Faculty Of Engineering

Department of Textile Engineering

Application of Industrial Engineering in Garments Sewing Floor

Course Code: TE-4214 Course Title: Project (Thesis)

Submitted By

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This report was presented in partial fulfillment of the Bachelor of Science in Textile Engineering degree requirements.

Advance in Apparel Manufacturing Technology

Fall 2021

APPROVAL LETTER

To,

The Head (In-Charge)

Department of Textile Engineering

Daffodil International University

Permanent Campus, Ashulia, Savar, Dhaka.

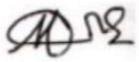
Subject: Approval of Project Report of B.Sc. in TE Program

Dear Sir

We are writing to inform you that the project report titled "Application of Industrial Engineering In Garments Sewing Floor" has been completed for final review by students Sulaiman Hossain ID: 181-23-456 and Md. Tuhin Ahmmed ID: 181-23-447. The entire report is organized based on thorough research and interruption by critical study empirical facts and required belongings. The students were personally involved in their project activities, and the report became crucial in providing the readers with a wealth of useful information.

As a result, it would be quite helpful if you could please accept this project report and examine it for final evaluation.

Sincerely yours,



……

Mst. Murshida Khatun

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ACKNOWLEDGEMENT

First and foremost, we express our gratitude to Almighty Allah for his kind blessings and support in allowing us to accomplish our project successfully.

We would like to express our gratitude to all who have contributed significantly to the success of our project. Their advice, suggestions, and inspiration were extremely beneficial to me. Mst. Murshida Khatun, Assistant Professor, Dept. of Textile Engineering, is our renowned instructor and academic supervisor, and we would like to convey our heartfelt gratitude to her (DIU). Her extensive knowledge and enthusiasm really aids and assists us in completing our project on the application of industrial engineering on the garment manufacturing floor. Her patience, motivation, guidance, ongoing consoling, superb supervision, constructive criticism, valuable suggestions, and checking and correcting much raw data at every level allowed this project to be completed.

We would like to express our heartfelt gratitude to Md. Mominur Rahman, Assistant Professor & Head (In-Charge) Department of Textile Engineering, as well as the other faculty members and staff of Daffodil International University's Textile Engineering Department, for their valuable suggestions..

We're also grateful to the Far East Knitting & Dyeing Industries Ltd. Authority for allowing us to work on our project in their facility. We are also grateful to Far East Knitting And Dyeing Industries Ltd.'s Manager of IE, for his cooperation with our project.

Finally, we want to express our gratitude to all of the employees, supervisors, line executives, and floor supervisors who have assisted, helped, and motivated us to achieve this assignment at various stages.

DECLARATION

We are pleased to inform that we completed this project under the supervision of Mst. Murshida Khatun, Assistant Professor, Daffodil International University's Department of TE. We also want to make it clear that neither this project nor any component of it has been submitted for a degree anywhere.

Submitted By:

Name of Students	ID	Signature
Sulaiman Hossain	181-23-456	Sulaiman
Md. Tuhin Ahmmed	181-23-447	TUHIN

ABSTRACT

"Application of Industrial Engineering in Garments Sewing Floor" is the basis for this project. Method development is critical to any procedure's success if it leads to increased resource application by reducing or, if possible, eliminating non-value added time and activities from the process. The outcomes obtained after implementing lean methods were really positive. Production cycle time is reduced by 9%, the number of operators required to produce the same amount of garment is reduced by 15%, rework is reduced by 75%, production lead time is reduced to one hour from two days, and work in progress inventory is kept at a maximum of 100 pieces rather than 500 to 1500 pieces. Apart from these valuable advantages, operator multiskilling and flexibility are also advantageous..

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Introduction

1.0 Introduction:

Expanding competition in nearly every aspect of the economy distinguishes today's techno financial locale. Client motivation is increasing, and manufacturers must plan ahead of time and deliver in whatever number range is possible under the circumstances (the idea of financial scale is no longer discussed) in order to meet client demands. In this way, businesses are put to the test of producing items of the correct quality and quantity at the right time and at the lowest cost in order to ensure their survival and development. This necessitates the spread of the association's favorable effects. Modern engineering will play an important role in increasing profitability. To break down, many mechanical design systems are used.

Chapter: 02
Literature Review

2.1 Activities of Industrial Engineering:

The American Institute of Industrial Engineers (AIIE) distinguishes the current techno-financial environment by defining Industrial Engineering as follows:

Dealing with the development of complicated processes or systems is what industrial engineering entails. It is concerned with the development, improvement, and evaluation of integrated systems of people, money, knowledge, information, equipment, energy, and materials, as well as the mathematical term, physical and social sciences, and engineering design fundamentals and methods to specify, predict, and evaluate the outcomes of such systems or processes. Although the engineering side emphasizes substantial mathematical proficiency and the use of quantitative methodologies, the underlying theory overlaps greatly with certain business-oriented standards such as operations management.

i)Procedure and numbering techniques selection ii)Tools and equipment compilation and form.

iii)Assembly of benefits, such as plant site, building architecture, machine, and tooling.

iv)Planning and control system layout and development for production, inventory, quality, and plant maintenance and coordination systems.

v)Time, cost, and performance requirements are all being improved. vi)Wage incentive systems are introduced.

vii)Value engineering and analysis system layout and induction. viii)Analysis of movement, including mathematical and statistical analysis.

2.2 Objectives of Industrial Engineering:

I) Develop strategies for enhancing operations and lowering manufacturing costs.
ii) Look for cost-cutting opportunities.
ii) Looking at ways to make processes more efficient.
iv) Improving manufacturing processes while guaranteeing worker safety'

2.3 Functions of an Industrial Engineer:

i) Consistent and simple work procedures, as well as one optimal method for completing the prescribed task.
ii) To optimize the process, choose the right process and assembly method.
iii) Create and pick appropriate tools and equipment. This will aid in the reduction of production costs and time.
iv) Establishing appropriate output measurement criteria and analyzing organizational and individual performance in order to achieve work standardization.
v) To regulate the work in process for each stage of production.

2.4 Techniques of Industrial Engineering:

- **Method study:** A time study of the same operation is required to discover a novel way for any operation. After a period of time has passed, a new process has been developed.
- **Time Study (work estimation):** The majority of the time, you'll see an IE with a

stopwatch in his or her hand. He/she uses this stop watch to study time. This is the approach for scheduling an appropriate time for a job or an activity.

