Project report on industrial engineering

Mistry, Sourav

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DAFFODIL INTERNATIONAL UNIVERSITY

FACULTY OF SCIENCE AND INFORMATION TECHNOLOGY
DEPARTMENT OF TEXTILE ENGINEERING

PROJECT REPORT ON

“INDUSTRIAL ENGINEERING”

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PROGRAM: B.SC. IN TEXTILE ENGINEERING

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All pleasure goes to the God who has given us the ability & strength to complete this project paper.

Completion of anything requires supports from various sources and it also an immense pleasure for us to thank a number of individuals for their precious help and encouragement, which contributed directly, and indirectly to complete this project.

First of all we want to convey our sincere gratitude to our supervisor **Md. Mahfuzur Rahman**, Assistant Professor (Dept. of TE) for his whole hearted supervision. His suggestion and comments to make the project a good one was really a great source of spirit for us.

No amount of gratitude is adequate for **Professor Dr. Mahbubul Haque**, Head of the Dept of TE, for his positive comment & support by giving the permission of this project.

After that our internship factory Fakir Knitwears Ltd also source of making this project paper.

Finally thanks to Daffodil International University to allow this project happen.
ABSTRACT

To improve Industrial engineering department by applying new techniques, which are directly or indirectly impact on garment production. Then efficient worker will stay in this sector, because day by day man power demand is increasing. So being increase production with that man power Industrial Engineering is needed. Then it is very easy to identify efficient operator. So being with efficient operator, production will increase. We have given a guideline by our supervisor to make our project easily. But we have faced some restrictions to collect some document from our internship factory.

We are chosen this topic, We have much interest on IE because of our supervisor & other special persons impression.

We are trying to show out this project very easily. We always trying to answer how can we solve mathematical problems.

We have done SMV calculation very clearly. Now by applying our formula anybody can find out SMV of a garment order.

Now target set up is done very easily by applying our formula. We don’t have any idea about pre-production meeting, all types of sewing m/c & their functions we also describe here.

Operation bulletin is new for us. Line balancing technique is learned.

Loss time reasons are find out to solve it.

Last one is bottleneck reasons & its solving system is given.
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1. INTRODUCTION

Industrial Engineering is the technique for developing productivity by proper using of manpower, machine, current infrastructures & facilities of the factory.

Garment Business today became very competitive. Low price, less lead time, high costing, many competitors made the market saturated. Depending on the level of journey this business came to a professional and scientific stage, where accurate planning, proper time management in production and operation, high skilled technical support, optimum cost-profit estimation are very important issues to survive. Now a day’s it’s impossible to run a Garment Manufacturing operation without Scientific and Professional Approach. Industrial Engineering Concepts are developed on this demand. Industrial Engineering Concepts are required in every stage, Costing, Product R&D, Planning, Supply Chain, Production management, Maintenance management, Layout plan, Productivity Improvement, Cutting Improvement, Manpower Skill Development and so on. Every Garment Owner now understood that, only Scientific and Professional Approach can make the profit. So demand for Industrial Engineering became very high, and still the Availability of Industrial Engineers is very less than the demand.

So now a day it is very essential to any garments Industry.

In this project Firstly we are trying to discuss about work study, that’s why we can give a clear idea about motion economy & time study.

SMV calculation is done very clearly, target set up, thread consumption, PP meeting formula, all types of m/c, operation bulletin report, bottleneck problems is solved.

Last one is the job sector condition of IE.

We have to improve this department because one day it very hard to get a operator that why we have find out how to minimize our operator during their work.

Now it is perfect time to establish this department.
2. WORK STUDY:

Work study is the systematic examination of the methods of carrying activities so as to improve the effective use of resources & to set up standards of performance for the activities being carried out.

Work study

- Method study
- Work measurement
- Work place engineering
- Motion economy
- Minimum work place
- Maximum work place
- Time study estimating
- G.S.D
- Sew easy 2005
- Capacity study
- Historical data
- Analytical

Work study is mainly concerned with the examination of human work. In fact planning can’t be done one knows how long it will take to do a particular job. Time is very important to the manufacturer who must promise to estimate quantities & to other industrial & business arrangements.
Why it is Valuable?

- It is a direct means of raising productivity involving little or no expenses.
- It is systematic, simple & consistent in based on the handling of facts.
- It ensures that no factor affecting the efficiency of operating is over looked.
- It is a tool, which can be applied universally.
- It is the most penetrating tools of investigation available to management.
- It is relatively cheap & easy to apply.
- The best way to do something.
- The time required to do.
- The way of measure results.

