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Sonargaon University (SU)
সোনারগাঁও ইউনিভার্সিটি (এসইউ)

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Department of Textile Engineering

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The Report presented in Partial Fulfillment of the requirement for the degree of **Bachelor of Science in Textile Engineering**

Advance Apparel Manufacturing

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LETTER OF APPROVAL

To

The Coordinator

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Wireless-Gate, Mohakhali, Dhaka-1212.

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

Dear Sir,

We are just writing to let you know this project report titled as study on Industrial Engineering has been prepared by the student is bearing **Mehedi Hasan ID: TEX2103024007, Md Shohag ID: TEX-2103024066, Md Sifat Miah ID: TEX-2103024056, Hafijur Rahman Shovon ID: TEX-2103024064 & Md Shajib ID: TEX-2103024017,** is 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 was 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 Thesis report and consider it for final evaluation.

Yours Sincerely

……..

Md.Selim

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DECLARATION

We here with declare that we've completed the present thesis entitled "**STUDY ON INDUSTRIAL ENGINEERING"** by us and without the use of any other than those listed.All passages that were taken either directly or mutatis mutandis from published and unpublished sources have been marked as such.The theis has been submitted to a different examination authority for any other degree in the same or a similar form.

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DECLARATION CERTIFICATE

This is certified that the entitled **"Study on Industrial Engineering**" is experimental research work carried out by **Mehedi Hasan ID: TEX2103024007, Md Shohag ID: TEX-2103024066, Md Sifat Miah ID: TEX-2103024056, Hafijur Rahman Shovon ID: TEX-2103024064 & Md Shajib ID: TEX-2103024017** under our supervision, and they have dulfilled the conditions laid down in the Sonargaon University ordinances. The submitted dissertation may be considered for awarding the B.Sc. in Textile Engineering degree.

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DEDICATION

Above all, We want to thanks almighty Allah. By the grace of Allah, We are successfully done our thesis paper. We want to thanks **Mohammad Selim (Coordinator)**, **Department of Textile Engineering, Sonargaon University** whose most contribution behind or our success. Especially our father whose hard fatigue helps to reach this situation. Frankly We want to say, my friends, cousin or relatives everyone owing to get the devotion.

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We would really like to particular our heartiest to the authority of the SQ Celcius Ltd.Unit-02 & Mondol Fabric Ltd. for their kind help to finish my mission. a particular way to SM.Moinul Islam (Asst.Manager IE), Habibur Rahman (AGM IE & Planning), who guided us in the manufacturing facility and entire employees and people who gave their valuable time for us.

We also like to thank all the staff and workers who helped us by providing respective information, valuable time and great support during the assessment for our thesis work.

In addition, thanks are due to those who helped me directly & indirectly during the different stages of the work.

Finally, we need to renowned with due appreciate the ordinary help and patients of our parents.

ABSTRACT

This thesis paper consists of the general approach of SMV and operation breakdown of the garments corporation. we've visited SQ CELCIUS. Ltd. and Mondol Fabric Ltd. gathering the SMV and its related facts. We completed in time test, production, capacity take a look at, Operation breakdown, target, overall performance.

After applying all of the ones, we have compared in advance than and after the state of affairs, hard work productivity, and live performance. sooner or later the proposed manufacturing format has been modeled and make sure a better productiveness.

in this paper, We cited a few approaches about time, capacity, aim, SMV, and manufacturing observe and evaluation of various technique and additionally mentioned about operation breakdown and other system and technique which consists of various experimental dialogue, test end result and talk this evaluation we can realize approximately the different object SMV. we're evaluation three gadgets operation breakdown. we are finished stop the result of product SMV for T-shirt (7.12), Calista Cardigan (8.73) and Dco Knit Warp Set Bottom (7.01). and performance for Tblouse (72%), Calista Cardigan (80%), Dco Knit Warp Set Bottom (80%).

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CHAPTER - 1: INTRODUCTION

Introduction:

The garment manufacturing industry faces many global challenges due to various factors including competition, increased production costs, less productivity/efficiency and labor attribution.

1.2 Nature of the work in IE:

Industrial engineers determine the most effective ways for an organization to use the basic factors of production - people, machines, materials, information, and energy - to make or process a product or produce a service. They are the bridge between management goals and operational performance. Industrial Engineer ensure production capacity, how to make on time production ,reduce cost, SMV control etc.

1.3 Objective of the project:

1. To increase productivity
2. Process improvement by motion reducing.
3. Reduce work in process (WIP) and remove the bottleneck.
4. Increase efficiency of operations
5. Reduce man machine ratio
6. Process improvement to reduce cost, waste and rejection Reduce wastage and defects
7. Fill up Key Performance Indicator (KPI) target.

1.4 Daily Activities and Duties of an Industrial Engineer in the Apparel Industry:

1. Collect line loading plan from the Planning Department
2. Attend in Pre-Production (PP) meeting
3. Collect size set sample and make operation bulletin accordingly.
4. Collect Operation Bulletin and make a paper layout
5. Discuss with Maintenance in-charge regarding machine, folder, attachment and Technical personnel for technical issues.
6. Make discussion with a floor in-charge about layout according to paper layout
7. Check Daily Non-productive time (NPT) and reduce machine breakdown time.
8. Make layout according to paper layout
9. Make line balancing according to target and capacity study during 2 – 3 days of layout
10. Find out the bottleneck process and solve it
11. If needed make 1-hour production study in required process
12. Everyday input and output monitoring
13. Give daily production target and follow up production achievement.
14. Hourly production follow-up
15. Everyday 5S related activities monitoring

1.4 Importance of the project:

A combination between our general education line & practical life with various articles, documents and calculation.

- 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.
- 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 industries author can realize the actual demand for IE section for increasing their produce.

CHAPTER – 2: LITERATURE REVIEW

2.0 Definition:

Industrial engineering is a branch of engineering that is associated with the optimization of complicated systems or approaches. it's far definitely worried with the development, improvement, and implementation of included structures of people, money, information, knowhow, power and it’s also evaluation in addition to the mathematical, bodily and social sciences collectively with the concepts and structures of engineering design to expect and assess the results to be acquired from such styles of structures.

2.1 Concept of IE:

The commercial way of garment manufacturing wishes an intensive practise of production because in the identical time, it is vital to mix some factors: humans, time, machines and region of manufacturing, enterprise, and fabric in a coordinated and rational system. Technological gadget of garment manufacturing should permit anticipated quality of product, essential scope of production, transport of prepared-made clothes inside the predicted time, most use of ability with minimal fees.

2.1.2 Process Flow chart of IE:

Process Flow Chart of Industrial Engineering (IE):

Negotiation with garments merchandiser
↓
Garments analysis
↓
Make P.P meeting if all the required fabrics, trimmings and accessories are in housed
↓
Production target
↓
Set machine layout
↓
Line setting
↓
Line balancing
↓
Continuous production meeting
↓
Collecting production data
↓
Preparing production report
↓
Production report analysis
↓
Report submit to factory manager

2.1.3 Functions of IE:

- Growing the best paintings methods and organizing one nice way of doing the paintings. organizing the performance requirements as per the standard techniques.
- To develop a sound wage and incentive schemes.
- Developing of fee discount and fee manipulate programs and to establish a fashionable costing system.

2.1.4 Activities of IE:

- Choice of processes and assembling strategies
- Cost control system
- Development and installation of job evaluation systems
- Operation research
- Mathematical and statistical analysis
- Performance evaluation
- Organization and methods.
- Supplier selection and evaluation.

2.1.5 Role of Industrial Engineer in Garment Industry:

1. Protection
2. Line balancing
3. fine – operation manipulates
4. education – how to train new personnel
5. Operator output – keeps excessive output and improves the abilities of those with a low output.
6. Loss manipulate – minimize off-general loss
7. Waste control – in substances, substances, and equipment
8. standard conditions – inside the place of job, within the stitching method, inside the machines

As a leader an amazing way of showing leadership is to be a terrific example for others. each executive/manager represents the corporation and any of his/her movements are an extension of the

- Maintenance
- Quality work
- Productivity

2.1.6 Techniques of IE:

Method study:

To hook up a present-day method of acting a method or an operation after a thorough evaluation of the jobs and to installation the layout of producing facilities to have a uniform waft of cloth without again monitoring.

Time study (Work Measurement):

That is a way used to set up a trendy time for a manner or for an operation.

