



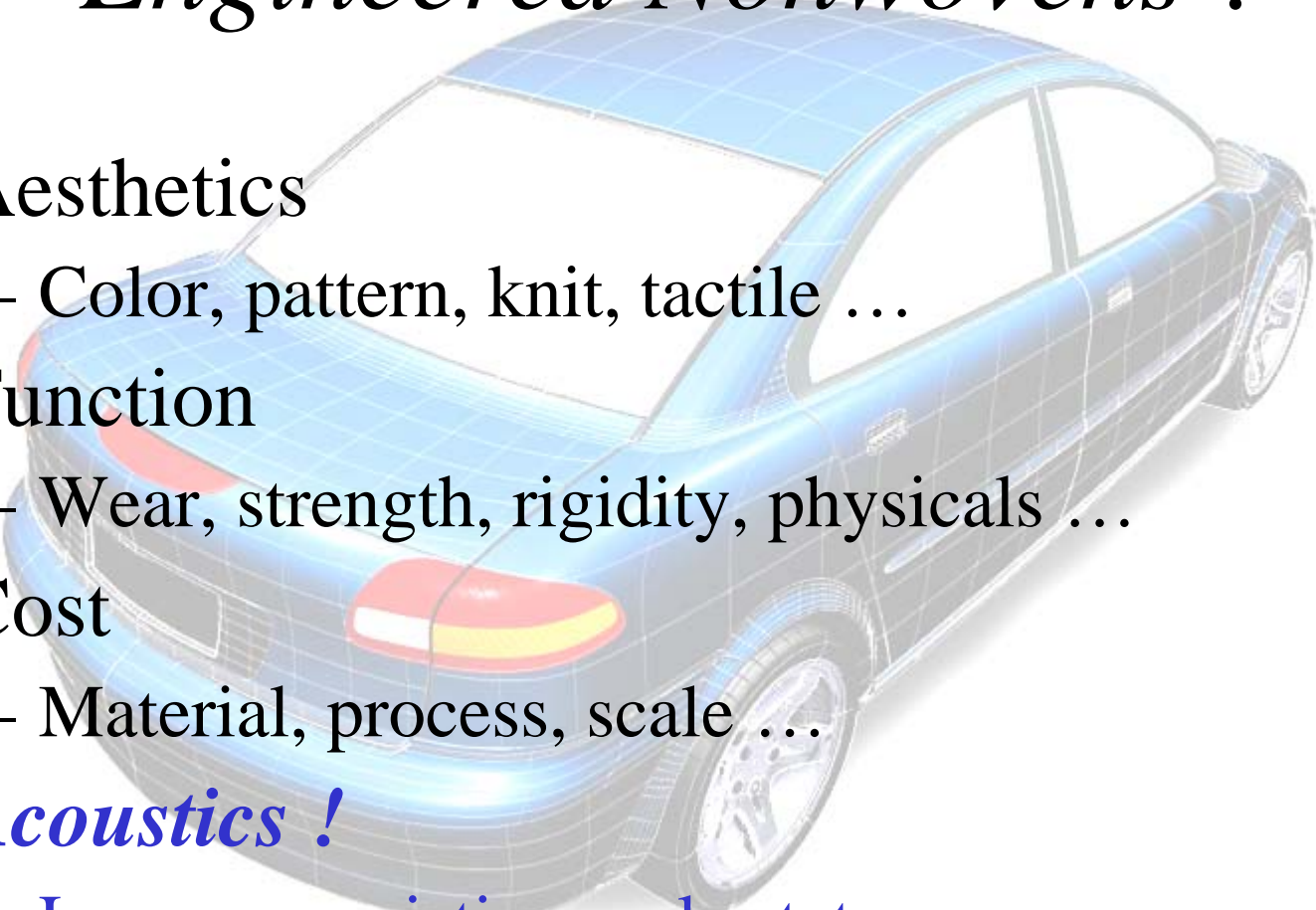
*Acoustic Influence of Nonwoven
Fiber Products in Automotive Interiors*

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“*Engineered Nonwovens ?*”

- Aesthetics
 - Color, pattern, knit, tactile ...
- Function
 - Wear, strength, rigidity, physicals ...
- Cost
 - Material, process, scale ...
- ***Acoustics !***
 - Leverage existing real estate