Objectives of work study:

- Lower cost.
- Increase productivity.
- Increase profitability.
- Increase job security.
- To make the work easier.
- Establish fair task for everyone.
- Check achievement against standard.

2.1 Method Study:

Method study is the systemic recording, critical examination of existing, proposed ways of doing work as means of developing, applying easier, more effective methods & reducing cost.

In a sort letter “to reduce the cost, which examination/system are going to set up to developing, applying easier & more effective methods”

Objectives of method study:

- Improve layout of factory & office.
- Simplify tasks.
- To improve the flow of work.
- To get the better quality.
- Effective materials handling.
- To improve the proper utilization of resources.
- To get maximum output.
- Waste reduction.
Method Improvement Technique:

For method improvement the way the job is performed has to be examining critically need to challenge its purpose, place, sequence & method of performance.

Purpose: What is done?
- Why it is done?
- What else might be done?
- What should be done?
  Ex: Mark sleeve pleats.

Place: Where it is done?
- Why it is done there?
- Where else might it be done?
- Where should it be done?
  Ex: Hand sew button.

Sequence: When it is done?
- Why it is done then?
- When might it be done?
- When should it be done?
  Ex: B/H at sleeve placket.

Person: Who does it?
- Why does that person do it?
- Who else might do it?
- Who should do this?
  Ex: Thread trimming.

Means: How is it done?
- Why it done that way?
- How else might it be done?  Ex: Cuff attaches.
The procedure of method study:

- Select: The work to be studied & define its boundaries.
- Record: The relevant factors about the job by direct observation & collect such additional data as may be needed from appropriate sources.
- Examine: The way the job is being perform, challenge its purpose, place, sequence & method of performance.
- Develop: The most practical, economical & effective method drawing on the contributions of those concerns.
- Evaluate: Different alternative to develop a new improved method comparing the cost effectiveness of the selected new method with the current method of performance.
- Define: The method as a result in clear manner and presenting to those concerns that is Management, supervisor & workers.
- Install: The new method as a standard practice & trained the process involved in applying it.
- Maintain: The new method an introduce control procedures to prevent a drifting back to the previous method of work.

2.2 Motion Economy:
Motion Economy is to standardize working motion of the manpower.

The Principle of motion economy:

- Use of human body.
- Arrangement of the work place.
- Design of tools & equipment.

Use of human body:

“Rhythm” is essential to the smooth & automatic performance of a repetitive operation. The work should be arranged to permit easy & natural rhythm whenever possible.

The two hands should begin & complete their movement at the same time. The two hands shouldn’t be idle at the same time except during the period of rest. Motion of the arm should be symmetrical & in opposite directions should be simultaneously. Continuous curve movements are to be preferred to straight line motions involving sudden & sharp changes in direction. Ballistic (free swinging) movement is faster, easier & more accurate than restricted movement. Work should be arranged so that eye movements are confined to a comfortable area without the need for frequent changes of focus.

Classification of movement:

<table>
<thead>
<tr>
<th>Class</th>
<th>Pivot</th>
<th>Body members moved.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Knuckle</td>
<td>Finger.</td>
</tr>
<tr>
<td>2</td>
<td>Wrist</td>
<td>Hands, finger.</td>
</tr>
<tr>
<td>3</td>
<td>Elbow</td>
<td>Forearm, hands, finger.</td>
</tr>
<tr>
<td>4</td>
<td>Shoulder</td>
<td>Upper arm, forearm, hands, finger.</td>
</tr>
<tr>
<td>5</td>
<td>Trunk</td>
<td>Torso, upper arm, forearm, hands, finger</td>
</tr>
</tbody>
</table>
Arrangement of the work place:

- Tools & materials should be repositioned to reduce searching.
- Tools, materials control should be located within the maximum working area & as near to the worker as possible.
- Tools, materials should be arranged to permit the best sequence of motions.
- A comfortable chair should be provided. It should be possible for the worker to put both knees under the bench.
- Adequate natural or artificial lighting should be provided.
- A pleasing color scheme makes the work place attractive.

Design of tools & equipment:

The hand should be relieved of all work of holding the work place where this can be done by jig, fixture or foot operated device. Two or more tools should be combined wherever possible.

2.3 Work measurement:

Work measurement is the application of techniques design to establish the time for a qualified worker to carry out a specified job at a defined level of performance. Work measurement is the study of an operation to determine. The time required for the operation using the best method.

