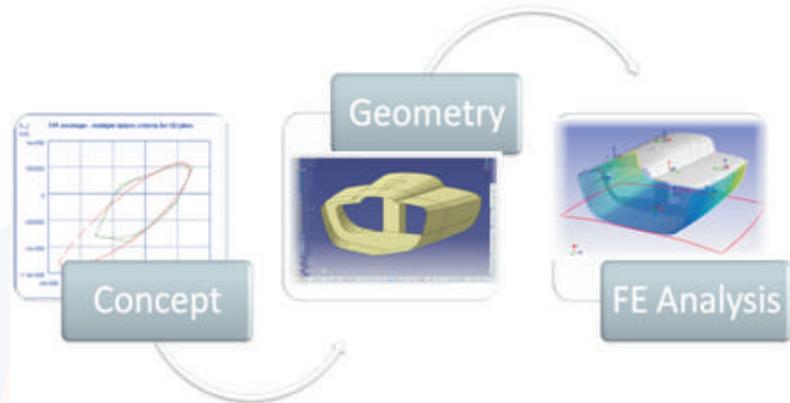# ESAComp Software
for Composites Design

The European Space Agency (ESA) initiated the development of ESAComp in the early 1990's. The goal was to create a standard tool to replace the various in-house codes used by the aerospace industry for the analysis and design of composite structures.

Today, users of ESAComp come from all industries using high-performance composites: Aircraft, Alternative energy (wind turbines), Automotive, Construction, Defense, Education, Machine design, Marine, Offshore, Pressure vessels, Rail transport, Space (launchers, satellites), Sports and leisure goods, …

ESAComp has its place in the design cycle of composite products together with general CAD tools used for defining the geometry and general finite element tools used for the simulation of the complete structure. ESAComp is used especially at the early stages of the design process for selecting material systems, defining the structural concept, and for performing preliminary dimensioning and laminate lay-up design. ESAComp can further be used for refining the design during the design iterations. In analyses of structural details, such as joints, ESAComp may replace the use of general FE software altogether.

Key Features of the ESAComp System

- Graphical user interface. All functions are accessible through a unified user interface, which guarantees an efficient workflow.
- ESAComp objects, multi-level database and Data Bank. Work with ESAComp is based on objects: fibers/matrix materials, plies, laminates, panels, beams, bonded or mechanical joints, loads and boundary conditions. The database is divided into three levels: the user and company levels, and the ESAComp Data Bank. This includes data for commonly used composite materials and material systems.
- Analysis capabilities: micromechanics, laminate stiffness and hygrothermal expansion, laminate failure with selected failure criterion (incl. advanced criteria like Puck 2D/3D), sandwich failure modes, rectangular panels (flat and curved), stiffened panels (beam type stiffeners or hat stiffeners), beams, bonded and mechanical joints, probabilistic analyses, moisture diffusion, …
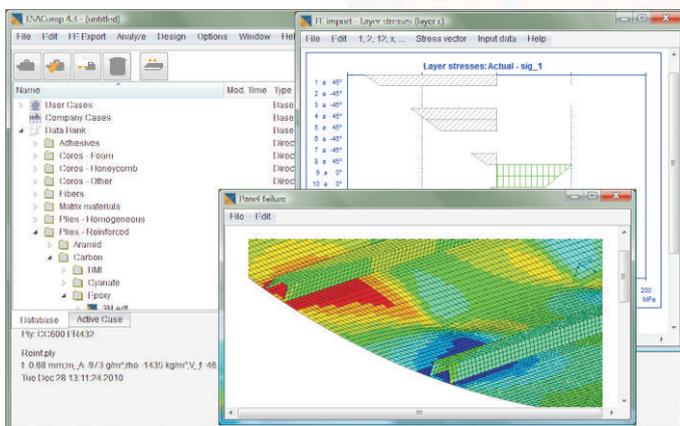
The ESAComp graphical user interface features a database browser for easy access to user or company specific data and to the Data Bank delivered with the system. Different types of graphic result displays are available for visualizing the analysis results.

www.esacomp.com

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Key Features of the ESAComp System (continued)

- <u>Multiple analyses and graphic display of results</u>. The user has almost limitless options for selecting and combining the resulting data. For example, several objects, laminate orientations or failure criteria can be selected for analysis. The results can be displayed as numeric tables, layer, bar, line, and polar charts, carpet plots, failure envelopes, and 3D contour plots.
- <u>Design environment</u>. ESAComp with its possibilities for easy creation and modification of laminate lay-ups and structural elements forms an efficient platform for performing design studies of composite structures. The graphical result displays help in performing trade-off studies between materials and structural alternatives. This hands-on approach is complemented with design tools for material selection and lay-up generation.
- <u>FE export interfaces</u>. Laminate lay-ups specified in ESAComp can be easily exported to FE software, along with the related material properties. Currently supported FE software include: ABAQUS, ANSYS, ANSYS Composite PrepPost, ANSYS Workbench, ComPoLyX, I-DEAS, LS-DYNA, NASTRAN, and NISA. ESAComp can be extended easily to support other FE packages.
- <u>Advanced FE post processing and results visualization</u> for ABAQUS, NASTRAN and ANSYS can be performed using ComPoLyX, another product in the ESAComp Software Suite. See separate info sheet.

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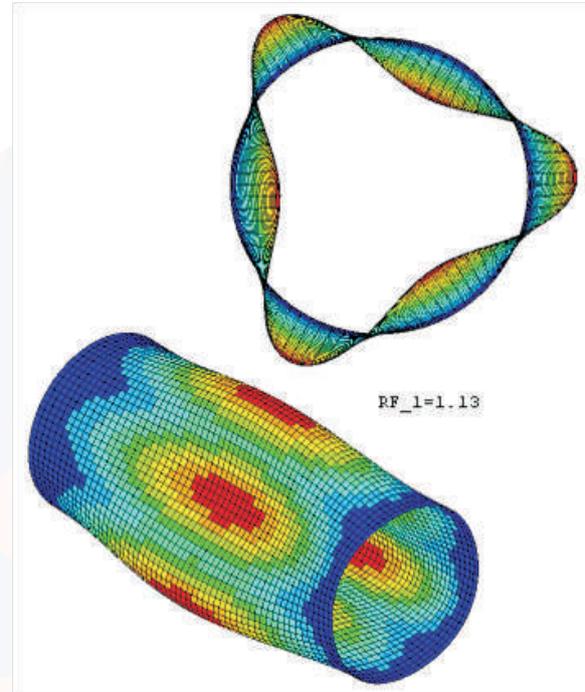
The analysis and design of cylindrical structures can be tackled with an ESAComp add-on module. The cylinder or tube like structure may be straight or conical and stiffeners may be placed in the axial direction or around the circumference. Various types of loads can be applied, such as inside/outside pressure, inertial forces, and forces and moments acting at the ends of the cylinder.

- <u>SI and Imperial (British/U.S.) units</u>. Units and output formats can be changed at any time during the session.
- <u>User extensions</u>. User modules, such as new failure criteria and micromechanics models, can be integrated in the system. ESAComp analyses can be incorporated into other applications by running ESAComp in batch mode.
- <u>Comprehensive documentation</u>: Quick Start Guide, Example Cases, on-line help, and theoretical background documents.
- <u>Computer platforms</u>: MS Windows and Linux.
- <u>Support</u>. Componeering and its worldwide support partners provide a Help Desk and training courses for ESAComp users in their own language. Componeering develops also customized extensions to meet the specific needs of customers.

ESAComp IN BRIEF

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