

HUNCH 2026-2027 D&P Q&A

Lunar Ag and Food Lab

Q1. Do we assume all power?

A1. As listed in the Objective page of this project, you want to “describe the amount of power needed for growing the plants as well as needs for the crew that are working in the facility—lighting, fans for air circulation, water pumping/cleaning...” In other words, calculate how much power your lunar Ag and food lab requires.

Q2. The water tanks section mentions the habitat will have 100 gal but the Ag module says it has 150 gal, which do we use?

A2. You want to assume that you have 100 gallons for the habitat and 150 gallons for the Ag module.

The Ag module and the main habitat have different water tanks. (we don't want minerals and fertilizers in the astronaut's drinking water) The 150 gallons for the Ag lab is separate from the 100 gallons for the habitat.

Q3. Can we model the Ag lab in VR (virtual reality)?

A3. Modeling the Ag lab in VR is not one of the key objectives of this project therefore, it is recommended you make sure you complete all key objectives and if you have time, then yes you can model it in VR as an additional feature.

Q4. Are we able to assume we will be using genetically modified plants in the Ag lab?

A4. You have to try to grow the plants so unless you have access to genetically modified plants, it is recommended you use plants you can get access to and test those.

I expect that NASA will probably use modified plants to keep the sizes small and the non-food materials to a minimum. This may mean some genetically modified plants. If they are available, use what you can. If not work with what is available.

Q5. The presentation talks about depressurization and fire and that connections need to go through the bulkhead and not the hatchway. Where is the bulkhead?

A5. The bulkhead is usually placed at the ends of a lab or doorway and is used to connect different rooms, while the hatchway is on one end of the lab and leads to the outside.

The picture on slide 6 shows where the pass throughs are on the bulkhead—not through the hatch.

Q6. At the base of the Lunar Ag lab, there is a 2 foot area (p5). What is going on there and we can build anything below it?

A6. The 2 ft label describes a cylindrical base below the hemi-spherical dome. This volume is part of the Ag lab and can be used. However, the floor is part of the sealed structure of the Ag lab, so the nothing is permitted below the floor..

Q7. The presentation talks about the base being permanently crewed. How long is that, years, decades, centuries?

A7. That is a good question. We are hoping for it to be used for years and decades.

Q8. How important is humidity or controlling humidity for plant growth as it could cause mold and other issues?

A8. You need to look at the impact overall and assess it in relation to the other requirements. However it is good that you are thinking about the impact of humidity. Try doing testing to see if you can better understand it too.

Q9. Can we use dead plants from our lab in the regolith as a way to lower costs and reduce materials from coming to the Moon?

A9. That sounds like a good idea and should be part of your research of the regolith and what it contains and doesn't contain.

Q10. Which method of plantation is best for minimizing cost?

A10. That is part of your research.

Lunar Shoes

Q1. How do you take into account the 1/6 stride of astronauts walking on the moon when designing the lunar shoes?

A1. I recommend looking at how an astronaut walks on the moon due to the lower gravity. They tend to hop but, this hopping motions was driven partially by the space suit

Q2. What material are the shirts the astronauts wear?

A2. They wear regular polos and clothes like we do, mainly made of material like cotton.

Q3. The requirements talk about a shoe that is light with good grip and impact. But shouldn't it be heavy to account for the lower gravity?

A3. That is a good point, but the focus of these shoes is to prevent buildup of static electricity. Also, you can think of these shoes as house shoes.

Q4. How many different floor samples should I make?

A4. One is fine. For your initial testing, you could try a couple of samples and then make a final determination.

Q5. For the flooring sample, can we choose to use an anti-static material across the whole surface?

A5. Yes.

Q6. How should we arrange the connection points on the mat?

A6. It is up to you, but the key item is to make sure that the connection points will not be a trip hazard.

Q7. Should we make the shoes multiple sizes to account for people of different foot sizes?

A7. No. Just pick one person on your team and use their shoe size for their demo.

Q8. Do we need to include arch support?

A8. That is up to your team.

Q9. Do we need to account for temperature variations when designing the shoe?

A9. The shoe will be used in the lab module where it's a short sleeve environment so there will not be a huge temperature swing. Just think about room temperature environment.

Q10. How much static can we allow?

A10. You want to try to minimize the static so design it that way as we cannot state how much is too much or too little.

Q11. How long is the shoe to last?

