ESTABLISHMENT OF NEW STANDARD TIME FOR THE MANUFACTURING OF HOT-DIP GALVANIZED STEEL OF TENAGA NASIONAL BERHAD (TNB) CONCRETE POLE ACCESSORIES

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor’s Degree of Mechanical Engineering Technology
(Maintenance Technology) (Hons)

by

AKMAL BIN ABD LAH
B071210178
891121-05-5123

FACULTY OF ENGINEERING TECHNOLOGY
2015
BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: ESTABLISHMENT OF NEW STANDART TIME FOR THE MANUFACTURING OF HOT-DIP GALVANIZED STEEL OF TENAGA NASIONAL BERHAD (TNB) POLE ACCESSORIES

SESU PENGAJIAN: 2015/16 Semester 1

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This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the Bachelor’s Degree of Mechanical Engineering Technology (Maintenance Technology) (Hons.). The member of the supervisory is as follow:

\[\text{Signature}\]

ALUDDIN BIN MOHD SIRAH
Pengarah
Jabatan Teknologi Kejuruteraan Mechanikal
Pekan Teknologi Kejuruteraan
Universiti Teknologi Malaysia Melaka

(Project Supervisor)
ABSTRACT

This study was conducted at Subsea Sdn Bhd, Sepang. This company was established in 2007 and its main business is to supply steel products to large corporations, particularly in the field of oil and gas (O & G) and construction. One of the company's main products is Tenaga Nasional Berhad (TNB) hot-dip galvanized concrete pole accessories. There are 17 types of pole accessories that are being produced by Subsea Sdn Bhd, which include J hook, bracket D, triangular bracket and band U 10M. This study focused mainly on four products. This company recently established the cycle time and standard time for the manufacturing of the product in order to determine the production target. The calculation of the standard time was based on a constant fatigue allowance, 30%. This 30% of allowance has become a common practice in this company. Fatigue allowance is the adjustment done to cycle time to obtain the standard time for the purpose to recover the loss time due to personnel need and fatigue. By providing small increase to the cycle time, the workers still able to cover loss time and complete the work assigned to them. In this study, a new standard time for the manufacturing of the products was proposed in order to achieve more accurate production target. The calculation of the new standard time incorporated fatigue allowance that is proposed by International Labour Organization (ILO). The fatigue allowances include personnel allowance, standby allowance, abnormal position, noise level, and atmospheric condition. Each of the allowances is rated by numerical value, 1, 2, and so on. Stopwatch was used to record the cycle time. Then, the standard time was calculated by dividing the average cycle time to the allowance based on the ILO rating scheme. The results show that the new fatigue allowance were range from 25% to 35% as compared to the constant 30% of the existing allowance adopted by the company. The new standard time result in the increase of production target for manufacturing product with less labour demands while reducing the production target of more labour intensive product. It also became apparent from this study that the production target increases by about 10% to 15% based on this new standard time. The newly established standard time apparently provides a guideline to the company especially to set daily production target that is more realistic and labour-oriented. The production target also could be adopted as a basis for a fairer productivity-linked incentive scheme that is being developed by the company.
ABSTRAK

DEDICATIONS

I dedicated this report to my beloved parents for their endless support, love and encouragement.
ACKNOWLEDGMENTS

I would like to thank you to my supervisor, Mr. Aludin Bin Mohd Serah, who help and guided me a lot. I also particularly impressed with his vast experience in various field made him able to be used as reference if there is a problem in writing the report. I would like to thanks to Universiti Teknikal Malaysia Melaka because give an opportunity to finish my writing. I also want to thanks to company Subsea Supplies Sdn Bhd for giving me the opportunity to conduct my research in their factory. I also want to thanks to my classmate and friends because they also help me to finish my research and keep supporting through this research. Lastly, a big thanks to my parents because the motivation and support that they give to me. I really appreciate all the support and motivation from everyone who help me to finish this project.
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# LIST OF SYMBOLS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNB</td>
<td>Tenaga Nasional Berhad</td>
</tr>
<tr>
<td>ILO</td>
<td>International Labour Organization</td>
</tr>
<tr>
<td>O &amp; G</td>
<td>Oil and Gas</td>
</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION

1.0 Introduction

Production of quality products is one of the key elements that should be included in every manufacturing industry. It is the key or basis that should be maintained to ensure their enterprise is last long. Subsea Sdn Bhd is no exception, where it is also a company that produce a massive product. Therefore, time plays an important role in this industry to ensure that costs are controlled and can be reduced. Therefore, time study research is very important to ensure that companies can make improvements in terms of production in order to get a system that is transparent and reduced cost and thus improve profitability and productivity.

