Faculty of Engineering

Department of Textile Engineering

REPORT ON

"Study on Industrial Engineering in Lingerie garments Production"

Course Code: TE-4214 **Course Title: project (Thesis)**

Submitted By:

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Supervised by:

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A thesis submitted in partial fulfilment of the requirements for the degree of

Bachelor of Science in Textile Engineering

Advance in Apparel Manufacturing Technology

Spring-2024

LETTER OF APPROVAL

July 26, 2024

To

The Head,

Department of Textile Engineering

Daffodil International University

Daffodil Smart City, Ashulia

Subject: Approval of project report of B.Sc. in TE Program.

Dear Sir,

I'm writing to inform you that the student with ID number 212-23-5793, who authored the thesis titled "Study on Industrial Engineering in Lingerie Garments Production," has finished it in preparation for final review. The manufacturing data with the necessary items is the basis for preparing the entire report. The students actively participated in the activities for their project report, and the report ended up being essential in sparking many insightful ideas for the readers.

As a result, we would really appreciate it if you would accept our report and take it into consideration for your final assessment.

Yours Sincerely

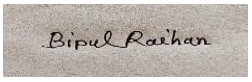
Abdullah Al Mamun

Associate Professor

Department of Textile Engineering, DIU

DECLARATION

Under the direction of Abdullah Al Mamun, an associate professor of textile engineering at the textile department, the thesis, "Study on Industrial Engineering in Lingerie Garments Production," is being undertaken (DIU). I certify that, to the best of my knowledge, the written submission report is entirely my own original work. No candidate for any other degree or diploma has received this report as of yet.

Name	**ID**	**Signature**
Bipul Raihan	212-23-5793	

This is to confirm that, to the best of my knowledge, the candidate's above declaration is accurate.

Supervisor

Abdullah Al Mamun

Associate Professor, TE, DIU

ACKNOWLEDGEMENT

Above all, I would want to convey our sincere gratitude to Almighty Allah for his kind blessing that has allowed us to successfully complete this process.

I want to express my gratitude to everyone who helped make this project possible by contributing significantly. Their advice, ideas, and inspiration were very helpful to me. I would like to sincerely thank Abdullah Al Mamun, an associate professor in the Department of Textile Engineering (DIU), my esteemed instructor and academic mentor. His extensive expertise and genuine enthusiasm in helping me with this research on the study of industrial engineering in the production of lingerie garments is really helpful. This project has been completed thanks to his unending patience, academic assistance, and unceasing encouragement.

I'm also grateful to INGENITEX (BD) Ltd. Authority for providing me with the chance to work on my project in their facility. I am also grateful to INGENITEX (BD) Ltd.'s Biswajit Kundu, Manager, IE, for his help with my project.

I should like to thank my entire course mate of Daffodil International University, who took part in effective discussion and _ to make this project as well.

Lastly, I would want to express my gratitude to every employee, manager, line chief, and floor supervisor who aided and motivated me at different points during this endeavor.

ABSTRACT

Bangladesh's ready-made garments (RMG) sector has the highest share of growth foreign exchange profits of any industry. The subject of this project is "Study on Industrial Engineering in Lingerie Garment Production". It is feasible to increase productivity while decreasing waste by utilizing the techniques, time, limit, and production study—all of which are covered in this paper. Work research documented the true individual capacity of every worker. I have entered the current cycle time for each worker and helper in order to determine the proper worker minute count, machine type, and particular capacity. I have also counted the target, which is 953 pieces; pitch time, which is 0.44; efficiency, which is 70%; manpower, which is 28; capacity, which is 80 pieces per hour; and labor productivity in order to calculate the standard minute value (SMV) for style no. 1. This page provided men's pants dimension sheets, schedules for structural and process defects, and SMV estimates for each operation. Among other study information strategies and tools, these include calculating the desired timeframe, maximizing commands, decreasing efficiency, and assessing system capabilities.

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CHAPTER- 1

INTRODUCTION

Background of the study

Bangladesh is a developing country, and its further development depends on the industrial sector at the moment. Bangladesh's economy is expanding quickly, and the textile and garment sectors provide all of the country's income. For the apparel industry, efficiency is more crucial to sales. The right use of equipment, labor, and systems is essential. Productivity gains in the apparel industry can result from waste removal and efficient utilization of raw materials. Reduce lag and time wastage. Making effective use of time could be very beneficial to the textile industry. There will be significant benefits for the team of industrial engineers.

Objective of the study

We are working toward a specific aim with this report. First, to learn more about the best organizational structure in terms of quality.

1. Imparting a particular response to observable or receding distortion.

2. The cause of string distortions and their correction techniques.

3. Coming up with a novel quality control plan.

Importance and scope of the study

1. To understand how the fashion industry is trying to boost output and the changes that are occurring in performance and technique.
2. Understanding what the Industrial Engineering Department does in the textile sector.
3. To understand the impact of the department of industrial engineering on development.
4. To comprehend the rise in output, capacity, and efficiency brought about by the used technique.

Limitation of the study

- The time allocated for researching this subject is restricted.
- Limitations on primary sources of data. problems with both output and input.
- Adjust the layout and design.

CHAPTER-2

LITERATURE REVIEW

2.1 Industrial Engineering

This department's main responsibility is to re-engineer the garment in order to make it more production-friendly throughout the sample phase. Production also contributes to increased productivity through researching motion, time, and machine architecture. We must constantly endeavour to improve both the standard of living in society and for ourselves if we are to continue being profitable and competitive in the sewn products sector. Increasing production is a possibility.

2.2 History of industrial engineering

A large chunk of the advancement of technology and engineering is covered by the history of engineering and industrial production. The history of engineering and industrial production is presented in this article courtesy of Stalwarts. Over time, industrial production and engineering have been widely recognized as major contributors to civilization's advanced advancement and economic success. Although manufacturing and industrial engineering have developed gradually throughout time, they have accelerated from the start of the pre-industrial revolution in England in 1730. The Industrial Revolution's progress saw a turning point with the mechanization of production processes. Engineering and industrial production are said to have been ignited by F.W. Taylor's ground-breaking work. Resource optimization became a focal point in the 20th century. Industrial engineering makes the most use of automation and digitization with the introduction of Industry 4.0 in the twenty-first century.

2.3 What does an industrial engineer do?

• Understanding manufacturing and service operations, reviewing engineering requirements, production schedules, process flows, and other data are among the general tasks carried out by industrial engineers.

• Decide on the most productive method for producing goods, components, or services.

• Establish management control systems to raise the efficiency of financial planning and cost analysis.

• Work with customers and management to develop design and production standards

• Create control systems to manage planning and production processes and guarantee that goods fulfil quality standards.

• Work together to establish design and manufacturing standards with clients and management.

• Establish control systems to oversee the production and planning procedures and ensure that the products meet quality requirements.

• Educate clients on project status personnel, manufacturing capacities, procurement sources, and product specifications.

2.4 Activities of industrial engineering

Industrial engineer is involved in activities such as:

• Equipment for manufacturing and processing, including its arrangement, design, and construction.

• The development and management of a quality control and assurance program.

• The development and use of recommendations for performance measurement.

• Planning and implementing an output-boosting program.

• Taking charge of and administering a new technology development project.

• The architecture and operation of the hardware planning system.

• Building mathematical models to analyse systems..

2.5 Objectives of industrial engineering

1. Encourage effectiveness.
2. Method enhancement with reduced motion
3. Get rid of the bottleneck and decrease the work in process (WIP).
4. Improve the service's performance.
5. Man-machine report offset.

6. Improving the procedures for pricing, waste, and rejection REDUCE wastage and flaws.
7. Complete the primary objective's key performance indicator (KPI).
8. Protect the environment and the workplace.
9. Planning and initiation of production

2.6 Function of an industrial engineer

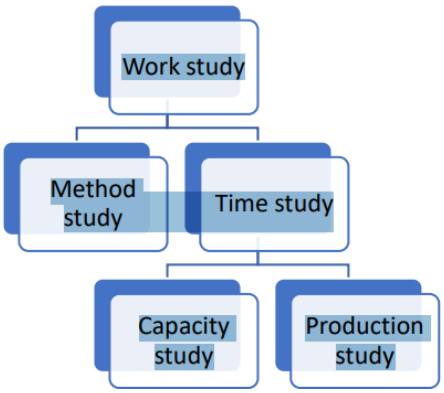
While enhancing worker productivity, safety, and well-being, industrial engineering typically includes a broad range of tasks that support manufacturing and service operations. Industrial engineering tasks can be organized in a number of ways to meet the needs of a company. The following main group is featured in the participation profile:

1. Measuring Work.
2. Organizing inventories and preparing installations.
3. Control of statistical precision.
4. Production scheduling and control.
5. Look over the techniques and tools for simulation.
6. The human capital.
7. Safety in the workplace
8. Facilities for engineers.

2.7 Steps of work Study:

The work study is the foundation of industrial engineering. Work study was divided into

1. Method of study
2. Time of study.



Fig; 2.7

Calculation types of industrial engineering

The key to a manufacturing industry is the industrial engineer. To make the organization better, they consistently employ the following strategies.

1. **Time study:** Using this application, you can set aside a regular period for chores or procedures.

2. **Study of the method:** following a thorough analysis of the task, to define the design of production facilities to ensure a consistent flow of material without back tracking, and to set a standard of execution of a work or activity.

3. **Movement economy:** This method minimizes worker fatigue and repetitious motions while optimizing manual production tasks. This approach is the same as the study procedures, except here, movements are closely examined.

4. **Value Analysis:** This method reduces non-value added time, erroneous procedures, and needless production costs by first studying the manufacturing process.

5. **Production, planning and control:** This technique is necessary for the preparation of resources, including labour, materials, and the machine under development. Planning and monitoring production processes appropriately to produce the necessary amount and quality.

6. **Work study:** This type of study combines technique and time studies.

   (Work study = time study + method study)

7. **Inventory control:** This method of inventory management is employed since it is well known that having too much inventory is wasteful and that maintaining stock levels helps a business in many ways, including increased production, efficiency, quality, and cash flow.

