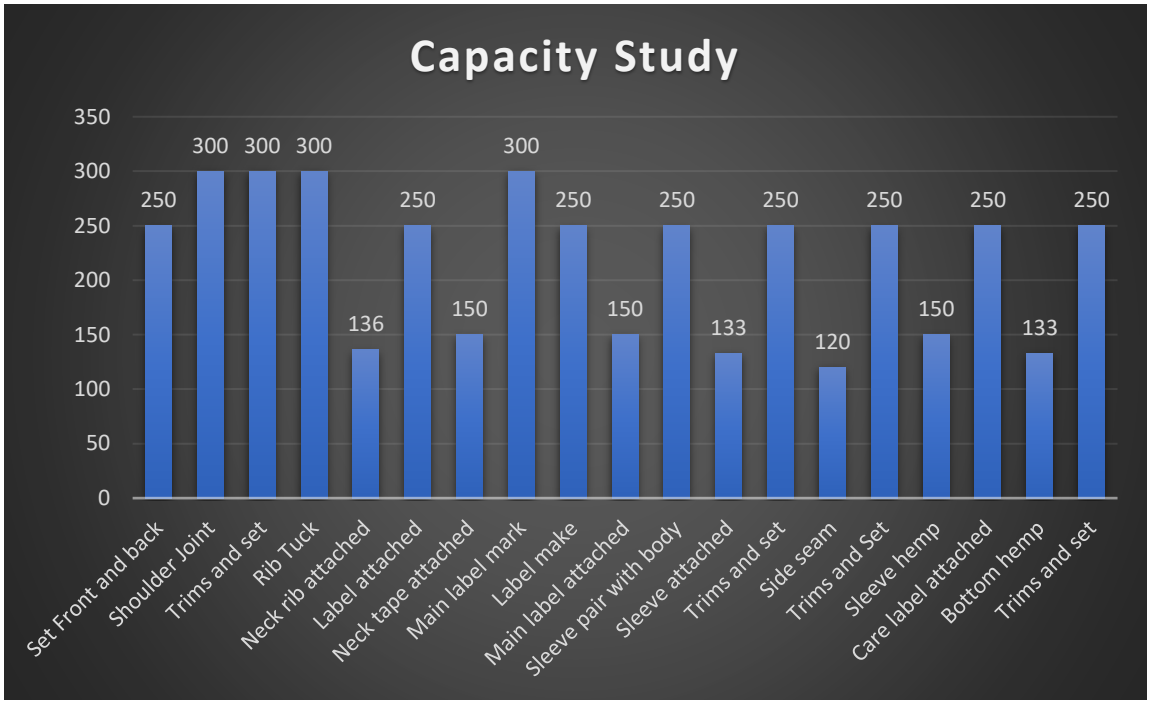


Figure 4.4.2: Analysis of Capacity for Different Operation from data 3.5 by the help of Bar chart

Analytical Description of Capacity for Different Operation by the help of Bar chart:

In above this chart we showed the hourly group capacity for diverse operations where the efficiency is 85% and by the help of this information, we make a bar chart where it shows that higher capacity and lower capacity. Before make this chart, we calculated individual production capacity in chapter 3. This chart contains information about capacity per hour for diverse operation. Here we can see the highest potential capacity for the operations are shoulder join, Rib tuck, main label mark and the lowest potential capacity for these operations are Side seam, Neck rib attached, Bottom hemp. And others are comparatively same.