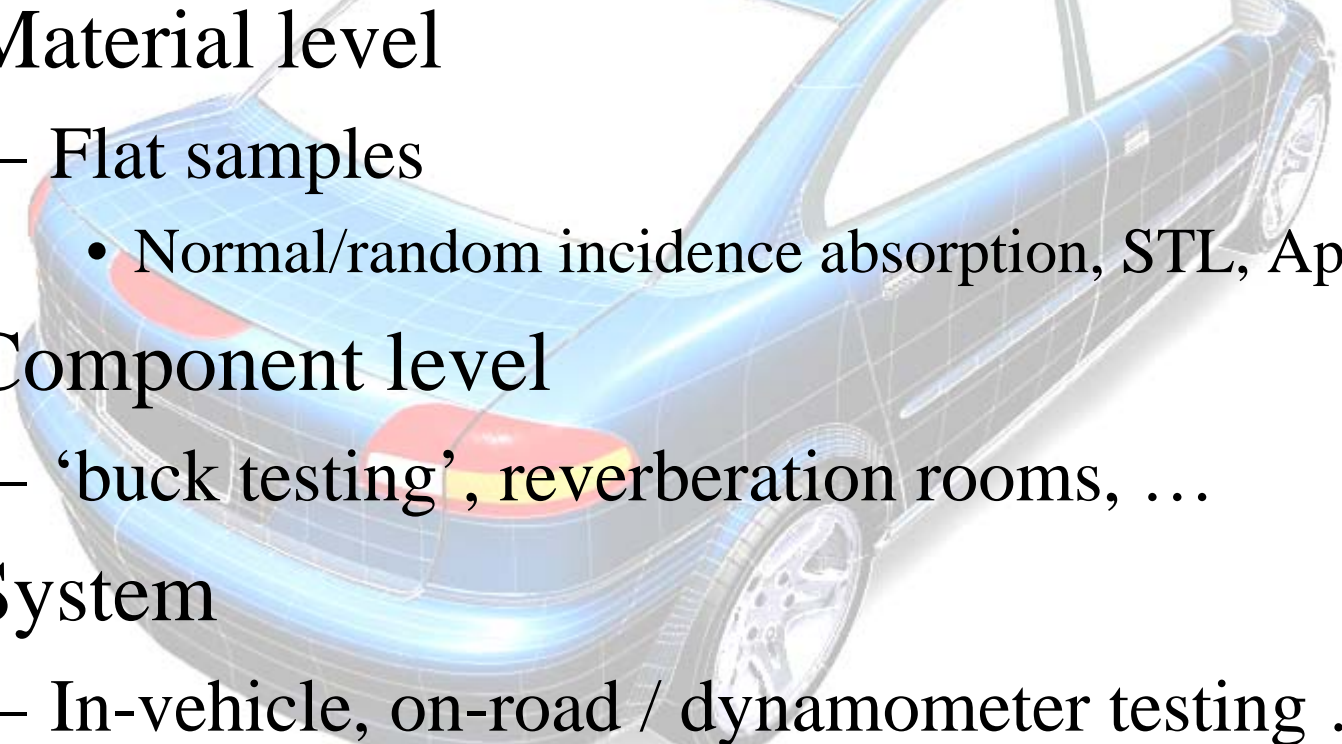
Existing *Real Estate*

- Typical 4 door midsize car interior

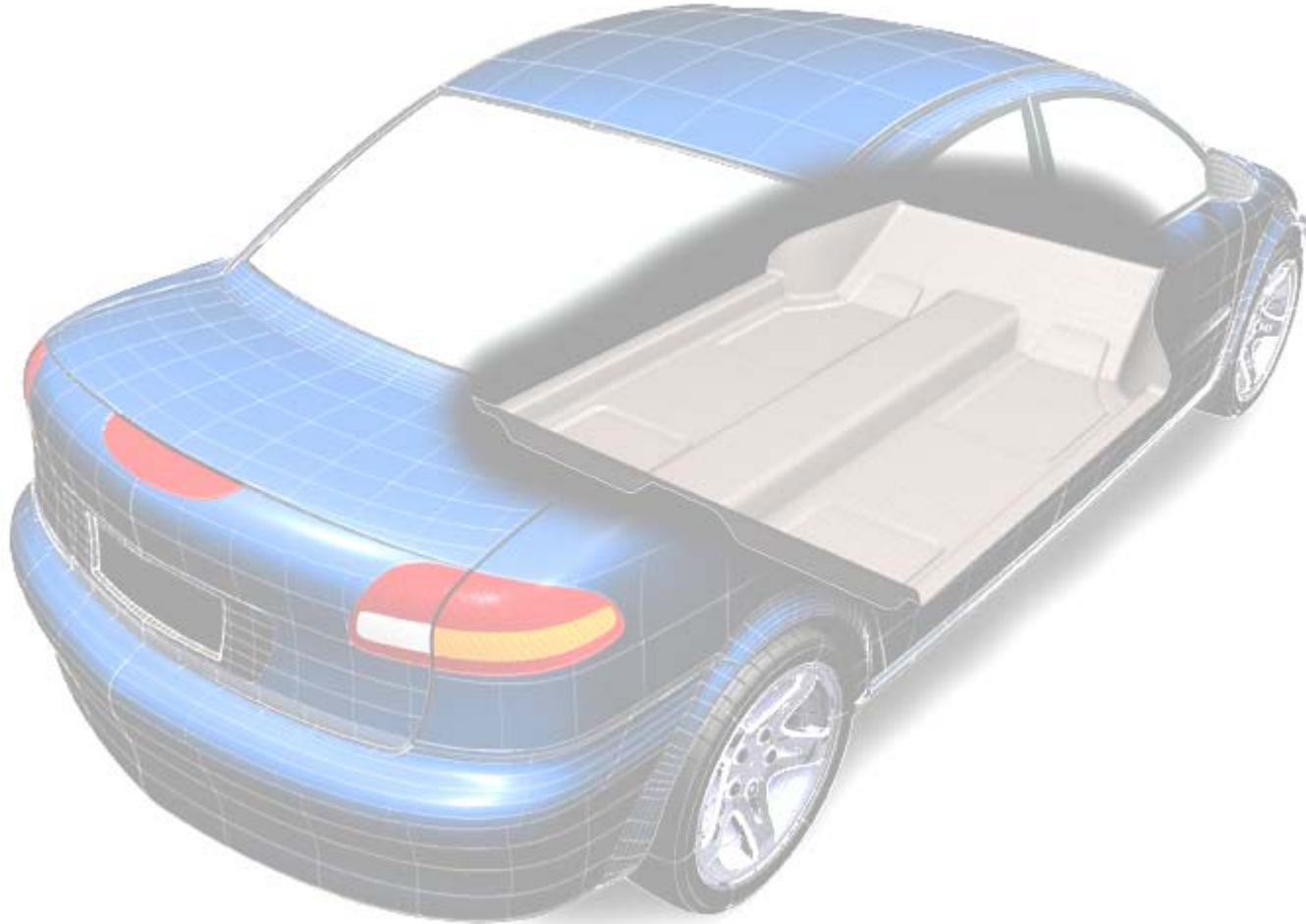
Component	Area (%)	
Dash Insulator	8.90%	✓
Carpet	13.30%	✓
Headliner	6.80%	✓
Seats	21.30%	✓
Package Tray	3.30%	✓
Total 'absorptive'		53.60%
All Pillar & Rocker	10.90%	✓
IP	6.70%	✓
Door Trim	11.30%	✓
Door Glass	5.50%	
Windshield	6.30%	
Backlit	5.70%	
Total 'reflective'		46.40%

✓ : Total potential
Nonwoven influence ~ 82%

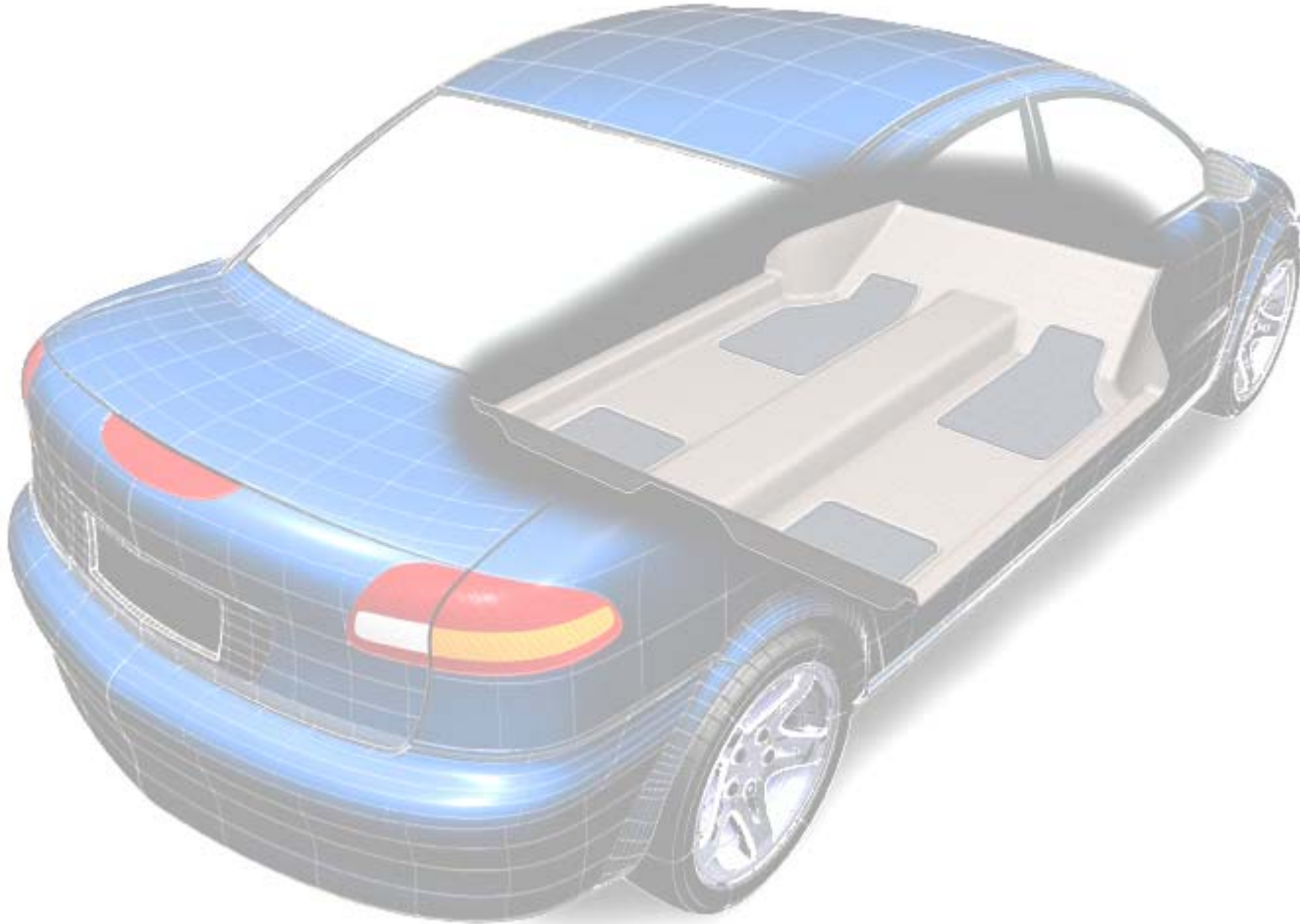
Acoustic Optimization

- Material level
 - Flat samples
 - Normal/random incidence absorption, STL, Apamat ...
 - Component level
 - ‘buck testing’, reverberation rooms, ...
 - System
 - In-vehicle, on-road / dynamometer testing ...
- 
- A blue car is shown from a rear three-quarter view, overlaid with a semi-transparent blue grid. The car's body panels are highlighted with red and yellow colors, indicating areas of interest for acoustic optimization. The grid is composed of small squares, and the car is positioned in the center of the slide.

