Faculty of Engineering

Department of Textile Engineering

Application of Industrial Engineering in Garments Sewing Floor

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

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of **Bachelor of Science in Textile Engineering**

Advance in Apparel Manufacturing Technology

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LETTER OF APPROVAL

To,

The Head

Department of Textile Engineering

Daffodil International University

Dattapara,Ashulia,Savar,Dhaka

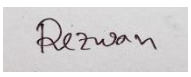
Subject: Approval of Project Report of B.Sc. in TE Program

Dear Sir

We are just writing to let you know that this project report titled as "Application of Industrial Engineering In Garments Sewing Floor" has been prepared by the students Md. Ruhul Amin ID.173-23-387, Ismail Hossain ID.173-23-367 and Md.Obaodullah Al Masud ID.173-23-385 is completed for final evaluation. The whole report is prepared based on the proper investigation and interruption through critical analysis empirical data with required belongings. The students were directly involved in their project activities and the report become vital to spark of much valuable information for the readers.

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

Yours sincerely



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At first, we like to express our heart-felt thanks to Almighty Allah for his kind blessing for completion of this Process successfully.

We would like to thank the people, who have made a significant contribution to make this Project. Their guide lines, suggestion & inspiration helped me a lot. We would like to express our deepest appreciation to our respected teacher and academic supervisor **Kazi Rezwan Hossain,** Lecturer, Dept. of Textile Engineering (DIU). Deep knowledge and keen interest of him helps and assists us much to carry out this project on Application of Industrial Engineering In garments sewing floor. His endless patience, scholar guidance, constant encouragement, energetic supervision, constructive criticism, valuable advice, checking many raw data and correcting them at all stage have made it possible to complete this project.

We would like to express my heartiest gratitude **Asst. Prof. Md. Mominur Rahman** Head(In-charge), Dept. of textile engineering for his kind suggestion and also the other faculty members and the stuff of TE department of Daffodil International University.

We are also very much glad to **Al-Muslim Group**. Authority for giving us opportunity to do our project work in their factory. We also thankful to **Md.Yasin Chowdhury**, **AGM**; IE of Al-Muslim Group. for our project assistance.

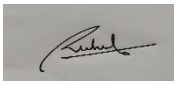
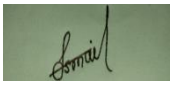
We would like to thank my entire course mate of Daffodil International University, who took part in effective discussion and suggestion to make this project as well.

At last but not the least, thanks go to all the worker, supervisor, line chief and floor in charge who have assisted, helped and inspired us to complete this task in various stage.

DECLARATION

We hereby declare that, this project has been done by us under the supervision of Kazi Rezwan Hossain, Lecturer, Department of TE, and Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree.

Submitted By:

Name of Students	ID	Signature
Md. Ruhul Amin	173-23-387	
Ismail Hossain	173-23-367	
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ABSTRACT

This project is on “Application of Industrial Engineering In Garments Sewing Floor”. Traditionally operated garment industries are facing problems like low productivity, longer production lead time, high rework and rejection, poor line balancing, low flexibility of style changeover etc. These problems were addressed in this study by the implementation of lean tools like cellular manufacturing, single piece flow, work standardization, just in time production, etc. After implementation of lean tools, results observed were highly encouraging. Some of the key benefits entail production cycle time decreased by 8%, number of operators required to produce equal amount of garment is decreased by 14%, rework level reduced by 80%, production lead time comes down to one hour from two days, work in progress inventory stays at a maximum of 100 pieces from around 500 to 1500 pieces. Apart from these tangible benefits operator multiskilling as well as the flexibility of style changeover has been improved. This study is conducted in the stitching section of a shirt & pant manufacturing company. Study includes time studies, the conversion of traditional batch production into single piece flow and long assembly line into small wall cell.

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Introduction

Introduction:

Present techno monetary circumstance is separate by growing competition in basically all aspects of economy. The longing for the customers are on the rising and creators need to design, and convey well in whatever number grouping as could be normal in light of the current situation (thought of budgetary parts of scale is no more talked off) to consider the solicitations of the customers. As such there is a test before the organizations to make results of right quality and sum and at perfect time and at any rate cost for their survival and advancement. This asks for the development in helpful adequacy of the affiliation. Present day Engineering will accept a huge activity in extending productivity. Diverse mechanical structuring strategies are used to separate and upgrade the work procedure, to crash squander and genuine task and utilization of advantages.

Present day planning is a bringing in which a data of numerical and trademark sciences got by study, comprehension and practice is associated with judgment to develop the ways to deal with use fiscally the materials and other basic resources and point of convergence of nature to serve mankind.

Chapter: 02
Literature Review

Activities of Industrial Engineering:

American Institute of Industrial Engineers (AIIE) defines Industrial Engineering as follows

Industrial Engineering is worried about the plan, enhancement and establishment of incorporated setup of men, materials and gear. It draws upon particular learning and abilities in the numerical, physical sciences well-adjusted with the standards and strategies for building investigation and configuration to determine, anticipate and assess the outcomes to be acquired from such frameworks.

I) Selection of policy and amassing strategies.

ii) Selection and plan of apparatuses along with gear.

iii) Design of offices including plant area, format of building, machine and hardware.

iv) Design and enhancement of arranging and control frame work for creation, stock, quality and plant support and circulation frameworks.

v) Development of time schedule, costing and execution norms.

vi) Install of wage motivating force plans.

vii) Design and establishment of significant worth building and observation framework.

viii) Operation inquire about including scientific and measurable examination.

ix) Performance value judgment.

x) Supplier choice and value judgment.

Objectives of Industrial Engineering dept.:

I) To build up techniques for enhancing the tasks and controlling the creation costing.

ii) To create software engineers for lessening how many costs.

Functions of an Industrial Engineer dept.:

I) Establishing the least perplexing stir strategies and working up one most perfect strategy for making the important strides.

ii) Developing the execution models as indicated by the standard strategies (Standard Time).

iii) To developing a sound wage and rousing power designs.

iii) To helping the progression and arranged of a sound stock control, confirmation of fiscal part size and work in process for each period of creation.

iii) Development of cost decline and cost control programming engineer and to develop standard costing structure.

iv) Sound assurance of site and working up a consider configuration for the smooth stream of work with.

Techniques of Industrial Engineering dept.:

 Method study: To set up a standard performance for playing out a vocation or an activity after careful examination of the employments and to build up the create of design offices to have a uniform stream of material without back following.

 Time Study (work estimation): This is a strategy used to set up a standard time for an assignment.

 Motion Economy: This is customary examinations the developments used by the executives make each fundamental stride. The principles of development economy and develop examination are incredibly useful in expansive scale fabric or for short cycle repetitive occupations.

 Value Analysis: It ensures that no silly costing are consolidation with the thing and it endeavors to give the required limits at the base cost. Thusly, updates the estimation of the thing.

 Financial and non-cash related Incentives: Those advances at a reasonable pay for the undertakings of the pros.

 Production, Planning and Control: This consolidates the preparing for the profit (like (3M) men, materials and machine) authentic booking and controlling age activities to ensure that right sum, nature of thing at fated time and pre-set up cost.

 Inventory Control: To find the profit related bundle gauge and the reorder levels for the things so the thing should be made turn to the creation at the perfect time and sum to avoid stock out situation and with least capital dart up.

 Job Evaluation: This is a work place which is used to choose the general worth of occupations of the relationship to help in planning vocations and work drive and to meet up at sound wage approach.

 Material Handling Analysis: To deductively examination the advancement of materials through different workplaces to discard inconsequential improvement to redesign the capability of material managing.

IE Job Profile:

It was just some years back that demand of an advanced expert has extended commonly. Reason, an Industrial architect can total an impressive measure to upgrade execution of the association. In any

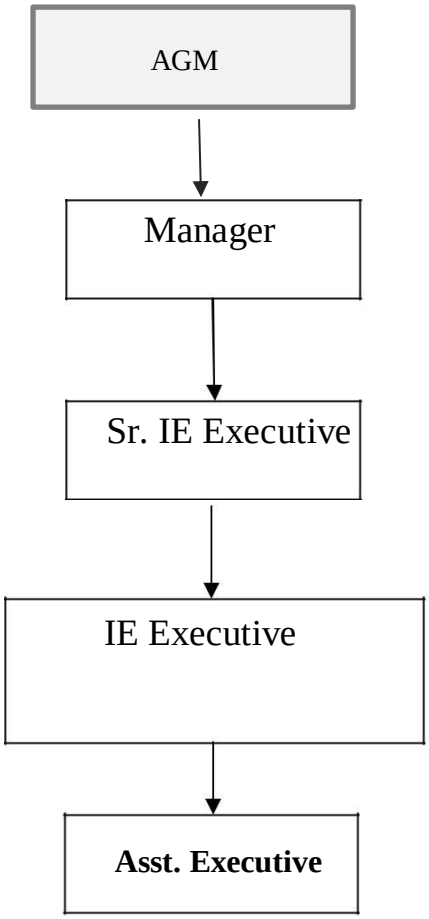
case, the new understudy go out from educational foundation (Fashion associations) acquired compelled finding out about the action profile of an Industrial authority or management. Most prominent works are learnt in plant by working. There is number of gadgets and strategies which are used in by mechanical engineers to set up an splendid age system in the association. Without having such gadgets earlier age chiefs and line supervisors stood up to inconvenience in evaluating task content, piece of attire costing, and creation organizing successfully, even it was hard to settle orders. Our gathering has endeavored to find fundamental assignments those are essential for an originator, and prerequisites point by point perception of age fields, fused into the going with. Regardless of the way that action profile of an Industrial Engineer varies association to association, most of the action profile fall under after once-over.

- Knowledge about different sewing creation structures
- Knowledge of a broad assortment of Sewing machine key for the affiliation
- Time utilizing (Cycle timing)
- Motion examination of the assignments
- Operation disengaged
- Preparation of OB (Operation assertion)
- SAM Calculation
- M/C Layout and Work station plan
- Line Set up
- Work Sampling
- Method Study (Seeing Movements of a task)
- WIP Control
- Line Balancing
- Capacity
- Cost estimation of a bit of clothing
- Developing and Maintaining Skill Matrix
- Incentives structures
- Calculating Thread Consumption
- Work helps, Guide and Attachment

- Performance Rating

An Industrial Engineer must have learned and tendency on each device and method. Execution of all devices without delay isn't required. Specialist needs to go all around asked. All task takes a gander at instruments and methodology are gotten from others endeavors and executed to the bit of clothing industry. So every work contemplate mechanical gathering has ensured advantage on the off chance that it is sufficiently utilized

Organogram Of IE department In Al-Muslim Group.



Industrial Engineering Tools:

I) Lean Manufacturing Process
II) 5S
III) 7s

IV) JIT (Just in Time)
V) Kanban
VI) KAIZEN

Lean Manufacturing Process:

Lean Manufacturing Process, moreover called Lean Production, is a course of action of gadgets and methods of insight that goes for the consistent end of all misfortune in the age technique. The essential favorable circumstances of this are cut down creation costs, extended yield and shorter age lead times. Even more especially, a part of the targets includes:

Deformity and wastage: Lessen absconds and trivial physical wastage, included plenitude usage of rough material data sources, preventable flaws, costs related with reprocessing imperfect things, and unnecessary thing quality which are not needed by customers

Process durations: Lessen absconds and unimportant physical wastage, including excess use of grudging material information sources, preventable disfigurements, costs related with reprocessing imperfect things, and insignificant thing properties which are not required by customers;

Stock dimensions: Limitation stock measurements at all periods of source, particularly works ahead of time between age stages. Lower catalog in like manner mean lower working capital necessities;

Work profitability: Improve work proficiency, both by reducing the idle time of pros and ensuring that when workers are working, they are using their effort as productively as could be normal considering the present situation (checking not doing unnecessary endeavors or silly developments);

Usage of hardware and space: Utilize equipment and gathering space even much capably by discarding bottlenecks and intensifying the rate of age anyway existing rigging, while at the equivalent time restricting machine downtime;

Adaptability: Can sustain an increasingly versatile extent of things with least changeover costs and changeover time.

