Virtual statistical energy analysis for vibroacoustic industrial prediction

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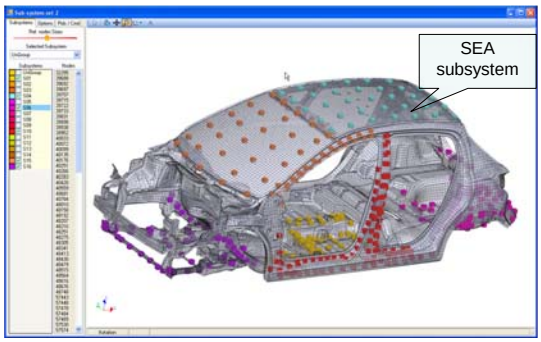
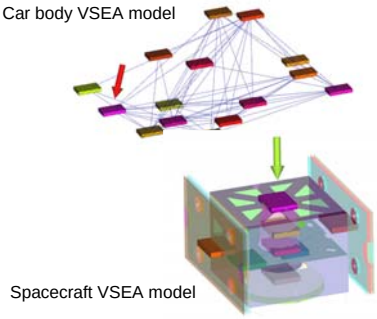
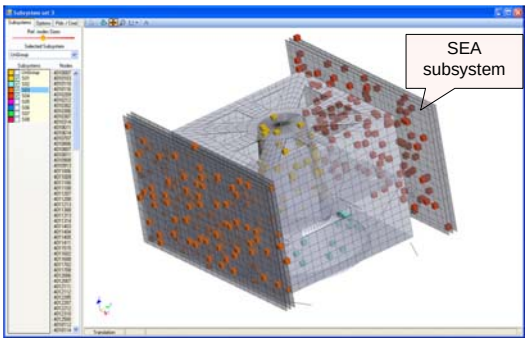
Virtual SEA (VSEA) provides a robust theoretical scheme for predicting structure-borne sound in the mid-frequency range for a wide range of vehicles from car body to spacecraft





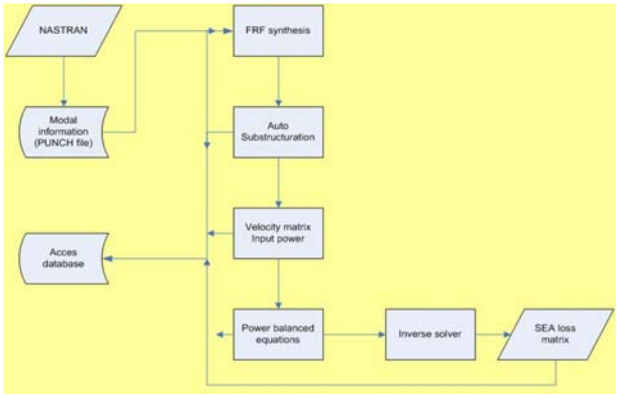


VSEA acts as a postprocessor of Finite Element Models (FEM) and derives automatically a Statistical Energy Analysis model (SEA) from FEM useful to analyze power flow through subsystems

VSEA has been developed by InterAC in a consortium joining PSA, Faurecia and CNES (SEAVirt software)

Automated VSEA process

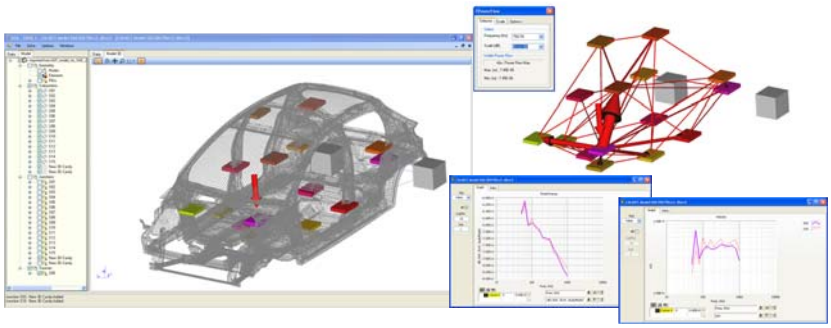
- VSEA is a postprocessor of FEM mode shapes and eigenvalues
- It performs the synthesis of point-to-point transfers on a grid of user-defined observation nodes
- Nodes are automatically grouped into subsystems by the original attractive algorithm
- SEA parameters (modal density and Coupling Loss Factors) are then computed using an inverse technique (Power Injection Method or PIM)

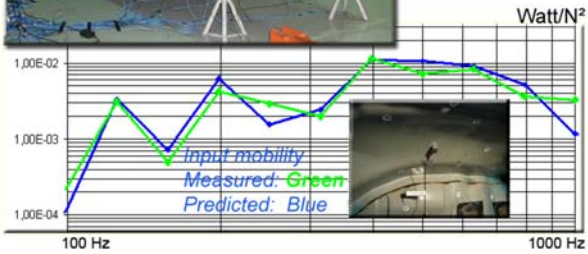


Using VSEA models

With the VSEA software manager, created models may be coupled to standard analytical SEA subsystems such as acoustic cavities or plates to compute sound transmission problems (for cars) or acoustic random vibrations (for spacecrafts)

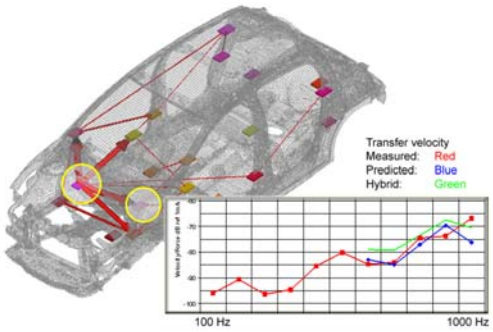
Excitations may be applied to all individual nodes of the VSEA model or on average on the subsystem





VSEA Full car validation (Faurecia-PSA)

- Measurement of all SEA subsystems obtained from VSEA using SEA-TEST experimental SEA software
- Comparison of predicted and measured structural transfers
- Analysis of damping provided by trims



- 64 fixed accelerometers on the structure shared out among the different subsystems where input power measurements have been performed
- 1048 points on the structure hit one by one with hammer in order to measure transfer functions between these points and the fixed accelerometers (reciprocal protocol)