

LOFTID (Low-Earth Orbit Flight Test of an Inflatable Decelerator) PASS (Payload Adapter Separation System) Design & Qualification

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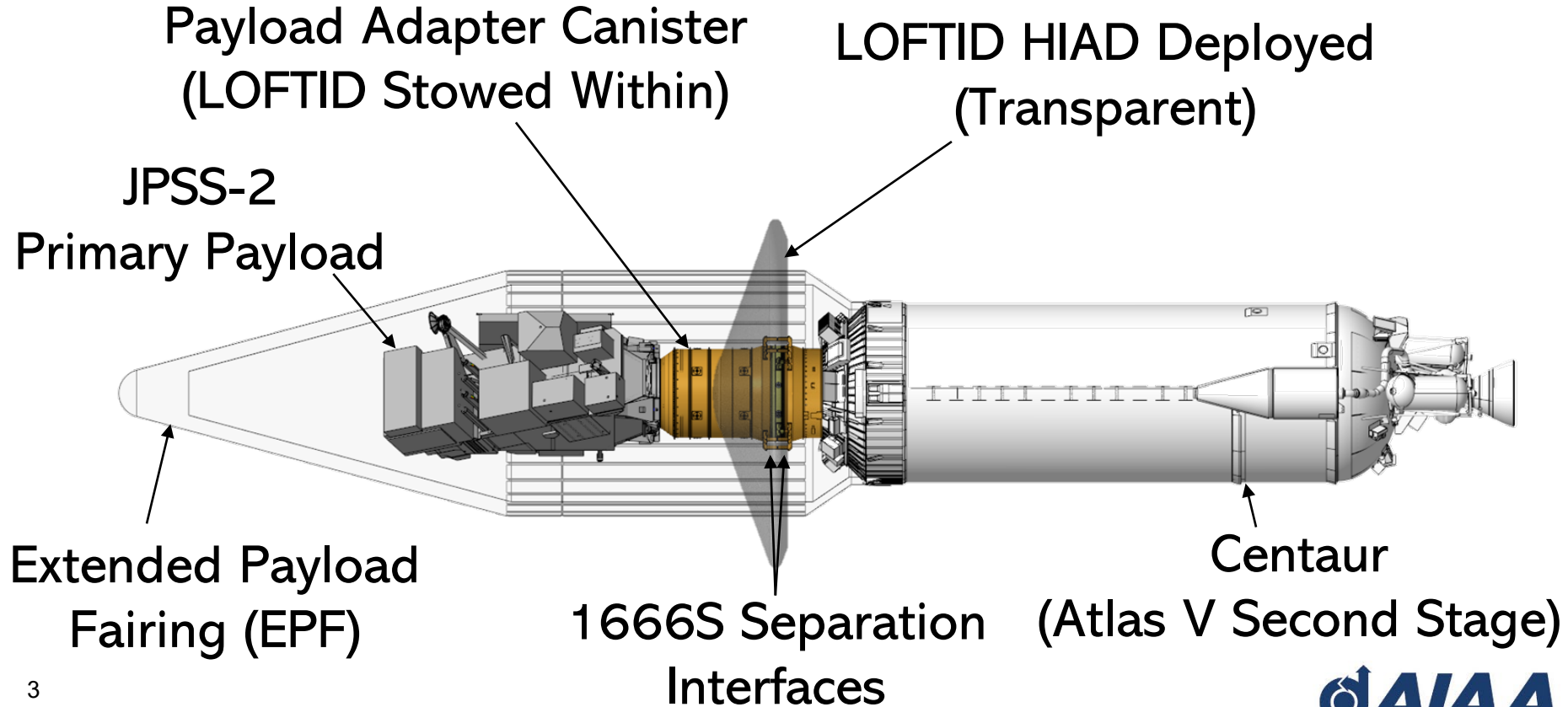
LOFTID PASS Design & Qualification Introduction

- November 10, 2022, LOFTID successfully demonstrated HIAD technology in an orbital test flight
- Demonstrated launch of 2 independent, similarly sized payloads
- Enabled by mission unique Payload Adapter Separation System



