Faculty of Engineering

Department of Textile Engineering

REPORT ON

"Study on Industrial Engineering in Woven Short Pant & Knitting T- Shirt Production"

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

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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

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LETTER OF APPROVAL

Jan 3, 2023

To

The Head,

Department of Textile Engineering

Daffodil International University

Dattapara, Ashulia, Dhaka

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

Dear Sir,

I am just writing to let you know that this thesis titled as “Study on Industrial Engineering in Woven Short Pant Production’’ have been prepared by the student bearing ID: 201-23-953, 201-23-781 and 201-23-897 is completed for final evaluation. The whole report is prepared based on the factory data with required belongings. The students were directly involved in their project report activities and report become vital to spark of many valuable information for the readers.

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

Yours Sincerely

Abdullah Al Mamun

Associate Professor

Department of Textile Engineering

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Daffodil International University

DECLARATION

The thesis entitled “Study on Industrial Engineering in Woven Short Pant Production’’ is conducted under supervision of Abdullah Al Mamun, an Associate Professor of textile engineering at textile department, (DIU). We declare that the written submission report is our own original work and best of our knowledge. This report has not been currently submitted to any candidate for any other degree or diploma.

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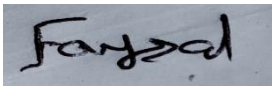
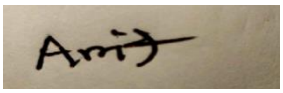
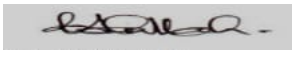
Faysal Ahamed	201-23-781	
Mo. Arif Mondol	201-23-897	

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

Supervisor



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ABSTRACT

The ready-made garments (RMG) of Bangladesh has got a more preponderant facet than any other sector in terms of growth foreign exchange earnings. This project is on “Study on Industrial Engineering in Woven Short Pant Production’’. This paper inaugurates the various concepts utilizing method, time, limit and production study, it is conceivable to increase productivity while diminishing wastage. Work study took a record the actual individual capacity of per worker. We have enrolled the existent cycle time to per worker for each and every worker and helper to invent the ideal number minute of worker, category of machine, particular capacity. To find out style no:1, the standard minute value (SMV)=18.91, in additional to that we have counted the target=1269, pcs, pitch time=0.44, upper control limit=0.51, lower control limit= 0.37, efficiency=100%, manpower= 40, capacity=1078pcs, labour productivity. This paper addressed pants dimensions sheets for men, structure and procedure malfunction schedules, SMV estimate for each operation. Goal period calculation, command maximum, efficiency reduction, system wise capability, as we other research information methods and tools.

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CHAPTER- 1: INTRODUCTION

1.1 Background of the study

Bangladesh is a developing country, now a days the industrial sector is playing a vital role in continuous developing process in this country. The textile and clothing industries are the single source of Bangladesh's rapidly developing economy. Efficiency is more essential for sales in the garments industry. There is a great need for proper machine, manpower and system consumption. Proper use of raw materials by eliminating waste can be more effective for clothing industry. Reduce lead time and wasted time. Good use of time would offer a lot of benefits to the textile industry. The team of industrial engineers will make a lot of it.

1.2 Objective of the study

The purpose of this report is specific, we are working on certain target. They are,

1. To get some answers about the correct organizational framework for quality.
2. The application of a particular response to clear or decreasing deformation.
3. The purpose behind string distortions and its fixes.
4. Designing a new quality management approach.

1.3 Importance and scope of the study

1. To know about the changed technique and performance and how the garment industry's production is working to rise.
2. Knowing about the-activates of the department of industrial engineering in textile sector.
3. To understand the effect of the department of industrial engineering on development.
4. To know productivity, capacity, efficiency gained by applied method.

1.4 Limitation of the study

- Limitation of time looking for this subject
- Limitation of primary data sources.
- Input and output problem.
- Change the style and arrangement.

CHAPTER-2: LITERATURE REVIEW

2.1 Industrial Engineering

The main function of this department is to re- Engineering the garment of the sampling phase so that it is a friendly production for production also contributes to increase the Productivity through the layout of the machine, the study of time and movement. In the sewn products industries, we must continually make sure we remain competitive and profitable while also seeking to improve our personal standard of living and community. Productivity improvements can be achieved.

2.2 History of industrial engineering

The history of industrial production and engineering encompasses a large period in the evolution of engineering and technology. This article presents the history of industrial production and engineering thanks to the contributions of Stalwarts. Industrial production and engineering played an important role in the society's advanced advancement and economic growth over the centuries. Although the evolution of production and industrial engineering is a slow process over the years, it has accelerated from the era of the pre-industrial revolution in England from 1730. The mechanization of production processes during the Industrial Revolution is a historic event for its growth. The formal start of industrial production and engineering can be associated with the pioneering work of F.W. Taylor. In the 20th century, the focus was on the optimization of resources. With the advent of Industry 4.0 in the 21st century, industrial engineering uses the best use of digitization and automation.

2.3 What does an industrial engineer do?

Industrial engineers generally perform the following:

- Examine production schedules, engineering specifications, process flows and other information to understand manufacturing and service methods.
- Determine the manufacture of parts or products or provide services with maximum efficiency.
- Develop management control systems to make financial planning and cost analysis more efficient

- Save quality control procedures to solve production issues or minimize costs
- Work with customers and management to develop design and production standards
- Design control systems to coordinate production activities and planning to ensure that products meet quality standard
- Proceed to customers of product specifications, purchasing providers, manufacturing capabilities and project status personal

2.4 Activities of industrial engineering

The industrial engineer is involved in activities such as:

- The planning, design and implementation of process and manufacturing equipment.
- The design and management of a quality improvement and control program.
- The development and implementation of performance measurement standard.
- The planning and execution of a program to improve productivity.
- Management and control of a new technology development program.
- The design and operation of a hardware planning system.
- The development of mathematical models for system analysis.

2.5 Objectives of industrial engineering

1. Stimulate efficiency.
2. Improvement of the method by reducing movement.
3. Reduce process work (WIP) and remove the bottleneck.
4. Increase the performance of the service.
5. Offset of the man-machine report.
6. Improving price, waste and rejection processes MINIMIZE waste and defects.
7. Fill out the main performance indicator of the main objective (KPI).
8. Secure the workplace and the environment.
9. Planning and initiation of production.

2.6 Function of an industrial engineer

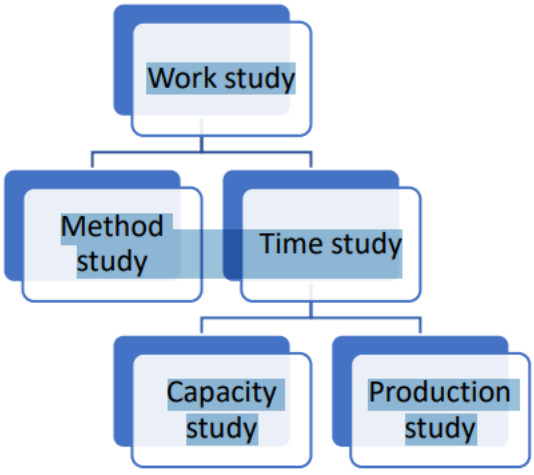
Industrial engineering typically many roles that help manufacturing and service operations at increase the efficiency, safety and health of workers. Industrial engineering functions can be organized in different ways of meeting the needs of a business. The main group that includes the profile of their participation:

1. Measure of work.
2. Preparation of installations and inventory management.
3. Regulation of statistical accuracy.
4. Planning and production management.
5. Analyse processes and simulation machine.
6. Human capital.
7. Health on work
8. Engineering facilities.

2.7 Steps of work Study:

The work study is the main part of industrial engineering. Work study divided into two parts

1. Method study
2. Time study.



Calculation types of industrial engineering

The industrial engineer is the key to a manufacturing industry. They always use certain technique to improve the organization and these techniques are as follows.

1. **Time study:** this is a tool used for setting up a regular time for work or operation.

2. **Study of the method:** after a careful examination of the work, to establish a standard of execution of a work or activity and establish the architecture of production facilities to provide a uniform flow of material without rear tracking.

3. **Movement economy:** this is the approach used to optimize manual production work and reduce the exhaustion and repetitive movements of the worker. This method is the same as the study processes, but movements are observed in depth here.

4. **Value Analysis:** This is the technique in which the production process is studied and then Non-value added duration, untimed procedures and unnecessary production costs are reduced.

5. **Production, planning and control:** The preparation of resources such as men, materials and the machine in development requires this technique. Appropriate planning and follow-up of manufacturing operations to achieve the quantity and quality required.

6. **Work study:** Work study combo of time study and method study.
   (Work study=time study + study of the method)

7. **Inventory control:** This is the approach used to balance the inventory because we know that the excess inventory is waste and a company receives many benefits by managing stocks, such as improved efficiency, productivity, quality and free cash.

8. **Operational Research technique:** Operational research is the problem methodology resolution and decision making. The different techniques used or this technique are LLP, the simulation models, network analysis.

9. **Ergonomics:** Human engineering is also called ergonomics. With regard to ergonomics, any new improvement of the workstation or the office should be accomplished.

10. **Employment Assessment:** This is a strategy in which the good word or the right work must be attributed to the right operator according to the competence of the operator. Employment assessment helps to improve the labour productivity and increase the rate of production.

11. **Material handling analysis:** In order to obtain better production and efficiency, the least of the moment of material is required. The analysis of material manipulation prevents excessive movement of the Equipment.

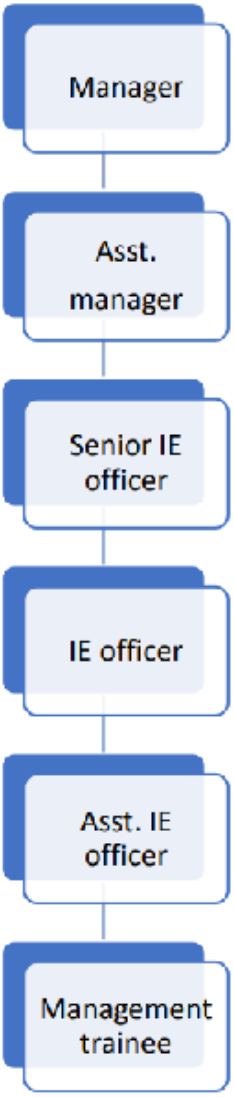
IE Job profile

It is barely for a few years that the market for and industrial engineer had increased several times. The explanation is that and industrial engineer can do a lot to improve the efficiency of society. But the new student of the Educational Institute has obtained a minimum knowledge of an industrialist job profile of the engineer. At the factory, full work is mastered by working. There is a range of instrument and techniques used by industrial engineers to produce an effective product.

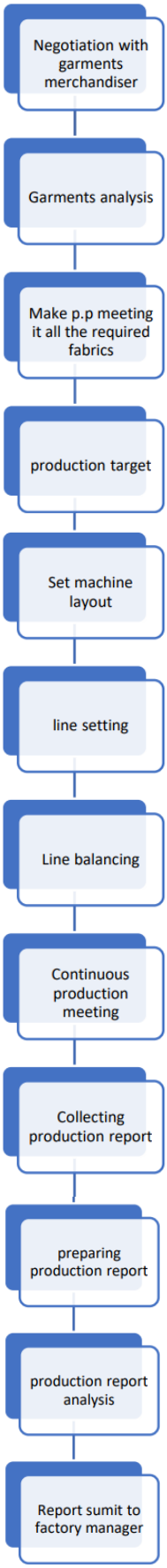
1. Awareness of several sewing production systems.

2. Knowledge of all types of sewing machines whose nee sof the company need.
3. Time study (cycle time)
4. Analysis of the movements of the operation
5. Decompose operation
6. Preparation of the OB
7. Calculation of Sam
8. Configured line
9. Estimation of production of a line
10. Work sampling
11. Method study (sewing movements of an operation)
12. M/C layout and layout
13. WIP control
14. Capacity study
15. Balancing the line
16. Performance note
17. Cost estimate of garment
18. Calculation thread consumption
19. Incentive schemes

2.10 Organogram of IE department



2.11 Process flow chart of Industrial Engineering



2.12 Industrial Engineering Tools

1. Lean manufacture
2. 5s
3. JIT (just in time)
4. Kanban
5. Kaizen.

2.12.1 Lean Manufacturing

Lean production is a systematic setting for disposal, without compromising efficiency, from waste of a production system or a flow of value. The value flow includes all sources of operation and knowledge that occurs between the producer of raw materials and the client possession. Lean making when it is well done can have o major effect on the bottom line, like Toyota showed that it is “The Toyota Way” operation model of the 1930s. The lean principles aim to recognize the waste present in almost all organizations and if possible, minimize or fully eradicate. The estimated acronym shows the 8 forms of waste that should be targeted by manufacturer skinny.

1. **Defects:** Retravailler / Rescue and waste will contribute. It is without a doubt the most expensive of waste, especially if the consumer receives a defective product.

2. **Overproduction:** it produces more items than requested, possibly create an inventory lack and waste hours of work that can be used somewhere.

3. **Pending:** These are many forms. The most remarkable, can be a line closure when waiting for replacement of parts or equipment. Finally, when an employee has to wait

for a computer to be treated before it can take the next step in the process, there is being treatment is being processed. There is a pending process that takes place.

4. **Not to use peoples talents:** It is a waste of their talents and when it comes to innovation, it could return a manufacturer. This could also contribute to the loss of skilled workers who have discovered that their skills could be better used elsewhere.

5. **Transport:** It is carried out in the manufacturing process, from the supply chain to the distribution of goods and within the particular area of production.

6. **Inventory:** There are five main categories: finished products, substructures, raw parts, office supplies and repairs, maintenance and repair and service (MRO)

7. **Movement:** Flex, Scope, Height and Wald Included. Easy to use as tools between the workstation will result in a lot of unnecessary movement.

8. **Excess processing**: occurs when times are spent on goods that do not affect the functionality of the components. For example, it is not essential and unnecessary to paint a part that is not seen if it still works properly without paint.