- **Motion Economy:** This is a method for keeping physical labor in production in good working order while reducing worker fatigue and unnecessary action. The motions are detailed in this method, which is similar to method study.
- **Value Analysis:** This is the method for analyzing the manufacturing process. Then, from that production, strive to eliminate non-value added time, non-value added procedures, and wasteful costs.
- **Financial and non-money related Incentives:** These proportions are a fair reward for the professionals' efforts.
- **Production, Planning and Control:** This includes preparing assets (such as personnel, materials, and machines), as well as proper planning and managing generating activities to ensure the precise quantity, kind of item at the time, and pre-set up expenditure..
- **Inventory Control:** It is a method for balancing inventory. As we all know, excess inventory is a waste, and by controlling inventory, a company has several benefits such as improved production, productivity, quality, and free cash flow.
- **Job Evaluation:** This is a process in which the proper job or work is given to the right operator based on their competence. The approach of job evaluation aids in improving labor efficiency and speed of production.
- **Material Handling Analysis:** To improve production and productivity, the least amount of material time is required. Unnecessary material movement is eliminated by material handling analysis.

Job Profile of IE [5]:

Only two or three years ago, the need for a modern specialist had grown significantly. Because of this, an industrial designer may take appropriate steps to improve the execution of the project. However, the new understudy who came out of practical development (Fashion firms) has a solid understanding of the activity profile of an Industrial expert. Working at a plant teaches you how to do better job. Mechanical architects use a variety of M/C and processes to establish a powerful generation framework in the company. Despite the fact that an Industrial Engineer's activity profile varies from organization to organization, the majority of the activity profile falls into the following categories.

- Initial Proto Sample and FIT, authorized sample, and real OB for layout are the three steps of the Operation Bulletin (OP).
- Checking production schedules, engineering requirements, and process flows, as well as preparing production processes that optimize efficiency and minimize costs.
- Creating a production method that is both efficient and cost-effective.
- Engineers go from one organization to the next, with the most of the activity profile falling under following the rundown.
- Developing and implementing process.
- Designing control system.
- Preparation of Operation declaration (OB).
- Designing the layout of facilities and determining personal requirments.

- Machine Layout and Work station.
- Planning the Line Set-up.
- Training staff for new process.
- Methodology Study (Seeing Movements of an assignment).
- Work In Progress (WIP) Control (WIP).
- Line Balancing is a term used to describe the process of balancing two or more lines Capacity.
- Estimation of the cost of an item of clothing.
- Developing and Keeping a Skill
- Designs for Matrix Incentives
- Rundown for calculating Thread Consumption.

An Industrial Engineer must be well-versed in every device and technique. It is not necessary for all devices to be executed immediately. Engineers must travel to all of the locations that have been requested. All work look at gadgets and processes are taken from other projects and applied to the garment sector. As a result, any job analyze mechanical assembly has a certain benefit if it is employed frequently enough.

2.5.1 Organogram Of IE department In Far East Knitting & Dyeing Industries Ltd [5].

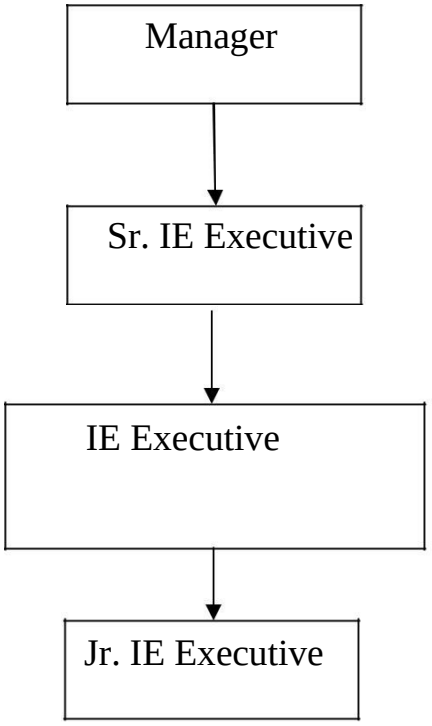

Figure 01

2.6 Industrial Engineering Tools:

I) Lean Manufacturing
II) 5S
III) Just in Time(JIT)
IV) KANBAN
V) KAIZEN

2.6.1 Lean Manufacturing:

"Lean" is a productive strategy for reducing waste in a production system while maintaining productivity. The main benefits include lower costs, increased yield, and shorter generation lead times.

Defects and wastage: Saults are scrap items or products that don't fulfill commercial criteria, and they're perhaps the most apparent sort of garbage. Faults create delivery delays and logistical hassles, resulting in a drop in customer satisfaction. Reworking defective clothing will also cost money. Defects need your organization to spend additional time resolving problems and completing documentation.

Cycle Times: Overuse of crude material data sources, avoidable deformities, expenses associated with reprocessing blemished items, and needless item features that are not required by clients are all examples of lessen absconds and unnecessary physical waste;

Inventory levels: The distinction between inventory waste and overproduction is that inventory has a physical cost, whereas overproduction is assumed. Overproduction can lead to inventory waste if you make more than your clients desire or assume demand will be satisfied later.

Motion: The waste of motion is the action of people, machines, or instruments that do not create value. To put it another way, you're wasting your time. This type of waste is caused by not adhering to the 5S lean manufacturing principle. Employees seeking for materials or equipment, or workstations that are disorganized, are common instances.

Utilization of equipment and space: By eliminating bottlenecks and increasing the rate of production using current equipment while avoiding machine downtime, you may make better use of hardware and assembly space;

Flexibility: Can supply a more versatile range of things with the least amount of switching costs and time.

1. **Extra Processing:** Extra processing, often known as over processing, refers to the addition of labor that isn't necessary. Extra processing expenses are incurred as a result of your employees' time, tools utilized, and equipment wear, and they accumulate over time. It also reduces the efficiency of your movement since employees who complete the extra processing labor may be undertaking value-added tasks instead.
2. 2. The majority of these benefits result in lower unit generation costs – for example, better utilization of hardware and space reduces depreciation costs per unit delivered, better utilization of work reduces work costs per unit created, and reducing deformities reduces the cost of merchandise sold.

2.6.2 5S:

5S refers to five disciplines for maintaining a visually appealing workplace (visual controls and data frameworks).

These are essential to Kaizen (continuous improvement) and a selection method based on "Lean Manufacturing" (waste elimination) principles.

One of the activities that will assist ensure our company's existence is 5S.

- **Sort:** The feeler rule followed here is red tagging. Red tags are absorbed to unnecessary items during sort phase. Unnecessary stuff piled block flow of work and increases hassles.

- **Set in Order:** After sorting, standarize what is left along the three dimensions, i.e. along X, Y & Z axis for suitable access. Anyone can find appropriate items when needed if things are stored/kept in organized way.