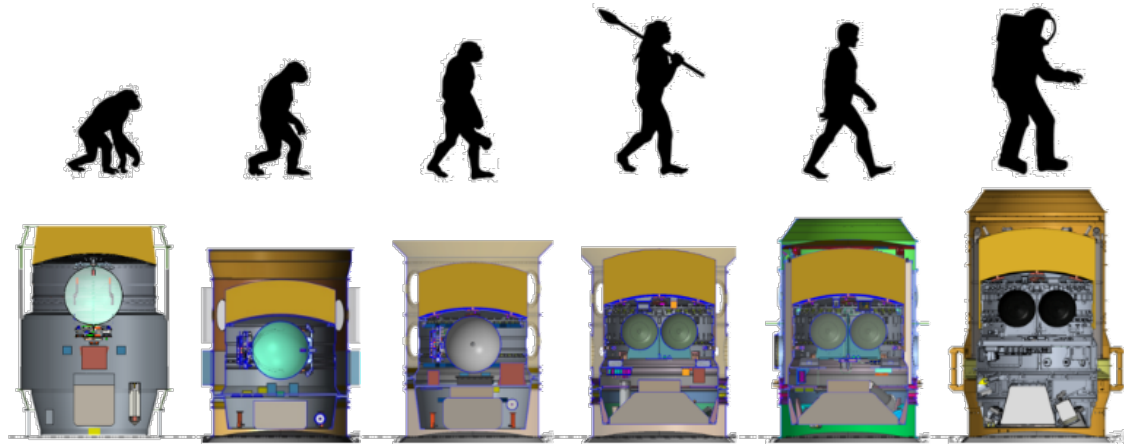
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Launch Configuration



LOFTID PASS Design & Qualification Rideshare

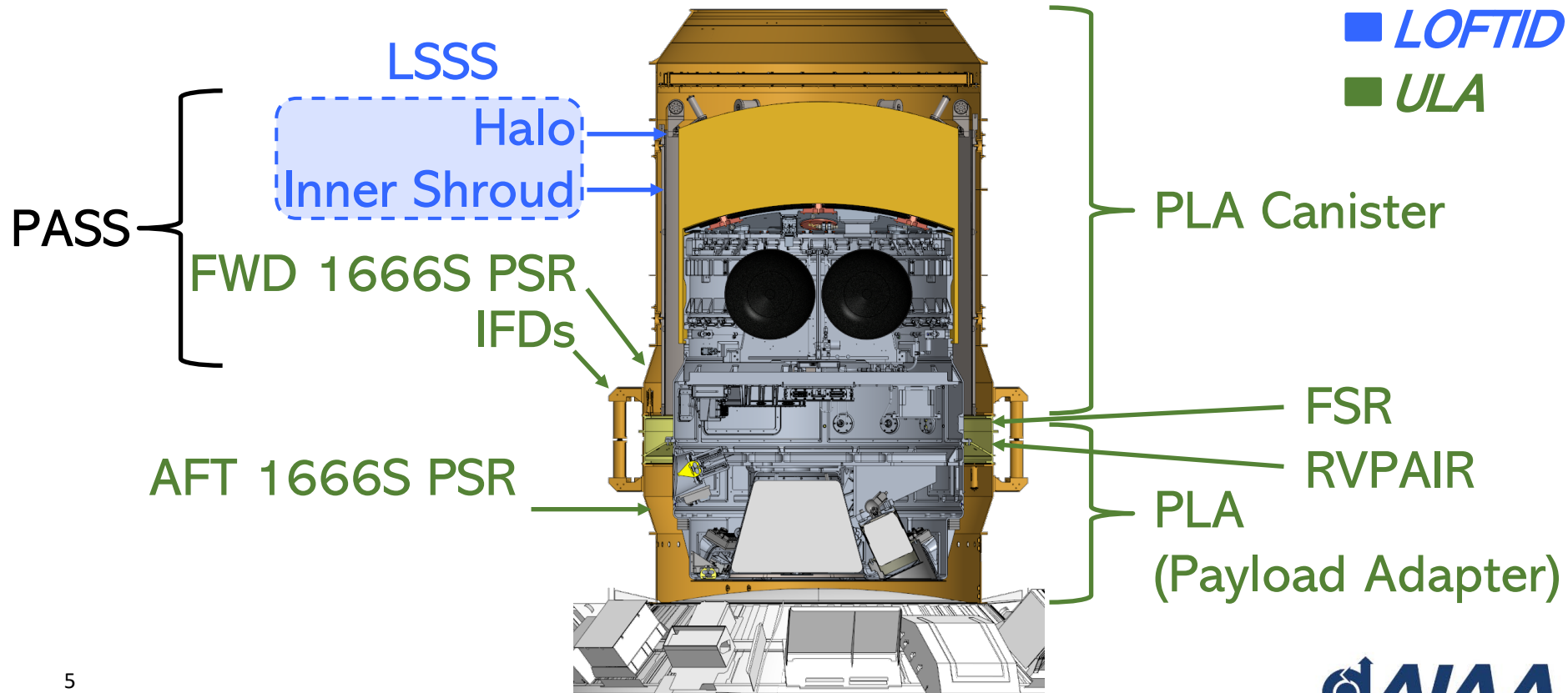
- ULA approached NASA in 2017 with proposal to use a HIAD for LV booster engine recovery
- LOFTID developed as orbital flight demonstration to prove the concept