Yield: Seeing that diminished procedure terms, extended work productivity and change of bottlenecks and machine downtime can be practiced, associations can all around through and extended yield from their present workplaces.

Most of these favorable circumstances provoke fetch down unit age costs – instance, progressively feasible usage of equipment and space prompts cut down depreciation expense per unit

conveyed, all the more convincing usage of task results in lower work costs per unit made and cut down disfigurements incite fatch down expense of stock sold.

5S:

5S addresses 5 disciplines for keeping up a visual workplace (visual controls and information structures).

And 5s is a term formed with initial letters of five Japanese words its philosophy used to organize

workplace.

5S is one of the activities that will help ensure our association's survival.

1. **Sort (Seiri)** - All unneeded instruments, parts and supplies are removed from the zone

2. **Set in order (Seition)** - A place for everything and everything is in its place

3. **Shine (Seiso)** - The zone is cleaned as the work is performed

4. **Standardize (Seiketsu)** - Cleaning and recognizing evidence strategies are dependably associated

5. **Sustain (Shitsuke)** - 5S is in the garments industry to be the way of life rather than just a routine. Success stories are being displayed.

7S:

5S and 7S almost similar. In 7S there is extra two parts added following contents

6. **Safety**
7. **Sprit**

JIT (Just in Time):

 JIT rationale suggests getting the right measure of stock at the excellent place and the well of time.

 JIT outperforms stock downfall.

 JIT is a broad hypothesis found on abstaining from waste.

 Waste is whatsoever does exclude regard.

A far reaching JIT see is one that incorporates the whole affiliation.

Objective of JIT:

 Propagate only the things the customer needs.

 Propagate things exactly at the rate that the customer needs them.

 Propagate with perfect quality.

 Propagate with least lead time.

 Propagate things with simply those features the customer needs.

 Propagate with no abuse of work, material or rigging - every advancement must have a reason so

that there is zero latent stock.

KANBAN:

KANBAN is the Japanese word for “signal card”, or a technique for work and stock release, is an significant piece of Just in Time and Lean Manufacturing hypothesis. It was at first made at Toyota amid the 1950s as a technique for managing material stream on the mechanical generation framework. Throughout ongoing decades, the Kanban strategy, a significantly capable and feasible plant creation system, has shaped into a perfect amassing condition provoking overall power.
Kanban stays for Kan-card, Ban-signal. The exemplification of the Kanban thought is that a supplier, the stockroom or amassing should simply pass on sections as and when they are required, so that there is no excess Inventory. Inside this method, workstations arranged along creation lines simply make/pass on needed fragments when they get a card and an unfilled compartment, exhibiting that more parts will be required in progress. In the event that there ought to be an event of line impedances, each workstation will sufficiently make sections to fill the compartment and after that stop. In addition, Kanban limits the proportion of stock in the process by going about as an endorsement to convey more Inventory. Since Kanban is a chain system in which orders spill out of one system to another, the creation or transport of fragments are pulled to the age line, rather than the value guess organized strategy where parts are pushed to the line.

Advantages of Kanban Processing:

The primary goal of Kanban is “to reduce waste”. So Gives an essential and sensible process. Gives quick and correct fact. There are low costs related with the trading of fact. Gives smart response to changes.
There is a strict limit of over-limit in techniques. Avoids overproduction. Breaking points waste.
Full control can be kept up. Operator's commitment to line workers.

KAIZEN:

Kaizen is the Japanese word for improvement or change for better.

Kai = to take a section

Zen = to make great.

Together these words intend to dismantle something with the end target to improve it.

HOW DOES KAIZEN WORK:

Ten fundamental standards for development in the perspective of KAIZEN:

1. Toss out most of your settled discretion with respect to how to complete things.

2. Consider how the new technique will task not how it won't.

3. Try not to recognize pardons. Altogether deny the same old things.

4. Try not to search for faultlessness. A 50% execution rate is fine as long as it's done on the spot.

5. Right mistakes the moment they're found.

6. Try not to spend an fascinating proportion of money on upgrade.

7. Issues enable you to use your psyche.

8. "Why" no not accurately on different occasions until the point that you find a conclusive reason.

9. Ten people's discretion are better than anything one person's.

10. Improvement knows no restriction.

PURPOSE OF KAIZEN:

Kaizen practices base on each undertaking and method with the ultimate objective to incorporate regard and discard squander.

Process: is the gathering of errands hoped to plan and make a thing.
Example is one improvement performed by a singular machine or individual on that thing.

OBJECTIVE OF KAIZEN:

Things (Quantity, Rejection, etcetera.)

Rigging (Changeover, Utilization, Breakdown)

Human (Communication, Awareness, Stillness)

Methodology (Waiting Time, Bottleneck, Line Balancing)

System (QC, Specification,).

Work study:

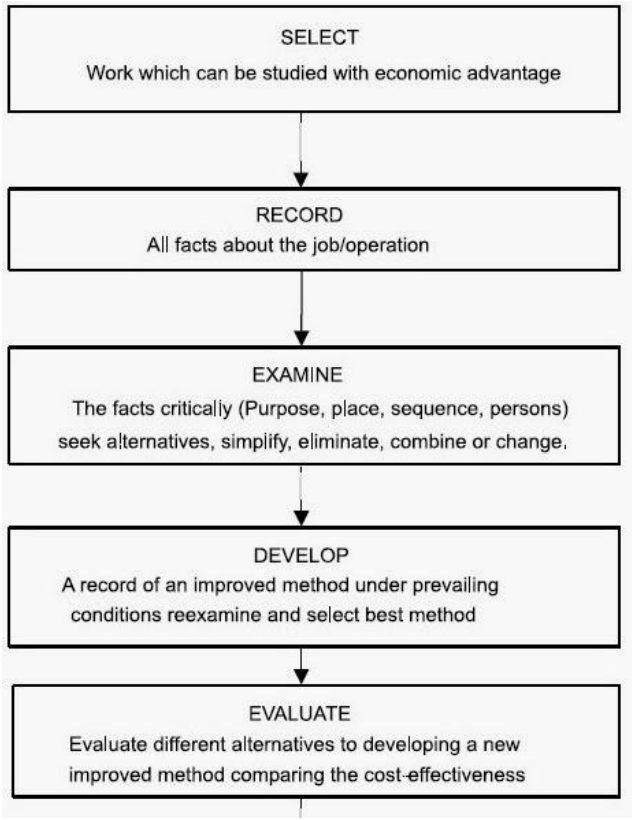
Work study is the systematic examination of the methods of carrying on activities so as to improve the effective use of recourse and set up standard performance.

Distinct discipline of work study:

 Method consider, which is stressed over the organized way by which the errands is finished, and

 Work estimation, which is stressed over the time and effort required to do the errand.

Work study structure:



Work considering is an exact movement procedure. There are different articles to be analyzed systematically to finish the most calm result. The skill will be continued with very much arranged for view. We should see the underneath.

 Select: Select the task to be considered.

 Record: Record or meeting each essential datum about the task or process.

 Examine: break down the record element essentially, "the purpose behind the activity, where it is played out, the course of action in which it is done, every person who is doing and by which it is done".

 Developing: Develop the most financial skill and drawing as reasonable method on the dedication of those concerned (overseers, chief, workers and others master).

 Evaluate: Evaluate the result gain by the new upgraded procedure differentiating the cost practicality of the picked new system with the present strategy for execution.

 Define: describe the new system and the related time and present it to all of those anxious, either verbally or in forming, using displays.

 Install: present the new system, setting up those included, as an agreed practice with the imposed time of undertaking.

 Maintain: keep up the new standard practice by checking the results and differentiating them and the first goal.

Characteristic of work ponder design:

A work considering expert ought to be educated, ace, adroit, certain, singular respectability and real. Focal points underneath

Genuineness and Honest:

The work think about individual must be potent and genuine just if is the circumstance will he she gains the surety and respect of those with whom the individual in question will work.

Vitality:

He she ought to be very excited about the deportment, have confidence in the critical of what the individual in question is doing and have the ability to transmit enthusiasm to the in total public circuitous.

Class/Diplomacy:

Class is overseeing people starts from understanding them and not wishing to harm their tendency by unkind or careless word, despite when these may be supported. Without

upheld no work consider individual will go anyplace.

Extraordinary Appearance:

The individual must be faultless tidy and look beneficial. This will awaken sureness among the all-inclusive community with whom the person needs to work.

Dauntlessness:

This can generally go with extraordinary getting ready and experience of applying work consider successfully. The work ponder master must have the efficiency to confront top organization, supervisors or authorities with honor to his appraisal and finding, and to do all things considered so will respect and not gives offense.

Function Of Work Study Engineering:

Engineering Function:

Procedure Study: Space proviso, Equipment, Machine association, Element analyze, Effective and unable time disengagement, Handling and advancement, Contingency, improve pro execution, find better skill for work, reduce lacking time and Increasing needling time, Selling better system to other individuals.

Work Measurement: Cycle check, Observed time, Rating, BMV, and SMV, Production look at, Time consider, setting time standard and reviewing.

General Sewing Data(GSD): System consider and make inside GSD coding time by reducing futile errand through procedure consider.

Breakdown and Layout: Action breakdown, Time setting, Process gathering, tight and free stream, Incentive or No helper plan, action and worker's assurance.

Use: All quantifiable trims like Thread, String, Tape, Webbing, Binding, Grosgrain, and Velcro. Adaptable, straight, surface and other like.

Figuring: Feeding time, Produced time, Efficiency, Target setting, gainfulness opening, Individual execution and limit, Potential pieces, Required creation days/hours/workers, Contingency, AQL, Accuracy and moreover any doubt measure, Cost breakdown point, Ratio, Load go, Sewing time, Effective time, BPT, HPT, LPT,BMV,SMV.

General Function:

1. SMV and Production Plan: SMV estimation and revive thinking plan.

2. Motivator Package: Exploration and control age plan as higher execution level.

3. Announcing: Efficiency, Performance, Capacity, Production explanation, Earning

declaration, Comparison, Factory/line limit, Incentive figuring and organization key information as required.

4. Keeping History: Standard data, Product, Earning, Efficiency, Performance, Progression, Target and target ability examination.

5. Information Centralization: Monitoring and centralization of all data across over units.

6. Spare Material: Protection to maltreatment of trims quantifiable like's strings. String, Binding, Tape, Velcro, Elastic, Z-band, Webbing, Grosgrain, etc and countable inclinations get eyelet, Stopper, Puller, Zipper, etc.

7. Multi Experience: Basic quality system and affirmation level, Basic upkeep, Cutting, Marker, Pattern, Sample and squeezing strategy.

