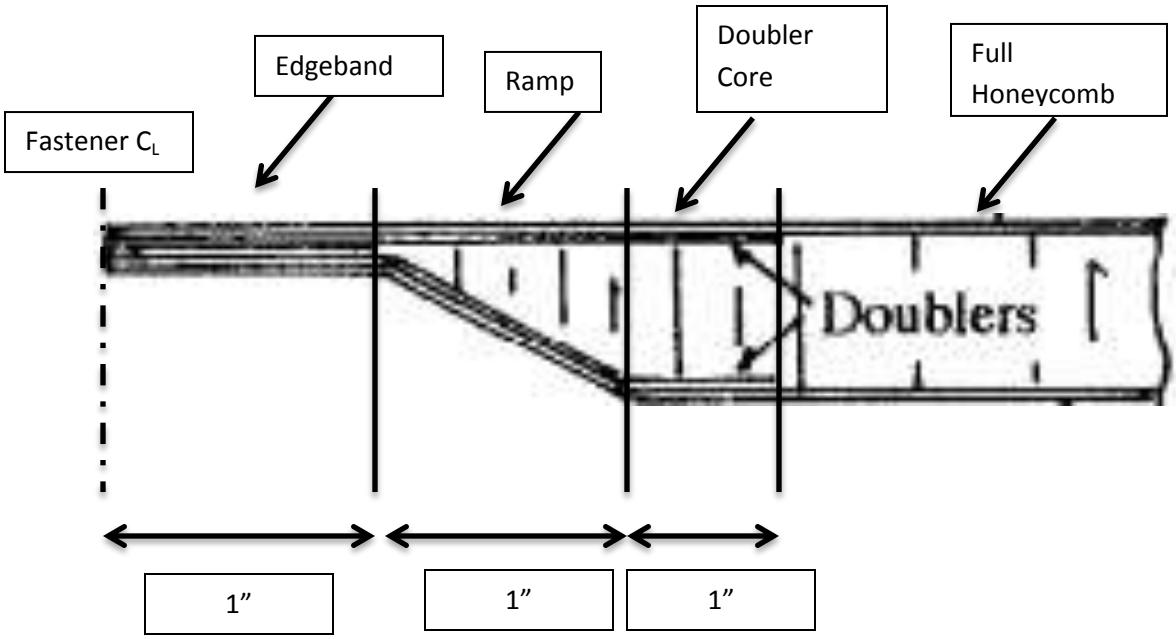
Sandwich Properties:

For testing the FE representation against a simple case:

- Face sheets: Titanium Alloy. Thickness: 0.016”
- Core: Al 5052 (6.5-3/8): Thickness: 0.968”
- Total Sandwich height: 1.0”
- Length (a): 20”
- Width (b): 15”
- Pressure: 45psi uniform
- Edge Fixity Condition: Simply Supported



Edgeband:

- As of now has 4 layers of Titanium Alloy Sheets
- Total Thickness: 4 x .016 = 0.064”
- Defined as just Plate (Shell) Properties in Nastran
- In PCOMP Thickness offset to 0.032”

Ramp:

- Has 2 layers of Titanium sheets in outer & inner face sheets each.
- Average thickness of ramp: 0.53”
- Thickness of Core: 0.53 – 2 x (2 x 0.016) = 0.466
- In PCOMP plate thickness offset to 0.265”

Doubler Core:

- Has 2 layers of Titanium sheets in outer & inner face sheets each.
- Total thickness of Sandwich: 1.0”
- Thickness of Core: 1.0 – 2 x (2 x 0.016) = 0.936”
- In PCOMP plate thickness offset to 0.5”