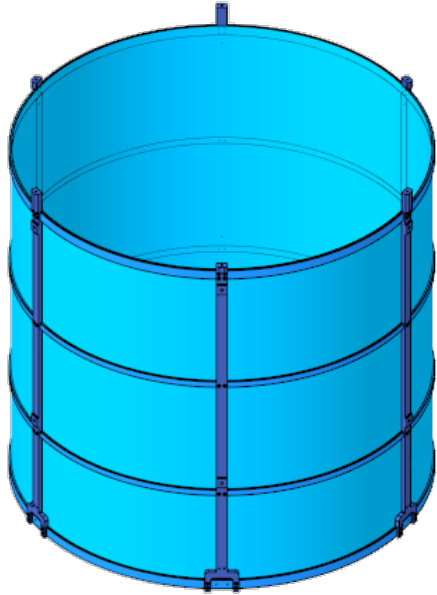
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Payload Adapter

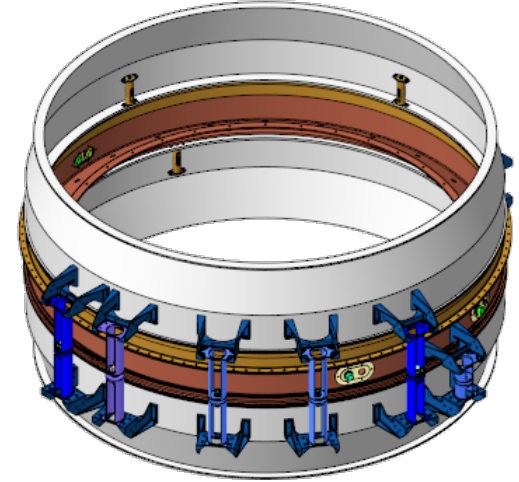


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PASS Design



Long Stroke Separation System



FWD 1666S Payload
Separation Ring



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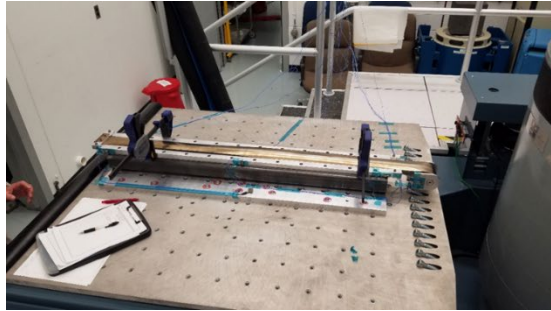
Qualification Test Matrix

Test	Recommended	LOFTID
Run-In	X	15 Cycles at Spring Level; Min 3 at Assy Level
Performance	Envelopes	Nominal Actuation
Random Vibration	Qual Level	Qual Level
Acoustic Vibration	Qual Level	Covered by Random Environments
Sine Vibration	Qual Level	Not Required
Thermal Cycle	X	Thermally Characterized Spring Sets
Life Cycle	X	48 Cycles at Spring Level; Min 5 at Assy Level
Static Loads	X	Analysis Only
Performance	Envelopes	Nominal, Envelopes, Off-Nominal

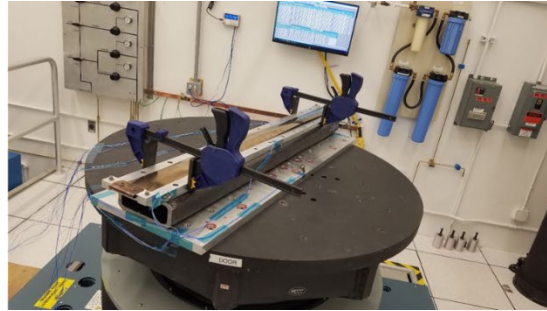


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Spring Component Qualification



