CHAPTER 6

SUMMARY AND SUGGESTION

The objective of this study is to study on progressive die replacement on 3 key aspects

1. Progressive die design
2. Cost of replacement
3. Efficiency improvement

After studying the existing system product of the company, and study on research literatures, it is shown that the most suitable die to be replaced is progressive die as it is able to solve most of problem criterion in this company.

Then the procedure is develop as following,

6.1 Progressive die design

It is done by considering part to be designed such as sharp, material thickness, types of material and the limitation of progressive die technique then if it is accepted on those priority ,then next step is to design on process step. It is done by design on strip sheet. The concept of process design is part must not be notched out or carried out on strip sheet until the last process and the gap for each step has to be aware.

Next step is to calculate a working force in order to determine a rough draft of overall dimensions and the machine capacity to be replaced. Finally, the last step is to draw die design if rough draft into CAD, which is represented in chapter 4.

6.2 Cost of replacement

On the replacement , there are 2 types of cost to be concerned.

6.2.1 Investment cost

6.2.2 Operating cost

- Investment cost , there are 2 items 1 Die 2. Equipment(regardless machine). For die making, the cost calculation is represented in breakdown cost ie. cost of labor and cost of material(design is excluded) whereas supporting equipment is called from price index in 2002.

- Operating cost , direct labor, cost and material cost is directly calculated. For the overhead, since the replacement does not exist yet ,the overhead is then calculated from the statistic method" the relation of linear regression" of progressive die company benchmarking.

After doing cost analysis , the result shows that the investment cost of progressive die is about 396,866 baht, while single die's is nil. On the other hand, in first year operation, cost of progressive die is less than single die's about 165,013 baht as shown in table below,

Table 6.1 cost of replacement for single die VS progressive die

	Investment (Baht)	1st year operating (Baht)
Single die		7,302,513.00
Progressive die	396,866.72	7,137,500.00
Difference	396,866.72	165,013.00
%difference	100.00	-0.02

For the recovery pay back time, as the operating cost in first year, progressive die is less than single die's. With this annual profit and interest rate of this operating cost will recover an investment cost 396,866 baht. The recovery pay back time is shown below ,

Assume interest rate = 10 % , present value of investment (p) = 396,866 baht , Annual payment is = 165,013 baht (the amount of operating cost's difference). The net cash flow is shown below,

Table 6.2 Annual cash flow for pay back period

Year 0	Year 1	Year 2	Year 3
-396,866	165,013	165,013	165,013

If 2 years

NPV2= -396,866+165,013(P/A10%2)

= -396,866+165,013(1.74)

= -110,485 baht

If 3 years

NPV3=-396,866 + 165,013(P/A,10%3)

= -396,866+165,013(24,869)

= +13,504 baht

It shows that NPV3 > 0,which means the pay back time is within third year. Therefore, it can be concluded that the payback time is not more than 3 years.

6.3 The study of performance

It is considering on key performance indicator such as cycle time, lead time, unit per hour and other related problem in the factory such as area, work in process, man power. After studying the replacement, the summary of performance is shown below,

Table 6.3 Summary result of performance

	Lead time (sec)	Area occupied (m2)	Unit per hour	Man power (person)	Set up time (sec)
Single die	3.62	150.00	994.00	13.00	4,524.00
Progressive die	2.00	50.00	1,800.00	10.00	1,600.00
Difference	1.62	100.00	806.00	3.00	2,924.00
% difference	45.00	75.00	52.00	23.00	65.00

In table 6.3,it can be concluded that , progressive die has more efficiency than single die. It is therefore suit for the company to improve efficiency and performance as following,

1. lead time reduce approximately 45%
2. Area occupied reduce approximately 75%
3. Unit per hour 52%
4. Manpower reduce 23%
5. Set up times reduce 65%

It is obviously shown that progressive die 's cycle time shorter than single die's because it eliminates manual time of loading in and out machine, idle time, and allowance times, therefore lead time is shorter from 3.62 to 2 sec or 55%. Unit per hour is consequently increase to 52%. Set up time reduce to 65% because die set up will be happen only 1 time instead of 4 times like single die. We can see that unit per hour ,set up time ,lead time is related to each others. Unit per hour decrease because set up time reduce and lead time reduce. But it is noticed that it is not really the same proportion, for example lead time reduce to 55% but unit per hour increase only 52%. It is because the allowance of operators and set up time is taken into account when calculate unit per hour.

Area ,manpower does very much reduce after replacement which is 75% and 60% respectively. Man power is reduced upon a number of progress of single die. The

more process step is replaced, the more man power and area reduce when progressive die takes place. Of cause work in process is definitely reduce almost zero because part is carried out until last process.

6.4 Suggestion

1. The data of progressive die for example, indirect cost is benchmarked with the industry running a progressive die product, therefore data is only an estimation. It has to give 5% allowance.
2. The company need to implement both lines (wheel frame and base frame) if possible, so that unit per hour will correspond to each other so that there will be no bottom neck problem in assembly process.
3. The cycle time of progressive die depends upon such as stroke per minute, feeding speed, strip die design, therefore in different part will be different time.
4. This thesis assume the output of progressive die and progressive die is the same amount for calculation on investment of replacement.