

Payload Interface Adapter (PIA) Conceptual Design & Analysis Trade Study

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System Definition & Integration Branch

Definition

Forward structural interface between the Payload Attach Fitting (PAF) and Payload Separation System (PSS)

Need

Integration of small diameter spacecraft/payloads to the PAF

Goals

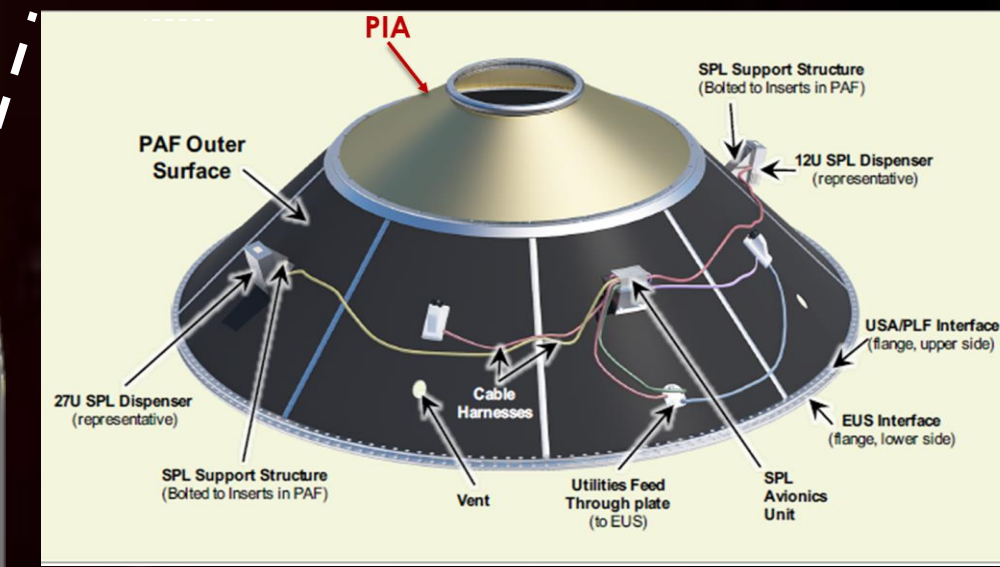
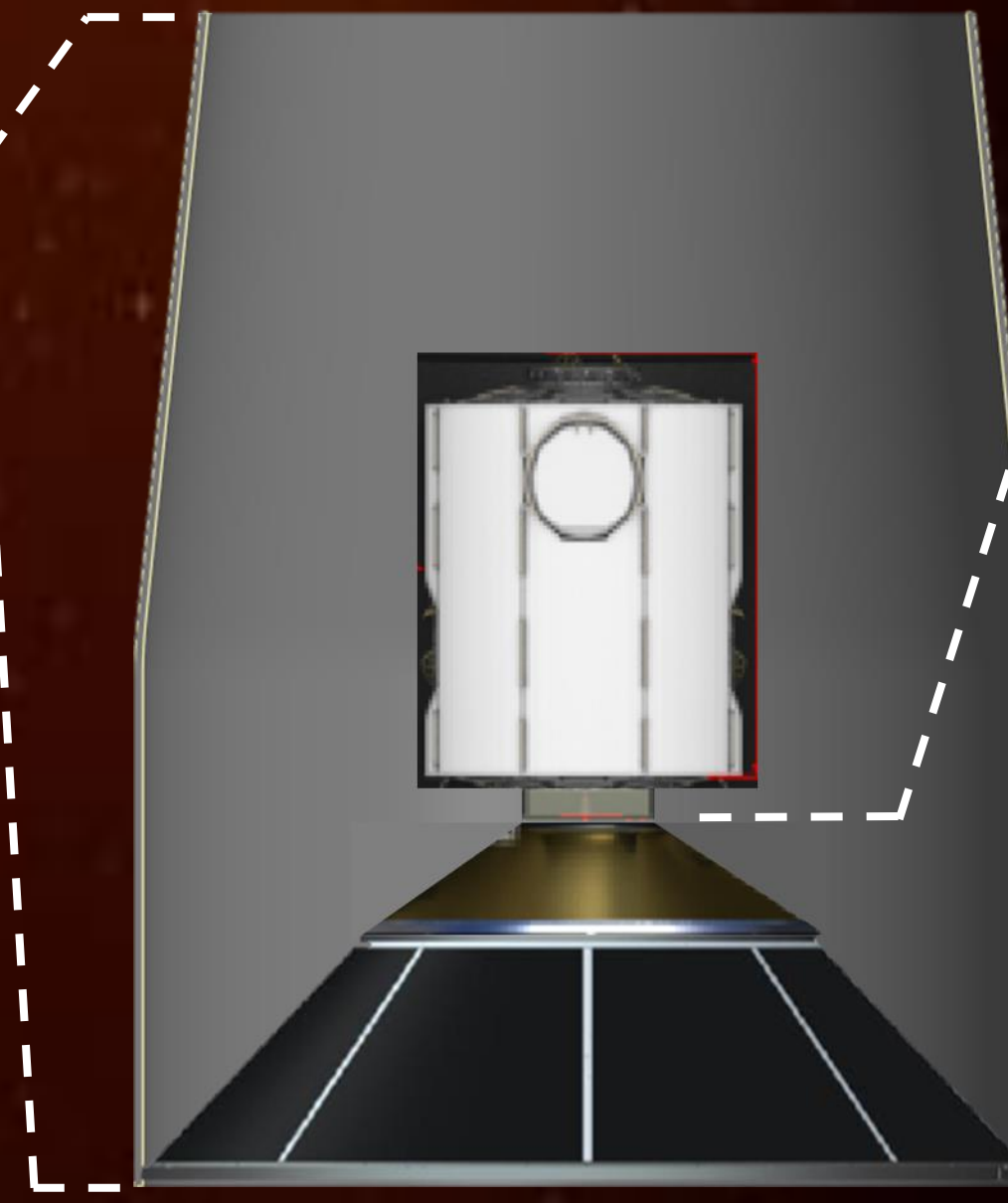
Verify that a PIA option is feasible by modifying PAF and PSS interfaces as well as reduce overall production time