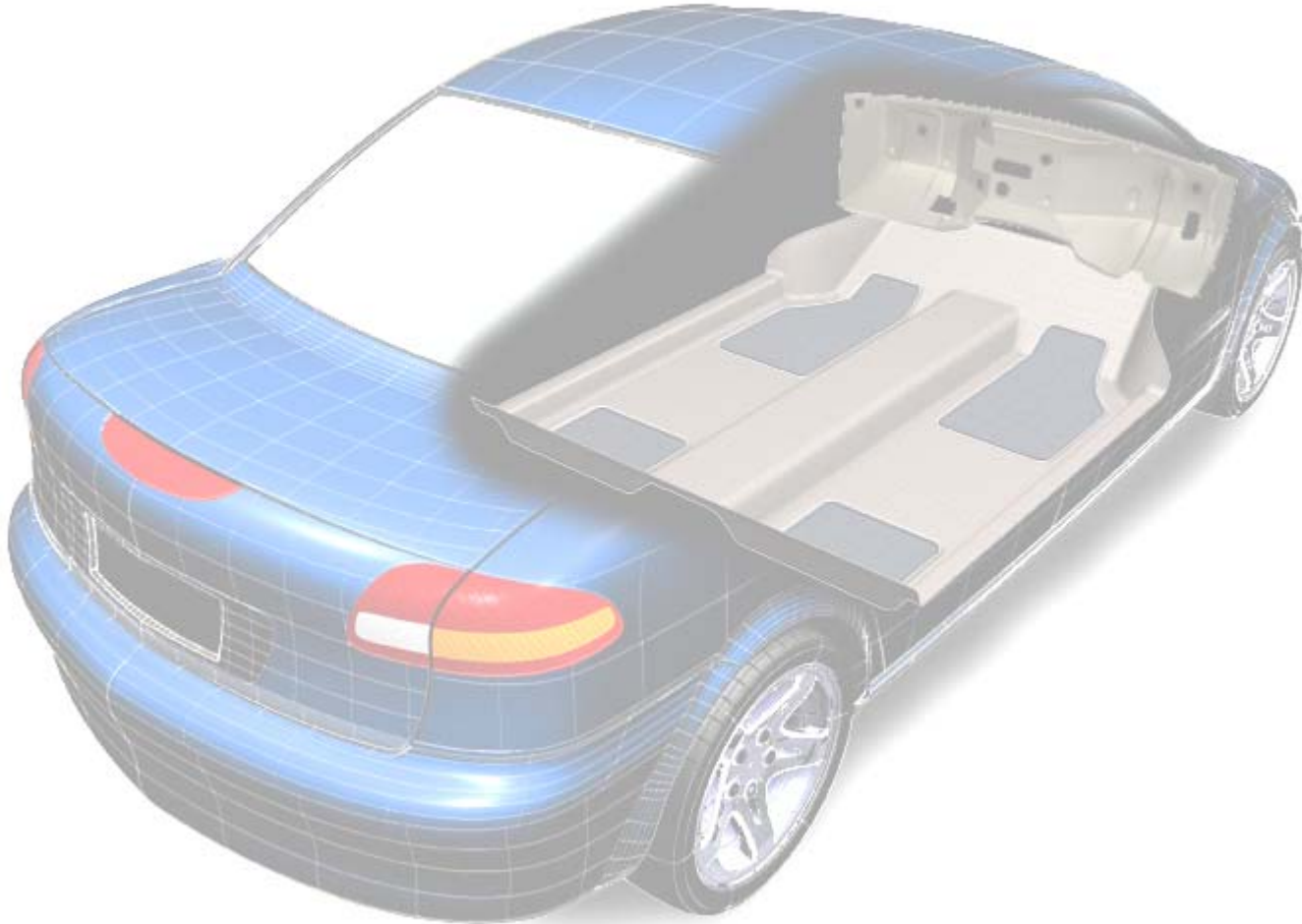
Carpet



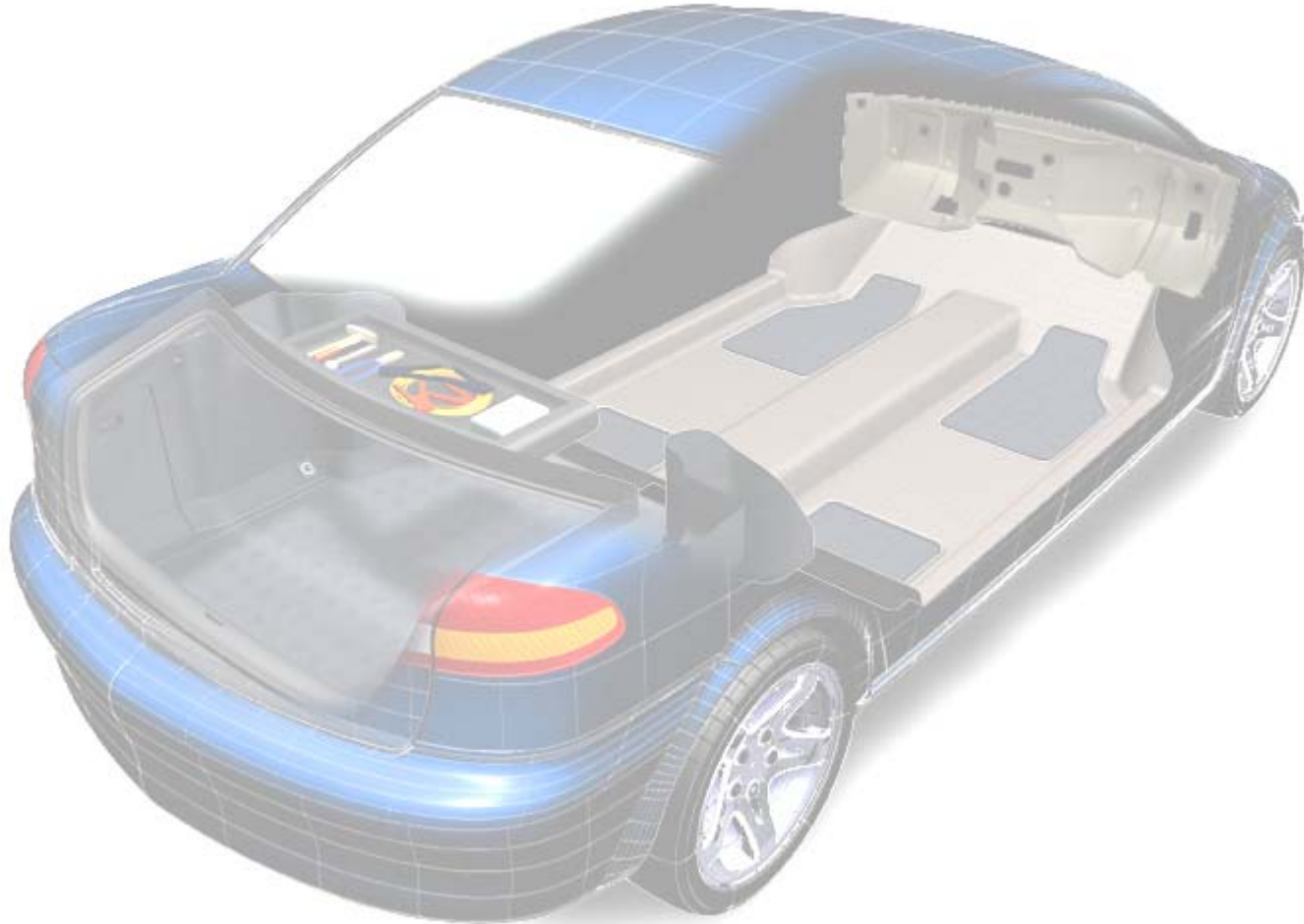
Floor Mats



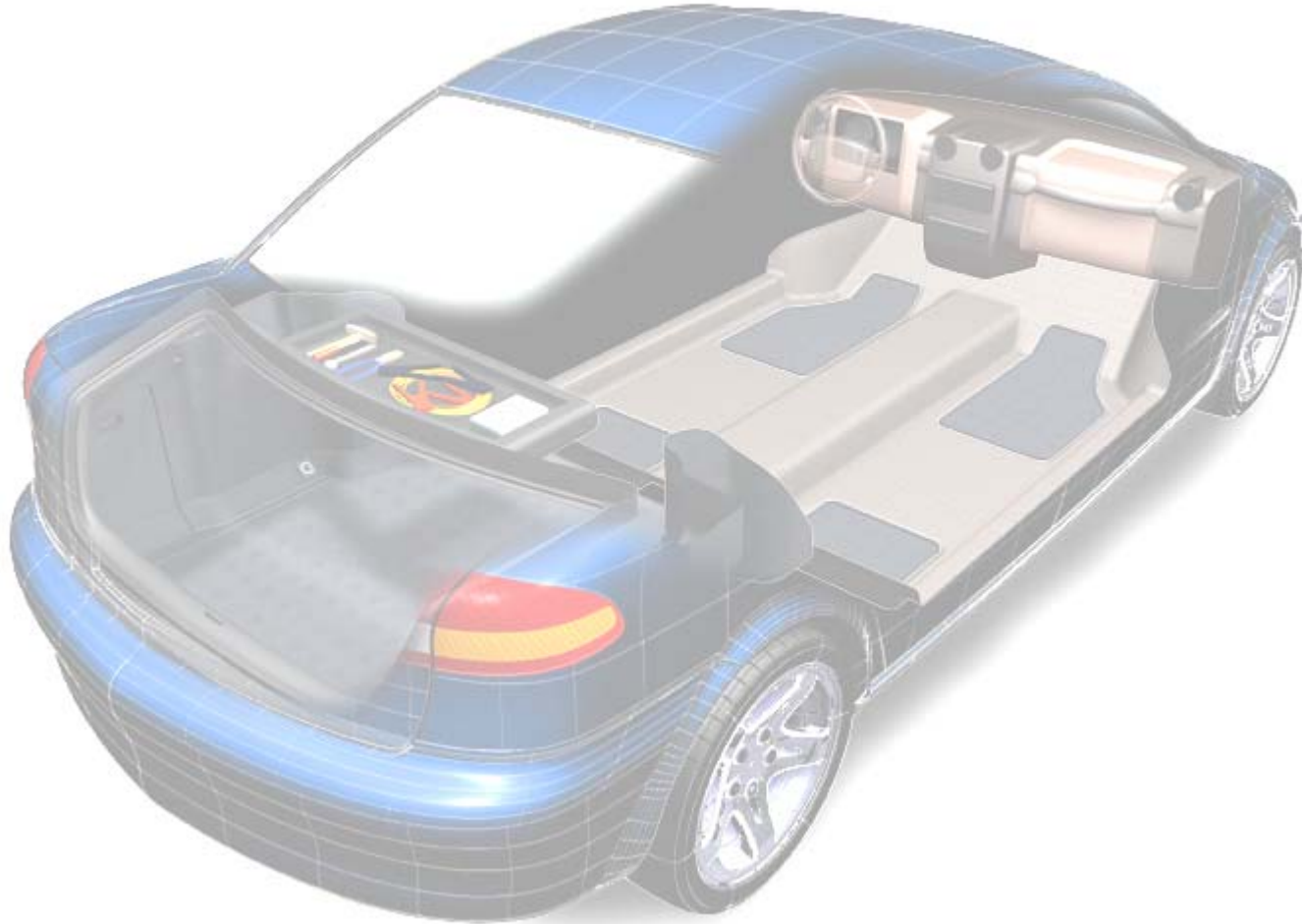
Dash Insulator



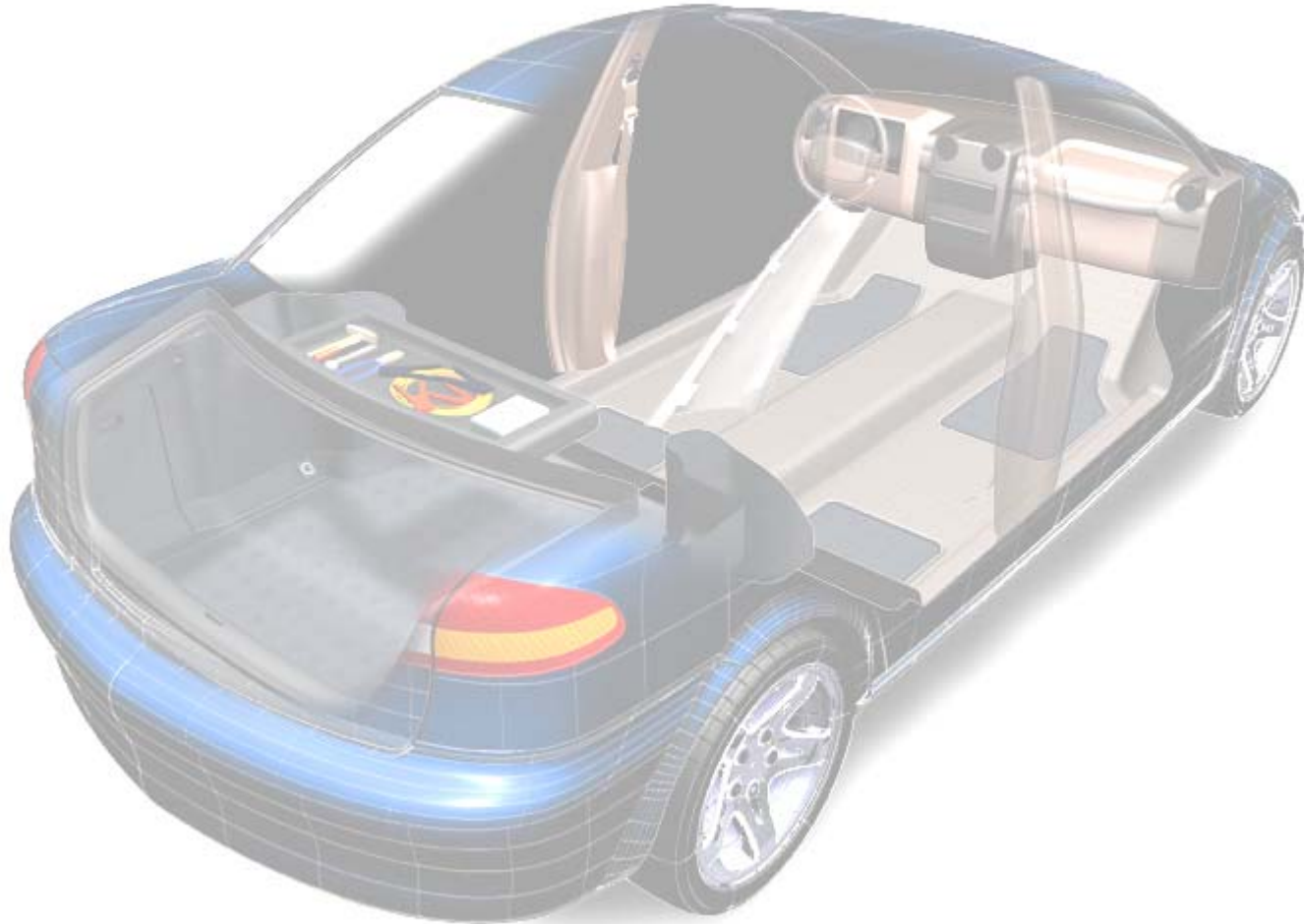