CF Spring Sine Vibe Testing



Load Cell

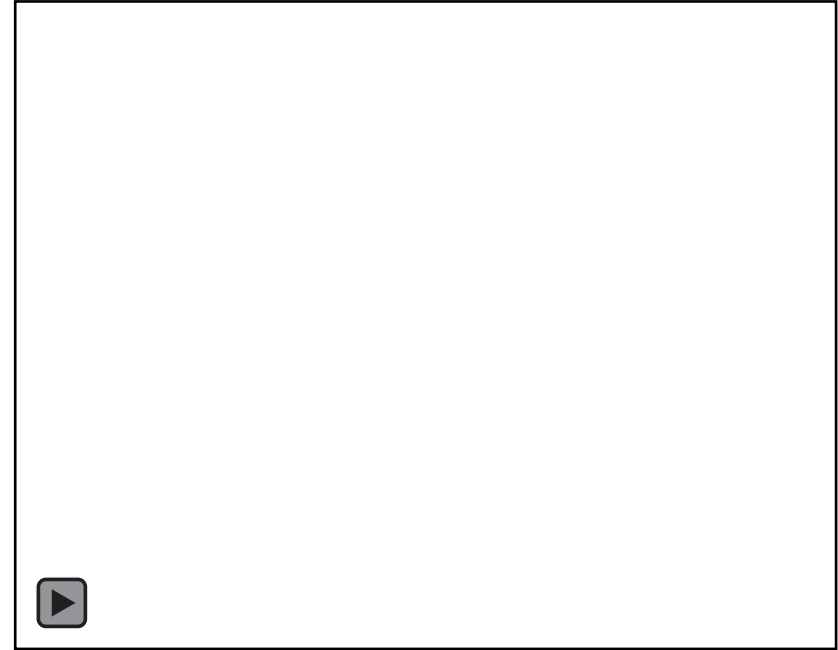
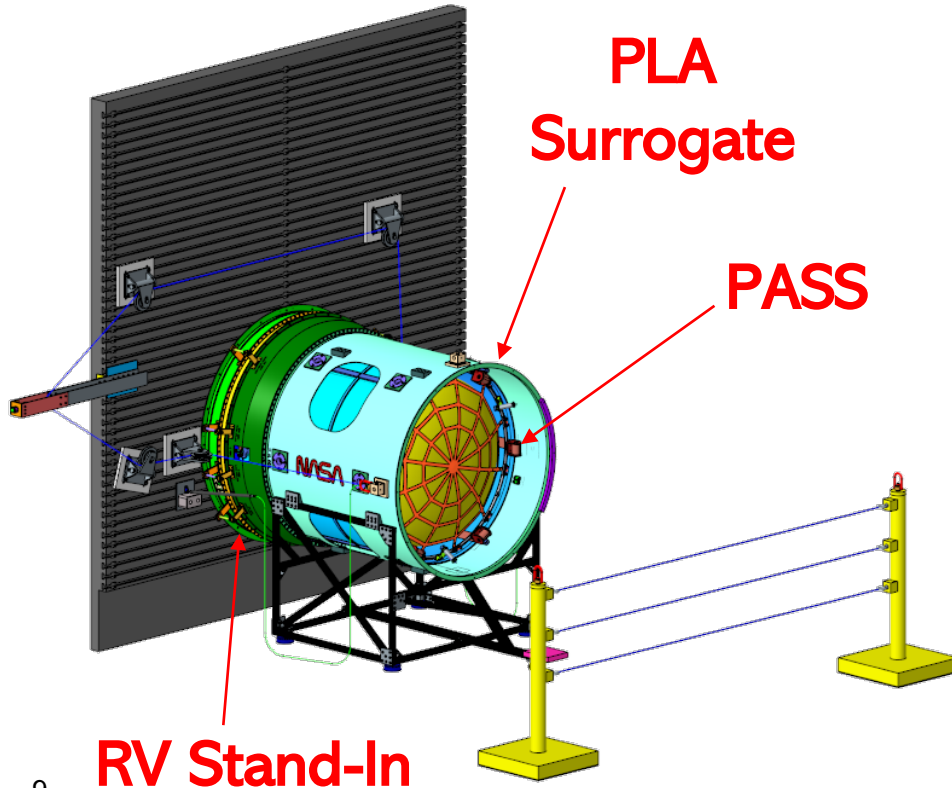
Test Article