Objective

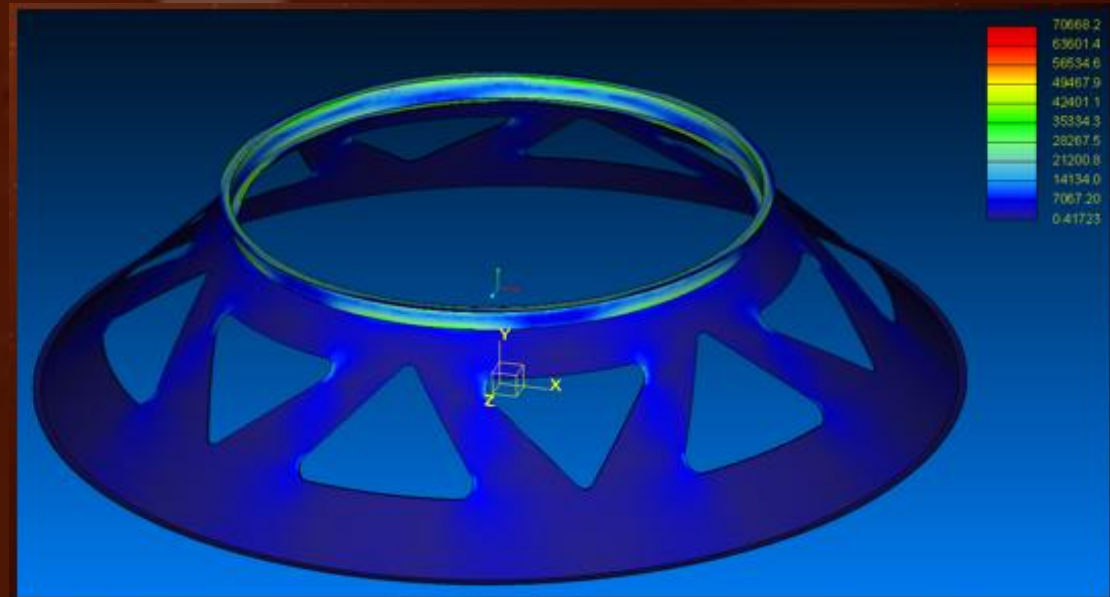
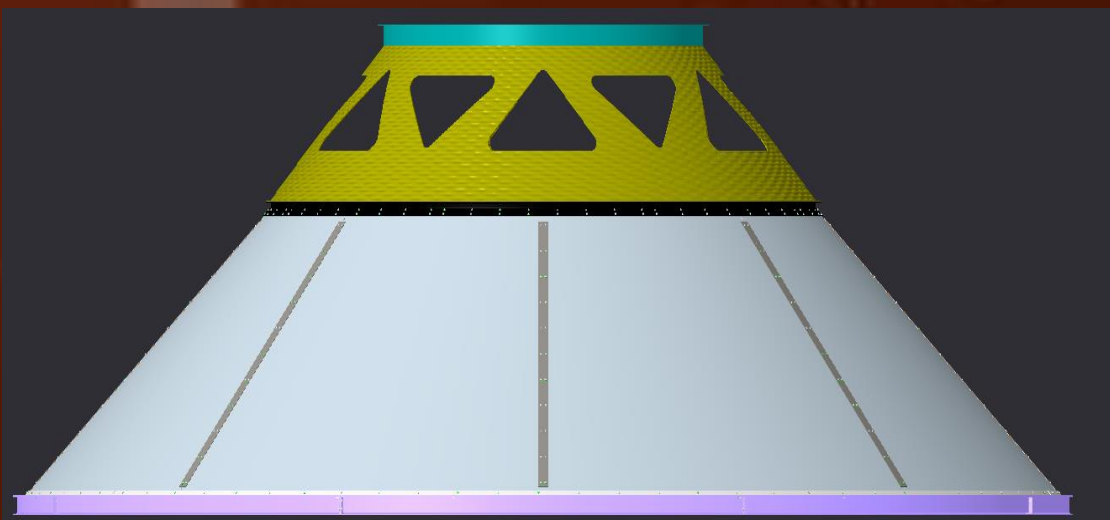
Revise the Payload Adapter Requirements Document with key driving PIA requirements