8. **Operational Research technique:** Operational research involves issue solving and decision-making using methodology. The various methods employed for this method include network analysis, simulation models, and LLP.

9. **Ergonomics:** Another name for human engineering is ergonomics. Any new ergonomic enhancements for the office or workstation have to be completed.

10. **Employment Assessment:** Depending on the operator's skill level, this tactic requires attributing the positive word or the suitable work to the appropriate person. Reducing labour costs and raising production rates are two benefits of employment assessment.
11. **Material handling analysis:** To achieve optimal productivity and efficiency, the least amount of material is needed. Excessive movement of the equipment is prevented by the examination of material manipulation.

IE Job profile

The demand for industrial engineers has grown significantly in the last few years. The rationale is that there are many things an industrial engineer can do to increase society's efficiency. However, the new Educational Institute student has learned the bare minimum about the industrialist engineer's job description. Working is the only way to master full work at the workplace. Industrial engineers employ a variety of tools and methods to create successful products.

1. Knowledge of various sewing manufacturing methods.
2. Familiarity with every kind of sewing machine required by the business.
3. Cycle time analysis
4. Examination of the operation's motions
5. Disintegrate the process
6. Getting the OB ready
7. Sam's Calculation
8. Setup line
9. A line's production estimate
10. Sampling at work
11. Layout and M/C arrangement

12. Control of work in progress
13. A study of capacity
14. Maintaining equilibrium
15. Performance note; 6. Apparel cost estimate; 7. Calculation of thread consumption;

2.8 Organogram of IE department

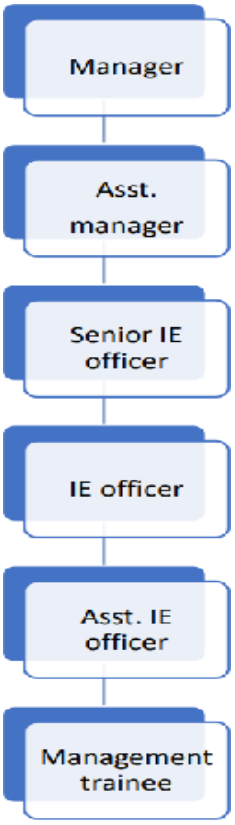
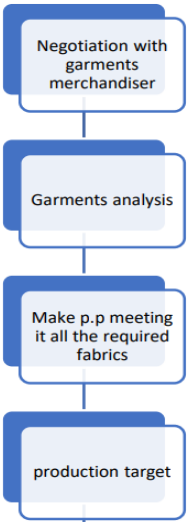


Fig:2.8

2.9 Process flow chart of Industrial Engineering



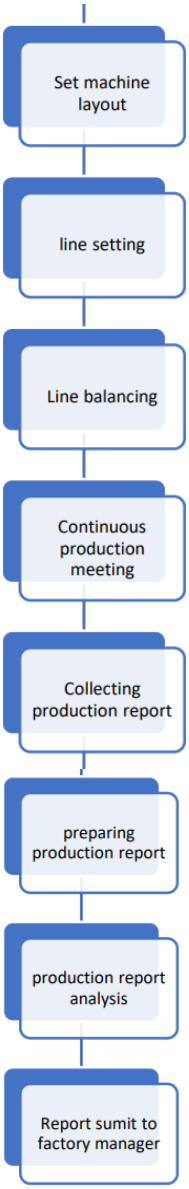


Fig:2.9

2.10 Industrial Engineering Tools

1. Lean manufacture
2. 5s
3. Kanban
4. Kaizen.

2.10.1 Lean Manufacturing

Lean production refers to a methodical approach to eliminating waste from a manufacturing system or value flow while maintaining efficiency. All sources of information and operations that take place between the raw material producer and the client's possession are included in the value flow. When implemented correctly, lean manufacturing can have a significant impact on profitability, as Toyota demonstrated with their 1930s "The Toyota Way" operational style. The lean principles seek to identify and, if feasible, reduce or eliminate the waste that exists in practically all companies. The eight types of waste that manufacturer skinny should focus on are displayed by the approximated acronym.

1. **Defects:** Certainly the most costly waste, particularly in cases where the customer obtains a damaged product, is rescue waste.

2. **Overproduction:** It creates more goods than required, could lead to a shortage in inventory, and wastes hours of that could be put to better use.

3. **Transport:** It is carried out in the particular production location as well as in the supply chain and product distribution network.

4. **Inventory:** Finished goods, substructures, raw materials, office supplies and repairs, and maintenance, repair, and servicing are the five primary categories (MRO)

5. **Movement:** Included are Flex, Scope, Height, and Wald. Simple to use instruments that need little movement between workstations will save a lot of needless mobility.

6. **Excess processing**: happens when time is spent on items that have no bearing on how well the components work together. For instance, if a part remains functional even without paint, painting it is not necessary nor important.

2.10.2 5s

Based on the idea of progress, 5s is an organized approach for workstation management. The most well-known phrase, 5S, refers to working circumstances, which improve products. It has extended over time to include lean manufacturing in Japan. This technique looks for waste forms to remove using five prayers, all of which begin with a 5S.

4. **Standardize**: Adhere to consistent protocols throughout all shifts to guarantee maximum production.

The 5s are the following:

1. **Sort:** Eliminate anything that is not required for a certain job to avoid any chaos or disaster at work.
2. **Set in order:** Carefully mark and organize anything that is behind the marking. Utilize the tools and parts.
3. **Shine:** Maintain a space free of debris, dust, and other issues.
4. **Standardize**: Adhere to consistent protocols throughout all shifts to guarantee maximum production.
4. **Hold:** To ensure that the other four are continued and that this is a continuous endeavour, procedures must be put in place.

2.10.3 Kanban

The lean production planning framework is called Kanban. The industrial engineer Taiichi Ohno used the phrase "Bill Board," or "Kanban," for the first time while working at Toyota.

2.10.4 The advantages of Kanban

1. Fleeting.
2. A boost in output.
3. A group that places greater focus.
4. Get rid of extra output.

5. Inventory controls that work best.

6. Smoother/more efficient workflow

2.10.5 Kaizen

Kaizen is the Japanese word for progress or ongoing development. Kaizen is referred to by two Japanese terms: "Z" (good) and "Kai," which signifies "shift." Toyota introduced the Japanese idea to the world for the first time in the 1980s, and many of businesses have since adopted it. This small adjustment fosters a culture of change that progressively raises profitability, productivity, and quality.

2.11 Work study

The measurement approach is all the tactics used in all of their contexts, such as methodology analysis and work calculations, that result in the investigation of every variable that affects the operational and strategic objectives of the scenario being studied.

2.11.1 Technical of the work study

There are two work study techniques:

1. **Study of the method:** The method is methodology research that gathers and examines data in a methodical manner in order to identify and apply work procedures that are easier to use, more cost-effective, and efficient.

2. **Work measure:** Using a process called work assessment, one can determine how long it will take a newly qualified employee to complete a given task at a specific level of performance.

2.11.2 Steps involved in the work study

The work study is a methodical examination of the procedures utilized to carry out tasks including creating performance standards and making efficient use of resources.

An eight-phase work analysis is the whole process. They're

Select the duty to be investigated.

1. **Register:** By gathering data from the gadget and by ongoing oversight.
2. **Examine:** Using the inquiry, the goal, the procedure, and the work plan.
3. **Develop:** Contemporary methods prioritized the involvement of all stakeholders.
4. **Assess:** The outcomes of logical choices.
5. **Installation:** Final preparations and approaches.
6. **Maintain:** Provide a way for monitoring.
7. **Describe:** There are other concepts and outcomes.

2.11.3 Personal qualities of the work study engineer

A work study engineer needs to have integrity, be courteous, knowledgeable, self-assured, and honest. The workman of the trade needs to possess these fundamental attributes.

1. Sincerity and honesty: The employee needs to be a real, honest person who respects and trusts the people he will be working with.

2. Enthusiasm: He or she will solely handle the task at hand. Recognize the worth of whatever he or she does for those around them.

3. Interest and empathy for others: The ability to communicate with people on all different levels is necessary to hear what they have to say and comprehend the motivations behind their actions.

4. Tact: Despite their rationality, individuals face them because they understand them and do not want their feelings to be hurt by insensitive or superficial language.

5. Well-groomed appearance: This gives people who work confidence. The person needs to be efficient, hygienic, and safe.

6. Self-assurance: This is only possible with sufficient planning and prior work experience. The worker needs to be able to deal with managers, supervisors, and union representatives.

2.11.4 Function of study engineering work.

1.Study of method: The method's configuration, tools, machinery repair, element analysis, productive and ineffective time division, management and movement, contingency, improved work, increased work efficiency, better work methods, shorter workdays, and larger needles are all studied.

2. Work measuring methods: include standard time setup, sampling, cycle checking, rating observed time, SMV, BMV, and rating.

3. General sewing data (GSD): Methodology study to remove unnecessary tasks and conduct process research and production within GSD time.

4. Operational breakdown and design: Process series, time management, loose flow, design or no opportunity, time management, personnel and operator selection.

5. Consumption: Everything from belts to thickens, elastic to Velcro to cloth, and everything in between.

6. Calculation: BTP, LPT, SMV, HPT, speed, time of use, capacity, customers, and customer service; feeding time, created time; AQL, efficiency, OQL, confidence level, and precision; cost rupture point; low range; percentage; effective time;

2.11.5 General function

1. **SMV & production plan:** SMV computes the manufacturing plan and updates it

2. **Report:** SMV estimations and quality updates, capacity, production, output report, incentive computation, will help with necessary detail computation and administration, compare, plant and row capabilities. the plant's manufacturing.

3. **Maintain history:** Standard productivity analysis includes data, goods, reception, efficacy, advancement, quality, objective, and objective

4. **Save materials:** Defense against malicious use of wires that can be measured in threads. All categories also include chain, lock, and ribbon, such as buttons, buttonholes, blockers, extractors, captures, and zippers
5. **Expert reserved**: If necessary, to assist someone in their role as a restricted expert.
6. **Motivation:** Jobs, mentoring, facilities, lifestyle enhancement, and technology.

