Comments and suggestions for 2025 projects

Congratulations for being invited to the Final Design Showcase. Please make updates to your prototype and plan on showing your best ideas. Expect that engineers and astronauts will ask you the materials you would use on the flight article and any changes that would be required before flight.

Choose comfortable clothes. Plan to dress business casual—collared shirt, nice pants or skirt, comfortable shoes. You don't have to dress like a team but it makes it easy to see who is together. April in Houston can be 85 and raining. The building will be air conditioned but there will be a lot of people.

Lunar Landing Legs and Payload delivery.

One of the things that makes this a hard project is the slope of the landing spot. As you may have heard the Intuitive Machines 2 lander touched down on the moon but fell over as it landed in the side of a crater. My first impression is that the slope was greater than 6 degrees. Landing on the moon is hard. You are helping to develop a new idea with this rocket. Putting the payload under the engines may not be new for helicopters but it is still fairly novel for rockets. So when you come to Houston to show your idea, realize some engineers will be skeptical. Be ready to mention how JPL landed Curiosity on Mars. When I made the rocket engine pack on the top I made the engines way too small. Do me a favor and reprint the rocket engine top with bigger engines—maybe 3 times bigger. Let's make it look a little more realistic.

Have your payload release system so it operates slick every time with both payloads and they change out quickly. Clean up the legs and pads with your improved ideas so they show your best thoughts.

Ice From Regolith

NASA is very interested in figuring out how to separate ice from regolith. Your device needs to show good separation without making a big mess on the tables. (it can make a mess on the moon but not on my table cloths).

Be ready to explain why you are using plastic as an ice simulant. It is important to have small sized plastic particles (sand grain size or smaller) to minimize the 'Brazil nut effect' so that people are seeing as much realism as possible. Please use a plastic that is visibly different in color from the regolith simulant. Batch or continuous process is fine but be ready to suggest how your process will work either as a stationary device that regolith is brought to or a device on a rover that travels around picking up regolith as it goes.

Ejecting Robot

The Ejecting Robot was a very difficult project. I stole the idea from JAXA (if you hadn't guessed) because it is such a cool project. When I mentioned that students across the US were working on it to

one of the JAXA astronauts he was very excited to hear that the Japanese space program is inspiring not only people in Japan but Americans too.

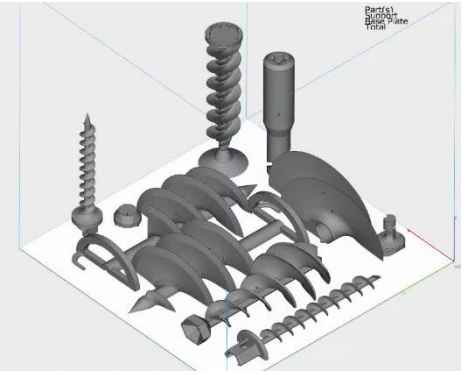
Any team that was able to accomplish even half of the requirements deserves credit for doing a good job after all, the Tomy company designing the JAXA robot probably had more time and money to devote to their robot. You all did a significant part of the design and mission on a much skinnier budget. Congratulations.

When you arrive in Houston to show off your robot, I don't want you to drop it over and over—it will break. Plan to show videos of what it has done. Drive it in dry sand and take pictures. Show off some of the innards and code. Show the designed components you did to make it robust and talk about what materials and changes you would make for the one that goes to the moon.

Lunar Camper

This project came from Langley Research Center and Glenn Research Center. Since the program is going with Lunar Terrain Vehicles that have an open cabin (exposed to the vacuum) there is good value in sending a camper style trailer. They are going to be very interested in how the camper expands and how accurately you represent the volume that objects take up and distribution of materials. Keep in mind you will be presenting on half of a 2x6 foot table (2 teams per table). Be ready to show how the camper looks when it is set on the moon and how it expands. The interior may be shown on another model but it all has to fit in your allotted space.

Lunar Stakes—Additive Manufacturing on the Moon



Plan on printing your insertion tool out of plastic. Elementum 3D will be printing the top 6 team stakes but not the insertion tools. HUNCH provided the top 14 teams by ratios of pull force/weight of stake but Elementum 3D chose the top 6 it felt could be printed. I am very interested in the holding force of the Lunar Stakes but I am also very excited by the differences in the styles. I could see the need on the moon of having a variety of different stakes depending on different conditions of the regolith in different areas and what else the stakes might be used for. The attachment to the drill is critical for how the astronaut will be installing them into the tarps and ground. The method of installing them into the regolith is also important—how much force to push down while drilling it in and using the hammer drill or not. Be ready to demonstrate installation in the ground and attachment of a guy wire or lanyard. HUNCH will provide 1 bucket of mortar mix for each table (two teams per bucket) for your demonstrations and something for compaction. Each team should bring their own drill.

Cosmic Dust Collector

NASA over time has collected a very small amount of cosmic dust all of which when collected together may not be visible to the naked eye. The possibility of collecting some dust off the ISS could be very revealing to space science and understanding the building blocks of the planets. The biggest difficulty is not the collection of particles but keeping the dust particles from being contaminated. Contamination could occur from the collection method or from bringing inside. Be ready to defend both your collection method and your containment. Make it easy for the astronaut to operate your device with big gloves on.

Solar Panel Deployer

Demonstrating how a set of solar panels will deploy in microgravity while on Earth is difficult at best but impossible for other configurations. Do your best to look for ways to show what you can. Engineers are always looking for better ways to deploy more panels from smaller spaces. The project you are working on is an ever evolving field that will continue to change as solar cell technology, the mechanical abilities and the materials advance. Be ready to talk about the materials you would use for the flight hardware and the amount of power you expect you will get with the maximum exposure (remember the sun won't hit all sides at once).

Cube Sat Heat Transfer

This might be the hardest project. There are many satellites circling Earth that have failed due to over heating. Some of you have found software that allows for testing how the heat dissipates for your design. Some of you have done good experiments and are able to show data for your hardware. I look forward to each of you seeing what the others have done to move the heat from the fish tank warmers to other parts of the skin of the satellite and minimizing the heat from the sun. There will be engineers who work on thermal systems for the ISS who will be interested in your work. Be aware of the ISS thermal systems and how it is similar and different to your application. I expect they will have comments that can be very helpful to your satellite problem.