

Increasing the Company Profit by Reduction the Production Cost (case study in an Oil Seal Automotive Manufacturing)

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Abstract

The purpose of this paper is to present how the automotive spare part manufacturing company obtains an increase in the profit cost by reducing the production cost. The reducing time for the preheating temperature during the process moldings obtained less than 30 minutes where it is provided as much as SG\$ 1.309 per month. Due to the replacement of the Tubular Lamp (TL) to the LED of 2440 pcs for the factory, we got reducing or saving of power about 228 kilowatt or approximately SG\$ 3.379 per month. From the Insulation machine as much as SG\$ 570 per month, and from the Trimming machine saving cost of SG\$ 4750. Then it provides the total reducing cost from the applied method as much as SG\$ 9438 per month. The main results obtained from the investigation show that the estimated downtime cost constitutes about 10% of the total of the proposed system in the remote area. It is found that the reduction of Electricity Bill about 2000 kilowatt-hours, every month. molding machine (lot 502), and the facilities. It is found that the profit around SG\$ 4750, So we found the total profit from around SG\$ 9.438 per month or SG\$ 113,256 per year..

Keywords: *Saving Cost, Cost Down, Reduction Cost, Profit*

1. Introduction

Nowadays the company always intents to increase the profit company by conduct the reduced production cost. Generally, the focus of reducing the production cost consists of spare-part reduction cost, machine improvement, utility reduction cost. The main target of the project is to gain more revenue by reducing production costs. A lot of tools have been implemented of the major factory all around the world every year, but only a few methods of tool that really can be affected by real efficiency. In this manufacturing, the company used the latest method as the total cost down (TCD) method. In some decades each manufacturing sector analyses to improve their production machines, electricity consumption, spare part usage that can be compatible but also lower cost. Some descriptions that filled here, can motivate every manufacture and industry to continuous do the reduction cost plan.

To get the organizational performance in a highly competitive environment, cost reduction techniques are the must and it should be implemented. To ensure more profit growth by producing quality goods and services with available resources on the ground, the organization should decide that there is a must of an amount of cost to reduce the cost of a certain limit of the acceptable limit as regards control and reduction on the production cost. To set a realistic standard in Industry cost reduction, the scheme of cost reduction must be properly administered and neatly. In an organization, the cost reduction should be operated in every department, especially the production department to make sure that

the numbers of finished goods are properly accounted for. The target and standard should not be unclear set as this will be unrealistic in the course of comprising planned costs in an organization.[1],[2]

As a company that produces automotive oil seal manufacturing[6-10], the company certainly hopes As a company of an oil seal automotive manufacturing[6-10], the company certainly hopes to be able to reduce the manufacturing costs without having to lessen the quantity and quality of the products. However, it should not be reckless while choosing to decide the cost-saving ideas, because they may ruin the business instead of growing the business itself. The company established the SOP of the above issue and put together the five ways that can be applied to trim the expenses while conducting the improving of business efficiency, as follows: To Cut the Material Costs, Applied the Just in Time for the inventory and Purchase, Optimize Employee Performance, replace the manual process to the automation as much as possible and conduct the negotiation with the Suppliers

2. Cost Reduction Theory

At this decade, there are a large number of methods that provide the cost reduction tools available on the market and many big and medium enterprises using it. The most useful tools are described in shortly but fully provide a clear meaning. They are mostly based on various types of financial and operational analysis but also include such simple concepts as idea generation and a variation on the standard budgeting system. Companies have used all of them with considering and hoping for success.

2.1. The 5(five) S Analysis

The 5(five)S or (5S), Analysis System found by the Japanese mindset or methods that consist of Seiri, Seiso, Seiton, Seiketsu, Shitsuke, means that: Sort, Set in order, Shine and Standardize, then it is adopted by world manufacturing and company. The 5S tools can be viewed as a system of workplace rules devised to create a safe and productive work environment and to provide efficient and effective realization of business tasks. By implementing the 5S tools, it is expected to reduce defects, improve the quality, increase the safety and morale of the employees, the working area will be clean and neat, and also improve employees' productivity. In the case study of oil-seal manufacturing research, it shows the results with the suggestion that the implementation of the 5S method can contribute to the performance of an organization in the short and medium-term [3]