Thermal Chamber

Pull Cord with String-Pot

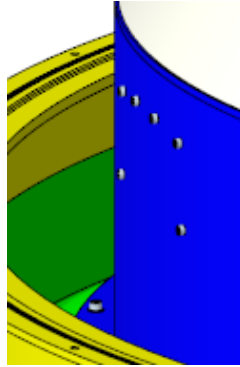
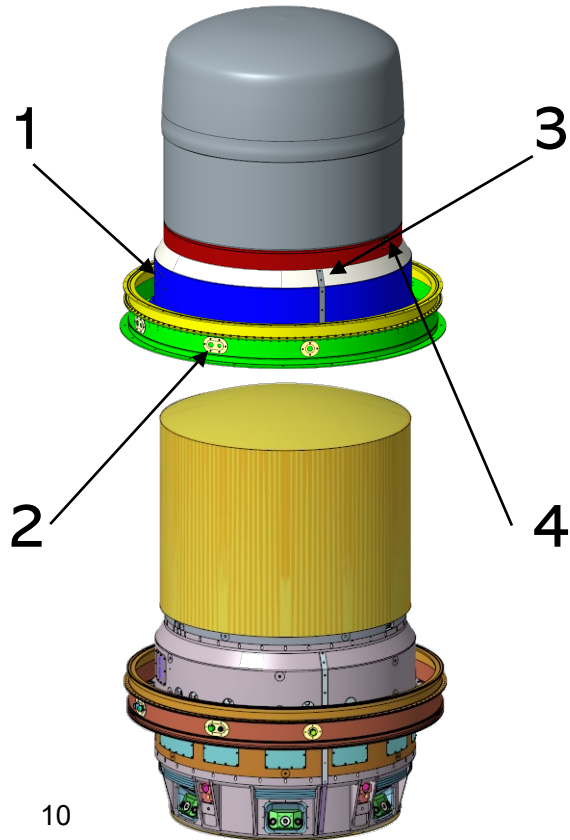
CF Spring Characterization

LOFTID PASS Design & Qualification Mechanism Testing

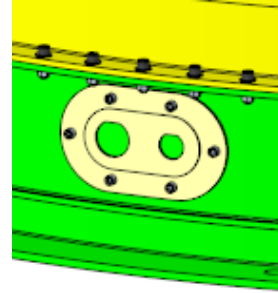


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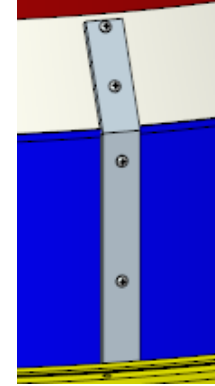
RV Stand-In



