

FINAL PRODUCT BREAKDOWN

TEAM: NASA RASC & 21Spr3

Due Date: 12/3/21

See Bb Learn

The completed system is shown below:

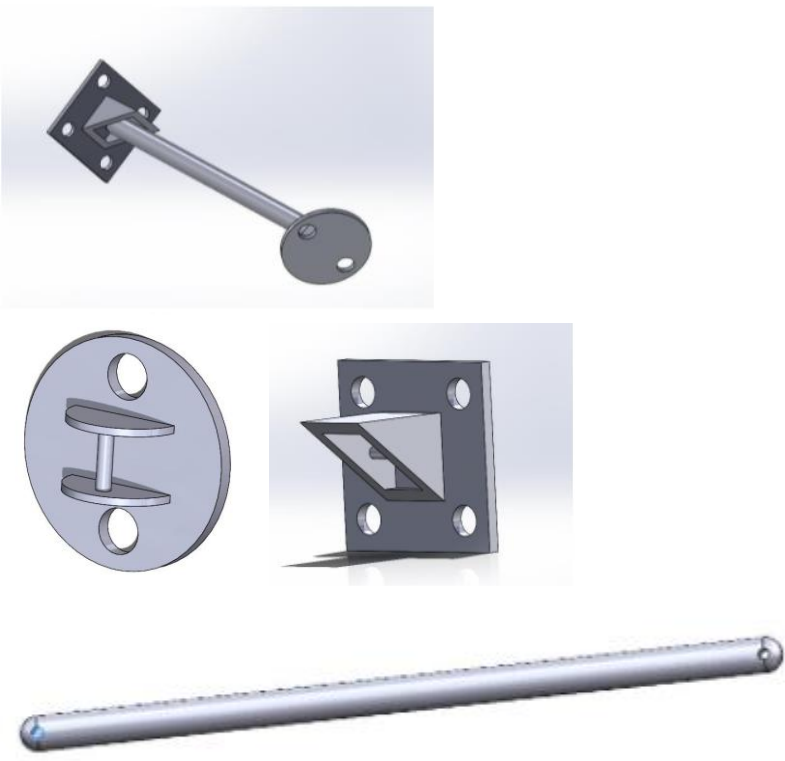
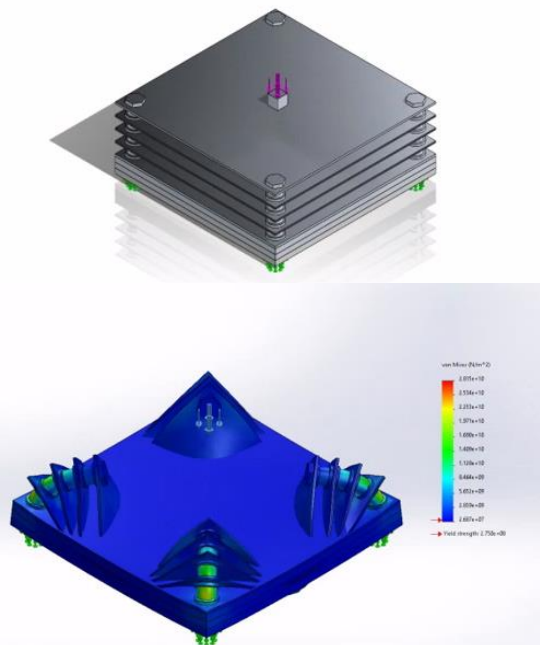
The following are the Action Items each person completed between Hardware Review 2 and the completion of the final product:

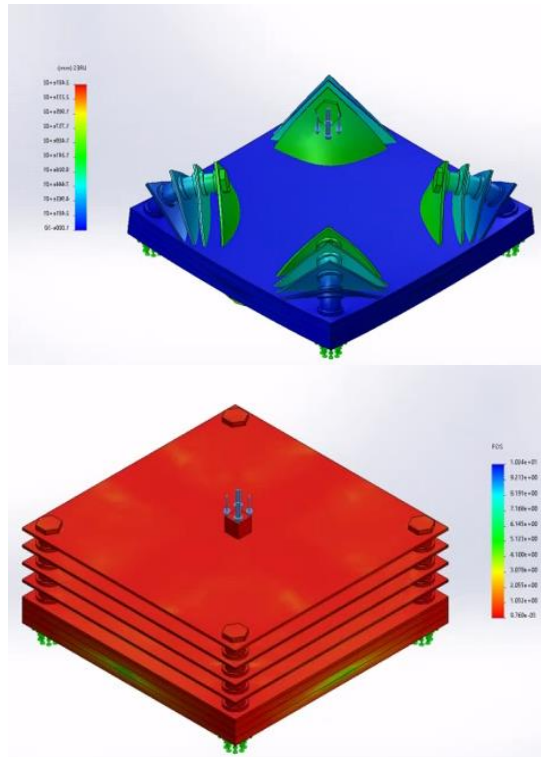
Team Member: Jelani Peay

Action Item	Date Completed	Result/Proof of Completion
Brainstormed ideas to conduct better FEA analyses.	11/10	Participated in a meeting with Keith to talk about more efficient ideas to run a better FEA analysis for the hypervelocity impact analysis.
Updated Prototype Budget	11/15	Update the prototype budget with all of the new components (i.e., Spacers, hex bolts, zip ties, 3-D printed parts)
Updated Theoretical Budget	11/16	Update the theoretical budget with the new components (i.e., ECLSS)
Worked on Theoretical & Prototype B.O.M	11/17 & 11/18	Worked with Ryan to update the B.O.M which corresponds to the parts list from the latest CAD model of the lunar habitat
Conducted Kinetic Energy Impact Analysis	11/18	To prove that our shield could withstand the amount of kinetic energy a micrometeorite can produce I conducted an analytical impact analysis through MATLAB.

Team Member: Keith Nagaruri

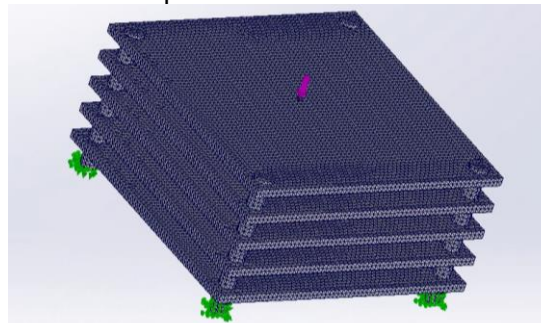
Action Item	Date Completed	Result/Proof of Completion
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<p>FEA Improvements and Analysis Meeting</p>	<p>11/10</p>	<p>Met with Jelani to identify problems with the mesh and FEA. Concluded that isolating joints for better mesh control is tough selecting between the plates is tough. Built a new test fixture for analysis.</p>
<p>Leg Design Solidworks Model</p>	<p>11/17</p>	
<p>Built new test fixture for Whipple shield and ran analysis</p>	<p>11/18</p>	<p>Study ran using the main CAD assembly.</p> 

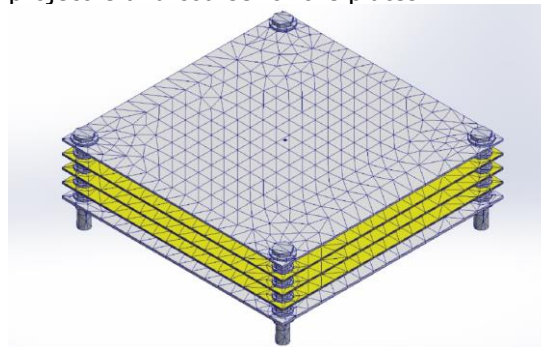


FOS failed. This is due to using a 25mm x 25mm lead cube. Thus the new test fixture without mli was generated to create a more accurate simulation.

