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Faculty of Engineering
Department of Textile Engineering

A Project on
Study on Industrial Engineering

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Bachelor of Science in textile Engineering.

Advance in Apparel Manufacturing Technology

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DECLARATION

We have declare that this has been done by us under take supervision of Mohammad Abdul Baset, senior Lecturer, Daffodil International University, we also declare that neither this industrial attachment nor any part of has been submitted else here for award of any degree.

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This is to certify that the above declaration made by the candidates is correct to the best of our knowledge.

LETTER OF APPROVAL

April 10, 2018

To
The Head
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102, Sukrabad, Mirpur Road Dhaka.

Subject: Approval of Industrial Attachment of B.sc in TE program

Dear Sir,

We are just writing to let know that, this project report has been prepared by the students bearing is Md. Mahafuz Hossain (152-23-4346)& Md. Al- Mamun (152-23-4413) is completed for final evaluation. The whole project report is prepared based on the proper investigation from factory. The students were directly involved in their attachment activities and the report become vital to spark of many valuable information for the readers.

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

Yours Sincerely,



Engr. Mohammad Abdul Baset

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ACKNOWLEDGEMENT

All pleasure goes to the Almighty Allah to give us strength and ability to complete our project. It was a great opportunity for us to complete the attachment.

We have feel grateful to my academic supervisor **Engr. Mohammad Abdul Baset**, Assistant Professor, Department of Textile Engineering, Daffodil international University him continuously guiding us about the development and preparation this report. He has enriched us with sharing necessary theoretical. We would like to express our thanks to **Prof. Dr. Md. Mahbulul Haque, Head, Department of Textile Engineering**, Faculty of Science and Information Technology, Daffodil international University for his kind help to finish our report. We have highly indebted to the authority of Euro-TEX Knitwear Limited. for allowing us to do a substantial practical ideas and supervised us to complete this report on time. We have also wish to express our gratitude to **Md. Mridul Hasan (GM)** sir part of the experiment work. Without their support we could not be able to finish the project. Especially we have thankful to **Md. Nagibur Rahman (HR)** sir without his permission no work could be done at the factory, love to our beloved parents and my friends for their mental support, strength, help and everything.

Finally we wish to avail of this opportunity, express a sense of gratitude and love to our beloved parents and my friends for their mental support, strength, help and everything.

DEDICATION

At first we want to dedicate this Industrial training report to Almighty **Allah** (ALHAMDULILLAH) for giving us the opportunity to prove ourselves. Without His help nothing would be possible.

Then we want to dedicate this report to **Prophet Mohammad (SM)**.

ABSTRACT

This project is on “**Study on Industrial Engineering in Euro-TEX Knitwear Limited**”.

This paper introduces the various concepts and methods that have been used in Industrial Engineering as a part of apparel engineering in Garment industries. Generally, Industrial Engineering department do Calculate SAM, SMV, Line balancing, Work study, Time study, Working for how to increase the productivity, Sewing floor layout, Line layout etc. First of all we would like to try express chapter 3 properly because of this is analytical part of this thesis project. First data of this chapter is Euro-TEX sewing m/c data analysis where we get, Euro-TEX sewing floor divided into two floor 2nd floor and 5th floor. Total sewing m/c of two floor is 821 and none of m/c are defected. Next we discussed about Leggings operation bulletin sheet, where from we get total SMV of a Leggings is 5.51 minutes, operator used 19 and helper needed 5, Operator and helper ratio is 1: 0.27. After that we try to analyzed about Tee-Shirt L/S making total SMV time is 6.01 minutes 19 operator and 7 helper need for this job done and the ratio is 1: 0.37. After that we try to discuss about company efficiency and productivity per month. This is the middle range of company where else their monthly production target is 427600 pcs and production is 399795 pcs. Average target fill-up 93.5% and average efficiency is 65.9%, NTP time is 0. Finally we try to express all the analytical data from sheet graphically in chapter 4.

The aim of this project is to know the sequence of industrial engineering as more as practically.

By going through this project work one can easily understand what generally happens underneath the execution of procedure of the Engineering.

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study:

The most important section in a garment industry is its Industrial Engineering section. In this section, Sequencing of Stitching operations, Line balancing, Operation break down, work study and time study should be inspected on a routine basis for identifying, correcting and controlling of faults and increasing the productivity. To ensure the quality of the product, quality control personnel have to control quality in different section in garment industry, which are directly or indirectly involved with IE section. Eliminate wasting time to earn more product is its done by industrial engineering Department..

1.2 Objectives of the Study:

- Knowledge about various sewing production systems & Sewing machine necessary.
- Knowledge about Calculating Thread Consumption & Performance Rating.
- Knowledge about Time study (Cycle timing), Motion analysis of the operations, Operations break down.
- Knowledge about SAM Calculation, M/C Layout and Work station layout & Line Set up.
- Knowledge about Line Balancing, Capacity study, Cost estimation of a garment.

1.3 Importance of the Study:

At Present Industrial Engineering (IE) is a very important key factor for the industry. It has so much importance as the Textile Engineers in the industry level. An Industrial Engineer makes a product or provides a service by determining the most effective ways to use the five basic factors of production: machines, materials, energy, information and people. A large number of foreign currencies are earned by garments & textile sector around (80-85). There is a large number of Industrial Engineers working in textile & its sub sector. We hope that the project will give a way to teach Industrial Engineers, which will help in the future to lead our textile & garments sector. Bangladesh is a developing country and a developing country largely depends on foreign currency.

1.4 Limitations of the Study

During the study I had faced the following limitation

- **Shortage of secondary data sources:** Publication of this field not available and there were no organization or department for maintaining proper information about the company.
- **Respondent unwillingness:** Some respondents were unwilling to respond due to maintaining secrecy about the company.
- **Lack of accurate data:** Respondents were unwilling to disclose their fault and quality check data. So, this types of data used in this report is not too proper.
- There is no special training department for study.
- **Shortage of time:** At least eight months required for completion of the final report but we have given only three months. So to acquire a vast knowledge it is the most important limitation for me.

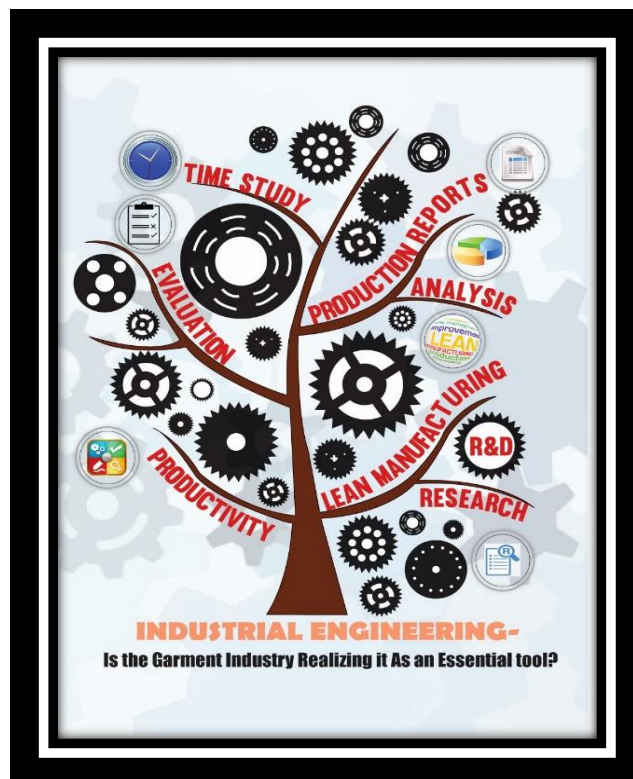
CHAPTER 2

LITERATURE REVIEW

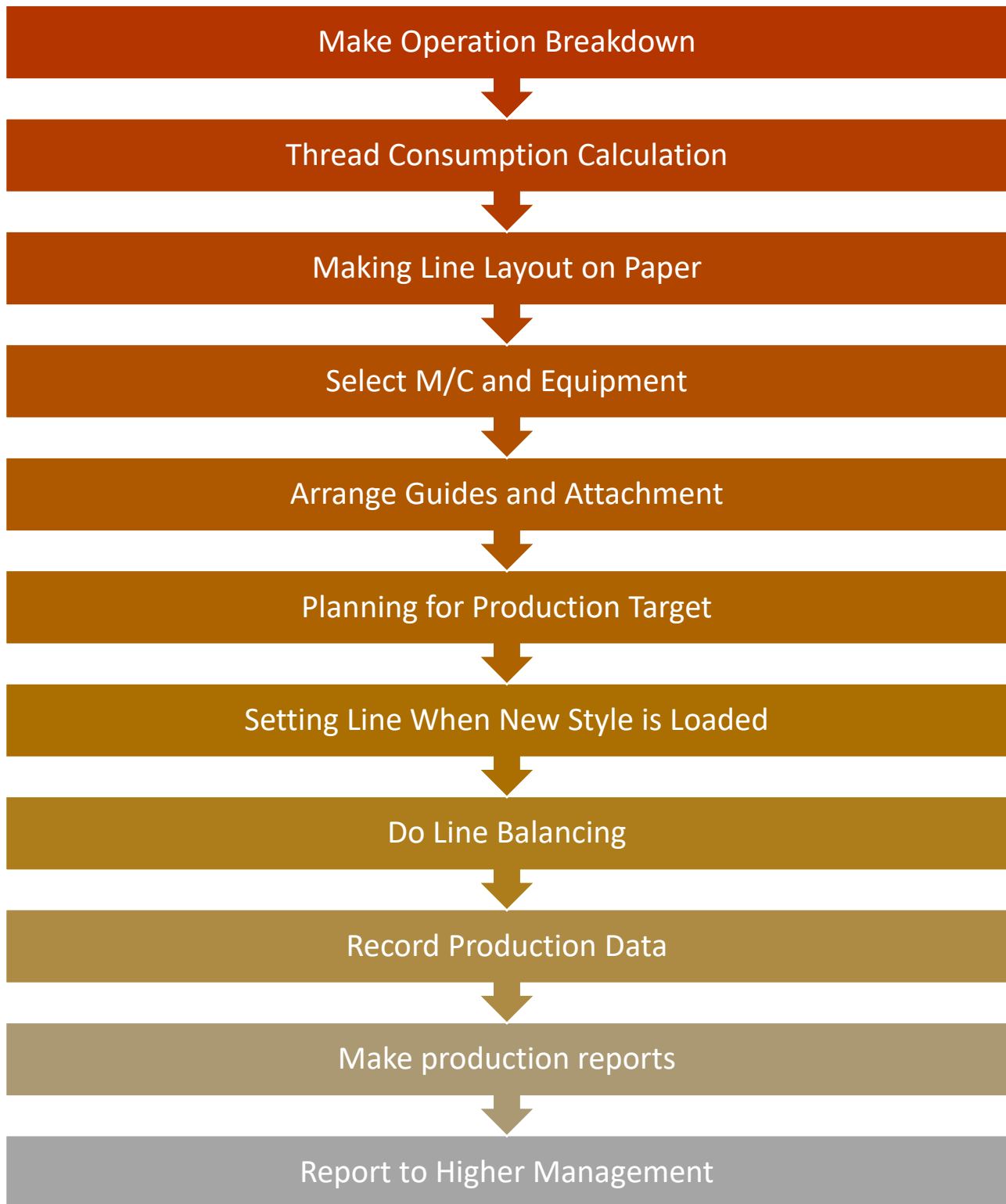
2.1.1 Industrial Engineering

Industrial Engineering (IE) is all close decisions - it is the building revision that recommendations the broadest exhibit of chances as far as utilize, and it is distinguished by its protection. While extra designing self-controls have a tendency to apply administrations to exceptionally point by point regions, modern architects might be begin possessed all over: from standard assembling organizations to aircrafts, from conveyance organizations to monetary foundations, from primary therapeutic manifestations to counseling enterprises, from innovative organizations to worries in the sustenance business.

Industrial Engineering is the main building revision with close families to association - a few modern specialists (IEs) exchange on to compelling professions in administration. Additionally, in the event that you consider that one day you will begin and run your privately owned business, a modern designing sequencer will offer you with the best bore for this –



2.1.2 Flow chart of industrial Engineering:



2.1.3 Careers in Industrial Engineering

Mechanical specialists create procedures and frameworks that enhance quality and profitability. Mechanical designers make noteworthy commitments to their managers by sparing cash while improving the working environment for different specialists. All things considered, they can look for some kind of employment in any association that esteems these objectives.

2.1.4 Pre-production

- Gotten tack pack from merchandiser and compose remarks basic activity and compose SMV and profitability construct amount in light of tack pack printed copy and sign
- Send to merchandiser SMV, hope to absorb information and effectiveness for costing by E-Mail
- Tack pack comments savvy test development and example check
- Moke up make and submit test and example segment
- Test input design savvy test development
- Exceptional envelope and connection orchestrate test segment
- Style assessment report make sent mechanical AGM
- Refresh SMV, efficiency and expectation to absorb information in first respond programming
- Activity announcement make for SMV by sew simple framework to asked for individual
- Creation spending plan give each style and setter sir for check and after send asked.

2.1.5 Post production

- Day by day examine the generation target and accomplished report furnish talk about with PM and AGM creation
- Refresh labor and propelled focus in FR business programming
- Go to day by day generation meeting masterminded by AGM creation
- Design make talk about with PM and line boss about format and submit 1 duplicate
- Line nourishing/arrange change over report
- Technique apply/movement lessen/superfluous movement or task decrease
- Uncommon envelope and connection organize creation floor
- Go to pre-creation meeting examine exceptional envelope and gauge target
- Time think about/limit check/follow up time consider
- Line adjusting man and machine
- Gather cutting report and give creation think about report
- Generation line development and attempt to fathom it
- Gather development for IE learning sharing gathering.

2.1.6 Utilization of IE

- Computers and Simulation
- Materials Handling
- Robotics and Automation
- Management Information Systems
- Logistics and Distribution
- Advanced Manufacturing Processes
- Facilities Layout and Location
- Quality Control
- Artificial Intelligence

2.1.7 What IEs Do:

Industrial Engineering is about decisions. Other designing controls apply abilities to certain regions. IE gives professionals the chance to work in an assortment of organizations.

Numerous experts say that a modern designing training offers the best of the two universes: an instruction in both building and business.

The most unmistakable part of mechanical building is the adaptability it offers. Regardless of whether it's shortening a rollercoaster line, streamlining a working room, appropriating items around the world, or assembling predominant autos, these difficulties share the shared objective of sparing organization's cash and expanding efficiencies.

As organizations receive administration methods of insight of ceaseless efficiency and quality change to make due in the undeniably focused world market, the requirement for modern architects

is developing. Why? Mechanical designers are the main building experts prepared particularly to be efficiency and quality change masters.

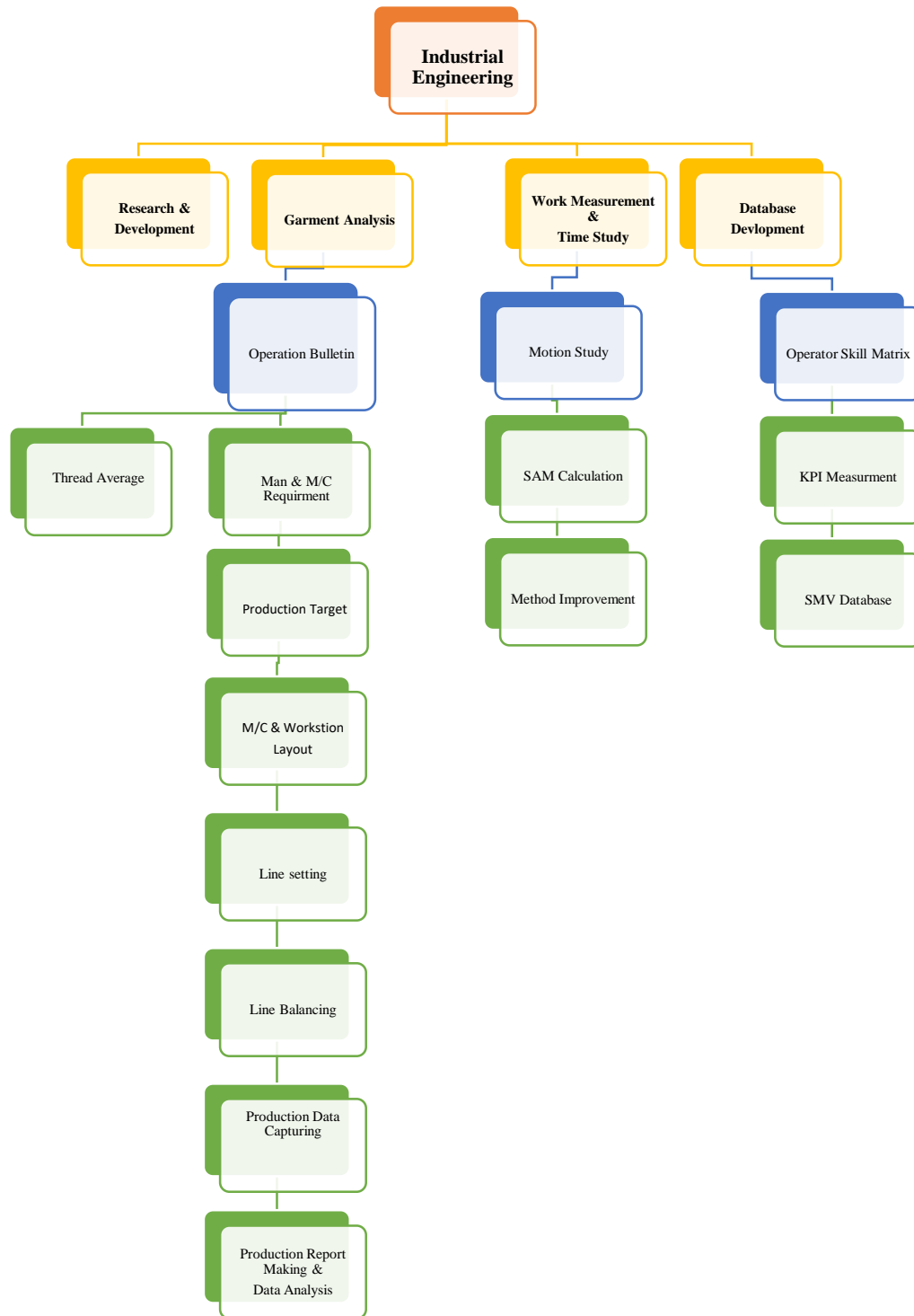
Industrial specialists make sense of how to improve. They design procedures and frameworks that enhance quality and profitability. They work to take out exercise in futility, cash, materials, vitality and different items. This is the reason numerous mechanical specialists wind up being advanced into administration positions.