- **Shine (and Inspect):-** Team spirit is increase by a clean, well-ordered workplace, where Sort and Set In Order have already freed floor and shelf space. Particularly, don't wait until the work space gets dirty.

- **Standardize (rust never sleeps):-** It standardizes housekeeping rules. You have to establish standards for how you do your work. As a result, Standarize seeks to create and implement standards for Sorting, Setting in Order, and Shine.

- **Sustain (Perserverance is all):-** This aims at maintenance of Sorting, Set in order and shining workplace and equipment. There is no point in cleaning when we cannot preserve it. Once the standards and methods are set, organization look into it to maintain the same and review it time to time. Or you can build 5S team leader on follow up things.

Furthermore, work environments are safe and devoid of hazardous or unsafe circumstances.

2.6.3 Just In Time (JIT):

Just-in-time (JIT) inventory management is a technique for aligning raw-material orders from suppliers with production schedules. Companies use this inventory technique to boost efficiency and decrease waste by acquiring products just as needed for the manufacturing process, lowering inventory expenses. This strategy requires manufacturers to precisely estimate demand. A comprehensive JIT observation is one that encompasses the whole organization..

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2.6.3.1 Objective of JIT:

- Zero inventory
- 100% on time delivery services
- Elimination of non-value added services
- Zero defects

2.6.4 KANBAN:

ANBAN, a work and stock discharge procedure, is an important component of Just in Time and Lean Manufacturing philosophy. KANBAN is a technique for controlling inventory in just-in-time (JIT) production. It was founded by Taiichi Ohno, a Toyota industrial engineer, and is named after the colored cards that are used to measure production and arrange new shipments of components or supplies when they run out. The KANBAN method simply implies using visual signals to motivate the activity required to keep a process running. KANBAN is the Japanese term for sign.

2.6.4.1 Advantages and Disadvantages of KANBAN Processing:

Advantages:

- The entire team is focused on completing a narrow set of tasks; this may be the best option for real-time business vital systems that require near-constant modification.

Disadvantages:

- Work continues until all items are accomplished, making deadlines and review points difficult to anticipate.
- Doesn't function well when there is a lot of change going on or a big project that might take weeks to complete.

2.6.5 KAIZEN:

Kai and Zen both are Japanese phrases. Kai indicates "continues improvement."

and Zen indicates "to achieve greatness."

These words, when put together, signify to destroy something in order to better it.

2.6.5.1 HOW DOES KAIZEN WORK:

The Implements of KAIZEN:

- Connection: Having a sense of belonging to a larger departmental purpose, their job, and their coworkers.
- Imagination: The ability to think about and solve issues in new ways that are both creative and practical.
- Control: Having a feeling of what's going on.

2.6.5.2 PURPOSE OF KAIZEN:

The term kaizen encompasses a wide variety of concepts. It goes on to explain how to make the employees more efficient and successful by establishing a collaborative environment, assuring employee engagement, and making work more fulfilling, less stressful, and safer.

The term "process" refers to the grouping of tasks required to plan and manufacture an item.

One movement done by a single instrument or individual on that object is referred to as a task..

2.6.5.3 TARGET OF KAIZEN:

Objects (Quantity, Rejects and so on.)

Apparel (Changeover, Utilization, Breakdown) Human

beings (Communication, Awareness, Stillness)

Framework for Procedures (Waiting Time, Bottleneck,

Line Balancing, VCS) (QC, Specification, Infection).

2.7 Work study:

Work study is a systematic assessment of activity techniques in order to increase resource efficiency and establish performance criteria for the activities being carried out..

2.7.1 **Father of work study:**

The organizer of work ponder is Mr. Frederic Winslow Tailor, who is renowned as the founder of rational administration. During WWII, the United States required a large volume of armaments in a short period of time. Mr. FW Tailor linked work considered the notion of making several arms in a short period of time and came up with a great result. His development data as he worked at several companies, and work thought is used all over. Currently, the circuit is progressing to a large extent..

2.7.2 **Distinct discipline of work study:**

- Method consideration, which is concerned with the order in which the errands are accomplished;
- Work estimation, which is concerned with the time and effort necessary to complete the errand.

2.7.3 **Work study procedure:**

Work consider is a research paradigm to action. There are a number of articles that must be thoroughly researched in order to arrive at the most balanced conclusion. The approach will be carried out in a well-organized manner for ease of monitoring. It's time to take a look behind the surface.

Select: Choose the task or method that is best for you**.**
Record: Recor**d** everything that happens from firsthand observation in order to acquire data for analysis**.**
Examine: critically examine the facts that have been recorded and question everything that has been done, taking into account the following factors: the goal of the action, the location where it is taking place.
Developing: Develop the most cost-effective ways possible, taking into consideration all factors**.**
Evaluate: Compare the economic viability of the chosen new strategy to the current method of execution to assess the output achieved by the new upgraded methodology**.**
Define: Define the new technique and the time associated with it**.**
Install: As per agreed-upon standard procedures, install the new method and time**.**
Maintain: Follow adequate control procedures to maintain the new standard practice**.**

Characteristic of work study engineer:

Work Study Engineer Characteristics: The Work Study Engineer must be educated, experienced, clever, nice, confident, have a pleasant demeanor, and be honest.

Honesty and sincerity:

Only by being real and honest can the work study engineer gain the trust and respect of individuals with whom he or she will collaborate.

Enthusiasm:

He or she must be really concerned about the job, believe in the value of what he or she is doing, and be able to convey that enthusiasm to others.

Tact/Diplomacy:

Tact in dealing with others stems from a desire to understand them and avoid hurting their feelings with unpleasant or thoughtless words, even if they are warranted.

Good Physical Appearance:

The individual must be nice, tidy, and appear to be efficient. This will motivate you..

2.7.4 **Function Of Work Study Engineering:**

2.7.5.1 Engineering Function:

Method Study: Equipment, Space Environment, Machine Attachment, Element Study, Effective and Ineffective time segregation, Handling and Movement, Contingency, Improve, Worker Performance, Find Better Way of Work, Reduce ineffective time and raising needling time, selling better method to others.

Work Measurement: Cycle Check, Observed Time, Line Balancing, Rating, BMV, SMV, Production Study, Time Study, Time Standard Setting, and Sampling.

General Sewing Data (GSD): Within GSD, study and develop methods By studying methods, you may cut down on coding time by eliminating superfluous tasks.

Breakdown and Layout: Process grouping, tight and loose flow, and operation breakdown Designing a motivator, whether it is an incentive or not, is a difficult task. Layouts, both active and inactive Effort and determination of the laborers.

Consumption: Thread, string, tape, webbing, binding, grosgrain, Velcro, Elastic, Z-Band/linear, Fabric, and other measured trims.