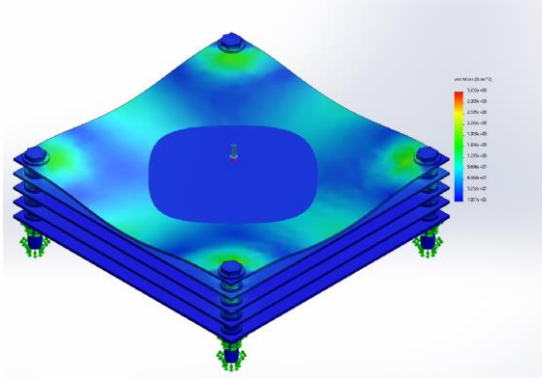
New Test Fixture: Removed the MLI layer and used Kevlar 49 for the 3 middle plates.



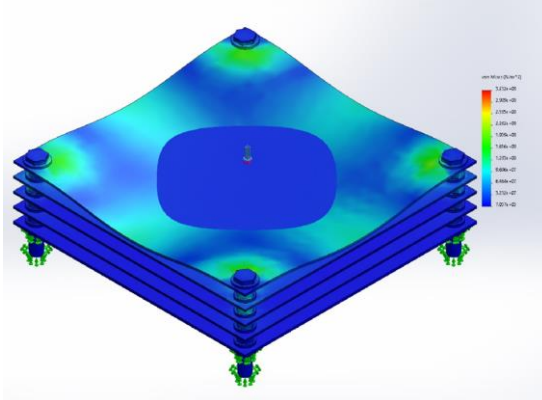
Further refinement of mesh to obtain fine mesh around the projectile and coarse for the plates:



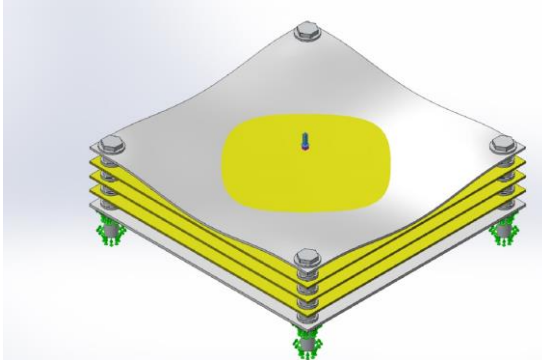
Max Stress Results: 323.2MPa



Displacement Results: 2.55 micrometers



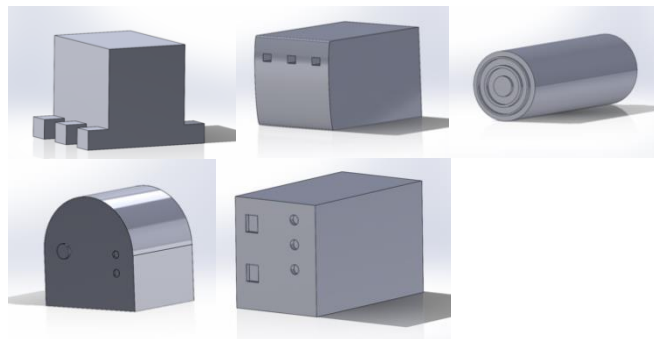
Deformation Scale: 3.691mm



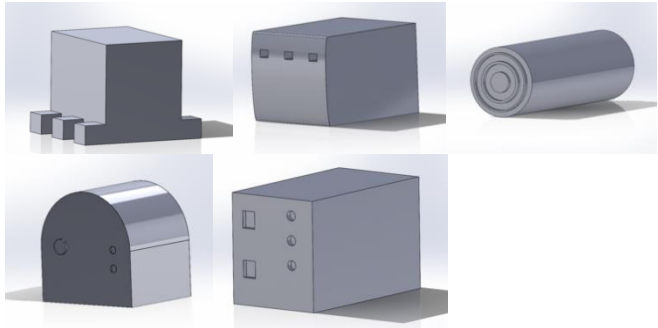

Whipple Shield Test = Pass

ECLSS CAD File Conversion

11/25



Team Member: Salar Golshan

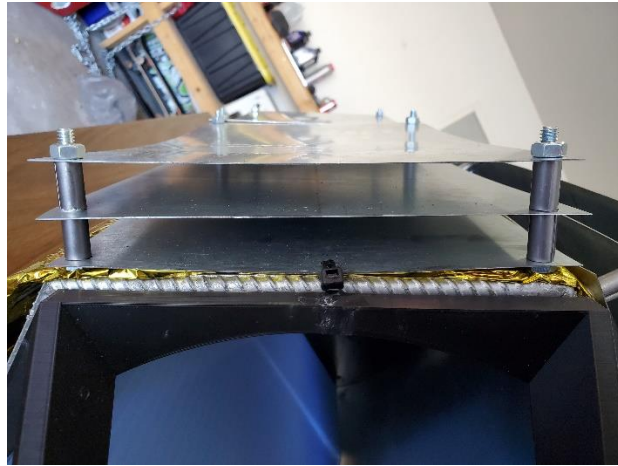
Action Item	Date Completed	Result/Proof of Completion
<p>CAD Modeled all 18 ECLSS sub systems to 1/10th scale in three individual racks supporting the O2 and H2O refinery systems.</p>	<p>11-28</p>	
<p>Completed the final dimensions and version of the hatch door, air lock room and window with Ryan and Aidan.</p>	<p>11-14</p>	
<p>Prototyped all scaled habitable necessary material (beds, desks, bathroom and kitchen area)</p>	<p>11-29</p>	

Team Member: Aidan O'Brien

Action Item	Date Completed	Result/Proof of Completion
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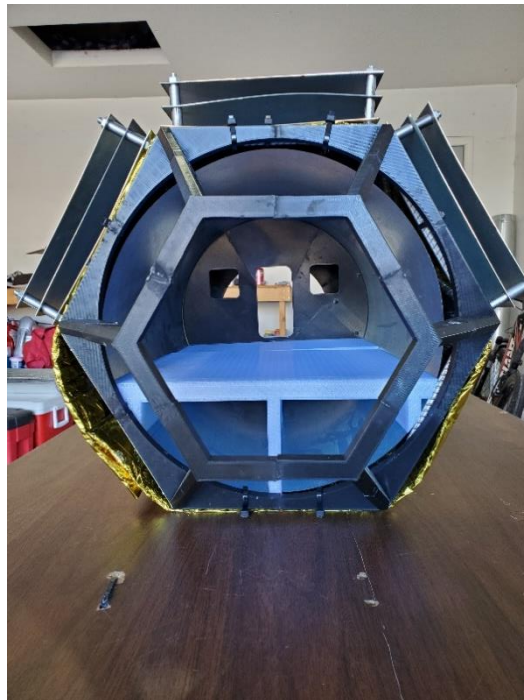
Rebuilding Whipple Shields with new bolts to make them more robust.

11/7



Learning how to use 3D printer. Helping Print Window, Interior and Exterior Air locks doors. Assembling and installing Window parts and interior Air lock door.

11/21



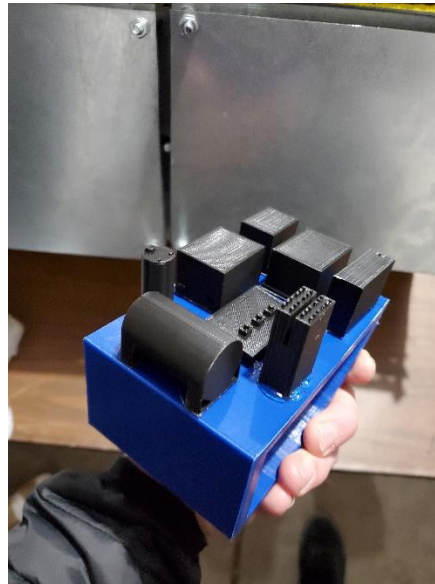
Sanding and assembling exterior Air lock door.

