

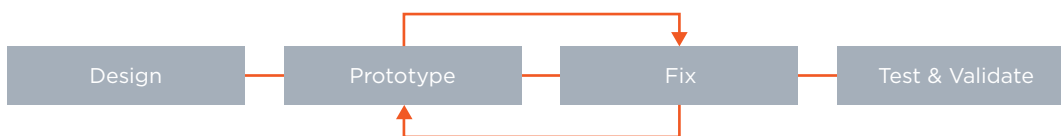


IDENTIFY AND ELIMINATE SQUEAK AND RATTLE PHENOMENA WITH ZIEGLER'S PEM DATABASE

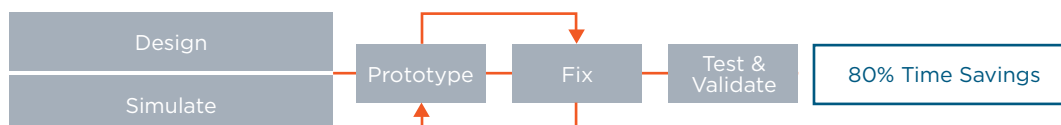
Altair's Squeak and Rattle Director (SnRD) enables expert and novice computer aided engineering (CAE) engineers to rapidly identify and eliminate a variety of sound, vibration, and perceived quality issues in products at an early design stage. A direct integration of the PEM Material Database by Ziegler Instruments allows to precisely detect and reduce stick-slip phenomena. The PEM Material Database provides access to results for over 11,000 individual stick and slip phenomena for different materials pairs.

Reducing the presence of interior Squeak and Rattle (S&R) noises has become an on-going trend within many industries. Manufacturers are now requiring suppliers to build product modules free of S&R issues as silence has become synonymous with luxury and quality to customers. Suppliers currently rely on system prototype testing or full-scale testing methods in place to reduce the occurrence of S&R, which is time consuming and far too late to begin the testing processes, as it leads to high costs and unnecessary material usage.

Traditional Test-based Design Process



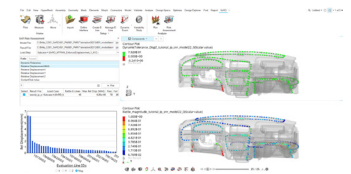
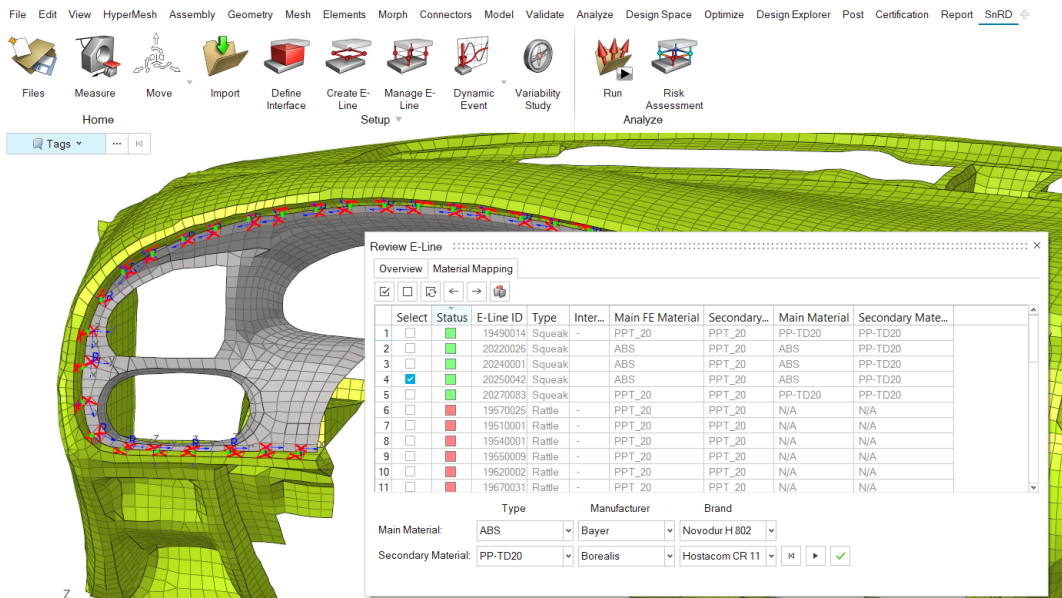
Altair's Simulation-based Design Process