Calculation: Individual Performance and Capacity, Potential Pieces, Feeding Time, Produced Time, Efficiency, Target Setting, Productivity Gap Days/hours/workers required for production Contingency, AQL, OQL, Accuracy and Confidence Level, Cost Breakdown Point, Ratio, Load Range, Sewing Time, Effective Time, Sewing Time, Effective Time, Sewing Time, Effective Time, Sewing Time, Effective Time, Sewing Time, Effective Time, Sewing Time, Effective Time, Sewing Time, Effective Time, Sewing Time, Effective Time, Sewing Time, Effective Time, BTP, HPT, LPT, BMV, and SMV are some of the acronyms used to describe different types of tests.

2.7.6 General Function:

1. **SMV and Production Plan:** Estimation and manufacturing plan for SMVs.
2. **Incentive Package:** Looking up and controlling the generation plan as production increases.

3. **Reporting:** Efficiency, performance, capacity, production articulation, comparison, factory/line limit, incentive calculating, and critical data management as needed.
4. **Keeping History:** Analysis of Product, Earnings, Efficiency, Performance, and Progression.
5. **Data Centralization:** All information from crosswise run units is controlled and centralized..
6. **Save Material:** Misuse of measurable trims, such as threads, is detected by rotation. String, binding, tape, Velcro, Elastic, Z-band, Webbing, Grosgrain, and a plethora of other materials, as well as a plethora of preferences such as catch eyelet, Stopper, Puller, and so on.
7. **Multi Experience:** Basic quality strategy and level of recognition Cutting, Marker, Pattern, Sample, and Pressing/Shipping Technique Basic maintenance, Cutting, Marker, Pattern, Sample, and Pressing/Shipping Technique.
8. **Reserved Expert:** As held master, to assist others in segmenting as necessary..
9. **Motivation:** Introduction to training, job offices, life institutionalization, and procedures.

2.7.7 STEPS INVOLVED:

1. Examine each style to determine its production requirements.

2. The style analysis is based on the following factors: -Quality standards of the company -Amount of labor required -Available equipment -Volume to be produced -Expected "throughput time"

3. Samples and specifications are analyzed to determine style requirements.

4. Apparel engineers are concerned with the following factors: -the number, complexity, and sequence of operations -the equipment required -the time and skill required

5. Operation Breakdown: Each process's work is divided into operations.

An operation break down is a list of all the procedures that are confusing in the process of arranging a garment that is used to determine the workflow for each style.Apparel engineers study each operation to progress its effectiveness and efficiency and to establish methods to ensure a consistent performance by operators and consistent products.

2.7.8 Standard Time and Target Setting:

Many businesses don't work with normal timeframes; instead, they rely on mystery and experience to define goals. The establishment of standard events and the development of the best plan to make is required in order to increase profitability. This is something that every firm that wants to compete in the future must grasp. If regular events and all-around created techniques are used, this graphic clearly explains the benefits to manufacturing plant proficiency.

2.7.9 Method Analysis:

The majority of organizations use ineffective strategies; administrators are left to figure out the best way to carry out the activity, determine the number of sewing blasts, collapsing and

unfurling of parts, unnecessary coordinating, and extra dealing with; these movements add to the time it takes to fabricate the article of clothing and should be avoided. A strategy study can be carried out in a generation framework, whether in-house or outsourced.

or in addition to a presumption of agreement Appropriate method investigation can increase profitability by at least 15%..

2.7.10 Workplace Layout:

The administration must cram as many machines as possible into the processing facility under the circumstances, limiting the amount of time available to improve techniques. Much of the time, the spacing between machines is insufficient.
A good work environment design will eliminate unnecessary movements and fatigue, resulting in a significant increase in the administrator's proficiency.
Take a look at the image below and consider how productive you'll be able to be if you spend 8 hours a day sitting in that position.

2.7.11 Operation Sequence:

A fraction of the production divisions operate without a properly organized or written activity grouping. This is a fundamental step in the construction of an article of clothing, and a mistake or neglect at this point can result in huge losses later in terms of administrator time, work substance, and quality.

2.7.12 Work Aids and Attachments:

The use of work assistance and linkages is insufficient. Many new and little connections and organizers are in effect generated on a regular basis; it is critical that these improvements are acknowledged to ensure a program of continuous improvement. Many new and small connections and organizers are always being developed; it is critical that these improvements be acknowledged in order to provide a program of continuous improvement.

2.7.13 Operator Monitoring:

Because many of the organizations examined lack the ability to compare their execution to industry standards, they have no idea where they stand. There are no credible estimates, hence they're useless.

Although proficiency levels are, in the best case scenario, a figure, it is difficult to see how they will be able to compete unless they have adequate controls in place and have built up efficiency improvement initiatives to push forward later.

2.8 Method Study for article of clothing tasks:

Strategy pondering is a more exact approach of dealing with job structure than a collection of tactics. It is defined as an ordered record and basic analysis of existing and prospective work procedures, as well as ways for developing and implementing simpler and more powerful strategies and lowering costs. The procedure consists of six stages that must be followed in order:

1 **Selection of work to be considered:** The majority of assignments are made up of a variety of distinct jobs or activities. The first step is to select the jobs that will provide the best return on investment for the time invested. Exercising with the highest degrees of development, those producing delays or bottlenecks, or those resulting in significant costs, for example.

2 **Recording of every important truth of current strategy:** Methodology considers formal techniques for recording the sequence of exercises, the time link between different assignments, the development of
materials, and the growth of staff. Technique pondering employs a variety of tactics.

3 **Critical examination of those actualities:** This is the most crucial stage to consider in terms of methodology. It is used to look at the current technique by seeking for responses to the following questions:

- The purpose for each component
- The location
- The sequence
- The individual
- The implication

4 **Development of the most handy, financial and powerful strategy:** By evaluating the results of the

fundamental examination, this stage is used to develop a new and better method for completing the

project. The new technique is made up of a combination of completely removing a few exercises,

combining a few portions, rearranging a few activities, and increasing the substance of others..

5 **Installation of new technique:** This step entails project management of the progressions and ensuring
that everyone involved is aware of the steps involved. At the end of the day, they understand the new
technique, what it is accomplishing, the differences from the old strategy, and most importantly, the
reason for the changes. Preparation is an important part of this stage, especially if the new approach
involves significant adjustments. It's also possible to integrate different gear, portions, and formats.

