

*We have one goal — improving the noise and vibration quality of our customers' products. Roush delivers innovative, effective noise and vibration control solutions. By combining advanced analysis capabilities, comprehensive engineering services, and state-of-the-art facilities, Roush has become a proven partner in identifying and resolving challenging noise and vibration issues. Backed by the diverse capabilities of the Roush family of companies, we are uniquely equipped to provide turnkey noise and vibration solutions.*

*Roush... your silent partner in developing smoother, quieter products.*

## Vehicle Sound Package Development

Roush Noise and Vibration Engineering is staffed with skilled and experienced technical experts who tune the acoustical insulation products in the vehicle to enhance sound quality, while minimizing cost and weight. By employing systematic diagnostic test methodologies along with specialized instruments, software and facilities, the Roush team assesses the acoustical insulation requirements of the vehicle in quantifiable terms. This, along with analytical modeling, enables Roush Noise and Vibration Engineering to prescribe insulation products which are tailored to achieve the vehicle acoustical targets which are sought. Roush validates the effectiveness of the sound package components by fabricating the insulators, installing them in the vehicle and testing.

### Develop Effective Acoustical Insulators

- Test material and insulator performance
- Model material and insulator performance
- Tune material and insulator characteristics to enhance performance
- Design insulators which yield optimal performance and comply with packaging requirements

### Vehicle Insulators Investigated

- Hood Insulators
- Headliners
- Engine Side Dash Insulators
- Carpet Insulators and Floor Mats
- Interior Dash Insulators
- Damping
- Interior Wheelhouse Insulators
- Exterior Wheelhouse Insulators
- Package Tray Insulators
- Door Insulators
- Body Static and Dynamic Seals
- Upper and Side Cowls
- Hush Panels
- Trunk Trim and Insulation
- Fender-to-Cowl Insulators
- Door Trim and Insulation
- Rear Quarter Panels and Insulators
- Pillar Trim and Insulators
- Tunnel Insulators
- Heat Shields and Under Body Insulators



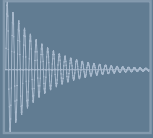
Jury Sound Quality Evaluations



Hemi-Anechoic Test Chamber



Vehicle Dynamometer Studies



## NOISE AND VIBRATION ENGINEERING

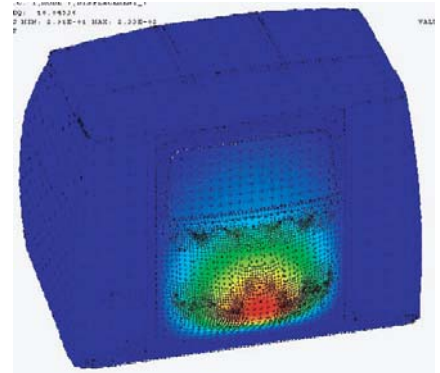
Roush Noise and Vibration Engineering is adept at balancing the airborne attenuation of each insulator in the vehicle sound package to achieve the acoustical targets you seek. Their close association with a wide variety of acoustical insulator suppliers allows Roush to apply the latest technologies in developing and designing optimized vehicle sound packages. In addition, their long history with damping products enables Roush Noise and Vibration Engineering to strategically locate damping on body panels to attenuate structurally excited low frequency acoustical phenomena.

### Vehicle Sound Package Test and Analysis Tools

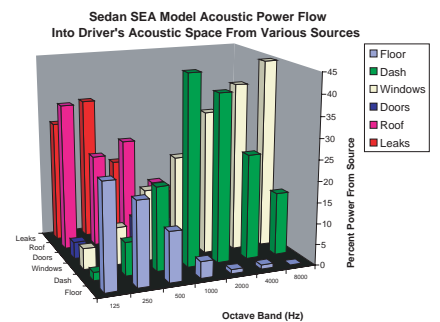
- On-Road Studies
- Wind Tunnel Studies
- Chassis Rolls in a Hemi-Anechoic Chamber
- Aachen Head HMS III Data Acquisition System
- Sound Quality Analysis with ArtimiS Software
- Reciprocity
- In-Cab Reverberant Decay
- SEAM & AutoSEA Analytical Modeling
- SAE J-1400 Sound Transmission Loss
- Large Reverberant Chamber ASTM C-423
- Apamat
- Alpha Cabin
- Intensity
- Laser Vibrometry
- Damping
- Impedance Tube
- Vehicle Air Leakage
- Boundry Element Analysis (BEA)
- Finite Element Analysis (FEA)
- Near Field Acoustical Holography (NAH)



The Latest Sound Quality Tools



Boundary Element Analysis



Statistical Energy Analysis



Intensity Studies

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