2.12.2 5s

5s is a structured method for the managements of the work station based on the concept of improvement. Working conditions, which leads to better goods, 5s is the most popular term, which has it evolved and developed over time such as lean manufacturing in Japan. This method uses five prayers, each starting with an S, to find waste forms to eliminate.

The five ss are the following:

1. **Sort:** Remove any disaster or disorder at work by elimination something that is not necessary for a specific job.

2. **Set in order:** Organize everything that is behind organizing and marking carefully. Use components and equipment.

3. **Shine:** Keep an environment free of dust, dirt and other problems.

4. **Standardize:** To ensure optimal productivity, follow uniform procedures in all shifts.

5. **Hold:** The processes must be placed in place to make sure that the other 4 are still pursued and it is not a one-time project.

Examples 5s

1. **Sort:** Fields have been sorted and redundant fields removed.

2. **Define in order:** On the basis of stakeholder feedback, the fields have been configured in the command.

3. **Shine:** The team shone in creating a Microsoft Access database to avoid duplication of the entrees.

4. **Normalize:** Preserving and making it a prototype, the tablet was standardized.

5. **Sustain:** Microsoft Access (for Duplication Data Management and Data format) and Microsoft Excel the models have built a freestanding frame (to control the spreadsheet size and command).

2.12.3 Jit (just in time)

Just in time is the management strategy that monitors inventory flows to and from a company, reduce inventory levels and increase the performance of the production process. The strategy is to organize. Command of raw materials so that the products are only requested for production when necessary.

Advantage of Jit.

1. Avoid excess production.
2. Reduced waiting times and traffic costs.
3. Saving resources through improved manufacturing process.
4. Capital reductions that tied.
5. Dispense from the obligation of inventory.
6. Product defect decreased.

2.12.4 Kanban

Kanban is planning framework of lean production. Kanban is the term “Bill Board” means and was invented for the first time and employed by the industrial engineer Taiichi Ohno to In Toyota.

2.12.4.1 The advantages of Kanban

1. Fleeting.
2. Improvement of performance.
3. A team with more emphasis.
4. Delete excess production.
5. Best control inventories.
6. Licer/ seamless workflow.

2.12.5 Kaizen

Kaizen is a word of improvement or continuous improvement. Two Japanese terms have described Kaizen: Kai, which means “Shift” and “Z” which means good. In the 1980s, Toyota launched Japanese philosophy for the first time and was embraced by thousands of companies around the world since. This minor transition promotes a culture of change that improve quality, productivity and profitability gradually.

2.12.5.1 Benefits Kaizen

1. **Objectives dignified:** Kaizen is not only useful for the organization as a means of change. This too helps workers, customers and the entire society.

2. **Improved coordination:** Improved coordination is one of the main advantages. Kaizen is a platform led by a quality management team.

3. **Kaizen develops leadership expertise:** Each kaizen team needs a team leadership. The team leader organizes and directs the execution of the kaizen team.

4. **Improvement of efficiency:** Improved quality is a great advantage of kaizen. Kaizen improvements improve the efficiency of the service.

5. **Waste reduction:** Kaizen has eliminated the waste process waste. It’s another big benefit of kaizen. The responsibility of everyone from kaizen.

6. **Better security:** Improving the workplace safety is a corporate company kaizen. When companies adopt ideas that clean and organize workspace, security is improved.

2.13 Work study

The measurement approach is a common term for the strategies used in all their contexts, in particular in the analysis of the methodology and the work calculation, which actively lead to the examination of all variables that affect the strategic and operational objectives of the circumstance being examined in order to progress.

2.13.1 Father work study

The founder of the work study is FW (Frederic Winslow), a tailor named science father of management. Does the United States need many weapons shortly during the Second World War? Mr. FW Tailor then applied the principle of the study to produce a result in a short time and many weapons.

2.13.2 Technical of the work study

There are two work study techniques:

1. **Study of the method:** The technique is a methodology study that studies that systematically collects and analyses current and potential work processes to create and apply methods are simpler and more efficient and minimize costs.

2. **Work measure:** The work assessment is the use of the technique designed to define the time required for a new qualified worker to complement a particular task at a given level of performance.

2.13.3 Steps involved in the work study

The work study is a systematic review of the methods of carrying out activities such as resources can be used effectively and performance standards are developed.

A complete work analysis consists of eight phases. They are,

1. **Select:** The duty to be investigated.

2. **Register:** By extracting information from the device and through constant supervision.

3. **Examine:** Through the question, the objective the process and the work design.

4. **Develop:** Modern techniques focused on the contribution of the parties involved.

5. **Evaluate:** The results of reasonable options.

6. **Installation:** Last approaches and preparation.

7. **Maintain:** Develop monitoring method.

8. **Define:** There are alternative ideas and results.

2.13.4 Personal qualities of the work study engineer

A work study engineer must be honest, polite, expert, confident, personal dignity. To the work man of work must have the following essential qualities.

1. **Sincerity and honesty:** The participant of the workplace must be genuine, truthful and trust and respect for those with whom he will work.
2. **Enthusiasm:** He or she will only take care of the job. Accept the value of whatever he or she does to people around it.
3. **Interest and sympathy with people:** The individual must be able to interact with people at all levels are essential to participate in their opinions and understanding the reasons behind your behaviour.
4. **Tact:** The reason why people face them are because they understand and do not want their feelings to be harmed by insensitive or non-deep terms, although they are rational.
5. **Good appearance:** This inspires confidence among those for those who work. The individual he must be safe, clean and effective.
6. **Confidence in itself**: It can only be done with adequate preparation and work experience. The employee must be able to face administration, bosses and union leaders.

2.13.5 Function of study engineering work.

1. **Study of the method:** Area configuration, tools, fixing machinery, analysis of elements, productive and division of ineffective time, management and movement, contingency, improvement of work, improvement of work efficiency, better methods of work, reduction of work time and larger needles.

2. **Work measurement:** Cycle check, rating observed time, SMV, BMV, rating, study of time, production study, standard time setting and sampling.

3. **General sewing data (GSD):** Process research and production within GSD time by methodology study to eliminate unimportant task.

4. **Breakdown and design:** Breakdown of the operation, process series, time setting, loose flow, design or no opportunity, time setting, selection of operatives and staff.

5. **Consumption:** All steps such as ropes, threads, links, belts, thicels, elastic, Velcro, fabric, etc.

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

2.13.6 General function

1. **SMV & production plan:** The manufacturing plan is calculated by SMV and revised.

2. **Report:** SMV estimates and quality updates, capacity, production, output report, reward calculate, will benefit computing and administration important details as necessary, compare, plant and row capabilities. Manufacture of the plant.
3. **Maintain history:** Normal productivity analysis data, reception, goods, effectiveness, progress, quality, objective and objective.

4. **Data centralization:** Command and central planning through groups of all information collection.

5. **Multi experience:** Simple level of acceptability and consistency, cutting, regular repairs, markers, specimen, survey process and shipping.

6. **Save materials:** Defence against wire abuse that can be calculated as threads. Chain, lock and ribbon, like button buttonhole and blocker, extractor, capture and zipper are also included in all categories.

7. **Expert reserved**: To support another as a restricted specialist, if applicable.

8. **Motivation:** Employment, coaching, infrastructure, optimization of life and technology.

2.13.7 Steps involved

1. Evaluate your demands, evaluate each style.

2. The fashion evaluation focuses on:
   - ✓ Quantity of the requested workforce.
   - ✓ Product quality of the production plant
   - ✓ Machinery offered
   - ✓ Expedited driving period
   - ✓ Density to remain manufactured

3. Experiments and adequate inspection are used to establish depending on the sample.

4. It seems that the technicians of the clothing seem to be:
   - ✓ Machinery needed.
   - ✓ Quantity, difficulty and series of operations
   - ✓ Indicate greater and skill

5. Breakdown on the procedure: The work is divided into operational activities for each style. The breakdown is a list of sequences of all assemblies of activities of a garment for each aesthetic.

6. Technical skill of clothing each procedure to improve its effectiveness and quality or to develop methods to ensure the efficiency of accurate operators and reliable articles.

2.13.8 Standard time and destination configuration

Most organizations should not use conventional time systems; your goals are based on the assumption and practice. Configure standard hours and develop adequate manufacturing processes is essential to improve efficiency. This must be understood by any organization that wants succeed in the future. That graph shows directly the advantages to plant productivity if it is normal times and procedures have been well.

2.13.9 Method analysis

Most organizations use bad approaches, workers have the way to do their jobs, settle in the amount of sewing, mixes unnecessary, packaging and unpacking materials, additional management. Bursts these gestures lead to the time it is taken to deliver and can be removed. A process the analysis can be done in a market or even based on any type of production process. Suitable approaches analysis will increase efficiency at a minimum of15%.

2.13.10 Workplace design

Administration is required to be a large number of computers that are practicable in installation, limiting the space for new strategies. There is always enough capacity between the teams. To the successful design of the workplace eliminates excessive movements and fatigue that dramatically improved the performance of the driver. Take a look at the photo and reflect on productivity with that you can operate 8 hours per day.

2.13.11 Organization segment

Many manufacturing facilities operate and without a number scheduled or specified steps. This is a vital step in the development of textiles, and an error or negligence will result in significant losses in time, material and performance for the manufacturer later.

2.13.12 Work aids and attachment

There is an inadequate use of labour support and accessories. There are many modern and attachments and affordable directories that are constantly created, which are essential for maintain a process of performance improvement. There are many modern and affordable. Attachments and directories that are constantly created, which are essential to maintain a quality improvement.

2.13.13 Observation of the operator

Half of the companies studied were no way to meet expectations, so they do not know there they are. Nor is there precise calculation, but its performance is well thought out, and it is not of course if you would be able to compete until you have better supervision and strategies for quality improvement in potential.

2.13.14 Cycle checks

Could be achieved by comparatively novice workers, a basic methodology addressed to evaluate operator's ability against real production, which is a significant aid to improve factory efficiencies. No organization conducts cycle controls. The following table shows the style contrast1 and style 2 (without department studies in different fields of clothing production. The following figure defines the manufactures.

2.14 Study method for clothing operation

1. **Selection of work:** Many roles or function separated from most of the activates. First step is to choose the work that will provide you with the highest yields for the time you spend.

2. **Record the facts:** Before elimination the process or technique, enough information with respect to the current system, it must be collected. This would be to make sure that the project is conserved during an impartial history.

3. **Critically examine the facts:** It is an essential step in the art the details collected it is verified and by section of the task is carefully evaluated to decide whether the following sections they include.

    - ✓ Combine with some other work element
    - ✓ Deleted completely
    - ✓ Linear incentive
    - ✓ Modified to minimize your work material

4. **Develop the new method:** Update and create a new structure or protocol, process, the chosen solution is used. Test executions may be required to evaluate viability. It is safer if necessary to carry out those experiments in a location outside the office.

5. **Install the method:** The decision must be made before the installation of the new technique:
    - ✓ Advance of the improvement of the manufacturing process.
    - ✓ Products are requested.
    - ✓ The scope of mobilization must be determined
    - ✓ Maintain current coherence and research requirements
    - ✓ Implementation of the new protocol for recording.

6. Maintenance of the method: After the implementation of a system, the transition seems to be slow down due to slight modifications of technicians or managers. For the identification of any changes, a linear programming model is required.

2.15 Study of time for clothing operations

2.15.1 Definition of time study

Time work is a method of work calculation, to document the times while performing a certain task or component, also for the evaluation of the date to obtain the time required for do it at any output rate for a worker.

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. Enter any description with a marker in research documents as it cannot be deleted
5. 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 average user
- ✓ The estimated volume of work
- ✓ Use the best type of work.
- ✓ For full preparation.
- ✓ A regular day of the day.

A significant factor to achieve a production objective is that all will reduce the capital in compliance with your own experience. More than any operation with less capacity makes more income. An objective for production establishes critical areas for estimation. Technology is a work goal of ordinary people with peaks are doing more, while those under the medium have less.

SAM: Standard assigned minute

Also known as SMV: Standard minute value

Time required for an activity, fully qualified average output if a correct approach is used and the efficiency reaches an appropriate standard.

Grading the time study

The time research agent analyses the results, since each worker is different. The actual result is linked. At a beginning of 100%. The objectives of the process of three things.

Competition: Sharpness and worker synchronization.

Effort: How complicated is the worker and during the survey?

2.15.3 How to carry out the time study?

A cycle includes the processing of the material, the arrangement and the arrangement of parts, clamping, seams, building and ropes. Take the original activity in separate components based on the action pattern with period's analysis format. For example, work components can be in action "Collar run stitch"

- ✓ Sew the second sewing collar,
- ✓ Collect the first clipping board
- ✓ Turn the collar to sew the third seam
- ✓ The following pending parts and
- ✓ Monitoring of employment and elimination.

Step 1: Preparation

- ➢ It will choose the research activity of time.
- ➢ Prepared with paperwork, such as work time design, automated stop watch and pencil
- ➢ Tell the user who needs time to execute the operation.
- ➢ Evaluate the activity closely and separate into pieces.

Step 2: Time capture: Now register the amount required for the supplier to complete each time of the operation cycle. The tracking suit is expected to be seized. Also, by successive 5 operation cycle, get component time. When the collection data, perusived, the stop see mostly in note and then determine the duration of the appearance

Step 3: Calculation of basic time: The time required for each factor with the five cycles is set reading (R) last dedication of literacy of simple reading. For each part, summarize the time of five cycles. Remember, no cycle would be 4 when you delete any reading. Average component times are measured. It is called simple time this average time.

Step 4: Standard time calculation: You must divide it by an efficiency ratio of the workers to translate a simple time to the standard. Here, for example, a 100 % rating was taken. Now it has incorporated supplies of the system, exhaustion and personal situation, etc. connect only the equipment assignment to certain items when the machine works and personal specifications and personal specifications are added to any item. We must have predetermined time in seconds for any function. Abstract all the time simple and transform the seconds in minutes. It's called SAM minutes.