Numerous individuals are deceived by the term mechanical architect. It's not just about assembling. It likewise includes benefit enterprises, with numerous IEs utilized in media outlets, transportation and coordination's organizations, and social insurance associations.

The advantages of mechanical designing are boundless as demonstrated in three distinctive slide appears.



2.1.8 IE Working flow Chart:



2.1.9 Job Duties and Tasks for: "Industrial Engineer"

1. Apply measurable strategies and perform scientific figuring's to decide fabricating forms, staff prerequisites, and generation gauges.
2. Organize quality control destinations and exercises to determine creation issues, boost item dependability, and limit cost.
3. Deliberate with sellers, staff, and administration work force in regards to buys, strategies, item particulars, fabricating abilities, and venture status.
4. Draft and outline format of hardware, materials, and workspace to delineate most extreme effectiveness, utilizing drafting instruments and PC.
5. Survey creation plans, building details, arranges, and related data to acquire information of assembling techniques, methods, and exercises.
6. Speak with administration and client work force to create generation and plan guidelines
7. Gauge generation cost and impact of item configuration changes for administration audit, activity, and control.
8. Detail inspecting techniques and plans and create structures and guidelines for recording, assessing, and announcing quality and unwavering quality information.
9. Record or supervise recording of data to guarantee cash of designing illustrations and documentation of generation issues.
10. Study tasks arrangement, material stream, useful proclamations, association outlines, and undertaking data to decide laborer capacities and obligations.
11. Coordinate laborers occupied with item estimation, examination, and testing exercises to guarantee quality control and dependability.
12. Actualize techniques and strategies for mien of discrepant material and imperfect or harmed parts, and survey cost and duty.
13. Assess exactness and precision of creation and testing hardware and designing illustrations to define remedial activity design.

14. Break down measurable information and item details to decide models and set up quality and dependability goals of completed item.
15. Create producing strategies, work usage norms, and cost examination frameworks to advance proficient staff and office use.
16. Suggest strategies for enhancing use of work force, material, and utilities.
17. Plan and set up grouping of activities to manufacture and gather parts or items and to advance proficient usage.
18. Finish creation reports, buy requests, and material, apparatus, and gear records.
19. Timetable conveyances in light of generation estimates, material substitutions, stockpiling and taking care of offices, and support prerequisites.
20. Manage and modify work process plans as per set up assembling groupings and lead times to assist creation tasks.

2.2.2 Work Study

Definition by ILO: Is a nonexclusive term for strategies, especially strategy study and work estimation, which are utilized for the examination of human work in every one of its specific circumstances, and which lead efficiently to examination of the considerable number of variables which influence the productivity and economy of the circumstance being checked on,

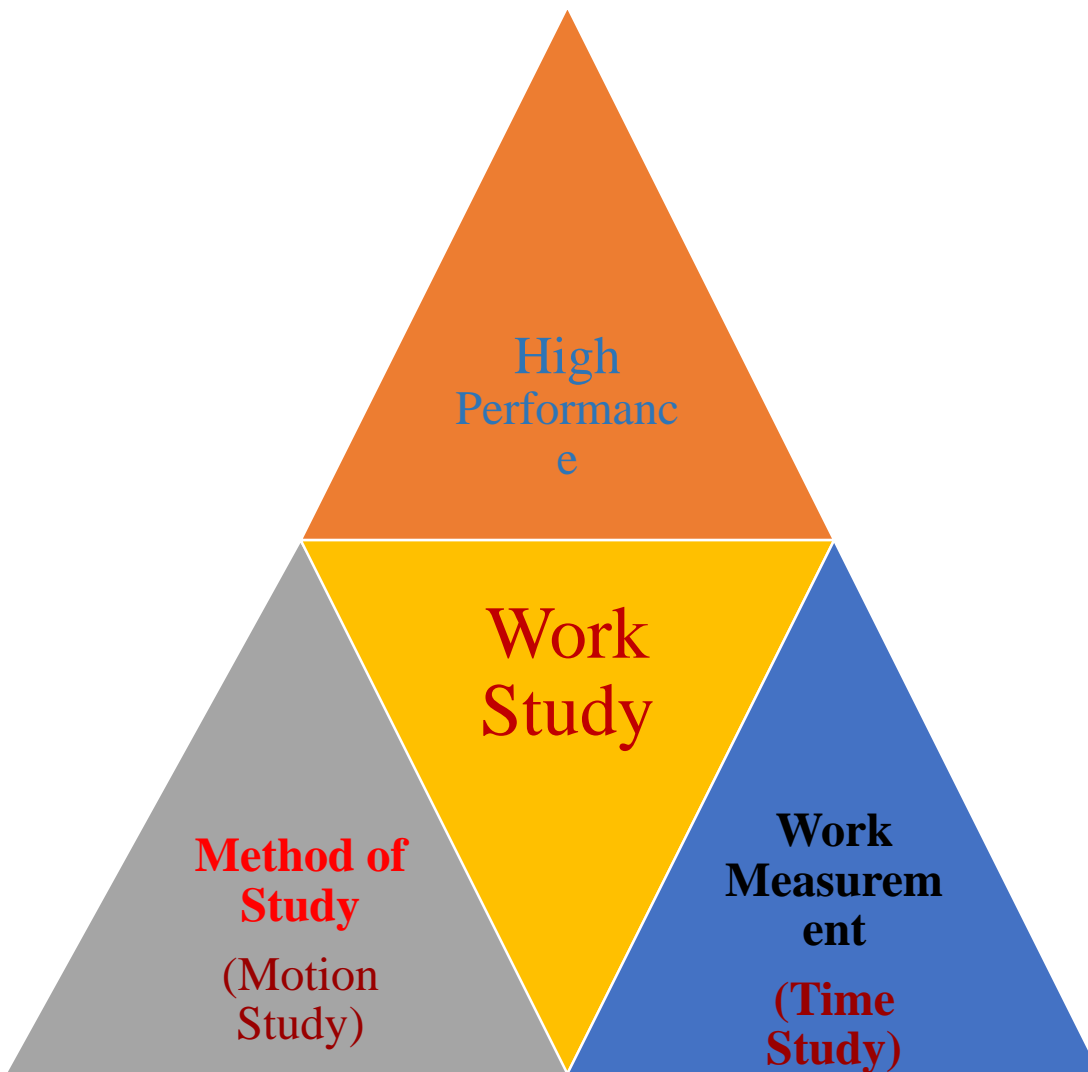


Fig 2.7.1 Framework Pyramid of Work Study

Work contemplate is a methods for upgrading the generation proficiency (efficiency) of the firm by disposal of waste and superfluous tasks. It is a system to recognize non-esteem including tasks by examination of the considerable number of components influencing the activity. It is the main exact and precise methodology arranged strategy to set up time benchmarks. It will add to the benefit as the investment funds will begin promptly and proceed for the duration of the life of the item. Strategy study and work estimation is a piece of work contemplates. Some portion of technique examine is movement think about, work estimation is likewise called by the name 'Time consider'.

2.2.3 Objectives:

- ❖ To examinations the present strategy for completing an occupation, methodically keeping in mind the end goal to build up another and better technique
- ❖ To gauge the work substance of an occupation by estimating the time required to carry out the activity for a qualified laborer and consequently to set up standard time.
- ❖ To build the efficiency by guaranteeing the most ideal utilization of human, machine and material assets and to accomplish best quality item/benefit at least conceivable cost
- ❖ To enhance operational proficiency.

2.2.4 Benefits of work study:

- Increased productivity and operational efficiency
- Reduced manufacturing costs
- Improved work place layout
- Better manpower planning and capacity planning
- Fair wages to employees
- Better working conditions to employees
- Improved work flow
- Reduced material handling costs.

2.2.5 Work measurement:

The application of techniques designed to establish the time for a qualified worker to carry out a specified job at a defined level of performance.

A qualified worker is one who is accepted as having the necessary physical attributes, possessing the required intelligence and the education and having acquired the necessary skill and knowledge to carry out the work in hand to satisfactory standards of safety, quantity and quality. – ILO.

2.2.6 Work simplification:

Includes change in work strategies or work process started and created by laborers or chiefs at work because of techniques preparing and/or monetary motivations. It is a composed utilization of good judgment to discover and apply better methods for doing any work at lesser cost.

2.2.7 Basic work study procedure:

- ❖ Select the activity or process or the task to be contemplated
- ❖ Record every single significant actuality about the activity or process or task
- ❖ Look at fundamentally all the recorded realities
- ❖ Build up the new strategy
- ❖ Measure the work content and build up the standard time
- ❖ Characterize the new technique
- ❖ Introduce the new technique.

2.2.8 Some important terms and definition:

- Work Study
- Method Study

- Work Measurement
- Work Sampling
- Work Content
- Time Study
- Qualified Worker
- Element
- Work Cycle
- Rating
- Standard Performance
- Basic Time
- Selected Time
- Relaxation Allowance
- Standard Time
- Predetermined Time
- Work Specifications

2.2.9 Work Study:

Work think about is the orderly examination of the strategies for carrying on exercises in order to enhance the viable utilization of assets and to set up measures of execution for the exercises being completed.

2.3.1 Method Study:

Technique think about is the precise chronicle and basic examination of methods for getting things done keeping in mind the end goal to make enhancements.

2.3.2 Work Measurement:

Work measurement is the application of techniques designed to establish the time for a qualified worker to carry out a task at a defined rate of working

2.3.3 Work Sampling:

Work sampling is a method of finding the percentage occurrence of a certain activity by statistical sampling and random observations.

2.3.4 Work Content:

The work content of a job or operation is defined as: basic time + relaxation allowance + any allowance for additional work – e.g. that part of contingency allowance which represents work.

2.3.5 Time Study:

Time study is a work measurement technique for recording the times of performing a certain specific job or its elements carried out under specified conditions, and for analysing the data so as to obtain the time necessary for an operator to carry it out at a defined rate of performance.

2.3.6 Qualified Worker:

A qualified worker is one who has acquired the skill, knowledge and other attributes to carry out the work in hand to satisfactory standards of quantity, quality and safety.

2.3.7 Element:

An element is a distinct part of a specified job selected for convenience of observation, measurement and analysis.

2.3.8 Work Cycle:

A work cycle is a grouping of components which are required to play out a vocation or yield a unit of creation. The arrangement may in some cases incorporate incidental components.

2.3.9 Rating:

Rating is the appraisal of the specialist's rate of working with respect to the eyewitness' idea of the rate comparing to standard pace.

2.4.1 Standard Performance:

Standard execution is the rate of yield which qualified laborers will normally accomplish without over-effort as a normal over the working day or move, gave that they know and cling to the predetermined technique and gave that they are inspired to put forth a concentrated effort to their work.

This execution is signified as 100 on the standard rating and execution scales.

2.4.2 Basic Time:

Fundamental time is the ideal opportunity for completing a component of work at standard rating.

2.4.3 Selected Time:

The chose time is the time picked as being illustrative of a gathering of times for a component or gathering of components. These circumstances might be either watched or fundamental and ought to be indicated as chosen watched or chose essential time.

2.4.4 Relaxation Allowance:

Unwinding recompense is an expansion to the fundamental time proposed to furnish the specialist with the chance to recoup from the physiological and mental impacts of doing determined work under indicated.

2.4.5 Standard Time:

Standard time is the aggregate time in which a vocation ought to be finished at standard execution.

2.4.6 Predetermined Time:

A foreordained time standard is a work estimation method whereby times built up for fundamental human movements (arranged by the idea of the movement and the conditions under which it is made) are utilized to develop the ideal opportunity for a vocation at a characterized level of execution.

2.4.7 Work Specifications:

A work determination is a record setting out the points of interest of an activity or occupation, how it is to be played out, the design of the working environment, particulars of machines, apparatuses and machines to be utilized, and the obligations and duties of the specialist.

2.4.8 Method study:

Method Study is the efficient chronicle and basic examination of existing and proposed methods for doing work, as a methods for creating and applying less demanding and more powerful strategies and diminishing expenses.

Strategy think about is additionally called techniques building or work outline. Strategy building is utilized to depict gathering of investigation procedures which center on enhancing the adequacy of men and machines.

As indicated by British Standards Institution (BS 3138):

"Technique consider is the methodical chronicle and basic examination or existing and proposed ways or doing fill in as a methods or creating and applying less demanding and more powerful strategies and decreasing expense."

On a very basic level strategy think about includes the breakdown of a task or methodology into its segment components and their precise investigation. In completing the strategy contemplate, the correct demeanor of brain is imperative.

2.4.9 The method study man should have:

1. The want and assurance to create comes about.
2. Capacity to accomplish comes about.
3. A comprehension of the human variables included.

Technique think about degree lies in enhancing work strategies through process and activity investigation, for example

1. Assembling activities and their grouping.
2. Laborers.
3. Materials, apparatuses and measures.
4. Format of physical offices and work station plan.
5. Development of men and material taking care of. 15
6. Workplace.

2.5.1 Origin of Methods Engineering:

Strategies designing became out of the spearheading improvements of the Gilbreths (Frank B, and his better half, Lillian M.) who created a considerable lot of the devices of "movement examine" as a piece of plan a deliberate way to deal with the examination of work techniques. Straight to the point B Gilbreth first wind up intrigued by techniques investigation as an outgrowth of his perceptions of block laying.

Gilbreth, who in 1885 was utilized as a student bricklayer, soon watched that an apprentice bricklayer utilized one arrangement of movements when laying blocks gradually, another set when working at normal speed, and still an alternate set when working at fast speed. Because of his perceptions, he created a customizable framework and built up an arrangement of movements that extraordinarily expanded the quantity of blocks that could be laid in a day.

2.5.2 Organization for Methods Engineering:

As showed already, strategies building is a vital capacity to guarantee that the most effective techniques are being utilized. This movement is most as often as possible performed by modern architects; be that as it may, all specialists ought to be worried about work strategies. The specialists might be relegated to a focal strategies building or modern designing office or might be appointed on a decentralized premise to particular working divisions.

Some multilane organizations keep up both a focal modern building gathering to take a shot at issues basic to numerous plants and furthermore allot architects to each plant to take a shot at ventures related just to that plant.

2.5.3 Approach to Methods Design:

Charles E. Geisel States that with a specific end goal to outline a framework (technique) completely, eight components must be considered.

1. Reason: The capacity, mission, point or requirement for the framework.
2. Info: The physical things, individuals, or potentially data that enter the framework to be handled into the yield.
3. Yield: That which the framework produces to achieve its motivation, for example, completed steel, amassed toasters, boxes, et cetera.
4. Succession: The means required to change over, change, or process the contribution to the yield.
5. Condition: The condition under which the framework works, including physical, attitudinal, hierarchical, authoritative, social, political, and lawful condition.
6. Human operators: The general population who help in the means of the arrangement without turning into a piece of the yield.
7. Physical impetuses: The gear and physical assets that guide in the means of the grouping without winding up some portion of the yield.
8. Data helps: Knowledge and data assets that guide in the means of the grouping without winding up some portion of the yield.

To guarantee that the ideal technique is discovered, an efficient way to deal with strategies outline, better than the utilization of a 'hit or miss' strategy, is utilized. Expressed in least complex frame, this approach comprises of the accompanying advances:

1. Investigate the issue: Identify the issue and after that protected all known data about it using suitable examination systems.
2. Question are available strategy. In the event that a strategy directly exists, question the points of interest of the known data to decide the standards damaged.
3. Blend a proposed strategy: Formulate a proposed technique for playing out the work, typifying every one of the standards of sound strategies building.
4. Apply the proposed strategy: Standardize and apply the new technique.

2.5.4 Objectives of Method Study

Strategy consider is basically worried about discovering better methods for getting things done.