Motion Economy:

This used to analyses the motions hired via the operators do the paintings. The standards of movement economic machine and movement analyses are very useful in mass manufacturing or for a short cycle repetitive method. **Financial and non-financial Incentives:**

Those help to evolve at a rational compensation for the efforts of the people. **Job Evaluation:**

That is a way that is used to determine the relative nicely worth of jobs of the agency to resource in matching jobs and employees and to reach a sound wage coverage. **Materials Handling Analysis:**

To scientifically analysis the movement of substances material handling. via several departments to get rid of needless moves to decorate the overall performance of material dealing with. Ergonomics (Human Engineering):

It's far involved with look at of dating between guy and his running situations to minimize mental and bodily strain. It is involved with man-gadget device.

2.2 Line Balancing:

Line Balancing is leveling the workload across all methods in a cellular or value move to cast off bottlenecks and excess capacity. A constraint slows the procedure down and results if watching for downstream operations and extra capability effects in ready and absorption of constant prices.

2.2.1 Objectives of Line Balancing:

Match the manufacturing fee in any case wastes have been removed to the communicate time at every manner of the price circulate.

Regular material flow.

1. Maximum uses of man power and machine capacity.
2. Minimum process time.
3. Minimizing slack time.
4. Minimizing workstation.
5. Maximum output at the desired time.
6. Quality maintenance of the garment.

7. Reduce production cost.

2.2.2 Importance of Line Balancing:

1. It also helps in the determination of labor requirement.
2. Good balancing reduces production time.
3. Profit of a factory can be ensured by proper line balancing.
4. Proper line balancing ensured optimum production at the agreed quality.
5. It reduces faults in the finished product.

2.2.3 Efficiency:

Performance is another way of expressing productivity, even though performance determines is extra useful and large. Overall performance figures tell us how we carry out towards a target that has been set in a scientific manner. Because the goal is expressed as a time consistent with a garment or a required degree of manufacturing, the performance is quite clean to calculate. The system for calculating performance regions fellow: efficiency % =

performance % =

overall minutes produced × 100

Toral houes labored × 60
Produced amount × one hundred production goal amount

2.2.4 Cycle checks:

A cycle takes a look at is a short time searching at with the reason of setting at goal fast, or checking whether or now not an operator is able to reach a modern-day time.

The cycle time is the time taken thru the operator to carry out one cycle of the operation, i.e. the time amongst choose-up and dispose of. behavior a cycle test consistent with the subsequent steps:

- select the operation/s to be studied and input the info on the best shape.
- Watch 5 cycles of each operation, nothing the time for every compete cycle.
- Calculate the average cycle time for each operation.
- evaluate cycle time to the issued primary time.

2.3 Standard Minute Value (SMV):
SMV is defined due to the reality the time it virtually is authorized to carry out a hobby satisfactorily. Generally, it's far expressed in the minute fee. The complete elaboration of SMV is desired the Minute price MV term is notably used within the garment manufacturing organization. SMV is also called the overall allocated Minute (SAM).

2.3.1 Factors of Standard Minute Value in Garments:

Types of garments.

- Types of fabrics.
- Garments size.
- Garment design.

2.3.2 SMV Calculation in Garments Industry:
Within the clothes enterprise, SMV calculation differs in keeping with the extensive form of operations sans duration, sorts of fabric, an extensive sort of employees, gadget overall performance, etc.

SMV = simple time + Allowance

Where primary time = determined time × score one hundred

Allowance = rest allowance + Contingency allowance + device postpone allowance.

Score = the pace or pace of the operator at which the operator is performing the challenge.
2.3.3 Bottleneck:
A bottleneck is a phenomenon in which the overall performance or capability of a whole system is constrained with the aid of a unmarried or restrained form of components or resources
2.3.4 Bottleneck in the Production Line:
The bottom output factor within the manufacturing line is referred to a bottleneck. That is the bottleneck area, in which supply gathered and manufacturing goes under capacity.
2.3.5 Aries of Bottleneck:

There are so many reasons to arise a bottleneck in the production line and it is describe bellow-

A. Bottleneck before input in line:
- Mistake Building.
- Supply Issue Wrong. If issue comes delay.
- Issue serial number mistake.
- Pattern problem.

B. Bottleneck in Line:
- Lack of supply.
- Non balance allocation of elements.
- Workers absenteeism.
- Machine disturbances / out of order.
-

2.3.6 Way of Reduce Bottleneck:

- To select right workers for right work.
- To maintain serial number.
- Reject garments should not forward.
- By reducing sewing burst.
- By improving method.
- Supply should be forwarded after checking.

2.4 Pitch Time:

In business engineering, pitch time is a ratio of widespread SMV of garment and sort of operation to be set for the fashion.
Pitch time = Garment SMV

No. of operations

Pitch time is used for line placing and calculating production intention for the street.

Score:

The concept of the score (known within the US as grading) is important in time have an exam. The capability to price correctly distinguishes an authorized time check practitioner from an amateur.

The score is the gadget utilized by the economic engineer to examine the actual average overall performance of the operator together with his/her highbrow idea of ordinary overall performance.

2.5 Work study:

Sports of work have a look at within the textile and apparel industry that are performed through the economic engineering branch. Without a doubt, paintings have a look at is used for measuring paintings. The industrial engineering branch is accountable for work observe in the garment enterprise. Work have a look at is the maximum crucial tool for controlling manufacturing and enhancing productiveness. Its miles a new idea within the fabric and garb industry. We will define work look at within the following way.

2.5.1 Purpose of work study:

In general, the purposes or objectives of work study are:

1. Establish the most economical way of doing the work.
2. Establish the time required for a job at a defined level of performance.
3. Increase productivity and profitability.
4. Make work easier.
5. Establish fair tasks for everyone.

2.5.2 Importance of work study:

1. Work study is a means of enhancing the production efficiency of the firm by elimination of waste and unnecessary operations.
2. It is the technique to identify non-value adding operations by investigation of all the factors affecting the jobs.

2.5.3 Role of Work Study:

There are six possible lines of attack on productivity problems, which can be classified as follows:

1. Improve basic processes by research and development.
2. Improving existing process and provide better plant and equipment.
3. Simplify the product, reduce and standardize the range.
4. Improve the planning of work and the use of manpower.
5. Improve existing methods of plant operation.
6. Increase the effectiveness of all employees.

2.5.4 Objectives of Work Study:

- Increased efficiency.
- Better product quality.
- To choose the fastest method to do a job.
- To improve the working process.
- Less fatigue to operators and workers.
- Effective labor control.

2.6 Method Study:

Method study is the machine of systematic recording and important examination of gift and proposed techniques of doing artwork, as a means of developing and using less difficult and similarly powerful techniques. It's far applied to lessen fees. For better productiveness inside the fabric and clothing enterprise technique take a look at the can to be very critical. It is one of the keys to mission productivity development. Skills of technique observe inside the fabric and garment business enterprise are finished with the resource of the industrial engineering branch.

2.6.1 The Major Aims of Method Study:

- Better design of plant equipment and buildings.
- Less fatigue or workers by avoiding unnecessary movements of manpower.
- Better working conditions and environment for workers/employes.
- To have more effective utilization of materials, machines and manpower and money.

- Better quality.
- Efficient and fast materials handling equipment.
- Leads to standardization, rationalization, simplification and specialization.
- Efficient planning of the section.
- Streamlined working procedures.
- Greater job satisfaction.
- Higher earning.
- Improve layout of factory and office.
- Higher standard of safety and health.
- To improve the flow of works.
- Effective material handling.
- Efficient process and procedure.
- To improve the proper utilization of resource.
- To get maximum output.
- To improve administration.
- Waste reduction.

2.6.2 Steps of Method Study:



Steps of Method Study

- Selection of work
- Recording information
- Examine information
- Develop the new process
- Install the new method
- Maintain new method

2.7 Time Study:

Time observe is a bit size approach for recording the time of acting a tremendous particular challenge or a detail of a method carried beneath targeted situations, and for analyzing the facts so one can gain the time important for an operator to keep it out at a described rate of performance.

2.7.1 Steps of Making Time Study:

1. Study of standard method.
2. Recording the operative and the surrounding conditions at the time study, which may affect the method of carrying the work and thereby time required to do the work.
3. Recording a complete description of the work as it is being carried out and breaking down the work or operation into elements for individual time determination.

4.Determination of the sample size.

2.7.2 Notes on Time Study:

- Be cordial and polite, but do not talk unnecessarily to the operator.
- Do not stand in front of the operator, Stand in a less discomforting position, such as off to the side or in the back
- Never sit down during on time study.
- Always calculate the time study results immediately after the date gathering.

2.7.3 Operator Performance:

Basically, the operator performance can be monitored with the help of three efficiency factors.

1. Single cycle efficiency.
2. On-standard efficiency.
3. Global efficiency.

2.7.4 Off-standardTime:

The time spent by an operator at his work under a condition that is not considered as productive. Types of off-standard,

- Machine break down.
- Waiting time.
- Quality problems.
- No feeding.
- Un familiar job.
- Training.