2.11.6 Method analysis

The majority of businesses employ ineffective methods; employees know how to complete their tasks, settle for minimal sewing, combine extraneous materials, pack and unpack supplies, and require extra management. These outbursts can be eliminated because they increase the delivery time. A market analysis or even one based on any kind of production process can be used to analyse a process. An analysis using appropriate methodologies will boost efficiency by at least 15%.

2.11.7 Workplace design

It is not possible to deploy a significant number of computers for administration, which leaves less room for innovative tactics. The teams can always accommodate one another. Excessive motions and weariness are eliminated by the workplace's successful design, which significantly improves driver performance. Examine the picture and consider how productive you can be if you work eight hours a day.

2.11.8 Organization segment

Many industrial facilities run without following a set of predetermined or scheduled steps. This is an important stage in the development of textiles, and a mistake or lack of attention will cost the producer a lot later on in terms of time, materials, and output.

2.11.9 Work aids and attachment

Accessories and labour support are not being used to their full potential. The maintenance of a process of performance improvement requires the availability of several contemporary attachments and reasonably priced directories, all of which are continually being developed.

Many are reasonably priced and contemporary. continually added folders and attachments, which are necessary to keep up the quality improvement.

2.11.10 Observation of the operator

It is unknown to them that half of the enterprises under study were unable to live up to expectations. Although it is not precisely calculated, it is performed well. Until you have improved supervision and methods for possible quality improvement, you cannot, of course, compete.

2.11.11 Cycle checks

A basic methodology targeted to assess operator performance versus actual production might be accomplished by relatively inexperienced personnel, which is a major help to increase factory efficiencies. No company carries out cycle controls. The style contrast 1 and style 2 (without department studies) in several apparel production industries are displayed in the following table. The manufacturers are defined in the following figure.

2.12 Study method for clothing operation

1. **Selection of work:** Numerous functions or positions diverged from the majority of activities. Selecting the work that will provide you the best returns for the time you invest is the first step.

2. **Record the facts:** Enough data on the current system must be gathered before the process or technique is eliminated. This would be to guarantee that the project is preserved throughout a fair historical account.

3. **Critically examine the facts:** This crucial stage in the process involves verifying the information gathered and carefully analysing each task part to determine whether to include it in the subsequent sections.

- ✓ Combine with an additional work piece. Delete entirely.
- ✓ Redesigned to reduce the amount of work material required
- ✓ Linear incentive

4. **Develop the new method:** The selected solution is applied, and a new structure, protocol, or procedure is updated. It could be necessary to run tests in order to assess viability. If those trials must be conducted, it is better to do so somewhere other than the office.

Install the method: Prior to the new approach being installed, the following decision needs to be made:

- ✓ Progression in enhancing the production process.
- ✓ Requests for products.
- ✓ Determining the extent of mobilization
- ✓ Uphold existing coherence and research standards.
- ✓ Put the revised recording protocol into practice.

5. **Maintenance of the method:** Following system deployment, there appears to be a slowdown in the transition because of minor adjustments made by technicians or managers. You will need a linear programming model in order to identify any changes.

2.13 Study of time for clothing operations

2.13.1 Definition of time study

Time work is a way of calculating labour that involves recording the times spent on a particular activity or component and evaluating the date to determine how long it will take a worker to complete it at any output rate.

Time study techniques

1. Understand the work process
2. Evaluate the efficiency of the staff
3. The worker should not be bothered by time studies
4. If the operator is told that occasionally he could investigate

Time study tools

- ✓ Time study format
- ✓ A stop watch
- ✓ Clipboard
- ✓ A pen or pencil
- ✓ Eraser
- ✓ Calculation

Production target

- ✓ The typical user
- ✓ The approximate amount of worker.
- ✓ Choose the optimal job type.
- ✓ To be completely ready.

Reducing capital in line with your individual expertise is an essential component of achieving a production goal. Compared to any other operation, this one generates more revenue. A production objective establishes critical zones for estimation. For average people, a career in technology is aspirational; those at the top do more, while those at the bottom do less.

SAM: Standard allowed minute

SMV: Standard minute value

Time needed to complete a task, the completely qualified average output when the right strategy is applied and the efficiency meets the necessary standards

Grading the time study

The time research agent looks over the data because every worker is different. The actual result is related. initially at 100%. The process has three objectives.
Competitors comprise worker sharpness and synchronicity.
Effort: How complicated is the worker during the survey?

2.13.2 How to carry out the time study?

A cycle consists of the following steps: material processing, part arrangement, clamping, seams, constructing, and ropes. Divide the initial activity into its component parts according to the action pattern and the format of the period's analysis. Work components, for instance, could be in operation. “Collar run stitch”

- ✓ Make the next sewing collar.
- ✓ Gather the initial cutting board.
- ✓ To sew the third collar, turn the collar.
- ✓ The subsequent unfinished components and
- ✓ Monitoring job opportunities and eliminating

Step 1: Preparation

- It will select the time-related research task.

- Equipped with documentation, including a work schedule, an automated timer, and a pencil

- Let know who needs more time to complete the task.

- Examine exercise carefully and break it up into smaller parts.

Step 2: Time capture: Enter now the amount needed for the supplier to finish each cycle of operations. We anticipate seizing the tracking suit. Also, by sequential 5 operation cycle, get component time. After reviewing the data collection, take note of the majority of the observations, and then calculate how long the appearance will last.

Step 3: Calculation of basic time: Reading (R) is the final literacy task for simple reading, and it takes a certain amount of time for each of the five cycles. Summarize the duration of five cycles for every component. Recall that deleting any reading would result in cycle 4 not occurring. Measurements are made of average component times. This average time is known as simple time.

Step 4: Standard time calculation: To convert a simple time to the standard, you must divide it by the workers' efficiency ratio. For instance, a 100% rating was obtained here. It now includes things like system supplies, fatigue, and individual circumstances, among other things. Once the machine functions and personal characteristics are applied to any item, only the equipment assignment should be connected to specific things. Every function needs to have a set amount of time, measured in seconds. Always keep things simple and convert seconds into minutes. It is known as SAM minutes.

Steps in the time study

- Adopt a worker-best work strategy
- He made the right work procedure choice.
- Assess the initiative and the potential of the workforce

- The manufacturer's window of opportunity for optimal operation
- Use regular job assignments to allow the employee to take breaks from sewing the gadget during such times.
- Permit the anticipated user time to be 100% (Estimated).

Work measurement related formula:

Standard minutes value (SMV) = Observed time × rating + 15 % (Allowance)

$$Daily\ target = \frac{Manpower \times 10 \times 60 \times Efficiency}{SMV}$$

$$Efficiency\ (\%) = \frac{\text{Output} \times 100}{\text{Input}}$$ (output = SMV× production quantity)

Individual worker target/ Hour = 60 × Wanted Efficiency/ SMV

2.13.3 Design of workplace

The design entails allocating production to the actual worker in the row while accounting for the worker's overall skill set, the machinery's complete experience, and the machine's shapes. The physical setup that makes it feasible to produce the goods at least as quickly as possible at the lowest unit cost is acceptable. Development procedure

1st Step:

1. The designer or designers.
2. APM.

3. Head of task execution
4. Worker analysis person.

2nd Step:

1. Select a line
2. To choose a style
3. Verify the operator in full

3rd Step:

1. The calculation's maximum SMV
2. Select a computer number from the list.
3. The approximate average SMV and operator will be ascertained.
4. Setting up the device as required.
5. To select the most appropriate operator based on the accuracy of the right technique.
6. The procedure needs to take place in the future.

Profit of the design:

1. Neck on the line does not generally exhibit any remarkable ways.
2. The mechanism's distribution and operation are extremely similar.
3. You can consistently satisfy the buyer's quality requirements.
4. No worker will be left unemployed.
5. You can reach the maximum lens in a short amount of time.

2.13.4 Line balance

The placement of methodical sewing lines, machinery, or task assignments to assist guarantee a steady output and reduce idle time is known as the "line balance." The balance of the line in the textile sector is categorized based on the kind and layout of sewing machines. What kind of apparel is made determines the sewing machine's line structure.

Importance of balancing line:

1. It is preferable for each operator to assign these tasks.

2. The present style machine is captured by the line balance.

3. The output rate is boosted by the robust line balancing.

4. It is feasible to distribute goods in the agreed-upon quality for the list's expenses at the appropriate time.

5. A correct line balance ensures the factory's benefit.

6. The negotiated requirement was met to the best of its ability thanks to the proper line balance.

7. Removes the possibility of final product defects.

2.13.5 Capacity study

We determine your efficiency while performing an operator capacity analysis if you consistently operate at the same pace and using the same methodology as the research. By the time the study ends, we can assume that the user might be a worker of 120%, or whatever level of success the study suggests.

Exactly, what else is said about talent? That is the same as having the same amount of time, though. This guarantees that the operator will be able to achieve the study's efficiency.

2.13.6 Breakdown of the operation

A breakdown is an assortment of items for a job's contents. Clothes are used in every activity and component. A breakdown occurs when one person's entire wardrobe is discovered behind the other, as per the system's overall method. It is crucial to provide the machine's form and approximate SMV with each approach.

Transaction breakdown procedure

1. The technical and research squad administrator, as well as the floor area leader.

2. One by one, the technician removes each item of clothing, chopping it to bits.

3. The head of the floor section and the work evaluation officer then raise the SMV of this task.

4. After the procedure is finished, all SMV processes must be recapitulated, and the SUM is referred to as SMV as the appropriate attire.

2.13.7 Bottleneck

The tallest thin portion of a bottle, known as the neck, is seen as an obstruction since it relates to both the narrow and wide parts of the bottle. It is a metaphorical situation that prevents production. Natural production pauses manufacturing in a manufacturing market. This is a sharp point—it flows. A bottleneck in the manufacturing sector, for instance, with the slightest manufacturing capacity, results in lost output and financial losses.