Steps in the time study

1. Have a workers best work approach
2. He chose the correct work process
3. Evaluate the potential of workers and the initiative
4. The manufacturers time for the best operation process
5. To enable periods that the worker is not sewing the device, apply regular work assignments
6. Allow the expected user period foreseen 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

2.15.5 Design of workplace

The design involves the distribution for the production to the real worker of the row by taking into account the general knowledge of the worker, the total experience of the machinery and the forms of the machine. The physical structure that allows to manufacture at least the merchandise at least the unit cost in the fastest possible way is fine.

Development procedure

1st Step:

1. The person involved with the design.
2. APM
3. Chief of execution of tasks
4. Person of work analysis.

2nd Step:

1. Choose a line
2. To select style
3. Confirm the entire operator.

3rd Step:

1. MAX SMV for the calculation
2. Choose between and computer number
3. Average approximate SMV/ operator to be determined
4. Installing the machine as needed.
5. To choose the best operator according to the quality of the correct procedure.
6. The process must be in the course of the future.

Profit of the design:

1. In general there is no unusual way of neck on the line.
2. The distribution/ work of the mechanism is very close.
3. You can reliably meet the quality level of the buyer.
4. There will be no idle worker.
5. Within so little time, you can hit the maximum lens.

2.15.6 Line balance

The line balance is described as the arrangement of systematic machinery or task assignments and sewing lines to helps ensure a constant output and minimize inactive time. In the textile industry, the balance of the line is classified according to the style and design of sewing machinery. The structure of the line of the sewing machine is determined by what type of clothing do.

Importance of balancing line:

1. It is better for each operator to delegate these activities.
2. The line balance helps capture the modern style machine.
3. The strong line balance increases the output rate.
4. The distribution of products in the negotiated quality for the expenses of the list is possible in the correct time.
5. The proper line balance can guarantee the benefit of the factory.
6. The appropriate line balance ensured that the negotiated standard occurred optimally.
7. Eliminates failures with the final product.

2.15.7 Capacity study

When e do an operator capacity analysis, we calculate your efficiency if you are always in the same rate and uses the same approach as the study. At the conclusion of the study, we can suppose that perhaps the user can be a worker of 120%, or what is the degree of success the study it implies.

What else do they say for talent precisely? Well, that is equivalent to the same as time ability. This ensures that the operator can reach the efficiency of the study.

2.15.8 Breakdown of the operation

The breakdown is a collection of items for the contents of a job. Any piece and variety of the activities are made of clothes. Breakdown means that full clothes are found behind the other in according to the system process for the entire procedure. It is important to write in addition to each method the approximate SMV and the shape of the machine.

Transaction breakdown procedure

1. The leader of a floor area, technical and research squad administrator should sit around breaking off.

2. The technician cuts the garments to bits and eliminates the items one by one.

3. The SMV of this activity is then increased by the work assessment officer and the head of the floor section.

4. Once the whole process is complete, it must recapitulate all SMV processes and the SUM is named SMV as the corresponding clothing.

Benefit of the breakdown

1. I would see all clothing activates at the same time.

2. You will find simple, easy and tedious things to dispose.

3. You can predict the problems of a crucial activity.

4. You can recognize the volume styles or equipment that produce the necessary fabric.

5. It may be aware of the consistency of the buyer's standard.

6. Easy to choose the correct operator.

2.15.9 Bottleneck

The tallest narrow section of a bottle is considered an obstacle, a neck, which corresponds to a wide part of the bottle and a narrow part of the neck. It is a figurative scenario that obstructs manufacturing. In a manufacturing market, manufacturing is interrupted by natural production. It flows, this is a drastic point. Bottleneck in a manufacturing industry means loss of output and financial losses, for example, with the slights manufacturing capacity.

1. Bottleneck before the entry online / group

1. The problem of source delays

2. MCD / store inaccessible problem

3. Poor production of problem

4. Inconsistency / error of the problematic series.

5. Question of trends.

6. Unreliable machine.

7. Question 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. Colour road.
11. If someone gets sick.

Difference of bottleneck

1. When performing the cycle verification: The measurement method is very simple and precise as well as the best technical means of location, the bottle of a diagram made of the results of the cycle inspection. The intense monitoring time position that an operator needs is the bottle point that is above HPT line even if the BPT line.
2. When verifying the counter machine: When testing the counter unit, where even the output was impoverished, it is easy to discover the boot and the stage. This method can be done per hour or within an early amount of time.
3. When observing the collection of supply: The region or position in which the distribution stack is detected is the bottle point or the area. Most workers receive a pile of food, so next to it and the opposite of the operator can rest and look like a bottleneck.
4. When observing the serial number of problems supplied: Both operators generally do their work similarly to the series / number of methods and if someone or any worker considers that now the little ones the serial number of execution problems may not vary fairly from another operator, therefore, it is established bottleneck point.

Method of removal of bottlenecks

1. Productions costs.

2. Have a structure before feedback.

3. Timely programming of preproduction meetings.

4. Check the materials and accessories before emitting.

5. Join that schematic sheet on time for repairs.

6. Choose the appropriate operator to do the correct work.

7. Pattern test in row before the problem.

8. Try to reduce overload of the excess task of the operator, find energy.

9. Assign the assignment according to the generated standard value

10. Establish a better system instead of bad method by reviewing the method.

11. Reduction of the time / task of inadequate development.

12. Keep the series of jobs.

13. Can not the goods be rejected?

14. Maintain action over time.

15. Discrepancy should not be communicated.

16. The demand must be provided after the inspection.

17. If the quality defect material is not transmitted.

CHAPTER-3: METHODOLOGY

3.1 Data collection

We collect our experience data in a different section of a woven garment plant. First we collect data from the industrial engineering section, then we collect data from merchandising section and sampling section. We also collect data from the line where we work our research. And we obtain information from the production manager.

3.2 Production Information

Style 1

Buyer: Speedo USA

Line: 8

Style: GM17778316S23

Tgt: 125 pcs (100%)

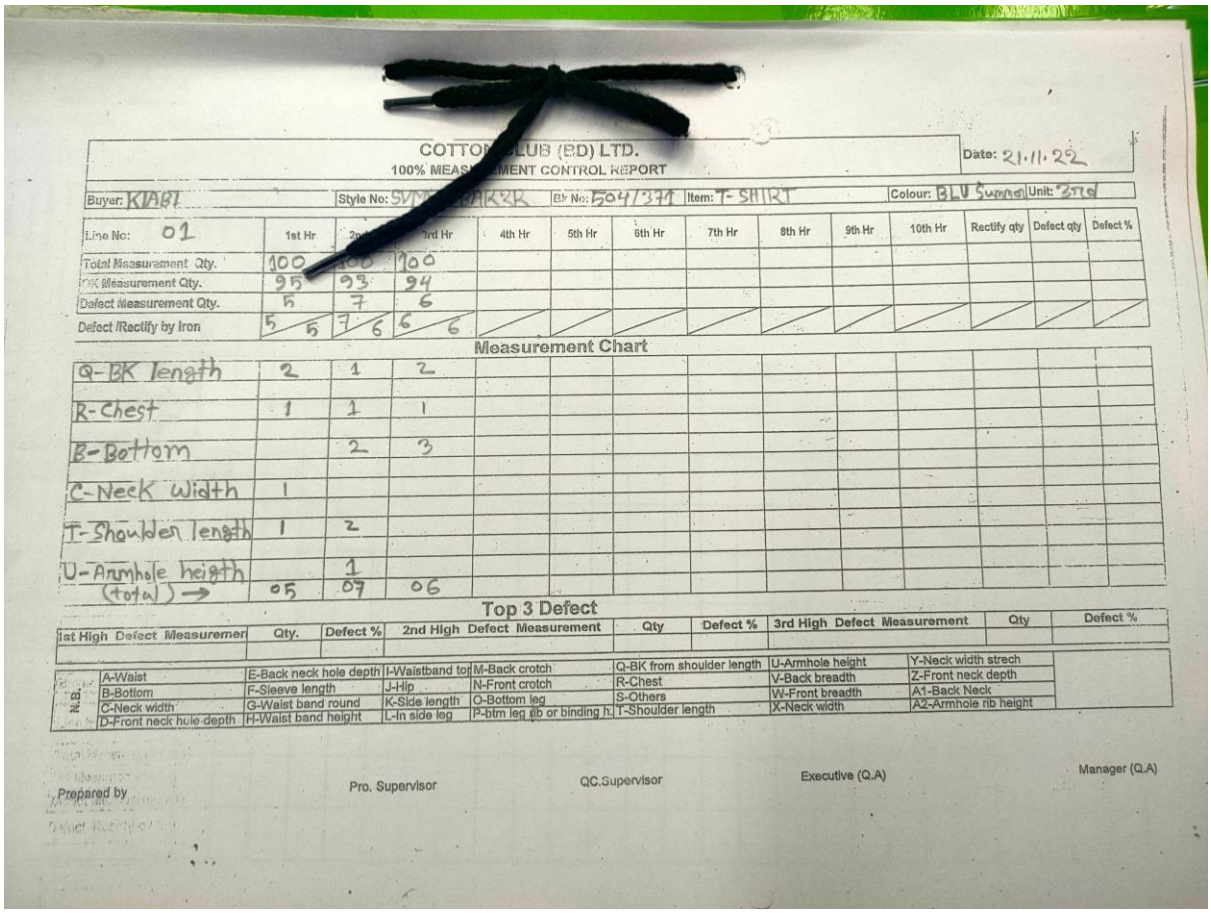
3.3 Product Sketch

3.4 Measurement Sheet

3.4.1 Measurement sheet no 1

LAGBE

3.4.2 Measurement Sheet No 2



COTTON CLUB (BD) LTD.
100% MEASUREMENT CONTROL REPORT

Date: 21.11.22

Buyer: KIABI | Style No: SUM[illegible]ARER | B/ No: 504737 | Item: T-SHIRT | Colour: BLU Summer | Unit: 3TQ

Line No: 01	1st Hr	2nd Hr	3rd Hr	4th Hr	5th Hr	6th Hr	7th Hr	8th Hr	9th Hr	10th Hr	Rectify qty	Defect qty	Defect %
Total Measurement Qty.	100	100	100										
OK Measurement Qty.	95	93	94										
Defect Measurement Qty.	5	7	6										
Defect /Rectify by Iron	5 5	7 6	6 6										

Measurement Chart

Q-BK length	2	1	2										
R-Chest	1	1	1										
B-Bottom		2	3										
C-Neck width	1												
T-Shoulder length	1	2											
U-Armhole height		1											
(total) →	05	07	06										

Top 3 Defect

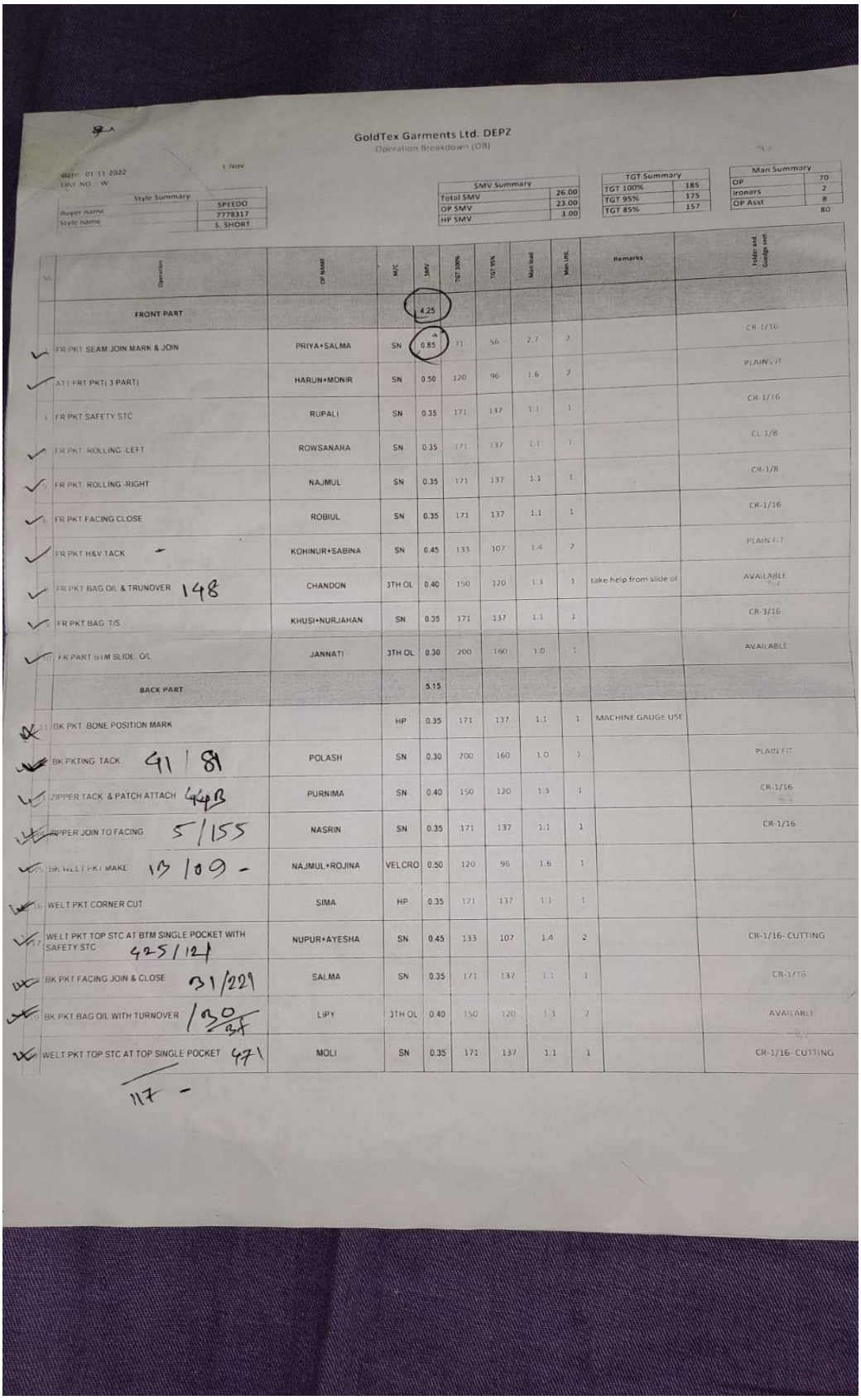
1st High Defect Measurement	Qty.	Defect %	2nd High Defect Measurement	Qty	Defect %	3rd High Defect Measurement	Qty	Defect %