8. Saved Expert: To enable other individuals to piece where required as held ace.

9. Inspiration: Training, Job workplaces, Life organization and methods presentation.

STEPS INVOLVED:

1. Analyze each style to ascertain its necessity for creation.

2. Style Analysis depends on:

   - ❖ Firm's quality norms
   - ❖ Amount of work required
   - ❖ Obtainable hardware
   - ❖ Volume to be delivered
   - ❖ Expected "throughput time"

3. Style prerequisites are resolved through inquiry of tests and details

4. Apparel Engineers are thought about:

- Number, intricacy and arrangement of Operations

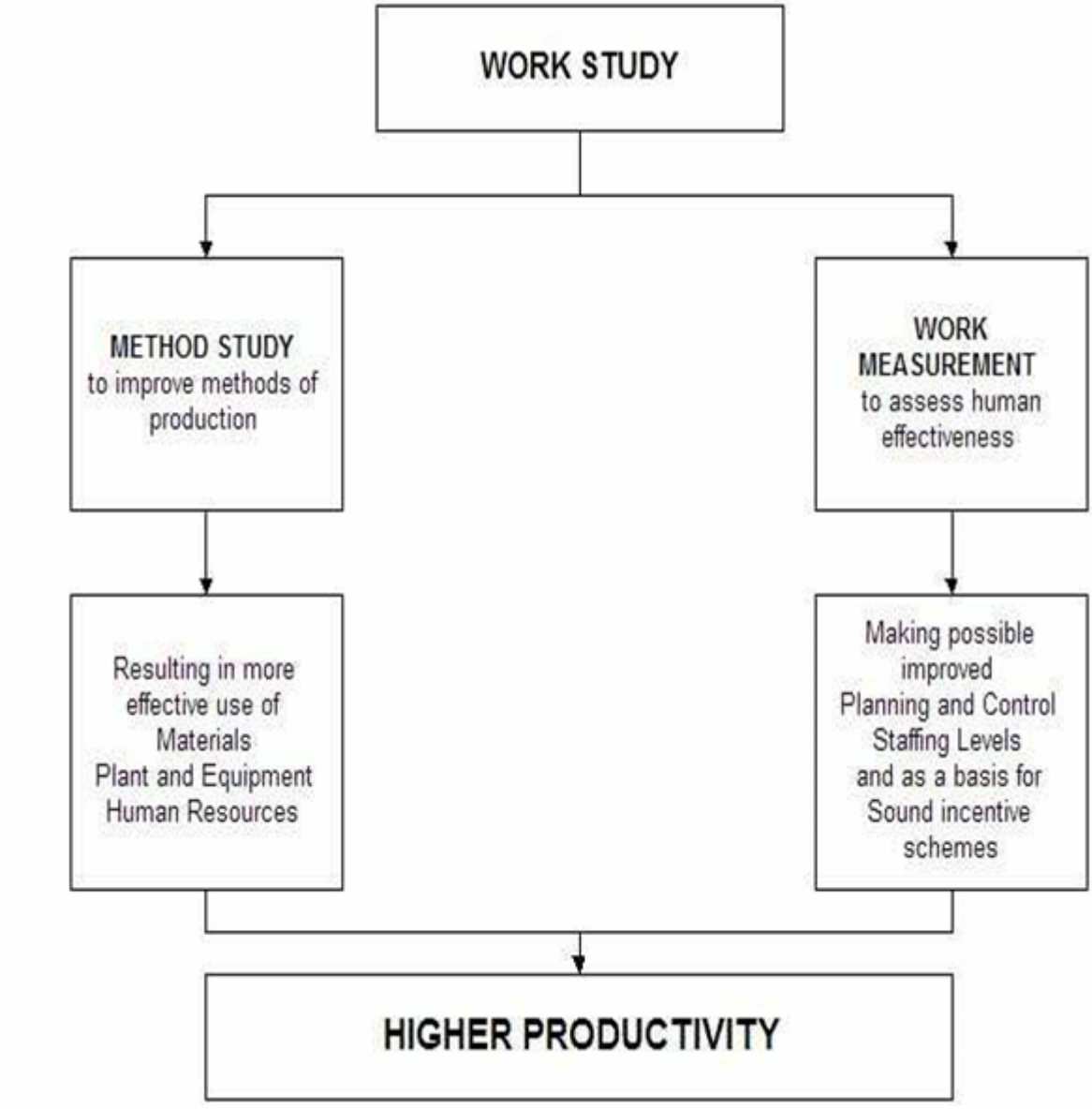
- Equipment necessary
- Time and Skill necessary

5. Task Breakdown: Work in each style is divided into activities

A task B/down is successive rundown of the considerable number of activities that involved with gathering an article of clothing used to build up the work process for each style.

6. Apparel designers consider every activity to improve its viability and productivity and to build up techniques to guarantee a reliable execution by administrators and steady items.

Diagram of Work study:



STEPS INVOLVED

1. Analyze each style to determine its need for production.

2. Style Analysis is based on:
   -Firm's multiplication standards
   -Amount of labor required
   -Obtainable equipment
   -Volume to be produced
   -Expected "throughput time"

3. Style requirements are need through analysis of samples and specifications

4. Apparel Engineers are concerned with:

   -Number, complexity and sequence of Operations

   -Equipment Required

   -Time and Skill Required

5. Operation Breakdown: Work in each style is crushed down into operations An operation B/down is sequential list of all the operations that involved in assembling a garment used to establish the workflow for each style.

6. Apparel engineers study each operation to improve its effectiveness and efficiency and to establish systems to ensure a consistent performance by operators and consistent products.

Operation follow up sheet

AL-MUSLIM GROUP

UNIT :

OPERATION FOLLOW UP SHEET

Line : I
Section : Sewing
Operator : Anoyara
Operation : Fh part bttm edge te
Style : BOIL SWIM SHORTS

SMV/TGT : 120
Best Achieved : 75
Study Achieved : 115
Study Capacity : 137

Date : 19-12-2020
Time Start : 10:00 AM
Time End : 11:00 AM
Study By : Ismail

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24	22	23	24	23													
285	287	293	288	290	267	293	277	274	262	390	65	140					

Effective Time : 2816
Ineffective Time : 635
Observed Time : 3451

Average Cycle Time : 24.48
Turn to min: 40
Capacity for 55 Mnts : 137

Next Hour/Day :

Operator Sign : অনোয়ারা
Supervisor Sign :
Line Chief Sign. :
Production Manager Sign. :

Comments :

Standard Time and Target Setting:

Various associations don't use standards time systems; target setting relies upon puzzle and skill. Establishment of Standard events and the headway of the best process to make is essentially crucial to upgrade productivity. Every association that wants to fight later on must perceive this. This graph clearly plots the points of interest to assembling plant ability if standard events and all around made systems are used.

Method Analysis:

Most of the associations are using poor systems, managers are left to set up most of right way to deal with do the action, settle on the amount of influence of sewing, crumbling and spreading out of parts, silly organizing and extra managing, these developments add to the time it takes to manufacture the piece of stuff and should be shed. Procedure study can be executed in an age structure if it is in-house or then again on an assentation introduce. Fitting strategy examination can upgrade advantage by in any occasion 15%.

Workplace Layout:

The organization needs to fit anyway much machines in the handling plant as could be normal the situation being what it is, diminishing the spread for techniques upgrade. The space among machines is lacking a significant part of the time.
A nice workplace configuration will clear out useless developments and exhaustion achieving liberal addition in the capability of the head.
Basically look at the picture close by and think how beneficially you will have the skill to work 8 hours' day by day sitting in that demonstration.

Operation Sequence:

A bit of the generation divisions works without a honestly masterminded or formed action gathering. This is an essential development investment creation and a mistake or recklessness at this stage can result into gigantic occurrence later to the extent manager time, work substance and quality.

Work Aids and Attachments:

Usage of work aides and associations is lacking. different new and unobtrusive associations and coordinators are as a result reliably made, it is basic that these headways are known to ensure a project of unfaltering upgrade. Various new and unassuming associations and coordinators are all the

things considered constantly made, it is crucial that these headways are known to ensure a program of reliable improvement.

Operator Monitoring:

A muscular segment of the associations investigated don't have the best approach to develop their execution against standard, so they don't understand where they stand. There are no real estimations so their ability levels are, most ideal situation a figure, it is hard to perceive how they will have the capability to continue fighting aside from in the event that they have fitting controls set up, and have developed effectiveness upgrade tasks to push ahead later on.

Method Study for article of clothing tasks:

Technique contemplate is to a more noteworthy degree an exact system to manage occupation structure than a course of action of methods. It is described as the precise annual and fundamental examination of existing and proposed structure for doing work, as a technique for making and applying less difficult and all the more principal methodologies and reducing costs. The system incorporates methodically following 6 phases:

1.Selection of work to be considered: Most assignments involve different discrete occupations or activities. The primary stage is to pick those vocations to be inspected that will take the best returns for the time spent. For example, practices with the best degrees for improvement, those causing delays or bottlenecks or those ensuing in high costing.

2. Recording of each critical truth of current system: Process consider uses formal techniques to record the progression of activities, the time association between different assignments, the improvement of materials, and the advancement of staff. There are different procedures used in system consider.

3. Critical examinations of those facts: This is the most basic period in strategy think about. It is used to essentially take a gander at the present method by searching for answers to questions:

- The explanation behind each segment
- The put

- The progression
- The person
- The infers

4. Development of the most convenient, monetary and incredible procedure: This stage is used to developed another and better strategy for executing the shot, by thinking about the delayed consequences of fundamental examination. The new process is made by a mix of thoroughly taking out a couple of activities, joining a couple of areas, changing the gathering of a couple of activities and by enhancing the matter of others.

5. Installation of new procedure: This movement incorporates adventure managing the movements and ensuring that everybody included appreciates the movements included. the day's end they understand the new system, which is doing what, the refinements appeared differently in relation to the old procedure and critically the cause behind the alteration. Getting ready is a basic bit of this stage particularly if the new procedure incorporates radical changes. Giving stable apparatus, portions and arrangements may in like manner be incorporated.

6. Maintenance of new procedure and periodic checking: Monitoring of how effective the update technique is and how staff have balanced is basic. Point that is now and again dismissed is to check what affect the new method has on various activities. For example, it may be that when the new methodology is successful in murdering a bottleneck in a particular area, the bottleneck has moved elsewhere at the same time. By irregular checking the new method and its things, organization can ensure that general capability is improving rather than falling apart.

Chapter 03

Time & Motion Study

Time Study for article of clothing tasks:

Definition of Time Study:

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

Time consider gadgets:

- A stop watch
- Time think about orchestrate
- One pen or pencil

Reduce line setting time for assembly line:

Specialists and generation chiefs dependably search for an access to enhance plant's task efficiency. In case, they investigate things that bring down work profitability. "Higher line setting time" is a standout amongst the most obvious reasons at present that lessens industrial facility's general profitability. When it requires longer investment for setting a line, the vast majority of the administrators sit inactive. That implies administrators are not used in creating piece of garments and administrator efficiency falls coming about high work cost. Following bit of article will assist you with reducing line time. I have seen production lines where 1.5 to 2 days is spent in line setting for woven tops. At the point when line chief and architects are inquired as to why they are setting aside that much opportunity to set a 40 machines

line, they give dozens of reasons. Whatever reasons line administrator have, is the underlying driver for the deferral. Reasons may change time to time or style to style. How about we talk about elementary concerns that reason longer time for line setting.

1.Industry begins stacking update style to the line once all administrators get free from the past style.

2.Frequent change in line arranging.

3.All trims have not been endorsed or not yet sourced. Until the point when required trims are sourced all activity can't be begun.

4.Few piece of clothing parts has been sent outside for printing or weaving however did not got on time.

5.Supervisor did not completely evaluate the work arrangement or expertise prerequisite for every activity.

6.Operators were absent in the underlying activities or basic tasks.

7.Quality issue, manager not get ready to give reasonable administrator for the basic activities.

8.Maintenance person don't capable set machine rapidly. Substitution of machine, setting aides and connection takes longer time than it ought to be.

9.Planning for bigger package measure. At the elementary day of line setting in the event that greater package estimate is utilized, it will set aside enormous measure of scope to achieve package at the last administrator.