Work measurement is a tool to:

- Set the production quota for the operation.
- Determine the cost of producing of a given garment.
- Plan production runs.
- Evaluate the performance of individual operators.

How to work with the operators during work measurement activities:

- Friendship to all operators.
- Put the operators at ease.
- Explain what you are going to do.
- Where & how to position yourself as you work.
- Do the job, don’t allow distractions to interfere.
- How to get operators to do things different.
- Tell the operators when you have finished the work & thank the operator.
Objectives of work measurement:

- Set target.
- Production planning & control.
- Manpower allocation.
- Incentive scheme.
- Determine cost.
- To find out bottleneck area.
- To establish the standard time.
- To find out line/factory efficiency.
- To know the worker / line productivity gap.

2.4 Time study:

Time study is a work measurement technique for recording the time of performing a certain / specified conditions & for analyzing the data so as to obtain time necessary for an operator to carry out at a define rate of performance.

The equipment used for time study:

- Stopwatch.
- Clipboard.
- Time study format.
- Pencil.
- Eraser.
- Calculator.

Techniques of time study:

- Good concept about the work flow.
- Shouldn't disturb the operator during your job.
- Should inform the operator that you are going to something study.
- All output data should write on paper in that time.
2.5 Cycle check:

Cycle check is a work measurement technique to measure the time taken the operators, when they are performing their jobs by using a stopwatch.

Cycle check procedure:

Select: One by one operator should be selected.

Record: Record operators data on the time study format paper.

Check: After finishing data record you have to check in all data for all the operators.

Target find out: By applying the formula you have to find out target of individual operator.

Calculate capacity: Then also find out the capacity of the operators.
## Cycle checking Format

<table>
<thead>
<tr>
<th>Name</th>
<th>Operation</th>
<th>M/C Type</th>
<th>Cycle Time</th>
<th>Observed Rating</th>
<th>AVG Cycle</th>
<th>Capacity</th>
<th>Actual Prodn</th>
<th>SMV</th>
<th>Time Study</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Razzak</td>
<td>Placket seam make</td>
<td>S/N 28</td>
<td>21 21 20 21 76%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hoque Ali</td>
<td></td>
<td>u</td>
<td>19 17 19 17 16 77%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Razim</td>
<td>Shoulder Join</td>
<td>O/L 18</td>
<td>14 14 16 14 13 78%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blias</td>
<td>Shoulder top stitch</td>
<td>A/L 14</td>
<td>14 14 14 14 13 78%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hassi</td>
<td>Collar tack to body</td>
<td>S/N 19</td>
<td>15 15 16 15 77%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mosin</td>
<td>Collar Join</td>
<td>O/L 19</td>
<td>12 11 11 10 76%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noorin</td>
<td>Neck tape att.</td>
<td>S/N 17</td>
<td>19 18 18 19 76%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lila</td>
<td></td>
<td>u</td>
<td>17 18 18 17 19 76%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Badshah</td>
<td>Waist tape close</td>
<td>S/N 13</td>
<td>13 13 12 12 76%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaiti</td>
<td>Trim X-Set</td>
<td>H/L 12</td>
<td>10 11 11 10 65%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noumani</td>
<td>Placket, pattern stitch</td>
<td>S/N 10</td>
<td>9 8 8 8 73%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Janjira</td>
<td>Placket close</td>
<td>S/N 12</td>
<td>10 10 10 11 74%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masud</td>
<td>Sleeves outtach</td>
<td>O/L 26</td>
<td>26 27 23 23 76%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Ajim</td>
<td></td>
<td>u</td>
<td>26 25 26 26 76%</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abutaleb</td>
<td>Sleeves X-Set</td>
<td>F/L 13</td>
<td>13 14 14 12 76%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shahanu</td>
<td>Trim X-Set</td>
<td>H/L 10</td>
<td>8 9 9 10 65%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Total Cycle Time:
3. SMV CALCULATION

SMV (standard minute value) calculation will find if you find out worker efficiency i.e. rating & standard worker for standard rating.

3.1 Standard worker:

The standard worker is that worker who has the consistency.

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

3.2 Rating:

Rating is the assessment of the worker rate of working relative to the observer’s concept of the rate corresponding to standard pace. In one word rating is the worker efficiency percentage.

Rating depends on four subjects:

- Skill.
- Effort.
- Quality.
- Speed.

Their average data is the operators observed rating.