A11. Think about how long your pair of shoes last. A sole or wear mechanism might be useful to determine when a shoe is no longer wearable.

Q12. Should we prioritize comfortability?

A12. Yes.

I would like someone to wear it for a day so you have some kind of data about comfort. It is also important for you to think about the looks. Would you want to wear it if it looks like clown shoes?

Q13. How long will the shoes be used?

A13. Think of them as "house shoes". The astronauts would be out doing work and then would enter the habitat and put on their house shoes.

Q14. What size for the shoe should we pick?

A14. Pick the size of one of your teammate and use that for your project.

Q15. Should we focus on certain areas of the foot? Is one better than another?

A15. That is part of your research.

What part of the shoe is important to you when you are wearing it?

Q16. What method should we use to clean the shoes?

A16. That is part of your research.

Depending on the shoe at home, they might get hosed off but I typically throw the shoes away after a certain amount of time. There won't be a lot of things dirtying up the shoes.

Q17. Should the flooring be rigid or flexible?

A17. That is part of your research and design.

The module will be inflatable. This means the flooring has to be flexible.

Q18. What if we want to vacuum (manual or robotic)? Should the surface be smoothed or grooved?

A18. That is part of your research but first focus on the shoe and surface and their design.

If there are grooves in the floor, it will be more difficult to clean. Carpet—bigger problem.

Robotic Sample Retrieval from Mars

Q1. For the sample tube – does it need to be sealed or hand tightened?

A1. Hand tightening is fine.

Your team is just picking it up and putting it into the launch container. Everything else is already done

Q2. Should the launch container slide with little wiggle or have no wiggle and be secured.

A2. As a start, you can have some wiggle as you don't have your final design. You don't know if your design will be like a telescoping pole where you will need room for one tube to slide into another or if it will be one rigid tube.

The launch container can be rigidly held or you can make it rotate like a revolver's cylinder. It needs to be in the spot described in the presentation.

Q3. How will the arm be mounted?

A3. Your arm is to be mounted onto the cardboard robot identified in page 9 of the presentation.

Cardboard is not sturdy enough. Use something better than cardboard like wood, metal, plastic.

Q4. Is our robot arm to be like a crane?

A4. Your robot arm is what you design it to be. You can consider it a robotic mechanism or a robotic arm. You could also consider it a crane, but it is designed to pick up samples.

Q5. What is the estimate sample weight?

A5. Page 4 lists it as 90g. Make sure your sample weight is that weight. If you 3d print it, you can make it hollow and add material inside to get it up to 90g.

I will be updating this to make it lighter. I think 90g is too heavy. Probably 60 grams.

Q6. Are we able to move the rover to get in place?

A6. Yes, but read the scenario on page 9 that talks about how to get your rover to the right location.

Q8. The presentation talks about 15cm clearance on p2 but then it talks about 100mm clearance on p9. Which is correct?

A8. The 15cm clearance is the wheel clearance from the ground while the 100mm is the distance of the bottom of the rover from the ground.

Q9. How do you get the rectangular body on the rover?

A9. You can attach it how you want.

Q10. Can you go over the solar panel with your robotic arm?

A10. Yes, it is possible and if you go over the solar panel to deposit the lunar sample, it is not like you will be blocking all the solar panels. Just be careful not to damage them.

Q11. Is it better to go faster or is it better to be precise and slow.

A11. There is no rush to get the sample into the container. During testing, we will allow you time to move and therefore, going slowly to make sure you can accurately get the sample into the launch container is most likely better.

Q12. What happens if we try and it misses?

A12. You will have 3 opportunities to randomly drop tube for the robot arm to pick up. We recommend rigorous testing of your design.

Q13. Do we have to use 3 plates, or could we use another container in the class?

A13. You can do testing in your class but for the final testing, it should be a plate as shown in the presentation.

Q14. How much sand is in the plate?

A14. The PowerPoint said to use a 30cm diameter paper plate containing sand and pea gravel covering the paper plate. Therefore, just put in as much sand and pea gravel as you need to cover the plate.

Food Bites

Q1. Can the food bites be used by the astronaut while working?

A1. Most of the time the astronaut will eat the food bites while on break, but it is possible they may eat it while working.

Q2. Can the food bites have caffeine?

A2. It is possible as the astronauts need to stay alert, but you just want to watch how much you put in each bite so if the astronaut eats an entire container they are not given a large amount of caffeine.

Your main goal is to develop the dispenser. Developing the food bites is cool and fun but not required.

