

ESAComp for Automotive

ESAComp is software for analysis and design of composites. Its scope ranges from conceptual and preliminary design of layered composite structures to advanced analyses that are applicable to the final verification of a design. The comprehensive material database of ESAComp forms the basis for design studies. ESAComp has a vast set of analysis capabilities, which can easily be applied to structural components made of composites within the automotive industry, such as monocoque, body panels, pressure tanks, or drive shafts. With its optimization capabilities ESAComp has been successfully applied within the design and optimization of a number of automotive applications such as the Biofore Concept Car.



Courtesy of UPM

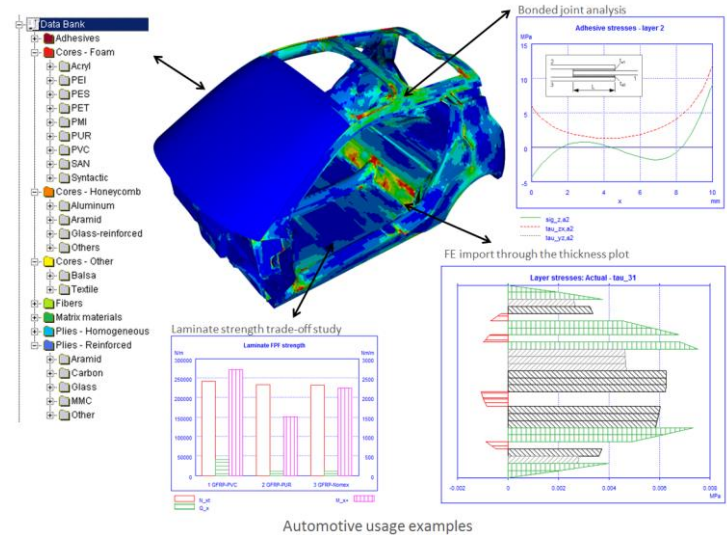
Solution Highlights

- Boosts fast and efficient pre-design as it covers all features needed, ranging from material selection and laminate analyses to the design of structural elements
- Large composite materials database (with more than 1000 material systems)
- Insight into laminate behavior and possible failure modes helps avoid pitfalls in composite design
- Composites specific post-processing with advanced failure criteria and the results are available in HyperView
- Highly customizable result outputs for verification and reporting
- Proven in practice within demanding aerospace applications
- Interfaces to third party software (HyperWorks, ANSYS, Abaqus, Nastran, CompositaD, RadTherm)



Automotive Capabilities

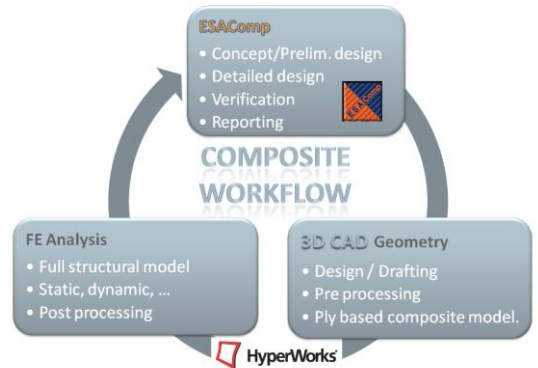
- ESAComp Data Bank as initial source of material data
- Trade-off studies for material selection
- Laminate lay-up design/optimization and export to widely used FE software packages (different HyperWorks solver profiles supported)
- Laminates, sandwich and stiffened panels for body panels and monocoque concepts
- Beam, panel and cylindrical shell analyses for conceptual design of chassis assemblies, drive shafts and power trains.
- Mechanical and bonded joint design: composite-composite; composite-metal
- Composite pressure vessel module for CNG and other gas-powered vehicles
- Post-processing using advanced composite failure criteria (HyperWorks-ESAComp post-processing interface)



Automotive usage examples

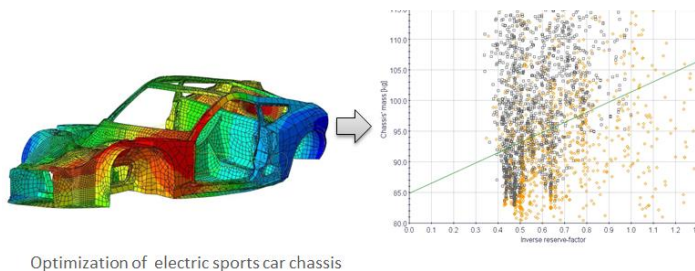
Interface

- Material and laminate data exchange with various FE software
- Composite post-processing interface for HyperWorks
- CompositaD-ESAComp for composite overwrapped pressure vessels
- XML data exchange
- Optimization and design exploration in conjunction with commercial optimization software



General Capabilities

- Vast set of analysis capabilities for solid/sandwich laminates and for micromechanical analyses
- Wide range of composite failure criteria available, incl. Puck, Tsai-Hill, Tsai-Wu, Hashin and LarCO3,...
- Integrated FE solver allows accurate analyses for parameterized structural elements
- Analysis types for structural elements: linear load response and first ply failure, natural frequencies, buckling, non-linear load response
- Customizable macros for graphic and numeric result display
- Batch capabilities for automated runs and integration in optimization loops
- Various specialized analyses, for example, probabilistic laminate analyses, moisture diffusion, notched laminates



Optimization of electric sports car chassis



Courtesy of Metropolia Electric Raceabout (ERA) team