Technique of Method Study

- Selection of job to be studied.
- Gathering, recording and presentation of necessary information.
- Analysis of existing systems.
- Develop the new systems.
- Install the new systems.
- Maintain the new systems.

The basic approach for the method study:

1. SELECT
2. RECORD
3. EXAMINE
4. DEVELOP
5. EVALUATE
6. DEFINE
7. INSTALL
8. MAINTAIN

Brief explanation of the eight steps
1. SELECT
The processing to be studied to selected and its boundaries are to be defined

2. RECORD
The processing is to be recorded in specified charts and diagrams.
Process charts
Flow charts
Flow diagram
String diagram

A variety of skill for analysis and charting have for a long time been established as IE techniques. Among the systems of analysis, process analysis, operation analysis, motion study, time study, work sampling, and flow analysis are widely used. Similarly, among the charting skills, process charts, pitch diagrams, multiple activity charts, process charts, and machine sequential charts are used. From among these various skills, the appropriate one will be chosen, based on the object being analyzed [3].

3. EXAMINE
A processing or method has activities.
The activities are categorized into action activities and idle (inventory) activities.
Action categories are subdivided into i) MAKE READY activities, (ii) Do operations iii) PUT AWAY activities

Each activity is subjected to a series of questions:
A. Purpose
What is done?
Why is it done?
What else might be done?
What should be done?

B. Place
Where is it done?
Why is it done there?
Where else might it be done?
Where should it be done?

C. Sequence
When is it done?
Why is done then?
When it might be done?
When should it be done?

D. person
Who does it?
Why does that person do it?

Who else might do it?
Who should do it?

E. Means
How is it done?
Why is it done that way?
How else might it be done?
How should it be done?

These questions in the above series must be asked every time a method study is undertaken. They are the basis of successful method study.

4. DEVELOP

The shortcomings of the present processing are brought out by the systematic questioning process that is combined with a knowledge relevant to the process being examined. Industrial may have the knowledge need or may not have the adequate knowledge. They required to have a knowledge library to support their effort as well as access to the experts during the study period. Alternatives to the current activities which have the shortcomings are to be produced during this stage.

5. EVALUATE

Alternatives are to be evaluated at this stage to find their contribution to the efficiency of the process as well as effectiveness.

6. DEFINE

The new process suggested has to be put down standard process sheets that are issued to the shop or department.

7. INSTALL

Industrial engineers of methods study persons have to train the operators and their supervisors in the update methods and participate in installing the method.

8. MAINTAIN

Industrial engineers have to conduct a periodic review of methods to obey modifications brought into the installed methods by operators and supervisors and if they are beneficial, they have to be made part of standard operating procedure (SOP). If they are not favorable, supervisors are to be informed of the same to bring the method back to SOP.

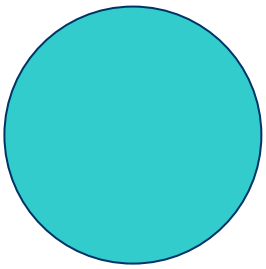
Charts for Method Study

Production order and method study are generally displayed in charts.

- **Process charts**

- It is a diagrammatic representation of sequence or order of operations from start to finish.
- It uses various symbols to represent multiple activities
- They are generally not drawn to scale.
- The symbols are drawn in vertical columns according to their sequence and description is given.

SYMBOLS used in process charts:

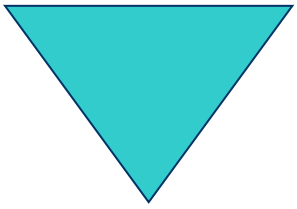


Operation

1. It represents a broad category of operations executed during a production process.
2. Operation occurs when an intention changes its properties physically or chemically.
3. Small alphabets are written inside the circle to denote a specific operation.

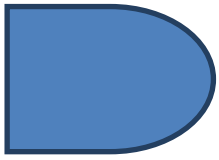
Movement

1. It represents an **inspection** during a production process.
2. The object is examined for its verification with need quality & other characteristic.



Storage

1. It represents a **storage** during a production method, protected against unauthorized removal.
2. Distinction can be made between permanent and temporary storage by writing TS or PS in diagram.
3.



Delay

1. It represents a delay during a production method.
2. It occurs when immediate performance of next planned step cannot be taken.

TIME STUDY EQUIPMENT

To carry out time study, a stop watch, a study board and time study forms are required. Along with the study, some measure of parts and distances moved by the operator etc. may need to be measured. Appropriate measuring instruments are used for such measurements.

It is important to take studies on capable workers when the job is done and is to be done by large number of workers.

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. (BSI: Glossary of terms used in management services, BSI 3138 , London 1991).

Purpose

1. To understand the production receptivity of the factory, and to draw up plans for the appropriate target output, suitable range of divided labor and optimum production (Scheduling, personnel planning or equipment planning).

2. To investigate the level of individual skill.

3. To determine the time value for each work compound under the motion study.

4. For use as a yardstick in evaluating the purpose.

5. To draw up plants and make catalogue for a change of product or for the constructions of a new or additional factory.

6. To obtain an evaluation standard for receiving planning, using the time study as the basis of the cost catalogue and control.

7. For use as the basis for determining the unit cost of manufacture and the wage rate.

8. For use the basis for introducing a production control method.

STEPS IN MAKING A TIME STUDY

1. Study of standard method.
2. Recording the operative and the nearby conditions at the time of study, which may affect the method of carrying the work and thereby time required to do the work.
3. Recording a complete description of the work as it is being carried out and breaking down the work or operation into elements for individual time determination.
4. Determination of the sample size.
5. Measuring and recording the time taken using a stop watch for each element in the operation.
6. Along with measuring time, the time study person has to assess the effective speed of the operative related to the rate corresponding to the standard rating.
7. Do the time study for the need sample size.
8. Extend the observed times to 'basic times'.
9. Determining the allowances to be provided.
10. Determining the 'standard time' for the operation.

Notes on time study:

- Be cordial and polite, but do not talk unnecessarily to the operator.

 Do not stand in front of the operator. Stand in a less discomforting position, such as off to the side or in the back.

 Never sit down during a time study!

 Always calculate the time study results immediately after the date assemblage

 Controversy over rating arises from a misunderstanding of what is being rated. An operator's output can vary only if:

i. She/he varies his/her pace of work.

ii. Varies his/ her system. Method includes the motion pattern, no. of motions and inters-motional delays.

 When studying, the observer notes the speed at which the operator performance, and compares this mentally with the idea of the standard pace at which an operator would work if motivated to apply herself and is free from fatigue (100% operator).

 The engineer should:

i. Have a mental idea of the 100% operator.

ii. Recognize deviation from the 100% pace and be able to put a relative value onto it.

 Do not confuse smooth, fluid motion with slow motion. Don't mistake rhythmic intensity for fast productive motion.

 Machine paced operations or material should be graded 105% to 115%, depending on the effectiveness of the operator in utilizing the machine cycle to do their job properly.

 Before starting a study the engineer must insure that he understands the correct motion for the operation, and then checks that the operator is using them. The study should not be taken if the motion pattern is incorrect if not the engineer is prepared to compensate for the incorrect motion in his elemental rating or else assures himself/herself that the discrepancy is insignificant.

 Have the quality supervisor or in-line sampler check the bundle. This ensures that the time standard is not established on an unsatisfactory quality value.

 Non-representative element times are circled. They may arise because:

i. Inclusion of work not identified by the element (such as changing bobbin).

ii. Faulty operation of some sort.

iii. Missing an element time.

 Allowances are added to the 100% time determined by the time study to give a value allowed time which will permit the average operator to earn a satisfactory wage, provided there is no abnormal delay and he/she applies his/ herself to her work.

 Machine delay includes the following:

i. Thread changes.

ii. Bobbin changes (on lockstitch).

iii. Cleaning & oiling machine.

iv. Thread breaks caused by operator, machine & thread.

v. Needle breaks.

vi. Minor adjustments or changes in folders and attachments.

vii. First 15 minutes of machine delay.

 The machine delay factor is applied to the total cycle time. This has the effect of giving a delay allowance on the manipulative elements within a machine cycle suppose "pick up garment".

On the average this does not present a problem since the percentage has been developed from actual experience.

 Personal & fatigue allowance covers:
i. Break periods.
ii. Personal needs such as water, rest rooms etc.
iii. Minor conversations.
iv. Factors for loss of pace due to getting tired.

Setting the standard time:

The standard time is the time required to complete one unit of work:
 Under the predetermined working conditions.

 According to the predetermined working setting.

 By a worker with average skill.

The three factors given here are the working setting, operation method and the worker's skill. Of these factors, the worker's skill in particular has the great influence on the processing time. The individual different in skill result in difference in the processing time. If the possible to mathematically understand the individual differences as a unified level standard.
The standard time setting may be used for the following purpose:

1. To promote the accuracy of planning.
2. To assign in an appropriate etiquette.
3. To understand the effect of teaching skills.
4. To set the direction of efforts aimed at improving skills.

Leveling is a system that allows the individual differences to be understood as a unified level value. Leveling permits the setting of the standard time using numbers called leveling coefficients.

The following shows the related formula.

Standard time= Time measure X (1 + Leveling co-efficient) X (1+ Allowance rate)

Rating:

The idea of „Rating" (known in the US as „grading") is fundamental in time study. The ability to rate effectively distinguishes a qualified time study practitioner from a novice.

Definitions:

Rating is the process used by the industrial engineer to: balance the actual performance of the operator with his/her mental concept of normal performance.

The rating is the numerical value used to denote the rate of working. In order to rate there must be a defined level of performance to balance with, an „average" level.

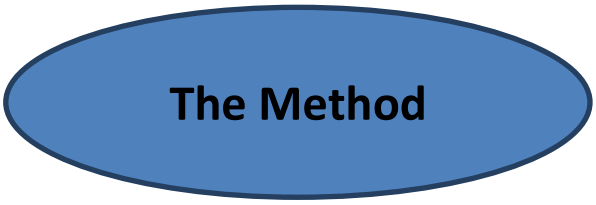
Time study professionals apply the concept of Standard Operator Definitions:

Definitions	A Standard Operator is Fully trained and motivated to perform a defined action (having a defined method) and is, by definition average in terms of his or her work-pace. **Standard Performance is** Achieved by a standard operator, as long as working conditions are correct.

Chapter 04
Performance Development

Performance Development

First

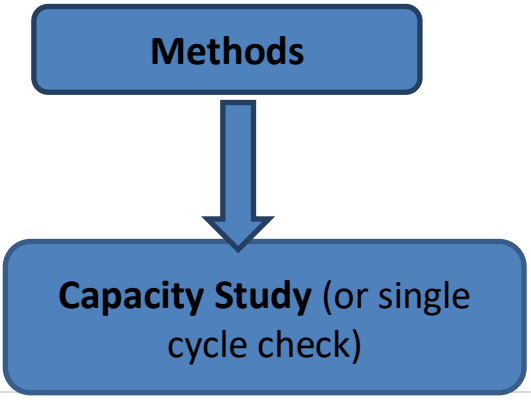


Then

Only then

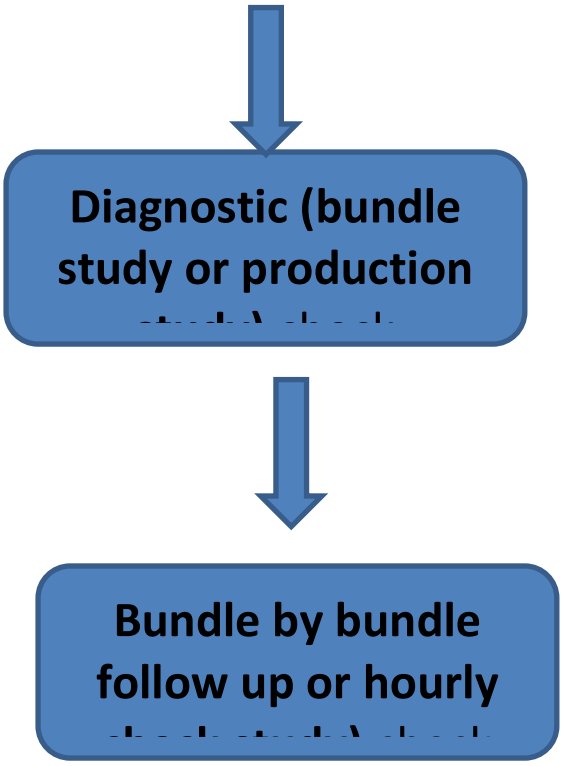
In a sewing factory, there is always a necessity to develop the skills and the stamina of the operators. There is a logical way in which this can be done. We develop skills first and then stamina, but the two cannot be separated.