It includes esteem and expands the effectiveness by wiping out superfluous tasks, 17

Avoidable deferrals and different types of waste. The change in proficiency is accomplished through:

- Enhanced format and plan of work environment
- Enhanced and proficient work systems.
- Powerful usage of men, machines and materials
- Enhanced outline or particular of the last item
- 5. Exhibit and dissect confirmed actualities concerning the circumstance.
- 6. To inspect those realities fundamentally

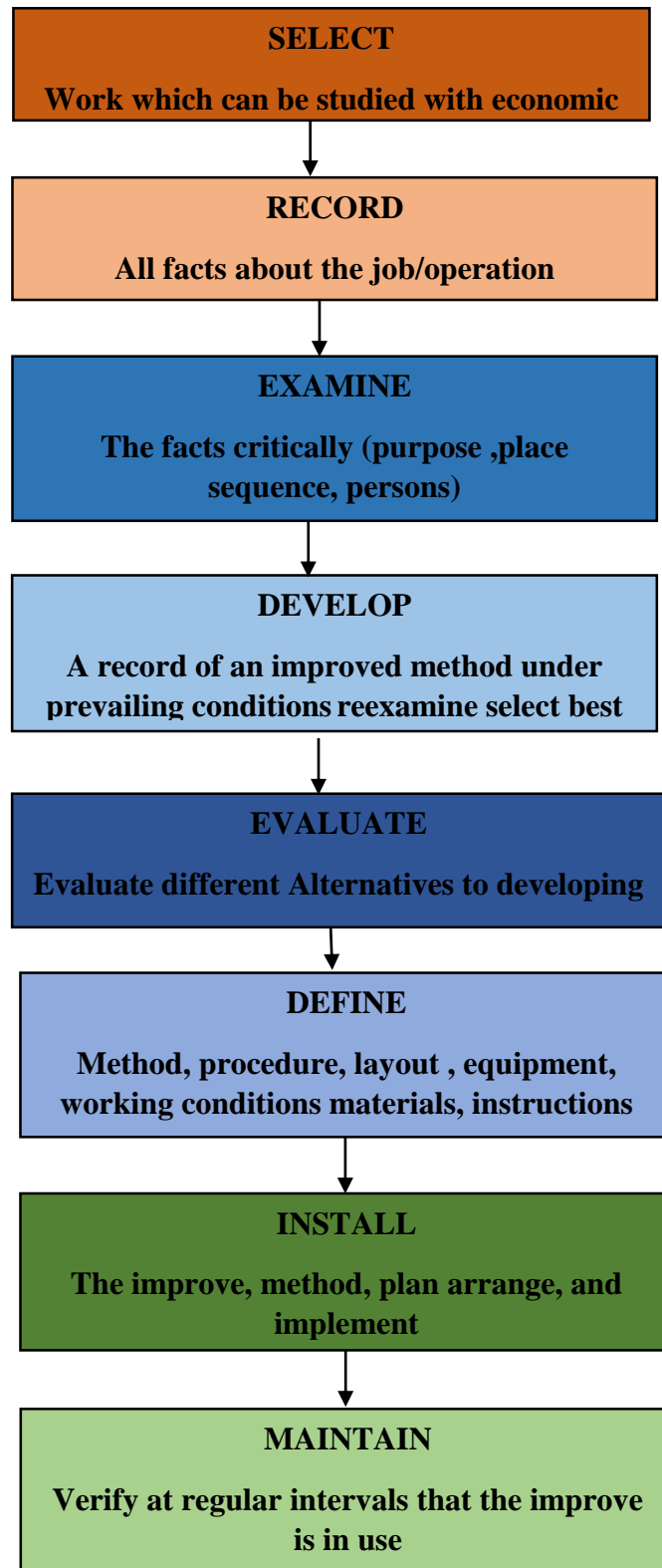
- 7. To build up the most ideal answer under given conditions in light of basic examination of actualities

2.5.5 Scope of Method Study

The extent of technique contemplate isn't confined to just assembling ventures. Strategy examine procedures can be connected adequately in benefit division also. It can be connected in workplaces, doctor's facilities, banks and other administration associations. The territories to which strategy study can be connected effectively in assembling are:

1. To enhance work techniques and methods
2. To decide the best arrangement of doing work
3. To smoothen material stream with least of back following and to enhance design
4. To enhance the working conditions and thus to enhance work effectiveness
5. To decrease tedium in the work
6. To enhance plant use and material use
7. Disposal of waste and inefficient activities

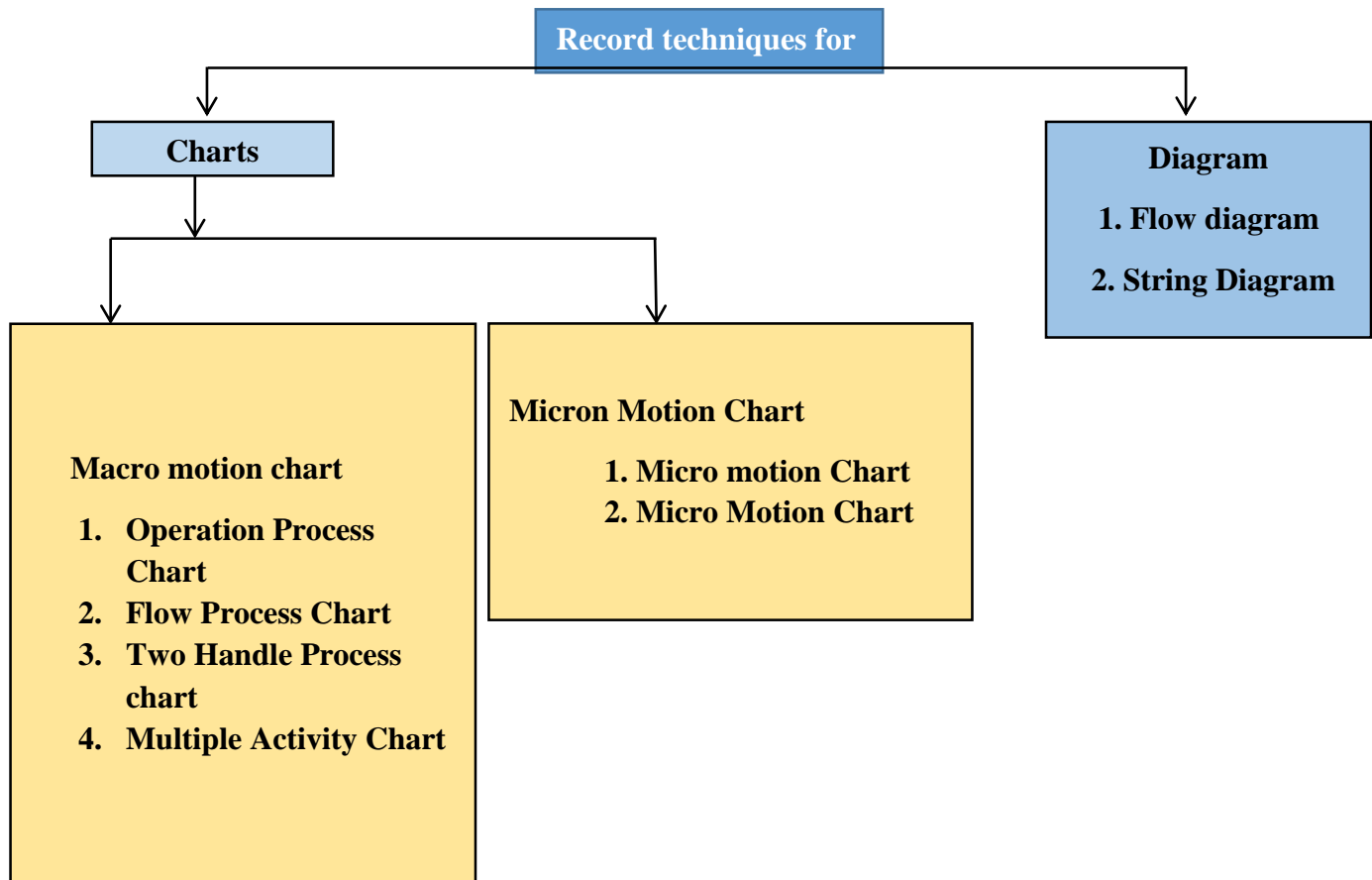
2.5.6 Steps or Procedure Involved in Methods Study:



2.5.7 Recording Techniques for Method Study

The subsequent stage in fundamental technique, in the wake of choosing the work to be considered is to record all realities identifying with the current strategy. All together that the exercises chose for

Examination might be pictured completely and with a specific end goal to enhance them through resulting basic examination, it is basic to have a few methods for setting on record all the vital actualities about the current technique. Records are particularly helpful to make when correlation with evaluate the viability of the proposed enhanced strategy. The account strategies are intended to rearrange and institutionalize the chronicle work. For this reason graphs and charts are utilized.



2.5.8 Micro motion Study

Smaller scale movement consider, which was begun by Frank B. Gilbreth, is a standout amongst the most demanding types of work examination accessible for work change. It is an examination strategy making utilization of films (or tape) taken at a steady and known speed. The film turns into a lasting record of both the strategy being utilized and the time devoured in taking every necessary step.

Albeit smaller scale movement examine some time ago made utilization of films, not very many organizations today are utilizing them. As showed before, tape hardware has been produced so broadly that it has practically supplanted the utilization of the movie camera. Assist it is so shoddy and simple to utilize that it makes the more seasoned approach bygone.

Smaller scale movement examine gives an important system to making minute examinations of those activities that are short in cycle, contain quick developments, and include high generation over a drawn out stretch of time. Along these lines it is exceptionally valuable in dissecting tasks, for example, the sewing of pieces of clothing, get together of little parts and comparable exercises.

2.5.9 Memo motion Study

Before leaving the general zone of small scale movement consider, let us touch quickly on reminder movement ponder. Reminder movement consider, which was started by M.E. Mundel, is extraordinary types of miniaturized scale movement examine in which the films or tape are taken at moderate velocities. Sixty and one hundred edges for every minutes are generally normal.

Update movement ponder has been utilized to examine the stream and treatment of materials, team exercises, militiaperson and machine connections, stockroom exercises, retail chain

2.6.1 Principles of Motion Economy

Through the pioneer work of Gilbreth, Ralph M. Barnes and different examiners, certain standards for movement economy and productivity have been created. A portion of the more vital of these standards are the accompanying:

1. The developments of the two hands ought to be adjusted and the two hands should start and end their movements at the same time.
2. The hands ought to do beneficial work and ought not be sit without moving in the meantime aside from amid rest periods.
3. Movements of the hands ought to be made in inverse and symmetrical course and in the meantime.
4. The work ought to be organized to allow it to be performed with a simple and common beat.
5. Energy and ballistic-type developments ought to be utilized wherever conceivable so as to lessen solid exertion.
6. There ought to be a distinct area for all instruments and materials, and they ought to be situated before and near
7. Canisters or different gadgets ought to be utilized to convey the materials near the purpose of utilization.
8. The working environment ought to be intended to guarantee sufficient brightening, legitimate working environment stature, and arrangement for interchange standing and sitting by the administrator.
9. Wherever conceivable, dances, apparatuses, or other mechanical gadgets ought to be utilized to assuage the hands of superfluous work.

10. Instruments ought to be prepositioned wherever conceivable so as to encourage getting a handle on them.
11. Question ought to be dealt with, and data recorded. Just once.

2.6.2 Job Enlargement and Enrichment:

This has prompted the conflict of various social researchers that jobs should be amplified or enhanced. Frederick Herzberg, one advocate of employment advancement, feels that the motivation behind occupation improvement ought to be to take out the unwanted attributes of very dreary, specific work by amplifying it to include:

1. More noteworthy assortment of learning and ability
 2. Giving a man an entire regular unit of work (module, division, region, and so forth.)
 3. More mind boggling usage of the essential intellectual and engine capacities controlled by the laborer.
 4. More flexibility and duty in the execution of the jobs needing to be done.
1. Among the rules that generally are connected in work advancement programs, the accompanying are taken care of by one substantial organization.
 1. Guarantee that there is assortment in the activity content.
 2. Incorporate into the work circumstance an open door for the laborer to develop and learn.
 3. Give a chance to every laborer to know about the part that his or her activity plays in the aggregate assembling process required to deliver the item.
 4. Plan the work with the goal that it has significance to the specialist and gives pride in execution to the laborer.
 5. Guarantee that the work is sensibly requesting and practically comprehensive. Accommodate self-bearing of the work and for the checking of nature of yield.

2.6.3 Social and Economic Effects of method Study

As pointed out toward the start of this section, present day industry is always hunting down better techniques. At the point when a business stops to push ahead, it will lost ground and may inevitably come up short. It is thus that the real organizations have composed mechanical building gatherings, work rearrangements and esteem investigation programs, recommendation frameworks, quality circles, and different techniques for accomplishing diminished expenses of assembling their items.

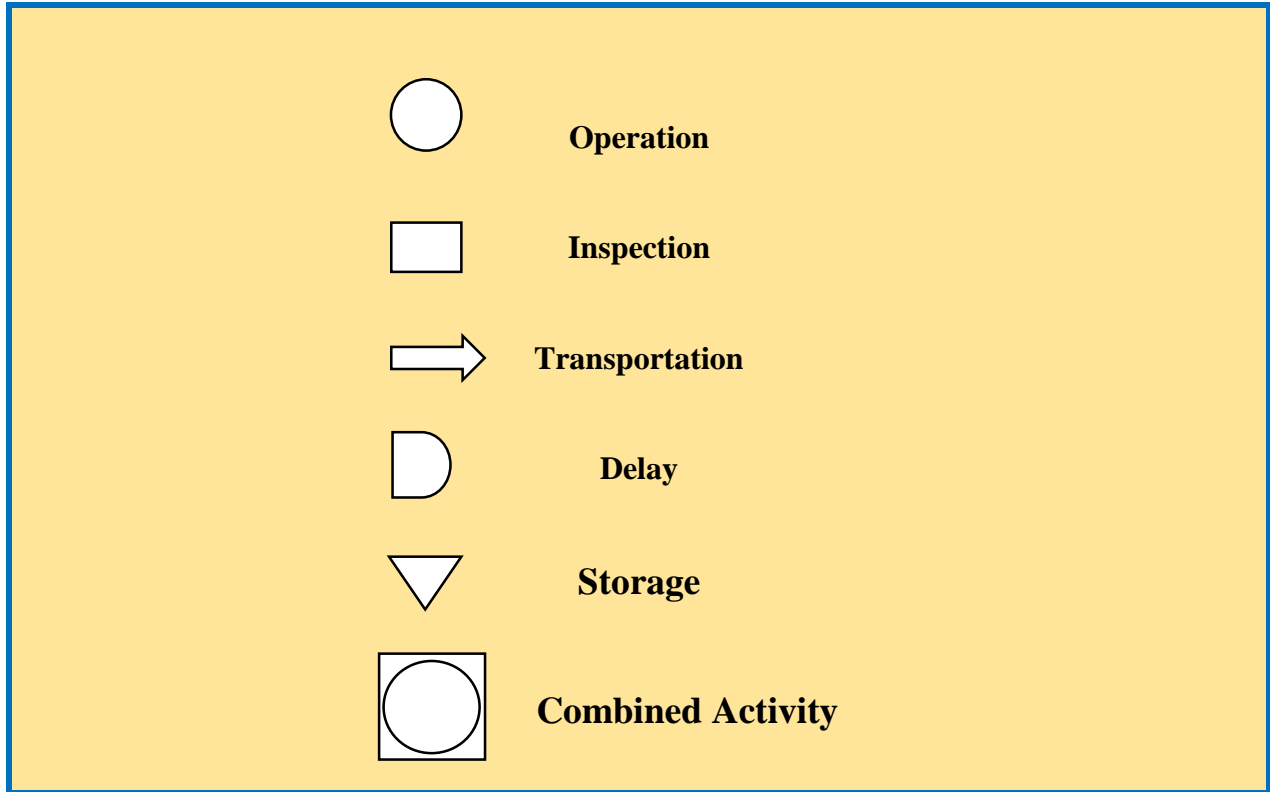
One of the outcomes of these projects has been expanded motorization, which, thus, has prompted the generation of an ever increasing number of products per work hour. Among the long-run benefits got from this expanded yield have been higher genuine wages,

an enhanced way of life, a shorter work week, and a response of the physical rigors of the activity.

2.6.4 Symbols Used in Method Study

Graphical strategy for recording was begun by Gilberth, keeping in mind the end goal to make the introduction of the actualities obviously with no equivocalness and to empower to get a handle on them rapidly and unmistakably. It is helpful to utilize images rather than composed depiction.

Fig 2.10.6.1 Symbols Used in Method Study



2.6.5 Motion Study

Movement examine is a piece of strategy think about where examination of the movement of an administrator or work will be contemplated by following the recommended strategies.

2.6.6 Principles of Motion study

There are various standards concerning the economy of developments which have been produced because of experience and which shapes the reason for the advancement of enhanced techniques at the working environment. These are first utilized by Frank Gilbreth, the originator of movement examine and additionally revamped and increased by Barnes, Maynard and others.

The standards are gathered into three headings:

- Use of the human body.
- Arrangement of workplace.
- Design of tools and equipment.

2.6.7 Recording Techniques of Motion Study

Most of the techniques mentioned in method study is used in the motion study.

They are as follows:

1. Macro Motion Study

- (a) Flow process chart
- (b) Two handed process chart.

2. Micro Motion Study

- (a) SIMO chart

2.6.8 What is line layout?

The sewing line layout can be defined as the way sewing workstations are placed in the sewing floor to form a line (or batch) that works on single style. The purpose of choosing one line layout over other is to achieve best production with existing resources.

The line layout in a factory is not changed frequently. Line layout is designed at the time of plant set up and after that if factory wants to change production system they might need to redesign the line layout. You may reallocate sewing machines while setting line for new styles but you don't change the form of line.

2.6.9 Different Types of Line Layout

1. Line with center table and operators facing same direction

In the line a center table is placed in between two rows of sewing machines. All operators sit on workstation facing same direction. Operators pick bundles from center table and after stitching dispose bundles on the center tables.



Fig 2.12.1.1 Straight line.

2. Line with center table and operators facing opposite direction

Machine layout is same as above one. Difference is on operators' sitting position. Operators sit on the machine keeping center table left side. This layout is more convenient to all operators for picking up work from left side.



Fig 2.12.2.1 Straight line operator facing opposite direction

3. Straight line without center table and one row of machines

In this layout no center table is used for material handling. Instead cutting and finished garments are kept on hangers, on baskets or on trolleys. See the different form of layout where machines are placed in a straight line but no center table is used.

(a) Overhead material movement: Garment components are placed clipped on hanger and transported on a rail.



Fig 2.12.3.1 Straight line layout with overhead material transportation.

(b) Trolley for material transportation: In this layout instead of center table trolleys are used for material transportation.



Fig 2.12.3.2 Straight line layout with trolleys

(c) **Line having individual disposal basket:** Instead of center table individual disposal baskets are provided to operators.



Fig 2.12.3.3 Straight line layout with individual disposal basket

4. Side by side machine layout:

In this layout sewing machines are placed side by side. Two rows of machines are faced each other. This type of layout is used for single piece production system.



Fig 2.12.4.1 Side by Side machine layout

5. U-shaped line layout:

This kind of line layout is used in lean manufacturing. Machines are placed side by side and U-shape is formed to make a line. Operators sit inside. No center table is used. This line layout is also known as modular line.



Fig 2.12.5.1 U-shaped line layout.

6. Modular line layout:

In lean manufacturing, to reduce material transportation and increase the machine utilization sewing machines are placed in such a way that neither it forms a U-shape nor a straight line. Instead machines placed that suits better to work into multiple sewing machines sitting in single chair. I don't know what the exact name of this kind of layout is. This layout is named as modular layout to differentiate from the above one.

7. Machine layout in UPS system:

This is bonus for you. I found this while searching on the web. Machines are placed in straight line but in an angle. In the other UPS workstation machines can be placed side by side.