1. Bottleneck before the entry online / group

1. The issue of source latency
2. The issue of MCD or inaccessible stores
3. Poor problem creation
4. The problematic series' inconsistency or mistake.
5. Trends question.
6. Untrustworthy apparatus.
7. Matter of content

2. Online bottleneck

1. Failure work workflow / work chain.
2. Distribution of the non-balance factor.
3. The choice of the worker is false.
4. Absenteeism in jobs.
5. Failure for staff.
6. Failures / out of control of the unit.
7. Non serial staff materials.
8. Lack of delivery.
9. The question of consistency.
10. The road of color.
11. If a person becomes ill.

Difference of bottleneck

1. The cycle verification process uses a very straightforward and accurate measurement technique along with the most advanced technical means of locating the cycle inspection results in a bottle-shaped figure.

2. When viewing the supply gathering, the bottle point or area is the area or region where the distribution stack is detected. The majority of employees are given a mound of

food, so they can rest next to it and to the other person without appearing to be a bottleneck.

3. Regarding the quantity of problems supplied in a serial fashion, both operators typically perform their tasks in a manner consistent with the series or number of methods. However, if an employee believes that the quantity of problems in a serial fashion may not be equally distributed between the operators, a bottleneck point has been identified.

Method of removal of bottlenecks

1. Costs of production.
2. Establish a framework before providing input.
3. Preproduction meetings are scheduled on schedule.
4. Before emission, inspect the components and accessories.
5. Integrate that schematic promptly for maintenance.
6. Select the proper operation to carry out the necessary tasks.
7. Test the pattern immediately, before the issue arises.
8. Make an effort to lessen the operator's overabundance of tasks in search of vitality.

CHAPTER-3:

METHODOLOGY

3.1 Data collection

A different area of a woven clothing factory is where I get my experience data. The industrial engineering area is where I first gather data, followed by the merchandising and sample sections. In the line where I conduct my research, I also gather data. Plus, I get data from the manager of production.

3.2 Production Information

Style -01

Buyer: Primark

Item: Bra

Line: 8

Style: PMB24-0082

Target: 995 pcs (70%)

3.3 Product Sketch

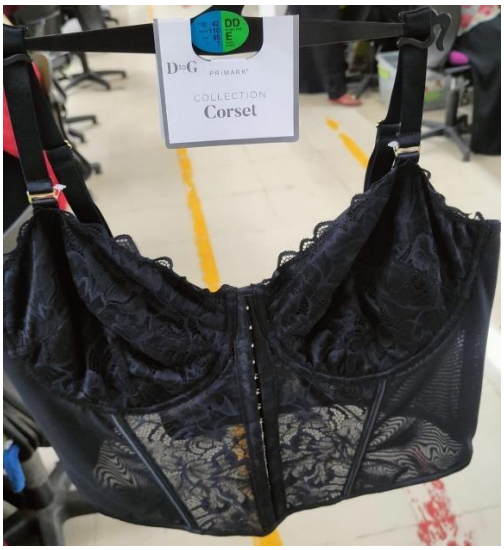


Fig:3.3

Product Information

Style -02

Buyer: Ziva

Item: Panty

Line: 6

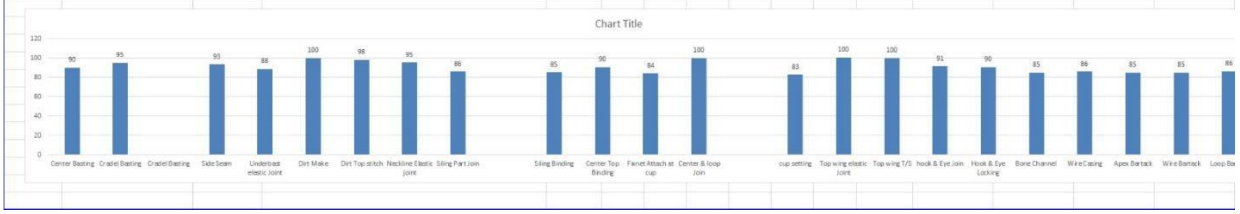
Style: ZI-2845

Target: 160 pcs/Hr (70%)

Fig: 3.2.1

3.4 Capacity Study

LINE NO	07	STYLE :	PMB24-082	SMV	12.33			POSSIBLE OUTPUT				83	STUDY BY		
BUYER:	Primark	ITEM:	Bra	M/C	26			EFF%				65%	DATE		
S/L	OPERATOR NAME	ID NO	OPERATION NAME	M/C	CYCLE TIME					AVG. TIME	WITH ALLOWANCE %	PROCESS CAPACITY	Working Time(min)	Balance Capacity	EXISTING POSSIBLE CAPACITY
					1	2	3	4	5						
1	Anika		Center Basting	SN	62	60	58	61	59	60.00	66	55	90.91	90	83
2	Rowshonara		Cradel Basting		44	45	43	44	43	43.80	48.18	60	82.64	95	83
3	Sharmin		Cradel Basting		47	45	48	45	48	46.60	51.26	35	141.21		83
4	Ismotara		Side Seam	SN	29	30	28	30	29	29.20	32.12	93	53.09	93	83
5	Sathi		Underbast elastic Joint	ZZ	37	38	36	38	36	37.00	40.7	88	56.06	88	83
6	Taslima		Dirt Make	OL	32	34	33	32	33	32.80	36.08	100	49.70	100	83
7	Sefaly		Dirt Top stitch	SN	34	36	32	31	34	33.40	36.74	98	50.61	98	83
8	Tania		Neckline Elastic joint	ZZ	34	36	34	35	33	34.40	37.84	95	52.12	95	83
9	Delwara		Siling Part Join	SN	70	73	70	72	70	71.00	78.1	46	107.58	86	83
10	Sabina			SN	84	82	84	82	81	82.60	90.86	40	125.15		83
11	Habiba		Siling Binding	FL	38	38	37	39	40	38.40	42.24	85	58.18	85	83
12	Hamida		Center Top Binding	FL	36	34	38	34	39	36.20	39.82	90	54.85	90	83
13	Shopna		Fixnet Attach at cup	SN	40	38	40	38	39	39.00	42.9	84	59.09	84	83
14	Akterun		Center & loop Join	SN	50	52	53	50	52	51.40	56.54	64	77.88	100	83
15					90	88	92	89	92	90.20	99.22	36	136.67		83
16	Bobita		cup setting		40	39	40	39	40	39.60	43.56	83	60.00	83	83
17	Momota		Top wing elastic Joint	ZZ	34	32	32	31	34	32.60	35.86	100	49.39	100	83
18	Sonia		Top wing T/S		32	34	32	32	34	32.80	36.08	100	49.70	100	83
19	Nazma		hook & Eye Join	ZZ	35	34	37	36	37	35.80	39.38	91	54.24	91	83
20	Nahar		Hook & Eye Locking		36	35	37	36	37	36.20	39.82	90	54.85	90	83
21	Sagorika		Bone Channel	DN	40	38	40	37	38	38.60	42.46	85	58.48	85	83
22	Rumana		Wire Casing		39	38	39	38	37	38.20	42.02	86	57.88	86	83
23	Shilpi		Apex Bartack	BT	40	38	39	38	38	38.60	42.46	85	58.48	85	83
24	Sahjadi		Wire Bartack		39	40	39	38	39	39.00	42.9	85	58.34	85	83
25	Jahanara		Loop Bartack		39	37	39	38	37	38.00	41.8	86	57.58	86	83
26	Trisha		Bone Bartack		38	35	38	36	39	37.20	40.92	88	56.36	88	83
PREPARED BY: IE DEPT.								P.O							PM



3.5 Operation Breakdown Procedure

OPERATION BREAKDOWN

Style No:	PMB24-0082
Buyer :	PRIMARK
Description :	BRA
Color :	
Season :	
Version :	BULK
P. Category :	

SKETCH

Machine SMV :		12.33										Date Created :
Carder :		28	14				10%					Date Updated :
70%	**Team Target :**	95	48	0								Date Revised :

No	Machine Type	Operation Description	SMV	Operation Status	Attachment	OP Target @100 %	Minimum TGT To Achieve	28 Theoritical Loading	MC Actual MO	Layout MCN	14 Theoritical Loading
1	3TOL	CUP OUTER DART MAKE	0.45			133	107	0.89	1.0	1	0.4
2	SNLS	OUTER DART TOP STITCH	0.40			150	120	0.79	1.0	1	0.4
3	FL FB BINDING	BINDING AT CUP SLING	0.35			171	137	0.70	1.0	1	0.3
4	1 STEP ZZ	ELASTIC ATTACH AT CUP NECKLINE	0.35			171	137	0.70	1.0	1	0.3
5	SNLS	SLING JOIN AT CUP OUTER	0.55			109	87	1.09	1.0	1	0.5
6	SNLS	CENTER MAKE	0.40			150	120	0.79	1.0	1	0.4
7	FL FB BINDING	CENTER BINDING LOOP MAKE	0.15			400	320	0.30	0.5	1	0.1
8	FL FB BINDING	CENTER TOP BINDING	0.15			400	320	0.30	0.5	1	0.1
9	SNLS	SIDE CADLE BASTING	0.75			80	64	1.49	2.0	2	0.7
10	SNLS	SIDE SEAM	0.38			158	126	0.76	1.0	1	0.4
11	3 STEP ZZ	ELASTIC ATTACH AT WING & CRADLE BOTTOM WITTH	0.70			86	69	1.39	1.5	2	0.7
12	SNLS	FIXNET ATTACH AT CUP BOTTOM	0.30			200	160	0.60	0.5	1	0.3
13	SNLS	CENTER & BACK PART JOIN	1.30			46	37	2.58	3.0	3	1.3
14	1 STEP ZZ	TOP WING & CRADLE 1ST ROW ZZ ELASTIC ATTACH	0.40			150	120	0.79	1.0	1	0.4
15	1 STEP ZZ	TOP WING & CRADLE 2ND ROW ZZ ELASTIC TOP STITCH	0.40			150	120	0.79	1.0	1	0.4
16	DNLS	SIDE BONE CHANNEL JOIN & BONE INSERT	0.70			86	69	1.39	2.0	2	0.7
17	DNLS	WIRE CHANNEL JOIN & INSERT	0.90			67	53	1.79	2.0	2	0.9
18	SNLS	LOOP MAKE AT APEX & LABEL MAKE	0.45			133	107	0.89	1.0	1	0.4
19	1 STEP ZZ	EYE HOOK JOIN & LOCKING	0.75			80	64	1.49	2.0	2	0.7
20	BT	BARTACK AT CASING*4,SIDE*4,WING*4,APEX*2	2.10			29	23	4.17	4.0	4	2.1
21			0.40			150	120	0.79			0.4
		SEWING SMV =	12.33				**SEWING MO :**		28.0	30	
22	Packing	PACKING				#DIV/0!	#DIV/0!	#DIV/0!	0.5	1	#DIV/0!
23	Exam	CHECKING				#DIV/0!	#DIV/0!	#DIV/0!	2.0	2	#DIV/0!
		TOTAL COSTED SMV =	12.33				**TOTAL MP :**		30.5	33	