6 **Maintenance of new technique and occasional checking:** It's critical to keep track of how well the new plan is working and how well employees have adapted. Checking the influence of the new approach on various exercises is an angle that is occasionally overlooked. It's possible, for example, that while the new method is effective in eliminating a bottleneck in one location, the bottleneck has migrated to another location else at the same time Administration can ensure that overall competence is improving rather than decreasing by checking the new technique and its possessions on a regular basis. [1]

2.9 Time Study for article of clothing tasks:

2.9.1 Definition of Time Study:

Time examination is a strategy for estimating labor that takes into account the seasons of carrying out a certain project or its components under specific conditions. For the entire day, an administrator performs the same activity (assignment). Time pondering aids in determining how much time is required for an administrator to finish an errand at a set pace of execution.

Consider the following devices:

• A pause to consider

• Take some time to consider and plan.

• One pencil or pen

2.9.2 Reduce line setting time for collection line:

1. Engineers and production managers are continually looking for ways to improve the labor productivity of their factories. They, on the other hand, search up items that reduce labor productivity. "Longer line setting time" is currently one of the most noticeable factors reducing production productivity. When establishing a line takes so long, the majority of the operators are left idle. As a result, operators are not used in the garment production process, and operator productivity suffers, resulting in high labor costs. The following article will assist you in reducing queue time. Once all operators have been released from the previous style, the factory begins loading fresh styles onto the line.

2. Line planning changes frequently.

3. No trims have been approved or are in the process of being sourced. Until the requisite trims can be found, the project will be on hold

4. There were no operators present throughout the initial or critical operations.
5. Supervisor is unable to provide an appropriate operator for a vital operation due to a quality issue.
6. The maintenance person is unable to swiftly set up the machine. Machine and tool replacement, as well as establishing guides and attachments, take longer than they should.

7. Make preparations for a larger bundle size. If a larger bundle size is chosen on the first day of line setup, it will take a long time to reach the last operator's bundle.

Chapter: 03

Methodology

3.1 Estimation Of Garments Production:

1. If one of the guests made this study of how to evaluate the formation of a style from the line.

2. It is a critical examination since it is the most fundamental understanding of creation administration, and everyone who works on a continuous basis must consider how assessed generation is calculated.

3. The mechanism of computation will be decoded in the next article:

4. Adding up the quantity of article of clothing pieces delivered by administrators in a line/cluster at a given time is part of the creation process (for instance: 8 hours day time). Day by day yield is another word for generation. It is critical to judge creation based on evidence.

5. 1. The article of clothing's Standard Allowed Minute (SAM). It refers to the amount of time it takes to complete one finished piece of clothing..

3.2 Operation Bulletin:

Far East Knitting & Dyeing Industries Ltd.

Operation Bulletin

Buyer:	Monoprix		**SMV**	8.52
Program No:	MP-1491		**Capacity @100%**	2183
Order Quantity:	21066		**Capacity / HR**	218
Fabric Type:	S/J		**Target @ 70%**	1528
GSM	140	gm	**Target / HR**	**153**
Colour:	NOIR		**MMR**	1.8
Booking Layout:	24/200		**Booking Layout**	
CM	5.76	$	**Operators**	17
FOB	3.55	$	**Helpers**	14

PROCESS CAPACITY BREAKDOWN

SL	NAME OF OPERATIONS		M/C Type	SMV		Capacity Per Hour	Planed Worker		Process Capacity
	Machine	Manual		M/C	HP		OP	HP	
1		Frt&Bck part mtc	HP		0.28	214		1	214
2	Both shoulder join		OL	0.31		194	1		194
3		T/C	HP		0.29	207		1	207
	Care label Make		SNLS	0.17		353	1		353
4	Care label attach		SNLS	0.16		375	1		375
5	Neck Rib Piping		FL	0.13		462	1		462
6		Pipe end cut	HP		0.23	261		1	261
7		T/C	HP		0.38	158		2	316
8	Pipe end tuck		SNLS	0.25		240	1		240
9	Neck Servicing		OL	0.19		316	1		316
10		Body Fold	HP		0.21	286		1	286
11	Shoulder to shoulder back tape		FOA	0.32		188	1		188
12		Scissoring	HP		0.28	214		1	214
13		Sleeve mtc with body	HP		0.21	286		1	286
14	Sleeve join		OL	0.98		61	3		184
15		T/C	HP		0.29	207	1		207
16	Side Seam		OL	1.00		60	3		180
17		Body Fold	HP		0.22	273		1	273
18		Scissoring	HP		0.36	167		1	167
19	Sleeve hem		OL	0.78		77	2		154
20		Body Flippest	HP		0.23	261		1	261
21		T/C	HP		0.70	86		2	171
22	Bottom Hem		FL	0.32		188	1		188
23		T/C	HP		0.51	118		2	235
Total/Average				**4.61**	**3.91**		**17**	**14**	

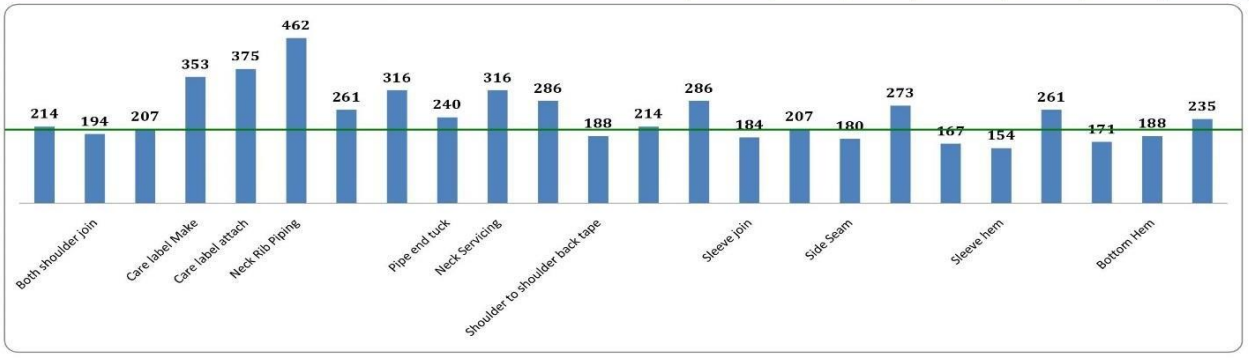


Fig.: Operation Bulletin

Description:

This is a mission. The bulletin sheet is a FAR EAST KNITTING AND DYEING IND. LTD. T-Shirt. This document listed the buyer's name, style name, and item. This sheet also included information on the operation, such as the SMV, TAM, total manpower in line, objective per hour, and efficiency. This sheet depicted a T-Shirt design that required 23 operations. For instance, a different type of machine is required. PM, O/L, FL, and so on. The total number of P/M machines is three. The total number of O/L machines is ten, while the total number of F/L machines is four. This sheet displayed many SMV operations. Finally, the total SMV was determined. The total SMV estimated is 23.71. The days target output is 1500, the plan target production is 1478, and the plan efficiency is 80%. There are various types of efficiency, such as 95 percent, 90 percent, and 90 percent, which are used to determine the total..

