

Chapter 7

Conclusions

This chapter provides a summary of the research presented in the earlier chapters. It further includes several recommendations for future research related to structural vibration prediction.

7.1 Summary

The vibration isolation effects of various mounting systems in a locomotive cab were studied in a laboratory environment. Experimental results were used in conjunction with an analytical formulation to predict the isolation effects of the mounting systems.

The cab was set up in a dedicated facility on four airbags to isolate it from the floor. Isolation of the cab from the sill structure was accomplished by six elastomeric mounts at the base of the cab and at the crash posts. The mounts at the base were selected such that they could support the static weight of the cab and offer good lateral and longitudinal stability.

Observation and emulation of the field data led to the excitation input to the baseline cab. Upon establishing the baseline cab, acceleration measurements were taken at various locations throughout the cab by piezoelectric accelerometers. A 16-channel data acquisition system was used to collect and save the acceleration data.

The collected experimental data was used along with an analytical model of the structure to generate structural vibration predictions. Vibration predictions of the cab and sill substructure were then compared to actual experimental results.

The test results from the analytical model approximations proved to have a strong correlation with experimental results. Vibration approximations of locations outside the cab had a higher correlation to experimental data than the points inside the cab.

7.2 Recommendations for Future Research

The tests conducted throughout this research indicated that, overall, the analytical process is effective in predicting structural vibrations. Possible future research in this area include validating the simulation approach on another structure, preferably one simpler than a locomotive cab, and establishing other methods that can be used to predict the effect of various soft mounts.

The possibility of improving the results of the analytical process can be attained by adding another layer onto the modeling scheme used for this research. In other words, to improve the results for points within the cab, the impedance characteristics due to all four mounts should be included into the model. Therefore, to predict the structural vibration of points within the cab in terms of velocity, the effects of all four elastomeric mounts will be taken into account.