SERIAL NO	DESCRIPTION	SMV	MANPOWER 28MC	14MC	MC
1	Total Sewing (S) :	12.33	0	0	0
1	Total Bonding (B) :	0.00	0	0	0
2	Total Manual (M) :	0.00	0	0	0
3	Total Pressing (P) :	0.00	0	0	0
4	Total Exam (E) :	0.00	2	2	2
5	Total Packing (PK) :	0.00	1	1	1
	TOTAL SEWING =	12.33	0	0	0
	GRAND TOTAL =	12.33	3	3	3

MACHINE REQUIREMENT				COMMENTS
MC TYPE	28MC	14MC	MC	
4TOL	0	0	0	
SNLS	11	0	0	
DNLS	4	0	0	
BH	0	0	0	
1 STEP ZZ	5	0	0	
3 STEP ZZ	2	0	0	
3TOL	1	0	0	
FL R EDGE CUTTEI	0	0	0	
FL FB TS	0	0	0	
BT	4	0	0	
BA	0	0	0	
SNEC	0	0	0	
FL FB BINDING	3	0	0	
FL CB TS	0	0	0	
FL RINGER	0	0	0	
FL HEM CUTTER	0	0	0	
FS	0	0	0	
DNCS	0	0	0	
SNAP BUTTON	0	0	0	
KANSAI	0	0	0	
IM	0	0	0	
MANUAL	0	0	0	
TOTAL M/C =	30	0	0	**Prepared By** / Incharge (Costing) — **Approve** / Manager
GRAND TOTAL =	30	0	0	

3.5.1 Operation Breakdown Chart -01

SL No	OPERATION	M /C Type	SMV
1	CENTER MAKE	SN	0.40
2	SIDE CRADEL BASTING	SN	0.75
3	SIDE SEAM	SN	0.45
4	ELASTIC ATTACH AT BOTTOM	ZZ	0.70
5	TOP WING ELASTIC ATTACH	ZZ	0.50
6	TOP WING TOP STITCH	ZZ	0.75
7	CENTER BINDING LOOP MAKE	FL/BINDING	0.40
8	CUP OUTER DIRT MAKE	OL	0.45
9	CUP OUTER DIRT TOP STITCH	SN	0.45
10	CENTER JOIN	SN	0.50
11	FIXNET ATTACH AT CUP BOTTOM	SN	0.40
12	SILING PART JOIN AT CUP	SN	0.55
13	CENTER TOP BINDING	FL/BINDING	0.20
14	ELASTIC ATTACH AT CUP NECKLINE	ZZ	0.60
15	CENTER LOOP MAKE	FL	0.55
16	CENTER BONE CHANNEL	DN	0.50
17	SIDE BONE CHANNEL	DN	0.50
18	CUP SETTING	SN	1.30
19	WIRE CASE	DN	0.90
20	HOOK & EYE JOIN	ZZ	0.75
21	HOOK & EYE LOCKING	ZZ	0.75
22	APEX LOOP BARTACK	BT	1.21
23	WIRE BARTACK	BT	2.10
24	SHOULDER BARTACK	BT	2.10
25	BONE BARTACK	BT	1.20

TOTAL SMV =12.33

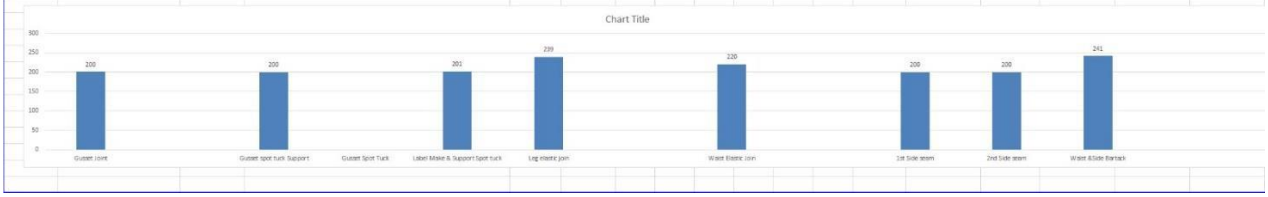
3.5.2 Operation breakdown sheet style -02

OPERATION BREAKDOWN

Style No:		ZI-2845,28-AW,AM,BI,BJ,BL,AS,BE,AM,BM,AL							SKETCH		
Buyer :		ZIVAME									
Description :		PANTY									
Color :											
Season :											
Version :		BULK									
P. Category :											
Machine SMV :		3.75									Date C
Carder :		28	14				10%				Date Up
75%	Team Target	336	168	0							Date R
No	**Machine Type**	**Operation Description**	**SMV**	**Operation Status**	**Attachmnt**	**OP Target @100 %**	**Minimum TGT To Achieve**	**28 Theoritical Loading**	**MC Actual MO**	**Layout MCN**	
1	4TOL	FRONT & BACK GUSSET JOIN	0.55			109	93	3.62			
2	4TOL	BOTH SIDE SEAM	0.40			150	128	2.64			
3	3TOL	ELASTIC JOIN AT LEG	0.75		DEVICE	80	68	4.94			
4	FL CB TS	ELASTIC TOP STITCH AT LEG	0.70			86	73	4.61			
5	3TOL	ELASTIC ATTACH AT WAIST	0.45		DEVICE	133	113	2.96			
6	SNLS	ELASTIC & LABEL TACK AT WAIST	0.35			171	146	2.31			
7	FL CB TS	ELASTIC TOP STITCH AT WAIST	0.45			133	113	2.96			
8			0.10			600	510	0.66			
9							0				
		SEWING SMV =	3.75				**SEWING MO :**		0	0	
22	Packing	PACKING				#DIV/0!	#DIV/0!	#DIV/0!	0.5	1	
23	Exam	CHECKING				#DIV/0!	#DIV/0!	#DIV/0!	2.0	2	
		TOTAL COSTED SMV =	3.75				**TOTAL MP :**		2.5	3	

Capacity Study Style-02

LINE NO	6B	STYLE :	P227994	SMV		3.75			POSSIBLE OUTPUT			200		STUDY BY		
BUYER:	KIK	ITEM:	Panty	M/C		15			EFF%			83%		DATE		
S/L	OPERATOR NAME	ID NO	OPERATION NAME	M/C	Process SMV	CYCLE TIME					AVG. TIME	WITH ALLOWANCE %	PROCESS CAPACITY	Process Eff	Working Time(min)	Balance Capacity	EXISTING POSSIBLE CAPACITY
						1	2	3	4	5							
1	Aysha		CG	OL	0.1	10	9	11	9	10	9.80	10.78	204	34%	58.67	204	200
2	Dulali		Gusset Joint	OL	0.28	22	21	20	21	22	21.20	23.32	43	20%	279.22	200	200
3	Bilkis			OL	0.28	22	21	20	21	20	20.80	22.88	157	73%	76.10		200
4	Kamrunnahar		Gusset spot tuck Support	SN	0.45	23	24	25	22	23	23.40	25.74	31	23%	385.24	200	200
5	Arfina		Gusset Spot Tuck	SN	0.45	20	19	20	18	20	19.40	21.34	169	127%	70.98		200
6	Kamrunnahar		Label Make & Support Spot tuck	SN	0.1	12	13	11	13	12	12.20	13.42	201	34%	59.51	201	200
7	Sathi		Leg elastic join	FL/RSC	0.48	25	26	27	25	28	26.20	28.82	125	100%	95.85	239	200
8	Anjuman			FL/RSC	0.48	28	29	28	29	30	28.80	31.68	114	91%	105.37		200
9	Ronjila		Waist Elastic Join	FL/RSC	0.3	22	20	23	21	23	21.80	23.98	150	75%	79.76	220	200
10	Mou			FL/RSC	0.3	22	25	23	23	24	23.40	25.74	70	35%	171.22		200
11	Tanjila		1st Side seam	OL	0.2	17	16	16	17	16	16.40	18.04	200	67%	60.00	200	200
12	Rina		2nd Side seam	OL	0.2	17	15	17	16	17	16.40	18.04	200	67%	60.00	200	200
13	Rimu		Waist &Side Bartack	BT	0.32	26	28	25	26	28	26.60	29.26	123	66%	97.32	241	200
14	Bashona			BT	0.32	28	26	28	29	28	27.80	30.58	118	63%	101.71		200
15	Sonia		Label Tack	SN	0.2	16	17	16	17	16	16.40	18.04	200	67%	60.00	200	200
PREPARED BY: IE DEPT.									P.O								PM



