APPLICATION OF INDUSTRIAL ENGINEERING TECHNIQUE FOR BETTER PRODUCTIVITY IN GARMENTS PRODUCTION

Mst. Murshida Khatun
Textile Engineering Department, Daffodil International University, Dhaka, Bangladesh
E-mail: murshidatex05@gmail.com, murshida@daffodilvarsity.edu.bd

Abstract: The paper comparing the productivity and efficiency before and after applying the Industrial engineering technique. This is true today Millions of dollars are wasted each and every day in organization, through lack of awareness of this need to constantly improve productivity. Most of it can be stopped. By using method, time, capacity and production study, it is possible to improve productivity while reducing wastage. Two important attributes have been considered, one is possible standard method for each process and another is considerable time. Time study took to record the actual individual capacity of each worker. The time has been recorded to make each process for each and every worker to find out the optimum number of operator and helper, type of machines, basic and standard pitch time and individual capacity. To find out the (standard minute value) S.M.V, process wise capacity has been calculate.

Keywords: Industrial Engineering, Breakdown method, works study.

1. Introduction

In earlier days clothing was only a basic necessity, used to cover the body and to protect from the climatic changes. Over the time people became concerned about the comfort of wearing and also the durability of the product. Garments began to be made with different fabrics to suit the climatic conditions and thus the requirement of seasonal wears emerged. But most of the garments looked similar with no much constructional/style. When people started having social gatherings, they began to think about having a unique look, which would reflect their life style.

Engineering is difficult to boil down into a simple definition, but for our purpose here let's use the following:

Engineering - a science by which the properties of matter and the sources of energy in nature are made useful to man. Now let's go one step farther and define Industrial Engineering. Let’s define Industrial

➢ The best way to do something
➢ The time required to do it
➢ The way to measure results

Received Oct 29, 2013 * Published December 2, 2013 * www.ijset.net
The basic objectives of Industrial Engineering are:

- Improving operating methods and controlling costs.
- Reducing these costs through cost reduction programs.

The aim of IE department is to provide specialized services to production departments, such as methods improvement, time study, and Job evaluation and merit rating and to head new projects if required [1].

Breakdown is a listing of the content of a job by elements. A garment consists of some parts & some group of operations. Breakdown means to writing down all parts & all process/operation after one another lying with the complete garment according to process sequence. It is a must to write down the estimated SMV & type of machine beside each & every process [5].

Work study is a generic term for method study and work measurement which are used in the Examination of human work in all its contexts and which lead systematically to the Investigation of all the factors which affect the efficiency and economy of the situation being reviewed, in order to effect improvement [8].

2. EXPERIMENTAL

2.1 Breakdown method and Plan layout

2.1.1 Breakdown Method
### Table 1: Operation Bulletin / Breakdown

#### Operation Bulletin/Breakdown Of Turag

**Item:** Kids t-shirt  
**Tar:** g/H  
**Buyer:** MAC  
**Style:** B3061B  
**Date:** 7/7/2013  
**Target:** 85

<table>
<thead>
<tr>
<th>Operation</th>
<th>M/C</th>
<th>SMV</th>
<th>TAM</th>
<th>Op. Hel.</th>
<th>Target t/HD/Hr</th>
<th>TTL Target</th>
<th>Target Variance</th>
<th>Theoretical Output</th>
<th>UCL</th>
<th>LCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Back &amp; front match</td>
<td>M</td>
<td>0.24</td>
<td>0.24</td>
<td>2</td>
<td>250</td>
<td>500</td>
<td>115</td>
<td>458</td>
<td>544</td>
<td>37</td>
</tr>
<tr>
<td>2 Shoulder join with tape</td>
<td>O/L</td>
<td>0.39</td>
<td>0.43</td>
<td>3</td>
<td>140</td>
<td>420</td>
<td>35</td>
<td>458</td>
<td>544</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Operation</td>
<td>Measurement</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------</td>
<td>-------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Neck rib tack &amp; fold</td>
<td>P/M</td>
<td>0.3</td>
<td>0.30</td>
<td>2</td>
<td>200</td>
<td>400</td>
<td>15</td>
<td>458</td>
<td>544</td>
</tr>
<tr>
<td>4</td>
<td>Neck join</td>
<td>O/L</td>
<td>0.27</td>
<td>0.28</td>
<td>2</td>
<td>212</td>
<td>423</td>
<td>38</td>
<td>458</td>
<td>544</td>
</tr>
<tr>
<td>5</td>
<td>Back neck tape attach &amp; cut</td>
<td>F/L</td>
<td>0.26</td>
<td>0.27</td>
<td>2</td>
<td>220</td>
<td>440</td>
<td>55</td>
<td>458</td>
<td>544</td>
</tr>
<tr>
<td>6</td>
<td>Back neck tape close with label</td>
<td>P/M</td>
<td>0.42</td>
<td>0.46</td>
<td>3</td>
<td>130</td>
<td>390</td>
<td>5</td>
<td>458</td>
<td>544</td>
</tr>
<tr>
<td>7</td>
<td>Sleeve match with body</td>
<td>M</td>
<td>0.24</td>
<td>0.24</td>
<td>2</td>
<td>250</td>
<td>500</td>
<td>115</td>
<td>458</td>
<td>544</td>
</tr>
<tr>
<td>8</td>
<td>Mark for shoulder drop</td>
<td>M</td>
<td>0.27</td>
<td>0.27</td>
<td>2</td>
<td>222</td>
<td>444</td>
<td>59</td>
<td>458</td>
<td>544</td>
</tr>
<tr>
<td>9</td>
<td>Sleeve join</td>
<td>O/L</td>
<td>0.52</td>
<td>0.55</td>
<td>3.5</td>
<td>110</td>
<td>385</td>
<td>0</td>
<td>458</td>
<td>544</td>
</tr>
<tr>
<td>10</td>
<td>Side seam</td>
<td>O/L</td>
<td>0.64</td>
<td>0.67</td>
<td>4.5</td>
<td>89</td>
<td>402</td>
<td>17</td>
<td>458</td>
<td>544</td>
</tr>
<tr>
<td>11</td>
<td>Body turn &amp; sticker remove</td>
<td>M</td>
<td>0.29</td>
<td>0.29</td>
<td>2</td>
<td>207</td>
<td>414</td>
<td>29</td>
<td>458</td>
<td>544</td>
</tr>
<tr>
<td>12</td>
<td>Sleeve hem</td>
<td>F/L</td>
<td>0.4</td>
<td>0.44</td>
<td>3</td>
<td>136</td>
<td>409</td>
<td>24</td>
<td>458</td>
<td>544</td>
</tr>
<tr>
<td>13</td>
<td>Bottom hem</td>
<td>F/L</td>
<td>0.35</td>
<td>0.30</td>
<td>2</td>
<td>202</td>
<td>403</td>
<td>18</td>
<td>458</td>
<td>544</td>
</tr>
</tbody>
</table>

