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INDIRECT STANDARD TIME MEASUREMENT USING MOST METHOD ON SUB ASSY WORKING MODEL B5581 AT PT. XYZ

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Abstract
PT XYZ applies a target time for completion of a harness. The problem that will be discussed in this research is how to calculate the standard time and improve the system/work method in order to increase the amount of production of the B5581 sub assy model using the MOST (Maynard Operation Sequence Technique) method. MOST itself is a work measurement technique that is arranged based on a sequence of sub-activity or movement. These sub-activities are basically obtained from movements that have repetitive patterns such as reaching, holding, moving and positioning objects and these patterns are identified and arranged as a sequence of events followed by object movement. Based on the research results, the standard time obtained from data processing for the initial working method is 3.12 minutes/harness and the standard output is 149 harness/day. The standard time can still be reduced again by improving the actual work method, because in the actual work method there are still many transportation activities so that it can waste the operator's work time. After the transportation activities are eliminated, the standard time of the proposed work method is 1.5125 minutes/harness and the standard output is 317 harnesses/day.

***Keywords**: **N**ormal time, MOST, Standard time, Working Method*

INTRODUCTION

The company certainly wants the production process to be carried out with a short working time so that the production target can be achieved, which is also directly proportional to the profits obtained. Time measurement is the work of observing and recording the working times of each element or cycle using tools that have been prepared. The ideal measurement is a measurement with a lot of data to get a definite answer (Rachman, 2013). Standard time is definitively stated as the time required by a worker who has an average level of ability to complete a job. PT XYZ is a manufacturer of harnesses in cars.

In order to increase production capacity, PT XYZ applies a target completion time of a harness. A capable, skilled and diligent operator will complete one unit of product in the right time frame according to the standard time set by the company. Operators who are less proficient will complete the same work but use a longer time so that production delays. The sub assy section is the first part of the process for working on a harness, if the sub assy section experiences problems, the production will be hampered so that the production target that should be achieved will be hampered because it is constrained in that section.

The following is the number of target and actual data on sub assy work in the sub assy assembly department in 2020.

Table 1. Total Target and Actual Data in October 2020

No	Hari/tgl/bln/thn	Target	Aktual
1	Kamis, 01 Oktober 2020	210	180
2	Jum'at, 02 Oktober 2020	210	180
3	Senin, 05 Oktober 2020	210	180
4	selasa, 06 Oktober 2020	210	180
5	Rabu, 07 Oktober 2020	210	180
6	Kamis, 08 Oktober 2020	210	180
7	Jum'at, 09 Oktober 2020	210	180
8	Sabtu, 10 Oktober 2020	180	170
9	Senin, 1 Oktober 2020	210	200
10	Selasa, 14 Oktober 2020	210	195
11	Rabu, 15 Oktober 2020	210	200
12	Kamis, 16 Oktober 2020	210	210
13	Jumat, 17 Oktober 2020	210	210
14	Senin, 18 Oktober 2020	210	200
15	selasa, 19 Oktober 2020	210	210
16	Rabu, 20 Oktober 2020	210	195
17	Kamis, 21 Oktober 2020	210	190
18	Jum'at, 22 Oktober 2020	210	210
19	Sabtu,24 Oktober 2020	180	175
20	Minggu, 25 Oktober 2020	180	185
21	Senin, 26 Oktober 2020	210	210
22	Selasa, 27 Oktober 2020	210	190
23	Rabu, 28 Oktober 2020	210	195
24	Kamis, 29 Oktober 2020	210	200
25	Jum'at, 30 Oktober 2020	210	200

Based on Table 1. it can be seen that in the last few months, the work has always decreased and did not reach the targets that had been set previously, this could result in the company losing money. The sub assy section is the part that still uses human power, if one of the operators does not work well, then the sub assy work process will cause the process to stop. So to overcome this problem, standard time measurements will be carried out for the current work method. The next step will be to improve the work methods carried out by workers. After improving the work method, a new standard time measurement is carried out for the new work method. Standard time measurement will be carried out using the Maynard Operation Sequence Technique (MOST) method.

The purpose of this study is to measure the indirect standard time using the most method in working on the sub assy model B5581 and to provide suggestions for improving work methods to increase daily output.

