SEA Modeling

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SAE®

COMET® ACOUSTICS

Outline

- Verification of full vehicle predictive SEA model with P/P measurements in **ENS**, TINS, tire patch, as well as with the measurements of dyno tests at 30/70 mph on smooth rolls, 25/40 mph on rough rolls.
- Sound package study – dash insulator & carpets.
- Design iteration
- Template based modeling

SEA model

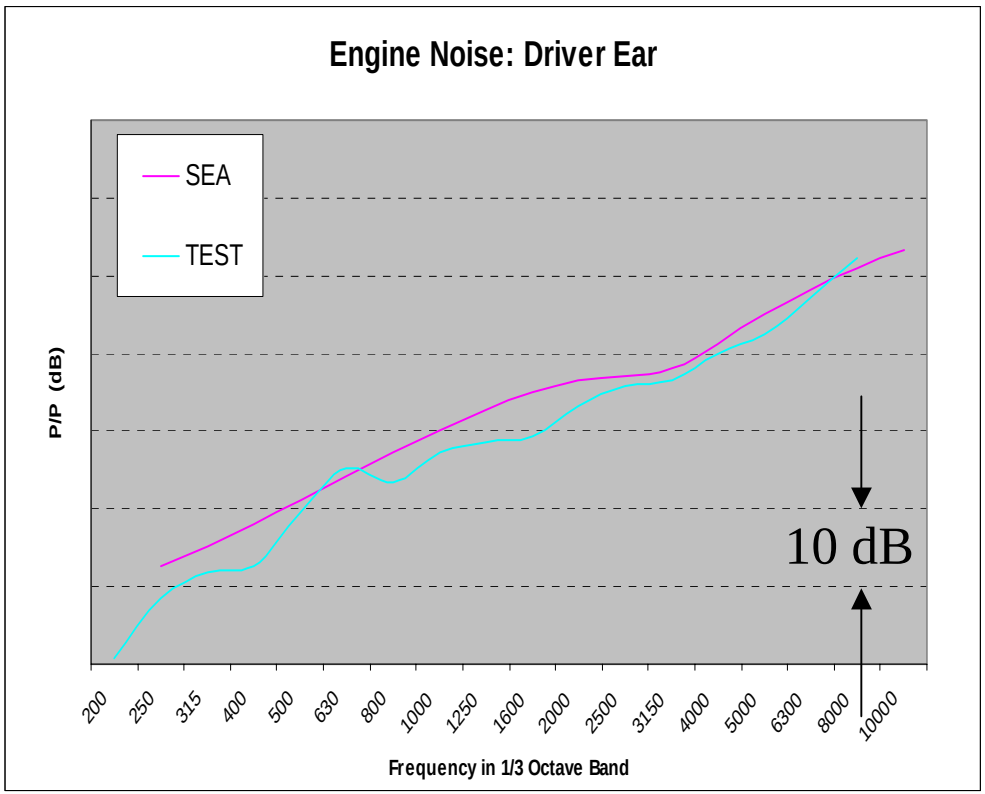
- Subsystems – total number of subsystems ~ 500.
- Materials – total number of material models ~200
- Junctions – total number of junctions ~2000