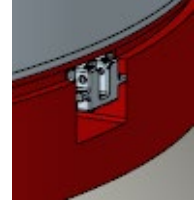
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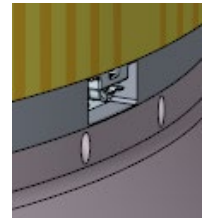
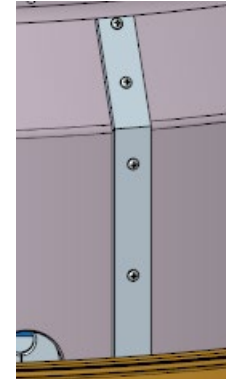
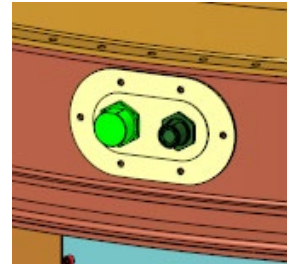
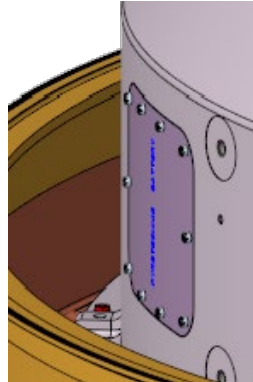
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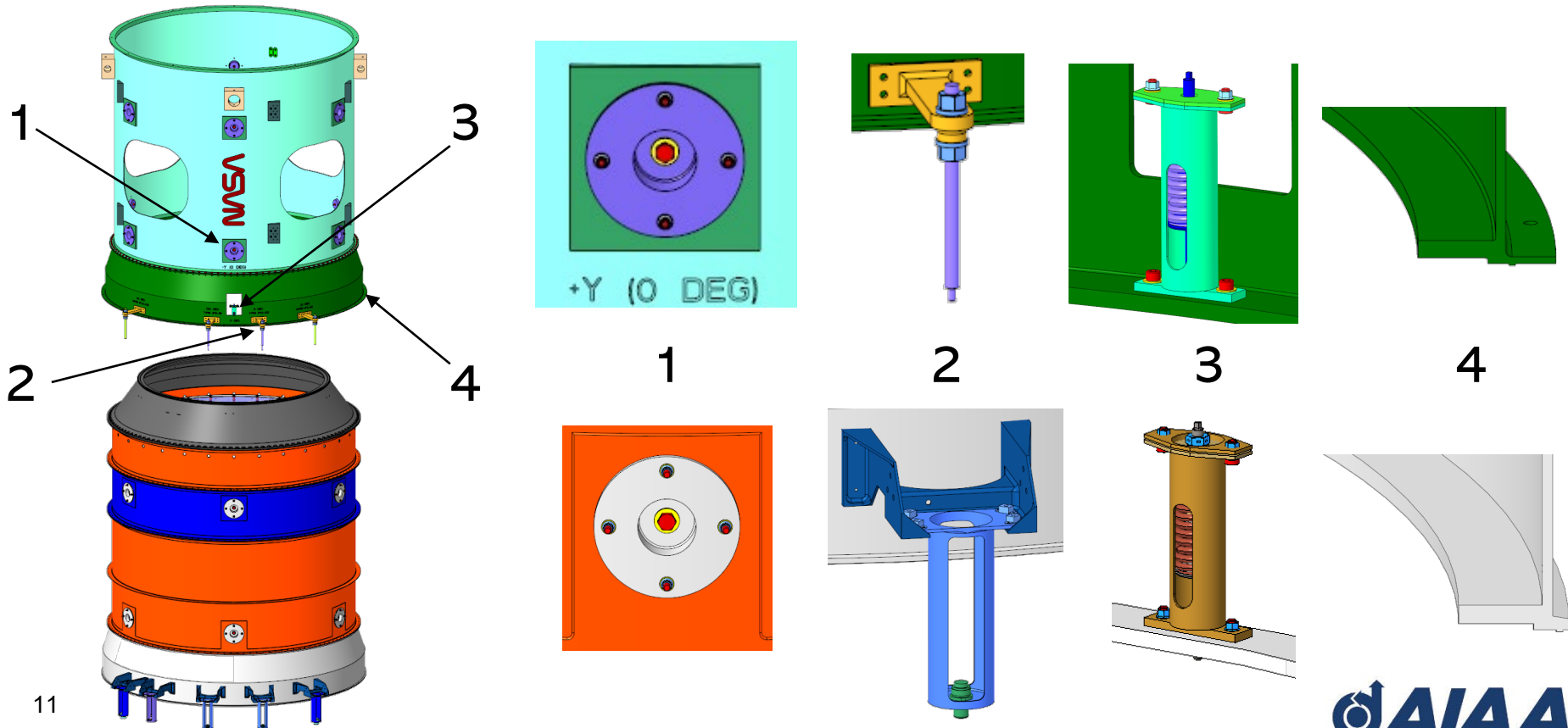