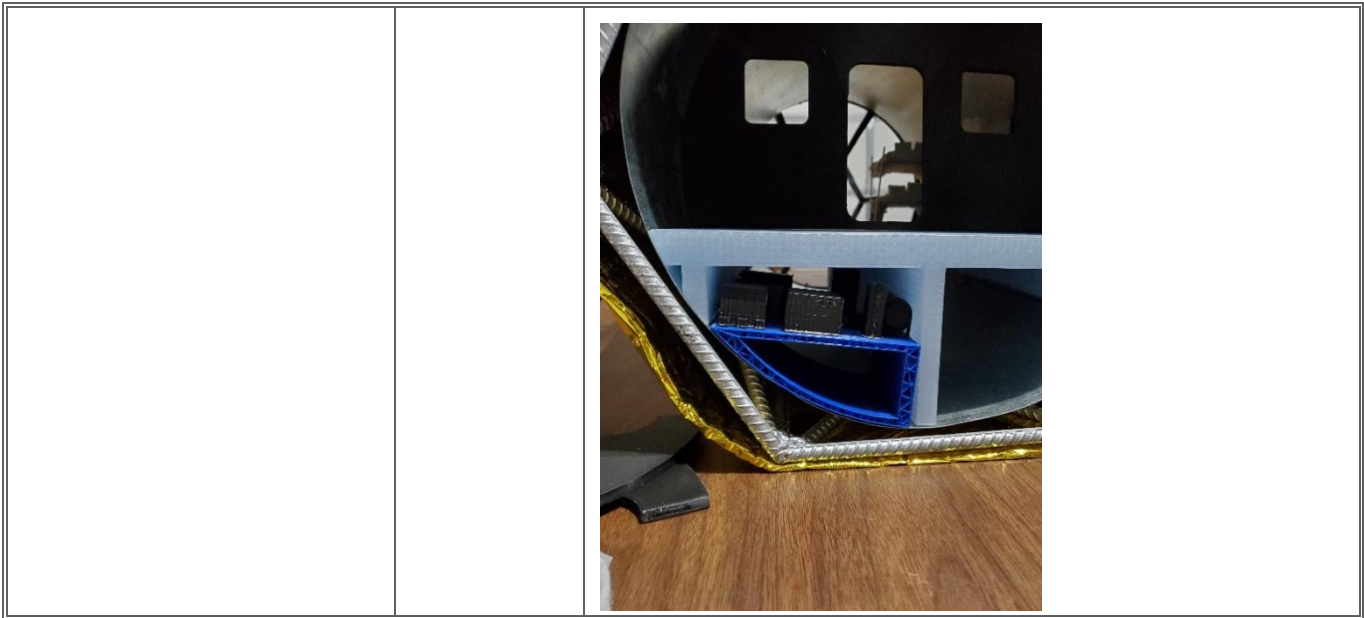
11/28



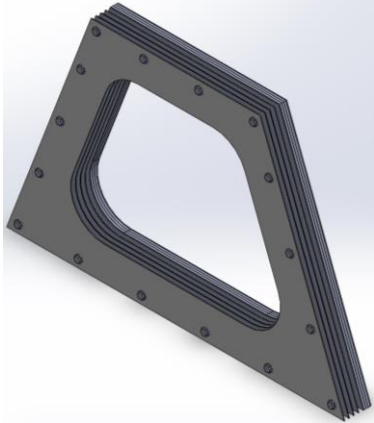
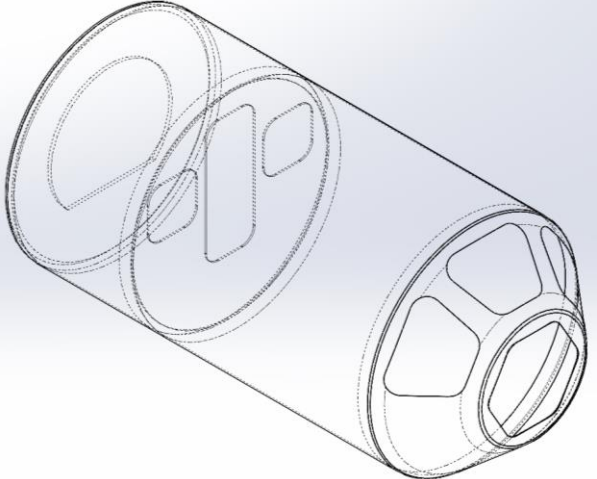
Printing life support systems as well as designing and printing the shelf for them.

11/30





Team Member: Ryan Navarette

Action Item	Date Completed	Result/Proof of Completion
CAD of Window shielding for analytical model	11/11	