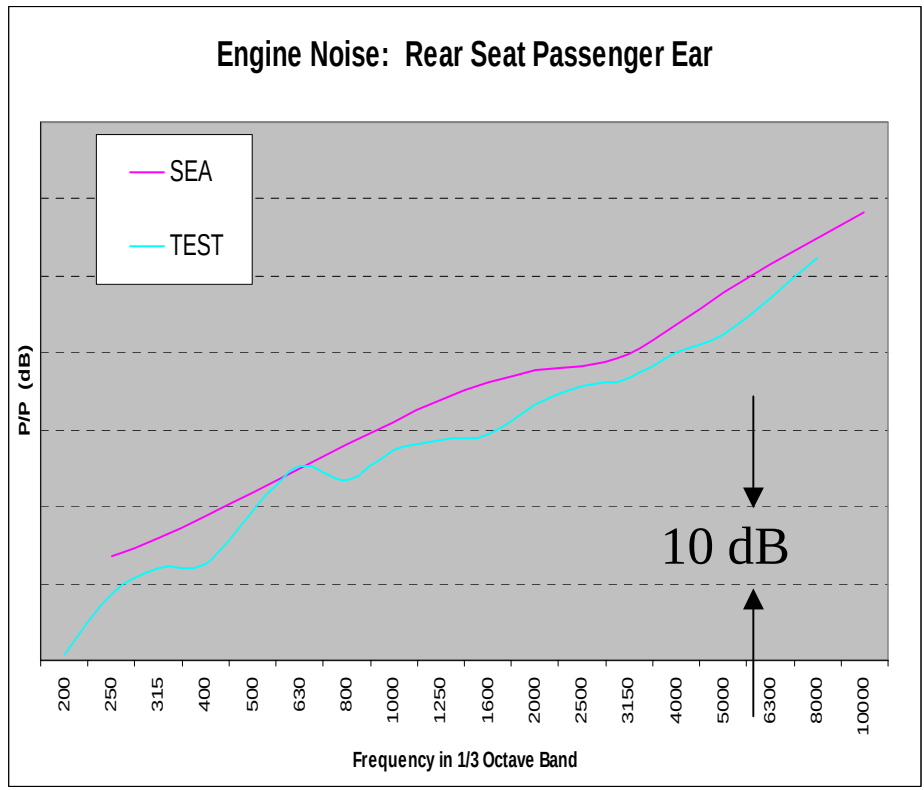
- Correlation loading cases – **ENS**, TINS, tire patch and chassis dyno smooth/rough rolls:

  smooth rolls: 30, 70 mph

  rough rolls: 25, 40 mph

Engine Noise: P/P Comparison of SEA Model and Measurements

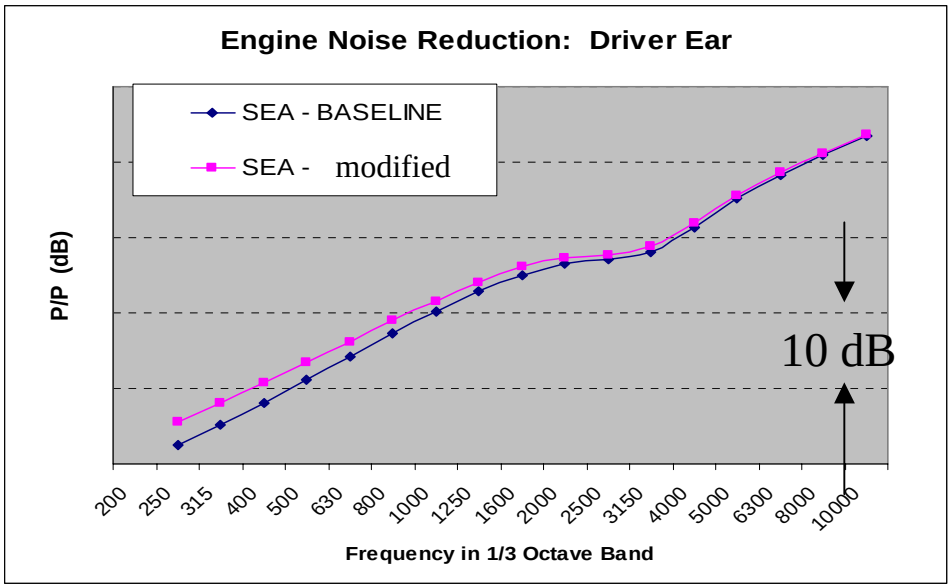


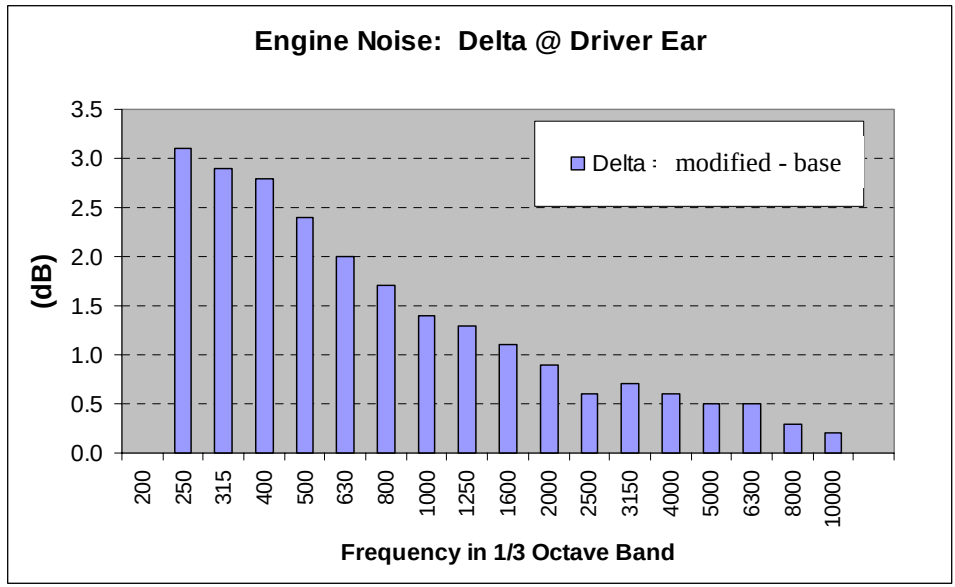