Trunk Mats



Cockpit / I/P



A / B / C Pillars



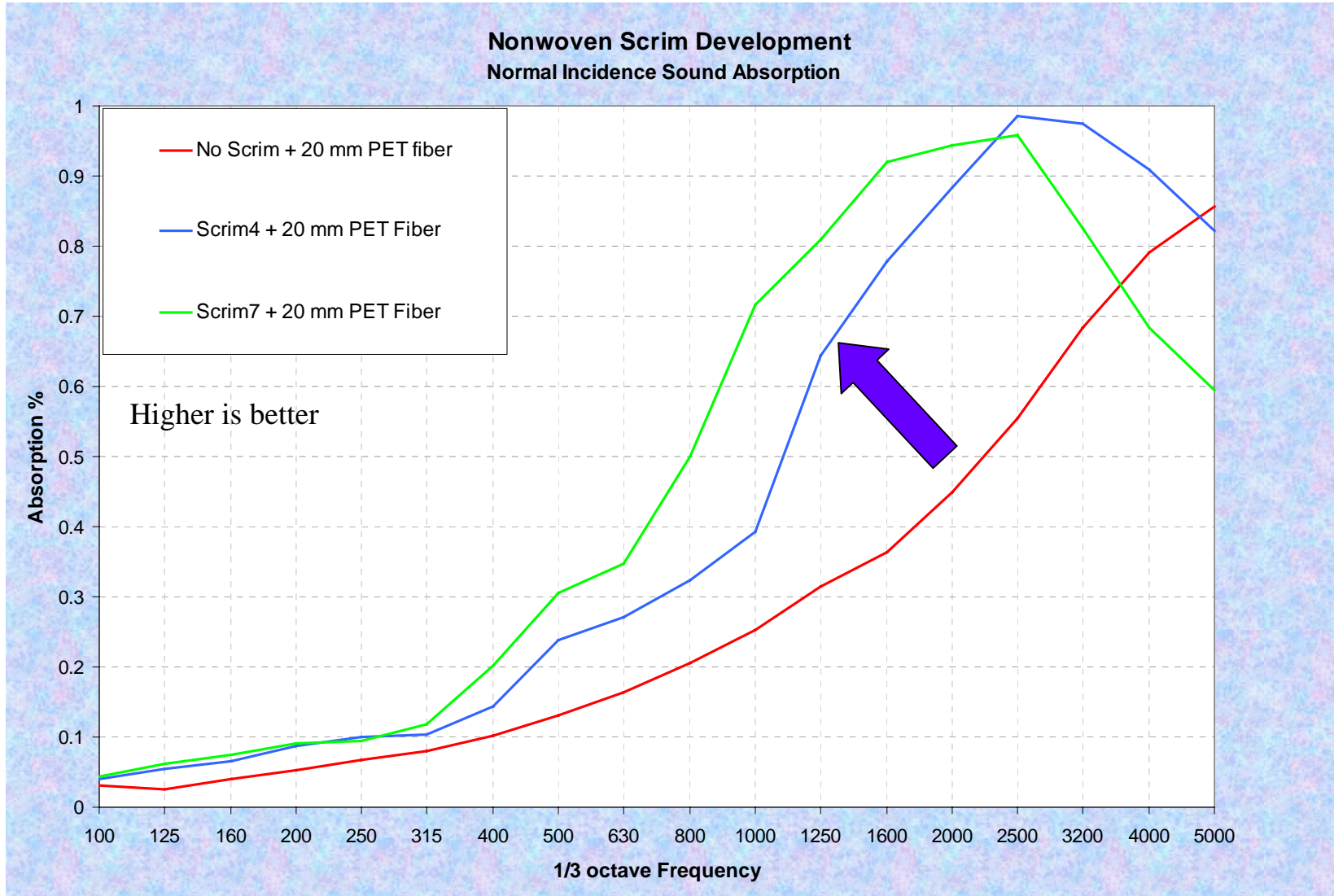
Door Trim



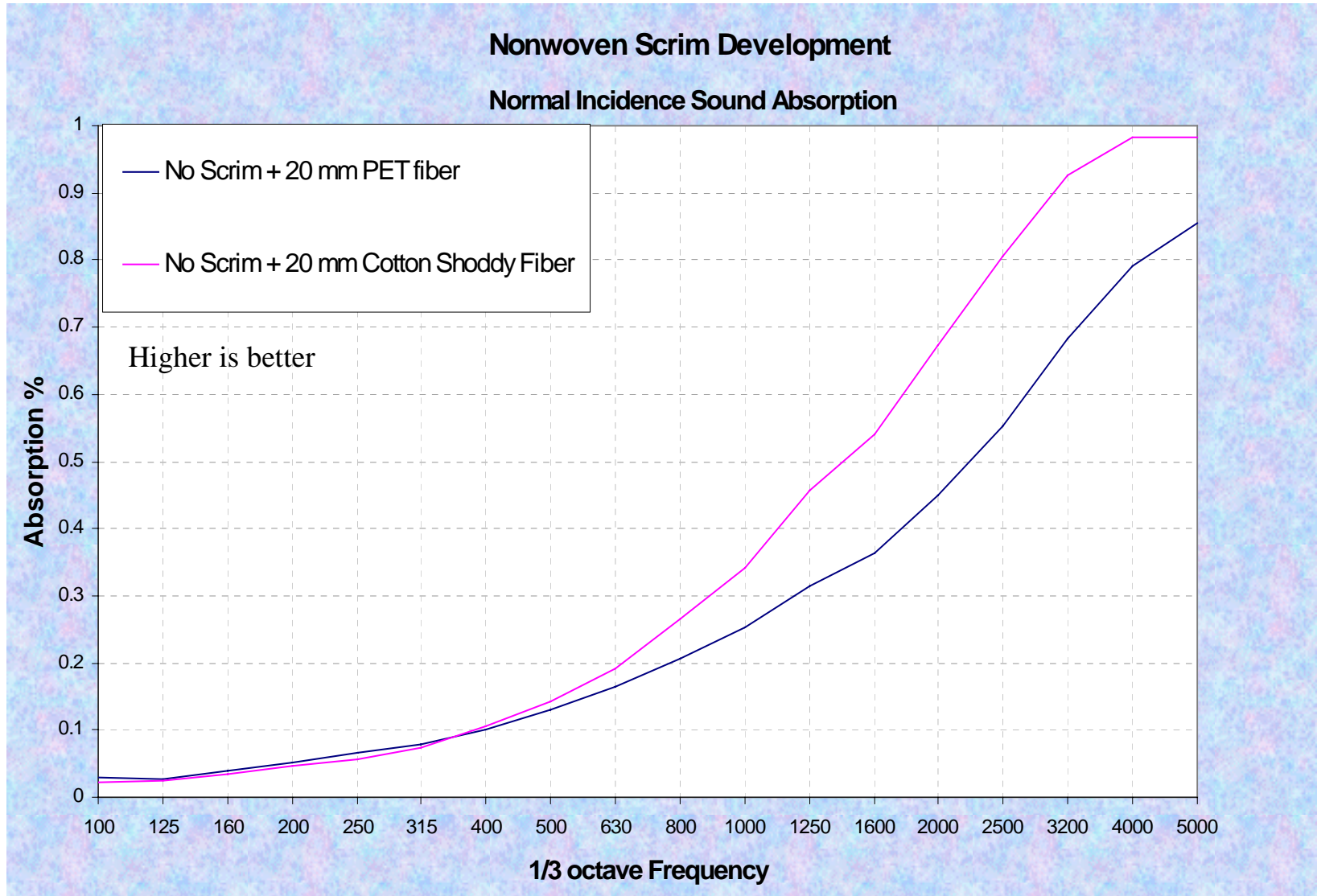
Package Tray