CAD completed of the Pressure Wall for analytical model with cut geometry and added thickness	11/18	

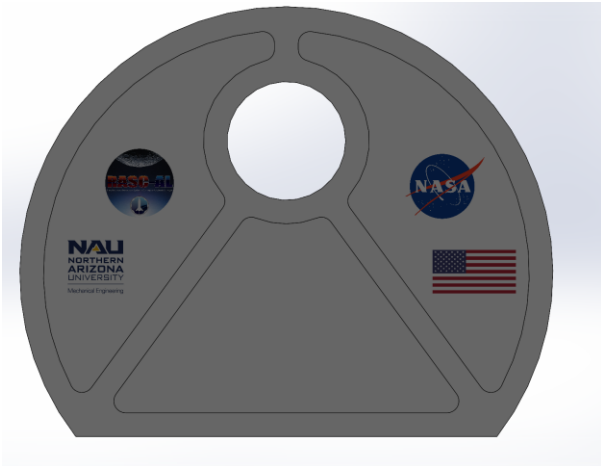
3D printing with a Creality Ender 3 v2 and created CAD models to be 3D printed for the physical model

11/22



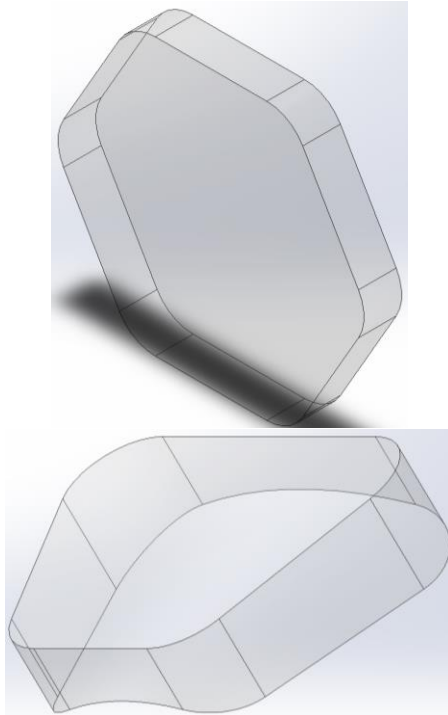
CAD updates to Airlock including front door, bulkhead door, and suit port access for analytical model