3.6 Calculation

$$Target\ Hourly = \frac{60}{\text{SMV}}$$

$$Line\ Daily\ Target = \frac{60+\text{No of worker}}{\text{Total GMT SMV}}$$

3.5.1 Bellow analysis is subjected to following supposition for style-01:

1	No. of worker (operator and helper)	28
2	Factory Efficiency	70%
3	Working hour	10
4	Total GMT SMV	12.33

$$Day\ line\ target = \frac{60+\text{No of worker}+W/H}{\text{Total GMT SMV}}$$

$$= \frac{28*10*60}{12.33} \times 70\%$$

Pcs day target = 953 pcs

Target per hour = 95 pcs

3.5.2 Bellow analysis is subjected to following supposition for style-02:

1	number of employees (helpers and operators)	14
2	Factory Efficiency	70%
3	Working hour	10
4	Total GMT SMV	3.75

$$Day\ line\ target = \frac{60+\text{No of worker}+W/H}{\text{Total GMT SMV}}$$

$$= \frac{14*10*60}{3.75} \times 70\%$$

Pcs day target = 1568 pieces

Target per hour = 157 pieces

3.7 Basic Pitch Calculation

3.7.1 Basic Pitch time calculation for style -01

Here,

No of operation = 28

Total SMV = 12.33

So,

$$Pitch\ Time = \frac{\text{Total GMT SMV}}{\text{No of operation}}$$

$$= \frac{12.33}{28}$$

$$= 0.44$$

$$\text{Upper Control Limit} = \frac{\text{Pitch time}}{\text{Expected efficiency}}$$

$$= \frac{0.44}{70\%}$$

$$= 0.58$$

3.7.2 Basic Pitch Time Calculation for Style -02

Here,

No of operation = 14

Total SMV = 3.75

So,

$$Pitch\ Time = \frac{\text{Total GMT SMV}}{\text{No of operation}}$$

$$= \frac{3.75}{14}$$

$$= 0.26$$

$$\text{Upper Control Limit} = \frac{\text{Pitch time}}{\text{Expected efficiency}}$$

$$= \frac{0.26}{70\%}$$

$$= 0.18$$

$$\text{Lower Control Limit} = (2 \times \text{Pitch time}) - \text{UCL}$$

$$= (2 \times 0.26) - 0.18$$

$$= 0.34$$

3.8 Bellow analysis is subjected to following assumption:

3.8 Bellow analysis is subjected to following assumption for style -01

i	Number of employees (helpers and operators)	28
ii	Factory Efficiency	70
iii	Working hour	10
iv	Total GMT SMV	12.33

$$\text{Day Line Capacity} = \frac{60+\text{No of worker}\times W/H}{\text{Total GMT SMV}} \times Efficiency$$

$$= \frac{28\times10*60}{12.33} \times 70\%$$

$$=953\text{pcs}$$

$$= 95 \text{ pcs}$$

Line labour productivity =Total number of outputs per day per line/Number of workers worked

$$= 953/28$$

$$= 34$$

Factory capacity = {(work hour × total workers × working day × 60) / SMV} × Efficiency

$$= \{(10\times950\times26\times60) / 12.50\} \times 70\%$$

$$= 841362$$

3.9 Line Balancing:

Line balancing refers to how necessary jobs are distributed more evenly among employees, which shortens wait times.

We must concentrate on the following facts and information for line balance:

1. The quantity of operators.
2. Title of operation.
3. SMV Operations

3.9.1 Line Balancing for Style -01

Efficiency Calculation

SMV = Basic time + Allowance

Basic time= Observe time ×Rating

Observe time (1part) = 30, 31,32,33,30

$= 156$

$= \frac{156}{5}$

$= \frac{31.2}{60}$

$= 0.52$

$\text{Rating} = \frac{\text{SMV}}{\text{Observe time}} \times 100\%$

$= 96\%$

Basic time = Observe time × Rating

$= 31.2 \times 96\%$

$= 30$

$= \frac{30}{60}$

$= 0.5$

SMV=Basic time + allowance

=0.5+ 0.075 (0.5 at 15%)

=0.57

$$\text{Target}=\frac{\text{working hour}\times\text{man power}}{\text{SMV}}$$

$$=\frac{10\times60\times40}{26}$$

=923.07 (100% target)

=923.07×80%

=738 for 10 hour

$$\text{Efficiency}=\frac{\text{production}\times\text{SMV}}{\text{workich hour}\times\text{man power}}$$

$$=\frac{738\times26}{10\times60\times40}\times100$$

=79%

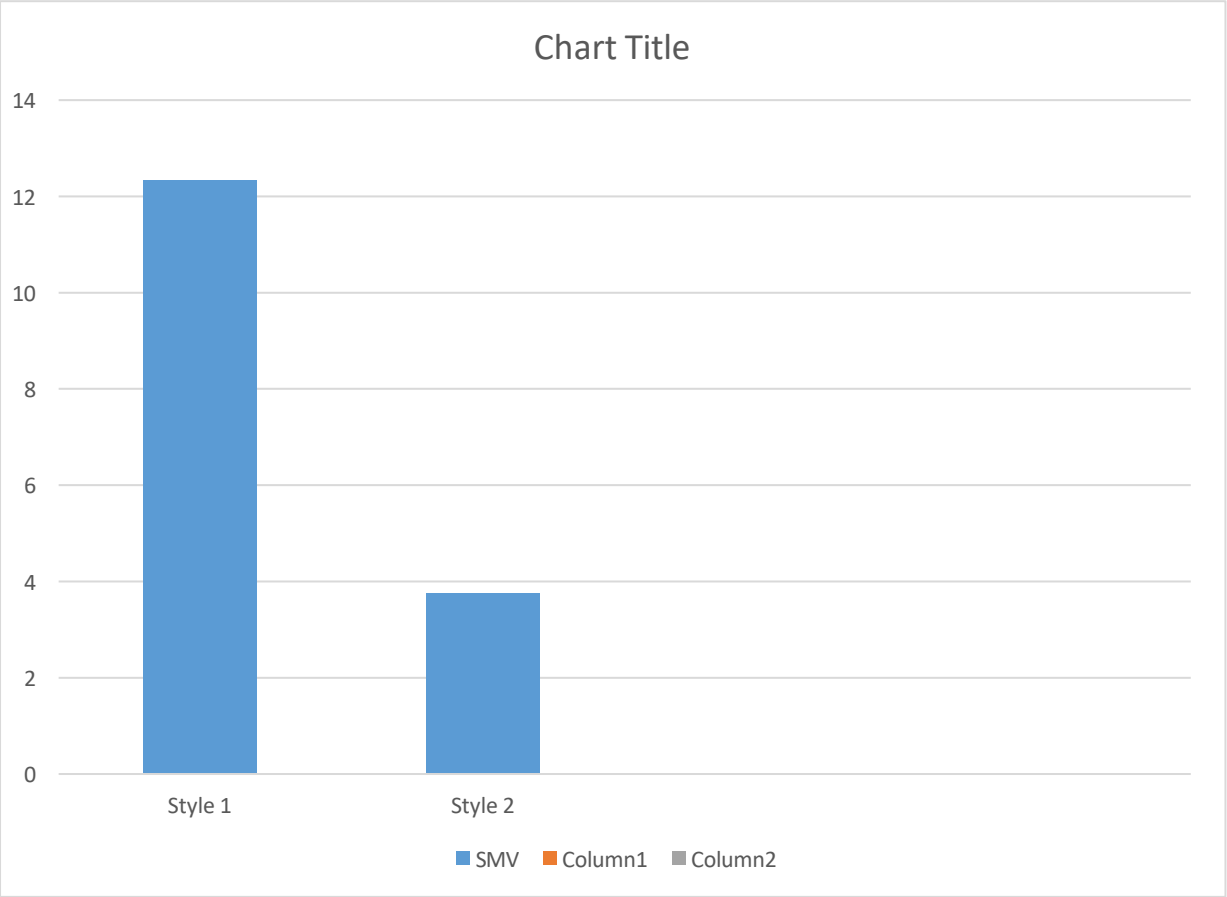
CHAPTER 4:

RESULT & DISCUSSION

4.1 SMV

Displays a comparison of two styles in SMV

Style number 1's SMV is 12.33, while style number 2's SMV is 3.75.



Graph fig 4.1: SMV

4.2 Line efficiency

Based on the graph, the line efficiency of style no. -1 to 70%

The graph indicates that style no. -2's line efficiency is 59%.

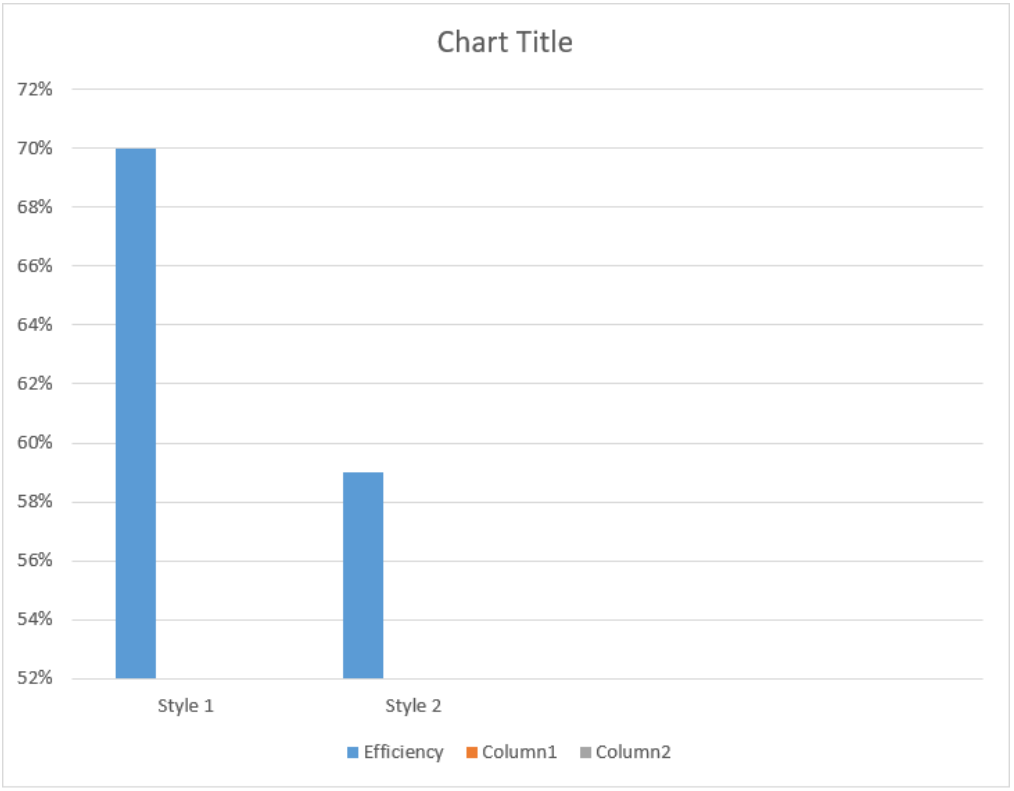
1. Style No. 2 machine breakdown is lower than Style No. 1 machine breakdown.