METHOD

The method used in this research is the MOST method and this research requires work movement data and work elements for each production process that will be passed in producing the B5581 sub assy model at PT XYZ. The stages are as follows:

1. Determine a basic sequence model, namely the general movement sequence and the controlled movement sequence.

   The sequence of movements in the MOST method;

   A ; action distance

   B ; body movement

   G ; gain control

   P ; place

2. Add all index values for the parameter. The index parameter value is multiplied by the value 10
3. Change the value to TMU (Time Measurement Unit). 1 TMU = 0.036 seconds.
4. Calculation of normal time Normal time is working time that has taken into account the adjustment factor
   $Wn = Wp\ X\ \frac{rating\ factor\%}{100\%}$
   Information:
   Wn = Normal Time
   Wp = Observation Time
5. Perform standard time calculations
   Standard time is the actual time used by the operator to produce one unit of product type data
   Wb=Wn X (100%)/(100%-% Allowance)
   Information:
   Wb = Standard time
   Wn = Normal Time
6. Perform standard output calculations to get the target that the operator gets per day
   OS = 1/Wb
7. Calculate the number of targets obtained in a day.
   Output/day = OS X hours worked/day

RESULT AND DISCUSSION

On the results of observations of work stations in the sub assy section, the elements of work on the work station can be obtained. Calculation of standard time using the MOST method for all activity elements can be seen in the calculation table below:

Table 2. Table of Standard Time Calculations Using the MOST . Method

Perhitungan Waktu Baku Dengan Metode MOST					
Metode Kerja			Kegiatan : Sub Assembly		
No	**Elemen Kerja**	**Model Urutan**	**∑TMU**	**Freq**	**Wktu**
1	Operator berjalan mengambil material yang akan digunakan	A16 B10 G1 A1 B10 P1 A1	390	2	780
2	Material diletakkan ditempat *Sub Assy,*	A1 B10 G1 A1 B0 P3 A1	170	2	340
3	Operator berjalan mengambil dummy	A10 B10 G1 A1 B10 P1 A1	340	1	340
4	Dummy diletakkan di tempat kerja *stand* dummy	A1 B10 G1 A1 B3 P3 A1	200	1	200
5	Operator membuat konektor dummy di *stand* dummy	A1 B10 G1 A1 B3 P3 A1	200	50	10000
6	Operator berjalan ke *stand Sub Assy* membawa konektor dummy	A10 B10 G3 A1 B0 P1 A1	260	1	260
7	Operator berjalan mengambil konektor 62 di *stand* dummy	A10 B10 G1 A1 B10 P1 A1	340	1	340
8	Konektor 62 diletakkan di tempat kerja *Sub Assy*	A1 B10 G1 A1 B0 P3 A0	160	1	160

9	Operator mengambil konektor	A1 B10 G1 A1 B0 P1 A1	150	6	150
10	Konektor diletakkan di dalam JIG (tempat memasukkan konektor) sesuai SK	A1 B10 G1 A1 B0 P3 A1	170	6	170
11	Operator *Sub Assy* menggambil *wire less* (kabel bercabang) di samping tempat kerja	A1 B10 G3 A1 B0 P1 A0	160	1	160
12	Operator *Sub Assy* melakukan *insert* menggunakan *wire less* di konektor 62	A1 B10 G1 A1 B3 P3 A0	190	1	190
13	Operator menaping *wire less* dan memasang vtb	A1 B10 G1 A1 B3 P3 A0	190	1	190
14	Operator menggambil *wire bosui* di samping tempat kerja	A1 B10 G1 A1 B0 P3 A0	160	1	160
15	Operator merakit *wire bosui* di konektor 62	A1 B10 G1 A1 B0 P3 A0	160	1	160
16	Operator mengambil 28 *wire single* didepan tempat kerja	A1 B10 G1 A1 B3 P1 A1	180	28	5040
17	Operator merakit *wire single* di konektor 62 dan konektor lain sesuai SK	A1 B10 G1 A1 B3 P3 A0	190	1	190
18	Mengambil fusenbar di belakang operator	A1 B10 G1 A1 B0 P1 A0	140	1	140
19	Memasukkan *wire* sesuai dengan angka yan ada di SK kedalam fusenbar	A1 B10 G1 A1 B0 P3 A0	160	1	160
20	Operator berjalan membawa hasil pengerjaan *Sub Assy* ke *rail stock*	A10 B10 G1 A1 B0 P3 A0	250	1	250
Waktu Total			4.160	108	19380

Wn = 4.160 TMU X 0.00001 hours
= 0.0416 hours x 60 minutes
= 2,496 minutes

A worker cannot work one full day continuously. He will need time to go to the toilet, eat and drink and so on. Inevitable delays may occur due to equipment breakdown and so on. So additional time needs to be given to normal time. This additional time is called the allowance factor. Allowance data given can be seen in Table 3

Table 3. Data Allowance

No	Faktor	Nilai
1	Tunjangan Pribadi	5
2	Tunjangan Dasar	4
3	Kelonggaran Berdiri	2
4	Kelonggaran Posisi Abnormal	0

5	Penggunaan Tenaga	1
6	Pencahayaan	0
7	Kondisi Atmosfer	0
8	Ketelitian	2
9	Kebisingan	2
10	Keteganggan Mental	1
11	Berulang-ulang	1
12	Kebosanan	2
Total Allowance		20

Wb = Wn X 100/(100-% Allowance)

= 2.496 X 100/(100-20)

= 2.496 X 1.25

= 3.12 minutes/harness

OS = 1/Wb

= 1/3,12

= 0.320 harness/min

The number of harnesses that can be completed in 1 day is

OS/day = OS X Number of hours worked 1 day

= 0.312 X 8 (60 minutes)