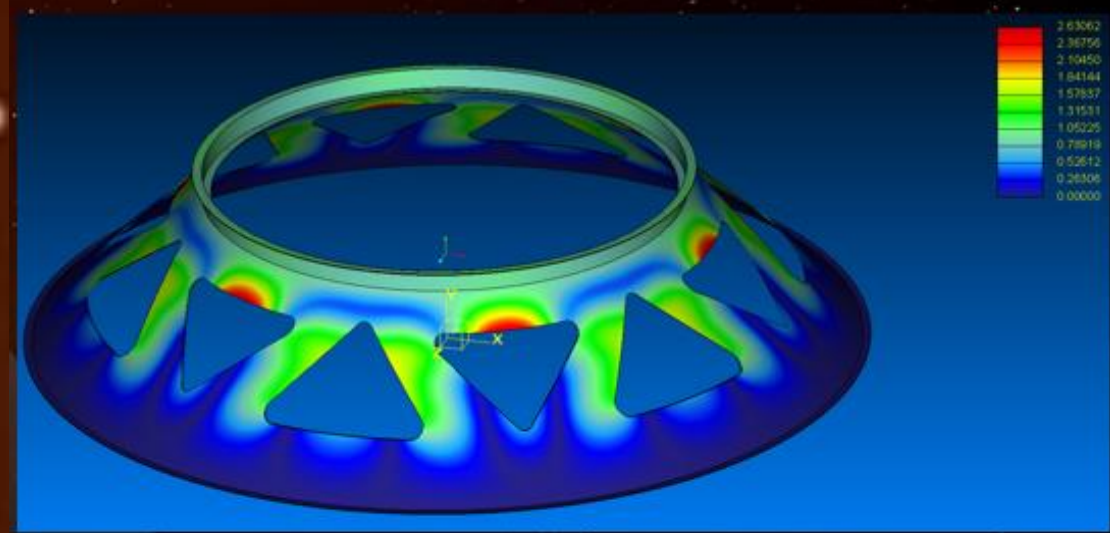
364 ft



Composite Triangular Concept

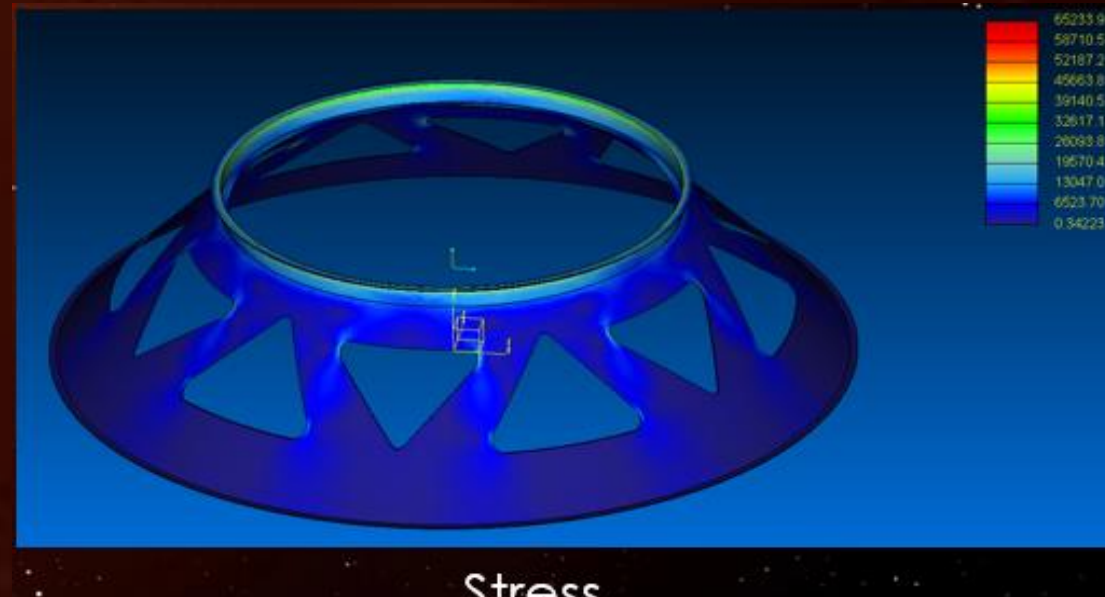
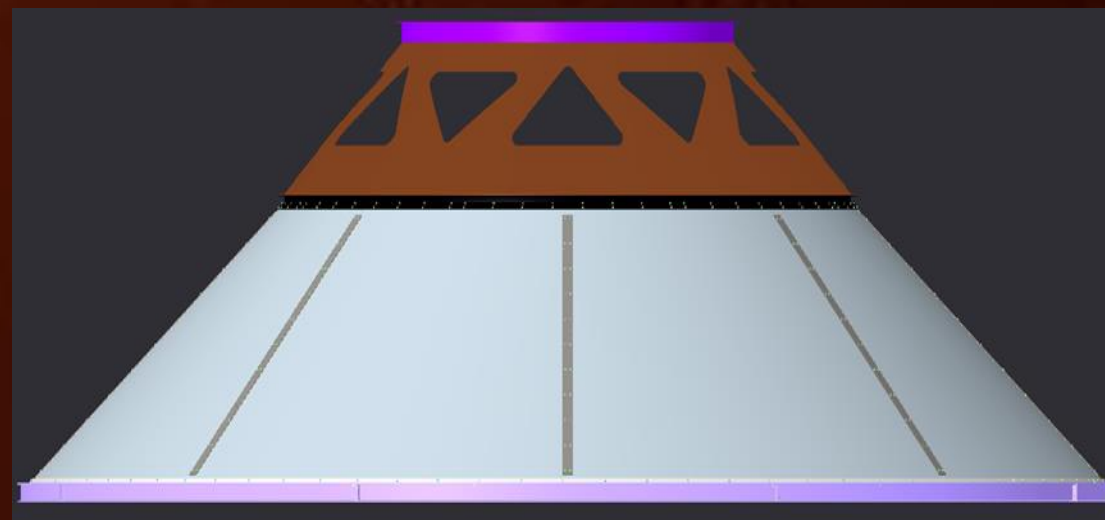