Fig 2.12.7.1 Line layout in UPS system

2.7.1 Production Planning and Control

Use of standard minutes in production planning.

SAM value of a garment is defined as how much time it would take to complete a garment in sewing. This is also known as garment work content and standard minutes.

To know the role of Garment SAM in production planning, first we have to understand primary roles of a Production Planning and Control.

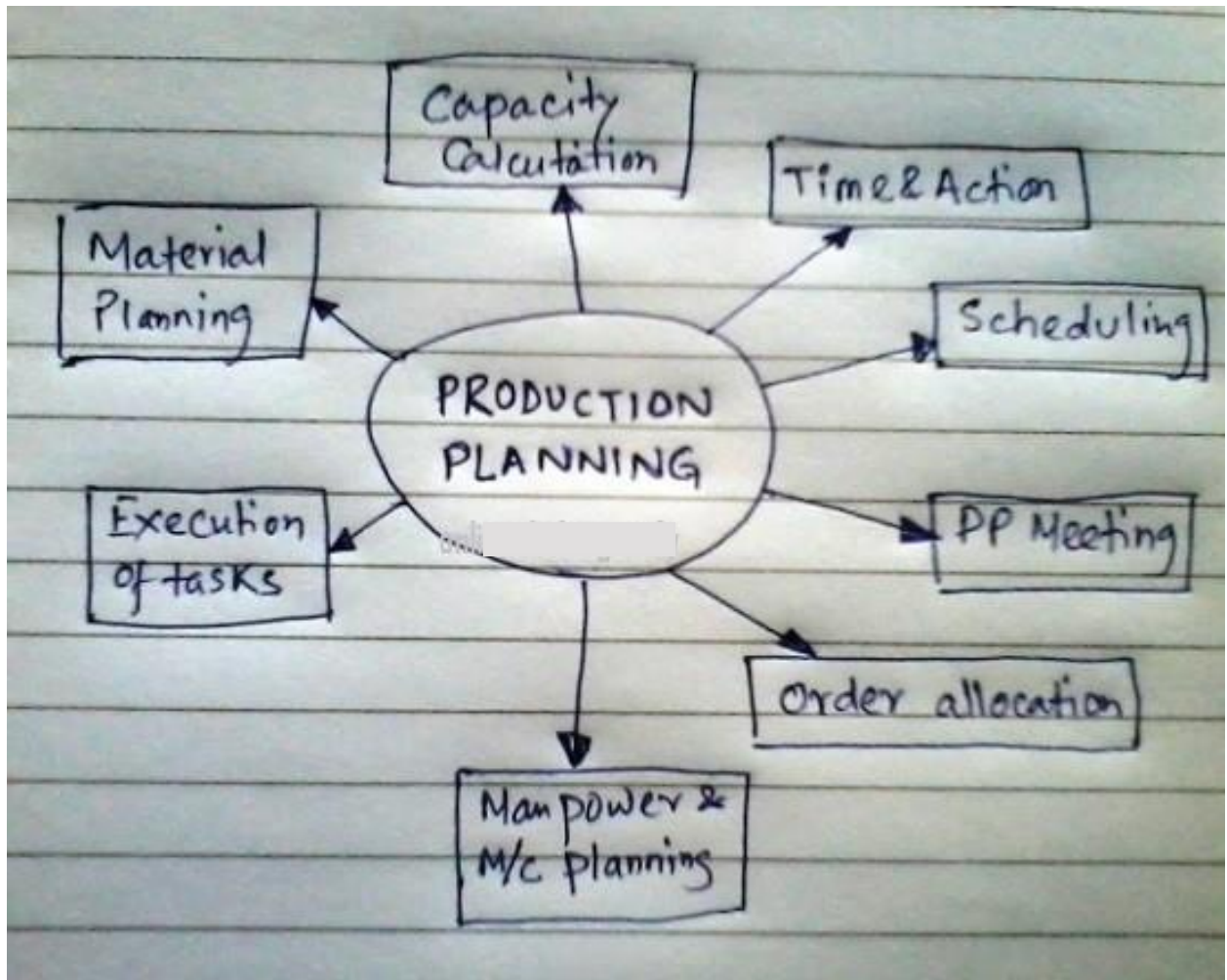


Fig 2.13.1 Functions of Production Planning Department

To be specific, in this article I am mentioning only key roles of PPC department, those can't be performed without having garment SAM value.

- Determining capacity of the factory and capacity of the individual sewing lines in terms of how many pieces (product specific) factory can make in a certain time period with existing machines capacity.
- Order booking based on factory capacity for different types of products
- Allocating of styles to the lines
- Determining production lead time for each orders (styles)
- Process scheduling

2.7.2 Production Planning includes...

1. Line Capacity Calculation: The scientific method of calculating production capacity of a line (in production pieces per day) is to use standard time (SAM) of a garment. So, to determine production capacity of a line (for specific products) in pieces you need to know garment SAM.

2. Lead Time Calculation: Based on the production capacity, order allocation is done for different lines. A planning guy also need to calculate how long a style would run in a line if loaded in a single line. If you need to complete the order in less time, calculate how many lines to be considered for an order.

3. Order booking: During order booking, you need to consider capacity availability in a certain period. In such cases you can use how many minutes you need to make the new orders using garment SAM value and compare the same with how many production minutes are available in your factory for the defined period.

4. Process Scheduling: Time and action calendar or production process scheduling of each order is done by planning department. Again to schedule a list of tasks, you need to know capacity of each process per day (or a predefined period). Based on the capacity of each process you allocate no. of days for the process. Like for sewing department, you determine sewing capacity of your line (or multiple lines) and according to that you set how many days to be given to sewing department for production.

5. Order Execution and Production Monitoring: Standard minutes help planners to set target for sewing lines. Mutually agreed and calculated target given to line supervisors. On daily basis when you check production status you can compare actual production with target production. In case production is getting delayed you can push production team based on given target.

6. Labor Cost Estimation: One most important task is labor cost estimation of a specific order. To estimate how much labor cost to be considered for an order (style), you can't make labor costing without having garment SAM value.

2.7.3 Time study:

Time think about is an attempted and tried technique for work estimation for setting essential circumstances and thus standard circumstances for doing determined work. Its underlying foundations are back to the period between the two World Wars.

The point of time think about is to build up a period for a qualified specialist to perform indicated work under expressed conditions and at a characterized rate of working. The vital capacity of time consider is finding the SMV (standard minute value).

Before influencing an opportunity to examine the work contemplate officer guarantee that state of the activity are typical.



Some condition of time study is given below:

- The work stream into the task is ordinary
- Measure of work in the area is ordinary
- The measure of the work accessible are ordinary

2.7.4 Techniques of Time study:

- 1 Evaluate the execution of the specialist.
- 2 Comprehend the stream of work.
- 3 Time examine individual ought not aggravate the operator's.
- 4 Should illuminate to the administrator that he will do now and again think about
- 5 Enter everything about examination papers by a pen as it can't erase.

2.7.5 Production target:

The measure of work anticipated from

- 1 A normal administrator
- 2 Completely prepared
- 3 Utilizing the right occupation strategy
- 4 Over an ordinary working day

One vital purpose behind having a creation target is to empower every individual to diminish an along these lines cash as indicated by her own particular level of capacity. The administrator will procure a few.

Cash than somebody with less capacity. A generation target builds up a typical benchmark against which to gauge. Science a vocation target is set up for a normal individual, the individuals who are normal in capacity will accomplish more, and the individuals who are beneath normal will do less.

SMV – standard moment esteem is additionally known is standard moment portion: time taken for one task, completely prepared normal creation when utilize revise strategy and compasses to an adequate amount.

2.7.6 Steps in Time Study

1. Set the right occupation strategy.
2. Get an administrator to utilize the right employment strategy.
3. The administrator utilizing time the right occupation technique
4. Succession the administrator by assessing her expertise and exertion
5. Apply the standard occupation remittances to consider the circumstances when the administrator would not be at the machine sewing.
6. Set the time production quota expected of the 100% (Average) operator

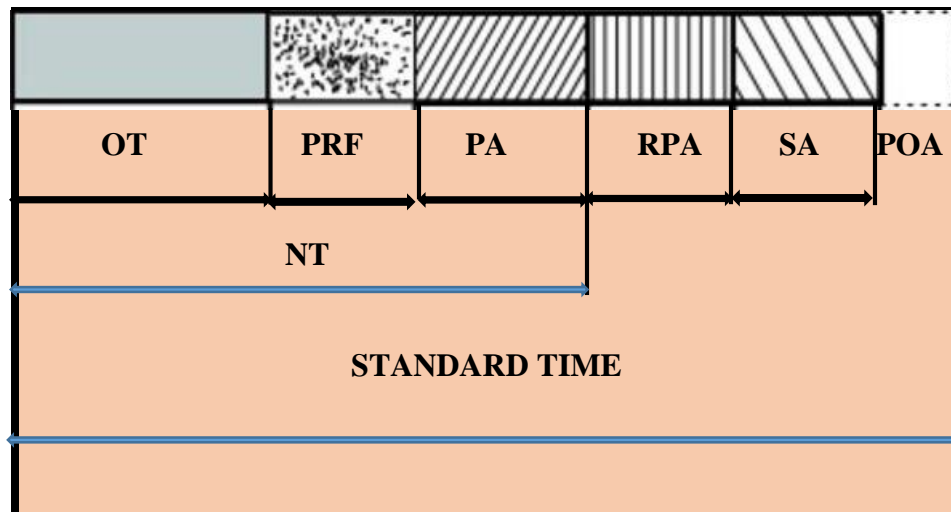


Fig: Component Standard Time

OT - Observe Time

PRF – Performance Rating Time

PA – Process Allowance

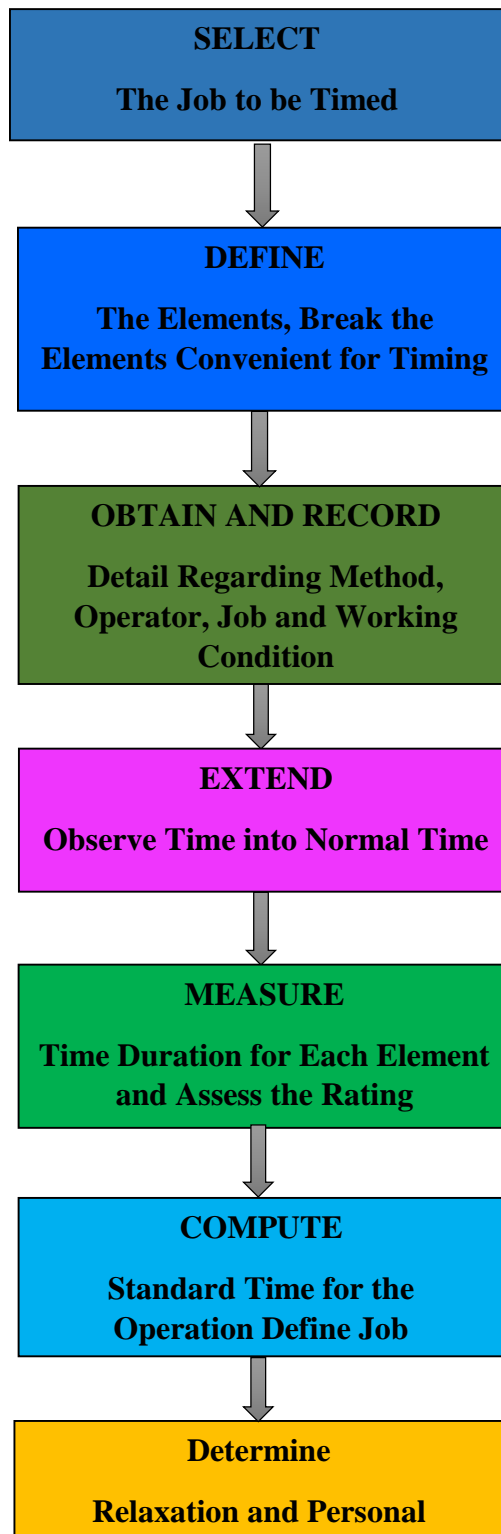
RPA – Rest and Personal Allowance

SA – Special Allowance

POA – Policy Allowance

NT – Normal Time

2.7.7 Step in Time Study:



2.7.8 Work Measurement related formula:

Some Important Work Study Formulas

1. $SMV = \text{Basic Time} + \text{Allowance [Allowance 15\%]}$
2. $\text{Basic Time} = \text{Cycle Time} \times \text{performance Rating}$
3. $\text{Standard allowed minutes (SAM)} = (\text{Basic minute} + \text{Bundle allowances} + \text{machine and personal allowances})$
3. $\text{Efficiency} = \frac{\text{Minutes Earned on STD}}{\text{Total Available Minutes}} \times 100$
4. $\text{Production Minute} = SMV \times \text{No of Produced Garments}$
5. $\text{Available Minute} = \text{No of Worker} \times \text{No of Working Hour} \times 60$

Line Balancing Formulas:

$\text{Pitch Time} = \frac{\text{Total Garments SMV}}{\text{no of Worker}}$

$\text{Upper Control Limit} = \frac{\text{Pitch Time}}{\text{Expected Line Efficiency}}$

$\text{Lower Control Limit} = 2 \times \text{Pitch Time} - \text{Upper Control Limit}$

CHAPTER 3

EXPERIMENTAL DETAILS

3.1.1 Eurotex Knitwear Sewing Machine Detail Sheet:

| Eurotex Knitwear Sewing Machine Details | | | | | | | Date:21-08-16 |
|---|------------|--------------|------------|------------|------------|-----------|---------------|
| M/C Type | Brand Name | Needle | 2nd Floor | 5th Floor | Total Qty. | Others | Remarks |
| Plain | Brother | S/N | 150 | 174 | 324 | | |
| | Brother | D/N | 3 | | 3 | | |
| Overlock | Pegasus | 2N | 130 | 110 | 240 | | |
| | Juki | 2N | 16 | | 16 | | |
| Cylinderbed | Pegasus | | 53 | 43 | 96 | | |
| Flatbed | Pegasus | | 19 | 14 | 33 | | |
| Feed Of the Arm | Brother | | 2 | 4 | 6 | | |
| Barteck | Brother | | 4 | 3 | 7 | | |
| Kanchai PMD | Kanchai | 11N | 2 | | 2 | | Both |
| Button Stitch | Brother | | 8 | | 8 | | Both |
| Hole Stitch | Brother | | 8 | | 8 | | Both |
| Snap Button | Nisho | | 14 | | 14 | | Both |
| Snap Button | Manual | | 6 | | 6 | | |
| Adjust Elastic | Pegasus | | 2 | | 2 | | Both |
| Rib Cutter | Dino | | 7 | 5 | 12 | | |
| Thread Cutter | Unisum | | 24 | 16 | 40 | | |
| Thread Sucker | Unisum | | 4 | | 4 | | Both |
| Cutting M/C | KM | 10 Inc Knife | | | 0 | 12 | |
| Needle Detector | | | | | 0 | 2 | |
| Iron Table | | | | | 0 | 67 | |
| Total | | | 452 | 369 | 821 | 81 | |

Fig: 3.1.1 Eurotex Knitwear Sewing Machine Detail

3.1.1 Euro-Tex Knitwear limited:

Sewing Machine Details

Date: 21-08-16

| M/C Type | Brand Name | Needle | 2 nd Floor | 5 th Floor | Total Qty | Others | Remarks |
|-----------------|------------|--------------|-----------------------|-----------------------|------------|-----------|---------|
| Plain | Brother | S/N | 150 | 174 | 324 | | |
| | Brother | D/N | 3 | | 3 | | |
| Overlock | Pegasus | 2N | 130 | 110 | 240 | | |
| | Juki | 2N | 16 | | 16 | | |
| Cylinderbed | Pegasus | | 53 | 43 | 96 | | |
| Flatbed | Pegasus | | 19 | 14 | 33 | | |
| Feed of the Arm | Brother | | 2 | 4 | 6 | | |
| Barteck | Brother | | 4 | 3 | 7 | | |
| Kanchai PMD | Kanchai | 11N | 2 | | 2 | | Both |
| Button Stitch | Brother | | 8 | | 8 | | Both |
| Hole Stitch | Brother | | 8 | | 8 | | Both |
| Snap Button | Nisho | | 14 | | 14 | | Both |
| Snap Button | Manual | | 6 | | 6 | | |
| Adjust Elastic | Pegasus | | 2 | | 2 | | Both |
| Rib Cutter | Dino | | 7 | | 12 | | |
| Thread Cutter | Unisum | | 24 | | 40 | | |
| Thread Cutter | Unisum | | 4 | | 4 | | Both |
| Cutting M/C | KM | 10 inc Knife | | | 0 | 12 | |
| Needle Detector | | | | | 0 | 2 | |
| Iron Table | | | | | 0 | 67 | |
| Total | | | 452 | 369 | 821 | 81 | |

Total M/C – 821

Plain M/C – 2nd Floor – 150, 5th Floor – 174, Total – 324

Over lock M/C - 2nd Floor – 130, 5th Floor – 110, Total – 240

Cylinder bed M/C - 2nd Floor – 53, 5th Floor – 43, Total – 96

Cutting M/C - 2nd Floor – 19, 5th Floor – 14, Total – 33

Overall M/C – 2nd Floor – 452, 5th Floor - 369

Industrial engineering department also have duty to maintain the sewing M/C. In this section in Eurotex Knitwear have many types of sewing M/C but different kind of Sewing M/C used for different purpose, like – Plain M/C for Plain Sewing, Overlock use for lock the edge of a garments.


2nd and 5th floor have number of sewing M/C – 821, 2nd Floor have 452, 5th Floor have 369, Straight Knif Cutting M/C – 12. Needle detector 2. It is help to create sewing layout in sewing floor also increase the productivity and without waisting time.