3.3 CALCULATION PROCESS:

The calculation process given of SMV, Target, Efficiency, etc are given bellow

Far East Knitting & Dyeing Ind. Ltd

Buyer: MONOPRIX
Article: T-SHIRT
Style: 142757

Target calculation

Manpower in total = 35
SMV =8.45
Work hour = 8
Efficiency = 65% 70% 75%

We know,
Target = (Manpower in total*work hour*60*efficiency)/SMV
= (35*8*60*65%)/8.45
= 1292 pcs

When efficiency 70%
Target = (35*8*60*70%)/8.45
=1391 pcs

When efficiency 75%
Target = (35*8*60*75%)/8.45
=1491 pcs

Efficiency level	65 %	70%	75%
Target per hour	161	174	186

3.4 SMV Calculation Of a Garment:

SAM stands for Standard Allowed Measurement. A minute is a unit of measurement used to determine the undertaking or labor item of a piece of clothing. Mechanical designers and generation individuals in the textile manufacturing industry are common targets for this essay. SAM esteem accept a critical role in estimating the cost of manufacturing a piece of clothing. In the past, researchers and clothing experts investigated how much time should be allowed to carry out an employment when following a typical technique while doing so. According to the examination, every growth expected to acquire a profession has been assigned a minute esteem. For each advancement, engineers' information is available. For SAM figuring, General Sewing Data (GSD) represents a set of codes for movement information. There are also several options.

3.5 TIME STUDY SHEET:

FAR EAST KNITTING & DYEING INDUSTRIES LTD.

TIME STUDY SHEET Date:12 November 2021

BUYER : MONOPRIX | STYLE :VIERRE | PO :MP-1206 | CM : 4.62 | FOB :1.8 | LAY/OUT :20/250 | LINE : 28

SL	PROCESS NAME		TYPES OF WORK	NO. OF WORKS	OBSERVED 8 CYCLE TIME	AVG. TIME	RATING (%)	ALLOWANCE	BPT	SPT	SMV		INDIVIDUL CAPACITY	Manpower		PROCESS CAPACITY	
	Machine operation	Manual work									Machine	Manual		O/P	H/P	Machine	Manual
1	Both shoulder join		O/L	1	104	13	100%	15%	13	15	0.25		241	1		241	
2		Thread cut Body fold.	H/P	1	96	12	100%	15%	12	14		0.23	261		1		261
3	Care label make		SNLS	1	96	12	100%	15%	12	14	0.23		261	1		261	
4	Care label attach		SNLS	1	96	12	100%	15%	12	14	0.23		261	1		261	
5	Neck join		O/L	1	96	12	100%	15%	12	14	0.23		261	1		261	
6		Neck thread cut	H/P	1	96	12	100%	15%	12	14		0.23	261		1		261
7		Stitch opening	H/P	2	160	20	100%	15%	20	23		0.38	157		1.5		235
8	Neck tuck		SNLS	1	96	12	100%	15%	12	14	0.23		261	1		261	
9	Neck servicing		O/L	1	96	12	100%	15%	12	14	0.23		261	1		261	
10		Neck thread cut	H/P	1	96	12	100%	15%	12	14		0.23	261		1		261
11	Shoulder to shoulder back tape join		Z/Z	2	122	22	100%	15%	22	25	0.42		142	2		285	
12		Thread cut Body fold.	H/P	1	71	12	100%	15%	12	14		0.23	261		1		261
13		Sleeve matching with body	H/P	1	112	14	90%	15%	13	14		0.24	248		1		248
14	Sleeve join		O/L	3	264	33	100%	15%	33	38	0.63		95	3		285	
15		Thread cut Body fold.	H/P	1	104	13	100%	15%	13	15		0.25	241		1		241
16	Side seam		O/L	4	304	38	100%	15%	38	44	0.73		82		1	330	
17	Sleeve hem		C/B	2	184	22	100%	15%	22	25	0.42		142	2		285	
18		Thread cut Body fold.	H/P	1	54	7	87%	15%	6	7		0.12	514		0.5		257
19	Body hem		C/B	1	96	12	100%	15%	12	14	0.23		261	1		261	
20		Thread cut Body fold.	H/P	1	90	10	100%	15%	10	12		0.19	313		1		313
TOTAL				28							3.83	2.10		14	10		
G.TOTAL											5.94						

CAPACITY AND TARGET CALCULATION		
SMV	6.86	Min
TOTAL MANPOWER	24	Persons
Line Capacity @ 100%	2099	pcs
Line Target @ 80%	1679	pcs

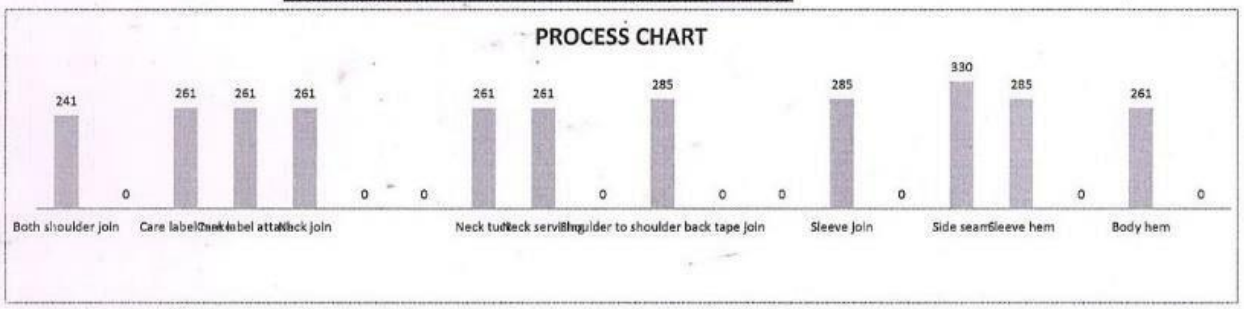


Fig.: Time Study Of a

Basic T-Shirt Technique 1-Using Time Study Data:

The 'Predetermined Time Standard' (PTS) code is used in this technique to generate a 'Standard Time' for a given object a sewing project or a piece of apparel

Stage 1: Choose one assignment for which you must calculate SAM.

Stage 2: Examine how that task is carried out. Continue by the side of an administrator to observe how he is doing. Write down all of the development that the administrator used to complete one work cycle. Re-observe and amend your note if all development/movement has been caught and corrected. (Get components one-handed or two-handed, adjust part on table or machine foot, realign handles, and so forth for item movements.)