2.2. Benchmarking

Benchmarks are standards for employee work that the company needs. The employee's ability to meet those benchmarks should be the basis to evaluate the performance company. Setting the benchmarks in several areas and communicate the company expectations for meeting standards to all the employees. Benchmarking is useful for deciding where to begin the cost reduction activities or to begin the Total Cost Down (TCD) activities. Benchmarking provides some information regarding the cost levels of other businesses, or another department in the same company, that can give the company new better ideas and methods for saving cost. After that, it can be compared between the companies system and implement better company target achievement

2.3. Breakeven Analysis

One of the cost reduction tools that can be used to determine whether the business will be able to cover all the expenses and begin to make a profit or not is using the Breakeven Analysis. The Breakeven Analysis and Breakeven Point (BEP) is extremely important to know the overhead cost, sales revenue, average gross profit

for each sale, and the percentage of average gross profit. These points will provide the needed information to generate enough sales revenue to pay the ongoing expenses related to running the business.

Some kind of a product line of the manufacturing may generate such minimal throughput (the number of materials passing through the systems) that it cannot pay for the cost of the overhead that is directly linked to it unless the product line produces at near-maximum capacity levels. To run a simple breakeven analysis on company operations, and to see where this problem arises and target cost reductions in those areas where the product lines are clearly at risk of not exceeding their breakeven levels. The breakeven calculation is to divide the related overhead expenses by the throughput margin of the product line.

2.4. Check Sheets

A check sheet means a structured form used for the collection and recording of the data to be analyzed periodically. The recorded data of the form was designed to be easy to understand by the operator or technician and made simple as possible, with the column of checkmarks and several symbols to be differentiated. The check sheet usually used in the production line or critical equipment in manufacturing and in building to control the condition of critical equipment and production machines. In this case.

In this case, we used the check sheet for recording the replacement of TL Lamp to LED Lamp, Temperature of Pre Heating Time Molding machine 110T 2 RT, the brake canvass thickness of brake Trimming Machine that needs to replace, and the electricity consumption for the factory

2.5. Employee Idea Systems

Nowadays almost all modern manufacturing and industry collect the new saving cost idea from its employees. Japanese manufacturing usually held campaign even to demonstrate and present the idea for saving cost down from each department of its company. Each department will present the methods of their saving cost down plan and how to implement it in front of the Management Teams. By this event, the company will get the best idea for the total cost down the project, and motivate the employees for a better mindset and performance.

Most of the employee idea event presentations held like a contest that gave several awards and benefits for the employees from the department that give the best total cost down solution idea. It will open the chance of the employees to reach better positions and benefits than before especially if the presentation and the implementation of the idea are good enough.

To prevent any difficulties from the employees to implement the total saving cost idea, the manufacturing company usually give the project budget to simple implementation for the best idea. After all, manufacturing also gets the result of the implemented total saving cost idea when it been accomplished. The result of the implementation idea also cause the cost reduction budget, electricity consumption, material consumption, effectiveness of production cycle time depend on the area of the saving cost down an idea will be focused.

2.6. Error Quantification

Normally if there is some error that occurs in the process, it will produce a scrapped or reworked product and becomes waste material also as a production cost. The manufacturing company can record the data and tracking the defect item quantity and compile into the daily production report then monthly and yearly report. It is clear if an item is scrapped, then the associated throughput is lost forever, and if an item is reworked,

then the cost of the rework labor is offset against the lost throughput to yield a reduced level of throughput. Further, the contents of the report indicate the time and labor cost required for rework, meaningly it will reduce the profit, So the employees should avoid making an error during the production process.

Based on the defect record production, usually, it will be held the discussion with the maintenance and engineering department to improve the process or machine specification. Maintenance and engineering will take action to improve the production process and machine abnormality based on the report from the production department. Also, the abnormality and product defects can be periodically reduced by the coordination from each related department in the manufacturing company, the waste and scrapped item will also decrease after the improvement and the repairs of the production machine completed. The faster the improvement of the defect, the faster the scrapped and waste material of the product will be reduced, and the manufacture company revenue and profit also will be increasing significantly.

2.7. Fixed Cost Analysis

The fixed costs are expenses that must be paid whether or not any units are produced. They are fixed over a specified period of time or range of production, and examples include: business premises lease (or mortgage) costs over the contract period, property taxes, insurance, vehicle leases, machinery, tools, computers, salary, utilities and accounting fees. To analyze the fixed cost in a manufacturing company, first, we must know the cost of each department especially the production & maintenance department that usually has the highest cost of the budget in the manufacture. In the production department, the highest cost must come from material cost and electricity consumption for the production machine. The material cost can be calculated periodically based on the production planning per month, and also important to get registered vendors and suppliers to give a fixed price for the material. By get the fixed price of the production material, the manufacture can be set the fixed production cost periodically.