So, rating = observed rating/standard rating.

Rating scale:

- 60-80
- 75-100
- 100-135
- 0-100 (British standard, ILO Certified)
On the basis of British standard, ILO Certified rating scale is given below with details:

- 0 = No activity.
- 1-50 = Very slow, clumsy, operator appears to be half asleep, fumbling movement, weak & no interest in the job.
- 51-75 = Trying to get output but for their handling problem, less attentiveness they can’t make sure the quality & output also.
- 76-100 = Very faster than normal operators. They are working with their 100% concentration to make the garment with satisfactory quality, quantity & within economical time.

Chart

3.3 Careful instructions during rating data recording:

The study person should be careful not to rate too highly when-

- The worker is worried or looks hurried.
- The worker is obviously being over careful.
- The job seems to be difficult to the study person.
- The study person is working very fast as when recording a short element study.

The study person should be careful not to be rate too low when-

- The job looks easy.
- The worker is using smooth rhythmic movement.
- The worker is performing heavy manual work.
- The study person is tired.
### 3.4 DOCUMENT OF OBSERVE RATING

<table>
<thead>
<tr>
<th>NAME</th>
<th>OPERATION</th>
<th>MC</th>
<th>Typi</th>
<th>Observ Rating</th>
<th>AVG Cycle</th>
<th>Capacity</th>
<th>Actual Prod</th>
<th>SMV</th>
<th>Time</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ralbi</td>
<td>Collar opening</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Syed</td>
<td>Collar opening</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Momran</td>
<td>Collar sewing</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Oliy</td>
<td>Collar opening</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Ali Hussen</td>
<td>Pocket 0/2</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>R1 Rib</td>
<td>Rib attaching sleeve</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>Collar's sleeve rib sew</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>Placket facing att</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Milan</td>
<td>Placket sewing</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Tanllma</td>
<td>Placket facing made front</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Rashida</td>
<td>Body made for placket all</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
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<tr>
<td>Skinratipl Loading</td>
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<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Dulaal</td>
<td>Placket att. from plott TH</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
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</tr>
<tr>
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<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Rina</td>
<td>Placket/1st top stitch</td>
<td>No</td>
<td>7</td>
<td>187</td>
<td>0.4</td>
<td>0.12</td>
<td>0.12</td>
<td>142</td>
<td>150</td>
<td></td>
</tr>
</tbody>
</table>
3.5 Average cycle time:

It defines how much time (minute) takes an individual operator for an individual operation.

It is expressed-

\[
\text{Average cycle time} = \frac{\text{Total cycle time}}{\text{No of cycle} \times 60}
\]

Basic time = Average cycle time $\times$ rating

Then,

SMV = Basic time + Basic time $\times$ Allowances %

Here,

Allowances % means operators without work duration period. i.e. drinking water period, going bathroom, taking rest.
**04. DAILY PRODUCTION REPORT/ HOURLY PRODUCTION REPORT:**

Hourly production report consists each working hour per operators no of garment pieces finish. Each hour finish garment pieces is written on the hourly production report. After that total working hours finish garment pieces will get & write on that report paper.

By this hourly production report it is very easy to find out daily production & write on daily production report.

**Some important formula is given below:**

- Output = SMV* product quantity.
- Input = Total manpower* working hour* 60.
- Efficiency % = \( \frac{\text{Output}}{\text{Input}} \) * 100
- Individual worker target per hour = \( \frac{60}{\text{SMV}} \) * wanted efficiency
- Worker potential production pieces per hour = 60/ SMV.
- Worker performance = (SMV/ 1.15 * 100) / Total average cycle time.
- Daily production target = \( \frac{\text{Total manpower* working hour*60}}{\text{efficiency%}} \) *wanted
  
  SMV
By using those formula we have solved an Hourly Production Report
05. THREAD CONSUMPTION FORMAT

Stitch wise per inch how much thread is needed that is given below on chart:

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Machine name</th>
<th>Per Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>P/M Lock stitch</td>
<td>05</td>
</tr>
<tr>
<td>02</td>
<td>O/L (3 thread)</td>
<td>14</td>
</tr>
<tr>
<td>03</td>
<td>O/L (4 thread)</td>
<td>22</td>
</tr>
<tr>
<td>04</td>
<td>O/L (3 thread Blanket stitch)</td>
<td>20</td>
</tr>
<tr>
<td>05</td>
<td>O/L (3 thread Latus)</td>
<td>20</td>
</tr>
<tr>
<td>06</td>
<td>F/L (S/N Chain stitch)</td>
<td>08</td>
</tr>
<tr>
<td>07</td>
<td>F/L (D/N 1/8 distance)</td>
<td>14</td>
</tr>
<tr>
<td>08</td>
<td>F/L (D/N ¼ distance)</td>
<td>20</td>
</tr>
<tr>
<td>09</td>
<td>F/L (3N Zigzag ¼ distance)</td>
<td>30</td>
</tr>
<tr>
<td>10</td>
<td>F/L (D/N Zigzag 1/8 distance)</td>
<td>20</td>
</tr>
<tr>
<td>11</td>
<td>Kanchai S/N chain stitch</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Pecoding double thread S/N</td>
<td>24</td>
</tr>
<tr>
<td>13</td>
<td>Bartack 1cm</td>
<td>12</td>
</tr>
<tr>
<td>14</td>
<td>Bartack 1.5cm</td>
<td>18</td>
</tr>
<tr>
<td>15</td>
<td>Button hole (3/8 Knife)</td>
<td>30</td>
</tr>
<tr>
<td>16</td>
<td>Button Attaching (4 eye button)</td>
<td>10</td>
</tr>
</tbody>
</table>
Here,

P/M = Plain machine.

O/L = Over lock m/c.

F/L = Flat lock m/c.

S/N = Single needle.

D/N = Double needle.

According to stitch two types of thread consumption format. Those are given below-

- For chain stitch (O/L & F/L),

\[(\text{Total sewn length} + \text{allowance}) \times \text{No of side} \times \text{required thread needed per inch}.\]

- For Lock stitch (S/N)

\[\text{Total sewn length} \times \text{no of side} \times \text{required thread needed per inch} + \text{allowance}\]

By using those formulas a finish garment required thread will find out also which seam join needs how much time that will also find out & idea also.
Before pre-production meeting must check some elements whatever for each order, those are given below-

- Approved style sample.
- Approved fabric standard.
- Approved color shade.
- Approved print embroidery.
- Approved washing standard.
- Approved trims / accessories.
- Approved pattern.
- Lab test report.
- Complete technical files.
- Packing instruction.
- Measurement specs sheet.
- Approved trim card

After checking those, some comments have to note down on pre-production meeting sheet. It may be correct, incorrect, missing or not applicable.
### Pre-Production Meeting

<table>
<thead>
<tr>
<th>Customer</th>
<th>MIA</th>
<th>Style No.</th>
<th>WILSONNEW</th>
<th>Fabric Description</th>
<th>G/M</th>
<th>Date: 21.07.12</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.O No.</td>
<td>42/1976</td>
<td>GSM</td>
<td>150</td>
<td>No. of Colors:</td>
<td>Red</td>
<td></td>
</tr>
</tbody>
</table>

**Checklist:** Correct - OK, Incorrect - X, Missing - M, Not Applicable - N/A

<table>
<thead>
<tr>
<th>Must Check</th>
<th>Comments</th>
<th>Must Check</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved Style Sample</td>
<td></td>
<td>Approved Pattern</td>
<td></td>
</tr>
<tr>
<td>Approved Fabric Standard</td>
<td></td>
<td>Lab Test Report</td>
<td></td>
</tr>
<tr>
<td>Approved Color Shade</td>
<td></td>
<td>Complete Technical Files</td>
<td></td>
</tr>
<tr>
<td>Approved Print Embroidery</td>
<td></td>
<td>Packing Instruction</td>
<td></td>
</tr>
<tr>
<td>Approved Washing Standard</td>
<td></td>
<td>Measurement Spec. Sheet</td>
<td></td>
</tr>
<tr>
<td>Approved Trims/Accessories</td>
<td></td>
<td>Approved Trim Card</td>
<td></td>
</tr>
</tbody>
</table>

### Production Plan

- **Order Qty:** 600
- **Delivery Date:**
- **SMV/Target Per hr.:**
- **Line No.:**
- **Pilot Run:**
- **Out Start:**
- **Print Start:**
- **Sewing Start:**

### Cutting, Printing, Embroidery, Sewing, Finishing, Store and Maintenance

**COMMENTS / IMPROVEMENTS FOR BULK PRODUCTION**

- Styling as per FP Sample.
- Zip may be tape at chain stitch color as per updates.
- Technical Sheet.
- Avoid lipoasyns from top at the neck.
- Neck rib width 1.2 cm due to snap button attachment.
- There may be elastic intervening under the 1st snap button and under sleeve plait also.
- Chain stitch M/B equal from center to edge.
- Button shaper straight.
- Avoid poth grain from outer shoulder.