Stage 3: Make a list of each action in order. Infer the TMU (Time Measuring Unit) values from the manufactured data. GSD (without allowing the use of GSD code) or Sewing Performance Data table can be informed for manufactured data (without allowing the use of GSD code to be cancelled), but GSD code and TMU esteems can be informed for each application and focus

(SPD). You currently have TMU esteem for one task (for instance say it is 400 TMU). Convert the total number of TMU into minutes (1 TMU = 0.0006 minute). Basic Time is measured in minutes. The initial process takes 0.25 minutes in this activity.

Stage 4: (Basic moment + Bundle remunerations + machine and individual remittances) = Standard Allowed Minutes (SAM). To calculate necessary time, add package stipends (10%) and machine and individual recompenses (20%). Now you have SMV (Standard Minute Value) or SAM (Standard Average Minute Value). 400 TMU SAM= (0.25+0.025+0.048) = 0.33 minutes Convert the total number of TMU into minutes (1 TMU = 0.0006 minute). Basic Time is measured in minutes. The initial process takes 0.25 minutes in this activity..

3.6 Efficiency estimation recipe:

Productivity (%) = [Total minute made by an administrator/Total moment gone to by him *100] Where, Total pieces made by an administrator X SAM of the activity [minutes] = total minutes delivered Total hours spent with the machine X 60 [minutes] = Total hours spent with the machine
An administrator, for example, was working on a SAM 0.50 minute assignment. He makes 450 pieces in an 8-hour moving day. As a result, according to the proficiency calculating equation, that administrator's overall effectiveness is

100 percent Equals (450 x 0.50)/(8 X 60)

= 225/480*100%
=46.8%

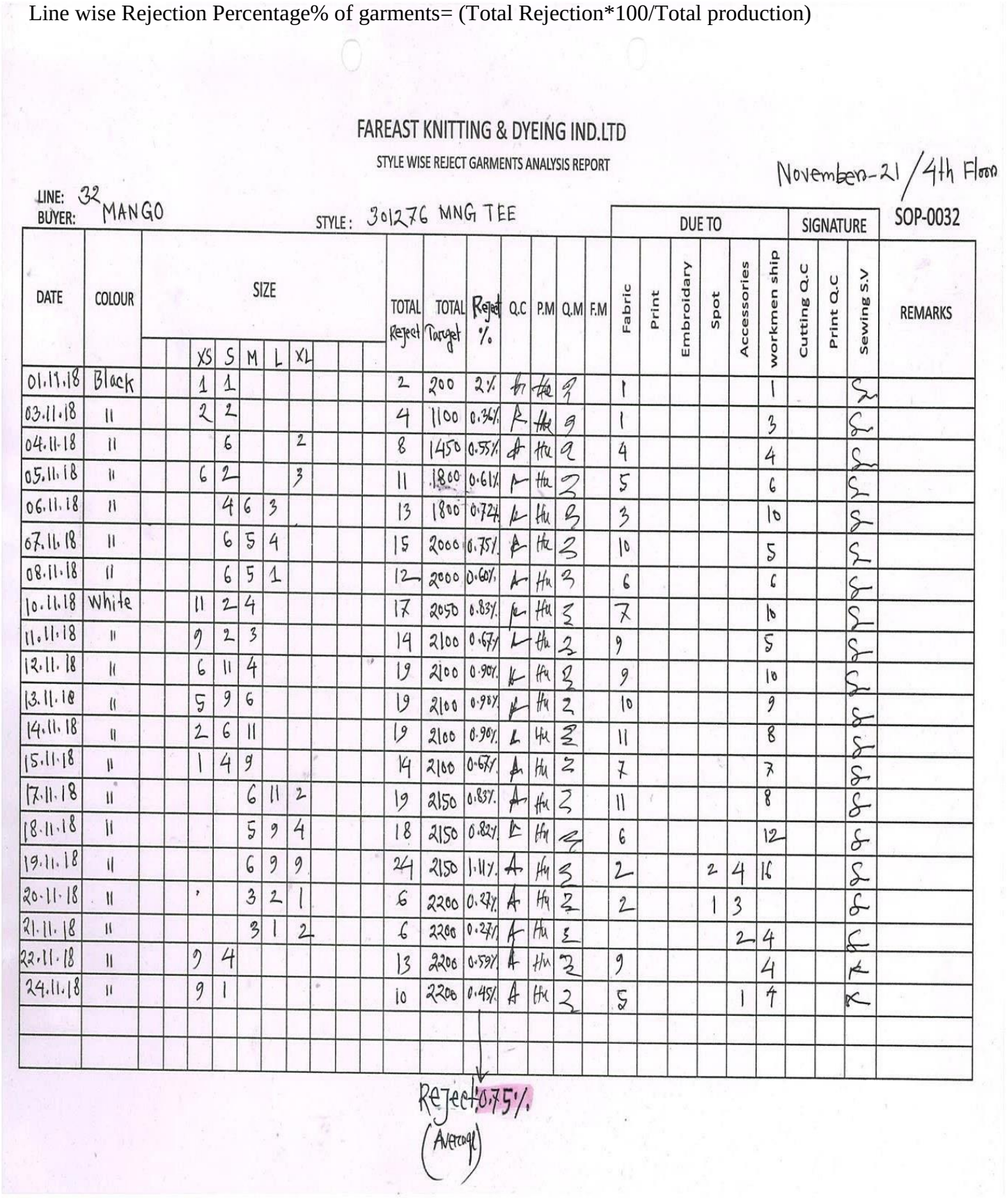
3.7 Wastage% Control:

We can decreased the floor wastage%. There are many wastage in garments sewing floor such as Garments Reject%, Thread Wastage%, and another Accessories%.