We can consider skill to be **sound & correct methods** once we have the method correct, we can start an effectiveness follow-up.



Review methods used and ensure correct motion pattern is in use.

Is there a difference between potential performance (capacity) and actual performance (achieved)? The gap is called is called a **Capacity Gap.**



What is the reason for the capacity gap?
Bundle handling?
Machine problems?
Cutting quality?
Repairs (sewing quality)?
Personal time?
Others

Is there a stamina problem? Can we develop performance gradually day by day?

Capacity Study:

When we make a capacity study on an operator, we are measuring the achievement she should attain if she continues to work at the same pace and use the same method as observed during the study. This means that at the end of the study we can say that operator has the conception to be a 120 percent performer" or whatever performance level the study indicates. What exactly do we mean by capacity? Well, it means the same as capability. It means that the operator is capable of achieving the achievement measured by the study.

Capacity Study Making:

The capacity study is a 10-cycle study to estimate an operator's production ability. If the actual production and capacity are different, then follow up studies should be made. During the capacity study, the operator's average time per wheel to sew her operation is determined. We then accept the operator works at this pace all day and takes the full amount of lost time (machine delay, personal and fatigue time) provided for in the target. We call the time left, after lost time has been deducted, the available sewing minutes. These are divided by the average time per piece to inventory production. Operators benefit from capacity studies only if you spot wasted motions and make suggestions and corrections. Results of every capacity study should be reviewed with the operator.

A. Allowances:

Allowances are added to the 100% time decided by a time study to give a Standard Time which will provide the average operator to earn a satisfactory wage, provided there is no abnormal incidence of delays and she applies herself to her work. These are also used while estimating an operator's capacity. Three categories are recognized: -

- Machine delay.
- Personal and fatigue.
- Incentive

B. Machine delay

Delays due to machine stoppage together with thread changes, bobbin changes, cleaning and oiling of machine, first 15 minutes of machine delay, thread breaks, needle breaks, minor adjustments or changes in folders, connection, minor delays caused by attachment etc. The machine delay factor is applied to the total of cyclic elements when the work is largely machining, although not applied to wholly racketeering work such as clipping or turning parts.

C. Personal and fatigue

Some aspects of simple required personal time can be quantified, but fatigue itself cannot be measured. It is also impossible to divided personal and fatigue time because of their inter-relation with one another. This allowance came into being through guesswork and trial based on normal use. Personal and fatigue allowance covers break periods, personal needs such as water, rest rooms, minor conversations etc. It should be noted that the machine delay factor is applied to 100% time, and the personal and fatigue time (with the incentive factor added) is applied to this to give the SAM.

General comments:

 Use of your time-

Follow-up is not simple clocking of cycles. This does none any good. Follow-up time is valuable. While timing a 2.0 SM operation use the time between the breakpoints to:
Look closely at the method

 Encourage the operator.

 Time the elements of the job.

 How to get effective studies:
Capacity studies record single cycles **Without :**

- Bundle handling
- Thread breaks

- **Bobbin & color changes**

When you conduct a study on a „long" cycle operation (say more than one basic minute), you can lose a complete cycle, because of one thread break. You can „save" and use much of this time if you have broken the job to suitable elements, then thread breaks would sentiment only one of the elements. You would still have the remaining cycles which can be used.

- **Other follow-up tools-**

In any situations requiring follow-up support you will need to trace out and choose the best approach. The tools detail for follow up (capacity study, diagnostic and follow-up study) are not the only ones you can use. Be creative in your follow-up. E.g., use graphs to plot cycle times and actual performance in opposition to target. Record the times for the particular elements of a job–plot them to show improvements; record single cycle one at a time and plot them; use visual aids to the full, and always explain the results to the operator.

Capacity Study Report:

AL-MUSLIM GROUP

UNIT : A.L.M Knit Wear LTD.

CAPACITY STUDY SHEET

LINE : H

DATE: 06-12-2020

STYLE # SLH STORM Flexsho TYPE :

ORDER QTY. :

PLAN QTY. #

SL. NO.	MC TYPE	OPERATOR /HELPER NAME+ID.NO	OPERATION	1st	2nd	3rd	4th	5th	6th	7th	TOTAL	AVG.	THREAD OUT AVG. TOME	TOTAL	TURN TO MIN.	BUNDLE HAND. TIME/PCS	TOTAL TIME	CAPACITY /HR	ACHIEVE /HR	CAPACITY GAP	REMARKS
1	S/N	Romoa	Loop Make by Folder	14	15	11	12	14	11	10	85	12.14		0.20			270				
2	S/N	Moyna	S/Fly Piping	-	-	-	-	-	-	-											
3	S/N	Lucky	Cam welt join to leg facing	34	32	35	32	34	31	34	232	33.14		0.55			98				
4	O/L	Tania	Cam welt facing O/L D/F	3	3	2	3	5	3	3	22	3.15		0.5			1.080				
5	O/L	Tania	Front rise O/L with loop	10	9	11	10	9	8	10	67	9.57		0.15			360				
6	S/N	Pinki	Cam plk join to small facing	14	12	13	14	14	13	15	95	13.57		0.22			245				
7	S/N	Rinu	Big end small facing join to pkting	12	13	11	13	14	13	12	88	12.57		0.21			257				
8	S/N	Monira	Facing join to pkting	5	5	4	6	5	6	5	36	5.14		0.085			635				
9	M/M	Mehenkar	Front pkt join to body	14	13	15	14	13	16	14	99	14.14		0.235			229				
10	S/N	Dulena	Front pkt holing	24	23	21	24	23	22	25	162	23.14		0.385			140				
11	S/N	Rahela	Front pkt holing and Tack	24	23	21	22	25	21	23	159	22.71		0.378			143				
12	S/N	Pinki	Zipper joint S/F join with pkt	15	16	14	15	16	17	14	107	15.28		0.254			213				
13	S/N	Mohsina	J hound stc	19	20	18	17	18	19	18	129	18.43		0.307			196				

SIGN OF WORK STUDY OFFICER

CHECKED BY WORK STUDY A G M

Chapter 05
Line Balancing & Bottleneck

Line Balancing:

Line Balancing is to share work, to support in another operation, to shift manpower according to their capacity for equal production in every point.

Necessity of line balancing:

- To get easily outturn.
- To get excellent performance of the workers.
- To ensure of proper use of time & manpower.
- To follow up the line easily.
- To give the pressure to workers for optimum outturn.
- To know the line's potential capacity of the line.
- To find out the productivity gap%.
- To take the next step for higher productivity at need the line balancing report.
- To get high productivity.

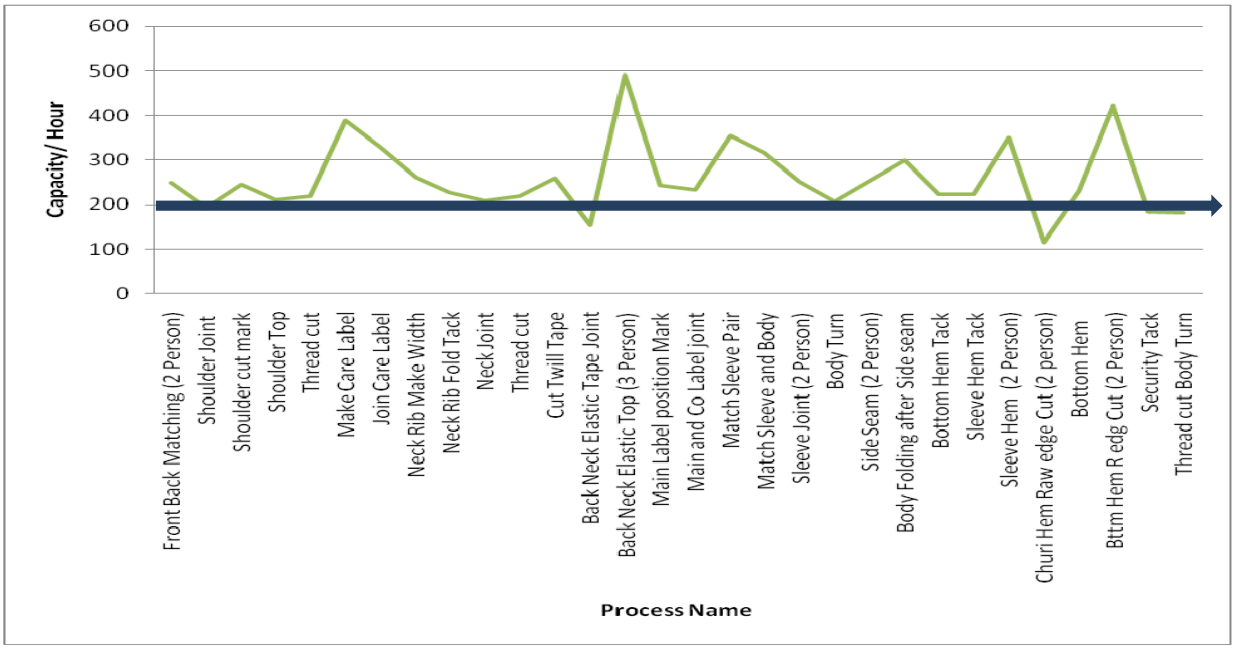


Figure: Variation in each process capacity per hour analogy to bench mark target per hour Plotting process wise capacity in a line graph shows the variation of each process from the bench mark target as the upper capacity is 490 pieces per hour where the lower capacity is only 115 pieces per hour

analogy to the bench
Mark target of 200 pieces. This shows the inconsistency situation in the line and bottleneck condition throughout the process of the whole garment making as lots of WIP stations in the line.

Balancing Processes

Balancing method is very vital to make the production flow almost smoother compare to the previous layout. Considering working distance, type of machines and efficiency, workers who have extra time to work after completing their works, have been shared their work to complete the bottleneck processes. Previously identified seven bottleneck method have been plotted in the left side of the Table. Make and join care label and Back neck elastic tape joint every have been made by lock stitch machine and these have been shared by two lock stitch machine processes. Operator who work in Process no. 7 Neck rib make width, have been worked for 50 minutes per hour in her first process, capacity 217 pieces and then have been worked in the process no. 6 make and join care label for last 10 minutes to make additional 30 pieces for overall capacity of 208 pieces on process no. 6. Similarly, Process no. 13.B back neck elastic top have been worked for 35 minutes and rest 25 minutes have been worked on process no. 12 to make total capacity of 216 pieces which was originally 153 pieces shown in Table 2. Process no.14, 25, 20 and 22 have been similarly worked on the process no.16, 23, 24 and 27 for the capacity of 195, 198, 153 and 199 pieces per hour. Process no. 24 churi hem raw edge cut have been suggested an extra floater to use after being shared worked from process no. 20.