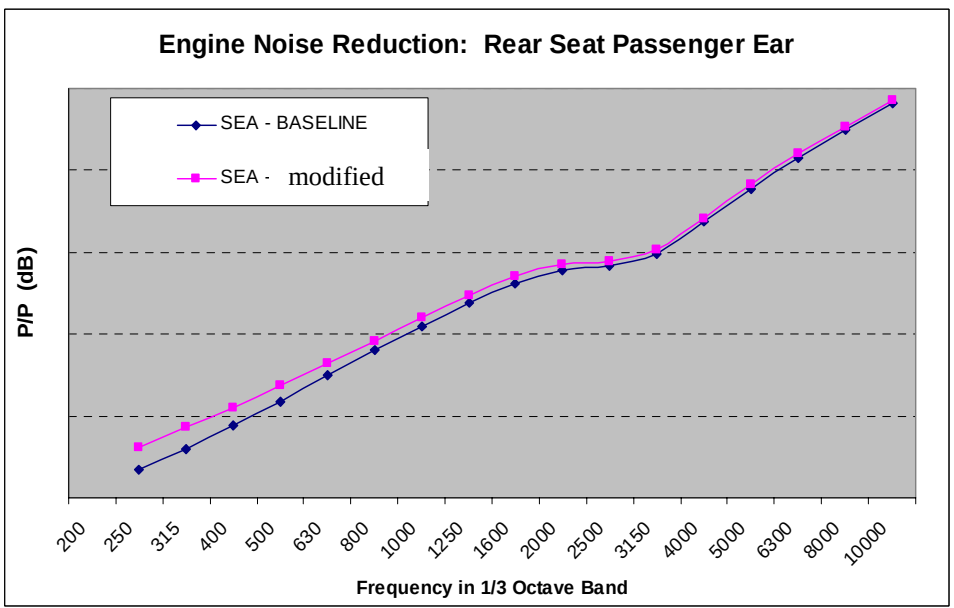
Sound Package Study - Engine Noise

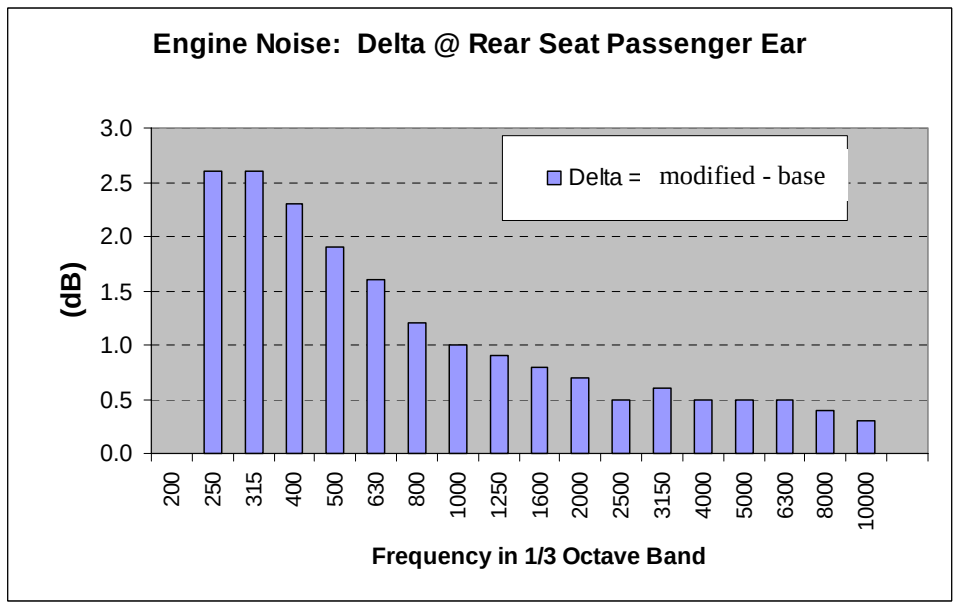
- Dash insulator – decoupler + barrier
- Carpets – decoupler + barrier + fabric surface