4.4.3 Comparison of higher and lower SMV of Different Operation from data 3.5

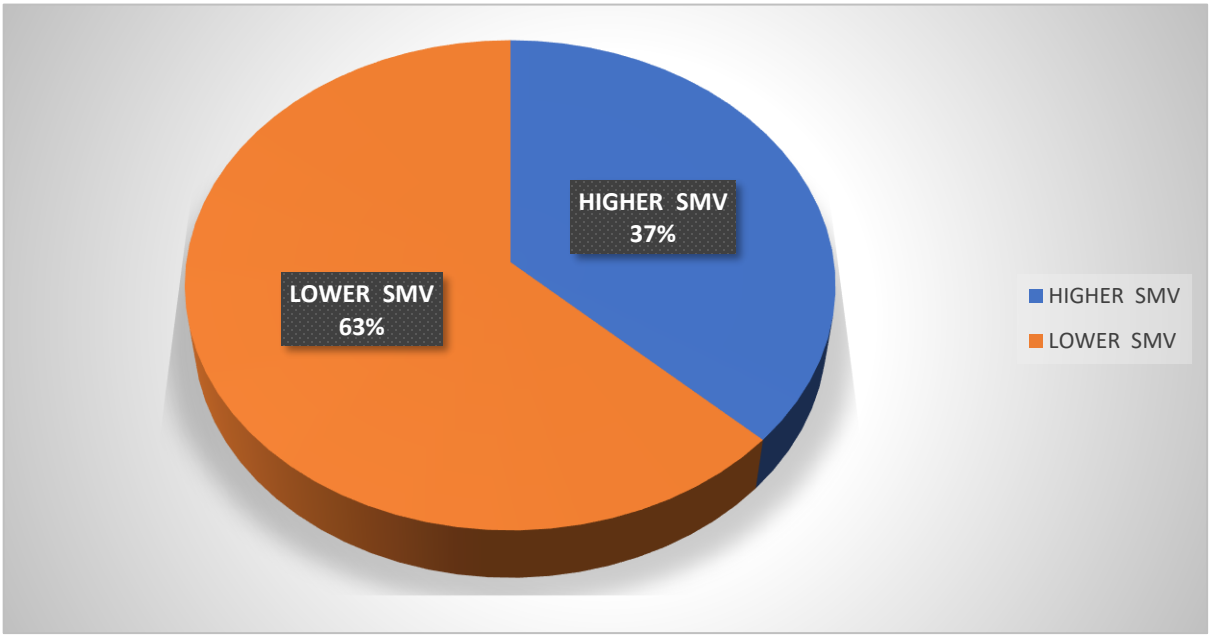


Figure 4.4.43: Comparison of higher and lower SMV of Different Operation from data 3.5 by the help of Pie chart

From above this PIE chart, we try to understand how many operations is contains higher SMV and how many operations is contains lower SMV. Here we found 7 operations which are combinedly make a percentage of higher SMV which is 37% and 12 operations which are combinedly make a percentage of lower SMV 63%.