= 0.21 X 480

= 149 harness/day

The following is the proposed layout for the proposed Sub Assy work method, which can be seen in Figure 1

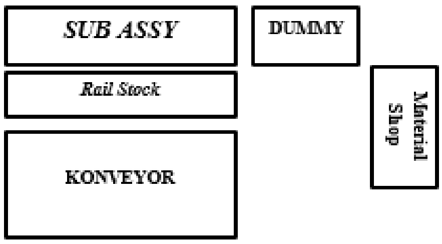

Figure 1. Layout of the proposed workplace from the Sub Assy operator

For the calculation of the standard standard time for the proposed work method on the MOST method of all activity elements, see Table 4.

Table 4. Calculation of the standard time of the proposed work MOST method

	Perhitungan Waktu Baku Dengan Metode MOST				
	Metode Kerja		**Kegiatan : Sub Assembly**		
No	**Elemen Kerja**	**Model Urutan**	**∑TMU**	**Freq**	**Waktu**
1	Operator *Sub Assy* mengambil konektor	A1 B10 G1 A1 B0 P1 A1	150	6	150
2	Konektor diletakkan di dalam JIG	A1 B10 G1 A1 B0 P3 A1	170	6	170

3	Operator *Sub Assy* menggambil *wire less*	A1 B10 G3 A1 B0 P1 A0	160	1	160
4	*Insert* menggunakan *wire less* di konektor 62	A1 B10 G1 A1 B3 P3 A0	190	1	190
5	Operator menaping *wire less* dan memasang vtb	A1 B10 G1 A1 B3 P3 A0	190	1	190
6	Operator menggambil *wire bosui* di samping tempat kerja	A1 B10 G1 A1 B0 P3 A0	160	1	160
7	Operator merakit *wire bosui* di konektor 62	A1 B10 G1 A1 B0 P3 A0	160	1	160
8	Operator mengambil 28 *wire single* didepan tempat kerja	A1 B10 G1 A1 B3 P1 A1	180	28	5040
9	Operator merakit *wire single* di konektor 62 dan konektor lain sesuai SK	A1 B10 G1 A1 B3 P3 A0	190	1	190
10	Mengambil fusenbar di belakang operator	A1 B10 G1 A1 B0 P1 A0	140	1	140
11	Memasukkan *wire* sesuai dengan angka yan ada di SK kedalam fusenbar	A1 B10 G1 A1 B0 P3 A0	160	1	160
12	Operator berjalan membawa hasil pengerjaan *Sub Assy* ke *rail stock*	A1 B10 G1 A1 B0 P3 A0	160	1	250
Waktu Total			2010	49	6960

Wn = 2,010 TMU X 0.00001 hours

= 0.0201 hours x 60 minutes

= 1.21 minutes

Allowance given is the same as before which can be seen in Table 3 with a total allowance of 20%

Wb = Wn X 100/(100-% Allowance)

= 1.21 X 100/(100-20)

= 1.21 X 1.25

= 1.5125 minutes/harness

OS = 1/Wb

= 1/1.5125

= 0.661 harness/min

The number of harnesses that can be completed within 1 day after repairs are made are:

OS/Day = OS X Number of hours worked 1 day

= 0.661 X 8 (60 minutes)

= 0.661 X 480

= 317 harness/day

Based on the results of calculations and data processing, it is known that prior to the repair, there were 12 operations and 8 transportation activities. In the Sub Assy process, many transportation activities are encountered, therefore it can cause the operator to have to leave his place of work to carry out these activities. The standard time obtained from data processing for the initial working method is 3.12 minutes/harness and the standard output is 149 harnesses/day. After improving the layout and work elements on the proposed work method, the transportation process and Sub Assy work are eliminated so that the operator does not leave his work place so that the operator's time is not wasted and the operator's work time focuses on operating activities only. After the transportation activities are eliminated, the standard time of the proposed work method is 1.5125 minutes/harness and the standard output is 317 harnesses/day. So that the operator can achieve the company's target of 210 harnesses/day

The comparison between the initial working method and the proposed work method can be seen in Table 5.

Table 5. Comparison of the initial working method and the proposed working method

	Pembanding			
	Elemen Kegiatan		**Waktu Baku**	**Output**
	Transportasi	**Operasi**		
Metode Kerja Awal	8	12	3,12 menit/harness	149 harnes/hari
Metode Kerja Usulan	0	12	1,5125 menit/harness	317 harnes/hari

Discussion

Based on data processing and data analysis, it was found that the standard time obtained from data processing for the initial working method was 3.12 minutes/harness and the standard output was 149 harnesses/day, meanwhile with the improvement of the working method the standard time of the proposed work method could be accelerated. up to 1.5125 minutes/harness and its standard output is 317 harnesses/day. So that operators can achieve the company's target of 210 harnesses/day

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