Stress

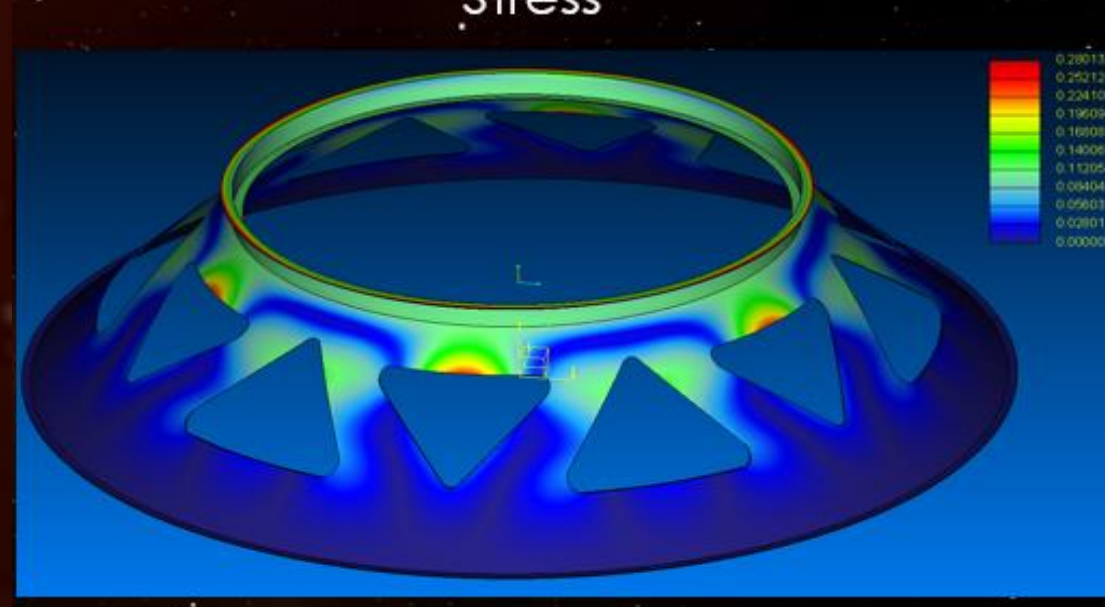


Displacement

Metallic Triangular Concept