2. Style No. 1 is well-balanced, but less so in other situations.

3. Strong manufacturing quality in style no. 1 and lower performance in style no. 2 that follows

4. Operators in style number 2 appear to possess less knowledge than those in style number 1.

5. While plant no. 1 is good style, plant no. 2 isn't.



Graph fig 4.2

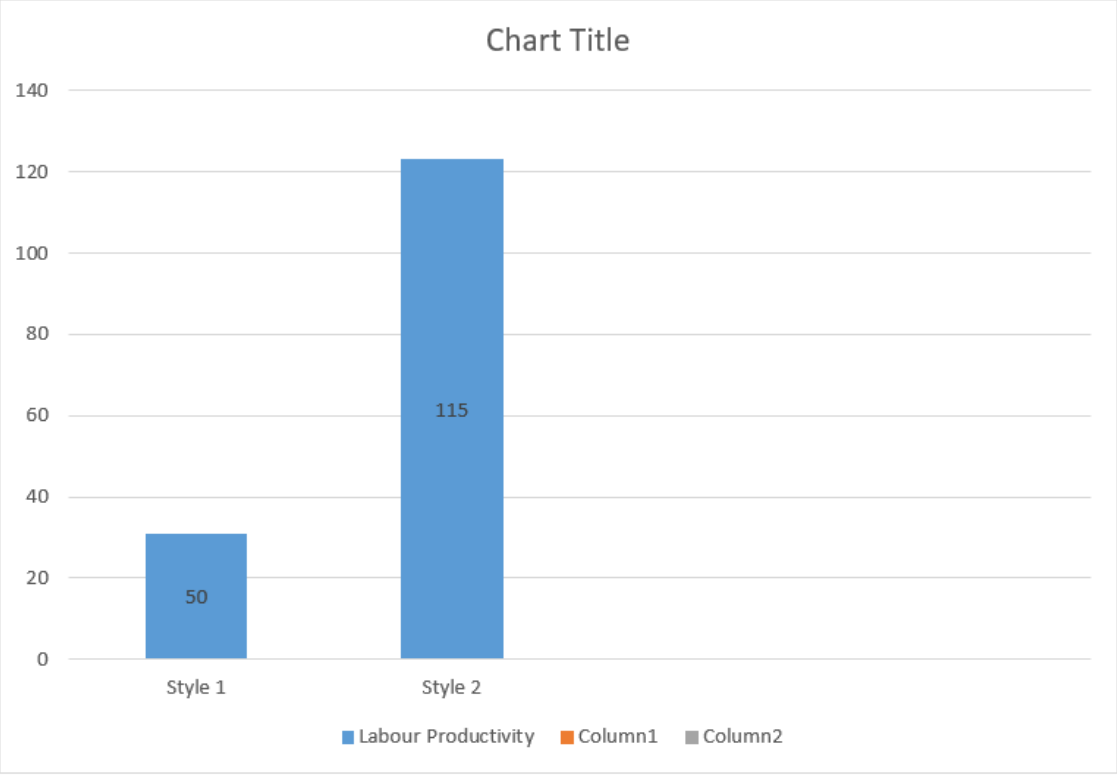
4.3 Labour productivity

The graph indicates that Style No. 1's labor productivity is 31 pieces.

The graph indicates that Style No. 1's labor productivity is 123 pieces.

1. Employees wearing style number two pants are far more alert to the task, yet style number one pants are more extravagant.

2. Less machine failure at style number 2, but a large breakdown at style number 1



Graph fig 4.3: labour productivity

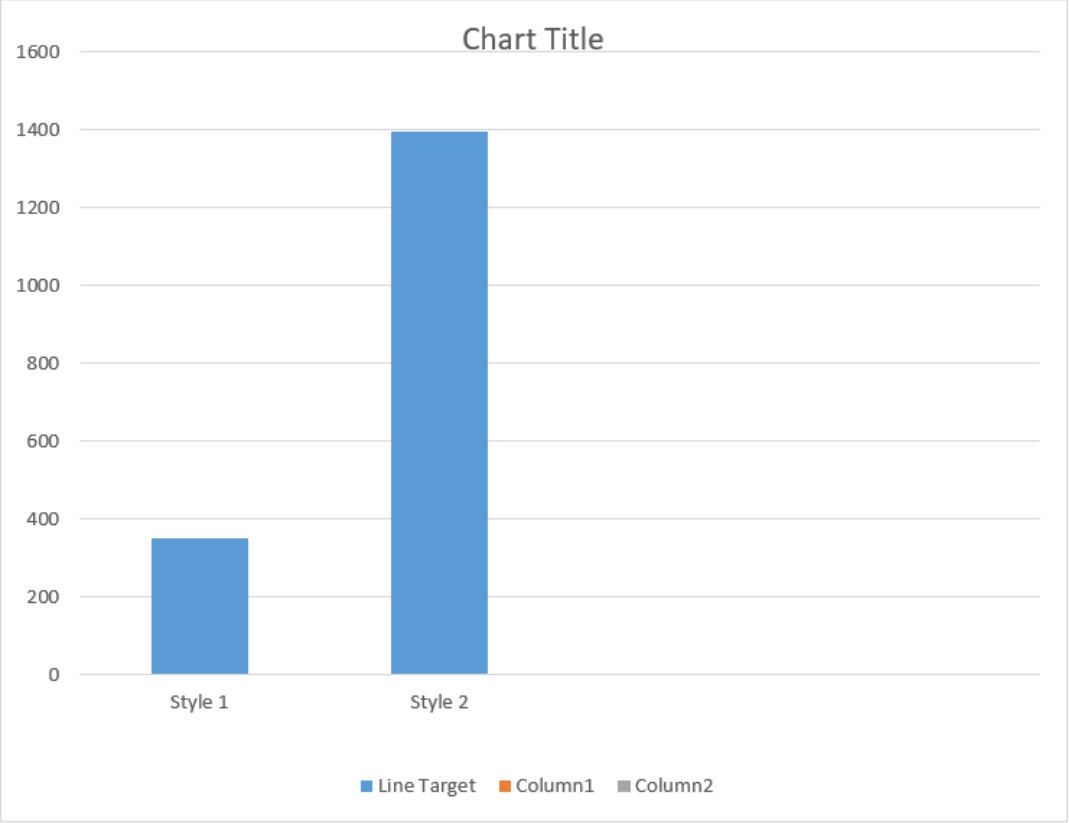
4.4 Line target

The graph indicates that the style no. -1 line target is 351 pieces.

The graph indicates that the style no. -2 line target is 1394 pieces.

1. Style No. 1 features an extra portion, but Style No. 2 has a well-planned plant layout.

2. Another key aspect is that Style No. 1 has a greater rate of machine breakage.



Graph fig 4.4: line target

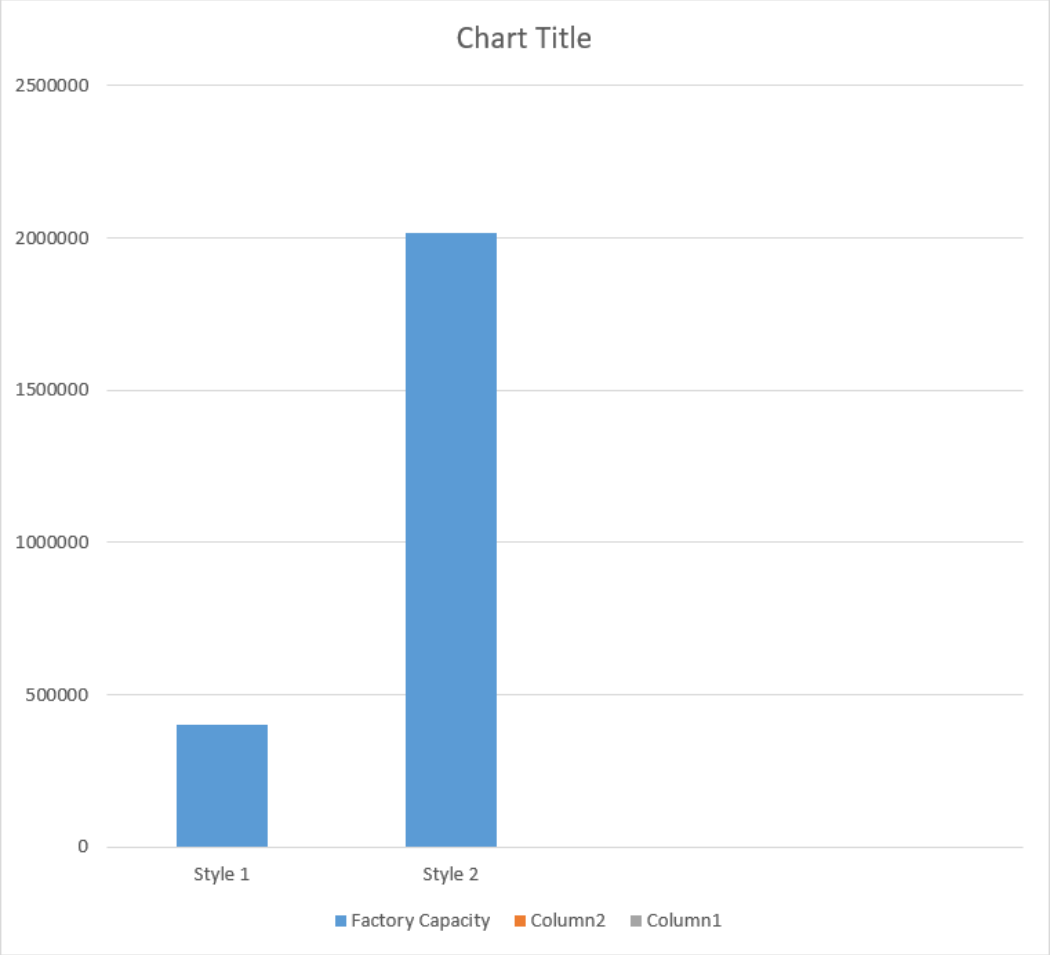
4.5 Factory capacity

The graph indicates that the 402331 pieces are the line goal of style no -1.