3.1.2 Operation Bulletin for Legging of Euro-Tex Knitwear Limited:

EuroTex Knitwear Limited.
Operation Bulletin

Date: Sunday, April 08, 2018
Buyer: NKD
Order Qty: Order: 507
Target/Hr= 220
Printed Date: Sunday, April 08, 2018
Item: Leggines


| Sl. No | Operations Name | M/C | Attachm ent | SMV | Ttl. SMV | MAM | Op. | Hel. | Target/ HD/Hr | TTL Target | Target Variance | Operation Request |
|-----------|----------------------------------|-----|-------------|------|----------|------|-----|------|---------------|------------|-----------------|-------------------|
| 1 | Care label make | PM | | 0.25 | | 0.25 | 1 | | 240 | 240 | 20 | |
| 2 | Back riser join | OL | | 0.26 | | 0.26 | 1 | | 231 | 231 | 11 | |
| 4 | Front riser join | OL | | 0.25 | | 0.25 | 1 | | 240 | 240 | 20 | |
| 5 | Back and front Match | M | | 0.24 | | 0.24 | | 1 | 250 | 250 | 30 | |
| 6 | Side seam with lbl | OL | | 0.76 | | 0.76 | 3 | | 79 | 237 | 17 | |
| 7 | Set for inseam | M | | 0.21 | | 0.21 | | 1 | 286 | 286 | 66 | |
| 8 | Inseam | OL | | 0.64 | | 0.64 | 2.5 | | 94 | 234 | 14 | |
| 9 | Elastic Tak,Cut with mark | PM | | 0.48 | | 0.48 | 2 | | 125 | 250 | 30 | |
| 10 | Body turn | M | | 0.21 | | 0.21 | | 1 | 286 | 286 | 66 | |
| 11 | Elastic Join | OL | | 0.44 | | 0.44 | 2 | | 136 | 273 | 53 | |
| 12 | Main lable attach | PM | | 0.28 | | 0.28 | 1 | | 214 | 214 | -6 | |
| 13 | Waist topstitch | FL | | 0.33 | | 0.33 | 1 | 1 | 182 | 182 | -38 | |
| 14 | Set for leg hem & sticker remove | M | | 0.24 | | 0.24 | | 1 | 250 | 250 | 30 | |
| 15 | Leg hem | FL | | 0.45 | | 0.45 | 2 | | 133 | 267 | 47 | |
| 16 | Leg inseam tak | PM | | 0.22 | | 0.22 | 1 | | 273 | 273 | 53 | |
| TOTAL SMV | | | | 5.51 | | 5.51 | 19 | 5 | | | | |



| PM | OL | FL | BH | DNCS | 2NCS | Helper | Total |
|-------|----|----------|----|------|------|--------|-------|
| 5 | 11 | 3 | | 0 | | 5 | 24 |
| RATIO | | Operator | | 1 | | | |
| | | : | | : | | | |
| | | Helper | | 0.27 | | | |

Fig: 3.1.2 Operation Bulletin for pant of Euro-Tex Knitwear Limited

3.1.2 Operation Bulletin for Legging of Euro-Tex Knitwear Limited:

| Euro-Tex knitwear Limited Operation Bulletin | | | | | | | | | | | | |
|---|---------------------------------|-----|-------------|------|----------|------|-----|------|---------------|---------------------------------|-----------------|--|
| | | | | | | | | | | Target/Hr= 220 | | |
| | | | | | | | | | | Printed Date: April 08, 2018 | | |
| | | | | | | | | | | Date: 07.10.17 Buyer: NKD | | |
| Si. No. | Operation Name | M/C | Attachm ent | SMV | Tti. SMV | MAM | OP. | Hel. | Target/ HD/Hr | TTL Targe t | Targt Varia nce | Operation Request |
| 1 | Care label make | M | | 0.24 | | 0.24 | | 1 | 250 | 250 | 30 | |
| 2 | Back riser join | OL | | 0.27 | | 0.27 | 1 | | 222 | 222 | 2 | |
| 3 | Front riser join | OL | Folder | 0.25 | | 0.25 | 1 | | 240 | 240 | 20 | |
| 4 | Back and front Match | FL | | 0.27 | | 0.27 | 1 | | 222 | 222 | 2 | |
| 5 | Side seam with ibl | FL | Folder | 0.27 | | 0.27 | 1 | | 222 | 222 | 2 |  |
| 6 | Set for Inseam | PM | | 0.27 | | 0.27 | 1 | 1 | 222 | 222 | 2 | |
| 7 | Elastic tac cut with mark | PM | | 0.24 | | 0.24 | 1 | | 250 | 250 | 30 | |
| 8 | Elastic tac cut with mark | OL | | 0.25 | | 0.25 | 1 | | 240 | 240 | 20 | |
| 9 | Body turn | M | | | | | | 1 | #DIV/0! | #DIV/0! | #DIV/0! | |
| 10 | Elastic join | FL | | 0.27 | | 0.27 | 1 | | 222 | 222 | 2 | |
| 11 | Main label attach | PM | | 0.52 | | 0.52 | 2 | | 115 | 115 | 11 | |
| 12 | Waist top stich | M | | 0.24 | | 0.24 | | 1 | 250 | 250 | 30 | |
| 13 | Set for leg hem& sticker remove | PM | | 0.25 | | 0.25 | 1 | | 240 | 240 | 20 | |
| 14 | Leg hem | OL | | 0.54 | | 0.54 | 2 | | 111 | 222 | 2 | |
| 15 | Leg Inseam | M | | 0.22 | | 0.22 | | 1 | 273 | 273 | 53 | |
| TOTAL SMV | | | | 5.51 | | 5.51 | 19 | 5 | | | | |

| PM | OL | FL | BH | DNCS | 2NCS | Helper | Total |
|----|-------|----------|----|------|------|--------|-------|
| 5 | 11 | 3 | | 0 | | 5 | 24 |
| | RATIO | Operator | | 1 | | | |
| | | : | | : | | | |
| | | Helper | | 0.27 | | | |

Total SMV: 5.51

Total MAM: 5.51

Total Number of Helper: 05

Total Number of Operator: 19

This data collected from Euro-Text Knitwear Limited in this case making for one pant total SMV time is 5.51 minutes. 4 types of m/c are used for making this garments. In this Section 19 operators & 5 helper are used for done this job. Total target per hour 220 pcs, and also for TTL Target & Target HD is 250, target variance for care label make variance 30 and for care level SMV 0.25.

3.1.3 Operation Bulletin for T-Shirt of Euro-Text Knitwear Limited:

EuroText Knitwear Limited
Operation Bulletin


Date: 07.10.17
Buyer: Primark

Order Qty: Order :52191

Target/Hr= 220

Printed Date: Item: Tee Shirt L/S

| Sl. No | Operations Name | M/C | Attachment | SMV | Ttl. SMV | MAM | Op. | Hel. | Target/HD/Hr | TTL Target | Target Variance | Operation Request |
|-----------|--------------------------------|-----|------------|------|----------|-----|-----|------|--------------|------------|-----------------|-------------------|
| 1 | Back and front match | M | | 0.24 | 0.24 | | | 1 | 250 | 250 | 30 | |
| 2 | Shoulder Join R with Tape | OL | | 0.27 | 0.27 | 1 | | | 222 | 222 | 2 | |
| 3 | Nek Binding | OL | Folder | 0.25 | 0.25 | 1 | | | 240 | 240 | 20 | |
| 4 | Front nk topstich | FL | | 0.27 | 0.27 | 1 | | | 222 | 222 | 2 | |
| 5 | Bk nk piping | FL | Folder | 0.27 | 0.27 | 1 | | | 222 | 222 | 2 | |
| 6 | Bk nk topstich | PM | | 0.27 | 0.27 | 1 | | | 250 | 250 | 30 | |
| 7 | Nek Open Tack | PM | | 0.24 | 0.24 | 1 | | | 240 | 240 | 20 | |
| 8 | Shoulder join L wt tape | OL | | 0.25 | 0.25 | 1 | | | 240 | 240 | 20 | |
| 9 | Both shoulder secessior | M | | | 0.00 | | | 1 | #DIV/0! | #DIV/0! | #DIV/0! | |
| 10 | Slv Hem | FL | | 0.27 | 0.27 | 1 | 1 | | 222 | 222 | 2 | |
| 11 | Slv geathering | PM | | 0.52 | 0.52 | 2 | | | 115 | 231 | 11 | |
| 12 | Slv match | M | | 0.24 | 0.24 | | | 1 | 250 | 250 | 30 | |
| 13 | Care Label make | PM | | 0.25 | 0.25 | 1 | | | 240 | 240 | 20 | |
| 14 | Slv join | OL | | 0.54 | 0.54 | 2 | | | 111 | 222 | 2 | |
| 15 | Set for side seam | M | | 0.22 | 0.22 | | | 1 | 273 | 273 | 53 | |
| 16 | Side Seam with care label | OL | | 0.68 | 0.68 | 3 | | | 88 | 265 | 45 | |
| 17 | Slv Open and Press & neck tack | PM | | 0.54 | 0.54 | 2 | | | 111 | 222 | 2 | |
| 18 | Body Turn For Hem | M | | 0.21 | 0.21 | | | 1 | 286 | 286 | 66 | |
| 19 | Body Hem | FL | | 0.25 | 0.25 | 1 | | | 240 | 240 | 20 | |
| 20 | Body Turn & sticker remove | M | | 0.23 | 0.23 | | | 1 | 261 | 261 | 41 | |
| TOTAL SMV | | | | 6.01 | 6.01 | 19 | 7 | | | | | |



| | PM | OL | FL | BH | DNCS | 2NCS | Helper | Total |
|-------|----|----|----|----|----------|------|--------|-------|
| | 7 | 8 | 4 | | 0 | | 7 | 26 |
| RATIO | | | | | Operator | 1 | | |
| | | | | | : | : | | |
| | | | | | Helper | 0.37 | | |

Fig: 3.1.3 Operation Bulletin of Euro-Text Knitwear Limited

3.1.3 Operation Bulletin for T-shirt of Euro-Text Knitwear Limited:

**Euro-Tex knitwear Limited
Operation Bulletin**

Target/Hr= 220

Printed Date:
April 08, 2018

Date: 07.10.17
Buyer: Primark

| Si. No. | Operation Name | M/C | Attachm ent | SMV | Tti. SMV | MAM | OP. | Hel. | Target/ HD/Hr | TTL Target | Target Variance | Operation Request |
|-----------|--------------------------------|-----|-------------|------|----------|------|-----|------|---------------|------------|-----------------|-------------------|
| 1 | Back and front match | M | | 0.24 | | 0.24 | | 1 | 250 | 250 | 30 | |
| 2 | Shoulder join R with Tape | OL | | 0.27 | | 0.27 | 1 | | 222 | 222 | 2 | |
| 3 | neck Binding | OL | Folder | 0.25 | | 0.25 | 1 | | 240 | 240 | 20 | |
| 4 | Front nk topstich | FL | | 0.27 | | 0.27 | 1 | | 222 | 222 | 2 | |
| 5 | Bk nk piping | FL | Folder | 0.27 | | 0.27 | 1 | | 222 | 222 | 2 | |
| 6 | Bk Nk topstich | PM | | 0.27 | | 0.27 | 1 | | 222 | 222 | 2 | |
| 7 | Nek open tack | PM | | 0.24 | | 0.24 | 1 | | 250 | 250 | 30 | |
| 8 | Shoulder join L wt tape | OL | | 0.25 | | 0.25 | 1 | | 240 | 240 | 20 | |
| 9 | Both Shoulder seccior | M | | | | | | 1 | #DIV/0! | #DIV/0! | #DIV/0! | |
| 10 | Slv hem | FL | | 0.27 | | 0.27 | 1 | | 222 | 222 | 2 | |
| 11 | Slv Geathering | PM | | 0.52 | | 0.52 | 2 | | 115 | 115 | 11 | |
| 12 | Slv match | M | | 0.24 | | 0.24 | | 1 | 250 | 250 | 30 | |
| 13 | Care Label make | PM | | 0.25 | | 0.25 | 1 | | 240 | 240 | 20 | |
| 14 | Slv Join | OL | | 0.54 | | 0.54 | 2 | | 111 | 222 | 2 | |
| 15 | Set for side seam | M | | 0.22 | | 0.22 | | 1 | 273 | 273 | 53 | |
| 16 | Side Seam with care label | OL | | 0.68 | | 0.68 | 3 | | 88 | 265 | 45 | |
| 17 | Slv Open and Press & neck tack | PM | | 0.54 | | 0.54 | 2 | | 111 | 222 | 2 | |
| 18 | Body turn for hem | M | | 0.21 | | 0.21 | | 1 | 286 | 286 | 66 | |
| 19 | Body Hem | FL | | 0.25 | | 0.25 | 1 | | 240 | 240 | 20 | |
| 20 | Body turn & Sticker remove | M | | 0.23 | | 0.23 | | | 261 | 261 | 41 | |
| TOTAL SMV | | | | 6.01 | | 6.01 | 19 | 7 | | | | |



| PM | OL | FL | BH | DNCS | 2NCS | Helper | Total |
|----|-------|----------|----|------|------|--------|-------|
| 7 | 8 | 4 | | 0 | | 7 | 26 |
| | RATIO | Operator | | 1 | | | |
| | | : | | : | | | |
| | | Helper | | 0.37 | | | |

3.1.4 According to Operation Bulletin of Euro-TEX Knitwear Limited:

Total SMV: 6.01

Total MAM: 6.01

Total Number of Helper: 07

Total Number of Operator: 19

This data collected from Euro-TEX Knitwear Limited in this case legging total SMV time is 6.01 minutes. 4 types of m/c are used for this making of garments. In this Section 19 operators & 7 helper are used for done this job. Total target per hour 220 pcs, and also for Sleeve Join TTL Target & Target HD is 222, target variance for care label make variance 2 and SMV 0.54.

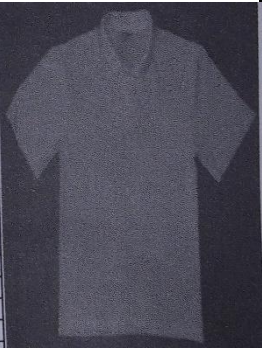
3.1.5 Operation Bulletin Half Sleeve Polo Shirt of Euro-TEX Knitwear Limited

| Masco Industries Limited. | | | | | | | | | | | Operation Bulletin | | Print Date: 8-Apr-18 | |
|---------------------------|--------------------------------------|---------------|------------|------------|-----------|-------------|-----|----------------|---------------|------------------|--------------------|-------------------|----------------------|--|
| 7-Feb-17 | | Buyer: Trutex | | Order Qty: | | Style: 5272 | | Target/Hr= 180 | | Item: Polo Shirt | | Operation Request | | |
| Sl. No | Operations Name | M/C | Attachment | SMV | Total SMV | MAM | Op. | Hel. | Target/H D/Hr | Total Target | Target Variance | | | |
| 1 | Front part iron & middle mark | M | | 0.32 | 0.32 | 0.32 | | 1 | 188 | 188 | 8 | | | |
| 2 | Plkt interlining attach with iron | M | | 0.26 | 0.26 | 0.26 | | 1 | 231 | 231 | 51 | | | |
| 3 | Plkt rulling | OL | | 0.21 | 0.21 | 0.21 | 1 | | 286 | 286 | 106 | | | |
| 4 | Back & front match | M | | 0.24 | 0.24 | 0.24 | | 1 | 250 | 250 | 70 | | | |
| 5 | Both shoulder join | OL | | 0.28 | 0.28 | 0.28 | 1 | | 214 | 214 | 34 | | | |
| 6 | Plkt attach with topstich | PM | | 0.6 | 0.60 | 0.60 | 2 | | 100 | 200 | 20 | | | |
| 7 | Plkt scissoring | M | | 0.32 | 0.32 | 0.32 | | 1 | 188 | 188 | 8 | | | |
| 8 | Placket nose tack | PM | | 0.27 | 0.27 | 0.27 | 1 | | 222 | 222 | 42 | | | |
| 9 | Collar rib mark | M | | 0.25 | 0.25 | 0.25 | | 1 | 240 | 240 | 60 | | | |
| 10 | Collar rib servicing | OL | | 0.27 | 0.27 | 0.27 | 1 | | 222 | 222 | 42 | | | |
| 11 | Collar rib tack | PM | | 0.46 | 0.46 | 0.46 | 1.5 | | 130 | 196 | 16 | | | |
| 12 | Collar rib join | OL | Folder | 0.64 | 0.64 | 0.64 | 2 | | 94 | 188 | 8 | | | |
| 13 | Lable position mark | M | | 0.25 | 0.25 | 0.25 | | 1 | 240 | 240 | 60 | | | |
| 14 | Bk nk topstich with lbl | PM | | 0.64 | 0.64 | 0.64 | 2 | | 94 | 188 | 8 | | | |
| 15 | Placket close both side | PM | | 0.67 | 0.67 | 0.67 | 2 | | 90 | 179 | -1 | | | |
| 16 | Placket 1/16 topstich | PM | | 0.31 | 0.31 | 0.31 | 1 | | 194 | 194 | 14 | | | |
| 17 | Patern topstich | PM | | 0.32 | 0.32 | 0.32 | 1 | | 188 | 188 | 8 | | | |
| 18 | Box inner & outer tack | PM | | 0.68 | 0.68 | 0.68 | 2 | | 88 | 176 | -4 | | | |
| 19 | Sleeve match | M | | 0.27 | 0.27 | 0.27 | | 1 | 222 | 222 | 42 | | | |
| 20 | Sleeve join | OL | | 0.54 | 0.54 | 0.54 | 2 | | 111 | 222 | 42 | | | |
| 21 | Care lable make | PM | | 0.25 | 0.25 | 0.25 | 1 | | 240 | 240 | 60 | | | |
| 22 | Set for side seam | M | | 0.24 | 0.24 | 0.24 | | 1 | 250 | 250 | 70 | | | |
| 23 | Side seam with care label & plkt cut | M | | 0.24 | 0.24 | 0.24 | | 3 | 79 | 237 | 57 | | | |
| 24 | Side seam with care label & plkt cut | OL | | 0.76 | 0.76 | 0.76 | 3 | | 1 | 273 | 273 | 93 | | |
| 25 | Body turn from hem | M | | 0.22 | 0.22 | 0.22 | | 1 | 200 | 200 | 20 | | | |
| 26 | Body hem | FL | | 0.30 | 0.30 | 0.30 | 1 | | 97 | 194 | 14 | | | |
| 27 | Sleeve hem | FL | | 0.62 | 0.62 | 0.62 | 2 | | 250 | 250 | 70 | | | |
| 28 | Sleeve hem | FL | | 0.24 | 0.24 | 0.24 | 1 | | 261 | 261 | 81 | | | |
| 29 | Placket inner tack | PM | | 0.23 | 0.23 | 0.23 | | 1 | 200 | 200 | 20 | | | |
| 30 | Button hole mark | M | | 0.23 | 0.23 | 0.23 | | 1 | 250 | 250 | 70 | | | |
| 31 | Button hole | BH | | 0.30 | 0.30 | 0.30 | 1 | | 188 | 188 | 8 | | | |
| 32 | Button hole | M | | 0.24 | 0.24 | 0.24 | | 1 | 150 | 225 | 45 | | | |
| 33 | Button stitch mark | BS | | 0.32 | 0.32 | 0.32 | 1 | | 1.5 | 150 | 225 | 45 | | |
| 34 | Button stitch | M | | 0.40 | 0.40 | 0.40 | | 1.5 | | | | | | |
| 35 | Button push | M | | 0.40 | 0.40 | 0.40 | | 1.5 | | | | | | |
| TOTAL SMV | | | | 11.92 | 11.92 | 11.92 | 30 | 13 | | | | | | |

| PM | OL | FL | BH | BS | DNCS | Helper | Total |
|-------|----|----------|----|------|------|--------|-------|
| 15 | 10 | 3 | 1 | 1 | 0 | 13 | 42 |
| RATIO | | Operator | | 1 | | | |
| | | : | | : | | | |
| | | Helper | | 0.42 | | 85% | |