### Attendance

<table>
<thead>
<tr>
<th>Name</th>
<th>Designation</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdullah Talan</td>
<td>Executive IP</td>
<td></td>
</tr>
<tr>
<td>MAHMUDO RAHMAN</td>
<td>P.M.</td>
<td></td>
</tr>
<tr>
<td>Md. Towhid Talan (Sham)</td>
<td>P.M.</td>
<td></td>
</tr>
<tr>
<td>Hussain ARI</td>
<td>P.M.</td>
<td></td>
</tr>
<tr>
<td>MD. FEMI</td>
<td>P.M.</td>
<td></td>
</tr>
<tr>
<td>ABU MAJEER SIDDIQ</td>
<td>SR. Executive</td>
<td></td>
</tr>
<tr>
<td>MD. SHAHID</td>
<td>S.R.E &amp; E.N.C.</td>
<td></td>
</tr>
<tr>
<td>Chowdhury</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD. MOHAMMAD</td>
<td>O.M.</td>
<td></td>
</tr>
</tbody>
</table>
Before starting an order in bulk production a PP(pre-production) meeting will be held with cutting, printing, embroidery, sewing, IE, finishing, store & maintenance departments manager level person. Each order production will start within a short quantity to find out its fault during process & note it on the pre-production meeting sheet. Their meeting topic on the basis of pre production sample.

07.LIST OF MACHINERY (SEWING FLOOR)

- Single needle plain m/c.
- Over lock m/c.
- Flat lock m/c.
- Button attaching m/c.
- Button hole m/c.
- Bar tact m/c.
- Kansai m/c.
- Zigzag m/c.
- Peocoting m/c.
- Snap button m/c.
- Kanchai

Nowadays m/c are made with multi function.

MACHINERY LIST(SEWING FLOOR) USED FOR A BASIC POLO SHIRT:
## 08. OPERATION BULLETIN REPORT

Operation bulletin report consists of Operation name i.e. placket overlock, m/c name for that operation, S.M.V., target per hour & target per shift (8 hours). To sew a garment all operation name will belong & also others i.e. m/c name. After that total S.M.V. will get.

<table>
<thead>
<tr>
<th>NO</th>
<th>OPERATION</th>
<th>M/C</th>
<th>S.M.V</th>
<th>TGT/ Hr</th>
<th>MAN.</th>
<th>TGT/ 8 Hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Placket overlock</td>
<td>O/L</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>02</td>
<td>Front &amp; back part set</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>03</td>
<td>Mark for moon attach at back</td>
<td>S/N</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>04</td>
<td>Moon attach at back</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>05</td>
<td>Mean top stitch</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>06</td>
<td>Pressing at placket</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>07</td>
<td>Placket mark</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>08</td>
<td>Mark for placket attach at body</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>09</td>
<td>Placket attach at body</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>10</td>
<td>Placket open</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>11</td>
<td>Placket (top stitching Part)</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>12</td>
<td>Placket nose tack</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>13</td>
<td>Placket box make &amp; cross tank</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>14</td>
<td>Shoulder join</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>15</td>
<td>Trim &amp; set</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>16</td>
<td>Shoulder top stitch</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>17</td>
<td>Mark for collar attach</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>18</td>
<td>Collar tack with body</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>19</td>
<td>Collar attach</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>20</td>
<td>Black Neck tape attach</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>21</td>
<td>Neck tape close</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>22</td>
<td>Placket neck close tack</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>23</td>
<td>Placket top stitch</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>24</td>
<td>Sleeve cuff attach</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>25</td>
<td>Trim &amp; set</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>26</td>
<td>Armhole top stitch</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>27</td>
<td>Sleeve open inner tack</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>28</td>
<td>Side seam</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>29</td>
<td>Trim &amp; set</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>30</td>
<td>Bottom hem</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>31</td>
<td>Mark for button hole</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>32</td>
<td>Mark for button hole</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>33</td>
<td>Button attach</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>34</td>
<td>Button insert</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>35</td>
<td>Loop iron</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>36</td>
<td>Loop set</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>37</td>
<td>Mark for loop attach</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
<tr>
<td>38</td>
<td>Loop attach</td>
<td>HEL</td>
<td>0.20</td>
<td>300</td>
<td>0.40</td>
<td>2400</td>
</tr>
</tbody>
</table>

**TOTAL**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NO OF WORKERS</th>
<th>TARGET</th>
<th>MAN</th>
<th>8 HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polo Shirt</td>
<td>96</td>
<td>120</td>
<td>28.00</td>
<td>960</td>
</tr>
</tbody>
</table>
09. BPT CALCULATION WITH GRAPH

BPT means basic pitch time. Firstly you have to know about pitch time, it's a ratio of S.M.V & manpower.

