Composite Design/Analysis Capabilities

Composite Design and Analysis Capabilities

EXPERIENCE:

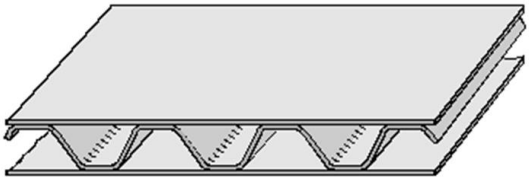
Space Launch System (SLS)
Ares V
Composite joint development
Honeycomb wrinkling failure criteria development
Analysis and optimization
Linear static analysis
Progressive collapse analysis
Linear/nonlinear dynamic analysis
Random vibration analysis
Payload fairing structural design
Payload adapter structural design
Interstage structural design
Intertank structural design
Stage adapter structural design

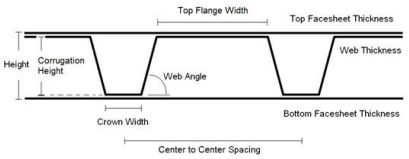
TOOLS:

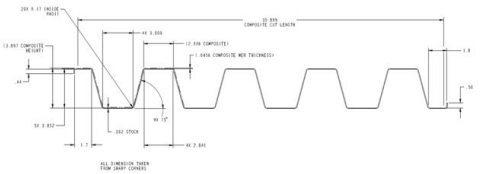
FEMAP
NX Nastran
HyperSizer
PTC Creo
MATLAB composite stitching analysis and optimization code
MATLAB micromechanics code
MATLAB classical laminate theory (CLT) composite analysis code
Best manufacturing practices that are employed in our designs

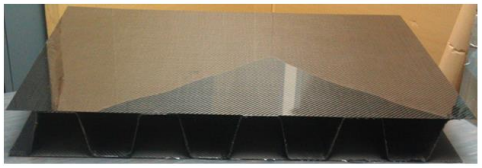
Dimension	Min	Max	Steps	Step Size
Ttop face (in)	0.0424	0.0424	1	
Tcore (in)	1.5	1.5	1	
Tbottom face (in)	*(Linked to Ttop face)*			
Height (in)	*(Dependent variable)*			

Freeze	Result	0/45/90 %	0/45/90 #	Plies
☐	0.0424	25/50/25	2/4/2	8
☐	1.5			
☐	0.0424			
☐	1.5848			









ZIN offers expertise in the area of composite structural design and analysis. We have over a decade of experience in providing safe, reliable designs that satisfy a broad range of strength, stability, and frequency criteria, which are concept-dependent. ZIN employs structural optimization software, HyperSizer, which assesses multiple geometries, panel concepts, and materials in an optimization process resulting in the lightest and most efficient final design. HyperSizer works in conjunction with finite element software tools, such as NX Nastran, from which it obtains element forces for design optimization. ZIN has expertise in sizing a number of different structural cross-sections including honeycomb, foam core, hat-stiffened, stringer-stiffened, corrugated, isogrid, and orthogrid. Our structural and mechanical designs are then performed using PTC Creo.

- **Various composite architectures can be sized.**
- **Trades between different architectures can be performed to obtain the lightest design.**
- **Several architecture specific local and global strength and stability failure criteria are evaluated during each sizing iteration.**
- **Different materials, including autoclave and out of autoclave, can be evaluated during sizing based on requirements.**
- **Static strength, buckling, and dynamic analyses can be performed to ensure that structural components meet all the design criteria.**
- **Explicit ply-by-ply strength analysis is coupled with good design practices to ensure realistic ply layups.**
- **Separate stitching sizing and analysis for areas with high peel stresses can be performed using ZIN developed MATLAB code.**
- **Detailed finite element analysis of the final sized configuration can be performed using FEMAP/NX Nastran to assess detailed stress distribution.**

VOYAGER SPACE

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