N.B

A-Waist	E-Back neck hole depth	I-Waistband top	M-Back crotch	Q-BK from shoulder length	U-Armhole height	Y-Neck width strech
B-Bottom	F-Sleeve length	J-Hip	N-Front crotch	R-Chest	V-Back breadth	Z-Front neck depth
C-Neck width	G-Waist band round	K-Side length	O-Bottom leg	S-Others	W-Front breadth	A1-Back Neck
D-Front neck hole depth	H-Waist band height	L-In side leg	P-btm leg rib or binding h	T-Shoulder length	X-Neck width	A2-Armhole rib height

Prepared by | Pro. Supervisor | QC.Supervisor | Executive (Q.A) | Manager (Q.A)

3.5 Capacity Study



GoldTex Garments Ltd. DEPZ

Operation Breakdown (OB)

Date: 01-11-2022 | 1 Nov
LINE NO : W

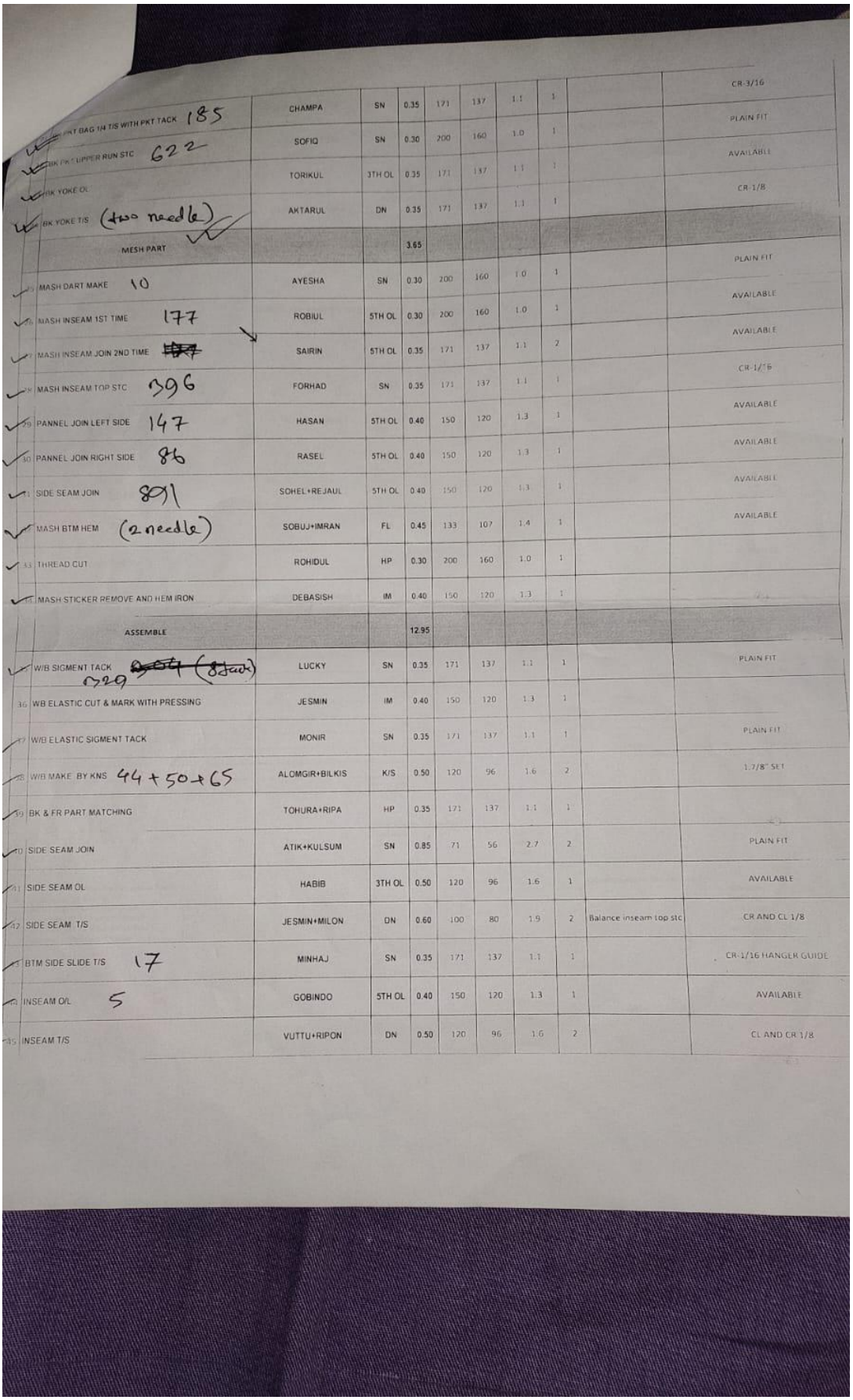
Style Summary	
Buyer name	SPEEDO
Style name	7278317 S. SHORT

SMV Summary	
Total SMV	26.00
OP SMV	23.00
HP SMV	3.00

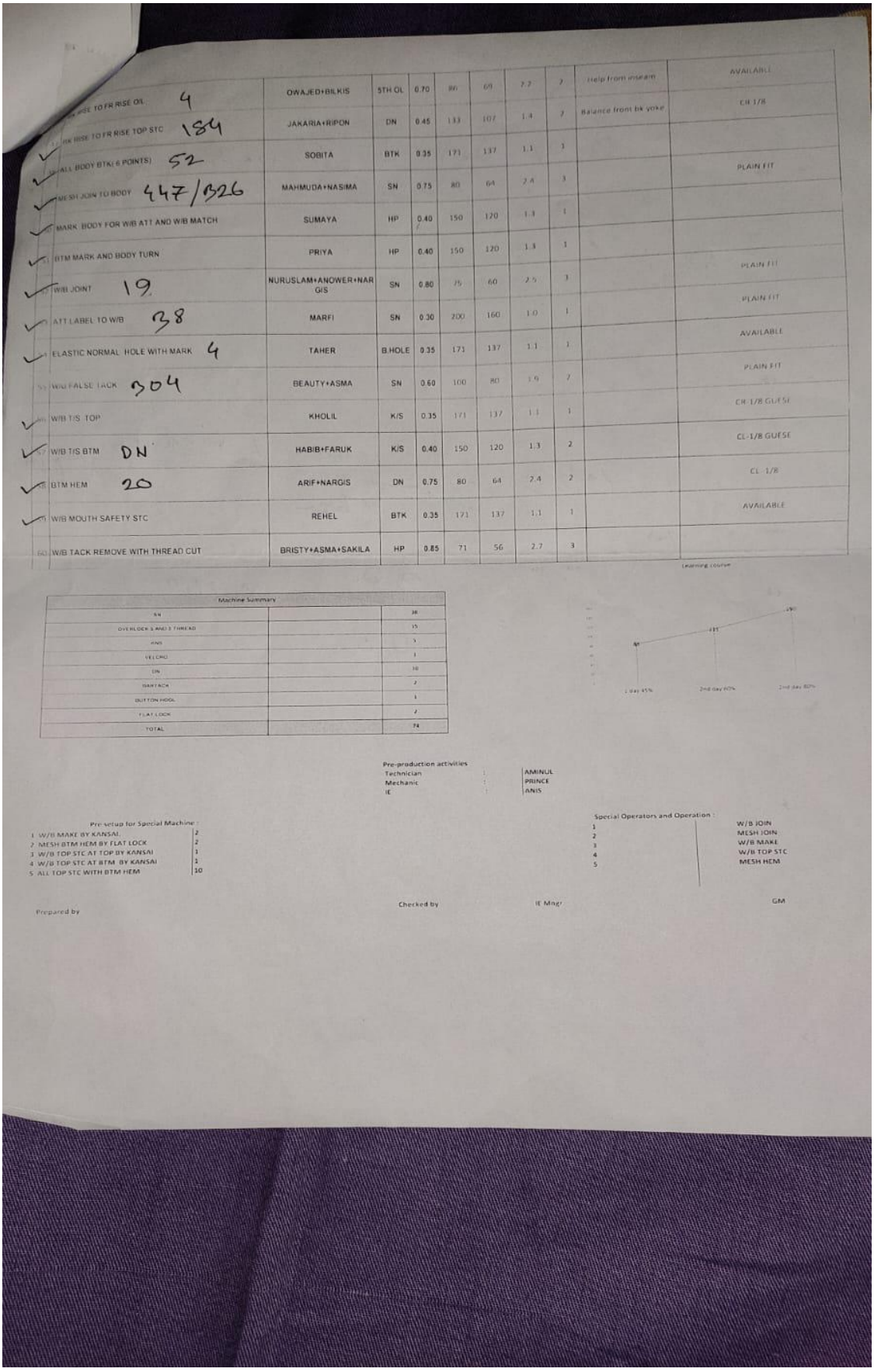
TGT Summary	
TGT 100%	185
TGT 95%	175
TGT 85%	157

Man Summary	
OP	70
Ironers	2
OP Asst	8
	80

SL	Operation	OP NAME	M/C	SMV	TGT 100%	TGT 95%	Man load	Man UNIL	Remarks	Folder and Guidge used
	FRONT PART			4.25						
	FR PKT SEAM JOIN MARK & JOIN	PRIYA+SALMA	SN	0.85	71	56	2.7	2		CR-1/16
	ATT FRT PKT(3 PART)	HARUN+MONIR	SN	0.50	120	96	1.6	2		PLAIN FIT
	FR PKT SAFETY STC	RUPALI	SN	0.35	171	137	1.1	1		CR-1/16
	FR PKT ROLLING LEFT	ROWSANARA	SN	0.35	171	137	1.1	1		CL 1/8
	FR PKT ROLLING RIGHT	NAJMUL	SN	0.35	171	137	1.1	1		CR-1/8
	FR PKT FACING CLOSE	ROBIUL	SN	0.35	171	137	1.1	1		CR-1/16
	FR PKT H&V TACK	KOHINUR+SABINA	SN	0.45	133	107	1.4	2		PLAIN FIT
	FR PKT BAG OIL & TRUNOVER 148	CHANDON	3TH OL	0.40	150	120	1.3	1	take help from slide oil	AVAILABLE
	FR PKT BAG T/S	KHUSI+NURJAHAN	SN	0.35	171	137	1.1	1		CR-3/16
	FR PART BTM SLIDE OIL	JANNATI	3TH OL	0.30	200	160	1.0	1		AVAILABLE
	BACK PART			5.15						
	BK PKT BONE POSITION MARK		HP	0.35	171	137	1.1	1	MACHINE GAUGE USE	
	BK PKTING TACK 91 / 81	POLASH	SN	0.30	200	160	1.0	1		PLAIN FIT
	ZIPPER TACK & PATCH ATTACH 448	PURNIMA	SN	0.40	150	120	1.3	1		CR-1/16
	ZIPPER JOIN TO FACING 5 / 155	NASRIN	SN	0.35	171	137	1.1	1		CR-1/16
	BK WELT PKT MAKE 13 / 09 -	NAJMUL+ROJINA	VELCRO	0.50	120	96	1.6	1		
	WELT PKT CORNER CUT	SIMA	HP	0.35	171	137	1.1	1		
	WELT PKT TOP STC AT BTM SINGLE POCKET WITH SAFETY STC 425 / 124	NUPUR+AYESHA	SN	0.45	133	107	1.4	2		CR-1/16- CUTTING
	BK PKT FACING JOIN & CLOSE 31 / 221	SALMA	SN	0.35	171	137	1.1	1		CR-1/16
	BK PKT BAG OIL WITH TURNOVER 130	LIPY	3TH OL	0.40	150	120	1.3	2		AVAILABLE
	WELT PKT TOP STC AT TOP SINGLE POCKET 471	MOLI	SN	0.35	171	137	1.1	1		CR-1/16- CUTTING
	117 -									



PKT BAG 1/4 T/S WITH PKT TACK 185	CHAMPA	SN	0.35	171	137	1.1	1		CR-3/16
BK PKT LIPPER RUN STC 622	SOFIQ	SN	0.30	200	160	1.0	1		PLAIN FIT
BK YOKE OL	TORIKUL	3TH OL	0.35	171	137	1.1	1		AVAILABLE
BK YOKE T/S (two needle)	AKTARUL	DN	0.35	171	137	1.1	1		CR-1/8
MESH PART			3.65						
MASH DART MAKE 10	AYESHA	SN	0.30	200	160	1.0	1		PLAIN FIT
MASH INSEAM 1ST TIME 177	ROBIUL	5TH OL	0.30	200	160	1.0	1		AVAILABLE
MASH INSEAM JOIN 2ND TIME ~~184~~	SAIRIN	5TH OL	0.35	171	137	1.1	2		AVAILABLE
MASH INSEAM TOP STC 396	FORHAD	SN	0.35	171	137	1.1	1		CR-1/16
PANNEL JOIN LEFT SIDE 147	HASAN	5TH OL	0.40	150	120	1.3	1		AVAILABLE
PANNEL JOIN RIGHT SIDE 86	RASEL	5TH OL	0.40	150	120	1.3	1		AVAILABLE
SIDE SEAM JOIN 891	SOHEL+REJAUL	5TH OL	0.40	150	120	1.3	1		AVAILABLE
MASH BTM HEM (2 needle)	SOBUJ+IMRAN	FL	0.45	133	107	1.4	1		AVAILABLE
THREAD CUT	ROHIDUL	HP	0.30	200	160	1.0	1		
MASH STICKER REMOVE AND HEM IRON	DEBASISH	IM	0.40	150	120	1.3	1		
ASSEMBLE			12.95						
W/B SIGMENT TACK ~~(8 stack)~~ 529	LUCKY	SN	0.35	171	137	1.1	1		PLAIN FIT
W/B ELASTIC CUT & MARK WITH PRESSING	JESMIN	IM	0.40	150	120	1.3	1		
W/B ELASTIC SIGMENT TACK	MONIR	SN	0.35	171	137	1.1	1		PLAIN FIT
W/B MAKE BY KNS 44+50+65	ALOMGIR+BILKIS	K/S	0.50	120	96	1.6	2		1.7/8" SET
BK & FR PART MATCHING	TOHURA+RIPA	HP	0.35	171	137	1.1	1		
SIDE SEAM JOIN	ATIK+KULSUM	SN	0.85	71	56	2.7	2		PLAIN FIT
SIDE SEAM OL	HABIB	3TH OL	0.50	120	96	1.6	1		AVAILABLE
SIDE SEAM T/S	JESMIN+MILON	DN	0.60	100	80	1.9	2	Balance inseam top stc	CR AND CL 1/8
BTM SIDE SLIDE T/S 17	MINHAJ	SN	0.35	171	137	1.1	1		CR-1/16 HANGER GUIDE
INSEAM O/L 5	GOBINDO	5TH OL	0.40	150	120	1.3	1		AVAILABLE
INSEAM T/S	VUTTU+RIPON	DN	0.50	120	96	1.6	2		CL AND CR 1/8