**BPT:** Basic pitch is the ratio of total SMV & total manpower.

It is written as, BPT = Total SMV/total manpower.

Now we will show a graph & also trying to express its description.

Here, UCL & LCL are new, now we will discuss about those.

**UCL:** UCL means upper control limit. It is calculated by adding 10% to 15% of the basic pitch time.

**LCL:** LCL means lower control limit. It is calculated by reducing (10-15)% of the basic pitch time.
10.LOST TIME REPORT

In sewing floor time lost will create due to many reasons. It is affected to the production target & line efficiency. When lost time will happen then it’s duration have to record on lost time sheet. Many types of lost time reasons is given below-

- Accessories delay.
- Approval delay.
- Cutting delay.
- Cutting mistake.
- Color shading.
- DMD(Production).
- DMD(Quality Control)
- Embroidery delay.
- Fabric delay.
- Feeding delay.
- Line Re-feeding.
- Machine breakdown.
- Machine delay.
- Printing delay.
- Production dept. delay.
- Power failure.
- Printing mistake.
- Pattern mistake.
- Quality checking delay.
- Re-work.
- Style changing delay.
- Sewing section delay.
- Store delay.

Such kind of reasons is occurred mainly. This report will be submitted to responsible person to sustain production plan & make a technique not to happen in future.
## Lost Time Sheet

**FAKIR KNITWEARS LTD.**
Kayempur, Fatullah, Narayanganj
(As ISO 9001: 2008; SEM & DECO - TEX CERTIFIED COMPANY)

**Industrial Engineering Department**

### Date: A

#### Unit: Dynamic

#### Team: Dynamic

#### Sup. Name: [Signature]

#### Line Tgt/Hrs: 360 pieces

<table>
<thead>
<tr>
<th>Working Time</th>
<th>Type of delay</th>
<th>Idle Time</th>
<th>Actual Production</th>
<th>Sup. Signature</th>
<th>Name &amp; Signature of Responsible Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.00-9.00</td>
<td>MB</td>
<td>20 min.</td>
<td>12043</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>9.00-10.00</td>
<td>RD</td>
<td>10 min.</td>
<td>58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.00-11.00</td>
<td>N/I</td>
<td></td>
<td>88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.00-12.00</td>
<td>N/I</td>
<td></td>
<td>88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.00-1.00</td>
<td>SD</td>
<td>10 min.</td>
<td>73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00-2.00</td>
<td>N/I</td>
<td>4 Break.</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.00-3.00</td>
<td>N/I</td>
<td></td>
<td>87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.00-4.00</td>
<td>SD</td>
<td>30 min.</td>
<td>43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.00-5.00</td>
<td>N/I</td>
<td></td>
<td>87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.00-6.00</td>
<td>N/I</td>
<td></td>
<td>87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.00-7.00</td>
<td>N/I</td>
<td></td>
<td>88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.00-8.00</td>
<td>RW</td>
<td>60 min.</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### AFFECTED SAM Earners:

- **Total Production:** 772 pieces
- **Workin Minutes:** 24570
- **No. of Workers:** 42
- **WAV:** 14.06
- **Line efficiency%:** 67%
- **Total Lost Minutes:** 150 minutes
- **Line Performance:** 80%

### Code of Terms:

- AD: Accessories Delay
- PD: Printing Delay
- Ap.D: Approval Delay
- PDD: Production Dept. Delay
- CD: Cutting Delay
- PF: Power Failure
- CM: Cutting Mistake
- PM: Printing Mistake
- CS: Color Shading
- PTM: Pattern Mistake
- DMD (Pdn): DMD (Production)
- QCD: Quality Checking Delay
- DMD (QC): DMD (Quality)
- ED: Embroidery Delay
- SCD: Style changing Delay
- FdD: Fabric Delay
- SSD: Sewing Section Delay
- FD: Feeding Delay
- SID: Store Delay
- LRF: Line Re-feeding
- LMB: Machine Breakdown
- MD: Machine Delay

*Officer / IE*
LINE BLANCHING USING OPERATOR SKILL

The prerequisite of this method is to have a skill matrix of sewing operators. Normally, at the time of line setting, operators are selected based on their experience on operations. The calculated skill level of the operators on the operations is not considered at all. As a result after couple of hours, high skilled operators start sitting idle and low skilled operators stuck with their work. Thus line becomes imbalanced and lot of productive time is lost as operators sit idle. To utilize operator’s maximum capacity, work allocation must be done based on operator’s potential performance level (efficiency) and work must be shared with operators who has excess capacity.

