

# LAP & CoDA Top Use Cases

Composite Analysis Software by Anaglyph

# Composites Layup Optimization

## Challenge

Generate a layup to satisfy design requirements.

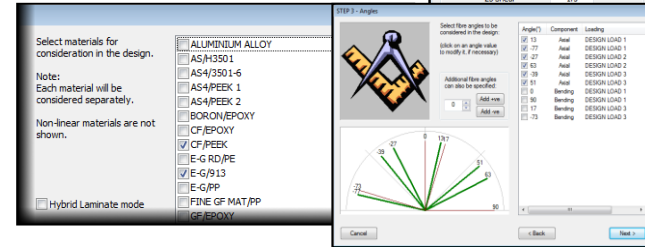
## Solution

Apply LAP to:

- Select the candidate materials, typical design loads
- Set the stiffness / strength requirements
- Select fiber angles to be considered, plus numerous additional parameters
- Proceed through converging steps to get the final stacking sequences **satisfying ALL requirements**

## Benefits

Obtain optimal layups, ensure best use of material, make structure as light as possible, avoid design iterations and prepare the ground for efficient use of HyperWorks.



STEP 9 - Stacking Sequences, Final

200 symmetric laminates that satisfy all loads are shown below:

#	Material	Top	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Mid	Total Thickness	Weight <sup>3</sup>	Cost (\$mm <sup>3</sup> )	
60	CF/PEEK	-73°	0°	17°	17°	17°	0°	90°	-73°	90°	-39°	13°	13°	13°	63°	13°	63°	13°	63°	-77°	4.25	6.8e-006	8.5e-006	
61	CF/PEEK	90°	17°	-73°	0°	-73°	90°	17°	0°	17°	-39°	13°	13°	13°	63°	13°	63°	13°	63°	-77°	4.25	6.8e-006	8.5e-006	
62	CF/PEEK	17°	0°	90°	-73°	90°	90°	90°	-73°	-39°	13°	13°	13°	63°	13°	63°	13°	63°	13°	63°	-77°	4.25	6.8e-006	8.5e-006
63	CF/PEEK	17°	90°	-73°	17°	-73°	0°	-73°	-73°	0°	-39°	13°	13°	13°	63°	13°	63°	13°	63°	-77°	4.25	6.8e-006	8.5e-006	
64	CF/PEEK	-73°	0°	17°	0°	90°	17°	17°	17°	90°	-39°	13°	13°	13°	63°	13°	63°	13°	63°	-77°	4.25	6.8e-006	8.5e-006	
65	CF/PEEK	90°	-73°	90°	17°	0°	90°	13°	90°	0°	-39°	13°	13°	13°	63°	13°	63°	13°	63°	-77°	4.25	6.8e-006	8.5e-006	

The following symmetric sandwich laminate (using a soft core) also satisfies all loads:

#	Material	Top	1	2	3	4	5	6	7	8	Core Thickness (%)	Total Thickness	Ighness <sup>3</sup>	Ibm <sup>3</sup>
1	CF/PEEK	-39°	13°	13°	13°	63°	13°	63°	-77°		1.125	4.25	3.2e-006	4e-006

# Composites Panel Edge Flange Effects

## Challenge

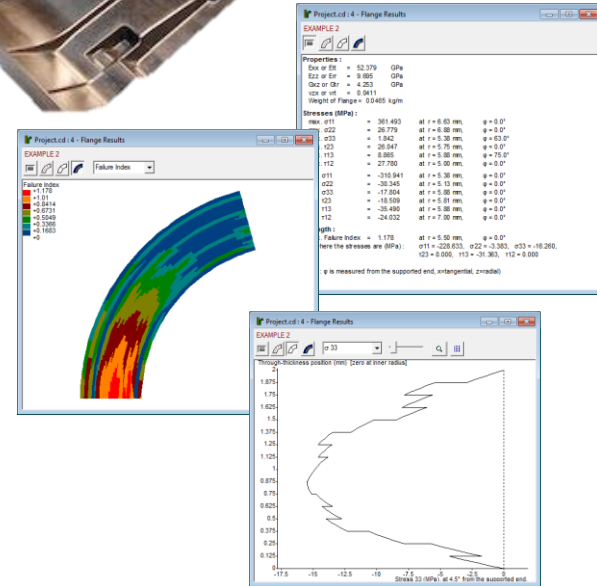
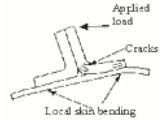
Stiffener and panel edge analysis for interlaminar effects.

## Solution

- Define the material, layup, geometry and loads.
- SOLVE to get layer 3D Stresses, and Failure Index calculations.

## Benefits

Obtain through-thickness stresses at critical locations and avoid interlaminar failures without uncertainty. Work with simple shell element Optistruct solutions for load calculation.



# Composites Layup Under Load Investigation

## Challenge

Reduce design time by optimizing the layup at points where the structure is subject to high loads.

## Solution

- Define the layup, input loads and failure criteria.
- Interactively obtain: stress, strain, polar, failure indices, displaced shape, etc.
- Modify the layup to optimize it, by instantly observing the effects of changes.

## Benefits

Save valuable time prior to analyzing zone layups using HyperWorks.  
Export materials and laminates directly to Optistruct.

