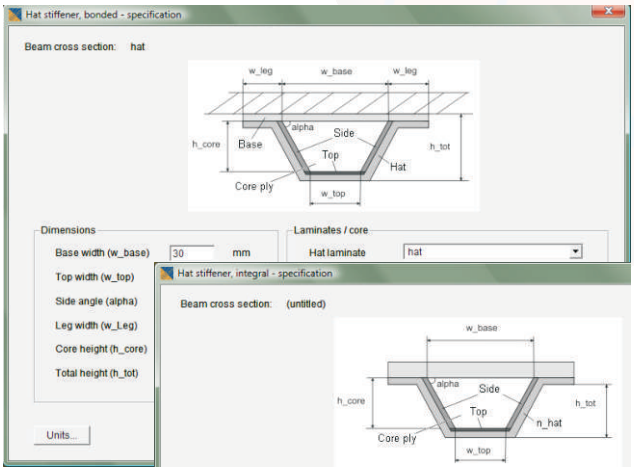
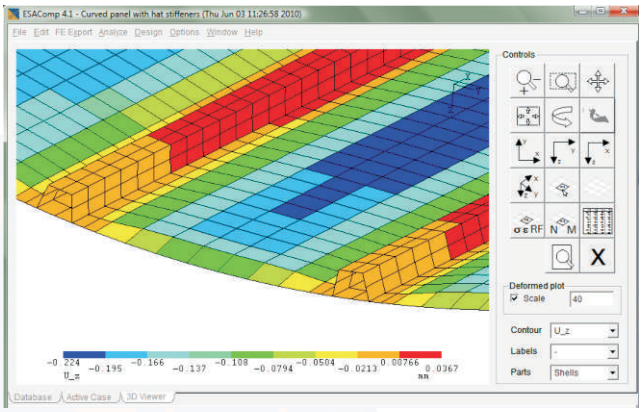
New in ESAComp Version 4.1

ESAComp 4.1 includes new analysis capabilities, new user interface features, an extensive update of the Data Bank, and enhanced data exchange with other software.

- Curved plates extend the old analysis capability for rectangular plates to singly curved plates defined by the plate dimensions and the radius of curvature. Stiffeners can be placed in the axial direction. The boundary conditions can be independently defined for each edge of the plate. Linear-static load response and failure analysis can be performed under pressure and point loads. Buckling and natural frequency analyses are introduced in future ESAComp releases.
- Hat stiffeners can be defined for curved plates besides the beam type stiffeners supported by earlier ESAComp versions. The hat stiffener types include bonded and integral stiffeners. The capabilities for defining both stiffener types are extensive. For instance, besides the hat laminate there are possibilities to define additional reinforcing layers for the sides and top part of the hat. In the analyses hat stiffeners are modeled using shell elements.
- Cylindrical shell add-on module allows analyses of cylinder and tube like structures. The cylinder may have a constant diameter or it may be conical. The laminate lay-up may vary in the axial direction by assigning different laminates for ring type cylinder segments. The boundary conditions at the ends of the structure are defined using an innovative and simple to use approach. Forces and moments can be applied at the ends of the cylinder. In addition, a pressure load or inertial loads due to linear acceleration or rotation may be applied. The analysis types include static load response and failure, as well as buckling and natural frequency analyses based on linear eigenvalue approach.



Two types of hat stiffeners can be defined: bonded and integral stiffeners. Bonded stiffeners are defined by giving the laminate or laminates that form the stiffener. Integral stiffeners are composed from the layers of the plate laminate itself, but additional reinforcement layers may be added as well.



ESAComp 4.1 features a new 3D viewer for plates and cylinders. The selected result item can be shown as contour plots with an option to show annotations to indicate failure modes and critical layers for each element. Through-the-thickness layer charts can be viewed for elements selected from the viewer.

- Stiffened cylindrical shell add-on module is a further extension of the cylindrical shell module. Beam type stiffeners can be placed in the axial and circumferential directions. The locations are specified independently for each stiffener. The stiffeners may be on the inside or outside of the cylinder. The analysis possibilities are identical to the standard cylindrical shell module.
- Elmer FE solver by CSC, The Finnish IT Center for Science is now included as a standard module in the ESAComp distribution. It is used for realizing the curved plate and cylindrical shell analyses and it also provides a basis for introducing advanced nonlinear analyses in the future ESAComp releases.
- New 3D result viewer is introduced for viewing the results of curved plate and cylindrical shell analyses. Versatile