2.8 Capacity Study:

It's miles precisely the degree of the operator the same as capability. It technique the operator is able to undertake the general overall performance measure with the aid of the have a look at. The important want for the functionality examines is to set quotas, to inspire the operator, and to degree the producing segment capability. through measuring the person operator capacities, the manager can decide the general functionality of their phase. It is truly the sum of person functionality.

2.8.1 Calculation Method of Sewing Line Capacity in Apparel Industry:

To calculation sewing lines capacity of a garment factory, an industrial engineer has needed the following information-

- No. of sewing machines in the line.
- Worker's absence percentage of that line.
- Daily working hours of that factory.
- Line efficiency of that factory.
- Standard allowed minutes (SAM) for the production item.

2.9 Allowance:

Earlier than it is possible to finish an issue that desired time for interest, it is needless to feature to the number one time positive allowances.

The motive for which encompass those allowances is that the paintings have a take a look at engineer has first-rate been considering the productiveness paintings of the operator and has now not considered the length of rest which can be required with the aid of using the operator to permit the operator to get over the strength enjoy the time that he/she wants to allow hobby to personal need.

CHAPTER – 3: EXPERIMENTAL DETAILS

3.0 EXPERIMENTAL DETAILS

We collected this operation breakdown & format sheet from Mondol Fabric Ltd. The accumulated date seventeen March 2025. We finished a record by way of following steps like format have a look at, capacity, SMV, production target, etc.

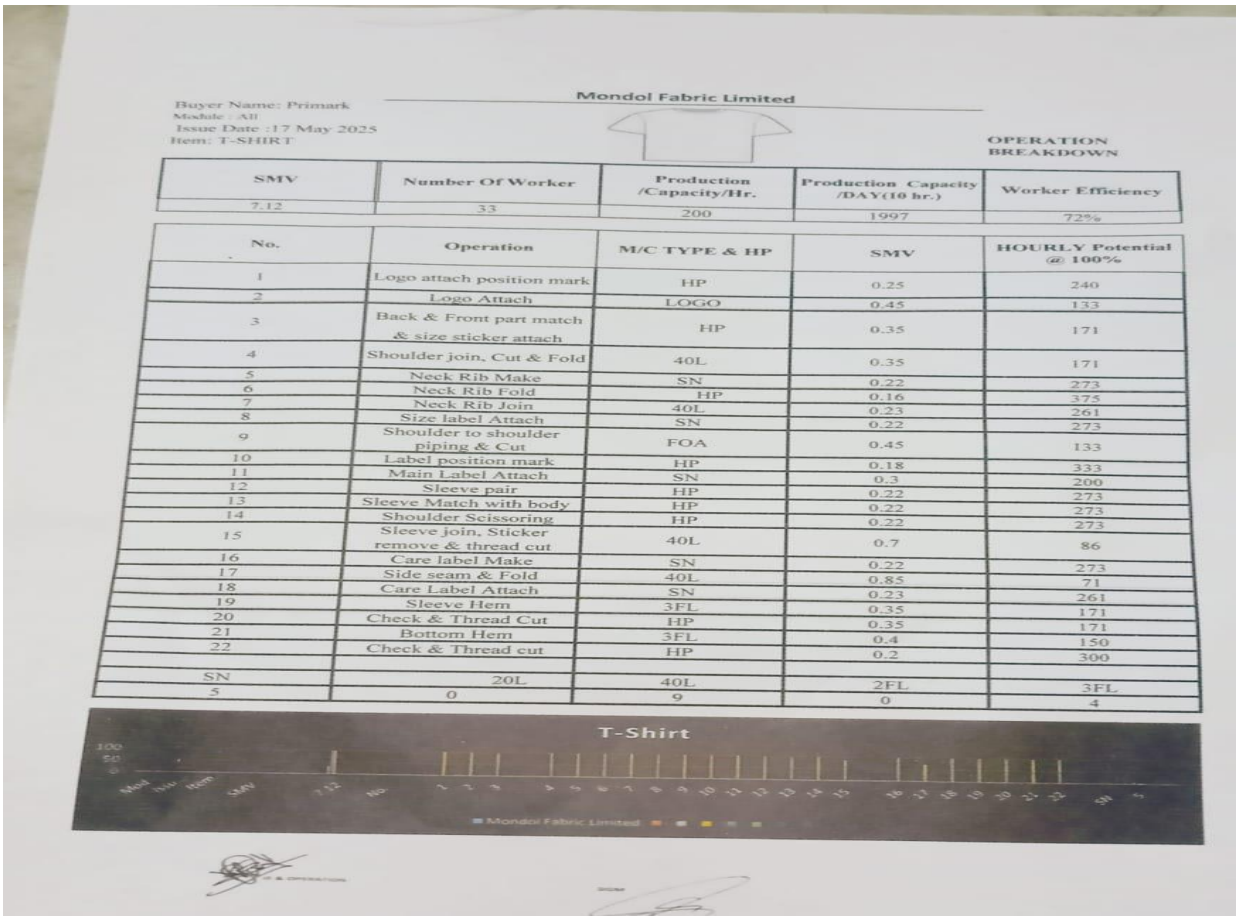
3.1 Operation Breakdown of T-SHIRT:

Mondol Fabric Ltd.

Buyer Name: Primark

Item: T Shirt

Style: T-DIEGO-DIV



Mondol Fabric Limited

Buyer Name: Primark
Module : All
Issue Date :17 May 2025
Item: T-SHIRT

OPERATION BREAKDOWN

SMV	Number Of Worker	Production /Capacity/Hr.	Production Capacity /DAY(10 hr.)	Worker Efficiency
7.12	33	200	1997	72%

No.	Operation	M/C TYPE & HP	SMV	HOURLY Potential @ 100%
1	Logo attach position mark	HP	0.25	240
2	Logo Attach	LOGO	0.45	133
3	Back & Front part match & size sticker attach	HP	0.35	171
4	Shoulder join, Cut & Fold	4OL	0.35	171
5	Neck Rib Make	SN	0.22	273
6	Neck Rib Fold	HP	0.16	375
7	Neck Rib Join	4OL	0.23	261
8	Size label Attach	SN	0.22	273
9	Shoulder to shoulder piping & Cut	FOA	0.45	133
10	Label position mark	HP	0.18	333
11	Main Label Attach	SN	0.3	200
12	Sleeve pair	HP	0.22	273
13	Sleeve Match with body	HP	0.22	273
14	Shoulder Seissoring	HP	0.22	273
15	Sleeve join, Sticker remove & thread cut	4OL	0.7	86
16	Care label Make	SN	0.22	273
17	Side seam & Fold	4OL	0.85	71
18	Care Label Attach	SN	0.23	261
19	Sleeve Hem	3FL	0.35	171
20	Check & Thread Cut	HP	0.35	171
21	Bottom Hem	3FL	0.4	150
22	Check & Thread cut	HP	0.2	300
SN	20L	4OL	2FL	3FL
5	0	9	0	4

T-Shirt

Figure 3.1.1: Operation Breakdown for T-SHIRT

Mondol Fabric Ltd.

Buyer Name: Primark

Item: T-SHIRT

OPERATION BREAKDOWN

SMV	Number of Worker	Production Capacity / Hr.	Production Capacity / Day (10 hr.)	Worker Efficiency
7.12	33	200	1997	72%

No.	Operation	M/C TYPE & HP	SMV	HOURLY POTENTIAL@ 100%
1	Logo attach position mark	HP	0.25	240
2	Logo Attach	LOGO	0.45	133
3	Back & Front part match & size sticker attach	HP	0.35	171
4	Shoulder join, Cut & Fold	40L	0.35	171
5	Neck Rib Make	SN	0.22	273
6	Neck Rib Fold	HP	0.16	375
7	Neck Rib Join	40L	0.23	261
8	Size label Attach	SN	0.22	273
9	Shoulder to shoulder piping & Cut	FOA	0.45	133
10	Label position mark	HP	0.18	333
11	Main Label Attach	SN	0.30	200
12	Sleeve pair	HP	0.22	273
13	Sleeve Match with body	HP	0.22	273
14	Shoulder Scissoring	HP	0.22	273
15	Sleeve join, Sticker remove & thread cut	40L	0.70	86
16	Care label Make	SN	0.22	273
17	Side seam & Fold	40L	0.85	71
18	Care Label Attach	SN	0.23	261
19	Sleeve Hem	3FL	0.35	171
20	Check & Thread Cut	HP	0.35	171
21	Bottom Hem	3FL	0.40	150
22	Check & Thread cut	HP	0.20	300
SN	20L	40L	2FL	3FL
5	0	9	0	4

Table 3.1.1: Operation Breakdown of T-SHIRT

TOTAL GARMENTS S.M.V = 7.12

Day TARGET = 1997

TARGET / HR. = 200

ABOVE ANALYSIS ASSUMPTION

NO OF WORKER	33
FACTORY EFFICIENCY	72%
NO OF WORKING HOURS	10

Description:

Above the operation, the breakdown sheet is a T-shirt of Mondol Fabric Limited. This sheet contains a client name Primark, proper here we can also position fashionable manpower is in the operation, SMV, performance, intention diploma in keeping with hour. Wherein 33 employees are used. The tool is used in this product are –No. of strolling hours 10hr, No of the 40L tool is 9, No of the 3FL gadget is 4, No of FOA device is, No of the brand tool is. This sheet showed remarkable operation SMV & calculate the general SMV. The calculate enormous SMV is 7.12. Plan aim production 1997. The planning overall performance is seventy %. There are one-of-a-kind types of standard overall performance is calculated like 72%, 75%, eighty%, 80% is calculated the whole manufacturing in keeping with 10 hrs.