In the Maintenance and Engineering department is also important to calculate and set the fixed cost periodically, such as the spare part replacement for production machines, electricity consumption for the utility that support the production and the manufacturing plan (air compressor, chiller, exhaust, cooling tower, Generator, etc). From the calculation of the budget plan maintenance and Engineering department also work with purchasing to get better price periodically and get the minimum stock of the production machines' spare part that can set the fixed cost of the maintenance department.

3. Scope of Works

This paper focused on how to increase the profit cost based on the reduction of the total production cost. Basically the production cost consists of the total cost of the direct material cost, the direct labor cost, and manufacturing/factory overheads. This paper mainly investigated, analyzed and calculated the ways how to reduce the manufacturing cost for increasing the profit. This studies using the following three case issue in an oil-seal automotive manufacturing as that the most important as this moment, as:

- a). Replace the lamp of Tubular Lamp (TL) to light-emitting diode (LED)
- b). Reduce the Spare part of the Brake of Trimming Machine.
- c). And Reduce Mahine Electricity Consumption



Figure.1 Molding Factory Condition

4. Reducing the Production Cost

This paper provides the ways for increasing the profit company by reducing the production/manufacturing cost with the concern of the three case issue as that the most important as replacing the lamp of TL to LED, reducing the spare part of the Brake of Trimming Machine application and reducing the Machine Electricity Consumption..

4-1. Replace the TL Lamp to LED

The fluorescent lamp is one of the best cost-effective and environment friendly in the lighting solution. And the lighting technology has grown fast every year that produces a new kind of lamp that low power electricity consumption and gives the brightness. Manufacture company and high rise building that usually has a large quantity of lighting consumption really need the low power consumption of lighting due to the quantity that their used reach thousands lamp.

Based on the development of technology, it is known that the LED's produce light in a variety of color temperatures which are similar to fluorescent but do not exhibit flickering issues. There are many LED options with complete dimming qualities. Fluorescents are expensive to dim and do not do it as effectively as LEDs.

In the last 2 years lighting technology found the effectiveness of LED light that consumes low electrical power and gives the same even brighter than the Tubular Light (TL Lamp). The LED lamp now used by almost manufacturing companies and high rise buildings due to its saving power consumption and easy to be installed. The lifetime of LED Lamp also longer than the Tubular Lamp, LED lifetime can reach 80.000 hours compare to the Tubular Lamp that just reaches 50.000 hours (T5 lamp).

Concerning the LED application for oil-seal manufacturing, we already replace the TL lamp 2400 pcs of 40 Watt each to the LED with 2400 pieces of 20 Watt, as shown in Table 2, where the value of the profit due to the replacement of TL shown in the calculation of the cost-profit.

4-2. Reduce the Spare part of the Brake of Trimming Machine.

Direct material cost constitutes a substantial portion of the total manufacturing costs. There are a number of techniques to control the direct material cost. In Molding Manufacturer Company that uses many Trimming machines, the brake spare part to stop the motor was crucial. If the brake was loose, so the quality of the trimming was Not Good (NG).

To buy the new brake trimming motor so you must buy one set of trimming motor (TECO brand). After study and trial to fabricate using the cast-iron brake (the soft) one we can modify the old and loose brake trimming motor to be reused again. The saving by fabricates this spare part was quite a lot, the standard TECO motor for the Trimming Machine was around SGD 250 (one set) but if only fabricate it with cast iron it only cost

SGD 50, that means a saving of SGD 200 per machine. The Oil Seal Manufacture company that we take the data had around 30 machines, which run normally 19 machines per day (other was back up machines).

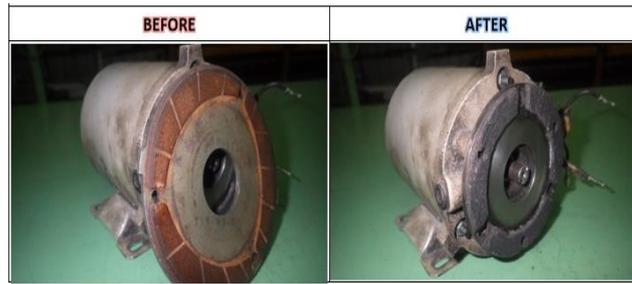


Figure 2. The Trimming Machine

4-3. Reduce Mahine Electricity Consumption.