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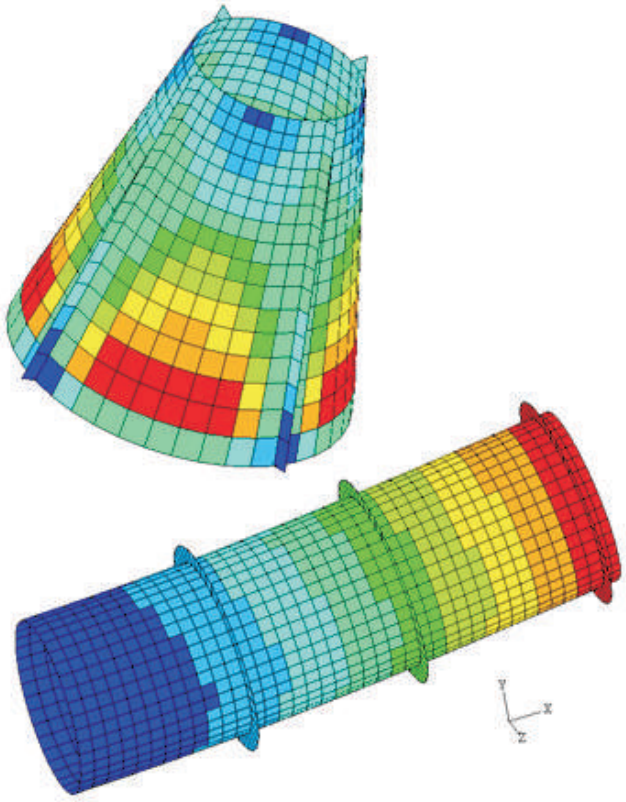
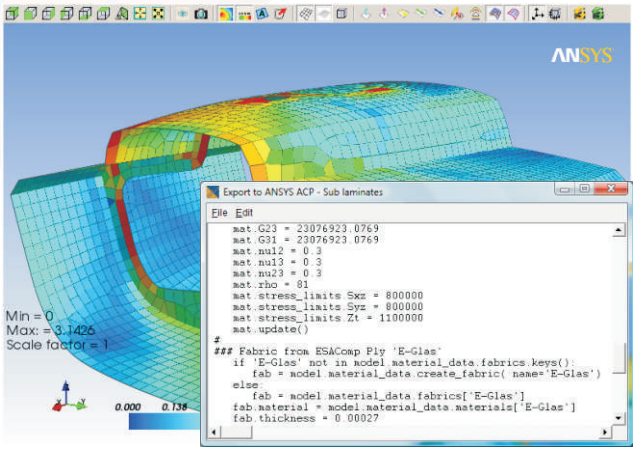


Cylindrical shells can be analyzed with the new add-on module of ESAComp. A further extension of the add-on allows placing beam type stiffeners (I, T, Z, and C cross sections) in both the circumferential and axial directions on either inside or outside surface of the cylinder.

capabilities for model rotation and zooming are included. The selected result item can be viewed as a contour plot with optional annotations for failure modes and critical layers. The features include also deformed plots and animation of eigenmodes. For a selected element, layer level stresses, strains and reserve factors can be viewed as layer charts and in numeric format.

- ESAComp Data Bank has been updated extensively. The update covers the following material types: foam cores, honeycomb cores, other cores, carbon fibers, glass fibers, typical aramid fibers, polyester resins, vinylester resins, some epoxy resins including typical classes, homogeneous plies, typical FRP, CSM, Spray up rovings, MMC, and plywood.
- Export to ANSYS Composite PrepPost (ACP). ACP supports data exchange with ESAComp using the ESAComp XML format. The new export capability improves the possibilities by writing an ACP specific Python script which can be simply copied and pasted to the ACP command prompt. Both ply materials and laminate lay-ups can be exported. Laminate lay-ups from ESAComp can be interpreted as Sub Laminates or Stack-ups in ACP.
- Export to ANSYS Workbench allows creation of an ANSYS specific XML file that can be read in by the WB Engineering Data module. Isotropic and orthotropic ply materials can be exported.
- Export to ComPoLyX allows transfer of ESAComp ply material data in the form of a ComPoLyX Python script. The typically incomplete material data from FE models can be completed with the material description from ESAComp before performing advanced failure analyses in ComPoLyX.
- Other interface enhancements concern ABAQUS export and support for unit systems in ESAComp XML.
- RLM based licensing and the new installation procedure make it easier to set up ESAComp.



The interface to ANSYS Composite PrepPost (ACP) guarantees efficient and error-free export of ply materials and laminate lay-ups from ESAComp to ACP in Python format.

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