3.1.1 The Calculation Process:

TARGET CALCULATION:

Here,

Total worker = 33

SMV = 7.12

Working hrs. = 10

Efficiency = 72%,

We know that,

Target = total man power × work hr. × efficiency % × SMV

= 33 × 10× 72% × 7.12

= 1691

When efficiency = 75%,

Target = 33 × 10 × 75% × 7.12

= 1762

When efficiency = 80%,

Target = 33 × 10 × 80% × 7.12

= 1880

When efficiency = 85%

Target = 33 × 10 × 85% × 7.12

= 1997

Efficiency	72%	75%	80%	85%
Target per hour	1691	1762	1880	1997

SMV CALCULATION:

We know that,

SMV = Basic time + Allowance of basic time

Basic time = Observed time × rating

Observed time = Average cycle time/60

Here, I show SMV calculation for Front & Back rise join This sheet is not contain rating and cycle time so I let the rating and cycle time and calculate the SMV

Let, Average cycle time = 12 sec

Now observed time = 12/60 = 0.20 sec

Rating = 80%,

So, Basic time = observed time × rating

= 0.20 × 0.80

= 0.16 sec

= 9.6 min

Let, Allowance 15%,

SMV = Basic time + Allowance of basic time

= 9.6 + 0.15

= 9.75 min

I can calculate other operation in same way.

PITCH TIME:

Here,

No. of Operation = 42

Total SMV = 7.12

So, Pitch time = No of operation/SMV

= 42/7.12

= 5.90 min.

EFFICIENCY CALCULATION:

Here,

Total production = 1997

SMV = 7.12

Total man power = 33
Working hour = 10

We know,

$$\text{Efficiency\%} = \frac{\text{Total production} \times \text{SMV}}{\text{Total man power} \times \text{working hour} \times 60} \times 100$$

$$= \frac{1997 \times 7.12}{33 \times 10 \times 60} \times 100$$

= 71.81

= 72%

LINE CAPACITY:

We know,

$$\text{Line capacity} = \frac{\text{Total man power} \times \text{working hour} \times 60 \times \text{efficiency\%}}{\text{SMV}}$$

$$= \frac{33 \times 10 \times 60 \times .72}{7.12}$$

= 2002 pcs

Target	1997
SMV	7.12
Pitch time	5.90 min
Efficiency%	72%
Line capacity	2002pcs

3.2 Operation Breakdown for Calista Cardigan S-04:

SQ CELCIUS. Ltd U-02

SQ Celsius Ltd. Unit-02

SQ Group
Jamirdia, Bhaluka, Mymensingh.

DEPT. OF INDUSTRIAL ENGINEERING

DIVIDING FOR MACHINE LAYOUT

CUSTOMER	H&M
STYLE	Calista Cardigan S/4
Module	All
Issue Date	13-May-25
Order Qty	

SMV Savings Information	
Finishing Saving	0.85
Total SMV	8.73



Operator/Module	30
Plan Eff%	80%
Plan Pcs/Hourly	165
F. BPT	0.29

FINISHING

SL	PROCESS	MACHINE	Running SMV	PLAN EFF%	TARGET PCS	T.M.L	A.M.L	TTL TGT	BULLETIN SMV	TGT 100%
1	Light Check-2	LC	0.50	75%	90	1.72	2.0	180.0	0.50	120.00
2	Attach main level & size label with m	SN	0.47	94%	120	1.62	1.5	180.0	0.50	127.66
3	Attach care LBL	SN	0.35	105%	180	1.20	1.0	180.0	0.40	171.43
4	Attach Additional Label	S/N	0.25	75%	180	0.86	1.0	180.0	0.25	240.00
5	Bottom Placket Sewing Tuck	S/N	0.28	84%	180	0.96	1.0	180.0	0.54	214.29
6	Measurement & cut Hanger loop	HW	0.10	75%	450	0.34	0.5	225.0	0.10	600.00
7	Attach Hanger loop	SN	0.33	98%	181	1.12	1.0	180.9	0.40	184.62
8	Mark for button attach & hole x 7	HW	0.35	104%	181	1.19	1.0	180.9	0.35	173.91
9	Button Hole X 7	BH	0.70	105%	90	2.41	2.0	180.0	0.70	85.71
10	Button attach X 7 & (Spare *1)	BA	0.62	93%	91	2.11	2.0	181.5	0.73	97.56
11	FQC	FQC	0.80	75%	56	2.75	4.0	225.0	0.90	75.00
12	Button close X 7	HW	0.35	105%	180	1.20	1.0	180.0	0.35	171.43
13	Ironing sleeve	IRON	0.80	120%	90	2.75	2.0	180.0	0.80	75.00
14	Ironing body	IRON	1.10	120%	65	3.78	3.0	196.4	1.10	54.55
15	Measuring	MQC	0.45	75%	100	1.55	2.0	200.0	0.50	133.33
16	Get up check	Get Up	0.45	75%	100	1.55	2.0	200.0	0.50	133.33
17	Attach hang tag with sizing & PO Ch	HW	0.35	104%	181	1.19	1.0	180.9	0.38	173.91
18	Dust remove & folding	HW	0.50	75%	90	1.72	2.0	180.0	0.58	120.00
	GRAND TOTAL SMV		8.73	92%		30	30.0	188	9.58	

SQ CELCIUS Ltd.

Floor: Davinci
Buyer Name: H&M
Style : Calista Cardigan S-4
Item: Sweater

OPERATION BREAKDOWN

SMV	Number of Worker	Capacity / Hr.	Production Capacity / Day (10 hr.)	Worker Efficiency
8.73	30	165	1649	80%

SQ Celsius Ltd. Unit-02

SQ Group
Jamirdia, Bhaluka, Mymensingh.
DIVIDING FOR MACHINE LAYOUT

DEPT. OF INDUSTRIAL ENGINEERING

CUSTOMER	H&M
STYLE	Calista Cardigan S;4
Module	All
Issue Date	13-May-25
Order Qty	

SMV Savings Information	
Finishing Saving	0.85
Total SMV	8.73

FINISHING



Operator/Module	30
Plan Eff%	80%
Plan Pcs/Hourly	165
F. BPT	0.29

SL	PROCESS	MACHINE	Running SMV	PLAN EFF%	TARGET PCS	T.M.L	A.M.L	TTL TGT	BULLETIN SMV	TGT 100%
1	Light Check-2	LC	0.50	75%	90	1.72	2.0	180.0	0.50	120.00
2	Attach main level & size label with m	SN	0.47	94%	120	1.62	1.5	180.0	0.50	127.66
3	Attach care LBL	SN	0.35	105%	180	1.20	1.0	180.0	0.40	171.43
4	Attach Additional Label	S/N	0.25	75%	180	0.86	1.0	180.0	0.25	240.00
5	Bottom Placket Sewing Tuck	S/N	0.28	84%	180	0.96	1.0	180.0	0.54	214.29
6	Measurement & cut Hanger loop	HW	0.10	75%	450	0.34	0.5	225.0	0.10	600.00
7	Attach Hanger loop	SN	0.33	98%	181	1.12	1.0	180.9	0.40	184.62
8	Mark for button attach & hole x 7	HW	0.35	104%	181	1.19	1.0	180.9	0.35	173.91
9	Button Hole X 7	BH	0.70	105%	90	2.41	2.0	180.0	0.70	85.71
10	Button attach X 7 & (Spare *1)	BA	0.62	93%	91	2.11	2.0	181.5	0.73	97.56
11	FQC	FQC	0.80	75%	56	2.75	4.0	225.0	0.90	75.00
12	Button close X 7	HW	0.35	105%	180	1.20	1.0	180.0	0.35	171.43
13	Ironing sleeve	IRON	0.80	120%	90	2.75	2.0	180.0	0.80	75.00
14	Ironing body	IRON	1.10	120%	65	3.78	3.0	196.4	1.10	54.55
15	Measuring	MQC	0.45	75%	100	1.55	2.0	200.0	0.50	133.33
16	Get up check	Get Up	0.45	75%	100	1.55	2.0	200.0	0.50	133.33
17	Attach hang tag with sizing & PO Ch	HW	0.35	104%	181	1.19	1.0	180.9	0.38	173.91
18	Dust remove & folding	HW	0.50	75%	90	1.72	2.0	180.0	0.58	120.00
GRAND TOTAL SMV			8.73	92%		30	30.0	188	9.58	

Table 3.2.1: Operation Breakdown for Calista Cardigan

TOTAL GARMENTS S.M.V = 8.73

Day TARGET = 1649

TARGET / HR. = 165

ABOVE ANALYSIS ASSUMPTION

NO OF WORKER	30
FACTORY EFFICIENCY	80%
NO OF WORKING HOURS	10

Description:

The Calista Cardigan has a total SMV of **8.73 minutes**. Based on **30 workers**, **80% efficiency**, and **10 working hours**, the calculated **daily production target** is **1,649 pieces**, with an **hourly target** of **165 pieces**. This target ensures optimal use of manpower and time while maintaining production efficiency.