Example: Changes of Dash Insulator & Carpets

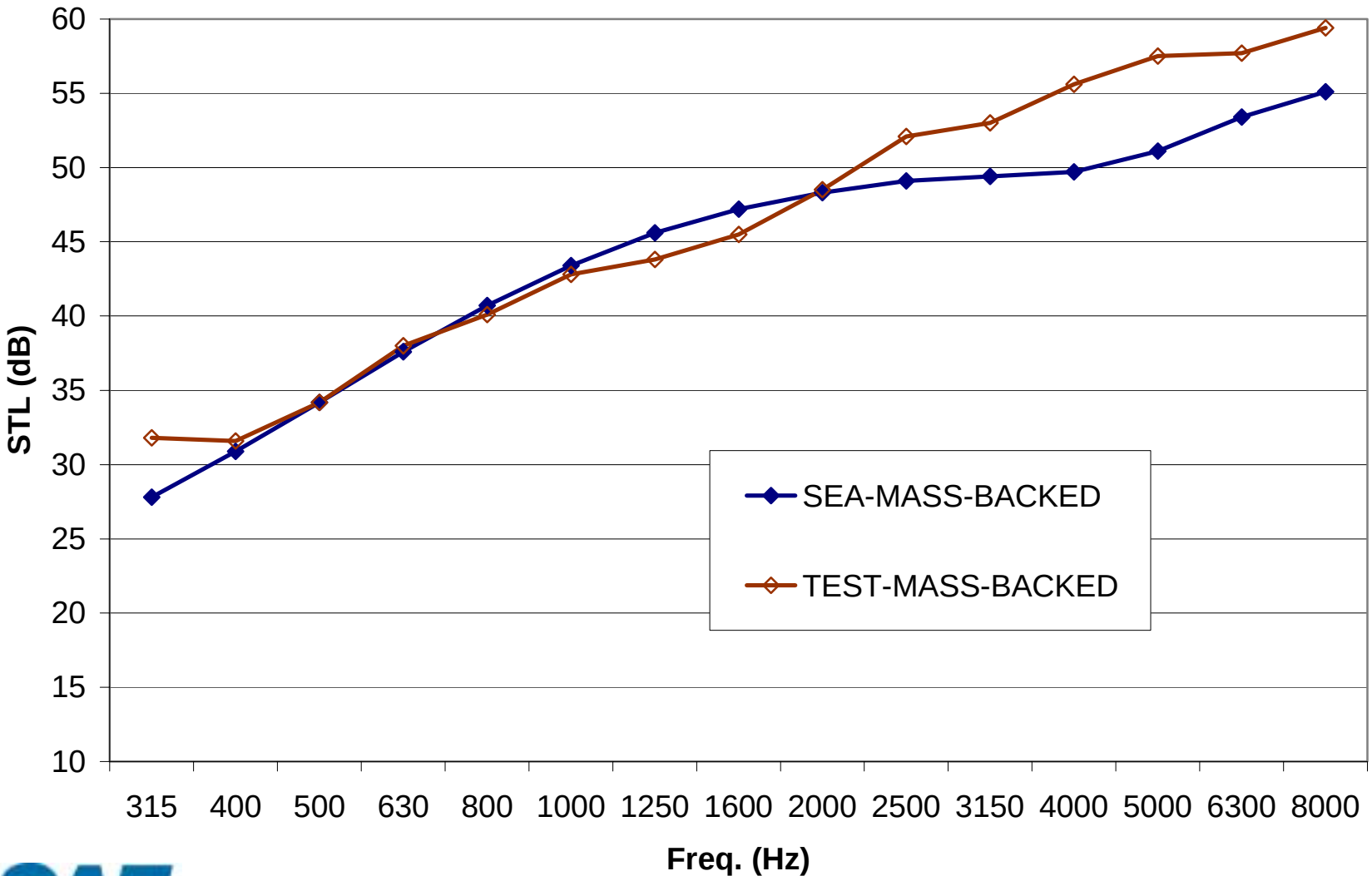




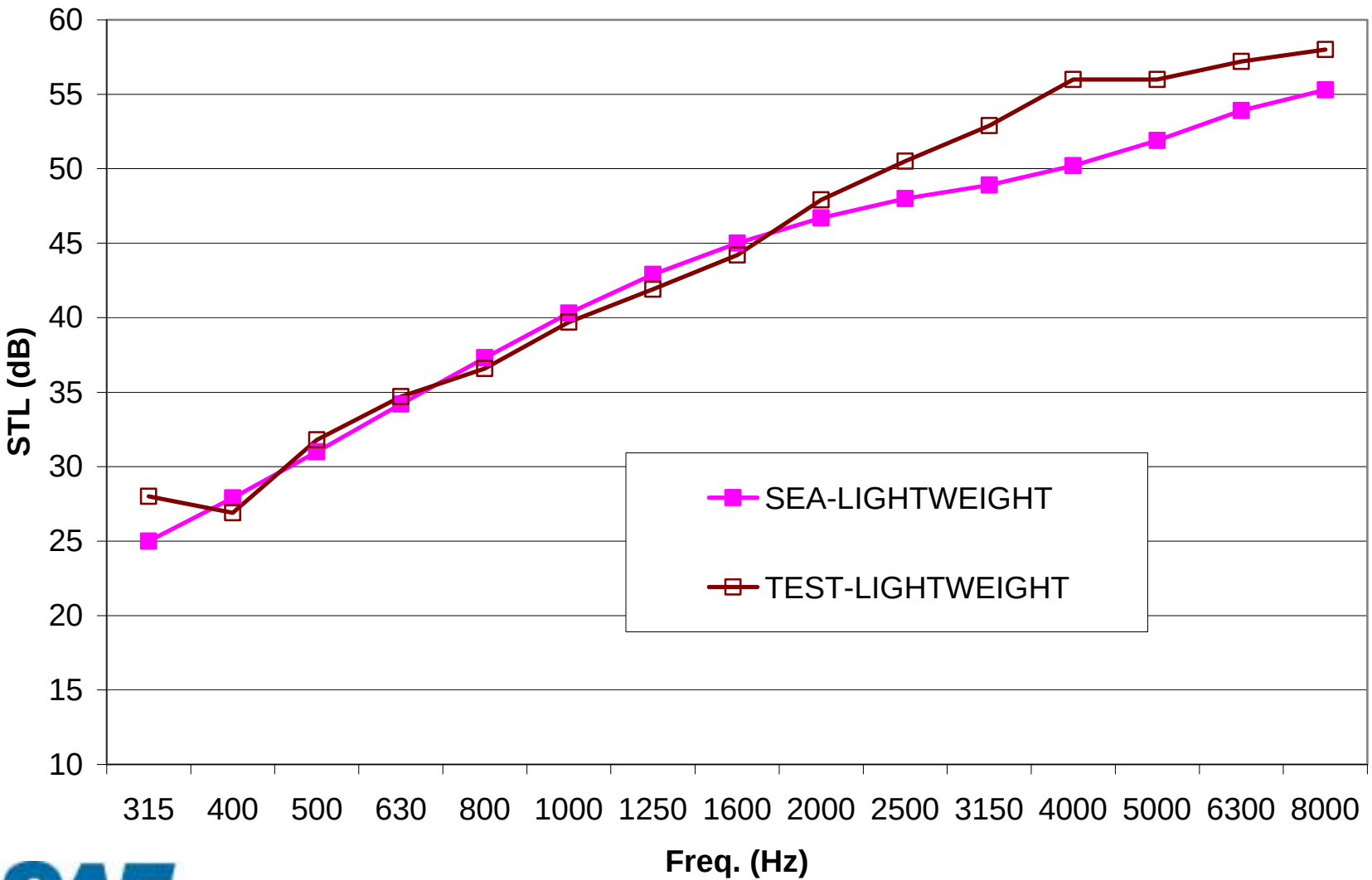




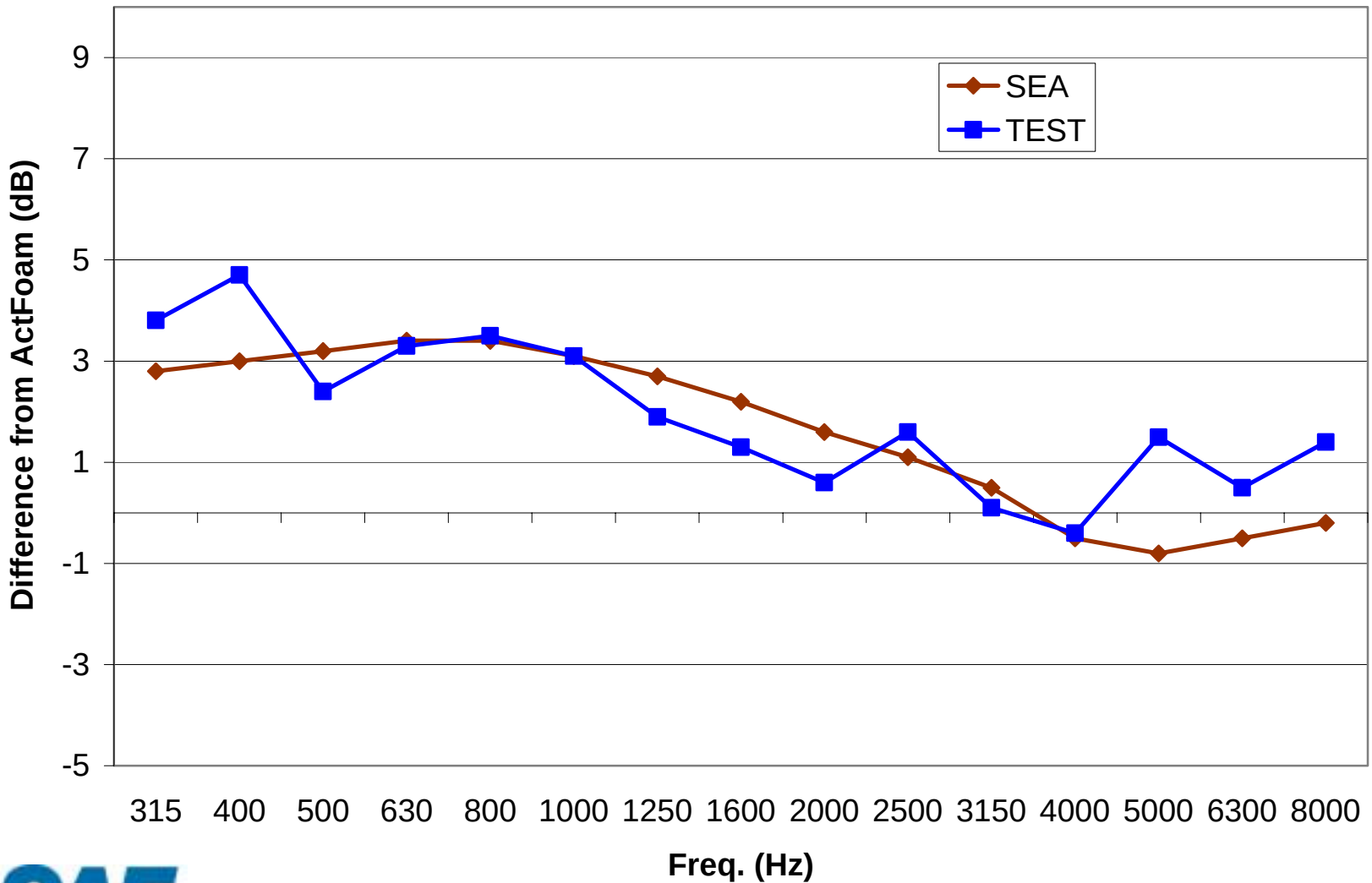
Sound Transmission Loss of Dash



Sound Transmission Loss of Dash



Performance Delta