	BK RISE TO FR RISE OL 4	OWAJED+BILKIS	5TH OL	0.70	80	69	2.2	2	Help from inseam / Balance front bk yoke	AVAILABLE / CH 1/8
	BK RISE TO FR RISE TOP STC 184	JAKARIA+RIPON	DN	0.45	133	107	1.4	2		
	ALL BODY BTK(6 POINTS) 52	SOBITA	BTK	0.35	171	137	1.1	1		PLAIN FIT
	MESH JOIN TO BODY 447/826	MAHMUDA+NASIMA	SN	0.75	80	64	2.4	3		
	MARK BODY FOR W/B ATT AND W/B MATCH	SUMAYA	HP	0.40	150	120	1.3	1		
	BTM MARK AND BODY TURN	PRIYA	HP	0.40	150	120	1.3	1		
	W/B JOINT 19	NURUSLAM+ANOWER+NARGIS	SN	0.80	75	60	2.5	3		PLAIN FIT
	ATT LABEL TO W/B 38	MARFI	SN	0.30	200	160	1.0	1		PLAIN FIT
	ELASTIC NORMAL HOLE WITH MARK 4	TAHER	B.HOLE	0.35	171	137	1.1	1		AVAILABLE
	W/B FALSE TACK 304	BEAUTY+ASMA	SN	0.60	100	80	1.9	2		PLAIN FIT
	W/B T/S TOP	KHOLIL	K/S	0.35	171	137	1.1	1		CH-1/8 GUESE
	W/B T/S BTM DN	HABIB+FARUK	K/S	0.40	150	120	1.3	2		CL-1/8 GUESE
	BTM HEM 20	ARIF+NARGIS	DN	0.75	80	64	2.4	2		CL -1/8
	W/B MOUTH SAFETY STC	REHEL	BTK	0.35	171	137	1.1	1		AVAILABLE
	W/B TACK REMOVE WITH THREAD CUT	BRISTY+ASMA+SAKILA	HP	0.85	71	56	2.7	3		

Learning curve

Machine Summary		
SN		38
OVERLOCK 5 AND 3 THREAD		15
HAND		5
VELCRO		1
DN		10
DARTACK		2
BUTTON HOOL		1
FLAT LOCK		2
TOTAL		74

Pre-production activities

Technician	:	AMINUL
Mechanic	:	PRINCE
IE	:	ANIS

Pre-setup for Special Machine :

1 W/B MAKE BY KANSAI	2
2 MESH BTM HEM BY FLAT LOCK	2
3 W/B TOP STC AT TOP BY KANSAI	1
4 W/B TOP STC AT BTM BY KANSAI	1
5 ALL TOP STC WITH BTM HEM	10

Special Operators and Operation :

1	W/B JOIN
2	MESH JOIN
3	W/B MAKE
4	W/B TOP STC
5	MESH HEM

Prepared by

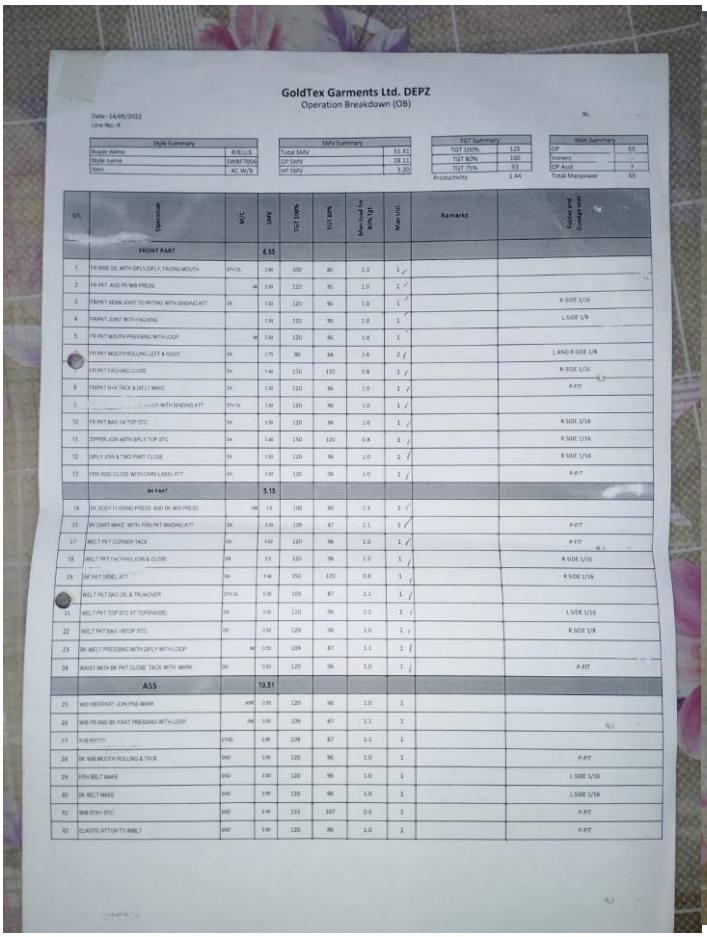
Checked by

IE Mngr

GM

3.6 Operation Breakdown procedure:

3.6.1 Operation breakdown sheet style no 1



GoldTex Garments Ltd. DEPZ
Operation Breakdown (OB)

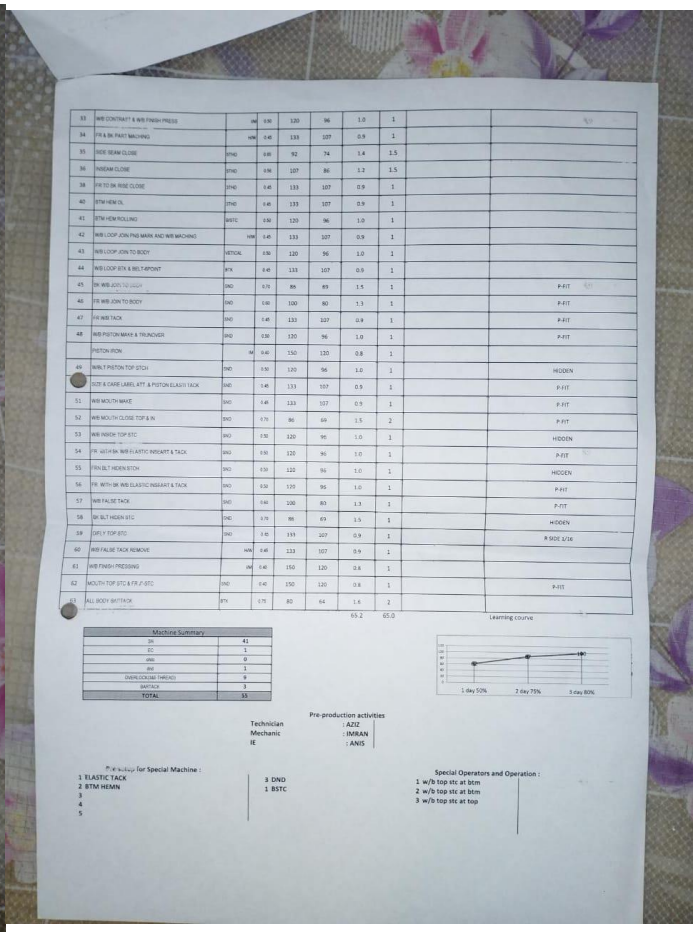
Style Summary	
Buyer Name	P/ELLIS
Style Name	SWBF7096
Item	AC W/B

SMV Summary	
Total SMV	33.31
OP SMV	28.11
HP SMV	5.20

TGT Summary	
TGT 100%	125
TGT 80%	100
TGT 75%	93
Productivity	1.44

Man Summary	
OP	55
Ironers	7
OP Asst	3
Total Manpower	65

S/L	Operation	M/C.	SMV	TGT 100%	TGT 80%	Man load for 80% TGT	Man /Hr.	Remarks	Feeder and Locality wise
	FRONT PART		8.65						
1	FR RISE DE WITH SPLY,DPLY, FACING MOUTH		0.50	100	80	1.3	1		
2	FR PKT. AND FR WB PRESS		0.50	120	96	1.0	1		
3	FR/PKT SEMI JOINT TO PKTING WITH BINDING ATT		0.50	120	96	1.0	1		R-SIDE 1/16
4	FR/PKT JOINT WITH FACHING		0.50	120	96	1.0	1		L-SIDE 1/8
5	FR/PKT MOUTH PRESSING WITH LOOP		0.50	120	96	1.0	1		
6	FR/PKT MOUTH ROLLING LEFT & RIGHT		0.75	80	64	1.6	2		L AND R SIDE 1/8
7	FR/PKT FACHING CLOSE		0.40	150	120	0.8	1		R-SIDE 1/16
8	FR/PKT H-V TACK & DPLY MAKE		0.50	120	96	1.0	1		P-FIT
9	[illegible] WITH BINDING ATT		0.50	120	96	1.0	1		
10	FR/PKT BAG till TOP STC		0.50	120	96	1.0	1		R SIDE 3/16
11	ZIPPER JOIN WITH SPLY TOP STC		0.40	150	120	0.8	1		R SIDE 1/16
12	DPLY JOIN & TWO PART CLOSE		0.50	120	96	1.0	1		R SIDE 1/16
13	FRN RISE CLOSE WITH CARE LABEL ATT		0.50	120	96	1.0	1		P-FIT
	BK PART		5.15						
14	BK BODY TUSSING PRESS AND BK WB PRESS		1.1	100	80	1.3	1		
15	BK DART MAKE WITH FRN/PKT BINDING ATT		0.55	109	87	1.1	1		P-FIT
17	WELT PKT CORNER TACK		0.50	120	96	1.0	1		P-FIT
18	WELT PKT FACHING JOIN & CLOSE		0.5	120	96	1.0	1		R SIDE 1/16
19	BK PKT (ATM) ATT		0.40	150	120	0.8	1		R SIDE 1/16
20	WELT PKT BAG OIL & TRUNCOVER		0.55	109	87	1.1	1		
21	WELT PKT TOP STC AT TOP(INSIDE)		0.50	120	96	1.0	1		L SIDE 1/16
22	WELT PKT BAG HITOP STC		0.50	120	96	1.0	1		R SIDE 1/8
23	BK WELT PRESSING WITH DPLY WITH LOOP		0.55	109	87	1.1	1		
24	WAIST WITH BK PKT CLOSE TACK WITH MARK		0.50	120	96	1.0	1		P-FIT
	ASS		19.51						
25	WB INSPAST JOIN PKS MARK		0.50	120	96	1.0	1		
26	WB FR AND BK PART PRESSING WITH LOOP		0.55	109	87	1.1	1		
27	WB PATTI		0.55	109	87	1.1	1		
28	BK WB MOUTH ROLLING & TACK		0.50	120	96	1.0	1		P-FIT
29	FRN BELT MAKE		0.50	120	96	1.0	1		L SIDE 1/16
30	BK BELT MAKE		0.50	120	96	1.0	1		L SIDE 1/16
31	WB STAY STC		0.45	133	107	0.9	1		P-FIT
32	ELASTIC ATTCH TO WBLT		0.50	120	96	1.0	1		P-FIT



Machine Summary	
SN	41
DC	1
OVL	0
FOV	1
OVERLOCKING THREAD	9
BARTACK	3
TOTAL	55

Learning curve

Pre-production activities
Technician : AZIZ
Mechanic : IMRAN
IE : ANIS

Special Machine :
1 TLASTIC TACK
2 BTM HEMN
3
4
5

3 DND
1 BSTC

Special Operators and Operation :
1 w/b top stc at btm
2 w/b top stc at btm
3 w/b top stc at top