4.5.1 Analysis of SMV for Different Operation from data 3.6

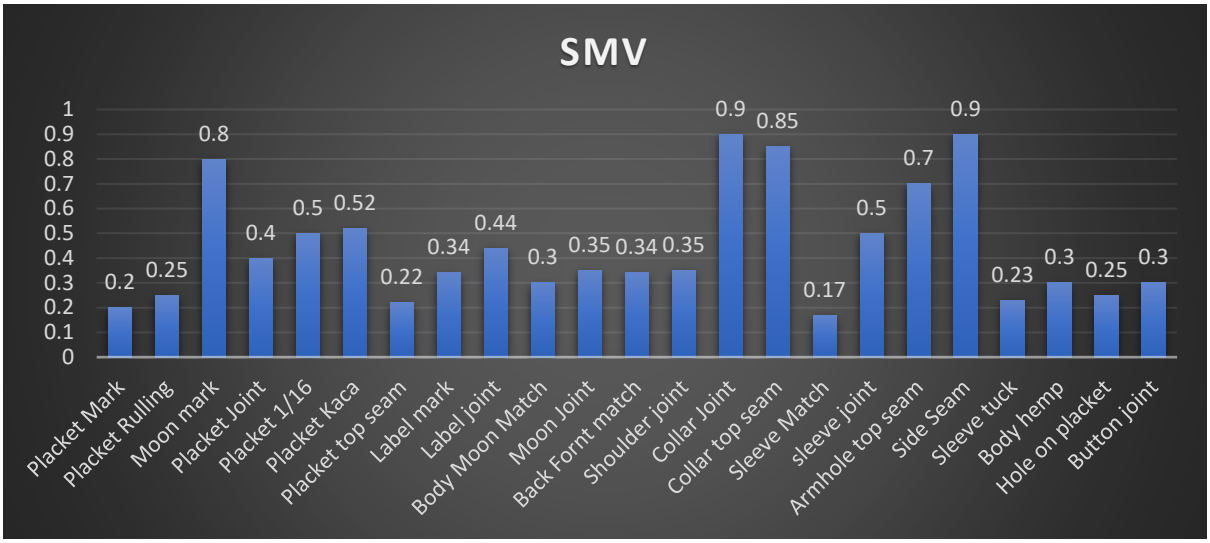


Figure 4.5.1: Analysis of SMV for Different Operation from data 3.6 by the help of Bar Chart

Analytical Description of SMV for Different Operation by the help of Bar chart:

In this bar chart we showed the different SMV needed for diverse operation for a **T-Shirt**. First of all, we calculated SMV for different operation. By the help of this result, we make a chart. This chart contains information about the name of operation and their SMV. Where the higher SMV is collar join, side seam is .9, and the lower sleeve match, placket mark, placket top seam is .2

4.5.2 Capacity Study Analysis for Different Operation from data 3.6

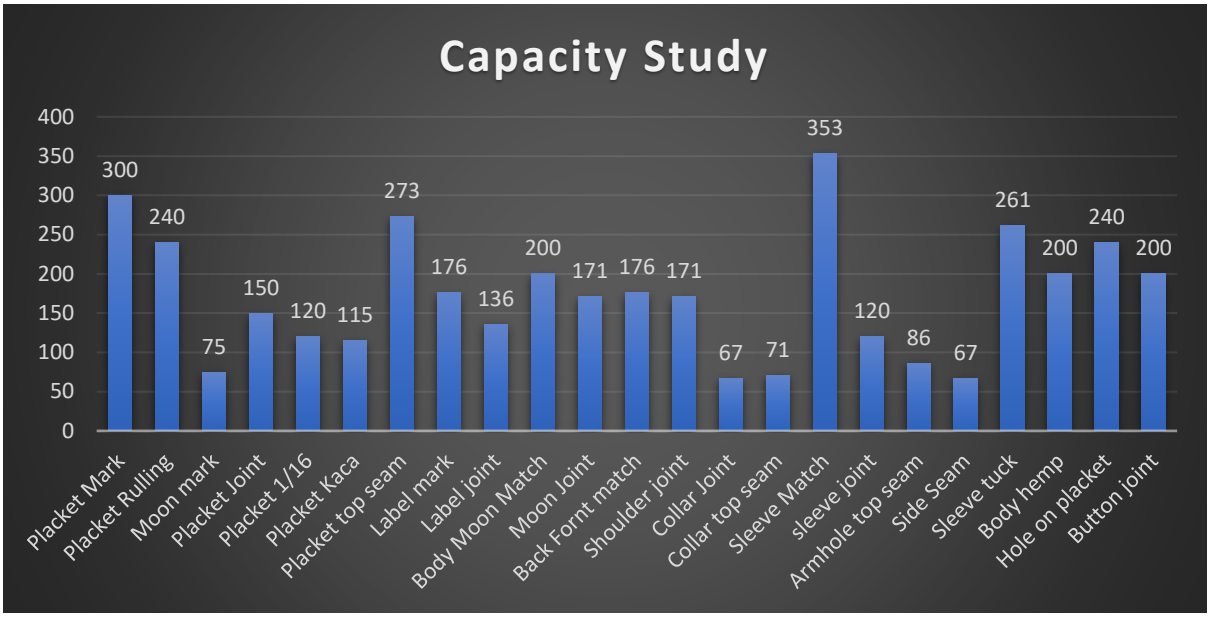


Figure 4.5.2: Analysis of Capacity for Different Operation from data 3.6 by the help of Bar chart

