CHAPTER 8

CONCLUSION

8.1 INTRODUCTION

In recent years, most of the researchers have contributed mainly to increase the profit and to reduce the wastage of materials. This investigation is focused only on the cutting layout optimization using traditional and nontraditional techniques. Hence, in this research work, optimum cutting layout parameters for material utilization ratio is predicted by using the Response Surface Methodology of Stainless Steel of Grade 304.

8.2 CONTRIBUTION OF THIS RESEARCH WORK

The objective of the lock manufacturing industries is to achieve the economic utilization of sheet metal layout and reduce scrap. The need of increasing material utilization ratio is very important in the lock industry. Hence finding the influence of optimal cutting layout plays crucial role in cutting process. In this research work, an attempt has been made to carry out the optimal cutting layout under four different approaches such as Manual Nesting Process i.e., Vision Nesting, the Response Surface Methodology based on Plasma Arc Cutting had done to examine the significance between the process variables like bridge width, number of strips used, stock size. This approach comes under experimental cutting. The heuristic based nontraditional technique, i.e., Genetic Algorithm and Coordinate Optimization Techniques have been done with the help of software support. The following conclusions are derived based on this research work conducted.
• Cutting layout is prepared and the number of strips selected for this experimental investigation is useful for the lock industries.

• The optimal material utilization ratio and scrap ratio is dependent upon the selection of input process parameters.

• The optimum cutting layout was developed by using the traditional and nontraditional approach.

• The utilization of strips in the cutting layout achieves maximum by using the traditional approach such as manual method (70.12 %) and Plasma Arc Cutting (70.13 %).

• Nontraditional technique such as Genetic Algorithm and Coordinate Optimization Technique are successfully employed in the optimization of cutting layout for lock industry.

• Maximum Material Utilization Ratio is achieved by using the Nontraditional approach such as Genetic Algorithm (95.56 %) and Coordinate optimization technique (91.32 %).

• The experimental results are validated by comparing with previous research work.

This experimental investigation is valuable for the researchers to enhance the competence of the optimum cutting layout for further investigations useful for the lock industries. Based on the research work, it is found that nontraditional approaches such as Genetic Algorithm and
Coordinate Optimization Technique are very effective for optimum utilization of cutting layout and reduce the scrap ratio.

8.3 LIMITATIONS OF THE RESEARCH WORK

The limitations of the present experimental work is listed below and these limitations can be used for further investigations

- The present is focused only on the optimum cutting layout and other processes and materials were not discussed.
- Intelligent technique such as PSO, SA and ANN are not used for the selection of optimal parameter.
- Traditional approaches are time consuming process because of human intervention
- Skilled labor is requirement to prepare the layouts
- Sometimes the prepared layout may be disorganized one.
- Cannot find the solution at the bottle neck situations.
- There is no standard technique available to define a fitness function and it is the complete responsibility of the user to define it.
- An optimal solution heavily depends on the fitness function. Therefore it should be determined accurately.
- Sometimes premature convergence can occur. Therefore the diversity in the population is lost.
- Genetic Algorithm is moderately scalable because an increased number of variables can be accommodated by increasing the length of chromosome.
- Larger length of chromosome is potential combination of genes. This result in more time required to calculate fitness function.

8.4 SCOPE OF THE FUTURE WORK

Most of the research work has been conducted to optimize the process parameter leads to enhance the productivity and quality. Hence in this investigation, attempts are made to analysis the optimum cutting layout with higher MUR and reduce scrap. Based on the limitations concluded in the present investigation and the considerable possibilities of scope of the future work are given below.

- To include cutting parameters such as blank pressure, cutting force, material properties, etc., may enhance the prediction rate.

- Cutting speed, gas pressure and arc current response also to be considered for profile cutting operation.

- This work is utilized the contribution of RSM with GA only for prediction of responses. So this can be extended to other intelligent modeling techniques such as Neural Network and Fuzzy Logic (FL) in order to obtain the fine results.

- This work is used for input parameter such as the bridge width, sheet size and number of strips but in future the material properties such as hardness, tensile strength, etc. may be added as input process parameters to increase the production rate.