Hydrophobic and Hydrophilic Surface Design in NASA Spacecraft Engineering: The Effect of Geometry and Microgravity on Landing Dynamics and Crew Safety

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Hydrophobic surfaces repel water (are water-fearing) while hydrophilic surfaces attract water (water-loving). From this knowledge, we can discover and make observations on how different materials and wettability play a role in how fluids, such as water, interact with their surfaces (Ahmad, 2018). This study investigates how different devices would displace in water (the deepest), while experiencing microgravity, through capturing from a high elevation. The microgravity set-up is simulated/developed as accurately as possible so there is as little influence from gravity. To fully capture the results of the devices. Continuing my research and improving through designs, capturing results, updating set-up, etc. Five new designs/devices were developed to truly discover whether or not shape/geometry had an impact on the results. The new initial hypothesis being, The engineered Pyramidal Tetrahedron device with the applied material, hydrophilic surface (sprayed in Anti-Fog Hydrophilic Spray), will show a greater displacement when immersed in water under microgravity conditions. After collecting data accurately through Tracker Online (a tracker resource from the NASA Drop Tower Challenge). After receiving and completing the results from the trials conducted, it was determined through compiling past and new data and performances that the device/object Hydrophilic-Pyramidal Tetrahedron (3D): Trials 1-5 (5.5 m High Elevation) displaced the most water, by 16.071826625387. The results from the data support the initial hypothesis. For future reference, I will research materials that are hydrophobic and hydrophilic in more detail. Along with how they can be applied to applications and designing more devices.

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