Bottleneck in line

- Worker selection wrong.
- Wrong works flow / sequence of works.
- Non balance allocation of elements.
- Works negligence by workers.
- Workers absenteeism.
- Machine disturbances / out of order.
- Lack of supply.
- Non serial supplies forward from workers.
- Color shading.
- Quality problem.

Way of reducing bottle neck

- To select right workers for right works.
- To keep supply available in time.

- To maintain serial number.
- Reject garments should not forward.
- Supply should be onwards after checking.
- To alert when bundling (maintain serial number)
- By improving system.
- By increasing worker's performance.
- By reducing sewing burst
- To make size set sample minimum 15 to 10 days before input.
- To arrange pre-production meeting in time.
- To prepared layout sheet before input in the line.
- To check fabrics and accessories before issuing in the line.
- To submit the layout sheet to maintenance section minimum 2-3 days before for better preparation.
- To check pattern before supply in the line.
- To reduce excess works from workers.

Chapter 06
Data collection & Analysis

Operation Bulletin (For a long pant):

AL-MUSLIM GROUP

UNIT : A.K.M Knit Wear LTD.

CAPACITY STUDY SHEET

LINE : H

DATE: 06-12-2020

STYLE # SLH STORM FLEX SHORT TYPE :

ORDER QTY. :

PLAN QTY. #

SL NO.	MC TYPE	OPERATOR /HELPER NAME+ID.NO	OPERATION	1st	2nd	3rd	4th	5th	6th	7th	TOTAL	AVG.	THREAD OUT AVG. TOME	TOTAL	TURN TO MIN.	BUNDLE HAND. TIME/PCS	TOTAL TIME	CAPACITY /HR	ACHIEVE /HR	CAPACITY GAP	REMARKS
1	S/N	Romiza Parvin 869	Loop Make by folder	14	15	11	12	14	11	10	85	12.14			0.20		270				
2	S/N	Moyna	S/Fly piping	-	-	-	-	-	-	-											
3	S/N	Lucky 34079	Coin welt join to leg facing	34	32	35	32	34	31	34	232	33.14			0.55		98				
4	O/L	Tamia 23089	Coin welt facing O/L D/F	3	3	2	3	5	3	3	22	3.15			0.5		1.080				
5	O/L	Tamia 23089	Front rise O/L with loop	10	9	11	10	9	8	10	67	9.57			0.15		360				
6	S/N	Pinki 37662	Coin pkt join to small facing	14	12	13	14	14	13	15	95	13.57			0.22		245				
7	S/N	Rinku 28871	Big end small facing join to pkting	12	13	11	13	14	13	12	88	12.57			0.21		257				
8	S/N	Monika 33092	Facing join to pkting	5	5	4	6	5	6	5	36	5.14			0.085		635				
9	W/M	Mehebuba 23807	Front pkt join to body	14	13	15	14	13	16	14	99	14.14			0.235		229				
10	S/N	Dulena 18792	Front pkt holing	24	23	21	24	23	22	25	162	23.14			0.385		140				
11	S/N	Rahela 41861	Front pkt holing and Tack	24	23	21	22	25	21	23	159	22.71			0.378		143				
12	S/N	Pinki 23618	Zipper joint S/F join 4 pkt	15	16	14	15	16	17	14	107	15.28			0.254		213				
13	S/N	Monirra	J hound stc	19	20	18	17	18	19	18	129	18.43			0.307		196				

11/12/14

SIGN OF WORK STUDY OFFICER

CHECKED BY WORK STUDY A G M

AL-MUSLIM GROUP

UNIT :

CAPACITY STUDY SHEET

NE: H

STYLE # SLH STORM flex TYPE :

ORDER QTY. :

DATE: 06-12-2020 PLAN QTY. #

SL. NO.	MC TYPE	OPERATOR/HELPER NAME+ID.NO	OPERATION	1st	2nd	3rd	4th	5th	6th	7th	TOTAL	AVG.	THREAD OUT AVG TOME	TOTAL	TURN TO MIN.	BUNDLE HAND. TIME/PCS	TOTAL TIME	CAPACITY /HR	ACHIEVE /HR	CAPACITY GAP	REMARKS
14	S/N	Sonnim 94168	D/Pkt join	19	20	18	19	17	20	19	132	18.86			0.31		174				
15	DNF	Taslima 26086	Front rise close	11	12	13	10	11	12	12	81	11.57			0.193		280				
16	V/T	Kulsum 18599	Front pkt Ventiele	20	21	19	20	20	19	18	137	19.57			0.33		164				
17	S/N	Rashida	PH bag s/h top stc	17	18	16	17	16	17	18	119	17			0.283		191				
18	S/N	kulsum 92937	Pkt tack to body	19	20	16	18	18	16	19	122	17.43			0.290		186				
19	V/M	Fahima 26138	Back pkt vertical	38	37	35	38	37	37	38	262	37.43			0.623		86				
20	S/N	Munni 42104	Pkt bag s/h (Back)	1:21	1:22	1:20	1:20	1:21	1:21	"	8.48	1.211			0.020		2900				
21	S/N	kulsum 19113	" " s/h	25	27	30	28	25	29	26	188	26.86			0.447		121				
22	S/N	Tithi 36592	Bone top seem (B/pkt)	21	22	23	20	21	21	20	148	21.14			0.352		154				
23	S/N	Sanjida 36592	W/S Tack	20	21	22	23	21	22	20	149	21.29			0.354		153				
24	S/N	Rabina 93354	Welt plating top Tack	24	26	27	25	24	25	26	177	25.29			0.421		128				
25	O/L	Rashida 24400	Loop and yoke join mark	10	12	11	10	8	9	10	70	10			0.166		325				
26	O/L	Rinku	Side join by O/L	36	35	38	32	35	34	36	246	35.14			0.585		92				

SIGN OF WORK STUDY OFFICER

CHECKED BY WORK STUDY A G M

AL-MUSLIM GROUP

UNIT :

CAPACITY STUDY SHEET

LINE :

DATE: 06-12-2020

STYLE #

TYPE :

ORDER QTY. :

PLAN QTY. #

SL. NO.	MC TYPE	OPERATOR/HELPER NAME+ID.NO	OPERATION	1st	2nd	3rd	4th	5th	6th	7th	TOTAL	AVG.	THREAD OUT AVG. TOME	TOTAL	TURN TO MIN.	BUNDLE HAND. TIME/PCS	TOTAL TIME	CAPACITY / HR	ACHIEVE / HR	CAPACITY GAP	REMARKS
27	S/N	Buty	Side cond ste	16	15	14	16	15	16	17	109	15.57			0.259			208			
		24418																			
28	V/m	Tania	Loop joint to W/B	25	21	24	23	25	26	21	165	23.57			0.392			138			
		36770																			
29	S/S	china	sharing	18	20	19	18	21	20	21	137	19.57			0.326			165			
		24389																			
30	S/N	minara	cone+country+size lebel	20	21	18	17	19	20	21	136	19.42			0.323			167			
		33750																			
31	S/N	sopna	patty + tack	19	22	20	18	19	20	20	138	19.71			0.328			164			
		41348																			
32	K/S	Gonga	Waist belt join to body	55	50	50	50	55	50	52	312	44.57			0.742			72			
		28067																			
33	K/S	Munalam	Waist belt join to bdy	47	48	50	47	50	50	48	340	48.57			0.809			66			
		37625																			
34	S/N	Riya	mouth close	30	29	35	30	30	29	31	214	30.57			0.509			106			
		35014																			
35	S/N	Sathi	Mouth close (Top)	30	32	34	35	31	30	34	226	32.28			0.538			100			
		21644																			
36	S/N	Rabya	Mouth close 1/4 Top ste	24	25	24	26	27	25	24	175	25			0.416			130			
		35063																			
37	S/N	Moyna	Loop Tack	27	26	28	25	27	29	27	189	27			0.45			120			
		20478																			
38	S/N	kulsum	Loop tack Top	37	36	38	34	35	34	37	253	36.14			0.602			89			
		24487																			
39	F/A	Jahangir	inseam close by folder	25	25	26	28	22	26	25	171	24.42			0407			132			
		20722																			

SIGN OF WORK STUDY OFFICER

CHECKED BY WORK STUDY A G M

AL-MUSLIM GROUP

UNIT :

CAPACITY STUDY SHEET

LINE: H

DATE: 06-12-2020

STYLE #

TYPE :

ORDER QTY. :

PLAN QTY. #

SL. NO.	MC TYPE	OPERATOR /HELPER NAME&ID.NO	OPERATION	1st	2nd	3rd	4th	5th	6th	7th	TOTAL	AVG.	THREAD OUT AVG. TIME	TOTAL	TURN TO MIN.	BUNDLE HAND. TIME/PCS	TOTAL TIME	CAPACITY / HR	ACHIEVE / HR	CAPACITY GAP	REMARKS
40	B/T	Sonia 40003	Loop Bartack (Tag)	15	16	14	15	16	16	15	107	15.29			0.254			212			
41	B/T	Phove Rani	Loop B/T button	30	27	28	31	27	28	27	202	28.86			0.481			112			
42		[illegible]	4/4 B/T	24	23	22	24	25	22	24	164	23.43			0.390			138			
43		Rebeka 19018	Bottom hem hollinger	25	24	25	25	26	25	24	174	24.85			0.414			130			
44																					