According to the graph, the line objective for style no. -1 is 2,016,730 pieces.

1. Compared to other styles, style no. 2 area is significantly larger overall.

2. Style number two uses more machinery than Style number one.



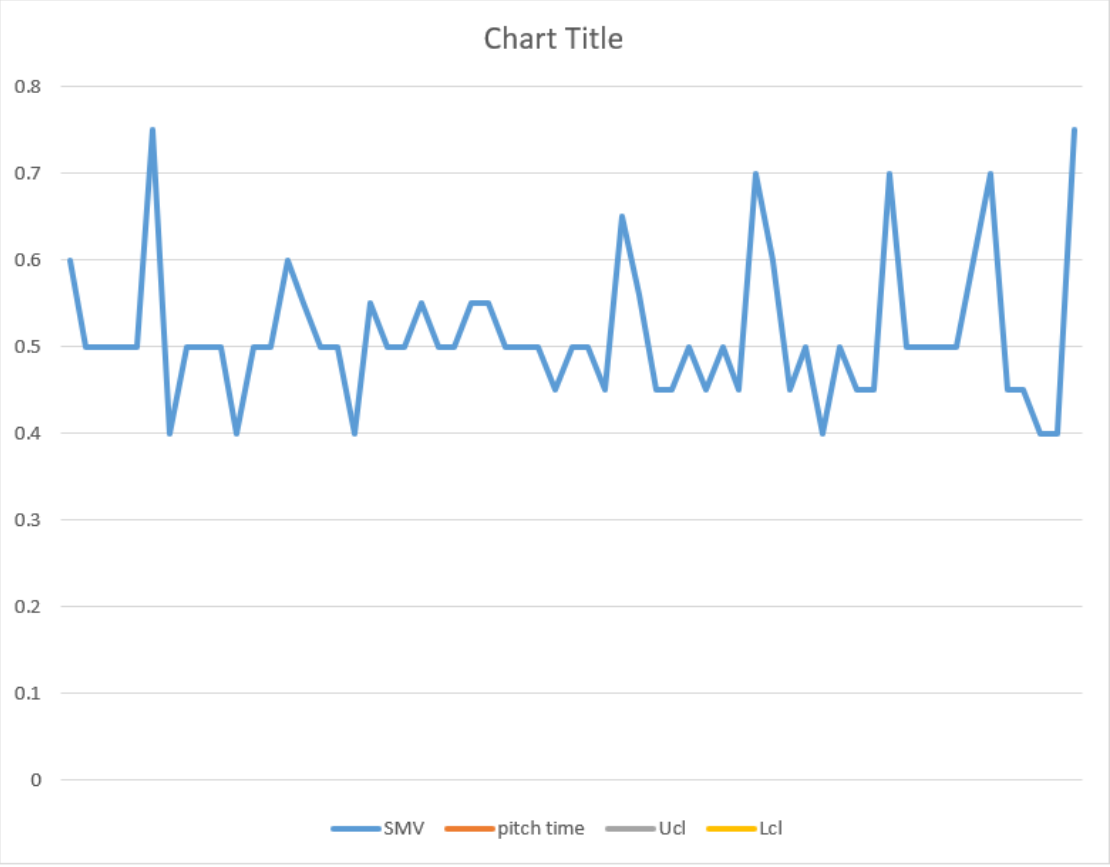
Graph fig 4.5: Factory capacity

4.6 Time Study

4.6.1 Result style no-1

I estimate the mean instead of taking processing time while using a timer. Since attaching ranking, I have had simple time. I earned style no. 1 SMV of 12.33 and no. 2 SMV of 3.75 after adding a baseline allowance of fifteen percent.

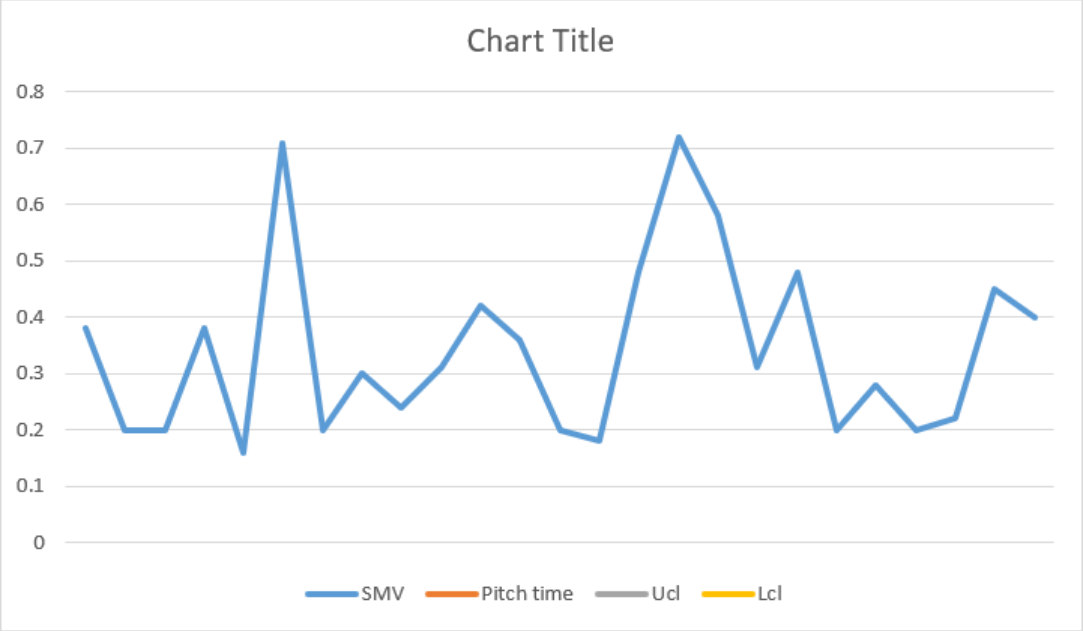
Next, we measured pitch time = 0.52 for style no. 1, higher control limit = 0.61, and lower control limit = 0.43.



Graph fig 4.6.1: pitch time Result

4.6.2 Result style no-2

The measurements for style no. 1 were then made with pitch time = 0.30, upper control limit = 0.35, and lower control limit = 0.25.



Graph fig 4.6.2: Pitch time result

Discussion

A certain procedure, such as style no. 2, must be built before we can increase output to the level of style no. 1 (income companion systems have increased).

2. High-caliber theoretical and technological device architecture and execution.

3. Establishing consistency, cost, and time standards.

4. Selecting and evaluating suppliers.

5. Analysis based on numbers and math, such as organizational studies.

6. Establishing infrastructure, such as machines, construction sites, and buildings.

7. Stock, system configuration, and enhancement for development scheduling and management.

CHAPTER 5:

CONCLUSION

Conclusion

Modern apparel manufacturing relies heavily on industrial engineering, which is a fundamental component of the sector's operations. I've gained a wealth of knowledge and unique insights into industrial engineering processes through this endeavor. In addition to shedding light on a number of industrial engineering difficulties, this project has given me useful task-management and problem-solving skills.

Distribution logistics, daily production targets, manufacturing capabilities, and layout optimization are just a few of the important obstacles that the apparel sector has historically faced. I now have a better knowledge of how these difficulties are optimized and managed thanks to this experiment.

Investigating these facets has been insightful, and it is evident that industrial engineering is essential to successfully navigating these obstacles. This trip has highlighted how important careful planning is.

-In style number one, the standard minute value (SMV) is equal to 12.33.
-We have counted the objective = 953 pieces in style no 1.
-Pitch time = 0.44, higher control limit = 0.58, lower control limit = 0.30 with style no one.
-The factory capacity for style no. 1 is 841362 units.
-Style number one indicates that the line efficiency is seventy percent.

Increased production capacity, line balance, and daily line targets are introduced after industrial engineering and planning. In addition, it makes it possible for us to adjust to the current situation and deepen our comprehension of the apparatuses, acquisition system, development process, generation structure, and material organization.

6. References

Books

1) Maynard's Industrial Engineering Handbook 4th Edition by William Hodson. ISBN-13:978-0070410862

2) The story of Industrial Engineering 1st Edition by Adedeji B. Baidu. ISBN-9781138616745

3) Handbook of Industrial Engineering: Technology and Operation Management, Third edition by Gavriel Salvendy PH.D. ISBN: 97804713330578

4) Introduction to Industrial Engineering by Avraham Stubs, Yuval Cohen 2nd edition. ISBN: 9781138747852

Website Links

1) https://www.up.ac.za/industrial-and-systems-engineering/article/45515/activities-of
2) https://ordnur.com/apparel/roles-of-industrial-engineering-in-garments-
3) http://industrialengineeringnotes.blogspot.com/2012/02/industrial
4) https://txm.com/what-is-lean-
5) https://www.mcl.bz/blog/5-best-practices-for-implementing-lean-
6) https://www.creativesafetysupply.com/qa/lean-manufacturing/what-are-lean-
7) https://www.nibusinessinfo.co.uk/content/advantages-and-disadvantages-just
8) https://onlinegarmentsacademy.blogspot.com/2019/08/operation-bulletin-smv-layout
9) http://work-study.info/basic-procedure-of-work-
10) http://work-study.info/the-qualities-and-qualification-of-work-study-