Analytical Description of Capacity for Different Operation by the help of Bar chart:

In above this chart we showed the hourly group capacity for diverse operations where the efficiency is 85% and by the help of this information, we make a bar chart where it shows that higher capacity and lower capacity. Before make this chart, we calculated individual production capacity in chapter 3. This chart contains information about capacity per hour for diverse operation. Here we can see the highest potential capacity for the operations are sleeve match, placket mark, placket top seam and the lowest potential capacity for these operations are side seam, moon mark, collar join. And others are comparatively same.

4.5.3 Comparison of higher and lower SMV of Different Operation from data 3.6

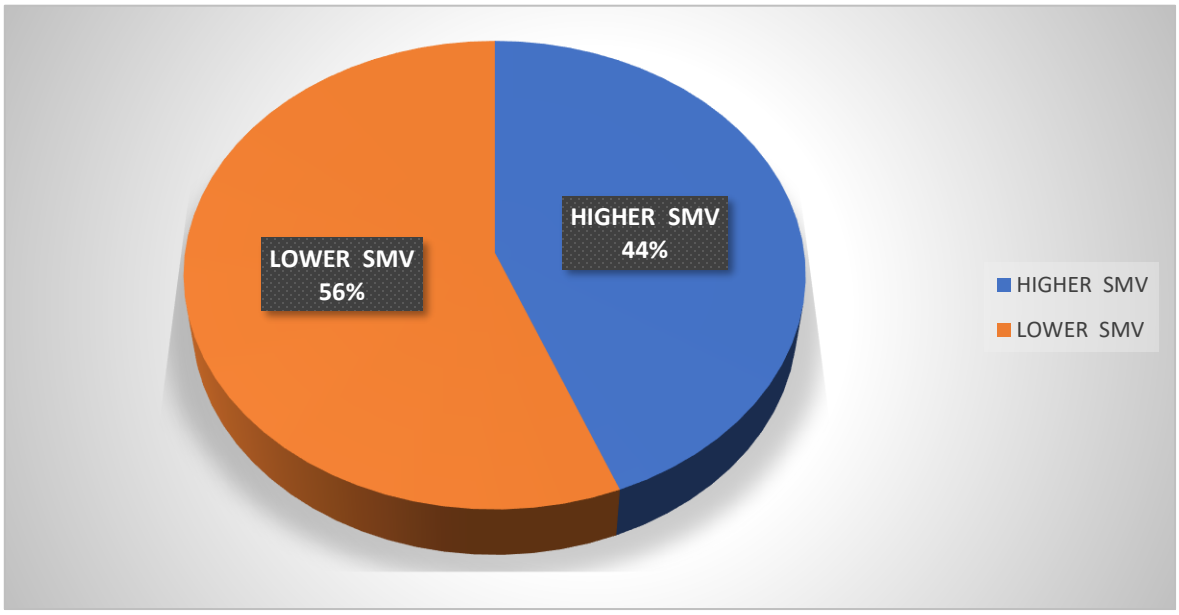


Figure 4.5.3: Comparison of higher and lower SMV of Different Operation from data 3.6 by the help of Pie chart

From above this PIE chart, we try to understand how many operations is contains higher SMV and how many operations is contains lower SMV. Here we found 11 operations which are combinedly make a percentage of higher SMV which is 44% and 12 operations which are combinedly make a percentage of lower SMV 56%.