.There is a selected sort of overall performance is calculated like 80 %, 85%, 90%, 95% is calculated the complete production in line with 10 hrs.

3.2.1 The Calculation Process:

TARGET CALCULATION:

Here, Total worker = 30

SMV = **8.73**

Working hrs. = 10

Efficiency = 80%,

We know that,

Formula:

Target = $$\text{Daily Target} = \frac{\text{No. of Workers} \times \text{Working Hours} \times 60 \times \text{Efficiency (\%)}}{\text{SMV}}$$

$$\text{Daily Target} = \frac{30 \times 10 \times 60 \times 0.80}{8.73}$$

$$= \frac{14,400}{8.73} \approx 1,649.25$$

=1649

When efficiency = 85%,

Target

$$= \frac{30 \times 10 \times 60 \times 0.85}{8.73} = \frac{15,300}{8.73} \approx 1,752.58$$

=1752

When efficiency = 90%,

$$= \frac{30 \times 10 \times 60 \times 0.90}{8.73} = \frac{16,200}{8.73} \approx 1,855.79$$

Target = 1856

When efficiency = 95%,

$$\text{Target} = \frac{30 \times 10 \times 60 \times 0.95}{8.73} = \frac{17,100}{8.73} \approx 1,959.11$$

= 1959

Efficiency	80%	85%	90%	95%
Target per hour	1649	1752	1856	1959

SMV CALCULATION:

We know that,

SMV = Basic time + Allowance of basic time

Basic time = Observed time × rating

Observed time = Average cycle time/60

Here, I show SMV calculation for Light Check-2

This sheet is not contain rating and cycle time so I let the rating and cycle time and calculate the

SMV

$$\text{Cycle Time} = \frac{60}{90} = 0.6667 \text{ minutes} \approx 40 \text{ seconds}$$

Now observed time = 0.50/0.75 = 0.67 min
Rating = 75%= 0.75

So, Basic time = observed time × rating
= 0.67× 0.75
= 0.50 minutes

Let, Allowance 15 %,
SMV = Basic time + Allowance of basic time
= O.50 + 0.15
= 0.58 min

Note: In your original data, the SMV for Light Check was listed as 0.50 — so either the allowance used is less than 15%, or the observed/rated time was slightly different.

I can calculate other operation in same way.

PITCH TIME:

Here,

- **Working Hours** = 10
- **No. of Workers** = 30
- **Available Time per Day** = 30 × 10 × 60 = **18,000 minutes**
- **Daily Target (at 80% efficiency)** = 1,649 pieces

So, Pitch time = Time per day / Daily target
= 18000/1649
= 10.92 minutes per unit.

EFFICIENCY CALCULATION:

Here, Total production = 1649
SMV = 8.73
Total man power = 30
Working hour = 10
We know, Efficiency% =

$$\frac{\text{Total production} \times \text{SMV}}{\text{Total man power} \times \text{working hour} \times 60} \times 100$$

=1649X8.73/30X10X60 X100
=79.97 = 80%

Line capacity = $\frac{Total\ Man\ power \times working\ hour \times 60 \times efficiency\%}{SMV} = \frac{30 \times 10 \times 60 \times 100\%}{8.73} = 2061$

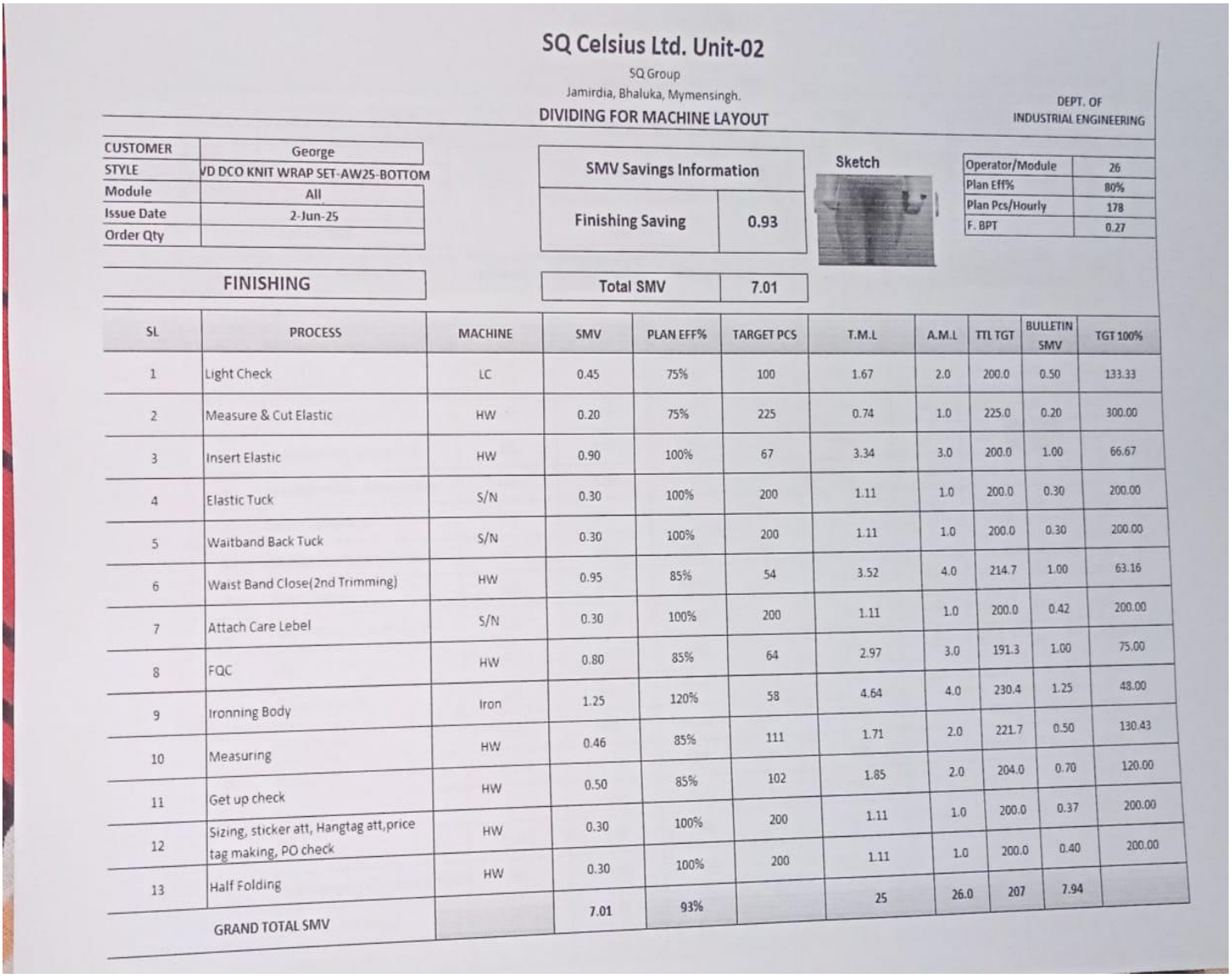
LINE CAPACITY:

Target	1649
SMV	8.73
Pitch time	10.92 min
Efficiency%	80%
Line capacity	2061

3.3 Operation Bulletin for Sweater Bottom

SQ CELCIUS LTD.