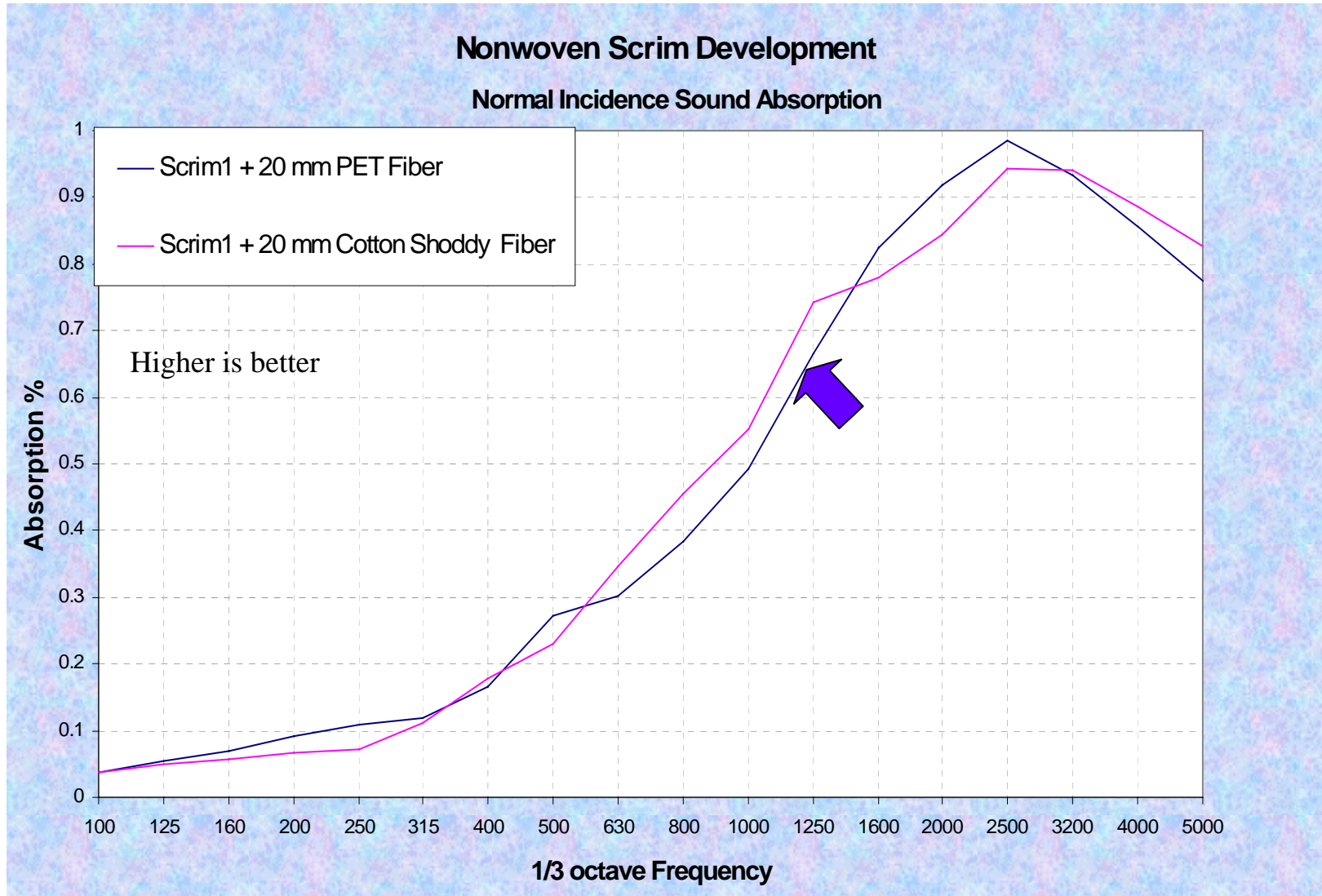
Influence of Nonwovens : Material Level



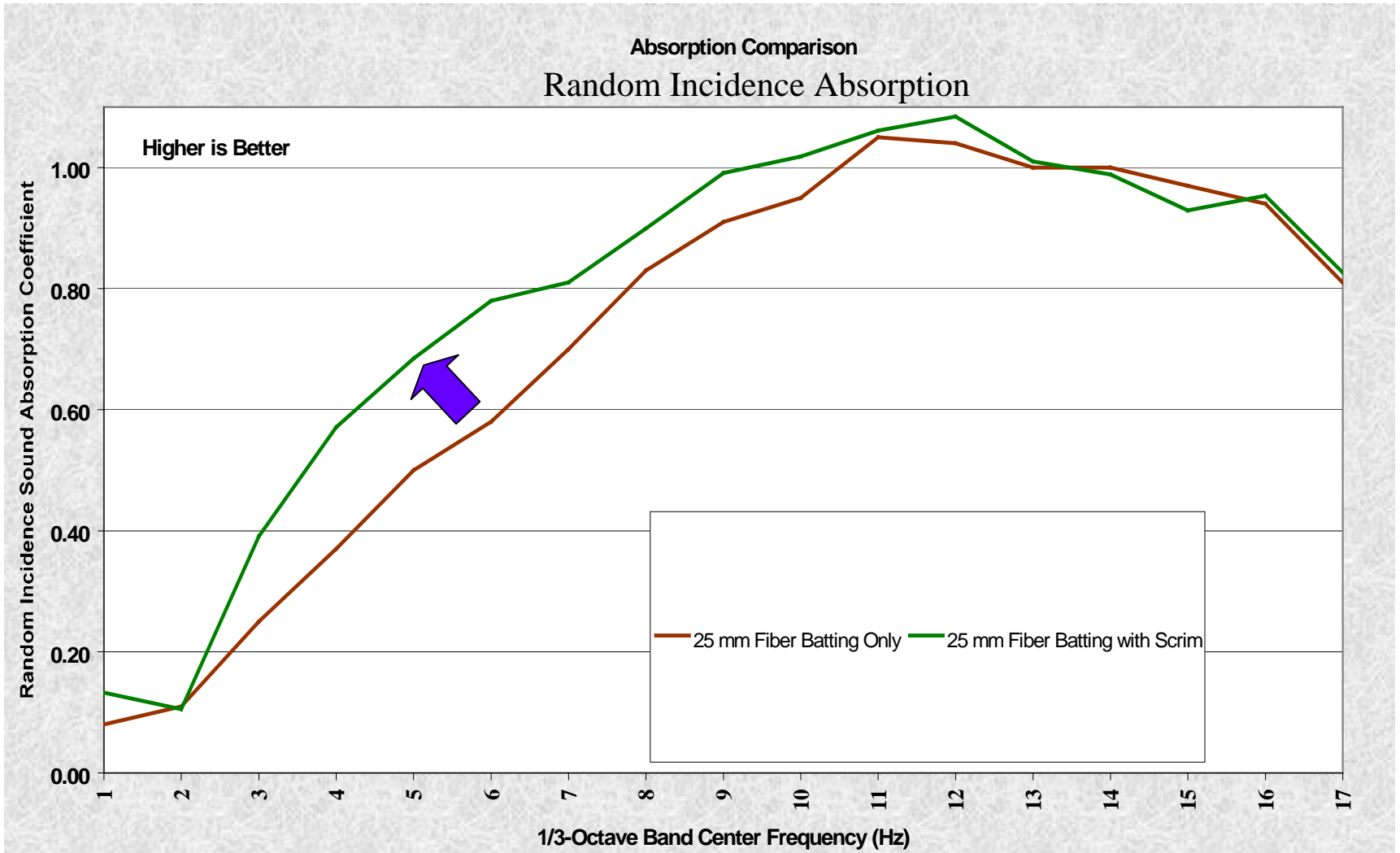
Influence of Nonwovens : Material Level