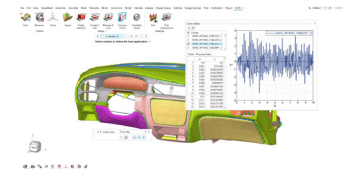
The Squeak and Rattle Director allows us to input different data, like design and manufacturing tolerances, in order to improve the output of our analysis and therefore have more valuable inputs to the project.

Marcelo Starling Braga, NVH Coordinator, FIAT Brazil

Learn more about:
[Squeak and Rattle Director](#)



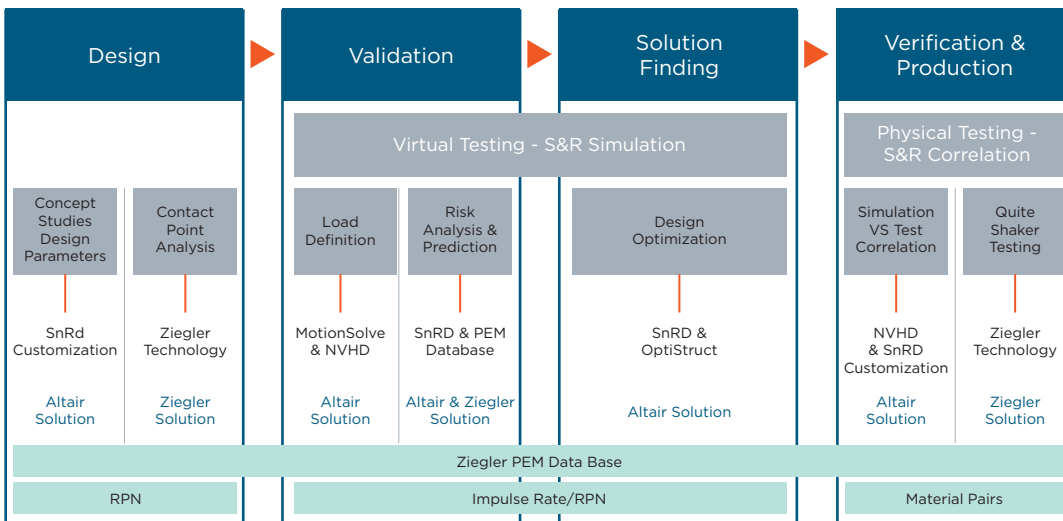
Create a virtual test rig Import excitation loads from test and/or simulation (MBD) Step-by-step process flow to a runnable model.



Automated post-processing with customizable output Root cause & Sensitivity analysis ("what if scenarios") Further customization for correlation with test data.

Increase S&R simulation accuracy by mapping material data from Ziegler Database to evaluation lines in SnRD

By using a fully simulated approach to S&R testing methodology early in the design stages the testing and validation time is reduced by more than half while costs and material usage decrease. Utilizing Altair's S&R solution, Squeak and Rattle Director and existing NVH simulation models, customers can apply physical testing procedures by building a virtual testing rig that works for sub-systems as well as at full system level, allowing the testing phase to happen throughout the design process. Integration of Ziegler PEM Material Database provides insights to reduce the stick-slip phenomena through a reliable indicator, the risk priority number (RPN) which quantifies the tendency a material pair have to emit a creaking or squeaking noise under certain conditions.



Altair Squeak and Rattle Director™ Value Proposition

- What: Establish simulation based method for S&R evaluation
- How: Use existing simulation models (NVH); Take advantage of Altair's domain experts; Apply physical testing procedures by building a virtual testing rig (sub-system and/or full system); Use stick-slip material data by Ziegler Instruments
- Benefits: Identify S&R risks at early stage; Guide the design with solution proposals; Reduce costs (less prototypes, less quick fixes); Take in account design variations => Robust Design; Automated and customizable process for S&R studies (lead time reduction)

[Learn more about Altair Squeak and Rattle Director](#)

Partnership with:

ZIEGLER