**TOTAL SMV**: 4.59 4.74 25 10

**Tables 2: Operation Bulletin/Breakdown Turag**

| OP: HEL | 1 | 0.40 |

**TOTAL OP**: 25
**TOTAL HEL**: 10
**TOTAL MANPOWER**: 35
2.1.2 Plan Layout

![Control Chart](image1)

**Figure (1): Control Chart**

![Layout for full sleeve Shirt](image2)

**Figure (2): Layout for full sleeve Shirt**

Given that these conditions are fulfilled, the synchro system can be very efficient.  

**Advantages:**

1. Labours of all levels, i.e., unskilled, skilled, semi-skilled labours, are involved in this system where the operations are broken into small simple operation. Hence the cost of labour is very cheap.

2. Here the quantity of each component is checked during the individual operation itself, so the quality is good.
3. The components are moved in bundles from one operation to next operation, so there is less chance for confusion like, lot mix-up, shade variation, size variation, etc.

4. Specialization and rhythm of operation increases productivity.

5. As the WIP is high in this system, it is a stable system. Because of the buffer, the breakdown, absenteeism, balancing of line, change of style can be easily managed.

6. An effective production control system and quality control system can be implemented. (a) Time study, method study techniques; (b) Operator training programme; (c) Use of material handling equipments, such as centre table, chute, conveyor, trolley, bins, etc.

7. Bundle tracking is possible, so identifying and solving the problems becomes easy (Ramesh Babu, 2006).

![Flow forward and side-to-side flow layouts](image1)

**Figure (3):** Flow forward and side-to-side flow layouts

![Zigzag layout](image2)

**Figure (4):** Zigzag layout

### 2.2. Work Study

Performance rating is the process during which the time study engineer compares the performance of the operator under observation with his own concept of normal performance.
The concept of normal performance must be such that the time standards set from it and must be within the capacity of the majority of workers in the enterprise.

\[
\text{Performance rating} = \frac{\text{Observed performance}}{\text{Normal performance}} \times 100
\]

From the above chart:
A is standard worker, B is a fast worker and C is a slow worker

Finally, we show some real examples of work study or its effectiveness in our report:

![Performance rating graph](image)

**Figure (5):** Performance rating graph

![Status of Workstudy Department](image)

**Figure (6):** Status of work study department
Benefits of work study department:

Looking at the comparison shown below it is obvious that group A factories are more productive than the group B factories. This fact is further strengthened when the overall factory survey results are compared. The factories in group A have a combined score of 62% for overall performance whereas factories in group B achieved a score of only 48%

3. Conclusion

Industrial engineering is an important and essential part of any Garments Industry. One of the aims of any production system is to make total production time as minimum as possible. This automatically reduces inventory cost to a minimum. Sub-assembly system provides many opportunities to economies on temporary storage and transportation space and time. No definite answer can be given as to which is the best, as it depends on garment style, specifications, machinery and manpower and manufacturing policies. It gives us an opportunity to compare the theoretical knowledge with practical facts and thus develop our knowledge and skills. This project also gives an opportunity to enlarge knowledge of textile administration, production planning, procurement system, production process etc. to adjust with the industrial life.

References

[2] www.google.com industrial engineering and engineering management in australia by Professor John W H Price PhD, FIEAust Mechanical Engineering Department, Monash University, Australia.
[3] www.google.com, industrial-engineering-lecture-02.ppt,
[6] Method of analyzing the actual status 4-Time Study Chapter two (page E-1, E-10) and Chapter three Production Design (page F-1, 2, 3, 6, 8, 9, 12, 13)
[10] Dr. KC. Jain, Production planning, control & Industrial management.