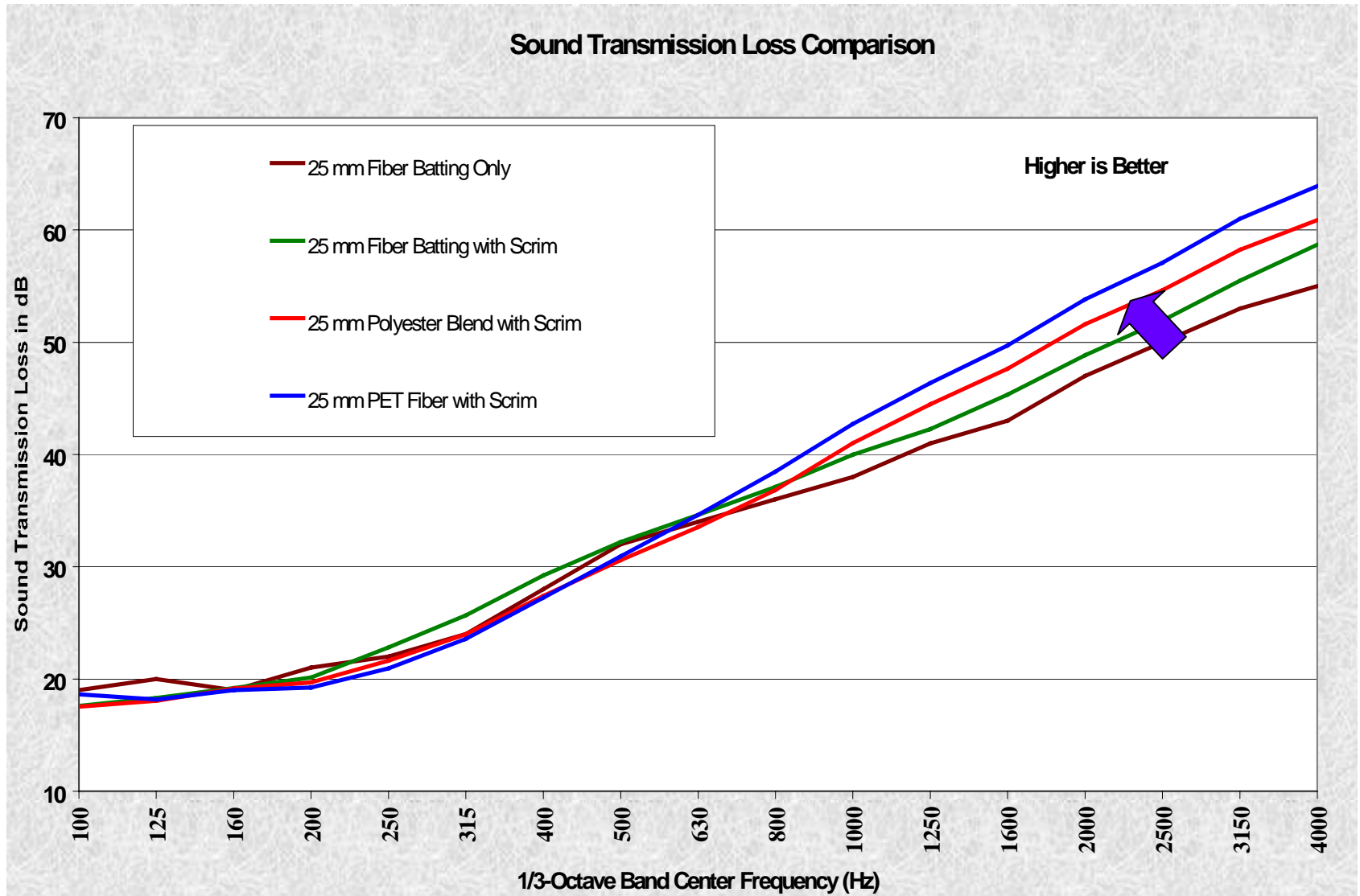
Influence of Nonwovens : Material Level



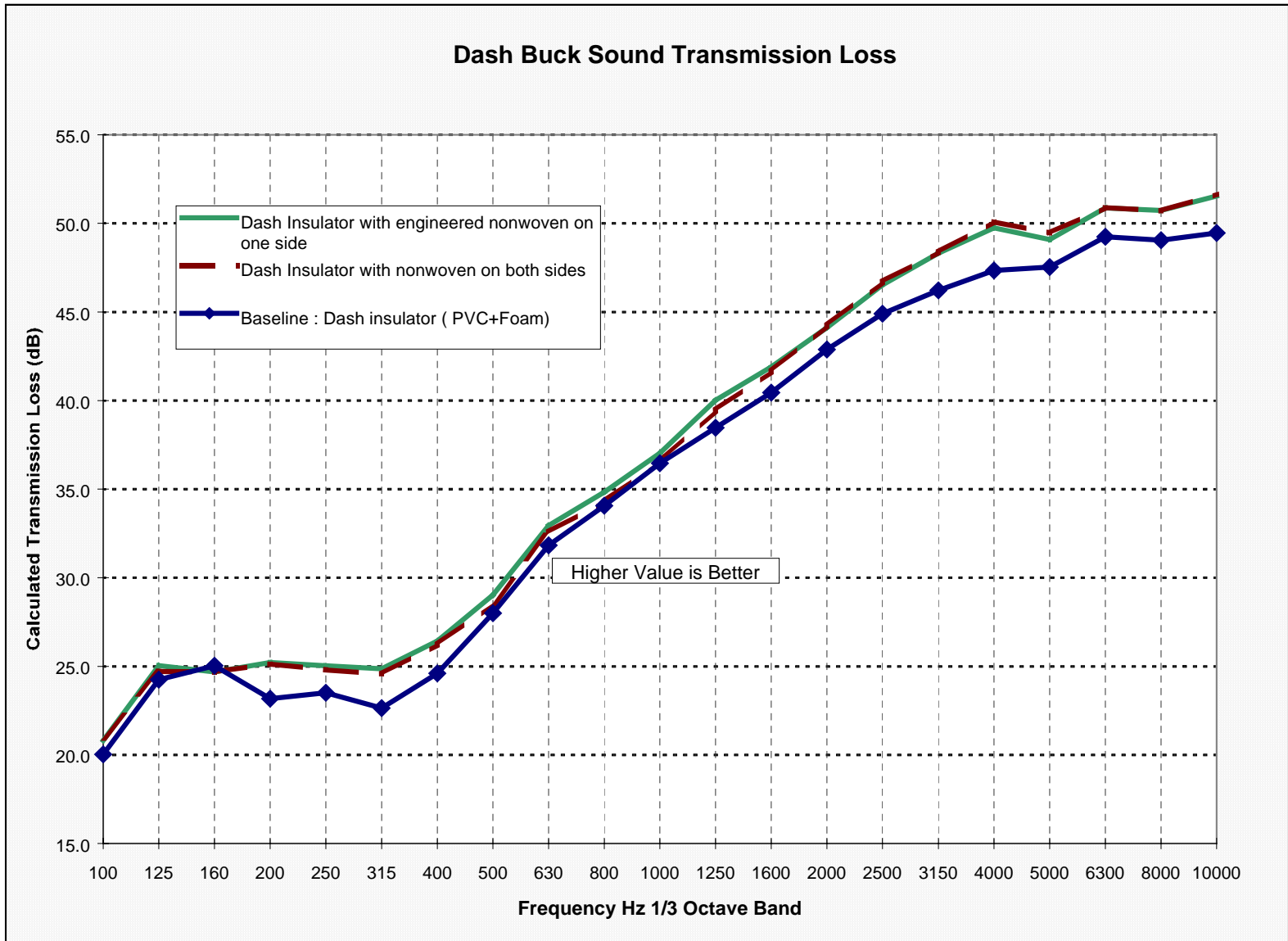
Influence of Nonwovens : Material Level



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