# OTV Mission Details - Material Identification

OTVs for all missions must adhere to the Over Terrain Vehicle Product Specifications and the spirit of the design project. Details about the testing arena can be found in the OTV Arena Details document.

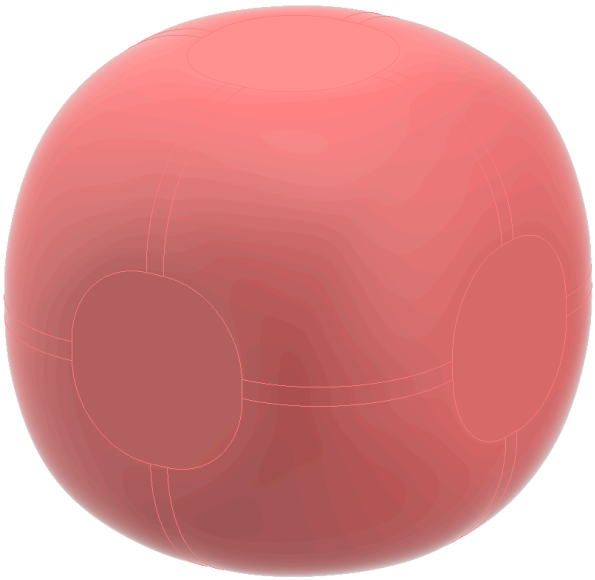
**Material Identification Background**

There are two types of payloads that must be identified and distinguished between one another. One of the payloads is hard red plastic and the other is soft red foam. Only one payload will be present during the mission. It is the job of the OTV to identify which type of payload it is.

**Material Identification Mission Objectives**

- Navigate to within 150 mm of the payload
- Acquire the ball by lifting it entirely off of the ground. Note: your OTV does not have to carry the ball to the goal zone
- Determine if the ball is in the heavy, medium, or light weight class
- Measure and correctly transmit the type of material present (plastic or foam)
- Navigate completely past the three obstacles
- Navigate completely into the destination zone

**Material Ball Details**



- The side length of the cube is 100-110 mm
- The corners have setback fillets with radii of 32 mm
- The foam ball compresses with a spring constant, k, of 0.58-1.89 N/mm
    - $mg = k\Delta x$ (force applied = spring constant * distance compressed)
    - 1 kg of mass will compress the ball by 5-16mm
- Ball masses ±20 g: 105 g, 190 g, 275 g

**Material Identification Randomization Procedures**

1) Select the random material type (plastic or foam)
2) Select the random material mass
    a) There are 3 options for each material, with option 1 being the smallest by mass and option 3 being the largest by mass
3) Place the selected material in the arena
    a) The center of the material is placed on top of the ground within 50 mm of the destination, relative to the vision system's Oxy reference frame
    b) The ball will not be adhered to the arena via Velcro, though it will be placed on top of the velcro pad already on the arena