CHAPTER 7.0 : CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

In this study, physical properties and mathematical manipulations such as Finite Element Methods have been utilized to obtain responses and data concerning the behaviour of the system in a quantitive and structured manner.

The results of this study have indicated that the draw punch design is reliable and will not fail under static loading in the normal operating conditions. Responses from three different failure theorems namely, *Maximum Normal Stress Theory*, *Maximum Shear Stress Theory* and *Distortion Energy Theory* clearly establishes the fact that the draw punch is stable and reliable under static loading. The maximum deflection under the peak loading is 0.0111 mm.

However, this draw punch has a finite life due to dynamic stresses. All stamping activities are associated with dynamic stresses and responses from the dynamic analysis have indicated that the maximum number of loadings are 1,989,352 strokes. This draw punch must be replaced just prior to the maximum number of loadings during predictive maintenance activities.

Most of the failures due to dynamic stresses are due to fatigue failures which are caused by repeated stress cycles. It is important to replace the affected component before it fails as the breakdown maintenance will have a negative impact on the product cycle time and involve high maintenance cost. Currently many tooling components fail while in service as the life span of the components are not known.

These conclusions have been obtained without the necessary fabrication of prototypes to test the draw punch under the real and actual operating conditions.

7.2 Recommendations

Future research should be directed at verifying the results obtained in this study. This can be accomplished by testing several prototypes of the actual draw punch under the real operating conditions.