Floor : Davinci
Buyer Name: H&M
Style: VD DCO KNIT WRAP SET-AW25-BOTTOM
ITEMS: Sweater



SQ Celsius Ltd. Unit-02
SQ Group
Jamirdia, Bhaluka, Mymensingh.
DIVIDING FOR MACHINE LAYOUT
DEPT. OF INDUSTRIAL ENGINEERING

CUSTOMER	George
STYLE	VD DCO KNIT WRAP SET-AW25-BOTTOM
Module	All
Issue Date	2-Jun-25
Order Qty	

SMV Savings Information	
Finishing Saving	0.93

Sketch

Operator/Module	26
Plan Eff%	80%
Plan Pcs/Hourly	178
F. BPT	0.27

FINISHING

Total SMV	7.01

SL	PROCESS	MACHINE	SMV	PLAN EFF%	TARGET PCS	T.M.L	A.M.L	TTL TGT	BULLETIN SMV	TGT 100%
1	Light Check	LC	0.45	75%	100	1.67	2.0	200.0	0.50	133.33
2	Measure & Cut Elastic	HW	0.20	75%	225	0.74	1.0	225.0	0.20	300.00
3	Insert Elastic	HW	0.90	100%	67	3.34	3.0	200.0	1.00	66.67
4	Elastic Tuck	S/N	0.30	100%	200	1.11	1.0	200.0	0.30	200.00
5	Waitband Back Tuck	S/N	0.30	100%	200	1.11	1.0	200.0	0.30	200.00
6	Waist Band Close(2nd Trimming)	HW	0.95	85%	54	3.52	4.0	214.7	1.00	63.16
7	Attach Care Lebel	S/N	0.30	100%	200	1.11	1.0	200.0	0.42	200.00
8	FQC	HW	0.80	85%	64	2.97	3.0	191.3	1.00	75.00
9	Ironning Body	Iron	1.25	120%	58	4.64	4.0	230.4	1.25	48.00
10	Measuring	HW	0.46	85%	111	1.71	2.0	221.7	0.50	130.43
11	Get up check	HW	0.50	85%	102	1.85	2.0	204.0	0.70	120.00
12	Sizing, sticker att, Hangtag att,price tag making, PO check	HW	0.30	100%	200	1.11	1.0	200.0	0.37	200.00
13	Half Folding	HW	0.30	100%	200	1.11	1.0	200.0	0.40	200.00
	GRAND TOTAL SMV		7.01	93%		25	26.0	207	7.94	

Figure 3.3.1: Operation Breakdown for Sweater Bottom

SQ CELCIUS LTD.

Floor: Davinci

Style: VD DCO KNIT WRAP SET-AW25-BOTTOM

Buyer Name: H&M

SQ Celsius Ltd. Unit-02

SQ Group

Jamirdia, Bhaluka, Mymensingh.

DEPT. OF INDUSTRIAL ENGINEERING

DIVIDING FOR MACHINE LAYOUT

CUSTOMER	George
STYLE	VD DCO KNIT WRAP SET-AW25-BOTTOM
Module	All
Issue Date	2-Jun-25
Order Qty	

SMV Savings Information	
Finishing Saving	0.93

Sketch



Operator/Module	26
Plan Eff%	80%
Plan Pcs/Hourly	178
F. BPT	0.27

FINISHING	Total SMV	7.01

SL	PROCESS	MACHINE	SMV	PLAN EFF%	TARGET PCS	T.M.L	A.M.L	TTL TGT	BULLETIN SMV	TGT 100%
1	Light Check	LC	0.45	75%	100	1.67	2.0	200.0	0.50	133.33
2	Measure & Cut Elastic	HW	0.20	75%	225	0.74	1.0	225.0	0.20	300.00
3	Insert Elastic	HW	0.90	100%	67	3.34	3.0	200.0	1.00	66.67
4	Elastic Tuck	S/N	0.30	100%	200	1.11	1.0	200.0	0.30	200.00
5	Waitband Back Tuck	S/N	0.30	100%	200	1.11	1.0	200.0	0.30	200.00
6	Waist Band Close(2nd Trimming)	HW	0.95	85%	54	3.52	4.0	214.7	1.00	63.16
7	Attach Care Lebel	S/N	0.30	100%	200	1.11	1.0	200.0	0.42	200.00
8	FQC	HW	0.80	85%	64	2.97	3.0	191.3	1.00	75.00
9	Ironning Body	Iron	1.25	120%	58	4.64	4.0	230.4	1.25	48.00
10	Measuring	HW	0.46	85%	111	1.71	2.0	221.7	0.50	130.43
11	Get up check	HW	0.50	85%	102	1.85	2.0	204.0	0.70	120.00
12	Sizing, sticker att, Hangtag att,price tag making, PO check	HW	0.30	100%	200	1.11	1.0	200.0	0.37	200.00
13	Half Folding	HW	0.30	100%	200	1.11	1.0	200.0	0.40	200.00
	GRAND TOTAL SMV		7.01	93%		25	26.0	207	7.94	

Table 3.3.1: Operation Bulletin for Sweater

$$\text{Day Target} = \frac{\text{No. of Operators} \times 60 \times \text{Working Hours per Day} \times \text{Efficiency \%}}{\text{Garment SMV}}$$

From data:

- **No. of Operators (A.M.L):** 26
- **SMV per Garment:** 7.01 minutes
- **Efficiency:** 80%
- **Working Hours per Day: 8 hours**

Step 1: Total available minutes/day

$$26 \text{ operators} \times 60 \text{ mins} \times 8 \text{ hours} = 12,480 \text{ minutes/day}$$

Step 2: Effective minutes (with 80% efficiency)

$$12,480 \times 0.80 = 9,984 \text{ effective minutes}$$

Step 3: Day Target

$$\frac{9,984}{7.01} \approx \boxed{1,424 \text{ garments/day}}$$

Table 3.3.1: Operation Bulletin for Sweater

TOTAL GARMENTS S.M.V = 7.01
Day TARGET = 1424
TARGET / HR. = 178 Pcs
ABOVE ANALYSIS ASSUMPTION

NO OF WORKER	26
FACTORY EFFICIENCY	80%
NO OF WORKING HOURS	08

Description:
Right here We also can be located fashionable manpower is within the operation, SMV, standard overall performance, purpose degree steady with the hour. In this sheet, we can found 13 m/c to make an extended pant. Where fifty-eight people are used. The calculate total

SMV is 7.01. Plan target manufacturing 1424. The making plan's performance is There are wonderful sorts of performance is calculated like

80%, is calculated the overall manufacturing consistent with 8 hrs. The front detail –distinction element: Pick up garment, Align waistband, Feed into machine, Stitch waistband, Trim threads light check,Pqc check,Sweing, nattached zipper, trims item, ayron, folding, and lots of others.

3.3.1 The Calculation Process:

TARGET CALCULATION:

Here,

Total worker = 26

SMV = 7.01

Working hrs. = 08

Efficiency = 80%,

We know that,

Target = total man power × work hr. in minute × efficiency % × SMV

= 26 × 480 × 80% / 7.01

= 1424

When efficiency = 85%,

Target = 26 × 480 × 85% / 7.01

=1513

When efficiency = 90%,

Target = 26 × 480 × 90% / 7.01

= 1602

Efficiency	80%	85%	90%
Target per hour	1424	1513	1602

EFFICIENCY CALCULATION:

Here,

Total production = 1424

SMV = 7.01

Total man power = 26

Working hour = 08

We know,
Here,

Total production = 1424

SMV = 7.01

Total man power = 26

Working hour = 08

$$\text{Efficiency} = \left(\frac{\text{Output} \times \text{SMV}}{\text{Manpower} \times \text{Working Time (mins)}} \right) \times 100$$

$$\text{Efficiency} = \left(\frac{\text{Output} \times 7.01}{26 \times 480} \right) \times 100$$

$$= \left(\frac{1424 \times 7.01}{12480} \right) \times 100$$

$$= \left(\frac{9981.44}{12480} \right) \times 100 \approx 79.96\%$$

Line Capacity:

Here,

SMV = 7.01

Total man power = 26

Working hour = 08

We Know,

$$\text{Line Capacity Per Day} = \frac{\text{Operators} \times 60 \times \text{Working Hours}}{\text{SMV}}$$

$$= \frac{26 \times 60 \times 8}{7.01} = \frac{12480}{7.01} \approx \boxed{1,780 \text{ pieces/day}}$$