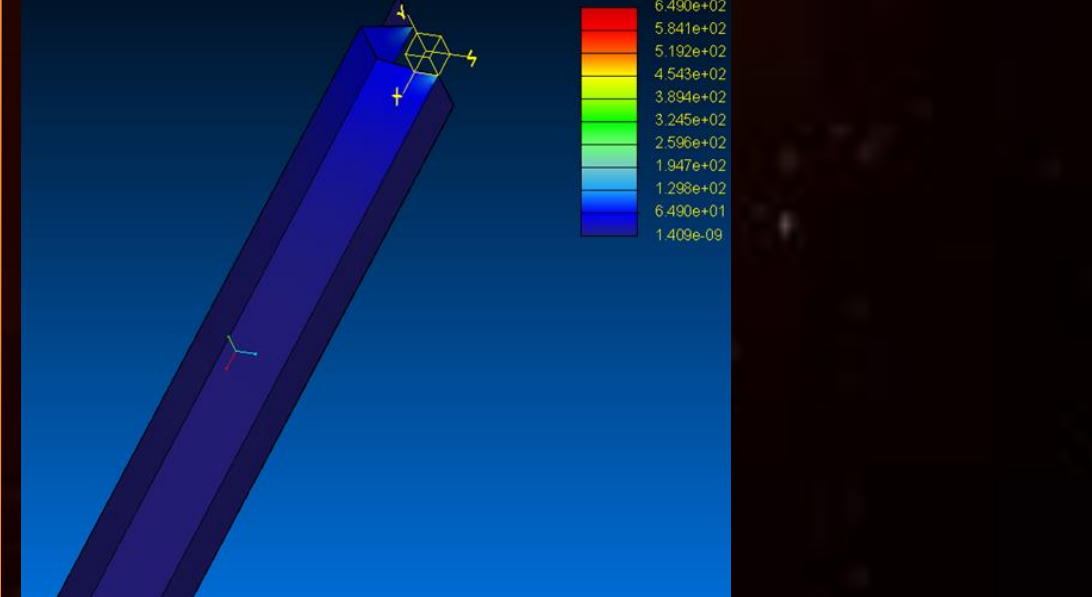
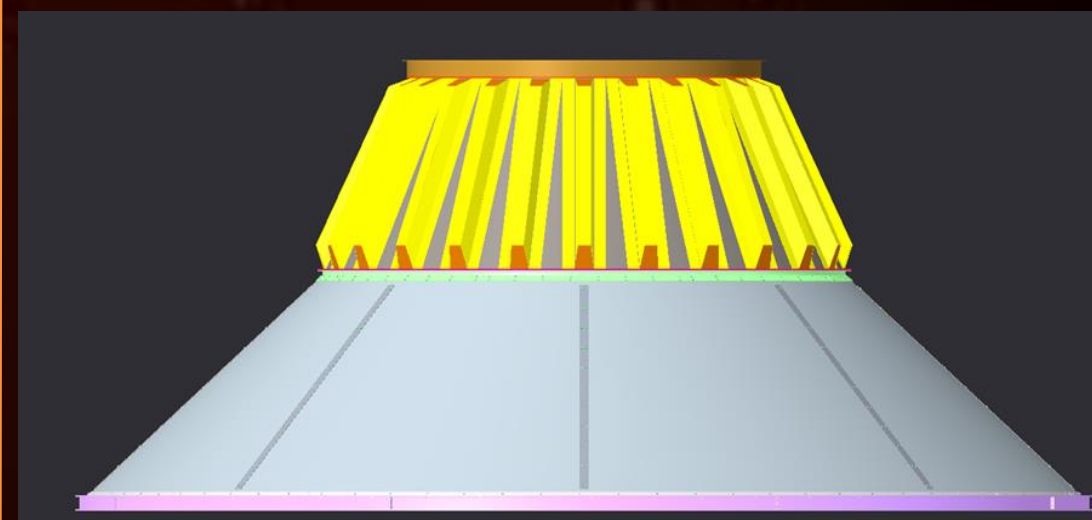