1.1 Background

This factory is a steel manufacturing plant where it produces accessories for TNB concrete pole accessories as shown in Figure 1.1. There are many types of pole accessories produced by Subsea Supplies for their customer such as J-hook, u-band, bracket D and others that use for TNB project. All of these products are galvanized before delivered to the customer, which is TNB. Subsea Sdn Bhd produces mass scale of this products in which almost 90% of all manufacturing processes for the pole accessory are made in the same factory. The products produced by this factory contain 17 kinds of different type and specification where it requires an efficient measure to control the entire product manufacture. Therefore, the time taken to produce each product is very important because it will determine the quality and the quantity of the product to be produced. The company also seeks to attain total customer satisfaction and for this reason, it strives to provide the best possible level service at all the times.
In the production of these products, many manufacturing processes would be involved and carried out by the operator with the help of specific machines such as stamping machine, bend saw for cutting and etc. The processes involved in this manufacturing process for example, cutting, bending, blanking, piercing and many more. Figure 1.2 shown cutting processes. These processes are controlled by experienced operators that work in machining and supervised by a qualified supervisor. Then, the quality of the product is checked from time to time so that the entire product is maintained at the required level.
In Subsea Supplies Sdn Bhd factory, there are some workers who form the backbone of the company. It consists of a manager, engineers, administrators and clerks are an employee for the management and the total for management department is 8 people. The company has a history of its own, but, sometimes, current development and economic factors affecting the stability and integrity of the company. Therefore, the company has developed a number of elements in the management and operation to strengthen its business. For the operation, there are two supervisors and 16 numbers of operators. The company background is show in Table 1.1.
1.2 TNB Pole Accessories

Subsea companies produce 17 iron-based products to be supplied to the TNB. These products are used in open areas and more likely to experience corrosion. Therefore, the production of this product is very cautious and quality of the products depends on the durability of the materials used. The iron core materials are coated by a layer of zinc to form anti-rust coating. List of the product is shown in Table 1.2
<table>
<thead>
<tr>
<th>No</th>
<th>Product name</th>
<th>Photo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>J-Hook</td>
<td><img src="image1.jpg" alt="Product 1" /></td>
</tr>
<tr>
<td>2</td>
<td>Bracket D</td>
<td><img src="image2.jpg" alt="Product 2" /></td>
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<td>3</td>
<td>Triangular Bracket</td>
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<td>4</td>
<td>U-band 7.5</td>
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<td>5</td>
<td>U-band 10</td>
<td><img src="image5.jpg" alt="Product 5" /></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Image</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>6</td>
<td>Stay Thimble</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>7</td>
<td>Bow with thimble</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>8</td>
<td>Stay plate</td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>9</td>
<td>Stay rod ¾”</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>10</td>
<td>Street lighting bracket long</td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>11</td>
<td>Street lighting bracket short</td>
<td></td>
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<tr>
<td>----</td>
<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Image of street lighting bracket short" /></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Hexagon bolt &amp; nut 5/8&quot; x 40 mm TL x 4 1/2&quot; Lg</td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Image of hexagon bolt &amp; nut 5/8&quot; x 40 mm TL x 4 1/2&quot; Lg" /></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Hexagon bolt &amp; nut 5/8&quot; x 50 mm TL x 5&quot; Lg</td>
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<td></td>
<td><img src="image" alt="Image of hexagon bolt &amp; nut 5/8&quot; x 50 mm TL x 5&quot; Lg" /></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Hexagon bolt &amp; nut 5/8&quot; x 55 mm TL x 12&quot; Lg</td>
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<td><img src="image" alt="Image of hexagon bolt &amp; nut 5/8&quot; x 55 mm TL x 12&quot; Lg" /></td>
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<tr>
<td></td>
<td>Description</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>15</td>
<td>Dead end clamp-single</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Dead end clamp-double</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Q-hook</td>
<td></td>
</tr>
</tbody>
</table>

1.3 Production Background

TNB pole accessories production process consists of several aspects such as use of machinery, raw materials, processing methods and also hired operator or employee. To ensure a more systematic production, the machines were used to optimum level of operation which is used preferably close to 80% for all products. The machines used have a variety of specifications and application and optimized using a modified mold according to the specifications of the product to be produced. Figure 1.3 shows the stamping machine used in the production site.
To ensure that the machine can operate with the same functionality but different process, the use of mold is very critical as it will involve the quality of the product and the time taken to produce the product. Table 1.3 shows the variety of mold used in the manufacturing of pole accessories. Hence, good quality and time-efficient can be implemented optimally. These machines are organized in order to ensure that the production process is not disrupted. Machine arrangement is also important to ensure the operator is using maximum movement. So, wide space is needed to ensure the operator movement. This is also allows the room to store more products and operator easily to organize the finished product. Finished product is heavy and forklift is used to transport the products.