CHAPTER – 4: RESULT AND DISCUSSION

4.1.1 Analysis of Capacity Study of Different Operation from Data 3.1

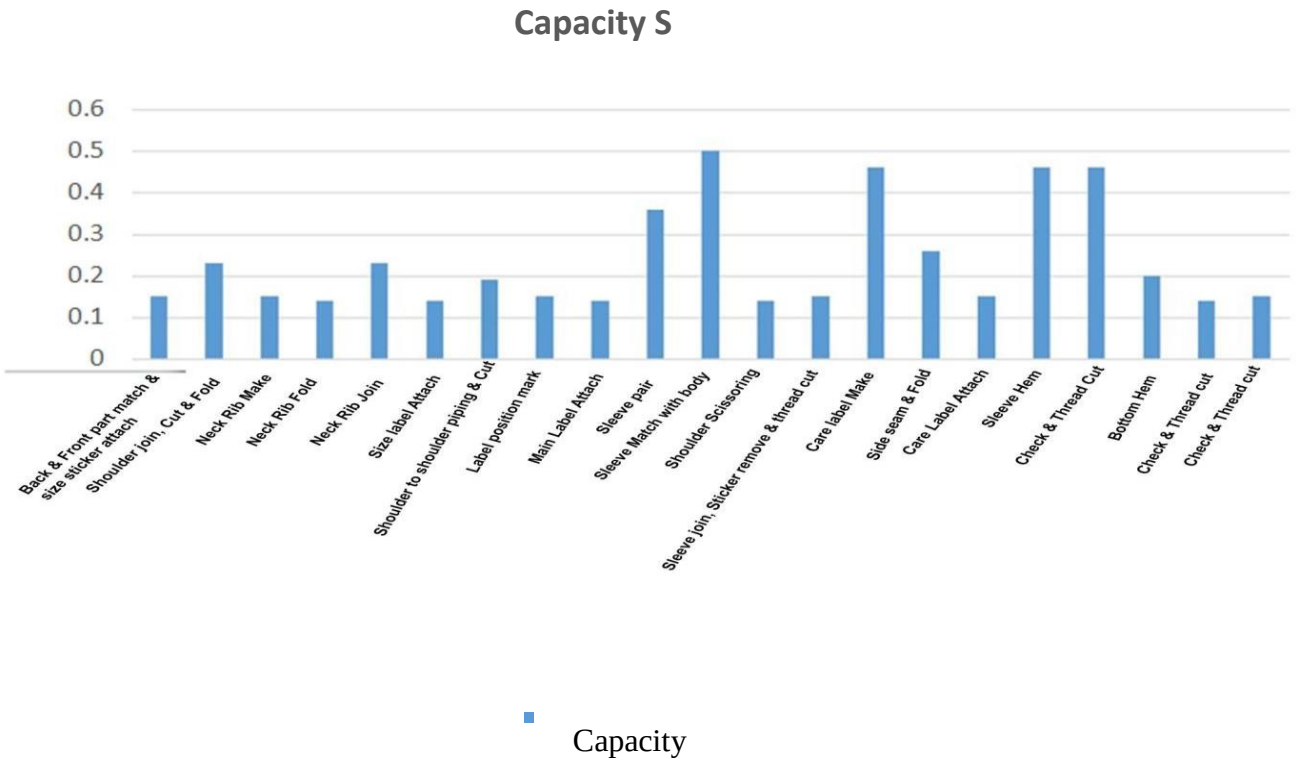
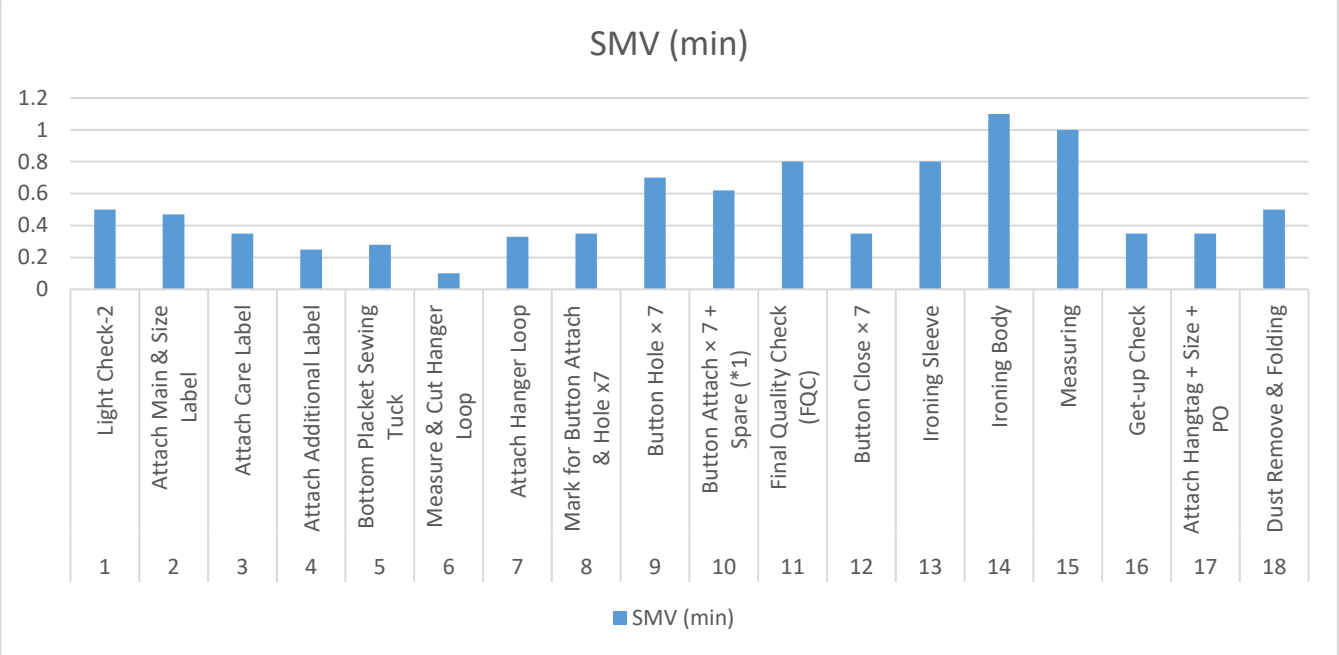


Chart 4.1.1: Analysis of capacity study for different operation of T-SHIRT from data

Description:

On this chart, we confirmed hourly production potential of diverse operation. Here seventy-two% efficiency calculated distinct operations with the aid of the result of We make a chart. To start with, we calculated manufacturing capacity in bankruptcy-03 and in the long run this quit end result and make a powerful chart. This chart offers statistics about distinct forms of operation underneath the chart and instead this chart showing the hourly manufacturing. proper here the very quality capability of the operation are t-shirt make, Care label tack & reduce, Neck rib and fold are 375 and the lowest capacity of the operation is Seam facet and fold is seventy one. And different operations are average potential.

4.1.2 Analysis of Capacity Study of Different Operation from Data 3.2



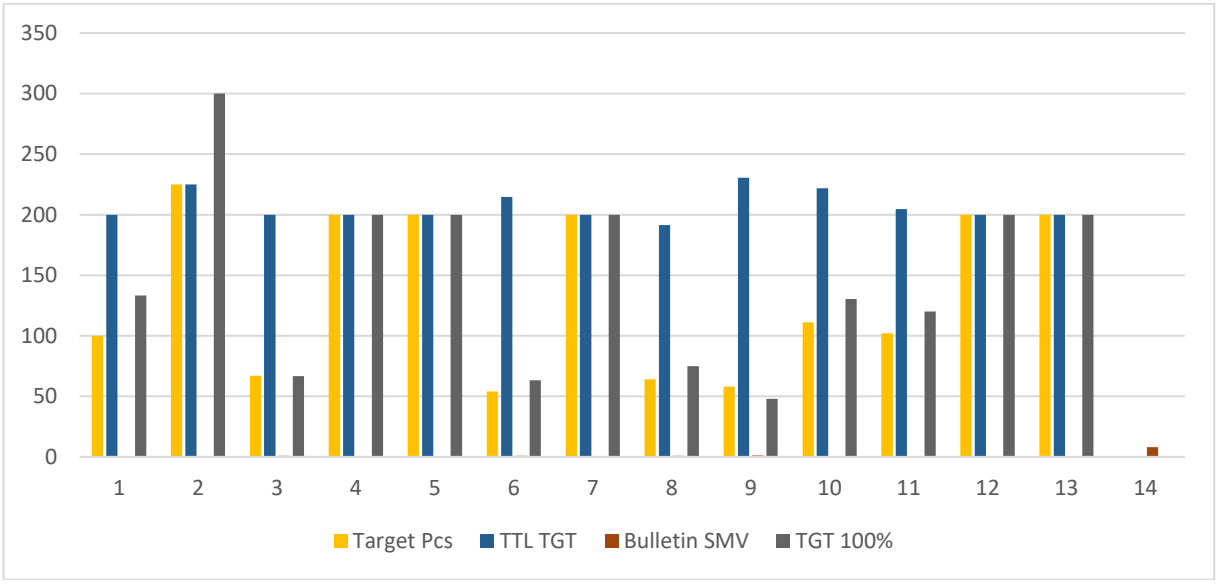
SMV

Chart 4.1.2: Analysis of SMV for Different Operation of Calista Cardigan Data

Description:

On this chart, we confirmed hourly manufacturing capability of diverse operation. Right, right here seventy % performance calculated precise operations by means of the use of the result of We make a chart. First of all, we calculated the producing
g capability in bankruptcy-03 and in the long run this stop result and make a powerful chart. Here the very fine capability of the operation is made, label characteristic mark, Armhole is 333 and the bottom potential of the operation is the side seam and fold is 80. And exclusive operations are commonplace functionality.SMV is the principal purpose for manufacturing.