3.6.2 Operation Breakdown Chart

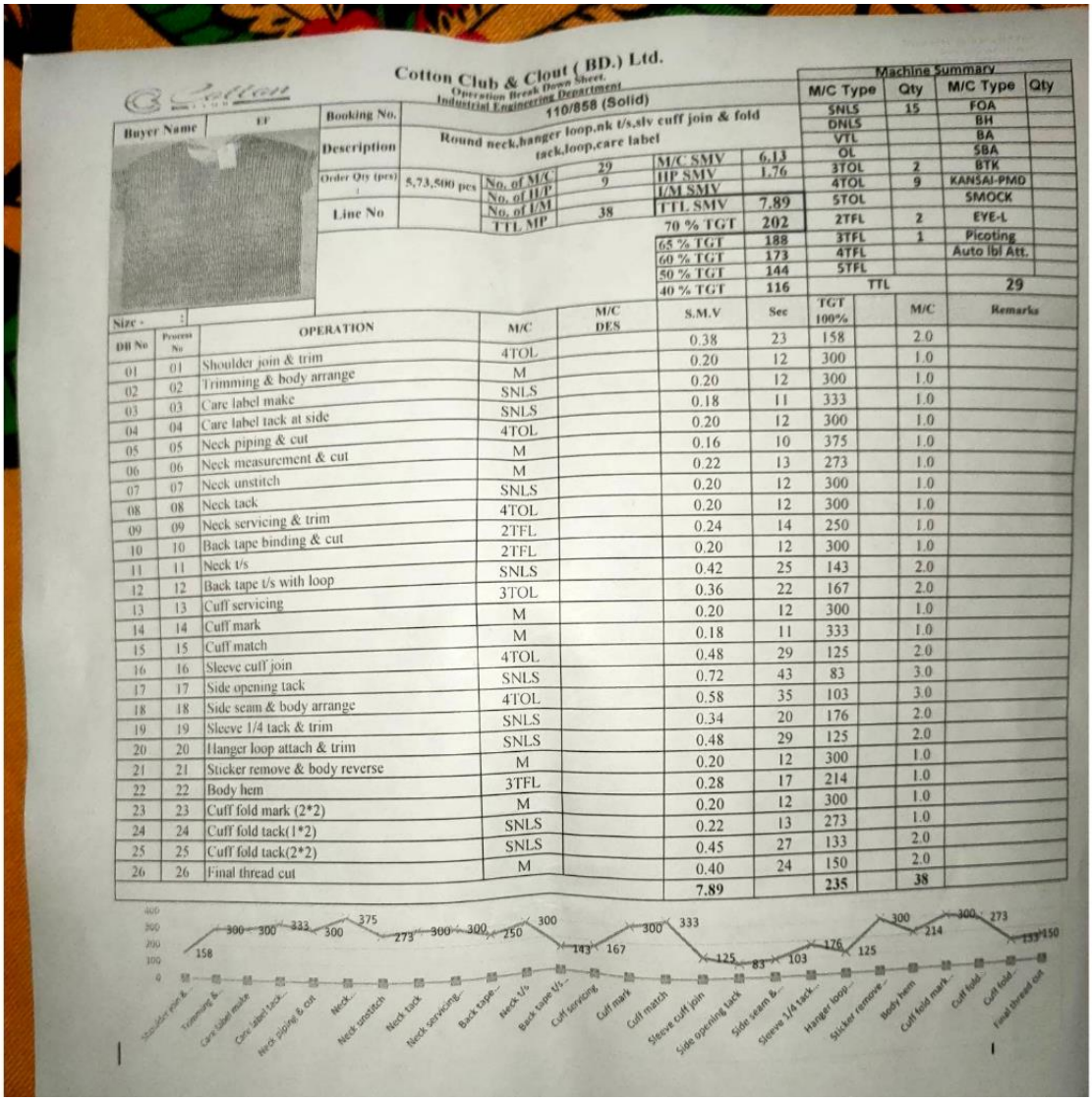
SL No	OPERATION	M /C Type	SMV
1	FR Rise O/L with S/FLY,D/FLY, Facing Mouth	3TH OL	0.60
2	FR PKT AND FR W/B PRESS	IM	0.50
3	FR/PKT SEAM JOINT TO PKTING WITH BINDING ATT	SN	0.50
4	FR/PKT JOINT WITH FACHING	SN	0.50
5	FR PKT MOUTH PRESSING WITH LOOP	IM	0.50
6	FR PKT MOUTH ROLLING LEFT & RIGHT	SN	0.75
7	FR PKT FACHING CLOSE	SN	0.40
8	FR/PKT H+V TACK & D/FLY MAKE	SN	0.50
9	FR PKT OVER LOCE AND BINDING ATT	3TH OL	0.50
10	FR PKT BAG ¼ TOP STC	SN	0.50
11	ZIPPER JOIN WITH S/FLY TOP STC	SN	0.40
12	D/FLY JOIN & TWO PART CLOSE	SN	0.50
13	FRN RISE CLOSE WITH CARE LABEL ATT	SN	0.50
14	BK BODY FUSSING PRESS AND BK W/B PRESS	IM	0.60
15	BK DART MAKE WITH FRN PKT BINDING ATT	SN	0.55
16	WELT PKT CORNER TACK	SN	0.50
17	WELT PKT FACHING JOIN & CLOSE	SN	0.50
18	WELT PKT FACHING JOIN & CLOSE	SN	0.40
19	BK PKT LABEL ATT	SN	0.55
20	WELT PKT BAG O/L & TRUNOVER	3TH OL	0.50
21	WELT PKT TOP STC AT TOP (INSIDE)	SN	0.50
22	WELT PKT BAG 1/8 TOP STC	SN	0.50
23	BK WELT PRESSING WITH D/FLY WITH LOOP	IM	0.55
24	WAIST WITH BK PKT CLOSE TACK WITH MARK	SN	0.50
25	W/B INERPART JOIN PNS MARK	H/W	0.50
26	W/B FR AND BK PART PRESSING WITH LOOP	I/M	0.55
27	W/B PISTOL	3THD	0.55
28	BK W/B MOUTH ROLLING & TACK	SND	0.50
29	FRN BELT MAKE	SND	0.50

30	BK BELT MAKE	SND	0.50
31	W/B STAY STC	SND	0.45
32	ELASTIC ATTACH TO W/BLT	SND	0.50
33	W/B CONTRAST & W/B FINISH PRESS	I/M	0.50
34	FR & BK PART MACHING	H/W	0.45
35	SIDE SEAM CLOSE	5THD	0.65
36	INSEAM CLOSE	5THD	0.56
37	FR TO BK RISE CLOSE	3THD	0.45
38	BTM HEM OL	3THD	0.45
39	BTM HEM ROLLING	B/STC	0.50

40	W/B LOOP JOIN PNS MARK AND W/B MACHING	H/W	0.45
41	W/B LOOP JOIN TO BODY	VERTICAL	0.50
42	W/B LOOP BTK & BELT -6 POINT	BTK	0.45
43	BK W/B JOIN TO BODY	SND	0.70
44	FR W/B JOIN TO BODY	SND	0.60
45	FR W/B TACK	SND	0.45
46	W/B PISTON MAKE & TRUNOVER	SND	0.50
47	PISTON IRON	IM	0.40
48	W/BLT PISTON TOP STCH	SND	0.50
49	SIZE & CARE LABEL ATT & PISTON ELASTIC TACK	SND	0.45
50	W/B MOUTH MAKE	SND	0.45
51	W/B MOUTH CLOSE TOP & IN	SND	0.70
52	W/B INSIDE TOP STC	SND	0.50
53	FR WITH BK W/B ELASTIC INSEART & TACK	SND	0.50
54	W/B FALSE TACK	SND	0.60
55	BK BLT HIDEN STC	SND	0.70
56	D/FLY TOP STC	SND	0.45
57	W/B FALSE TACK REMOVE	H/W	0.45
58	W/B FINISH PRESSING	I/M	0.40
59	MOUTH TOP STC & FR J" STC	SND	0.40
60	ALL BODY BARTACK	BTK	0.75

TOTAL SMV = 31.31

3.6.3 Operation breakdown sheet style Two



Cotton Club & Clout (BD.) Ltd.

Operation Break Down Sheet.

Industrial Engineering Department

Buyer Name	EF
Booking No.	110/858 (Solid)
Description	Round neck,hanger loop,nk t/s,slv cuff join & fold tack,loop,care label
Order Qty (pcs)	5,73,500 pcs
Line No	

No. of M/C	29	M/C SMV	6.13
No. of H/P	9	HP SMV	1.76
No. of I/M		I/M SMV	
TTL MP	38	TTL SMV	7.89
		70 % TGT	202
		65 % TGT	188
		60 % TGT	173
		50 % TGT	144
		40 % TGT	116

Machine Summary

M/C Type	Qty	M/C Type	Qty
SNLS	15	FOA	
DNLS		BH	
VTL		BA	
OL		SBA	
3TOL	2	BTK	
4TOL	9	KANSAI-PMD	
5TOL		SMOCK	
2TFL	2	EYE-L	
3TFL	1	Picoting	
4TFL		Auto lbl Att.	
5TFL			
TTL		29	

Size :

DB No	Process No	OPERATION	M/C	M/C DES	S.M.V	Sec	TGT 100%	M/C	Remarks
01	01	Shoulder join & trim	4TOL		0.38	23	158	2.0	
02	02	Trimming & body arrange	M		0.20	12	300	1.0	
03	03	Care label make	SNLS		0.20	12	300	1.0	
04	04	Care label tack at side	SNLS		0.18	11	333	1.0	
05	05	Neck piping & cut	4TOL		0.20	12	300	1.0	
06	06	Neck measurement & cut	M		0.16	10	375	1.0	
07	07	Neck unstitch	M		0.22	13	273	1.0	
08	08	Neck tack	SNLS		0.20	12	300	1.0	
09	09	Neck servicing & trim	4TOL		0.20	12	300	1.0	
10	10	Back tape binding & cut	2TFL		0.24	14	250	1.0	
11	11	Neck t/s	2TFL		0.20	12	300	1.0	
12	12	Back tape t/s with loop	SNLS		0.42	25	143	2.0	
13	13	Cuff servicing	3TOL		0.36	22	167	2.0	
14	14	Cuff mark	M		0.20	12	300	1.0	
15	15	Cuff match	M		0.18	11	333	1.0	
16	16	Sleeve cuff join	4TOL		0.48	29	125	2.0	
17	17	Side opening tack	SNLS		0.72	43	83	3.0	
18	18	Side seam & body arrange	4TOL		0.58	35	103	3.0	
19	19	Sleeve 1/4 tack & trim	SNLS		0.34	20	176	2.0	
20	20	Hanger loop attach & trim	SNLS		0.48	29	125	2.0	
21	21	Sticker remove & body reverse	M		0.20	12	300	1.0	
22	22	Body hem	3TFL		0.28	17	214	1.0	
23	23	Cuff fold mark (2*2)	M		0.20	12	300	1.0	
24	24	Cuff fold tack(1*2)	SNLS		0.22	13	273	1.0	
25	25	Cuff fold tack(2*2)	SNLS		0.45	27	133	2.0	
26	26	Final thread cut	M		0.40	24	150	2.0	
					7.89		235	38	

3.7 Calculation:

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

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

3.7.1 Bellow analysis is subjected to following supposition for style one:

1	No. of worker (operator and helper)	40
2	Factory Efficiency	100%
3	Working hour	10
4	Total GMT SMV	31.31

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

$$= \frac{60+40+10}{31.31} \times 100\%$$

Pcs day target = 351 pcs

Target per hour = 35 pcs

3.7.2 Bellow analysis is subjected to following supposition for style Two:

1	No. of worker (operator and helper)	40
2	Factory Efficiency	100%
3	Working hour	10
4	Total GMT SMV	7.89

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

$$= \frac{60+40+10}{7.89} \times 100\%$$

Pcs day target = 1394 pcs

Target per hour = 139 pcs

3.8 Basic Pitch Time Calculation

3.8.1 Basic Pitch Time Calculation For style one

Here,

No of operation = 60

Total SMV = 31.31

So,

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

$$= \frac{31.31}{60}$$

= 0.52

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

$$= \frac{0.52}{85\%}$$

= 0.61

Lower Control Limit = (2 × Pitch time) – UCL

= (2 ×0.52) - 0.61

= 0.43

3.8.2 Basic Pitch Time Calculation For style Two

Here,

No of operation = 26

Total SMV = 7.89

So,

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

$$= \frac{7.89}{26}$$

$$= 0.30$$

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

$$= \frac{0.30}{85\%}$$

$$= 0.35$$

Lower Control Limit = (2 × Pitch time) – UCL

$$= (2 \times 0.30) - 0.35$$

$$= 0.25$$

3.9 Bellow analysis is subjected to following assumption:

3.9.1 Bellow analysis is subjected to following assumption for style 1

1	No. of worker (operator and helper)	40
2	Factory Efficiency	100%
3	Working hour	10
4	Total GMT SMV	31.31

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

$= \frac{60+40\times 10}{31.31} \times 85\%$

=1249 pcs

= 125 pcs

Line labour productivity =Total number of output per day per line/Number of worker worked

= 1249/40

= 31

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

= {(10×950×26×60) / 31.31} ×85%

= 402331

3.9.2 Bellow analysis is subjected to following assumption for style 2

1	No. of worker (operator and helper)	40
2	Factory Efficiency	100%
3	Working hour	10
4	Total GMT SMV	31.31

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

$= \frac{60+40\times 10}{7.89} \times 85\%$

=4955 pcs

= 495 pcs

Line labour productivity =Total number of output per day per line/Number of worker worked

= 4955/40

= 123

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

= {(10×1200×26×60) / 7.89} ×85%

= 2,016,730

3.10 Line Balancing:

Line balance means the better parcelling of the necessary tasks between the workers which reduces waiting time,

For line balance we have to focus some data & information those are follows:

1. Number of operators.
2. Operation name.
3. Operation SMV

3.10.1 Line Balancing for style 1

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

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

= 96%

Basic time = Observe time × Rating

=31.2×96%

=30

$=\frac{30}{60}$

=0.5

SMV=Basic time + allowance

=0.5+ 0.075 (0.5 ar 15%)

=0.57

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

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

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

=79%

3.10.2 Line Balancing for style Two

Efficiency Calculation

SMV = Basic time + Allowance

Basic time= Observe time ×Rating

Observe time (1part) = 34, 31,30,33,30

= 158

$=\frac{158}{5}$

$=\frac{31.6}{60}$

= 0.52

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

= 96%

Basic time = Observe time × Rating

=31.2×96%

=30

=$\frac{30}{60}$

=0.5

SMV=Basic time + allowance

=0.5+ 0.075 (0.5 ar 15%)

=0.57

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

=$\frac{10 \times 60 \times 40}{26}$

=923.07 (100% target)