Fig: 3.1.5 Operation Bulletin for Polo Half Sleeve Shirt

3.1.5 Operation Bulletin for Half Sleeve Polo shirt of Euro-Text Knitwear Limited:

| Euro-Text Knitwear Limited Operation Bulletin | | | | | | | | | | | | |
|--|-----------------------------------|-----|------------|------|----------|---|-----|------|--------------|------------|-----------------|---|
| Date: 07.10.17 Buyer: Trurex | | | | | | Target/Hr= 220 Printed Date: April 08, 2018 | | | | | | |
| Si. No. | Operation Name | M/C | Attachment | SMV | Tti. SMV | MAM | OP. | Hel. | Target/HD/Hr | TTL Target | Target Variance | Operation Request |
| 1 | Front part iron & middle mark | M | | 0.24 | | 0.24 | | 1 | 250 | 250 | 8 | |
| 2 | Plkt interlining attach with iron | OL | | 0.27 | | 0.27 | | 1 | 222 | 222 | 51 | |
| 3 | Back and front match | OL | Folder | 0.25 | | 0.25 | 1 | | 240 | 240 | 106 | |
| 4 | Front nk topstich | FL | | 0.27 | | 0.27 | | 1 | 222 | 222 | 2 | |
| 5 | Bk nk piping | FL | Folder | 0.27 | | 0.27 | 1 | | 222 | 222 | 2 | |
| 6 | Bk Nk topstich | PM | | 0.27 | | 0.27 | 2 | | 222 | 222 | 2 | |
| 7 | Nek open tack | PM | | 0.24 | | 0.24 | | 1 | 250 | 250 | 30 | |
| 8 | Shoulder join L wt tape | OL | | 0.25 | | 0.25 | 1 | | 240 | 240 | 20 | |
| 9 | Both Shoulder seccior | M | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! |  |
| 10 | Slv hem | FL | | 0.27 | | 0.27 | 1 | | 222 | 222 | 2 | |
| 11 | Slv Geathering | PM | | 0.52 | | 0.52 | 2 | | 115 | 115 | 11 | |
| 12 | Slv match | M | | 0.24 | | 0.24 | | 1 | 250 | 250 | 30 | |
| 13 | Care Label make | PM | | 0.25 | | 0.25 | 1.5 | | 240 | 240 | 20 | |
| 14 | Slv Join | OL | | 0.54 | | 0.54 | 2 | | 111 | 222 | 2 | |
| 15 | Set for side seam | M | | 0.22 | | 0.22 | | 1 | 273 | 273 | 53 | |
| 16 | Side Seam with care label | OL | | 0.68 | | 0.68 | 2 | | 88 | 265 | 45 | |
| 17 | Slv Open and Press & neck tack | PM | | 0.54 | | 0.54 | 2 | | 111 | 222 | 2 | |
| 18 | Button stich mark | M | | 0.21 | | 0.21 | 1 | 1 | 286 | 286 | 66 | |
| 19 | Box inner | FL | | 0.25 | | 0.25 | 1 | 1 | 240 | 240 | 20 | |
| 20 | Sleeve match | PM | | 0.32 | | 0.27 | 2 | | 111 | 240 | 42 | |
| 21 | Sleeve join | PM | | 0.56 | | 0.50 | 2 | | 240 | 250 | 60 | |
| 22 | Care label make | PM | | 0.22 | | 0.25 | 1 | 1 | 250 | 237 | 70 | |
| 23 | Set for side seam | PM | | 0.65 | | 0.24 | | | 79 | 273 | 57 | |
| 24 | Side seam with care label | | | 0.26 | | 0.75 | 13 | 1 | 273 | 200 | 93 | |
| 25 | Body turn from hem | OL | | 0.30 | | 0.22 | 1 | | 200 | 200 | 20 | |

| | | | | | | | | | | | | |
|-----------|---------------------|----|--|------|------|------|-------|-----|-----|--------|----|--|
| 26 | Sleeve hem body hem | OL | | 0.62 | | 0.30 | 2 | | 97 | 194 | 14 | |
| 27 | Placket inner tack | FL | | 0.24 | | 0.24 | 1 | | 250 | 250 | 70 | |
| 28 | Button hole mark | PM | | 0.23 | | 0.23 | | 1 | 261 | 261 | 81 | |
| 29 | Button hole | BH | | 0.30 | | 0.30 | 1 | | 200 | 200 | 20 | |
| 30 | Button stich mark | M | | 0.24 | | 0.24 | | 1 | 250 | 250 | 70 | |
| 31 | Button stich | BS | | 0.32 | | 0.32 | 1 | | 188 | 188 | 8 | |
| 32 | Button push | M | | 0.40 | | 0.40 | | 1.5 | 150 | 225225 | 45 | |
| TOTAL SMV | | | | | 11.2 | | 11.92 | 30 | 13 | | | |

| PM | OL | FL | BH | DNCS | 2NCS | Helper | Total |
|----|-------|----------|----|------|------|--------|-------|
| 7 | 8 | 4 | | 0 | | 7 | 26 |
| | RATIO | Operator | | 1 | | | |
| | | : | | : | | | |
| | | Helper | | 0.37 | | | |

3.1.6 According to Operation Bulletin data for polo t- shirt in Euro-Tex

Total SMV: 11.2

Total MAM: 11.92

Total Number of Helper: 13

Total Number of Operator: 30

This data collected from Euro-Tex Knitwear Limited in this case Polo T-shirt total SMV time is 11.2 minutes. 4 types of m/c are used for this making of garments. In this Section 30 operators & 13 helper are used for done this job. Total target per hour 220 pcs, and also for Sleeve Join TTL Target & Target HD is 250..

3.1.7 Productivity and efficiency report (sewing) of Euro-Tex knitwear limited:

For the Month of April 4th, 2018

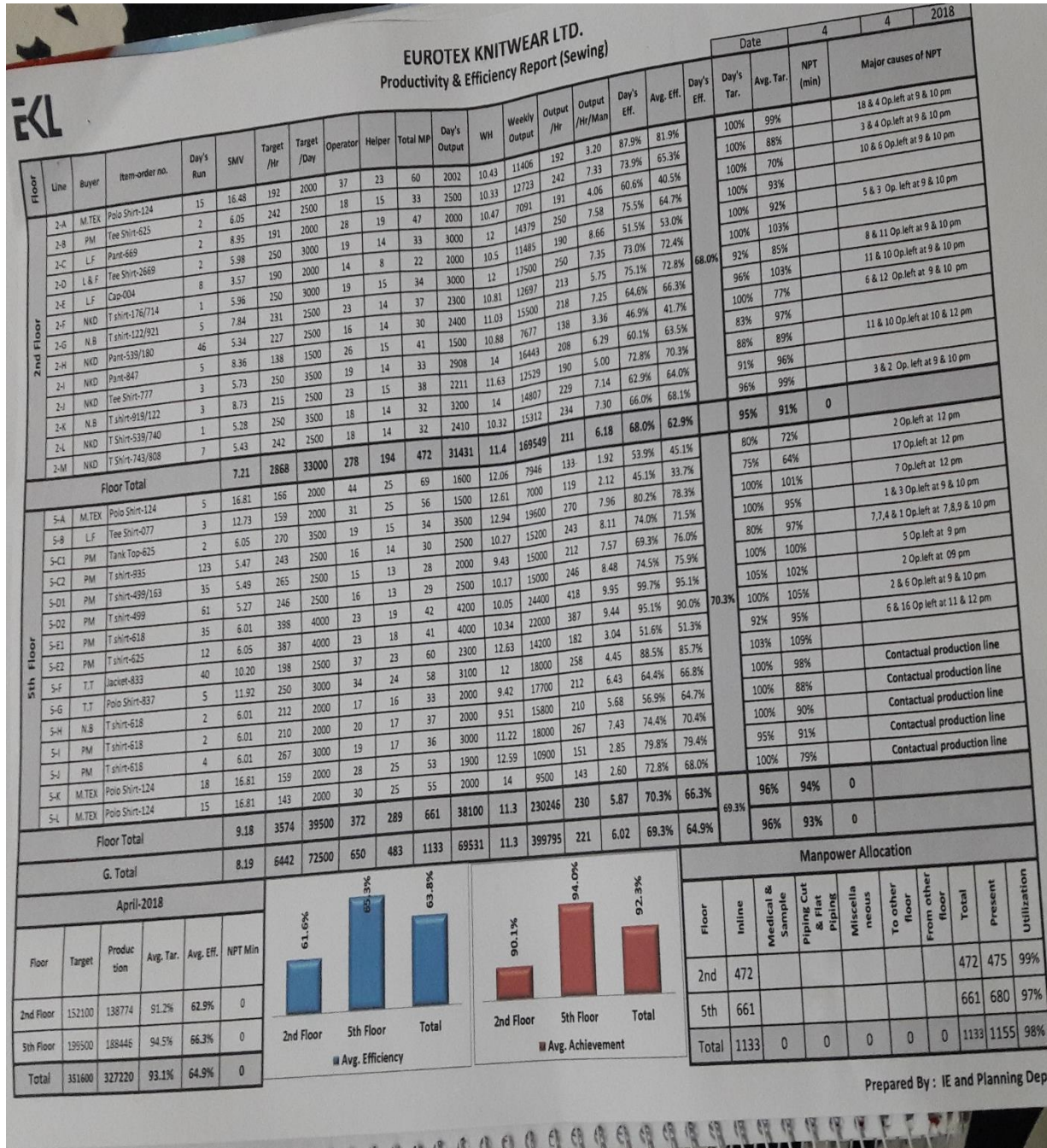


Fig: 3.1.7 Productivity and efficiency report (sewing) of Euro-Tex knitwear limited

3.1.7 Productivity and efficiency report (sewing) of EuroTex knitwear limited:

For the Month of April 4th, 2018

| EUROTEX KNITWEAR LTD | | | | | | | | | | | | | | | | | | | | Date | | 4 | | 4 | | 2018 | |
|----------------------------------|-------|----------------|-----------------|-----------|-------|-----------|------------|----------|--------|----------|--------------|-------|---------------|-----------|-------------|-----------|----------|------------|-----------|----------|----------------------------|-----------------------------------|--|---|--|------|--|
| Productivity & Efficiency Report | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Floor | Line | Buyer | Item-order no. | Day's Run | SMV | Target/HR | Target/Day | Operator | Helper | Total MP | Day's Output | WH | Weekly Output | Output/HR | Output/Hr/M | Day's Eff | Avg.Eff. | Day's Eff. | Day's Tar | Avg.Tar. | NPT(min) | Major causes of NPT | | | | | |
| 2nd Floor | 2-A | M.TEX | Polo Shirt-124 | 15 | 16.48 | 192 | 2000 | 37 | 23 | 60 | 2002 | 10.43 | 11406 | 192 | 3.2 | 87.90% | 81.90% | | 100% | 99% | | 18 & 4 Op.left at 9 &10 pm | | | | | |
| | 2-B | PM | Tee Shirt-625 | 2 | 6.05 | 242 | 2500 | 18 | 15 | 33 | 2500 | 10.33 | 12723 | 242 | 7.33 | 73.90% | 65.30% | | 100% | 88% | | 3 &4 Op.left at 9 &10 pm | | | | | |
| | 2-C | LF | Pant-669 | 2 | 8.95 | 191 | 2000 | 28 | 19 | 47 | 2000 | 10.47 | 7091 | 191 | 4.06 | 60.60% | 40.50% | | 100% | 70% | | 10 & 6 Op.left at 9 &10 pm | | | | | |
| | 2-D | L&F | Tee Shirt-2669 | 2 | 5.98 | 250 | 3000 | 19 | 14 | 33 | 3000 | 12 | 14379 | 250 | 7.58 | 75.50% | 64.70% | | 100% | 93% | | | | | | | |
| | 2-E | LF | Cap-004 | 8 | 3.57 | 190 | 2000 | 14 | 8 | 22 | 2000 | 10.5 | 11485 | 190 | 8.66 | 51.50% | 53.00% | | 100% | 92% | | 5 & 3 Op.left at 9 & 10 pm | | | | | |
| | 2-F | NKD | T shirt-176/714 | 1 | 5.96 | 250 | 3000 | 19 | 15 | 34 | 3000 | 12 | 17500 | 250 | 7.35 | 73.00% | 72.40% | 68.00% | 100% | 103% | | | | | | | |
| | 2-G | N.B | Tshirt-122/921 | 5 | 7.84 | 231 | 2500 | 23 | 14 | 37 | 2300 | 10.81 | 12697 | 213 | 5.75 | 75.10% | 72.80% | | 92% | 85% | | 8 & 11 Op.left at 9 & 10 pm | | | | | |
| | 2-H | NKD | Pant-539/180 | 46 | 5.34 | 227 | 2500 | 16 | 14 | 30 | 2400 | 11.03 | 15500 | 218 | 7.25 | 64.60% | 66.30% | | 96% | 103% | | 11 & 10 Op.left at 9 &10 pm | | | | | |
| | 2-I | NKD | Pant-847 | 5 | 8.36 | 138 | 1500 | 26 | 15 | 41 | 1500 | 10.88 | 7677 | 138 | 3.36 | 46.90% | 41.70% | | 100% | 77% | | 6 &12 Op.left at 9 & 10 pm | | | | | |
| | 2-J | NKD | Tee Shirt-777 | 3 | 5.73 | 250 | 3500 | 19 | 14 | 33 | 2908 | 14 | 16443 | 208 | 6.29 | 60.10% | 63.50% | | 83% | 97% | | | | | | | |
| | 2-K | N.B | T shirt-919/122 | 3 | 8.73 | 215 | 2500 | 23 | 15 | 38 | 2211 | 11.63 | 12529 | 190 | 5 | 72.80% | 70.30% | | 88% | 89% | | 11 & 10 Op.left at 10 & 12 pm | | | | | |
| | 2-L | NKD | T Shirt-539/740 | 1 | 5.28 | 250 | 3500 | 18 | 14 | 32 | 3200 | 14 | 14807 | 229 | 7.14 | 62.90% | 64.00% | | 91% | 96% | | | | | | | |
| | 2-M | NKD | T Shirt-743/808 | 7 | 5.43 | 242 | 2500 | 18 | 14 | 32 | 2410 | 10.32 | 15312 | 234 | 7.3 | 66.00% | 68.10% | | 96% | 99% | | 3 & 2 Op.left at 9 & 10 pm | | | | | |
| Floor Total | | | | | 7.21 | 2868 | 33000 | 278 | 194 | 472 | 31431 | 11.4 | 169549 | 211 | 6.18 | 68.00% | 62.90% | | 95% | 99% | 0 | | | | | | |
| 5th Floor | 5-A | T.T | Polo Shirt-124 | 1 | 12.66 | 166 | 2000 | 32 | 25 | 57 | 2000 | 12.04 | 7946 | 166 | 2.91 | 61.50% | 45.10% | | 100 | 72 | | 20p.left at 11 pm | | | | | |
| | 5-B | LF | Tee Shirt-077 | 4 | 12.73 | 164 | 2000 | 37 | 25 | 62 | 1500 | 12.16 | 7000 | 123 | 1.99 | 42.20% | 33.70% | | 75 | 64 | | 5 OP.left at 12 pm | | | | | |
| | 5-C1 | PM | Tee Shirt-625 | 3 | 6.05 | 292 | 3500 | 19 | 15 | 34 | 3500 | 12 | 19600 | 292 | 8.58 | 86.50% | 78.30% | | 100 | 101 | | | | | | | |
| | 5-C2 | PM | T shirt-935 | 124 | 5.36 | 298 | 3500 | 16 | 14 | 30 | 2700 | 11073 | 15200 | 230 | 7.67 | 68.50% | 71.50% | | 77 | 95 | | 17,1 & 1 Op.left at 10,11 & 12 pm | | | | | |
| | 5-D1 | PM | T shirt-499 | 36 | 6.03 | 250 | 3000 | 18 | 13 | 31 | 3000 | 12 | 15000 | 250 | 8.06 | 81% | 76% | | 100 | 97 | | | | | | | |
| | 5-D2 | PM | T shirt-499 | 62 | 5.27 | 216 | 2500 | 23 | 12 | 28 | 2500 | 11.57 | 15000 | 216 | 7.72 | 66.80% | 75.90% | | 100 | 100 | | 8 & 18 Op.left at 9 & 10 pm | | | | | |
| | 5-E1 | PM | T shirt-618 | 36 | 6.01 | 398 | 4000 | 23 | 19 | 42 | 4200 | 10.05 | 24400 | 418 | 9.95 | 99.70% | 95.10% | | 105 | 102 | | 1 Op.left at 9 & 10 pm | | | | | |
| | 5-E2 | PM | T shirt-625 | 13 | 6.05 | 379 | 4000 | 37 | 18 | 41 | 4000 | 10.07 | 22000 | 397 | 9.69 | 97.70% | 90% | 70.30% | 100 | 105 | | 1 & 10p.left at 11 & 12 pm | | | | | |
| | 5-F | T.T | Jacket-636 | 41 | 10.2 | 205 | 2500 | 34 | 23 | 60 | 2400 | 12.2 | 14200 | 197 | 3.28 | 55.70% | 51.30% | | 96 | 95 | | | | | | | |
| | 5-G | T.T | Polo Shirt-837 | 6 | 11.92 | 250 | 3000 | 19 | 23 | 57 | 3500 | 12 | 18000 | 292 | 5.12 | 101.70% | 85.70% | | 117 | 109 | | Contactual Production line | | | | | |
| | 5-H | N.B | T shirt-618 | 3 | 6.01 | 283 | 3000 | 19 | 37 | 35 | 2500 | 10.6 | 17700 | 236 | 6.74 | 67.50% | 66.80% | | 83 | 98 | | Contactual Production line | | | | | |
| | 5-I | PM | T shirt-618 | 3 | 6.01 | 279 | 3000 | 19 | 34 | 35 | 2500 | 10.77 | 15800 | 232 | 6.63 | 66.40% | 83.70% | | 83 | 88 | | Contactual Production line | | | | | |
| | 5-J | PM | T shirt-618 | 5 | 4048 | 357 | 5000 | 28 | 19 | 35 | 4500 | 14 | 18000 | 321 | 9.18 | 68.60% | 70% | | 90 | 90 | | Contactual Production line | | | | | |
| 5-K | M.TEX | Polo shirt-124 | 19 | 16.81 | 167 | 2000 | 28 | 19 | 53 | 1900 | 12 | 10900 | 158 | 2.99 | 83.70% | 79.40% | | 95 | 91 | | Contactual Production line | | | | | | |
| 5-L | M.TEX | Polo shirt-124 | 16 | 16.81 | 167 | 2000 | 30 | 19 | 55 | 1100 | 12 | 9500 | 92 | 1.68 | 46.70% | 68% | | 55 | 79 | | Contactual Production line | | | | | | |
| Floor Total | | | | | 9.18 | 3574 | 39500 | 372 | 289 | 661 | 38100 | 11.3 | 230246 | 230 | 5.87 | 70.30% | 66.30% | | 96% | 94% | 0 | | | | | | |
| G. Total | | | | | 8.19 | 6442 | 72500 | 650 | 483 | 1133 | 69531 | 11.3 | 399795 | 221 | 6.02 | 69.30% | 64.90% | | 96% | 93% | 0 | | | | | | |

