



Validation Process for Vehicle Low Frequency NVH CAE Model

Jin Kwan Suh

Won Yong Lee

Hyundai Motor Company



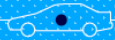
Abstract

Through a multi-year project, Hyundai Motor Company and MSC Software co-worked to build a full vehicle CAE model for low frequency NVH analysis.

CAE-test validation process which was taken will be introduced from component level to full vehicle level.

Validation results for components and trimmed body include frequencies, MAC's, and frequency response functions.

For full vehicle, tactile and acoustic responses will be compared.








Workscope

- Create modeling guidelines for MSC.NASTRAN in-line with best practices.
- Perform component level analysis (and test) to ensure a quality finite element model to be used in Trimmed Body.
- Perform trimmed body level analysis to ensure a quality finite element model to be used in Full Vehicle.
- Perform full vehicle level analysis.







Body Components

- BIW 
- Steering Column 
- Seat 
- Front & Rear Door 
- Front & Rear Chassis Frame 







Trimmed Body NVH

- Trimmed Body Assembly 
- Trimmed Body Normal Mode 
- Trimmed Body Point Mobility (V/F) 
- Trimmed Body Acoustic Sensitivity (P/F) 



Full Vehicle

- Full Vehicle Assembly 
- Full Vehicle Normal Mode 
- Idle Shake & Boom 
- Road Noise 



Conclusions

- Components :
 - High MAC's are achieved in components except doors.
- Trimmed body :
 - Modes are difficult to be identified.
 - Agreement in P/F is worse than V/F.
- Full Vehicle :
 - Load definitions proved to be reasonable.
 - Simulation model can be used to assess proposed design changes for improving full vehicle responses.