=923.07×80%

=738 for 10 hour

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

=$\frac{738 \times 26}{10 \times 60 \times 40} \times 100$

=79%

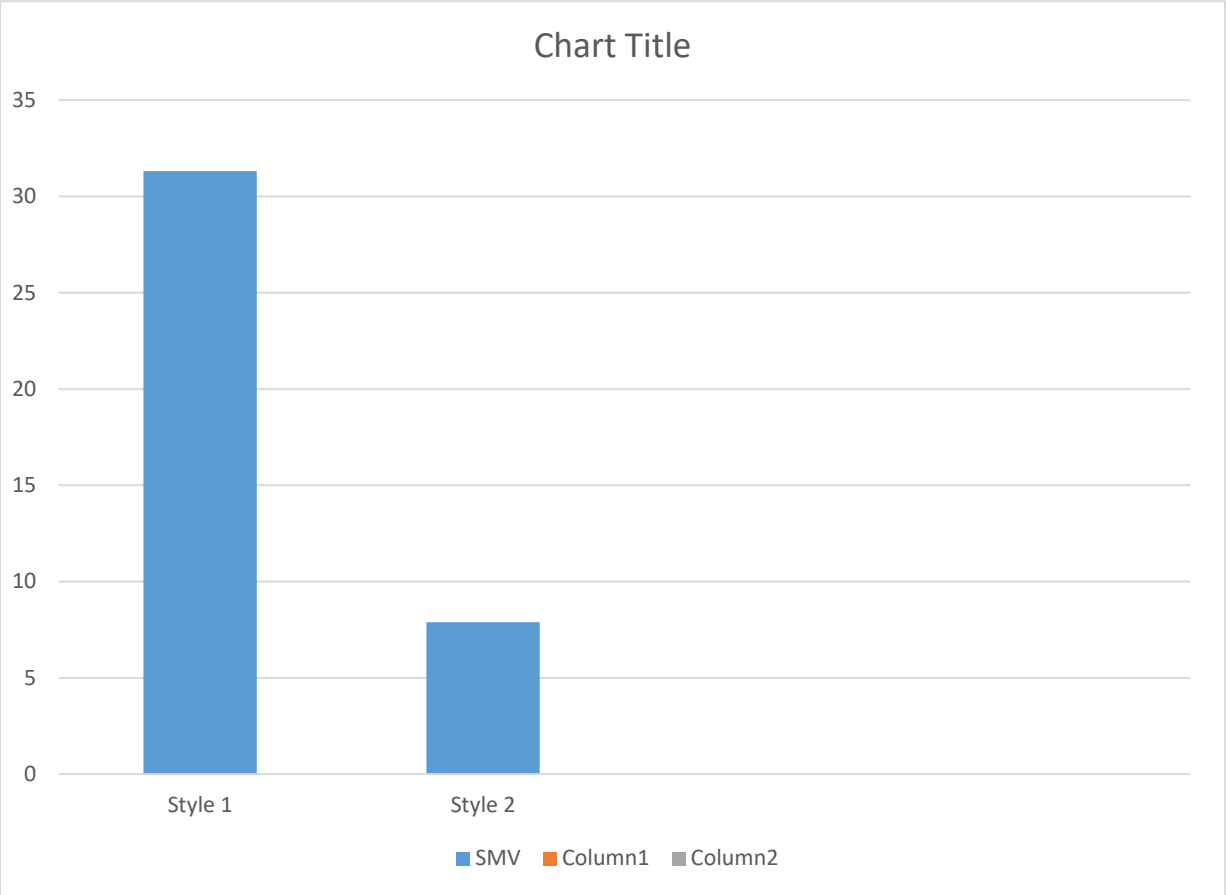
CHAPTER 4: RESULT & DISCUSSION

4.1 SMV

Shows the SMV comparison of two style

SMV of style no- 1 is 31.31

SMV of style no- 2 is 7.89



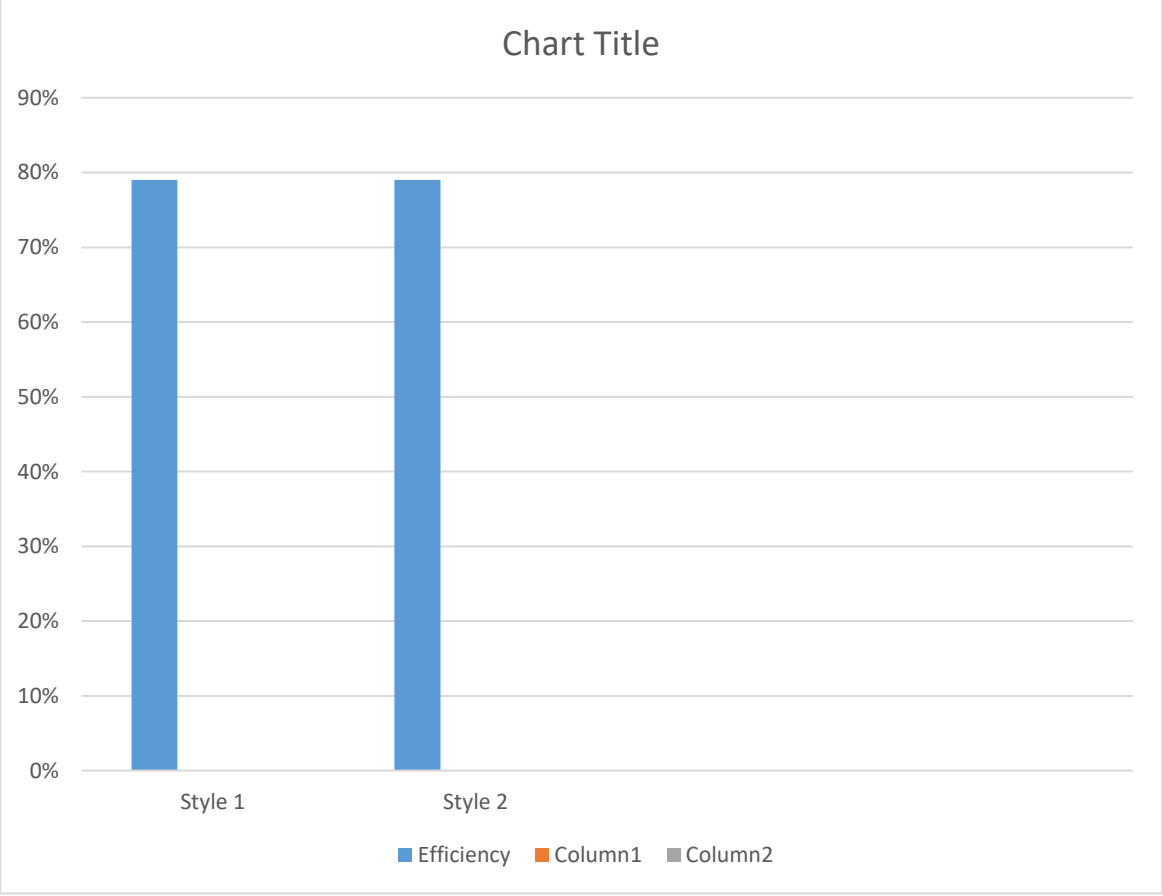
Graph fig 4.1: SMV

4.2 Line efficiency

Graph shows that line efficiency of style no -1 -79%

Graph shows that line efficiency of style no -2 -79%

1. Less machine breakdown at style no-2 but more machine breakdown of style no-1
2. Style no 1 well balanced, although in others it is not so healthy.
3. Strong manufacturing quality style no-1 and in the following style no 2 fewer performance
4. Style no 1 seems to have more expertise but fewer skills in style no 2 operators
5. The plant is fine style no 1, but no 2 plants aren't as well.



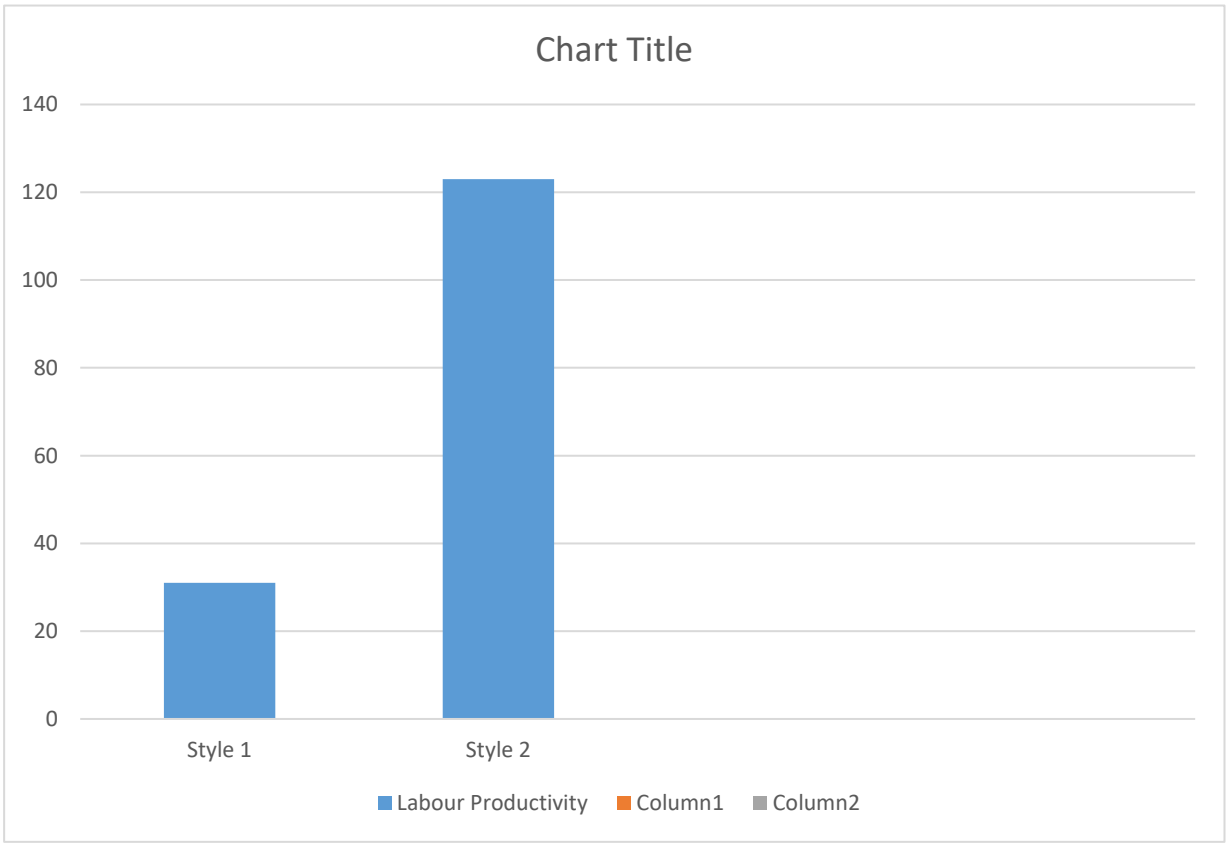
Graph fig 4.2

4.3 Labour productivity

Graph shows that labour productivity of style no1 is 31pcs

Graph shows that labour productivity of style no1 is 123pcs

1. Style no2 workers are much more careful of the mission but style number 1 pant part is extra.
2. Lower machine breakdown at style no 2 but style number 1 breakdown high



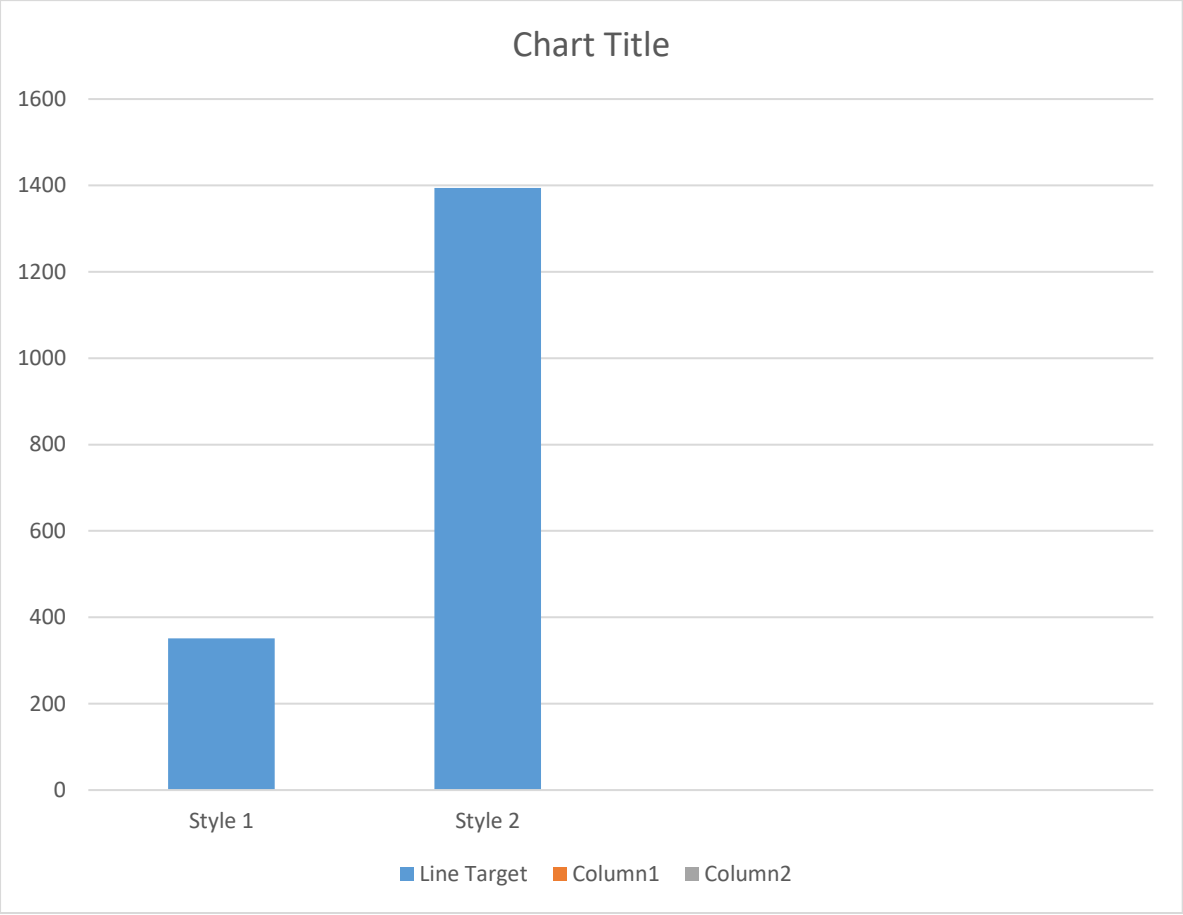
Graph fig 4.3: labour productivity

4.4 Line target

Graph shows that line target of style no -1 is 351 pieces

Graph shows that line target of style no -2 is 1394 pieces

1. Style no 2 has well plant layout but style no 1 have extra part
2. Style no 1 is higher machine breakdown is another main facto