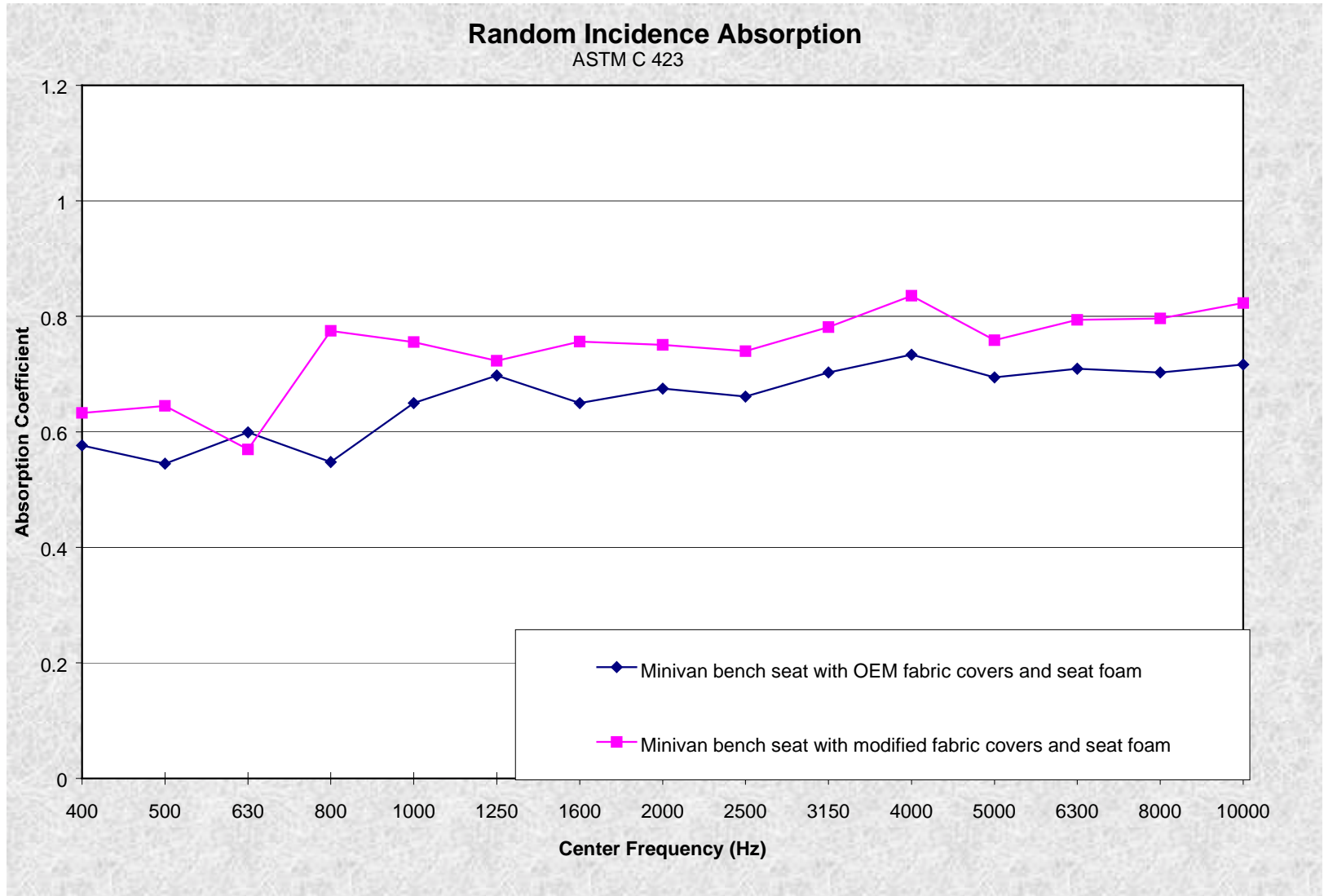
Influence of Nonwovens : Component Level



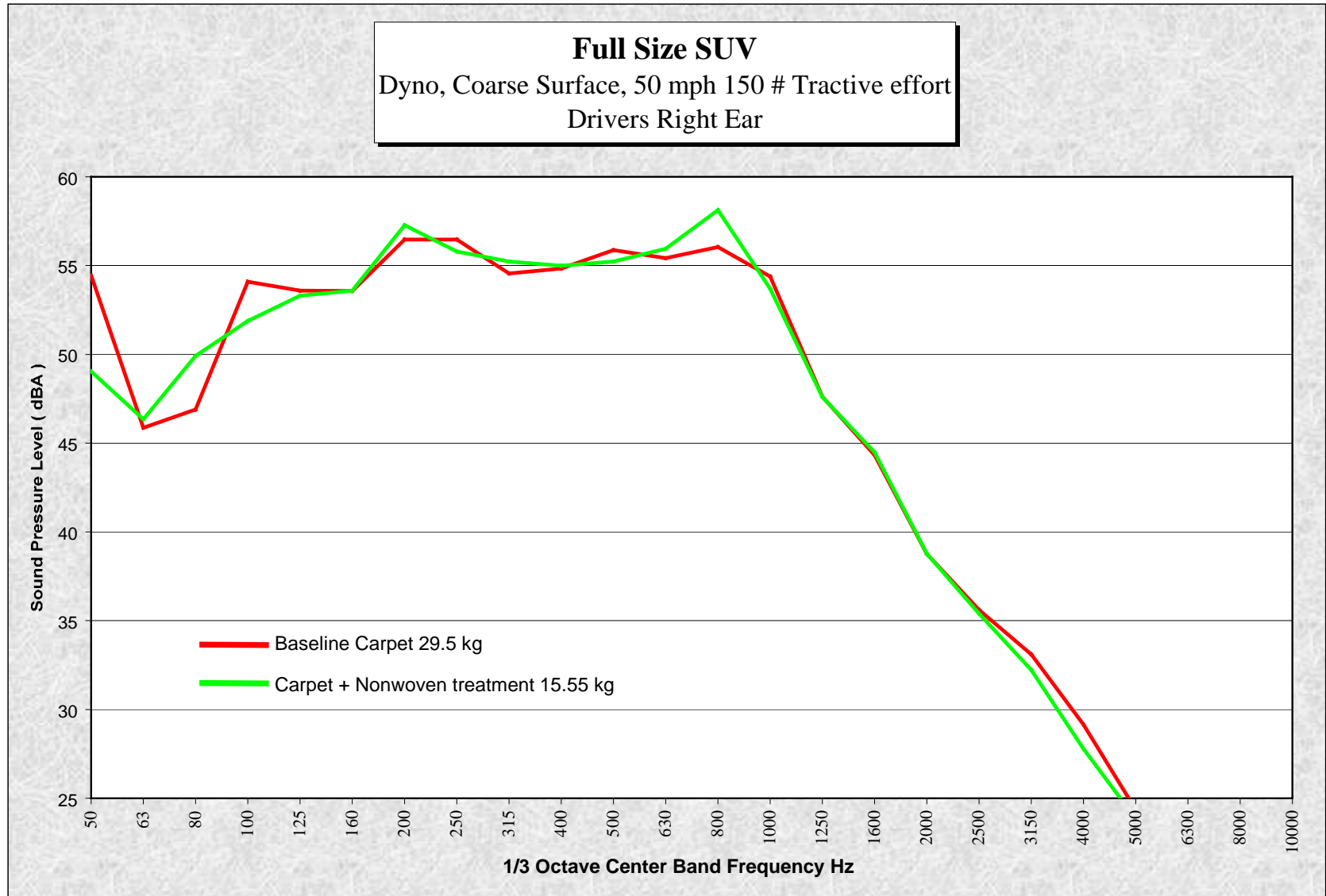
Influence of Nonwovens : Component Level