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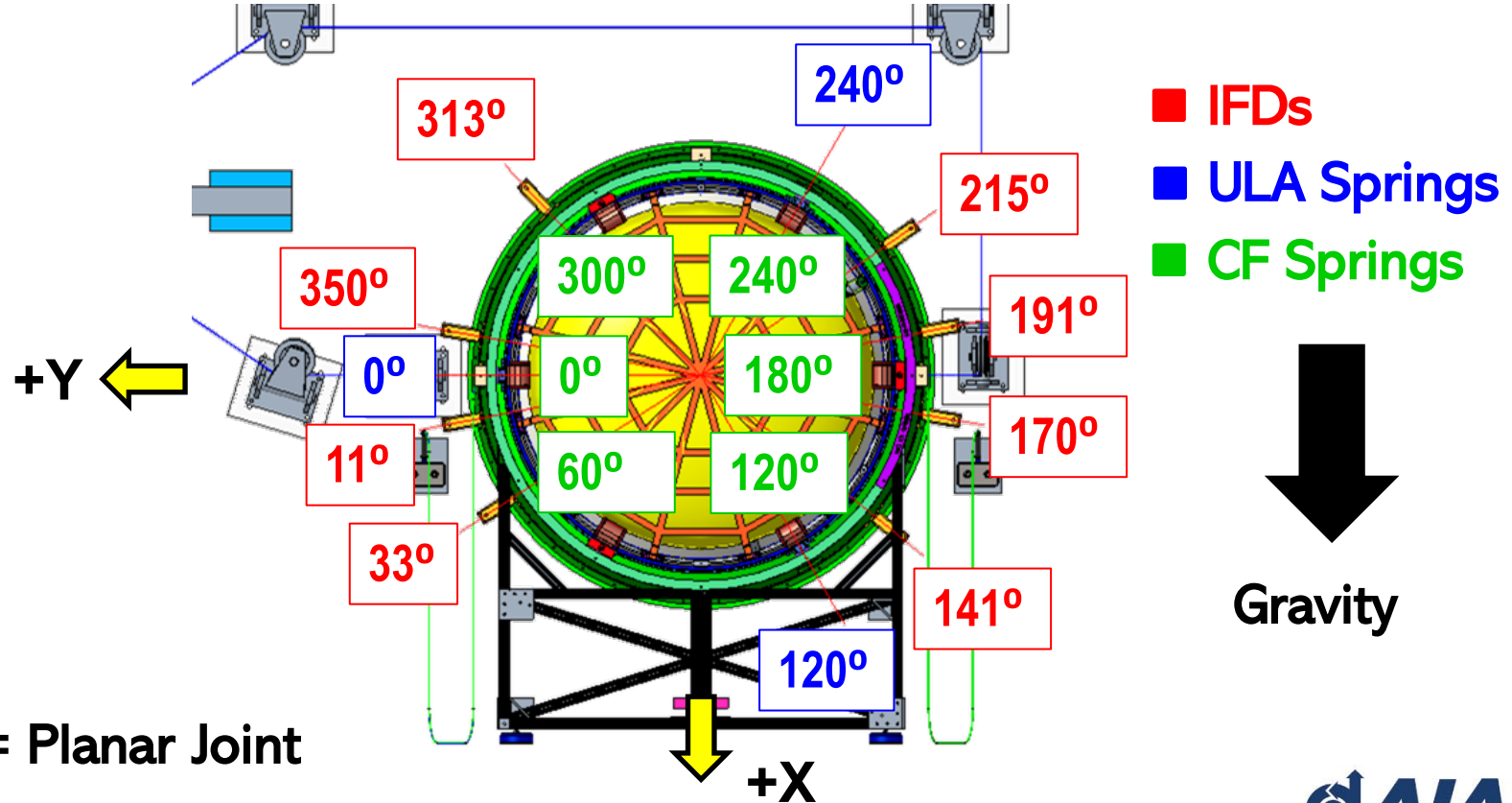


