

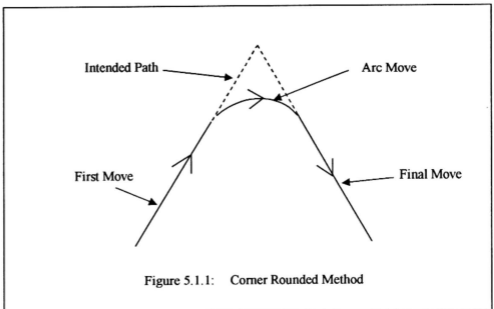
CHAPTER 5

CONCLUSION

5.1 Summary

A CO₂ laser cutting program with user friendly graphical user interface has been developed to assist in the cutting process. The program includes some important functions such as Click and Move features, Database, 2D CAD, Real Time System Setup, and profile cutting experimental modules.

A rounded corner algorithm is written to cut a sharp curvature without abrupt stop of any axis. A fillet arc is joined between two linear segments as shown in Figure 5.1.1. The advantage of this method is that uniform speed can be maintained throughout the move. The drawback is a rounded corner instead of a perfect sharp curvature. It is recommended that this method be used to cut turning angles not exceeding 30° because the heat affected zone is quite large when cutting at angles less than 30°.



5.2 *Suggestions for future studies*

It is suggested that the CO₂ Laser Cutting program be improved further on the functions and features such as error control and the CAD portion. A 3D cutting program is recommended. Study of spline move might improve the cutting program. For the CAM part, the moves should be stored in arrays and each move should be easily modified by the user. Besides, path planning algorithm should be studied extensively for industrial profile cutting. The software architecture can be improved by writing more functions for general use to minimize repetitive source code.

For cutting curvature less than 30⁰, methods such as the overshooting method which gives time for the workpiece to cool before the next move is executed should be used. Studies should also include the combination of arcs, curve and linear segment of sharp curvatures. Cutting curvature using workpiece with more than 3mm radius is expected to be better (less heat affected zone). System tuning including the gain and following error should be carried out frequently so that a sharper curvature is obtained.

For laser cutting quality, the problem of initial cut should be improved by super pulsed power supply if possible. If not, beam chopping method with different delay times and frequencies could be carried out for a reasonably acceptable cutting quality.