
Engineering Design Challenge: Why Pressure Suits

NASA works tirelessly to ensure the safety of its pilots and astronauts. As research continues, the pressure suits that provide many layers of protection against the harsh environments of the upper atmosphere and space continue to improve. Pressure suits are necessary for space exploration. Because pilots and astronauts must complete their work in a near-vacuum or absolute-vacuum environment, the protective suits must exert pressure on the body to simulate Earth's environment to keep the pilots and astronauts safe at all times.



Figure 6. A current NASA pressure suit. (NASA)

The Challenge

Students will work in teams to design and build a pressure suit that will protect pilots and astronauts from the dangers of low-pressure environments. All materials used for the spacesuit must be tested in a vacuum to make sure they are safe in low-pressure environments. Student teams can use a marshmallow or a balloon to represent the pilot or astronaut.

Criteria and Constraints

1. The protective suit must be constructed of materials that are not affected by near-vacuum or absolute-vacuum environments.
2. The pressure suit must completely surround the marshmallow or balloon astronaut.
3. The astronaut must fit completely within the vacuum chamber and have a total mass of less than 50 g.
4. The pressure suit must prevent the astronaut from expanding and constricting while in the vacuum chamber.