



Composite Design/Analysis Capabilities

ZIN Technologies

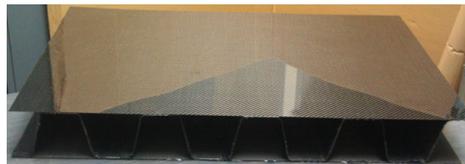
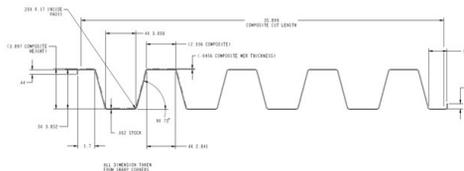
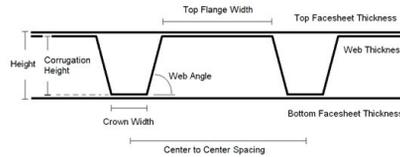
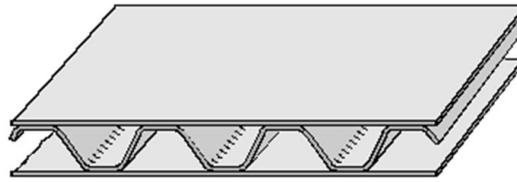
Composite Design and Analysis Capabilities

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



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 layouts.
- 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.



Dimension	Min	Max	Steps	Step Size	Freeze	Result	0/45/90 %	0/45/90 #	Ply's
Top face (in)	0.0424	0.0424	1		<input type="checkbox"/>	0.0424	25/50/25	2/4/2	8
Core (in)	1.5	1.5	1		<input type="checkbox"/>	1.5			
Bottom face (in)	(Linked to Top face)				<input type="checkbox"/>	0.0424			
Height (in)	(Dependent variable)				<input type="checkbox"/>	1.5848			



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