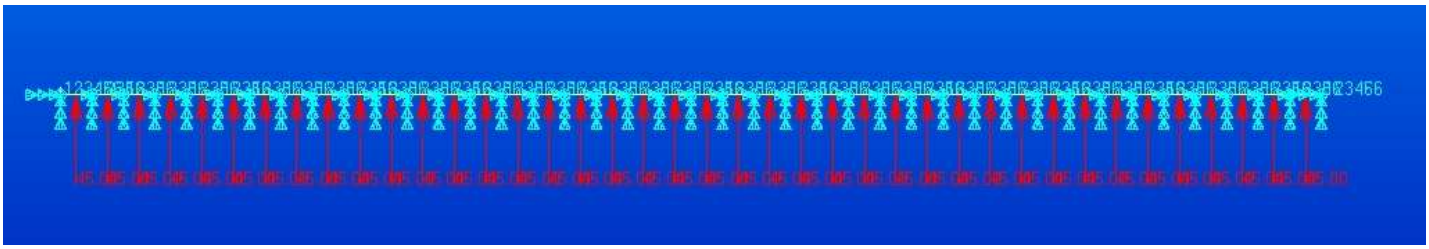
Full Honeycomb:

- Has 1 layer of Titanium sheets in outer & inner face sheets each.
- Total thickness of Sandwich: 1.0”
- Thickness of Core: 0.968”
- In PCOMP plate thickness offset to 0.5”

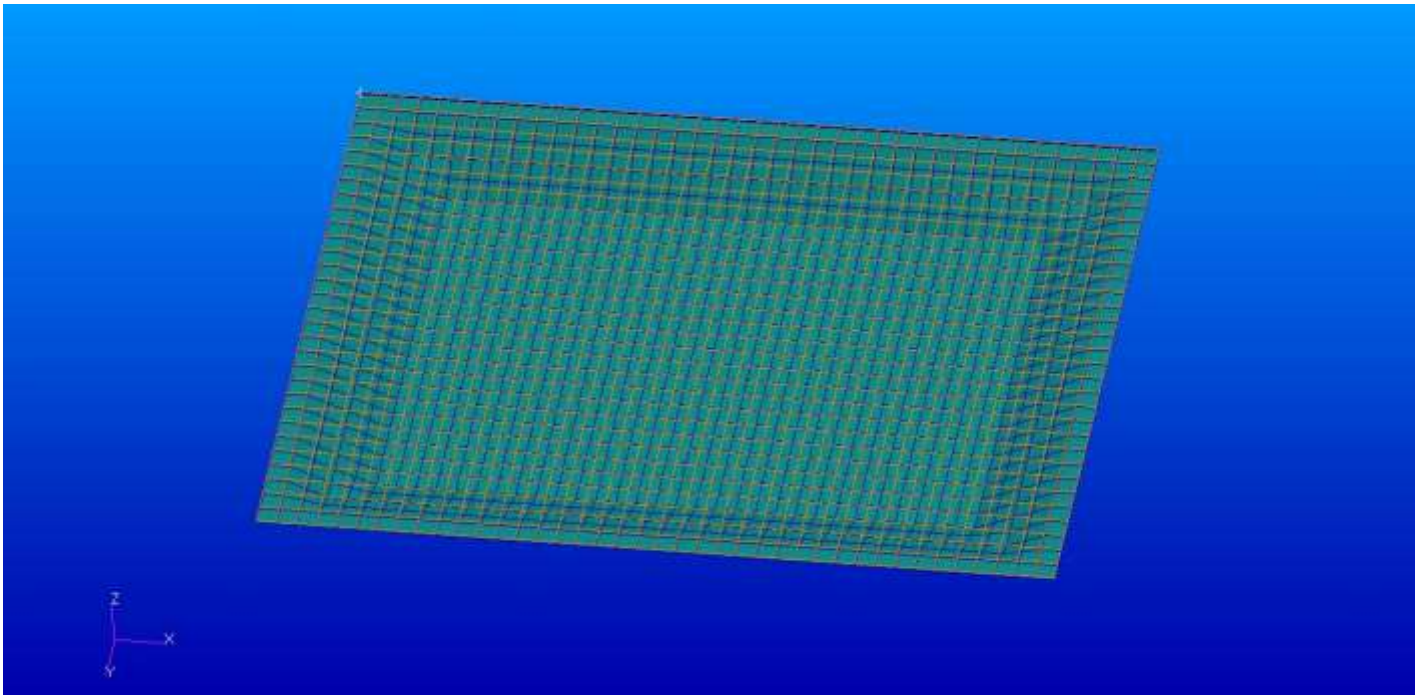
FE Representation:

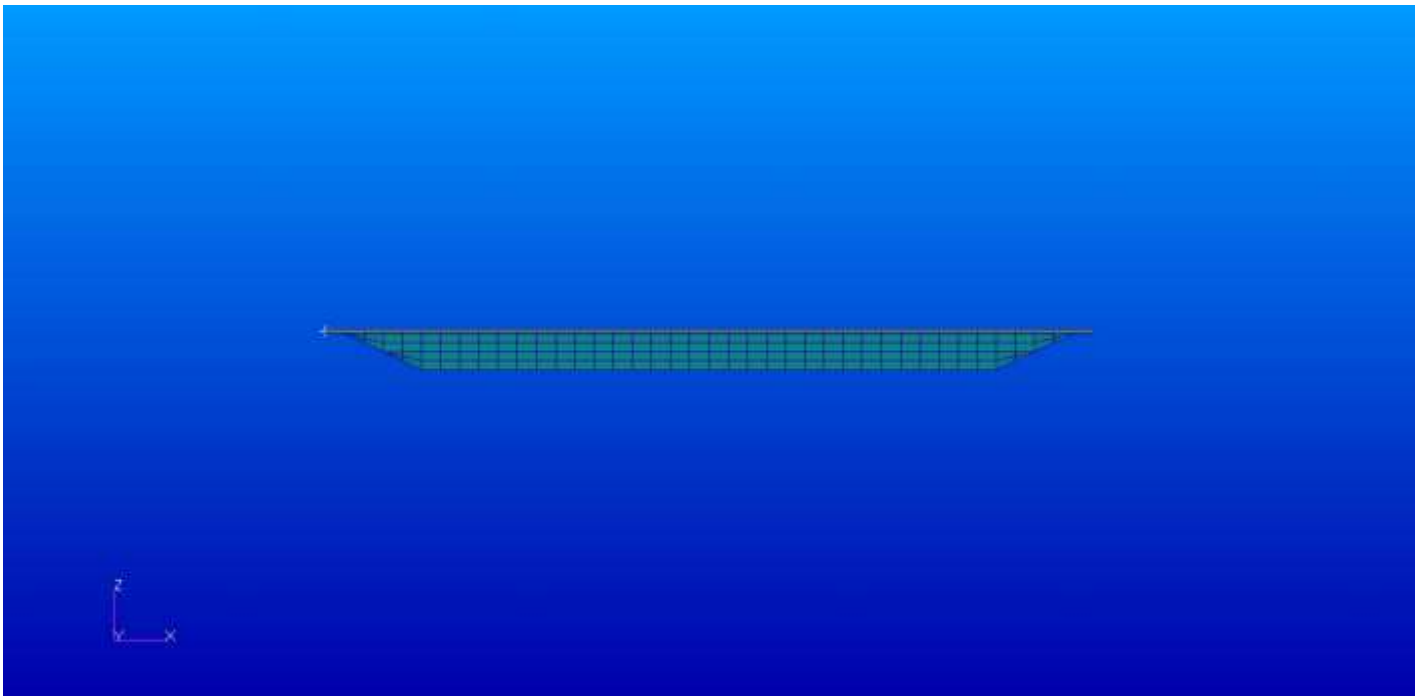
- Sandwich is represented in 2D
- Mesh size is 0.5” x 0.5”

Load & BC:



Laminate Layup Representation (Display Shell Thickness Option in PATRAN)





Results

Parameter	Hand Calc (Using Hexcel Sandwich Design Equations)	FEA (with just max core –facesheet represented)	FEA (with all features modeled)
Peak Deflection	.125”	.123”	.203”
Peak Face Sheet Stress	43700 psi (both face sheets)	44600 psi (both face sheets)	38800 psi (Outer face sheet, tension side) @ edgeband-ramp interface region 6220 psi at the center of the panel 53100 psi (Inner face sheet, compression side)
Peak Core Transverse Shear (WZ)	247 psi	256 psi	391 psi (Edgeband-Ramp Interface region) 144 psi (Max Core thickness)
Peak Core Transverse Shear (LZ)	268 psi	240 psi	141 psi (Max core thickness) 511 psi (Edgeband-Ramp Interface region)