Q3. People have allergies to gluten and peanuts, should the energy bite be nut-free alternative. Our school is a nut-free zone we cannot utilize nuts.

A3. The Astronaut screening process lists an allergy of sufficient severity so as to interfere with the performance of duties as a disqualifying medical condition. , so those selected do not have gluten or peanut allergies. If you cannot utilize nuts, don't use it for your food bites.

Concentrate on the dispenser, not the food bites. But I will try any samples

Q4. Can the mechanism for food bite be mounted on the body or neck?

A4. It is recommended you place the mechanism on the helmet as outlined in the requirements. The astronaut will have other clothing on their body so the mechanism cannot be mounted there. Also, the size of astronauts will vary so the body or neck is not appropriate.

Q5. Wouldn't having astronauts utilize food bites be a choking hazard?

A5. It's possible but they are careful when they eat.

Q6. What should be the dimensions of the bite?

A6. That is up to you to design but you want it bite sized.

Some general dimensions are mentioned but they are not required. Make the food bites match your dispenser.

Nose Scratcher

Q1. Can we have the nose scratcher attached to the torso of the astronaut?

A1. No, you want to attach it to the helmet as outline in the project description.

Multi purpose Lunar Locker

Q1. Does the locker need to be modeled after the ISS locker?

A1. No. It just needs to be a rigid packing box with similar scaled dimensions. The ISS locker was put there for you to see what we have and are currently using.

Q2. What is being put inside the locker?

A2. The key aspect of this project is not what is in the locker when transiting to the moon but what happens once on the moon and unpacked. Once on the moon and unpacked, the crew can take it apart quickly and reassemble it into different configurations so that it could be a different structure or equipment—a wall, an arch, a road, a table, a bench, a shovel.." So you don't just focus on what you can put into the box but rather what else can it be utilized for.

What kind of things need to go to the moon? Food, clothing, computers, tools, batteries, ... anything you might need to use to live on the moon.

Q3. Can we add cushioning in the drop test?

A3. You can add it if you think it will help with the drop test or you can make the cushioning part of the box.

Q4. Are there any weight constraints?

A4. Typically, NASA says as light as possible but think about weight optimizations and take that into account.

Q5. Is there a list of items to prioritize that the box can be turned into?

A5. That is up to you.

Pneumatic Tools

Q1. We have decided on a specific type of engine to provide power. However, we are not entirely sure what the constraints and limitations are for the size of the motor we are building. How should we proceed?

A1. The constraints and limitations for your motor should be determined by you as you do research for what you need. However, here is a link that can help with air motors.

<https://www.atlascopco.com/en-us/itba/expert-hub/articles/air-motors-101-a-comprehensive-guide>

How big of a tool will you need to use when you are using space gloves? it fit your hand when wearing a welding glove.

Q2. Should we try to scale the air system on the ISS for this project.

A2. You are designing the air motor not the system. Assume the air system already exists. This will only be used on the surface of Mars.

Washing Machine

Q1. Do we have to rely on the NASA water system?

A1. You are not integrated with NASA water system, but you also don't want to make request like water of a certain temperature.

The water system on the ISS provides water pressure of about 15 psi and about 71 F. there will not be any other water source available.

Q2. How much water do we use?

A2. Presentation says maximum of 1 Liter (you can use less).

Q3. Can we use heat to dry?

A3. Drying is not part of the requirements at this time. However, if you get all the key objectives completed, you can recommend ways to dry the shirt.

Q4. Can we do more than 1 shirt?

A4. Yes, but make sure you are meeting the original objectives first.

Q5. How do we measure the behavior of the system in 0g?

A5. You should research that behavior and review page 10 of the presentation as it has a lot of links about the behavior of water in microgravity.

Will your system work the same if it is upside down? On its side? This helps but isn't final.

Q6: Would a system that spins with an internal and external centrifuge work well for spin cancellation?

A6: While possible, there is now factors such as moments and resulting forces that can be imposed; it is a complex process.

Keep it simple

Q7: Can we use chemicals with water or other liquids?

A7: No, as stated in project documentation on page 3 under "specifics to help" -Water only, No soap or detergent.

Q8: Should we look at removing stains?

A8: The project documentation shows the objectives. This could be addressed if not stated, but make sure to target the main objective first.

2 drops of mustard, 2 drops of siracha sauce. The difficulty is removing them when the shirt is all wadded up in your cleaning chamber.