TANIQWIND® DESIGN TOP USE CASES

Altair Partner Alliance

200% Coverage Path for Tape Winding

Challenge

- When designing a composite pressure vessel, it is desired that reinforcement layers have an exact 200% tape coverage (or multiple of this) on the cylindrical area, without gaps or overlaps. The challenge is designing a path having the 200% coverage criteria, and matching other important criteria such as winding angle and (zero) dwell.

Solution

- TaniqWind has a dedicated function for making a coverage path. Within the design panel the user can input the desired coverage, winding angle, and dwell (including plus/minus tolerances) and the program will compute all possible options and display these in an overview table.

Results

- In TaniqWind, the user can generate an overview of all possible coverage paths, within the set criteria, in seconds. The overview furthermore allows the results to be sorted on most the important criteria to find the best result even faster.
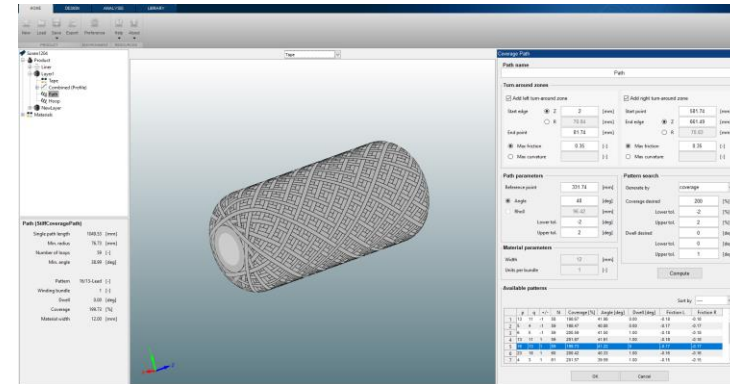
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# Export of Laminate Structure and Data to Altair® HyperWorks®

Challenge

- To analyze or optimize a part using FEA Software, the laminate structure and data of the design must be imported in the FEA Software. The challenge is to create a reliable FEA model from the design made with the filament winding software.

Solution

- After making a composite part design in TaniqWind, the user can automatically generate an export file of the laminate data for import in HyperWorks. Due to the unique data structure developed in collaboration with Altair, a more detailed description of the winding structure is generated, providing a more realistic representation of the winding structure in the FE model.

Results

- It is easy for the user to export the data structure to HyperWorks. The specific data structure results in a more representative model having a more realistic representation of the actual product.

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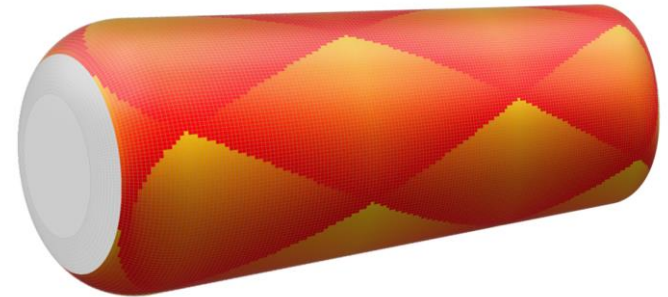
More Accurate Tape Build-up Prediction for Composite Pressure Vessels

Challenge

- Tape build-up prediction in critical areas of composite pressure vessels such as the domes and polar openings, cannot be accurately predicted since all existing build-up models are based on winding of filaments (instead of tapes).

Solution

- TaniqWind has a dedicated build-up model for tapes. After adding a composite layer the user can create a new profile for applying the next composite layer, which derives its contour automatically from the build-up of the previous layer.

Results

- The TaniqWind tape build-up prediction gives a more reliable approximation of the actual tape build-up in the pressure vessel. This means that:

  ○ The software creates a more reliable model for FE analysis.

  ○ Since the surface profiles in the model are more consistent with the actual winding surface, the winding programs are more accurate.

Thickness distribution 800%

Legend:
- Test results
- Analytical solution
- AF 4th order

Parameters:
$R_{wang} = 2\ r_{Band}$
$F_{void} = 2\ t_{tape}$
$F_{step} = 0.2\ r_{pole}$

Y-axis: Dome thickness t_{dome} [mm]
X-axis: Contour length s [mm]

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