In Automotive Manufacturing Company, it must have many kinds of Molding Curing Machine (MCM). The MCM which uses a heater to finalize the rubber part. For the Oil Seal Manufacturing company, they used the best material for chamber Insulation using Asbes-Toast which is quite expensive but it provides the perfect insulation if using the MCM. By using this insulation we obtain the reduction of the preheating time approximately 25%.

Figure 3 shows an example of one of the Oil-Seal Manufacture in Batam Island, the curing machine 110 Tons 2 Round up Table (2RT). With its pressure capacity curing pressure 110 Tons, it needs 3 pieces of heater for curing the rubber material into oil seal units. In every curing machine, there is one step preheat molding that must be done before curing the production step.,

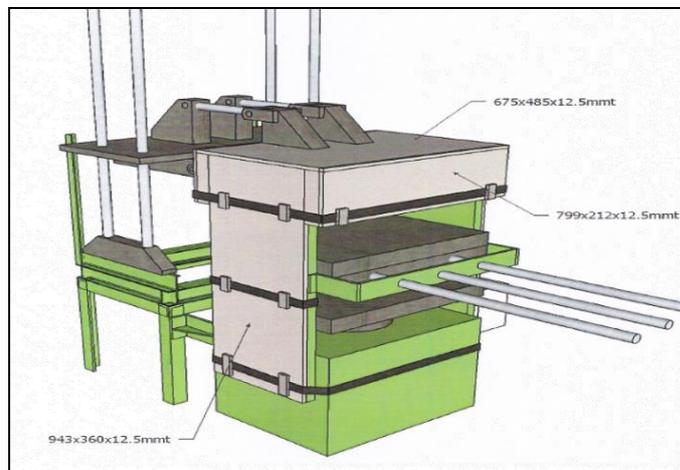


Figure 3.110T 2RT with additional insulation Asbest-Toast

For Preheating molding the operator must turn on the heater to warm up the molding for 30 minutes. This step was taken electricity a lot, due to the high power of heater usage. One heater use 100W so it uses 3 heaters to be 300W, then if it runs for 30 minutes for the pre-heat process (without produce item) it will become a waste of electricity consumption.

We and the Engineering & Maintenance Department team has done the analysis and trial to achieve the preheat time of 140 Celsius degrees, it was found less than 30 minutes. So it clear that by using the material Asbestos as insulation will reduce the usage the electricity about 25% using the normal insulation (bakelite or and the pertinex) So it

means that the payment of electricity bills will be reduced by the cost of electricity that must be paid for the usage of 30 minutes, or it will reduce the production cost, it will automatically increase the profits.

5. Calculation the Profit

Based on the data obtained from the implementation of 3(three) ways for reducing the cost as above. The calculation of the profit i.e, Before additional Insulation and After the additional insulation the result as follows:

Electricity Consumption/month = (heater power × quantity/machine) × normal preheat time.

$$0.9 \text{ kWh} = 1.8\text{kW} (400\text{W} \times 6) \times 0.5 \text{ hour (30minutes)}$$

After we provide the additional insulation (Asbest Toast), we reduce the preheat time for the chamber to be prepared for molding oil seal product:

Electricity Consumption/month = (heater power × quantity/machine) × 1/3 preheat-time
 $0.3\text{kWh} = 1,8\text{kW} (400\text{W} \times 6) \times 0.17 \text{ hour (10minutes)}$

So for the saving of electricity after used the insulation 0,62 kWh per machine, with the total machines of 30 pieces, so the total saving is ;

$$\begin{aligned} \text{Total Saving is} &= 30 \times 0,62 \text{ kWh} \times 16\text{hours run machine/day} \times 22 \text{ days run/month} \\ &= 6.547 \text{ kWh} \end{aligned}$$

The calculation of saving cost from the Spare part of the Trimming Machine as below:
Brake Motor Saving = Original TECO Motor (1 set) - Fabricate Brake Old TECO.
For one set machines is SG\$ 1000 – SG\$ 50 = SG\$950,
so for 5 machines we get, The Total saving SG\$ 4750

The detail calculation of saving cost from the replacement of the Tubular lamp (TL) to LED shown as follows: The Lamp Cost Saving = Difference Watt TL with LED × quantity lamp in Factory × running hour per hour/days × running hour per month × ballast factor.