4.6.1 Analysis of Total SMV of Different item from Data 3.2, 3.3, 3.4, 3.5.3.6

Item Name	Total SMV
Polo T-Shirt	12.02
Accelerator T-Shirt	18.48
Ladies Short Sleeve T-Shirt	11.32
T-Shirt	5.76
Polo T-Shirt	10.11

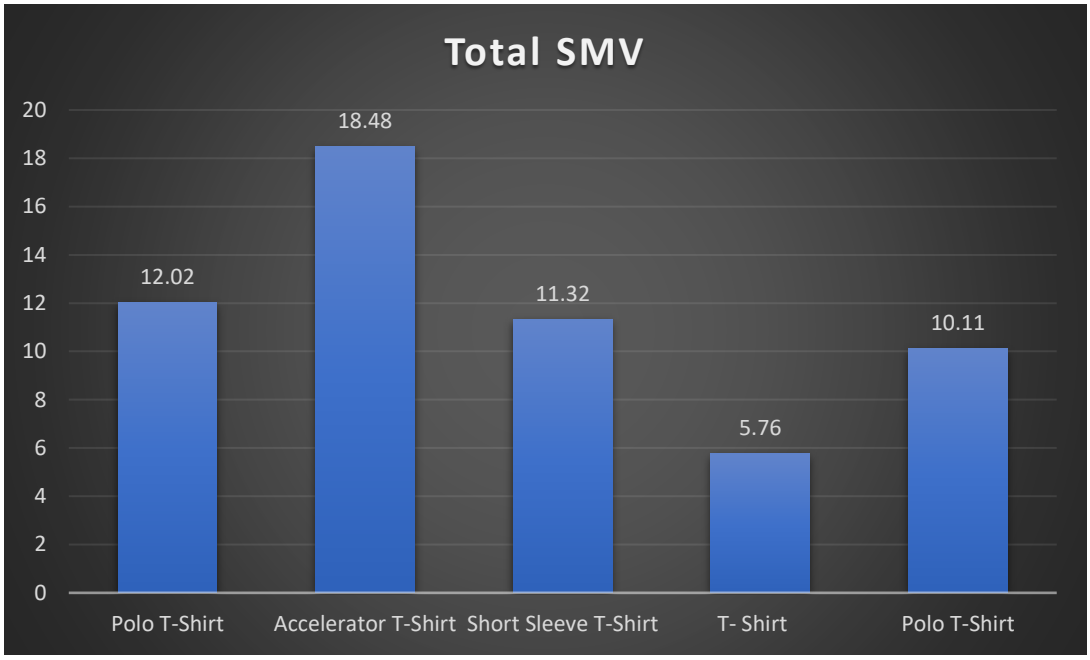


Figure 4.6.1: Analysis of total SMV of Different Item Polo T-Shirt, Accelerator T-Shirt, Ladies Short Sleeve T-Shirt, T-Shirt, Polo T-Shirt

Description

In this chart we have figure out the differing's item of total SMV. Here we study the item of Polo T-Shirt, Accelerator T-Shirt, Ladies Short Sleeve T-Shirt, T-Shirt, Polo T-Shirt. From this chart we can see the total SMV of Polo T-Shirt is 12.02, Accelerator T-Shirt is 18.48, Ladies Short Sleeve T-Shirt-Shirt is 11.32, T-Shirt is 5.6 and Polo T-Shirt is 10.11.

CHAPTER 5: CONCLUSION

Conclusion:

We had completed our project by collection SMV chart and operation bulletin sheet with its related info from Esquire Knit Composite Ltd and Opex and Sinha Textile Ltd. This project helps us to understand regarding the assembly, SMV, time and motion study connected formula and additionally their corrected methodology. We also realize that this project helps us to gain knowledge about IE of a garments industry. This project report gives us an opportunity to extend our knowledge about textile sector like production, planning procurement system, production process and machineries and teaches us to adjust with the textile industry. Hope it will help us our future professional career.

Reference:

- https://www.onlineclothingstudy.com/2019/09/standard-minute-value-smv-definition.html
- https://www.assignmentpoint.com/science/textile/application-industrial-engineering-sewing-floor.html
- https://jituseu20.webnode.com/products/how-to-calculate-smv-sam-/
- https://www.scribd.com/document/218512437/Tools-of-Industrial-Engineering
- https://www.ques10.com/p/23024/what-are-the-different-techniques-of-industrial-en/
- https://garmentsmerchandising.com/