Here, production per hour two line is shown. But line B is better balancing than line A. It is only possible to assessment with operator & find out their efficiency over an operation.
12. BOTTLENECK

Causes of Bottleneck:

- 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.
- If anybody becomes sick.

Way of reducing bottle neck:

- To make size set sample minimum 15 to 10 days before input.
- To arrange pre-production meeting in time.
- To prepare 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
- 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 forwarded after checking.
- To alert when bundling (maintain serial number)
- By improving method.
- By improving workers performance.
- By reducing sewing burst
If you can reduce bottleneck then the line performance will be liked that,
13. JOB PROFILE OF INDUSTRIAL ENGINEERING

It was just a couple of years back that demand of an industrial engineer has increased many times. Reason, an Industrial engineer can do a lot to improve performance of the company. But the fresh student passed out from educational institute (Fashion institutes) acquired limited knowledge about the job profile of an Industrial engineer. Maximum works are learnt in factory by working. There is number of tools and techniques which are used in by industrial engineers to establish an effective production system in the company.

Without having such tools earlier production managers and line supervisors faced difficulty in measuring work content, garment costing, and production planning correctly, even it was difficult to finalize orders. Our team has worked to find out important tasks those are important for an engineer, and needs detailed understanding of production fields, included in the following.

Though job profile of an Industrial Engineer varies company to company, most of the job profile fall under following list.

1. Knowledge about various sewing production systems
2. Knowledge of all types of Sewing machine necessary for the company
3. Time study (Cycle timing)
4. Motion analysis of the operations
5. Operation break down
6. Preparation of OB (Operation bulletin)
7. SAM Calculation
8. M/C Layout and Work station layout
9. Line Set up
10. Production estimation of a line
11. Work Sampling
12. Method Study (Seeing Movements of an operation)
13. WIP Control
14. Line Balancing
15. Capacity study
16. Cost estimation of a garment
17. Developing and Maintaining Skill Matrix
18. Incentives schemes
19. Calculating Thread Consumption
20. Work aids, Guide and Attachment
21. Performance Rating

An industrial engineer must have knowledge and skill on each tool and technique. Implementation of all tools at a time is not needed. Engineer has to go step by step. Almost all work study tools and methodology are adopted from others industries and Implemented to the garment industry. So each work study tool has guaranteed benefit if it is Used effectively.
14. CONCLUSION

As textile sector is improving day by day without working, it will be wronged intention. Now everyday every department of textile sector is developed by taking new technique. It is a matter of great positive sign for this sector. We are trying to show out a small department of textile field, that is IE. To make on its project we were facing many confusion but we have worked this project during our internship, so it is quite easy to understand critical term of IE that’s why we can give such information.

Here we have achieved that is whatever we have discussed that is our mind language i.e. trying to use easy language to understand everyone. To entry every second of apparel industry, there is IE department application. That’s why we have discussed work study & hopefully successfully give clear idea about it’s depth information. Then we have discussed about SMV. Now we can easily find out SMV. After that we have discussed about daily production target/ hourly production target. Now by applying our formula anyone can give production target as he want & also production efficiency.

During operation breakdown making thread consumption is important that’s why we have given detail on thread consumption. Pre-production meeting document is given which is related of IE. All type of sewing m/c list is given to make line balancing correctly & their function. After that operation bulletin report system is given. After that BPT calculation is given to make efficient breakdown process of a garment & also making fluent line balancing. After understanding BPT, it is very easy to find out efficient worker. Loss time is done on apparel industry must.

We want to give types time loss & it’s disadvantages. After that bottleneck is must on sewing floor but by observing sewing line you can arrange line balancing on the basis of BPT. Last one is job profile for textile engineer in IE department. We are trying to show all kind of job in IE. By improving IE department will get higher product, lower manpower & m/c, within lower cost but profit will rise. This is the main theme of IE.

In our project we can’t say it is enough, here all theory is done on practical experiment.
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