The Lamp Cost Saving is: $0.02 \times 2400 \times 16 \times 22 = 16.896 \text{ kWh}$

Tabel 1. Shows the Saving Result for Replacement Brake TECO Motor of Trimming Machines. This method provides the saving cost of SG\$ 4750 per month. The Saving Result for the Replacement TL to LED, it provides as much as SG\$ 563 per month as shown in Table 2.

Table 3 shows the comparison of the plan and the result after applying the reduction cost method during the manufacturing process for one year. The resulting saving during 2013 as much as SG\$ 570 per month.

Table 4 shows the average reducing the consumption of electricity around 20,000 kWatt per month. It is seen that the electricity usage decrease with the average the electricity bill approximately 2000 kilowatt-hours, monthly. It found that the main results from the investigation show that the estimated downtime cost constitutes about 10% of the total of the proposed system in the remote area. It is found that the reducing of the Electricity Bill about 2000 kilo watt-hours, every months. molding machine (lot 502), and the facilities as depicted in Table 4.

Table 1. Saving Result for Replacement Brake TECO Motor for Trimming Machines

Repair Cost of Brake Trimming Machine (Unit)	5	5	5	5	5	5	5	5	5	5	5	5
Plan Saving (SG\$)	4.750	4.750	4.750	4.750	4.750	4.750	4.750	4.750	4.750	4.750	4.750	4.750
Accumulated Plan (SG\$)	4.750	9.500	14.250	19.000	23.750	28.500	33.250	38.000	42.750	47.500	52.250	57.000
Actual Saving (Unit)	5	5	5	5	5	5	5	5	5	5	5	5
Result Saving (SG\$)	4.750	4.750	4.750	4.750	4.750	4.750	4.750	4.750	4.750	4.750	4.750	4.750
Result-accumulated (SG\$)	4.750	9.500	14.250	19.000	23.750	28.500	33.250	38.000	42.750	47.500	52.250	57.000

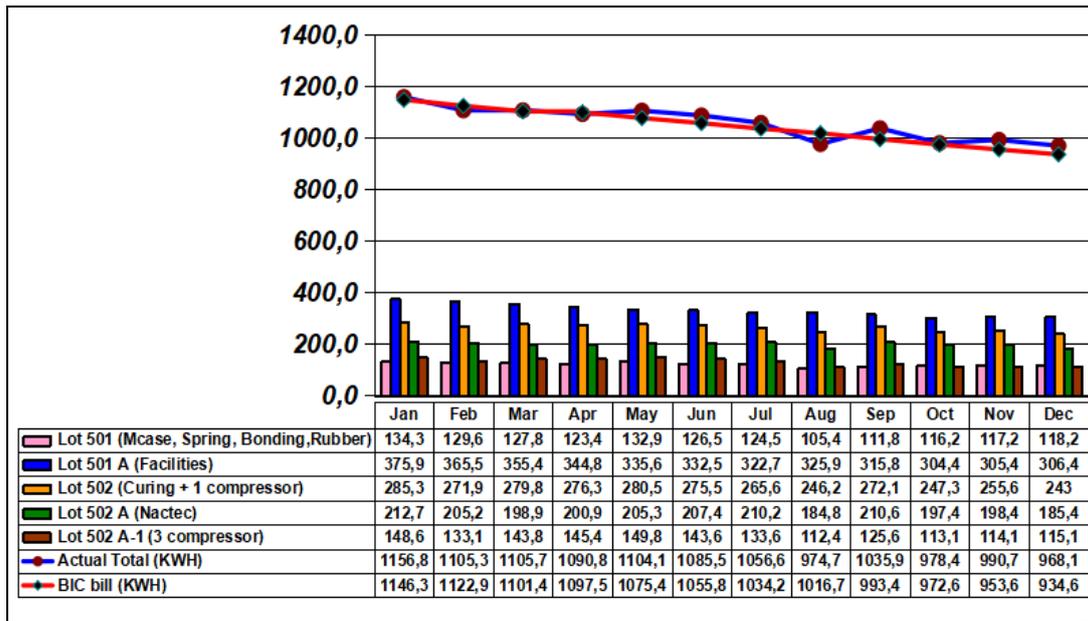
Table 2. Saving Result for Replacement TL to LED