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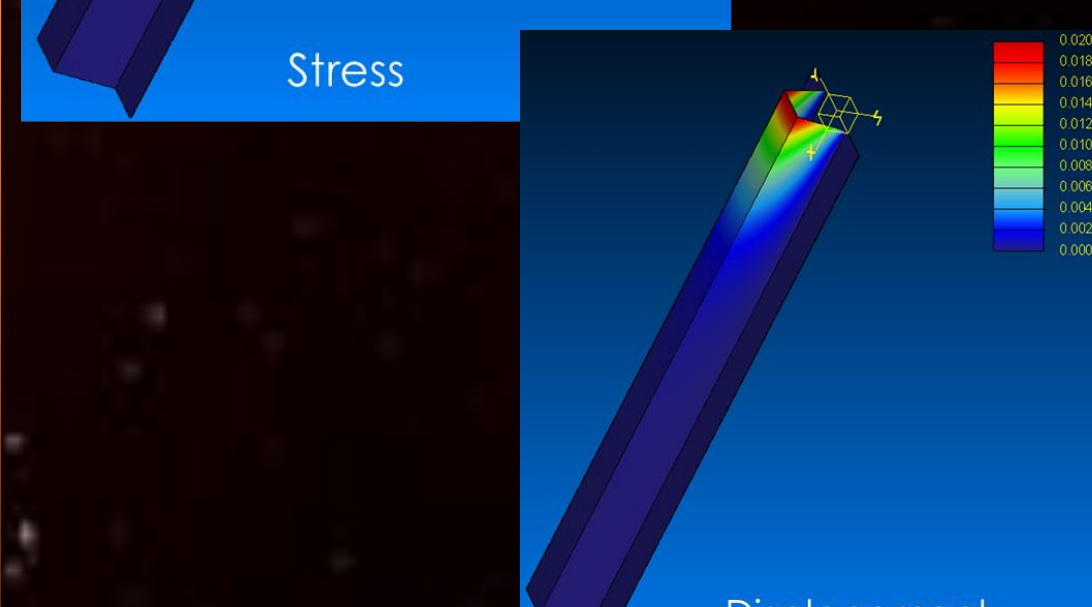


Displacement

Composite Hat-Stiffener Concept

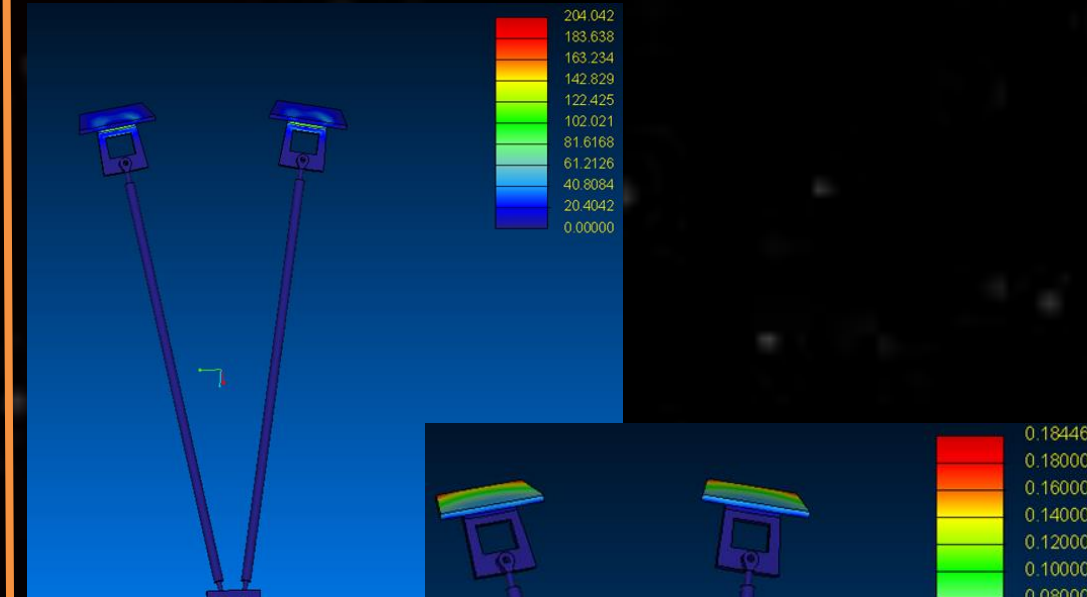
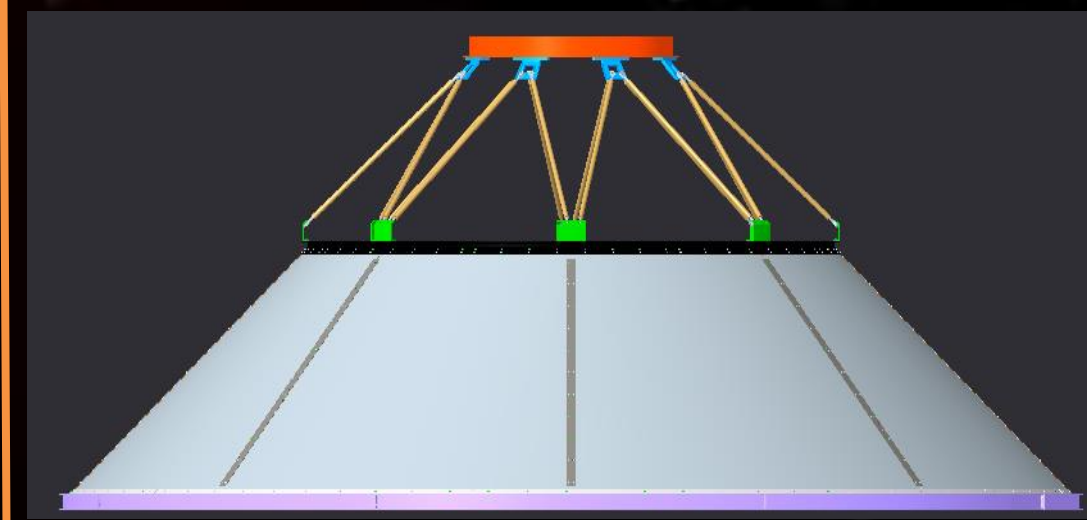