SIGN OF WORK STUDY OFFICER

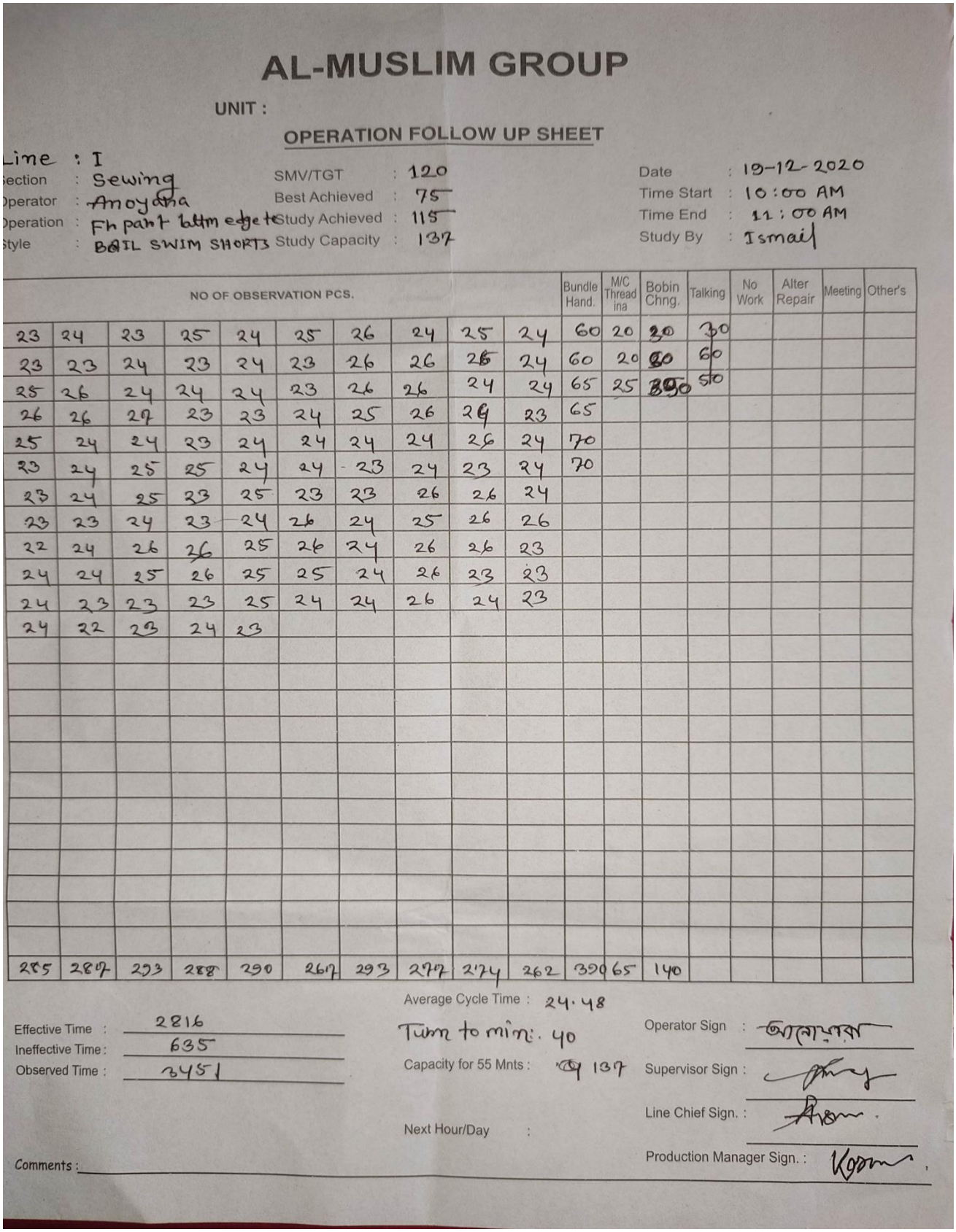
CHECKED BY WORK STUDY A G M

Total SMV	9.92
TARGET PER HOUR	298
TARGET PER HOUR	209
Total operator	45
Total Helper	14
Total Man Power	40
Basic Pitch Time	o.20
Cycle Time	

Objective:

1. To maintain line balancing operation bulletin must need.
2. To reduce bottleneck.
3. To do capacity study more efficiently.
4. To give Target per hour.
5. To know how many workers needed.

Operation Follow up Sheet:



AL-MUSLIM GROUP

UNIT :

OPERATION FOLLOW UP SHEET

Line : I
Section : Sewing
Operator : Anoyara
Operation : Fh part bttm edge to
Style : BOIL SWIM SHORTS

SMV/TGT : 120
Best Achieved : 75
Study Achieved : 115
Study Capacity : 137

Date : 19-12-2020
Time Start : 10:00 AM
Time End : 11:00 AM
Study By : Ismail

NO OF OBSERVATION PCS.										Bundle Hand.	M/C Thread ina	Bobin Chng.	Talking	No Work	Alter Repair	Meeting	Other's
23	24	23	25	24	25	26	24	25	24	60	20	30	30				
23	23	24	23	24	23	26	26	26	24	60	20	80	60				
25	26	24	24	24	23	26	26	24	24	65	25	850	50				
26	26	27	23	23	24	25	26	26	23	65							
25	24	24	23	24	24	24	24	26	24	70							
23	24	25	25	24	24	23	24	23	24	70							
23	24	25	23	25	23	23	26	26	24								
23	23	24	23	24	26	24	25	26	26								
22	24	26	26	25	26	24	26	26	23								
24	24	25	26	25	25	24	26	23	23								
24	23	23	23	25	24	24	26	24	23								
24	22	23	24	23													
285	287	293	288	290	267	293	277	274	262	390	65	140					

Average Cycle Time : 24.48

Effective Time : 2816
Ineffective Time : 635
Observed Time : 3451

Turn to min: 40

Capacity for 55 Mnts : 137

Next Hour/Day :

Operator Sign :
Supervisor Sign :
Line Chief Sign. :
Production Manager Sign. :

Comments :

Analysis:

Produced Pcs during study	93 Pcs/Hr	Total productive time	54 Min	Signature	
Previous best Achived	137 Pcs/Hr	Total Non productive time	6 min	Worker	*Anoyara*
Target improvement	17 Pcs/Hr	Non Productive %	11.10%	Line Chief	
Improvement %	5.43%	Total Observe Time	1 hour	PM	
Avg: Capacity time	24.48 Sec	Total Study Time	1 hour	WSO	
Capacity target	150 Pcs/Hr	Error			
Remarks					

Objective:

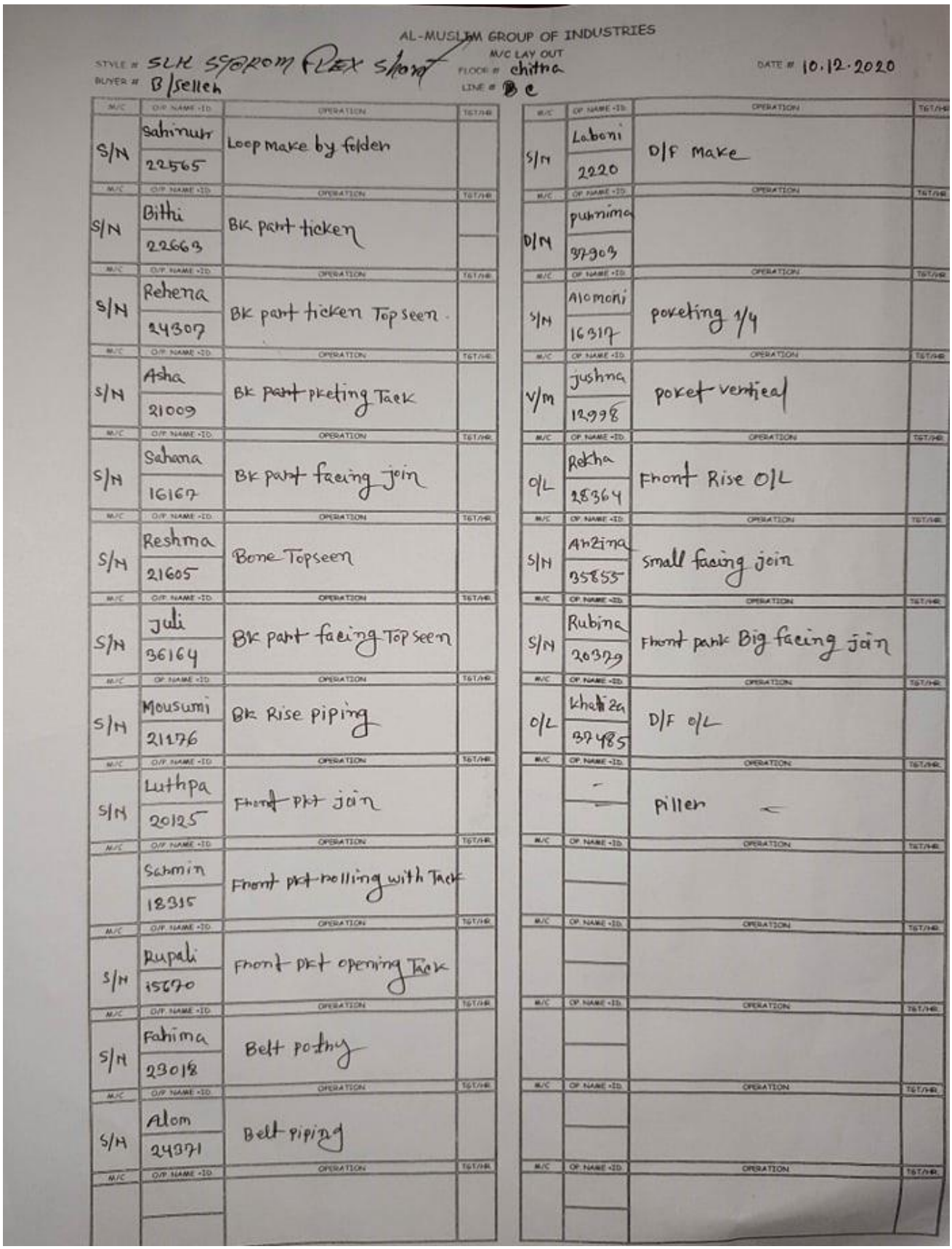
- Production study is used to measure the actual production of a worker per hours.
- To calculate the actual production we have to see the total working minute in hour without lost time.
- To know target of a worker.
- To evaluate the finishing time of an item or product.

- Production study helps for planning to maintain the layout and line balancing of machine and product.
- For use as the basis for determining the unit cost of manufacture and the wage rate.
- For use the basis for introducing a production control system.

List of machinery:

01. Plain machine or single needle lock stitch Sewing machine.
02. Over lock sewing machine.
03. Flat lock machine.
04. Button attach machine.
05. Button hole machine.
06. Bartack machine.
07. Snap button or eyelet or repeat machine.
08. Kansai machine.
09. Smoke machine.
10. Feed of arm sewing machine.
11. Back tap machine.
12. Two needle chain stitch machine.
13. Cylinder bed m/c
14. AGM kanshai special
15. Fusing m/c
16. Zigzag m/c
17. Eyelet m/c
18. Velcro Attach m/c
19. Blind stitch m/c
20. Safety stitch m/c
21. Air compressor m/c
22. Snap button hole m/c
23. Snap button attaching m/c
24. Special hum m/c
25. Plain machine/Single needle edge cutter machine
26. APW special machine.
27. Loop attach machine

Machine Layout:



AL-MUSLIM GROUP OF INDUSTRIES

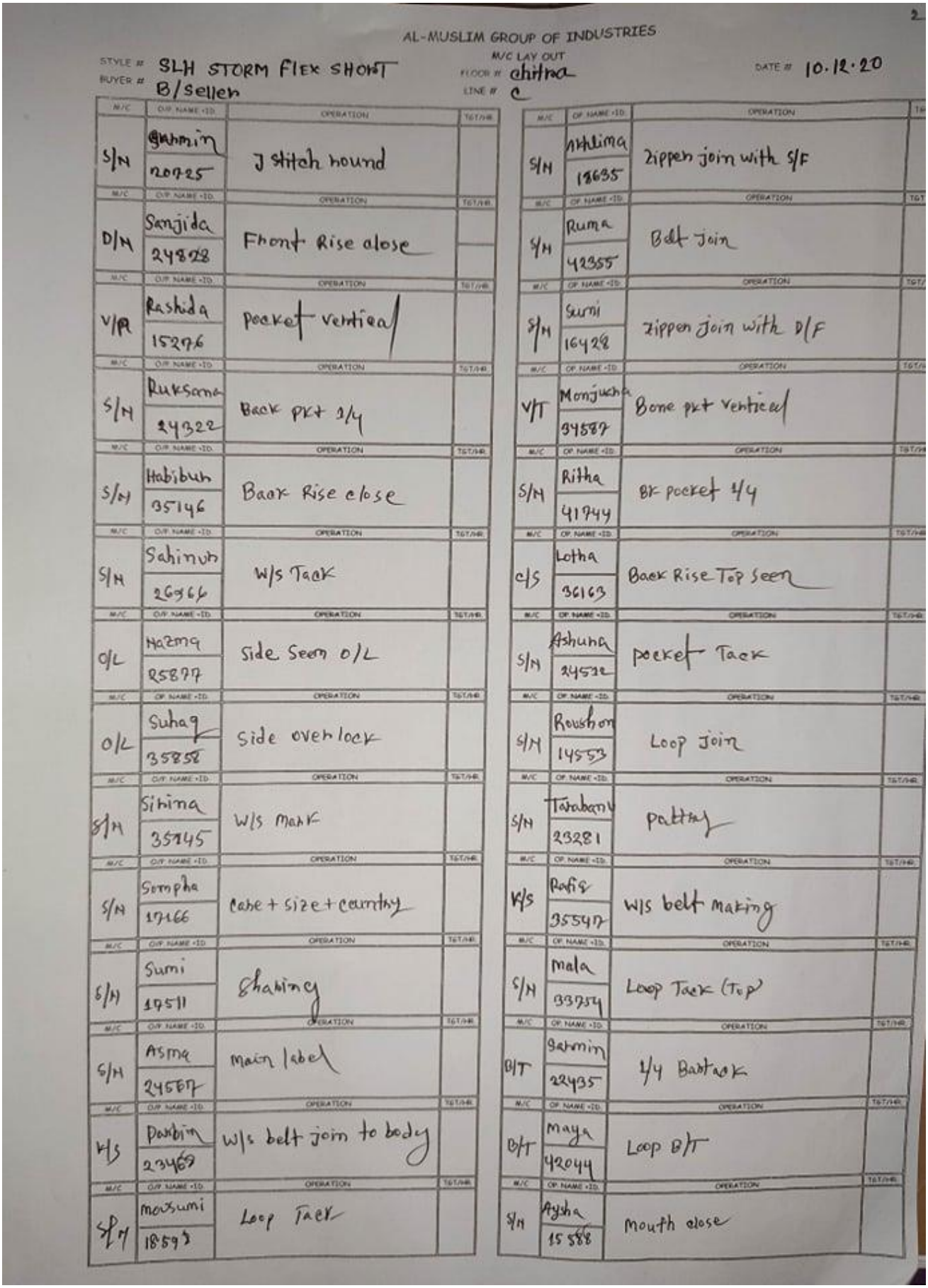
M/C LAY OUT

STYLE # SLK STORM FLEX SHORT FLOOR # chitra DATE # 10.12.2020

BUYER # B/seller LINE # B C

M/C	O/P NAME -ID	OPERATION	TGT/HR
S/N	Sahinur 22565	Loop make by folden	
S/N	Bithi 22663	BK part ticken	
S/N	Rehena 24307	BK part ticken Topseen	
S/N	Asha 21009	BK part pketing Taek	
S/N	Sahana 16167	BK part facing join	
S/N	Reshma 21605	Bone Topseen	
S/N	Juli 36164	BK part facing Topseen	
S/N	Mousumi 21176	BK Rise piping	
S/N	Luthpa 20125	Front pkt join	
	Sahmin 18315	Front pkt rolling with Taek	
S/N	Rupali 15670	Front pkt opening Taek	
S/N	Fahima 23018	Belt pothy	
S/N	Alom 24371	Belt piping	

M/C	OP NAME -ID	OPERATION	TGT/HR
S/N	Laboni 2220	D/F make	
D/N	purnima 37903		
S/N	Alomoni 16317	poreting 1/4	
V/M	jushna 12998	poket vertical	
O/L	Rekha 28364	Front Rise O/L	
S/N	Anzina 35855	small facing join	
S/N	Rubina 20329	Front pank Big facing join	
O/L	khadiza 37485	D/F O/L	
	- -	pillen	



AL-MUSLIM GROUP OF INDUSTRIES

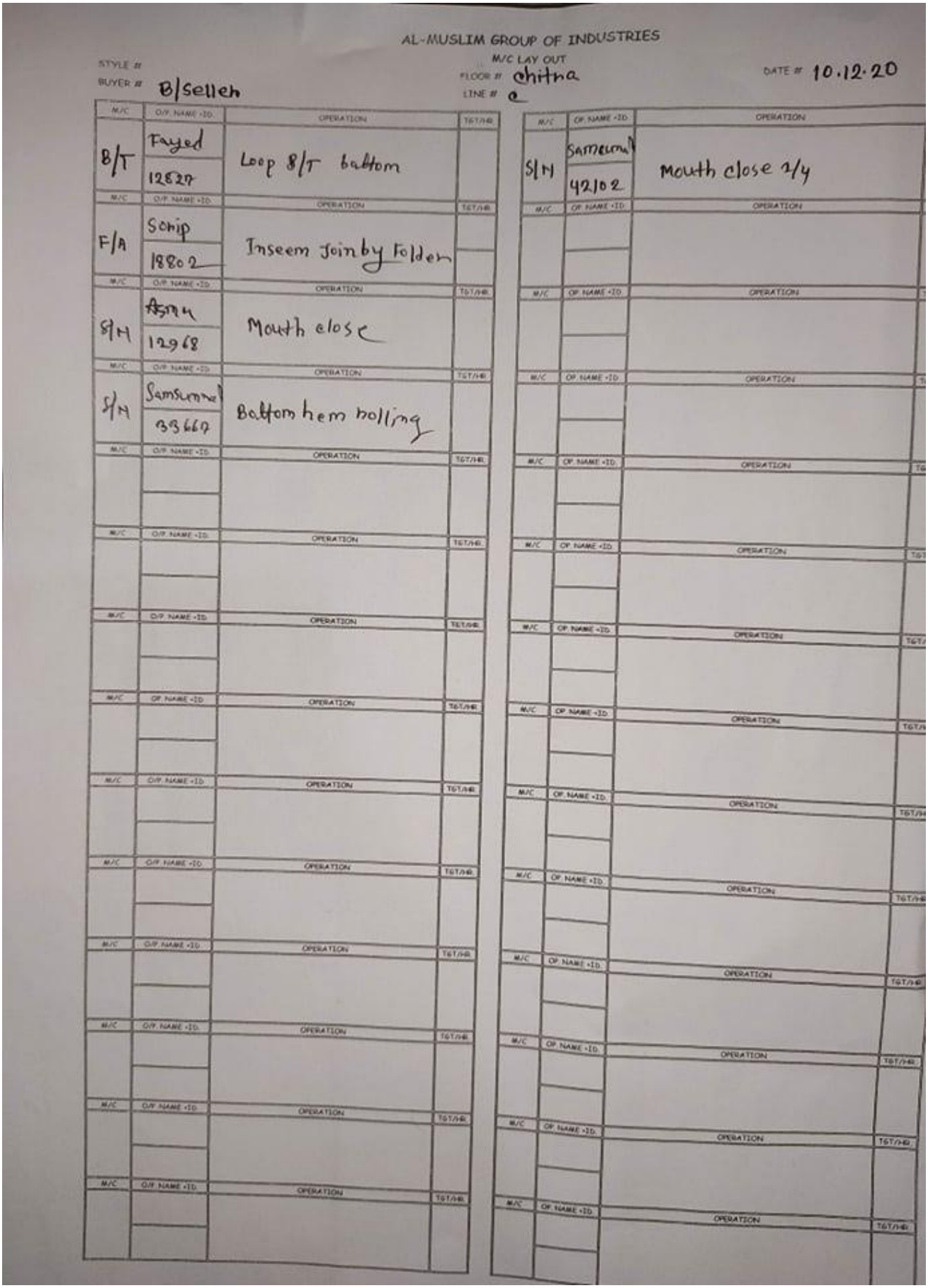
STYLE # SLH STORM FLEX SHORT
BUYER # B/sellen

M/C LAY OUT
FLOOR # chitra
LINE # C

DATE # 10.12.20

M/C	OP. NAME + ID.	OPERATION	TGT/HR.
S/N	Sharmin 20725	J Stitch hound	
D/N	Sanjida 24828	Front Rise close	
V/P	Rashida 15276	pocket vertical	
S/N	Ruksana 24322	Back pkt 1/4	
S/N	Habibun 35146	Back Rise close	
S/N	Sahinur 26966	W/s Tack	
O/L	Hazma 25877	Side Seem O/L	
O/L	Suhag 35858	Side overlock	
S/N	Sirina 35745	W/s Mark	
S/N	Sompha 17166	Lable + size + country	
S/N	Sumi 17511	Shaving	
S/N	Asma 24587	Main label	
K/S	Pabin 23469	W/s belt join to body	
S/N	Mousumi 18593	Loop Tack	

M/C	OP. NAME + ID.	OPERATION	TGT/HR.
S/N	Nilima 18635	Zipper join with S/F	
S/N	Ruma 42355	Belt Join	
S/N	Sumi 16428	Zipper join with D/F	
V/T	Monjucha 34587	Bone pkt vertical	
S/N	Ritha 41744	BK pocket 1/4	
C/S	Lotha 36163	Back Rise Top Seem	
S/N	Ashuna 24512	pocket Tack	
S/N	Roushon 14553	Loop Join	
S/N	Tarabanu 23281	patty	
K/S	Rafiq 35547	W/s belt making	
S/N	Mala 33754	Loop Tack (Top)	
B/T	Sarmin 22435	1/4 Bartack	
B/T	Maya 42044	Loop B/T	
S/N	Aysha 15588	Mouth close	



AL-MUSLIM GROUP OF INDUSTRIES

M/C LAY OUT

STYLE #

BUYER # B/Sellers

FLOOR # chitna

LINE # e

DATE # 10.12.20

M/C	O/P NAME +ID	OPERATION	TGT/HR
B/T	Fayed 12827	Loop B/T bottom	
F/A	Sonip 18802	Inseem join by Folder	
S/M	Asim 12968	Mouth close	
S/M	Samsuma 33669	Bottom hem holling	

M/C	OP NAME +ID	OPERATION
S/M	Samsuma 42102	Mouth close 1/4

SMV Calculation:

Element description	Obser rating	Obser. time	Basic Time	Freq.	Basic Time/Gmt
Get bundle and sort parts	95	0.32	0.304	1/30	0.010
Match pocket flap to lining	105	0.11	0.116	1/1	0.116
Sew round flap	100	0.48	0.480	1/1	0.480
Trim threads and turn out flap	58	0.35	0.298	1/1	0.298
Top stitch flap	90	0.56	0.504	1/1	0.504
Close bundle and place aside	110	0.23	0.253	1/30	0.008
Total					1.416

- Total basic time/garment (brought forward): 1.416

Add machine attention allowances 7%
7% for (0.480 + 0.504) = 0.07 x 0.984 =0.069 0.069
Basic time + MAA (1.416 + 0.069) 1.485
Add personal needs and relaxation allowances14%
14% of 1.485 = 0.14 x 1.485 = 0.208 0.028

Standard minute Value (SMV) =Basic time + all allowances
=1.485 + 0.208 = 1.693 (SMV)

Analysis of SMV Calculation:

1. First we have to calculate G. Total Avg.BT (Basic Time) by adding all basic time of a worker for this operation.

2. G. Total Avg.BT is introduced by all OT (Observe Time) of a worker for this operation, and then OT is divided by the reading which is taken.

3. Total Allowances of a worker is maximum 19% (M/C Delay Allowance is 7% and Relaxation and Contingency Allowance is 12%)

4. Then all data put into the formula to calculate the SMV.

5. To understand the production capacity of the factory, and to draw up plans for the appropriate target output, suitable range of divided labor and optimum production (Scheduling, personnel planning or equipment planning)

6. To determine the time value for each work compound under the motion study.

7. To obtain an evaluation standard for receiving planning, using the time study as the basis of the cost estimate and control.

8. For use as the basis for determining the unit cost of manufacture and the wage rate.

9. For use the basis for introducing a production control system.

Conclusion

Industrial engineering is an significant and essential part of any apparel industry. We learn all the implementations of the processes which we have studied theoretically. It gives us an opportunity to compare the theoretical knowledge with practical facts and thus develop our knowledge and skills. This project also gives us an opportunity to elaborate our knowledge of textile administration, production planning, procurement system, production process, and machineries and teach us to adjust with the industrial life.

Reference:

1. Most of the information is collected from Al-Muslim Group.
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