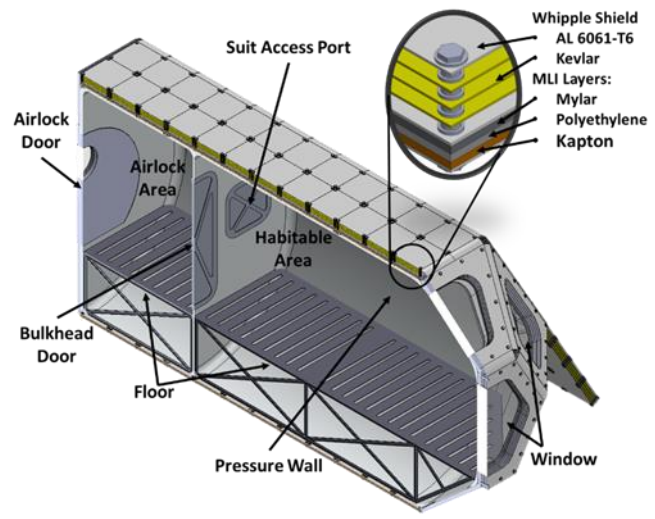
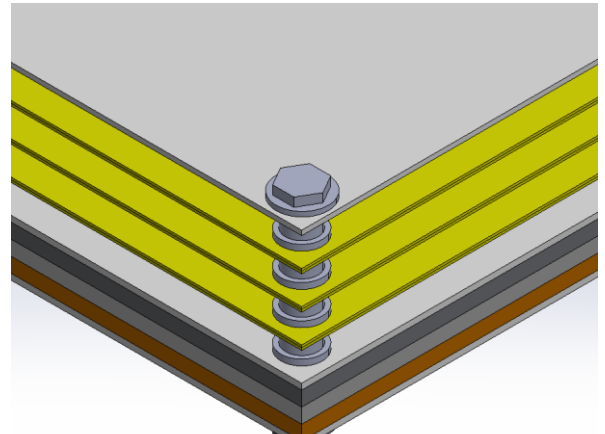
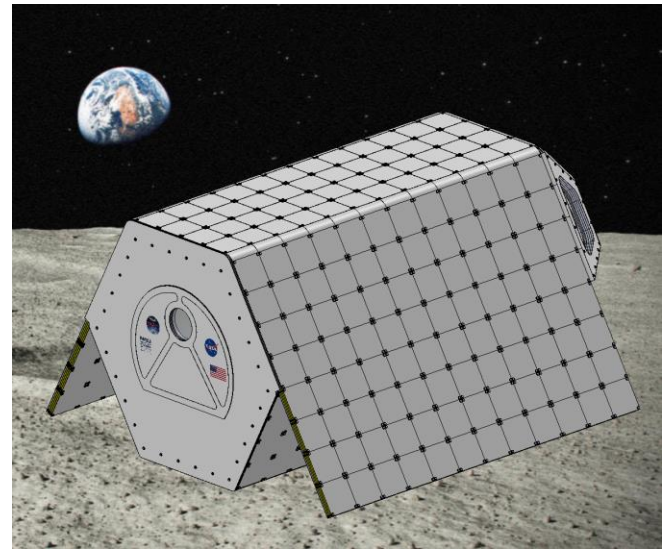
11/19



CAD completed of the glass window for analytical model

11/29



<p>Material selection added to CAD model as well as</p>	<p>12/01</p>	 <p>A 3D cutaway diagram of a spacecraft module. The diagram shows the internal structure with labels for 'Airlock Door', 'Airlock Area', 'Suit Access Port', 'Habitable Area', 'Bulkhead Door', 'Floor', 'Pressure Wall', and 'Window'. An inset shows a cross-section of the Whipple Shield with labels: 'Whipple Shield', 'AL 6061-T6', 'Kevlar', and 'MLI Layers: Mylar, Polyethylene, Kapton'.</p>
<p>CAD of the Whipple Shield completed</p>	<p>12/01</p>	 <p>A close-up 3D diagram of the Whipple Shield assembly at a corner joint. It shows multiple layers of yellow MLI (Multi-Layer Insulation) sandwiched between aluminum (AL 6061-T6) and Kevlar layers, with a central bolt and nut assembly.</p>
<p>Completed CAD model that includes all dry-mass subsystems and photo taken for poster</p>	<p>12/01</p>	 <p>A 3D rendering of the spacecraft module on the lunar surface. The module is covered in a grid of Whipple Shield tiles. The Earth is visible in the background against the blackness of space.</p>