Month		Jan-18	Feb-18	Mar18	Apr18	May18	Jun18	Jul18	Aug18	Sep18	Oct18	Nov18	Dec18
Plan	Replace TL to LED (Pcs)	2.400	2.400	2.400	2.400	2.400	2.400	2.400	2.400	2.400	2.400	2.400	2.400
	Lighting Plan Saving (kWh)	16.896	16.896	16.896	16.896	16.896	16.896	16.896	16.896	16.896	16.896	16.896	16.896
	Accumulate Plan Saving (kWh)	16.896	33.792	50.688	67.584	84.480	101.376	118.272	135.168	152.064	168.960	185.856	202.752
	Plan Saving (SG\$)	3.379	3.379	3.379	3.379	3.379	3.379	3.379	3.379	3.379	3.379	3.379	3.379
	Accumulated Plan (SG\$)	3.379	6.758,4	10.137,6	13.516,8	16.896,0	20.275,2	23.654,4	27.033,6	30.412,8	33.792,0	37.171,2	40.550,4
Actual	Actual Saving (KW hour)	16.896	16.896	16.896	16.896	16.896	16.896	16.896	16.896	16.896	16.896	16.896	16.896
	Result Saving (SG\$)	3.379	3.379,2	3.379,2	3.379,2	3.379,2	3.379,2	3.379,2	3.379,2	3.379,2	3.379,2	3.379,2	3.379,2
	Result-accumulated (kWh)	16.896	33.792	50.688	67.584	84.480	101.376	118.272	135.168	152.064	168.960	185.856	202.752
	Result-accumulated (SG\$)	3.379	6.758,4	10.137,6	13.516,8	16.896,0	20.275,2	23.654,4	27.033,6	30.412,8	33.792,0	37.171,2	40.550,4

Table 3. Saving Result for Insulation Molding Machines

Month		Jan-18	Feb-18	Mar18	Apr18	May18	Jun18	Jul18	Aug18	Sep18	Oct18	Nov18	Dec18
Plan	Insulation Heat (Unit)	30	30	30	30	30	30	30	30	30	30	30	30
	Plan Saving (KW hour)	6.547	6.547	6.547	6.547	6.547	6.547	6.547	6.547	6.547	6.547	6.547	6.547
	Plan Saving (SG\$)	1.309	1.309	1.309	1.309	1.309	1.309	1.309	1.309	1.309	1.309	1.309	1.309
	Accumulated Plan (SG\$)	1.309	2.619	3.928	5.238	6.547	7.857	9.166	10.476	11.785	13.094	14.404	15.713
Actual	Actual saving (KW hour)	6.547	6.547	6.547	6.547	6.547	6.547	6.547	6.547	6.547	6.547	6.547	6.547
	Result Saving (SG\$)	1.309	1.309	1.309	1.309	1.309	1.309	1.309	1.309	1.309	1.309	1.309	1.309
	Result-accumulated (kWh)	6.547	13.094	19.642	26.189	32.736	39.283	45.830	52.378	58.925	65.472	72.019	78.566
	Result-accumulated (SG\$)	1.309	2.619	3.928	5.238	6.547	7.857	9.166	10.476	11.785	13.094	14.404	15.713

Table 4. The average of profit per month



6. Conclusion and Remarks

Based on the reduction method applied in this article for the manufacturing company, we conclude as follows; The reducing time for the preheating temperature during the process moldings (Insulation Machine) obtained less than 30 minutes, it is provided as much as SG\$ 1.309 per month, Due to the replacement of the Tubular Lamp (TL) to the LED for the factory, we got the reducing or power saving of 228 kilowatt or approximately SG\$ 3.379 per month. The saving cost from the Insulation machine and Trimming machine of SG\$ 570 and SG\$ 4.750, respectively. So it is found the total reducing cost or the saving cost from the applied method as much as SG\$ 9.438 per month.

Finally from this research can be concluded that by replace the lamp of Tubular Lamp (TL) to light-emitting diode (LED), reduce the Spare part of the Brake of Trimming Machines, and reduce machines electricity consumption willl reduce the manufacturing cost as well as it will be increasing the profit of the company. The main results obtained from the investigation show that the estimated downtime cost constitutes about 10% of the total of the proposed system in the remote area. It is found the total profit from around SG\$ 9.438 per month or SG\$ 113,256 per year.

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