Fig.: Calculation of Garments Rejection wastage%

Calculation:

Line wise Rejection Percentage% of garments= (Total Rejection*100/Total production)



FAREAST KNITTING & DYEING IND.LTD

STYLE WISE REJECT GARMENTS ANALYSIS REPORT

November-21 / 4th Floor

LINE: 32 BUYER: MANGO STYLE: 301276 MNG TEE SOP-0032

DATE	COLOUR	SIZE									TOTAL Reject	TOTAL Target	Reject %	Q.C	P.M	Q.M	F.M	DUE TO						SIGNATURE			REMARKS
				XS	S	M	L	XL										Fabric	Print	Embroidary	Spot	Accessories	workmen ship	Cutting Q.C	Print Q.C	Sewing S.V	
01.11.18	Black			1	1						2	200	2%					1					1				
03.11.18	"			2	2						4	1100	0.36%					1					3				
04.11.18	"				6			2			8	1450	0.55%					4					4				
05.11.18	"			6	2			3			11	1800	0.61%					5					6				
06.11.18	"				4	6	3				13	1800	0.72%					3					10				
07.11.18	"				6	5	4				15	2000	0.75%					10					5				
08.11.18	"				6	5	1				12	2000	0.60%					6					6				
10.11.18	White			11	2	4					17	2050	0.83%					7					10				
11.11.18	"			9	2	3					14	2100	0.67%					9					5				
12.11.18	"			6	11	4					19	2100	0.90%					9					10				
13.11.18	"			5	9	6					19	2100	0.90%					10					9				
14.11.18	"			2	6	11					19	2100	0.90%					11					8				
15.11.18	"			1	4	9					14	2100	0.67%					7					7				
17.11.18	"					6	11	2			19	2150	0.83%					11					8				
18.11.18	"					5	9	4			18	2150	0.82%					6					12				
19.11.18	"					6	9	9			24	2150	1.11%					2			2	4	16				
20.11.18	"					3	2	1			6	2200	0.27%					2			1	3					
21.11.18	"					3	1	2			6	2200	0.27%									2	4				
22.11.18	"			9	4						13	2200	0.59%					9					4				
24.11.18	"			9	1						10	2200	0.45%					5				1	4				

Reject 0.75%

(Average)

Chapter: 04
Result and Discussion

4.1 Result & Discussion

It is clear from the preceding discussion that there were significant disparities in Productivity, Efficiency, Costing, and Wastage.

We have to raise productivity and efficiency, decrease costing & wastage by this method and result is given below:

i) We used proper man, machine, materials
ii) Set correct line target
iii) Set line balancing
iv) Decreased bottleneck.
v) Proper floor monitoring.
vi) Determined individual capacity.
vii) Decreased over time
viii) Prepared good working environment.

After application of Industrial Engineering in **4th floor at Far East Knitting & Dyeing Industries Ltd.** We showed that the increasing the 4th floor efficiency percentage because of proper application of IE.

4.2 Result Summary:

October-2021 efficiency report of **Far East Knitting & Dyeing Industries Ltd.** Is given below:

Fig: Efficiency% Report of Far East Knitting & Dyeing Industries Ltd. On October-2021

Far East Knitting & Dyeing Industries Limited

FAR EAST KNITTING & DYEING INDUSTRIES LTD.

MONTHLY FLOORWISE EFFICIENCY% REPORT

MONTH: OCTOBER-2021

SOP NO: 318

SL No	FLOOR	PM	EIIFIENCY% PREVIOUS MONTH	EFFICIENCY % CURRENT MONTH	PM SIGNATURE
01	3rd	Saiful	51%	50%	
02	4th	Harun	49%	55%	
03	5th	Ali	48%	48%	
04	6th	Rahim	49%	49%	

IE-Manager FM AGM (Productivity) GM/DGM

November-2021 efficiency report of **Far East Knitting & Dyeing Industries Ltd.** is given below:

Fig: Efficiency% Report of Far East Knitting & Dyeing Industries Ltd. On November-2021

Far East Knitting & Dyeing Industries Limited

FAR EAST KNITTING & DYEING INDUSTRIES LTD.

MONTHLY FLOORWISE EFFICIENCY% REPORT

MONTH: NOVEMBER-2021

SOP NO: 319

SL No	FLOOR	PM	EIIFIENCY% PREVIOUS MONTH	EFFICIENCY % CURRENT MONTH	PM SIGNATURE
01	3rd	Saiful	50%	49%	
02	4th	Harun	55%	56%	
03	5th	Ali	48%	51%	
04	6th	Rahim	49%	49%	

IE-Manager FM AGM (Productivity) GM/DGM

4th floor Monthly Efficiency Report:

SL No	Month	PM	Floor	Efficiency
01	October	Harun	4th	55%
02	November	Harun	4th	56%

After two month application of Industrial Engineering we get the **CM Ranking** result on November at Far East Knitting & Dyeing Ind. Ltd

SL No.	Floor Name	CM Ranking
01	3rd Floor	3
02	4th Floor	2
03	5th Floor	4
04	6th Floor	1

Fig.: CM ranking Result on November at Far East Knitting &Dyeing Ind. Ltd

After application of Industrial Engineering in **4th floor at Far East Knitting & Dyeing Industries Ltd.** We showed that the decreasing the 4th floor wastage Percentage because of proper application of IE.

October-2021 wastage% report of **Far East Knitting & Dyeing Industries Ltd.** is given below:

Fig: Wastage% Report of Far East Knitting & Dyeing Industries Ltd. On October-2021

Far East Knitting & Dyeing Industries Limited

FAR EAST KNITTING & DYEING INDUSTRIES LTD

MONTHLY FLOORWISE WASTAGE% REPORT

MONTH: OCTOBER-2021

SOP NO: 00411

SL No	FLOOR	QC	WASTAGE%% PREVIOUS MONTH	WASTAGE% CURRENT MONTH	QC SIGNATURE
01	3rd	Zahangir	2.1%	**2.0%**	
02	4th	Biplob	1.7%	**0.95%**	
03	5th	Hasan	1.7%	**0.94%**	
04	6th	Mahfuz	1.11%	**1.34%**	

Quality-Manager FM AGM (Quality) GM/DGM

November-2021 wastage% report of **Far East Knitting & Dyeing Industries Ltd.** is given below:

Fig: Wastage% Report of Far East Knitting & Dyeing Industries Ltd. On November-2021

Far East Knitting & Dyeing Industries Limited

FAR EAST KNITTING & DYEING INDUSTRIES LTD

MONTHLY FLOORWISE WASTAGE% REPORT

MONTH: November-2021

SOP NO: 00412

SL No	FLOOR	QC	WASTAGE% PREVIOUS MONTH	WASTAGE% CURRENT MONTH	QC SIGNATURE
01	3rd	Zahangir	2.0%	1.7%	
02	4th	Biplob	0.95%	0.93%	
03	5th	Hasan	0.94%	1.3%	
04	6th	Mahfuz	1.34%	1.17%	

4th floor Monthly Wastage% Report:

SL No	Month	QC	Floor	Wastage%
01	October	Biplob	4th	0.95%
02	November	Biplob	4th	0.93%

Chapter: 05

Conclusion

5.1 Conclusion

Any clothes industry would be incomplete without industrial engineering. Every decapitation is one of the parts of the process that we have abstractly considered. It allows us to compare hypothetical data with relevant facts and, as a result, improve our understanding and talents. This project also allows us to broaden our understanding of material organization, creation planning, acquisition framework, production process, and equipment, as well as teach us how to adapt to modern living.

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