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PLA Surrogate



LOFTID PASS Design & Qualification Separation Modeling

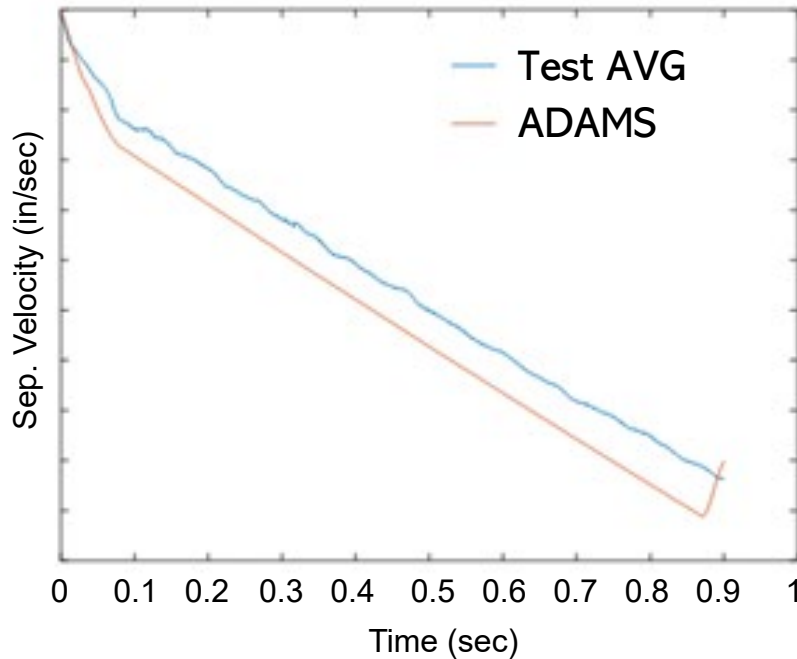


Floor = Planar Joint

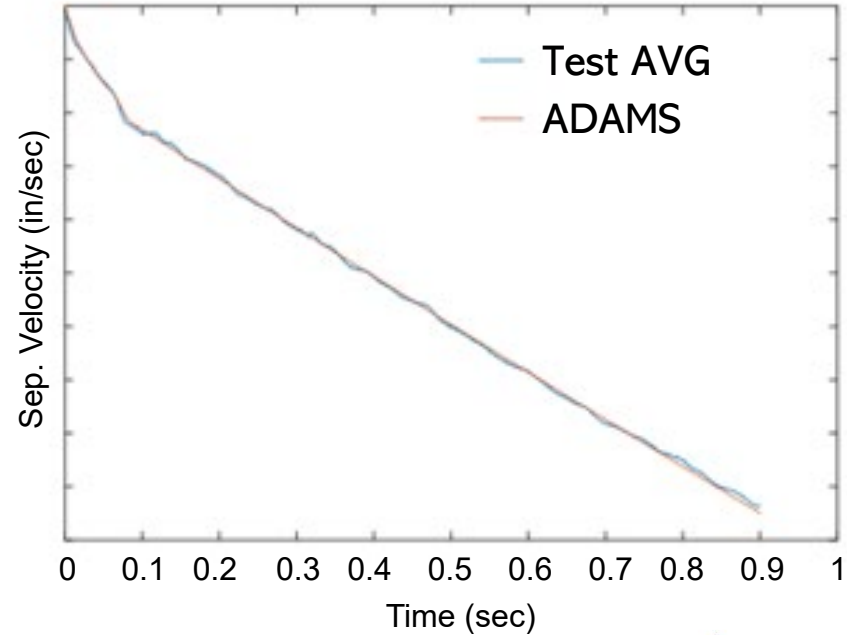


LOFTID PASS Design & Qualification Modeling Comparison

Z-Velocity (x-axis)

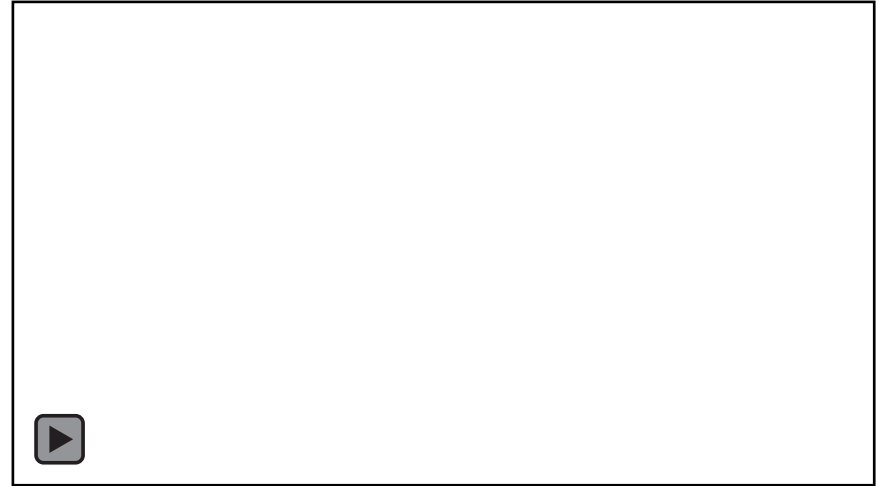
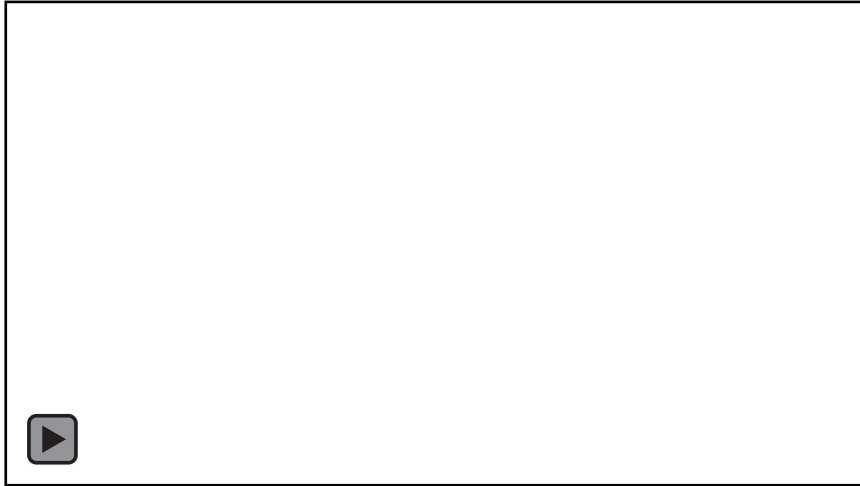


Z-Velocity (x-axis) - tuned





LOFTID PASS Design & Qualification Summary



- 31 Successful Deployments
- Flawless Performance in Flight
 - No noticeable tip-off
 - Separation velocity in kind with ground testing



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