Euro-Tex knitwear limited have two sewing floor 2nd & 5th floor

2nd floor production target are given below.....

- Production target is 152100 pcs
- Production 138734 pcs
- Average target 91.2%
- Average Efficiency 62.9%

5th floor production target are given below.....

- Production target is 199500 pcs
- Production 188446 pcs
- Average target 94.5%
- Average Efficiency 66.3%

Total production target are given below.....

- Production target is 331600 pcs
- Production 327220 pcs
- Average target 93.1%
- Average Efficiency 64.9%

In Euro-Tex knitwear ltd have making different types garments, most of them are T-shirt, Pants, Polo Shirt, and Legging etc. In making of polo shirt-124 SMV is 16.48 minutes, T shirt-625 SMV is 6.05 minutes, Pant-847 SMV is 8.36 minutes. Polo shirt per hour target 192, Tee shirt per hour target 242, Pant per hour target 138. In Euro-Tex average monthly productivity target is 152100 pcs, at the end of the month production is 138734 pcs. Average target is 91.2% Average Efficiency is 62.9% in 2nd floor. 5th floor productivity is 199500 pcs and production is 188446 pcs, Average target is 94.5% Average Efficiency is 66.3%. Total target in Euro-Tex per month is 331600 pcs but production 327220 pcs. No NPT Time. I think it's a good achievement for Euro-Tex Knitwear Limited.

3.1.8 Productivity and efficiency report (sewing) of EuroTex knitwear limited:

For the Month of April 5th, 2018

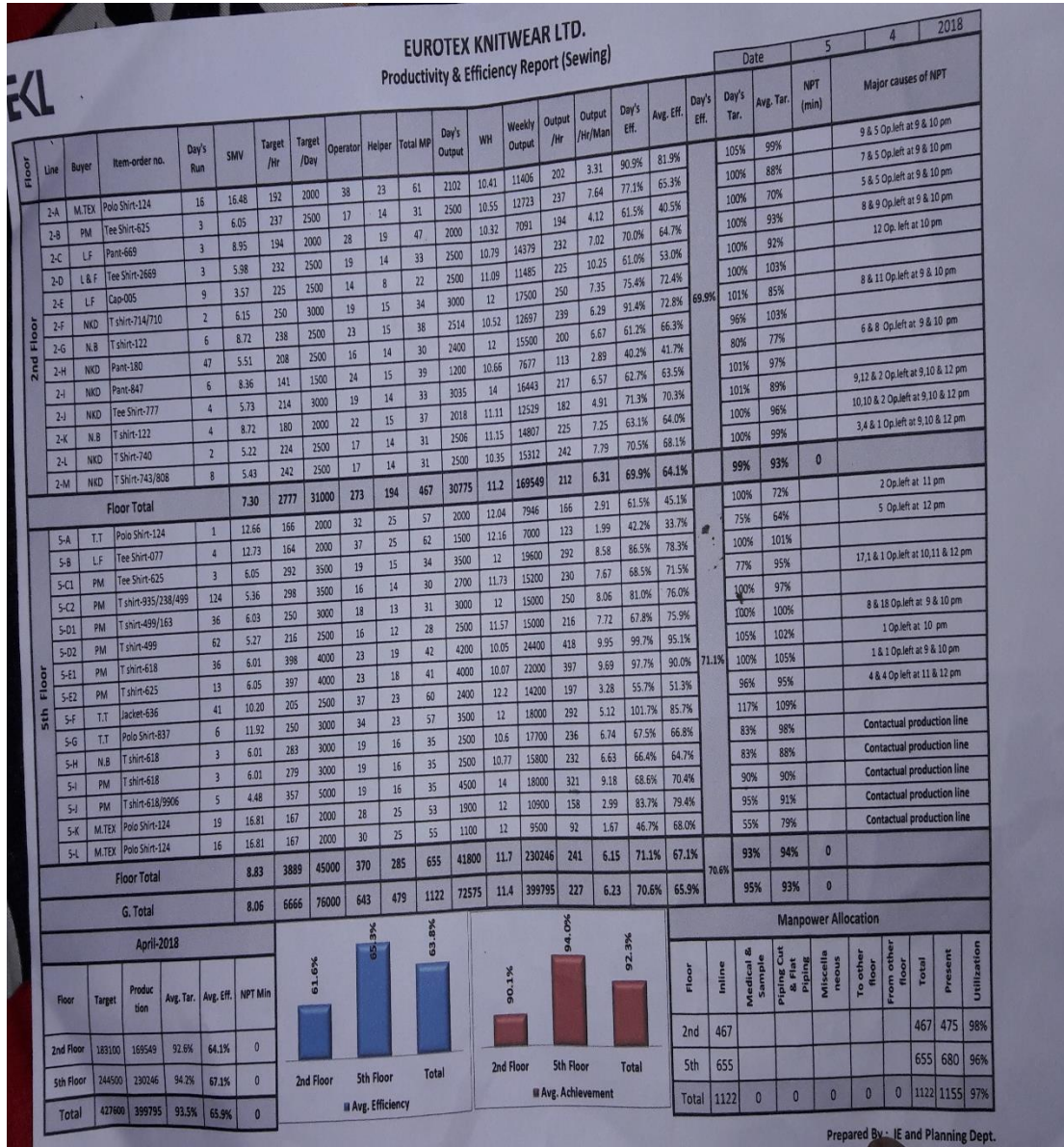


Fig: 3.1.8 Productivity and efficiency report (sewing) of EuroTex

3.1.8 Productivity and efficiency report (sewing) of EuroTex knitwear limited

For the Month of April 5th, 2018

| EUROTEX KNITWEAR LTD | | | | | | | | | | | | | | | | | | Date | | 5 | | 4 2018 | |
|----------------------------------|-------|-----------------|-----------------|-----------|-------|-----------|------------|----------|--------|----------|--------------|-------|---------------|-----------|-------------|------------|-----------|------------|------------|----------------------------|-----------------------------------|-----------------------------|--|
| Productivity & Efficiency Report | | | | | | | | | | | | | | | | | | | | | | | |
| Floor | Line | Buyer | Item-order no. | Day's Run | SMV | Target/HR | Target/Day | Operator | Helper | Total MP | Day's Output | WH | Weekly Output | Output/HR | Output/Hr/M | Day's Eff. | Avg. Eff. | Day's Eff. | Day's Tar. | Avg. Tar. | NPT(min) | Major causes of NPT | |
| 2nd Floor | 2-A | M.TEX | Polo Shirt-124 | 15 | 16.48 | 192 | 2000 | 37 | 23 | 60 | 2002 | 10.43 | 11406 | 192 | 3.2 | 87.90% | 81.90% | 100% | 99% | | 18 & 4 Op.left at 9 & 10 pm | | |
| | 2-B | PM | Tee Shirt-625 | 2 | 6.05 | 242 | 2500 | 18 | 15 | 33 | 2500 | 10.33 | 12723 | 242 | 7.33 | 73.90% | 65.30% | 100% | 88% | | 3 & 4 Op.left at 9 & 10 pm | | |
| | 2-C | L.F | Pant-669 | 2 | 8.95 | 191 | 2000 | 28 | 19 | 47 | 2000 | 10.47 | 7091 | 191 | 4.06 | 60.60% | 40.50% | 100% | 70% | | 10 & 6 Op.left at 9 & 10 pm | | |
| | 2-D | L&F | Tee Shirt-2669 | 2 | 5.98 | 250 | 3000 | 19 | 14 | 33 | 3000 | 12 | 14379 | 250 | 7.58 | 75.50% | 64.70% | 100% | 93% | | | | |
| | 2-E | L.F | Cap-004 | 8 | 3.57 | 190 | 2000 | 14 | 8 | 22 | 2000 | 10.5 | 11485 | 190 | 8.66 | 51.50% | 53.00% | 100% | 92% | | 5 & 3 Op.left at 9 & 10 pm | | |
| | 2-F | NKD | T shirt-176/714 | 1 | 5.96 | 250 | 3000 | 19 | 15 | 34 | 3000 | 12 | 17500 | 250 | 7.35 | 73.00% | 72.40% | 100% | 103% | | | | |
| | 2-G | N.B | Tshirt-122/921 | 5 | 7.84 | 231 | 2500 | 23 | 14 | 37 | 2300 | 10.81 | 12697 | 213 | 5.75 | 75.10% | 72.80% | 69.90% | 92% | 85% | | 8 & 11 Op.left at 9 & 10 pm | |
| | 2-H | NKD | Pant-539/180 | 46 | 5.34 | 227 | 2500 | 16 | 14 | 30 | 2400 | 11.03 | 15500 | 218 | 7.25 | 64.60% | 66.30% | 96% | 103% | | 11 & 10 Op.left at 9 & 10 pm | | |
| | 2-I | NKD | Pant-847 | 5 | 8.36 | 138 | 1500 | 26 | 15 | 41 | 1500 | 10.88 | 7677 | 138 | 3.36 | 46.90% | 41.70% | 100% | 77% | | 6 & 12 Op.left at 9 & 10 pm | | |
| | 2-J | NKD | Tee Shirt-777 | 3 | 5.73 | 250 | 3500 | 19 | 14 | 33 | 2908 | 14 | 16443 | 208 | 6.29 | 60.10% | 63.50% | 83% | 97% | | | | |
| | 2-K | N.B | T shirt-919/122 | 3 | 8.73 | 215 | 2500 | 23 | 15 | 38 | 2211 | 11.63 | 12529 | 190 | 5 | 72.80% | 70.30% | 88% | 89% | | 11 & 10 Op.left at 10 & 12 pm | | |
| | 2-L | NKD | T Shirt-539/740 | 1 | 5.28 | 250 | 3500 | 18 | 14 | 32 | 3200 | 14 | 14807 | 229 | 7.14 | 62.90% | 64.00% | 91% | 96% | | | | |
| 2-M | NKD | T Shirt-743/808 | 7 | 5.43 | 242 | 2500 | 18 | 14 | 32 | 2410 | 10.32 | 15312 | 234 | 7.3 | 66.00% | 68.10% | 96% | 99% | | 3 & 2 Op.left at 9 & 10 pm | | | |
| Floor Total | | | | | 7.21 | 2868 | 33000 | 278 | 194 | 472 | 31431 | 11.4 | 169549 | 211 | 6.18 | 68.00% | 62.90% | 95% | 99% | 0 | | | |
| 5th Floor | 5-A | T.T | Polo Shirt-124 | 1 | 12.66 | 166 | 2000 | 32 | 25 | 57 | 2000 | 12.04 | 7946 | 166 | 2.91 | 61.50% | 45.10% | 100 | 72 | | 2 Op.left at 11 pm | | |
| | 5-B | L.F | Tee Shirt-077 | 4 | 12.73 | 164 | 2000 | 37 | 25 | 62 | 1500 | 12.16 | 7000 | 123 | 1.99 | 42.20% | 33.70% | 75 | 64 | | 5 Op.left at 12 pm | | |
| | 5-C1 | PM | Tee Shirt-625 | 3 | 6.05 | 292 | 3500 | 19 | 15 | 34 | 3500 | 12 | 19600 | 292 | 8.58 | 86.50% | 78.30% | 100 | 101 | | | | |
| | 5-C2 | PM | T shirt-935 | 124 | 5.36 | 298 | 3500 | 16 | 14 | 30 | 2700 | 11073 | 15200 | 230 | 7.67 | 68.50% | 71.50% | 77 | 95 | | 17,1 & 1 Op.left at 10,11 & 12 pm | | |
| | 5-D1 | PM | T shirt-499 | 36 | 6.03 | 250 | 3000 | 18 | 13 | 31 | 3000 | 12 | 15000 | 250 | 8.06 | 81% | 76% | 100 | 97 | | | | |
| | 5-D2 | PM | T shirt-499 | 62 | 5.27 | 216 | 2500 | 23 | 12 | 28 | 2500 | 11.57 | 15000 | 216 | 7.72 | 66.80% | 75.90% | 100 | 100 | | 8 & 18 Op.left at 9 & 10 pm | | |
| | 5-E1 | PM | T shirt-618 | 36 | 6.01 | 398 | 4000 | 23 | 19 | 42 | 4200 | 10.05 | 24400 | 418 | 9.95 | 99.70% | 95.10% | 105 | 102 | | 1 Op.left at 9 & 10 pm | | |
| | 5-E2 | PM | T shirt-625 | 13 | 6.05 | 379 | 4000 | 37 | 18 | 41 | 4000 | 10.07 | 22000 | 397 | 9.69 | 97.70% | 90% | 100 | 105 | | 1 & 10 Op.left at 11 & 12 pm | | |
| | 5-F | T.T | Jacket-636 | 41 | 10.2 | 205 | 2500 | 34 | 23 | 60 | 2400 | 12.2 | 14200 | 197 | 3.28 | 55.70% | 51.30% | 96 | 95 | | | | |
| | 5-G | T.T | Polo Shirt-837 | 6 | 11.92 | 250 | 3000 | 19 | 23 | 57 | 3500 | 12 | 18000 | 292 | 5.12 | 101.70% | 85.70% | 117 | 109 | | Contactual Production line | | |
| | 5-H | N.B | T shirt-618 | 3 | 6.01 | 283 | 3000 | 19 | 37 | 35 | 2500 | 10.6 | 17700 | 236 | 6.74 | 67.50% | 66.80% | 83 | 98 | | Contactual Production line | | |
| | 5-I | PM | T shirt-618 | 3 | 6.01 | 279 | 3000 | 19 | 34 | 35 | 2500 | 10.77 | 15800 | 232 | 6.63 | 66.40% | 83.70% | 83 | 88 | | Contactual Production line | | |
| | 5-J | PM | T shirt-618 | 5 | 4048 | 357 | 5000 | 28 | 19 | 35 | 4500 | 14 | 18000 | 321 | 9.18 | 68.60% | 70% | 90 | 90 | | Contactual Production line | | |
| | 5-K | M.TEX | Polo shirt-124 | 19 | 16.81 | 167 | 2000 | 28 | 19 | 53 | 1900 | 12 | 10900 | 158 | 2.99 | 83.70% | 79.40% | 95 | 91 | | Contactual Production line | | |
| 5-L | M.TEX | Polo shirt-124 | 16 | 16.81 | 167 | 2000 | 30 | 19 | 55 | 1100 | 12 | 9500 | 92 | 1.68 | 46.70% | 68% | 55 | 79 | | Contactual Production line | | | |
| Floor Total | | | | | 8.83 | 3889 | 45600 | 370 | 285 | 655 | 41800 | 11.7 | 230246 | 241 | 6.15 | 71.00% | 66.30% | 69.30% | 93% | 94% | 0 | | |
| G. Total | | | | | 8.06 | 6666 | 76000 | 643 | 479 | 1122 | 72575 | 11.4 | 399795 | 227 | 6.02 | 70.60% | 65.90% | 95% | 93% | 0 | | | |

Euro-TEX knitwear limited have two sewing floor 2nd & 5th floor monthly production capacity.....

2nd floor production target are given below.....

- Production target is 183100 pcs
- Production 169549 pcs
- Average target 92.6%
- Average Efficiency 64.1%

5th floor production target are given below.....