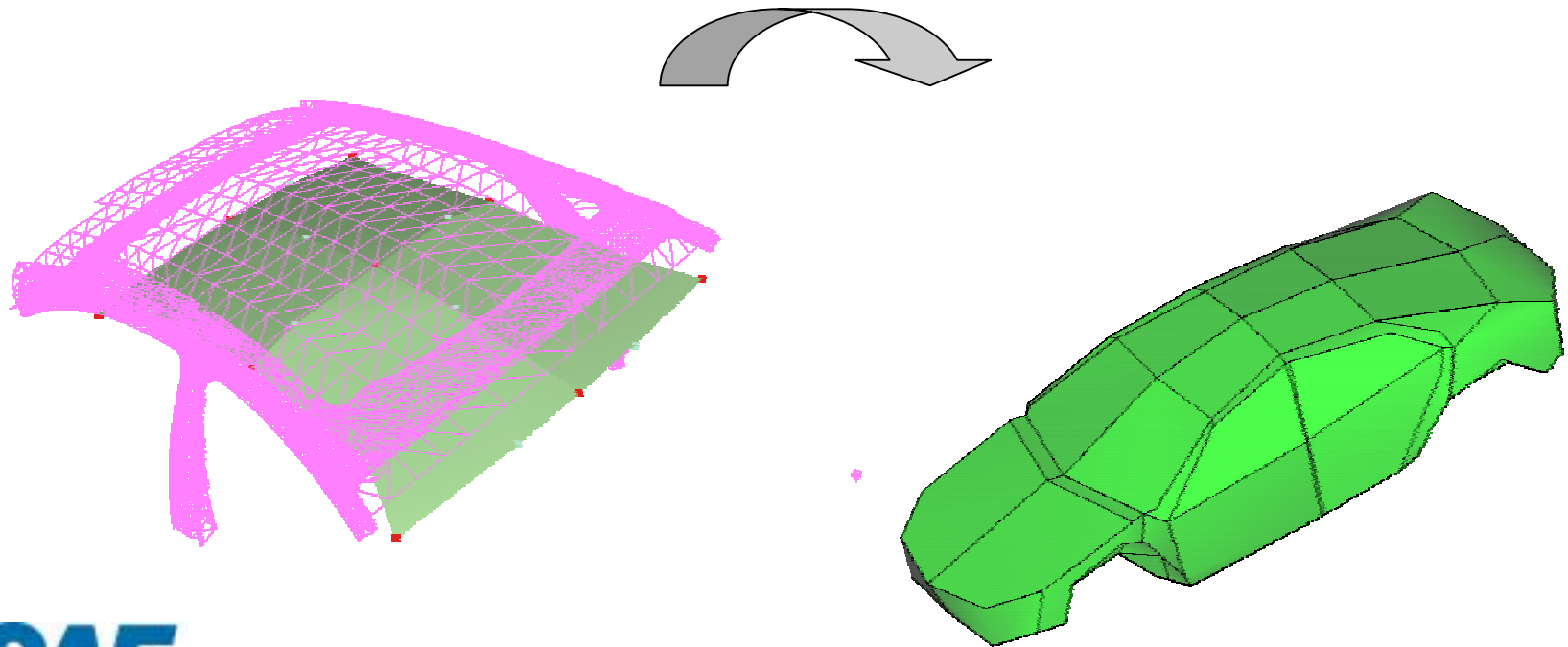


TEMPLATE BASED MODELING

- Full Vehicle Template
  - Capture Interior Cabin Space
  - Accurately Simulate Exterior Sound Field
- Detailed Subsystem Templates
  - Capture Details of Vehicle Structure
  - Accurately Predict STL and Absorption Coefficient

MORPHING PROCEDURE

- Morphing applied to subsystem templates
- Changes propagated to full vehicle model



Conclusion

- SEA predictive model is quite good and reasonable.
- Suitable for studying design iterations.
- Template based morphing allows faster, more reliable models.