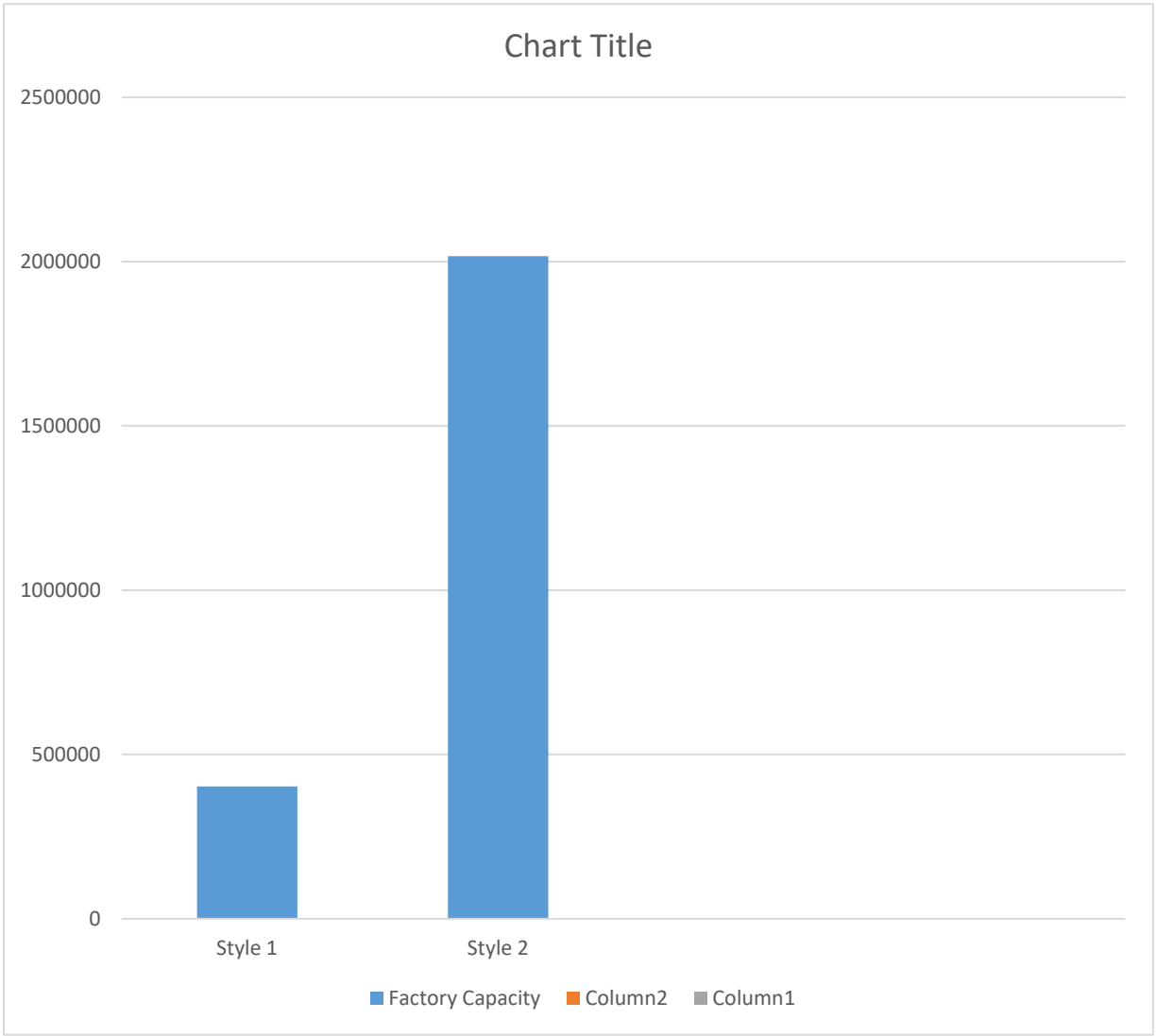
Graph fig 4.4: line target

4.5 Factory capacity

Graph shows that line target of style no -1 is 402331 pieces

Graph shows that line target of style no -1 is 2,016,730 pieces

1. Style no2 space is much more overall than other.
2. More machinery used at style no2 than style no 1.



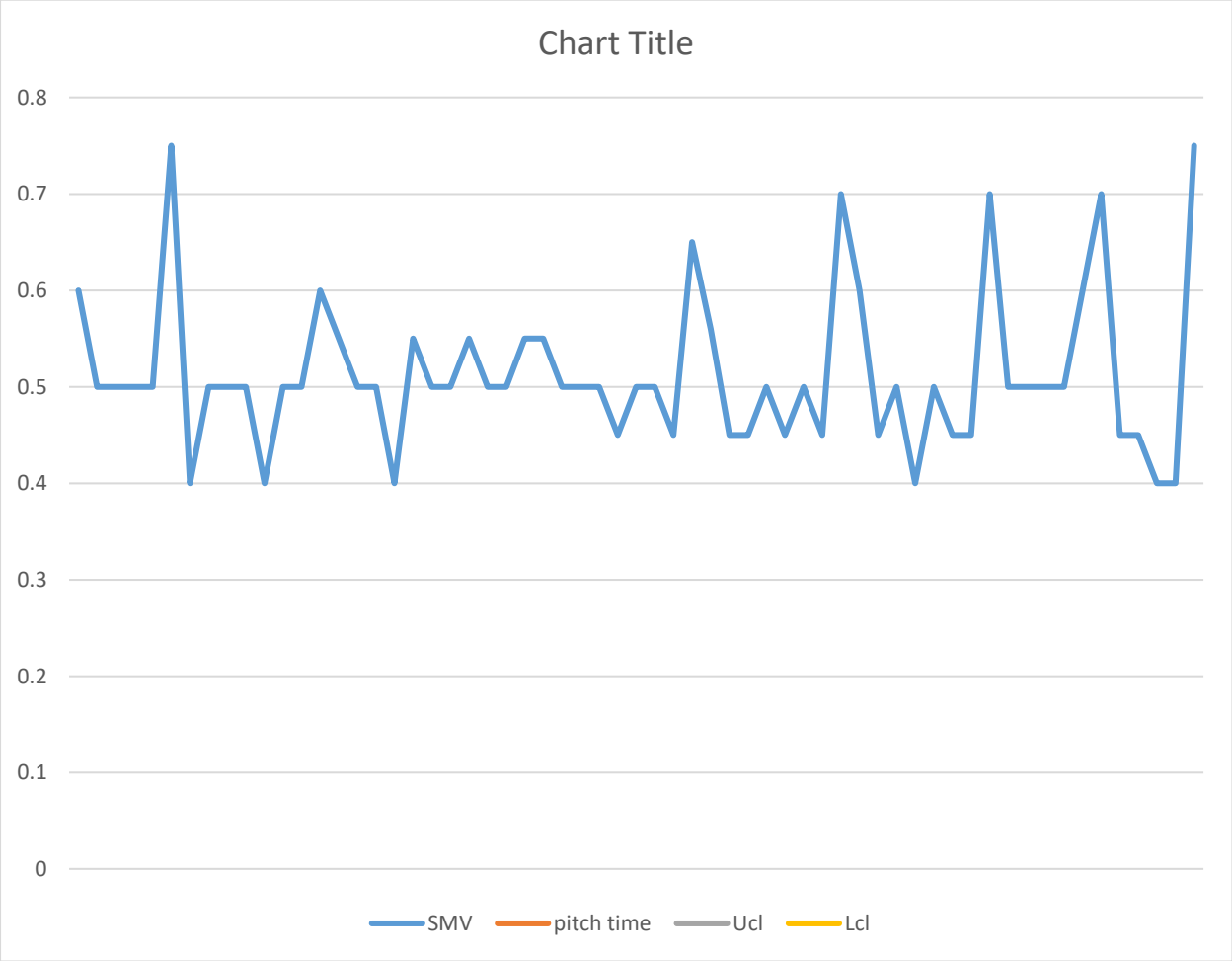
Graph fig 4.5: Factory capacity

4.6 Time Study

4.6.1 Result style no-1

While using stopwatch we take processing time instead estimated the mean. We received simple time since attaching ranking. We added an allowance of basic (15 percent), then earned style no-1 SMV is 31.31 & no-2 SMV is 7.89.

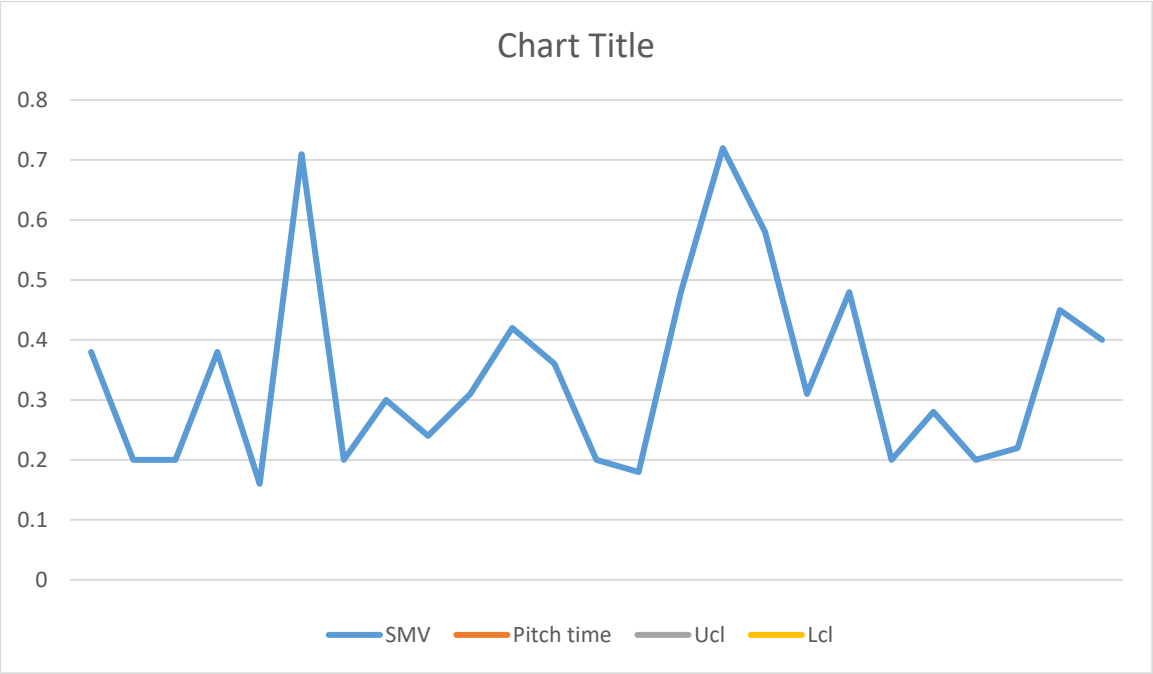
Then we measured for style no-1, pitch time =0.52, upper control limit = 0.61, lower control limit = 0.43



Graph fig 4.6.1: pitch time Result

4.6.2 Result style no-2

Then we measured for style no-1, pitch time =0.30, upper control limit = 0.35, lower control limit = 0.25



Graph fig 4.6.2: Pitch time result

Discussion

If we are to raise higher output like style no -2 in style no-1, it must first build a certain process including style no-2, for example

1. Income companion systems have mounted.

2. Quality technical and theoretical device architecture and implementation.

3. Time, cost and consistency criteria creation.

4. Choice & appraisal of vendors.

5. Numerical and mathematical analysis, like organizational studies.

6. Creation of installations like plant site, construction structure, machinery.

7. Development scheduling and management system configuration and enhancement, stock.

CHAPTER 5: CONCLUSION

Conclusion

Industrial engineering is now an unabated and most relevant part of every apparel industry. We have learnt many procedures and interesting things about industrial engineering by doing this experiment. We find out several problems in Industrial Engineering, we also know how to solve problems by doing this experiment, and how to organize all, Industrial Engineering work. Before IE there were many problems in the apparel industry such as manufacturing ability, daily target ability, layout, distribution problems. After this experiment we find out this calculation.

- In style no:1, the standard minute value (SMV)= 31.31 and the standard minute value (SMV)= 7.89 for style two.
- In style no 1 we have counted the target=351 pcs on the other hand the target =1394 pcs in style no 2
- With style no one the pitch time=0.52, upper control limit=0.61, lower control limit =0.43 and pitch time =0.30, upper control limit=0.35, lower control limit=0.25 with style no two
- That for style no-1 factory capacity is 402331 pieces and for style no-2 factory capacity is 2016730 pieces.
- Style no 1 shows that the line efficiency is 79 % and that the line efficiency of style no-2 is 79 %.

After Industrial Engineering and Planning there is implementation in line balancing, daily line target, production capacity increase. In addition, it gives us the opportunity to expand our knowledge into material organization, generation structure, acquisition system, method of development, and apparatuses and allow us to change with present life.

6. References

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