4.2.1 Analysis Study of Different Operation from Data 3.3



Capacity Study

Chart 4.2.1: Analysis of Capacity Study for Different Operation of Bottom from Data

Description:

On this chart, we confirmed the hourly production ability of different operationThis chart affords information approximately unique sorts of operation beneath the chart and then again this chart displaying the hourly production. Here the highest potential of the operation is pinnacled sew is a hundred 80 and the bottom functionality of the operation H&V Tuck is 133. And other operations are common potential.

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

ITEM	TOTAL SMV
T-SHIRT	7.12
Calista Cardigan Sweater	8.73
DCO Knit Warp Set Bottom	7.01

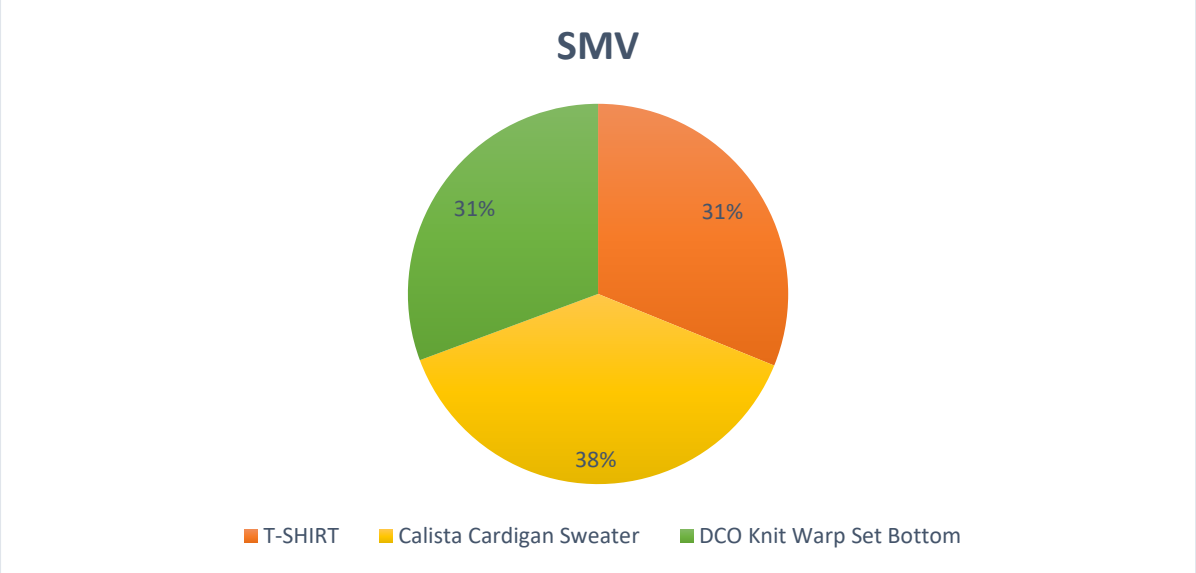


Chart 4.3.1: Analysis of Total SMV of Different Item T-SHIRT, CALISTA CARDIGAN, DCO WARP KNIT BOTTOM

Description:

On this pie chart, we confirmed the only of kind gadgets of usual SMV which we calculated financial ruin-03. Right here we evaluation T-Shirt, Calista Cardigan, DCO Knit Warp Set. This pie chart indicates the overall SMV. The overall SMV of T-shirt is 7.2, Calista Cardigan is 8.73, and DCO Knit Warp Set is 7.01. Right here we're able to see a higher SMV in the pie chart is Calista Cardigan is 8.73 and the lowest SMV in the pie chart is DCO Knit Warp Set is 7.01.

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

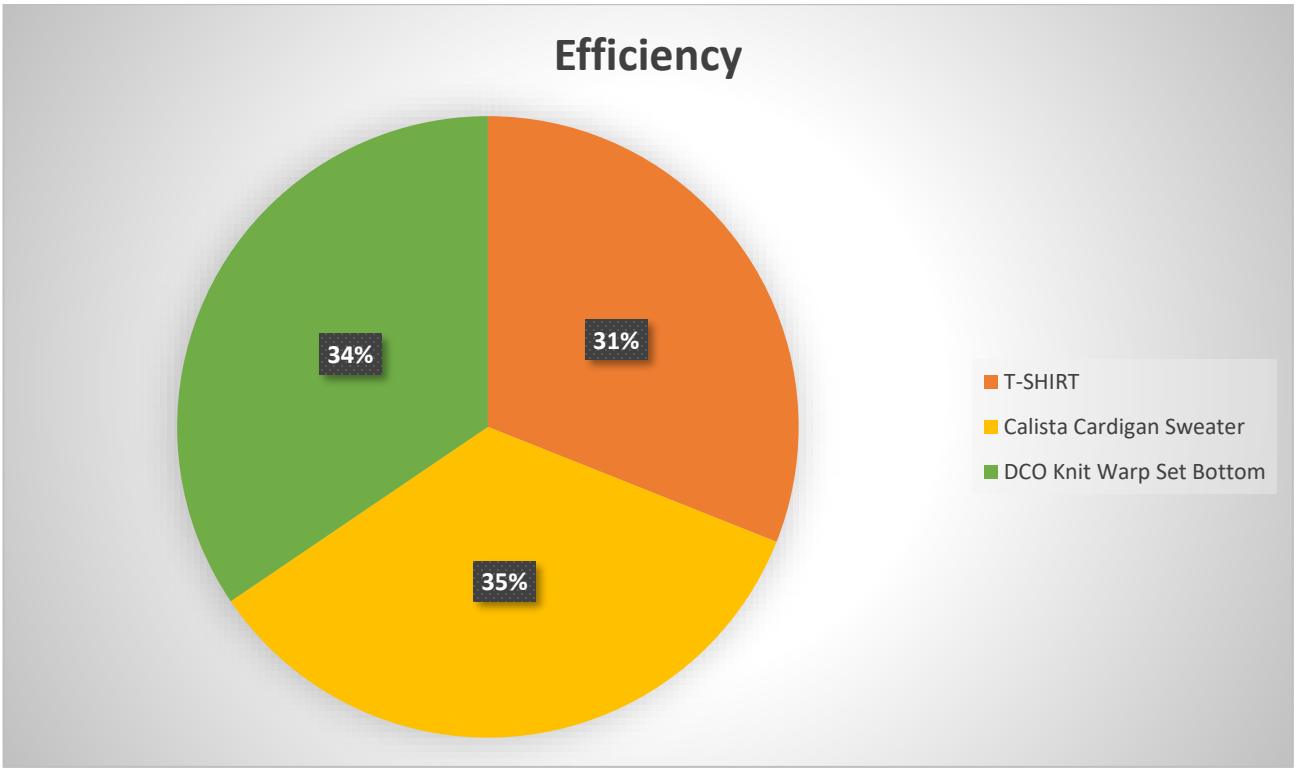


Chart 4.4.1: Analysis of Total Efficiency of Different Item T-SHIRT, CALISTA CARDIGAN, DCO WARP KNIT BOTTOM

Description:

On this pie chart, I confirmed the first-class-of-a-kind object common overall performance% which we calculated bankruptcy-03. Proper right here I evaluation T-shirt, Calista Cardigan, DCO Warp Knitted Bottom. This pie chart shows the performance%. Overall performance% of the Tshirt is seventy two %, the Calista is Eighty %, and the extended DCO is Eighty %. Proper right here we're able to see better general overall performance% within the pie chart is Calista Cardigan is eighty % and the lowest usual performance% inside the pie chart is the extended T Shirt is seventy two %.

CHAPTER – 5: CONCLUSION

Conclusion:

we've got completed our project with the aid of gathering SMV chart and operation bulletin its associated manner records from SQ CELCIUS. Ltd. & Mondol Fabric Limited.

This challenge allows to know approximately the production, SMV time has a look at related components and additionally their rectified method. We collect knowledge from this undertaking different types of knitting Machine, Linking Machine, Embroidery, finishing, cutting, sweing, sizing, garments, ETP plant, Overlock, undeniable system, and many others.

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