- Production target is 244500 pcs
- Production 230246 pcs
- Average target 94.2%
- Average Efficiency 67.1%

Total production target are given below.....

- Production target is 427600 pcs
- Production 399795 pcs
- Average target 93.5%
- Average Efficiency 65.9%

In Euro-TEX knitwear ltd have making different types garments, most of them are T-shirt, Pants, Polo Shirt, and Legging etc. In making of polo shirt-124 SMV is 16.48 minutes, T shirt-625 SMV is 6.05 minutes, Pant-847 SMV is 8.36 minutes. Polo shirt per hour target 192, Tee shirt per hour target 242, Pant per hour target 138. In Euro-TEX knitwear average monthly productivity target is 183100 pcs, at the end of the monthly production is 169549 pcs. Average target is 92.6% Average Efficiency is 64.1% in 2nd floor. 5th floor productivity is 244500 pcs and production is 230246 pcs, Average target is 94.2% Average Efficiency is 65.9%. Total target in Euro-TEX per month is 427600 pcs but production 427600 pcs. No NPT Time. I think it's a good achievement for Euro-TEX Industry.

CHAPTER 4

RESULT AND DISCUSSION

4.1.1 Euro-Tex Sewing M/C Details in Graph:

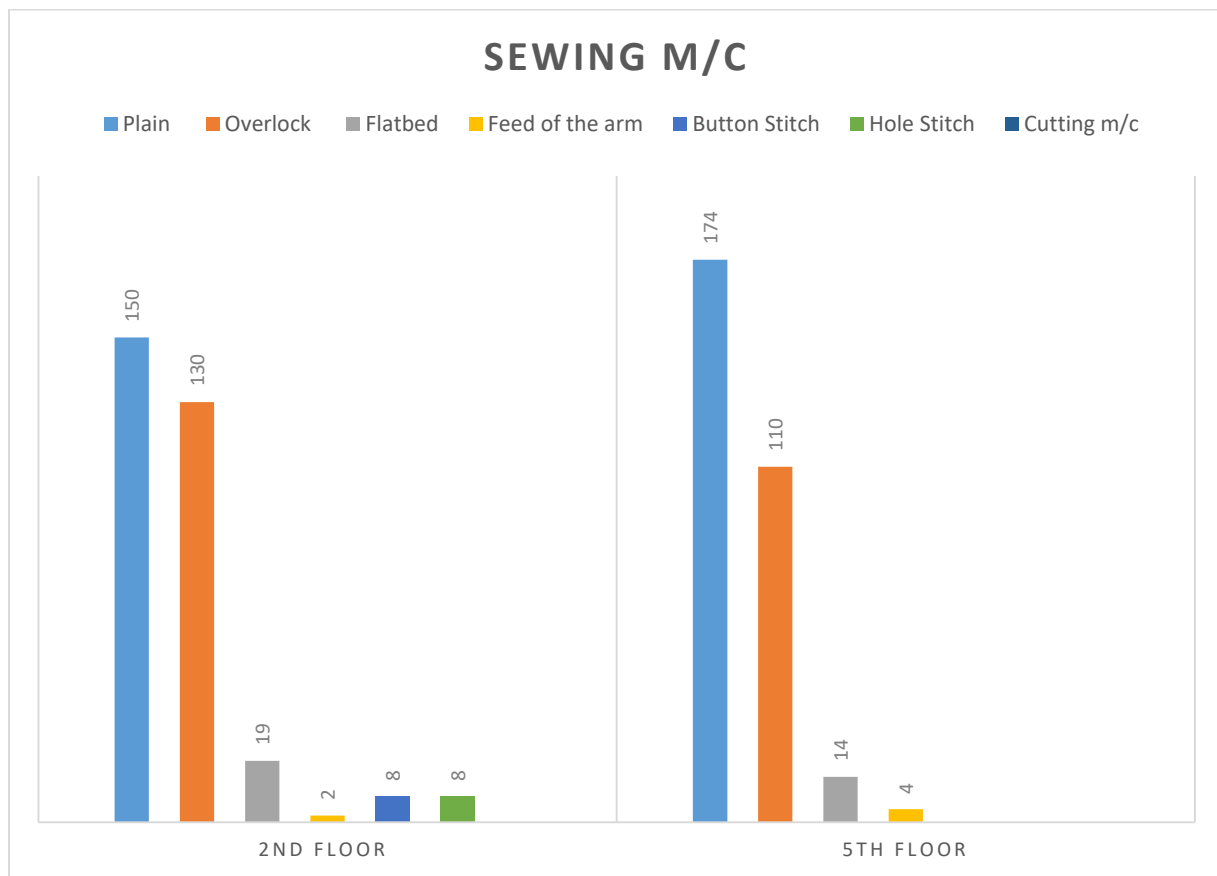


Fig: 4.1.1 Sewing m/c in Euro-Tex

Industrial Engineering office likewise have obligation to keep up the sewing M/C. In this segment in Euro-Tex Knitwear have numerous sorts of sewing M/C yet unique sort of Sewing M/C utilized for various purpose, as – Plain M/C for Plain Sewing, Over lock use for bolt the edge of an articles of clothing.

2nd and 5th floor have number of sewing M/C – 821, 2nd Floor have 452, 5th Floor have 369, Plain M/C total-324. Overlock 240. Flatbed 33, Feed of the arm-6.

4.1.2 Euro-Tex Knitwear Ltd Operation of Leggings Graph Chart:

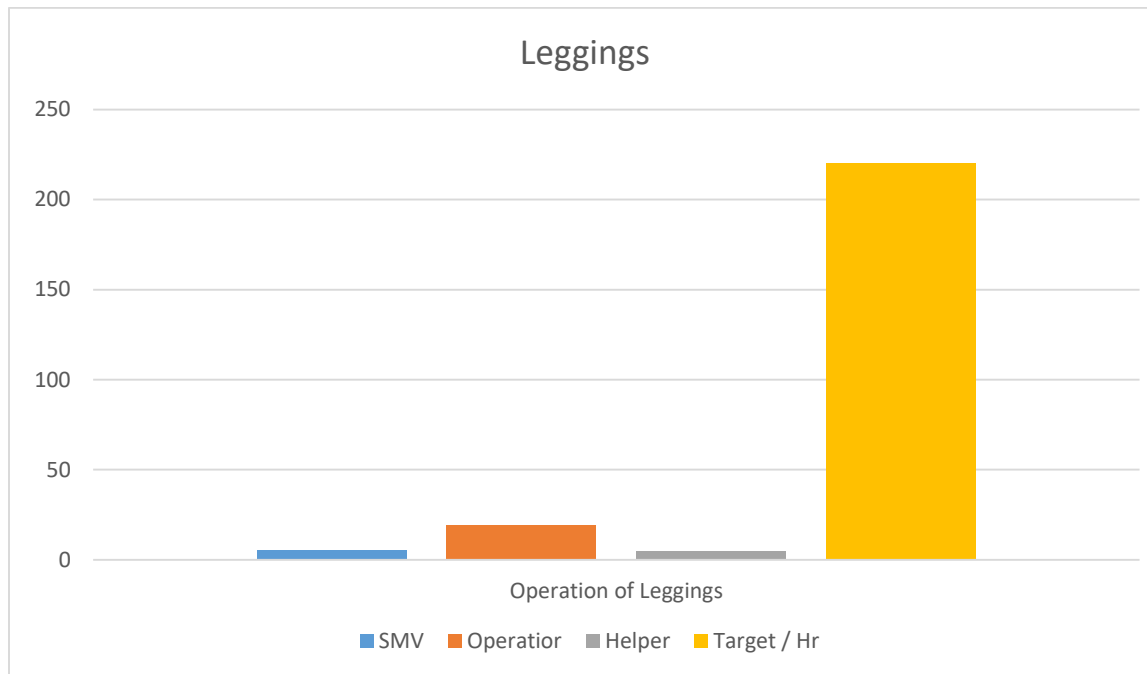


Fig: 4.2.1 Operation of Leggings Chart

This data chart show the operation of a leggings total SMV time is 5.51 minutes. 4 types of m/c are used for making this garments. In this Section 19, operators & 5, helper are used for done this job. Total target per hour 220 pcs, and also for TTL Target & Target HD is 250, target variance for care label make variance 30 and for care level SMV 0.25.

4.1.3 Euro-TEX Knitwear Ltd Operation Bulletin of T-Shirt graph Chart:

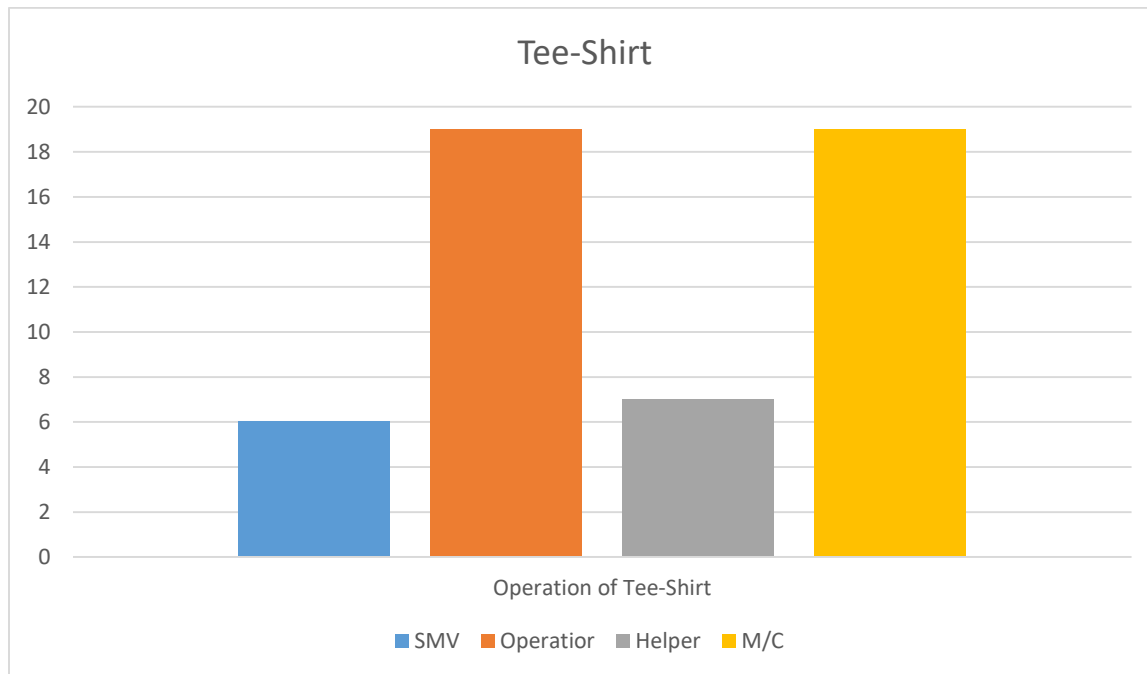


Fig: 4.1.3 Operation Chart of T-Shirt

This data chart shows the operation of a Tee-Shirt. The total SMV time is 6.01 minutes. 4 types of m/c are used for making these garments. In this section, 19 operators and 7 helpers are used to complete this job. The total target per hour is 220 pcs, and also for TTL Target & Target HD is 250, target make variance 30.

4.1.4 Operation bulletin of Polo-Shirt Graph Chart:

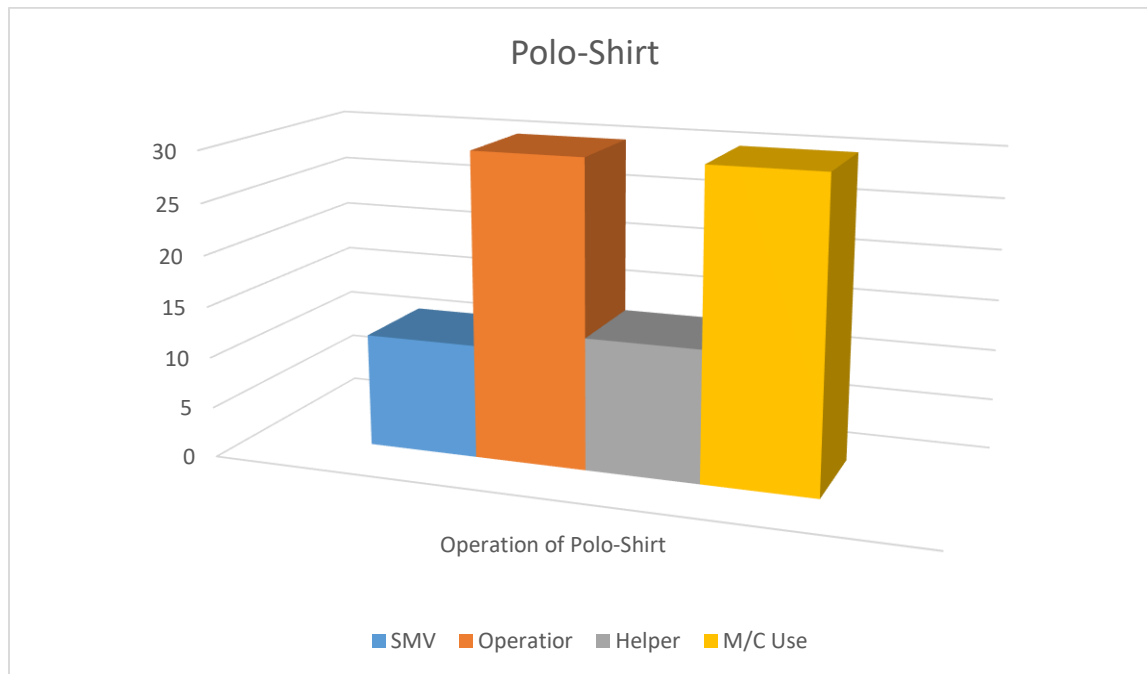


Fig: 4.1.4 Operation of Polo-Shirt Graph Chart

This data chart show the operation of a Polo-Shirt total SMV time is 11.2 minutes. 6 types of m/c are used for making this garments. In this Section 30 operators & 13 helper are used for done this job. Total target per hour 220 pcs, and also for TTL Target & Target HD is 188, target make variance51.

4.1.5 Average Efficiency chart according to Productivity and efficiency report (sewing) of Euro-TEX knitwear limited:

4th April, 2018

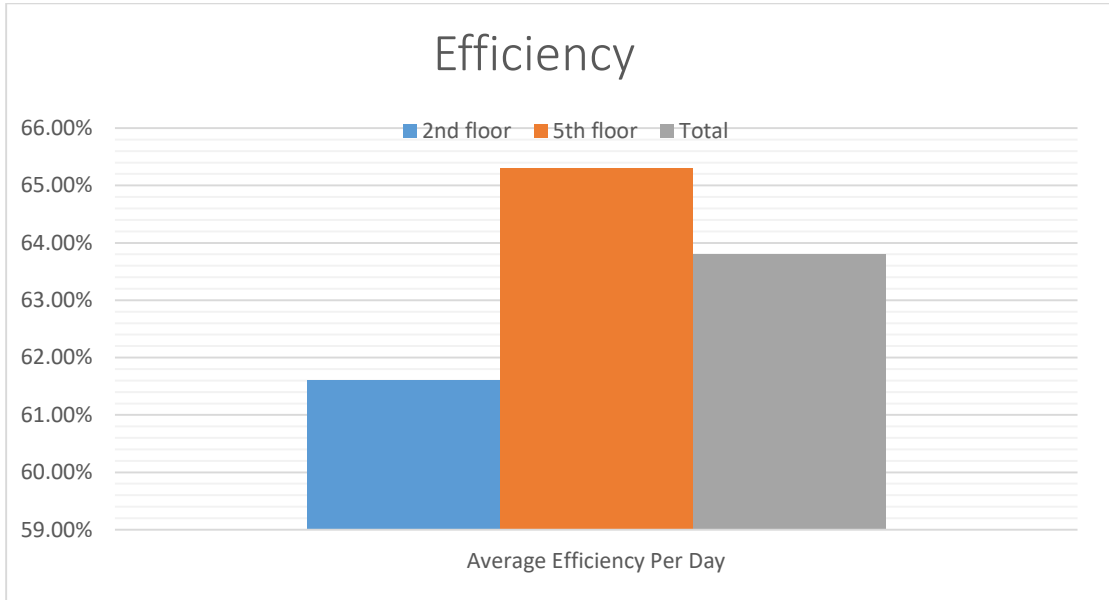


Fig: 4.1.5 Efficiency chart per day



Fig: 4.1.5 Productivity per day chart

4.1.6 Discussion of the chart:

In Euro-Text knitwear ltd have making distinctive writes articles of clothing, the majority of them are T-shirt, Pants, Polo Shirt, and Legging and so on. In making of polo shirt-124 SMV is 16.48 minutes, T shirt-625 SMV is 6.05 minutes, Pant-847 SMV is 8.36 minutes. Polo shirt every hour target 192, Tee shirt every hour target 242, Pant every hour target 138. In Euro-Text normal monthly efficiency target is 152100 pcs, toward the finish of the month generation is 138734 pcs. Normal target is 91.2% Average Efficiency is 62.9% out of second floor. Fifth floor profitability is 199500 pcs and generation is 188446 pcs, Average target is 94.5% Average Efficiency is 66.3%. Add up to focus in Euro-Text every month is 331600 pcs however creation 327220 pcs. No NPT Time. I believe it's a decent accomplishment for Euro-Text Industry.

CHAPTER 5

CONCLUSION

5.1 Conclusion

Industrial Engineering is a vital and basic part of any clothing industry. We take in every one of the usage of the procedure which we have considered hypothetically. It gives us chances to think about the theoretical information and abilities. This venture additionally gives us chances to broaden our insight. We can state it is not really conceivable to increase outmost handy information inside a brief period on this expansive segment however whatever we have accomplished, we trust, will help us to make bright careers on the sector.

5.2 Reference:

Books

Understanding textiles for A Merchandiser

Industrial Engineering in Apparel Production

Elements of Production Planning and Control

Apparel Costing & Consumption (A C C)

Writer

Prof. Dr. Engr. Shah Alimuzzaman Belal

V. Ramesh Babu

Dr. Hosne Ara Begum

Engr. Md. Sajjak Hossain