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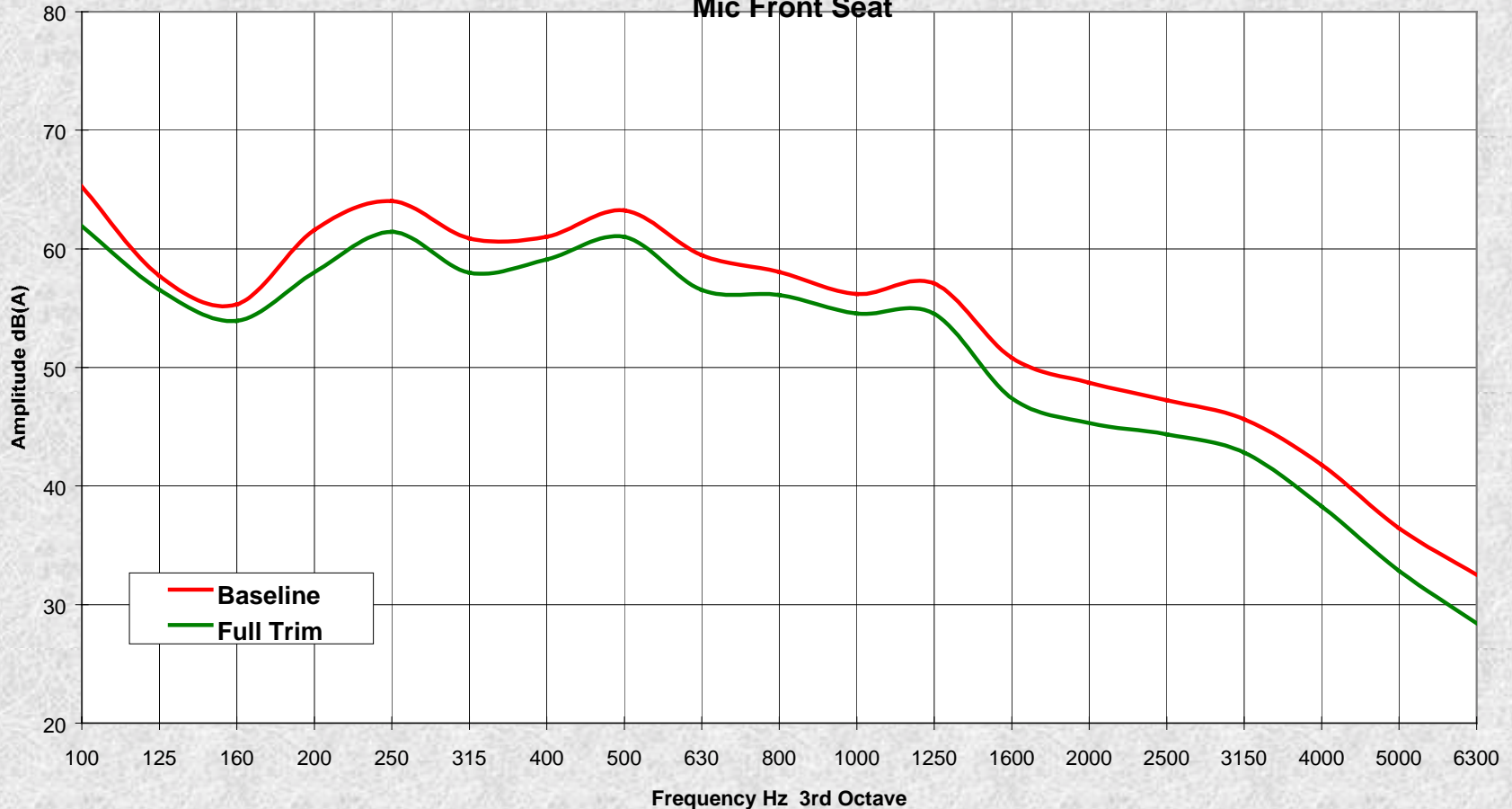


Influence of Nonwovens : Vehicle Level



Influence of Nonwovens : Vehicle Level

**Nonwoven PET Acoustic Treatment Study
65MPH High Speed Track
Mic Front Seat**

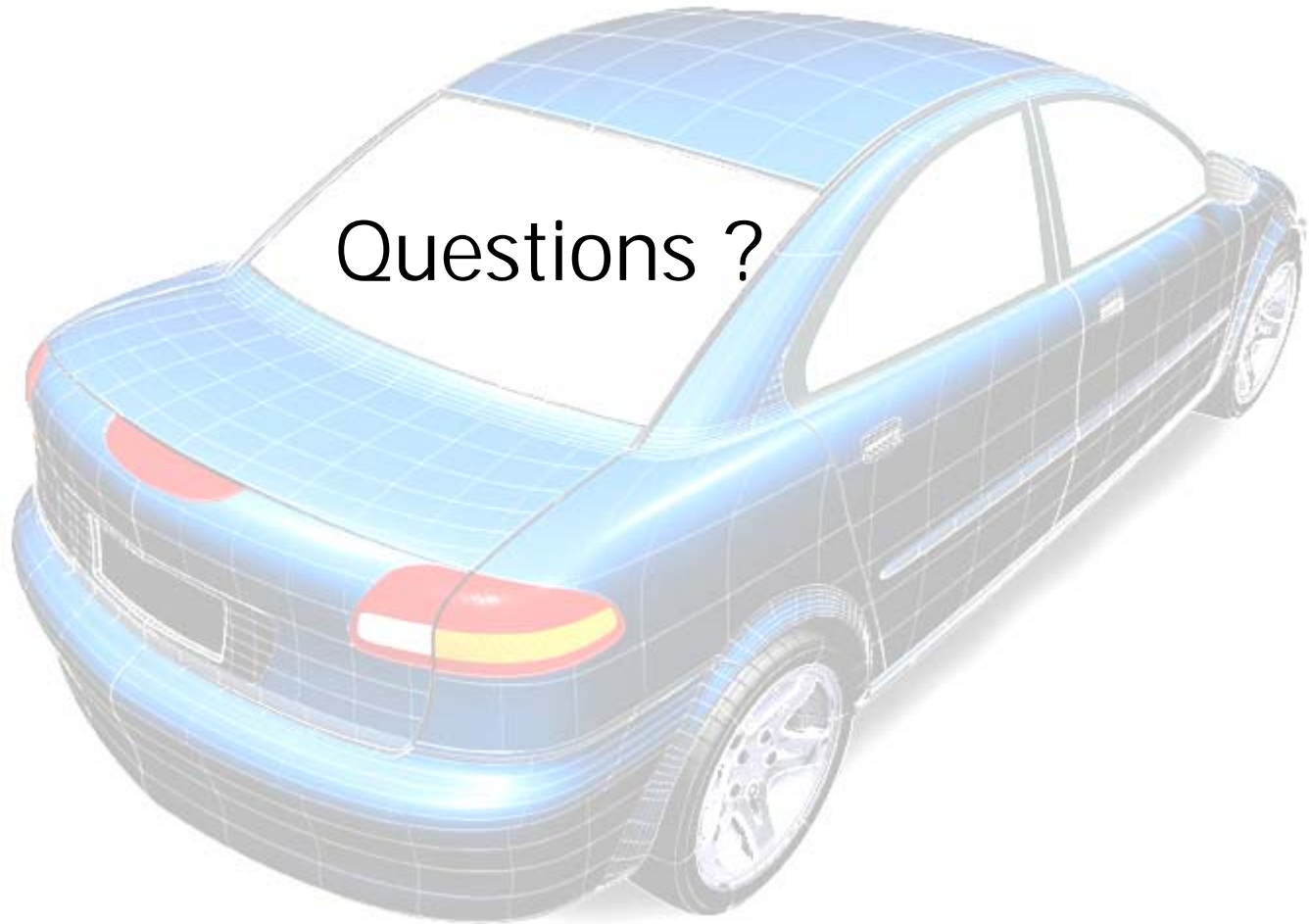


Automotive Interior Acoustics

- Need for acoustic tuning
 - Vehicle platforms
 - Trim levels
- The ability to tune finished product
 - Manufacture to a given acoustic specification
 - Utilize existing infrastructure

SIGNIFICANT

INFLUENCE OF NONWOVENS !



Questions ?