CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The objective of this thesis is to reduce the defects that tend to occur during metal casting process. The defects can be classified into three defects types which are metallic projection, cavities, and defective surface. According to the experiment, these defects are likely to occur in every casting piece. Metallic projection and Cavities defects the data are collected by counting the number of defects according to occurred in each casting piece, unlike the Defective surface the data is collected in term of grading, casting piece will be given grade according on its defective area on the surface of casting piece.

After sufficient data of the defects has been gathered, the potential causes are defined. Conclusively, there are six factors: Pouring Height, Snow powder quantity, Solidification time, aluminum combination, and gate size, which characterize the potential causes of defect. These six factors are then analyzed by Design of Experiment (DOE) technique to define level of their significance.

The significant factors that reduce Metallic projection are Aluminum Combination and Gate size. For Cavities, the significant factors are pouring height, number of gate, snow powder quantity, aluminum combination, and gate size. In case of Defective surface, number of gate, snow powder quantity, solidification time, aluminum combination, gate size are its significant factor.

From DOE, the experimenter found a conflicting result in one of the factor. The factor is Gate size. The data shows that either level – or + reduces the response (– for metallic projection and cavities, + reduce defective surface). The cost of correction has brought up to calculate which level gives lower cost of correction. After calculation the + level gave the less cost of rework than – level.

The table below shows the optimal factor level that will reduce the defect from the casting process. These factors are then implemented into the casting process, the production time has reduced from 6 hours and 1 minute to 5 hours and 40 minutes, or it reduces by 6 %. If calculate it in term of products that the company can gain after implementing this new setting. The company can actually produce the products 26.43 extra garden sets from the original setting and gain the income by 330,313.49 baht as shown in *Table 5.2*

Table 5.1: Best Factor Level

Factors	Level	Definition
A = Pouring Height	-1	10 cm
B = No. of gates	-1	1
C = Snow powder quantity	-1	1
D = Solidification time	1	10 minutes
E = Aluminum Combination	-1	(18,2)
F = Gate Size	1	2x7 cm

Table 5.2: Income gaining

	Before	After	Difference	Difference (%)
Production time	6:01:41	5:39:59	0:21:42	6.00
Working hours/day	08:00:00	08:00:00	-	0
Working hours/year	2496:00:00	2496:00:00	-	0
Production/year	414.06	440.48	26.43	6.00
Price/set	12,500.00	12,500.00	-	0
Income (baht)	5,175,736.11	5,506,049.60	**330,313.49**	6.00

However, the new setting only applies to the chair's legs. If this experiment expands to the rest of the chair parts the income will likely increase.

5.2 Lesson Learned

There are a number of lessons that could be learned during the experiment. The first lesson is the sample size of the experiment. The experiment was run twice due to the sample size that was not enough for the first run. The second lesson is resulting from the result of the experiments which are conflict. The experiment results show effects of factors that are not consistent with some responses. The experimenter was then, used the total cost of rework to make the decision criteria for factor level selection.

5.3 Recommendation

For future development of this experiment, additional outsource factors, such as new type of green sand, aluminum alloy, and new casting methods, can also be used. This experiment concerned only the in-source factors that are currently implemented. To further develop the experiment, the test should be run for all products to reduce the overall production cost of the company. Factors that are unrelated to production should also be considered. These factors can be grouped into three categories: management/organization, workers, and facility. Rush orders can directly reduce the quality of products. Workers should get adequate training. They should not be working under too much pressure. The environment of the facility is also an important attribute to the quality of work and should be included in future experiment.