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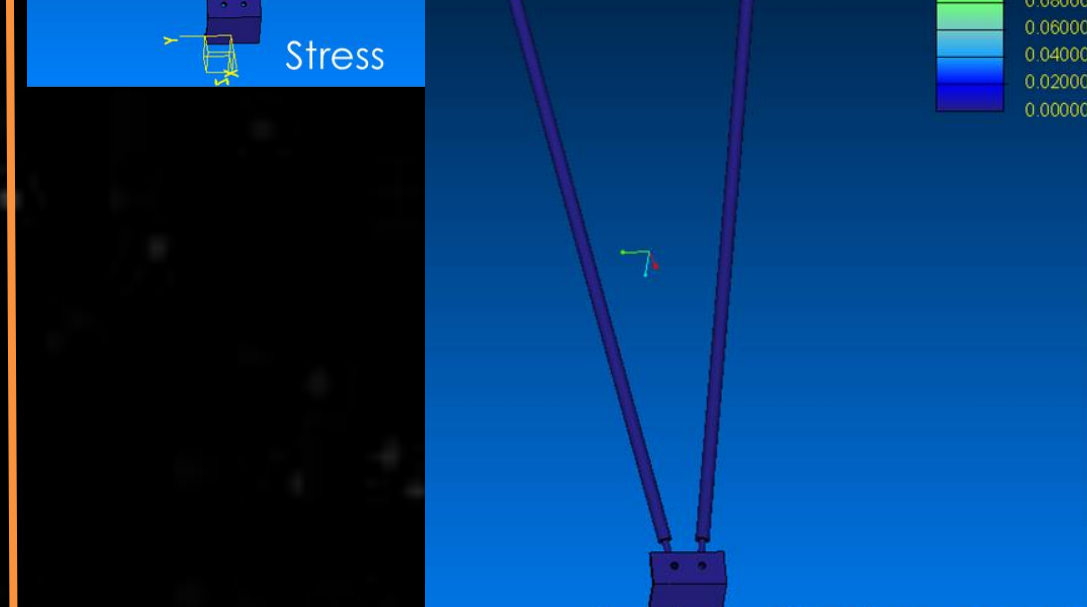


Displacement

Metallic Truss Concept

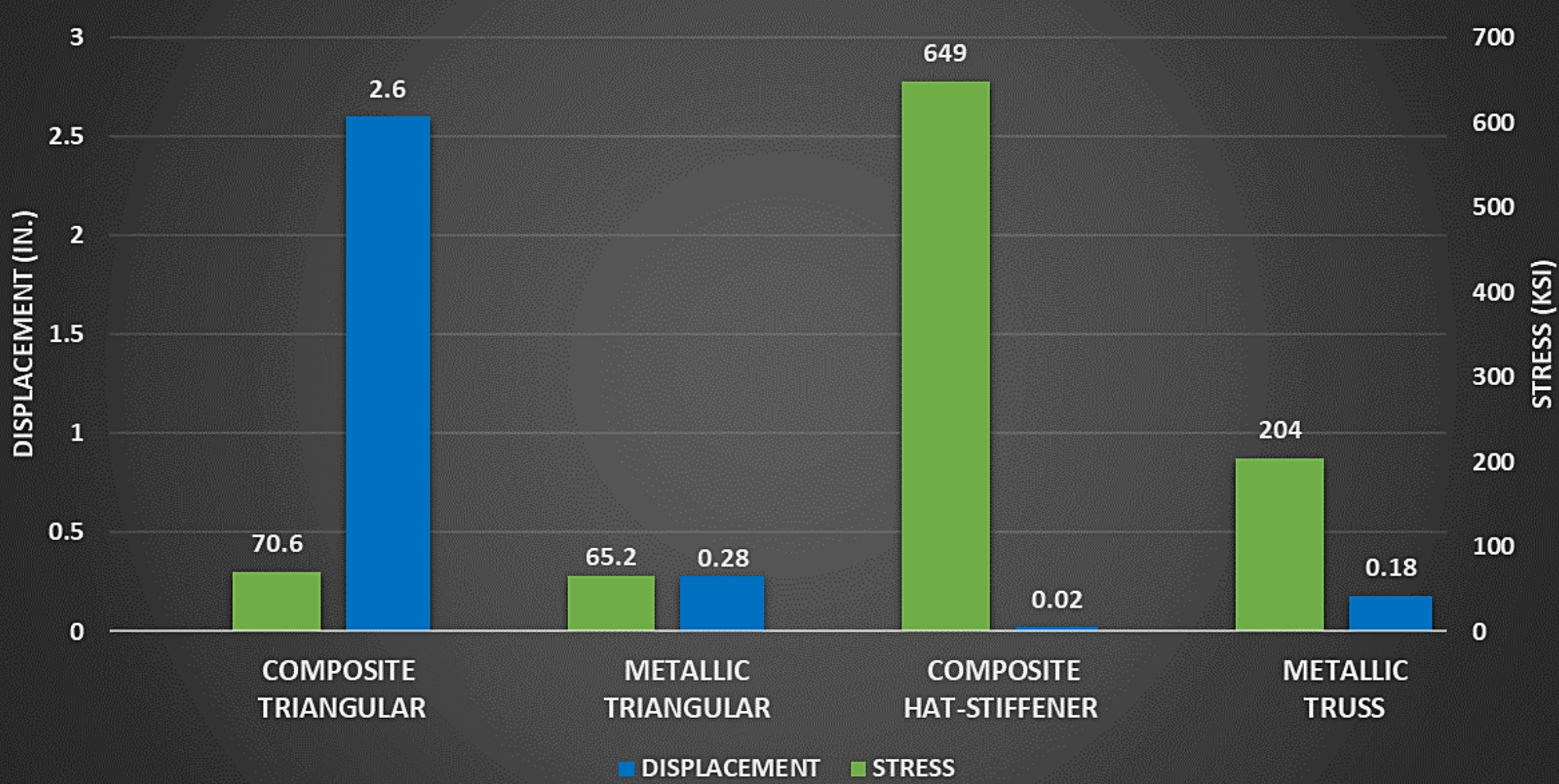


Stress



Displacement

STRESS & DISPLACEMENT



Ground Rules & Assumptions

- Current Payload Adapter is defined as PAF + PSS
- PAF mass allocation has been defined, PIA is assumed to have a much lighter mass
- Maximum Co-manifested/Primary Payload mass capacity has determined loading for the various concepts
- PAF's aft diameter will remain constant
 - PAF's forward diameter determines the PIA's aft diameter
- PIA's forward diameter and height is determined by the PSS (purchased component) as well as the Payload's diameter
- Center of Gravity location, acoustics, and natural frequency will be future considerations

Conclusion

Literature surveys show that the PIA concept is a viable option. The results of the design and analysis trade study indicate the PIA concept for the Space Launch System (SLS) is feasible. The Spacecraft/Payload Integration & Evolution (SPIE) Payload Adapter requirements document will be updated to reflect the PIA's mass, interface, frequency, and center of gravity requirements.

Acknowledgements

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