Loose Article Containers

Sticky Box and the Zip Stick

Schools: Oak Ridge H.S. Texas, Jackson Hole H.S. Wyoming
Students: Logan Bretz, Blake Kolodejcak, Aaron Tanner, Stephanie Salerno
Teacher: Jeff Marcinkowski, Gary Duquette
Mentor: Flo Gold, Glenn Johnson

Develop a container that will prevent loose items like nuts or bolts from getting away from the astronauts in zero-g but still be easy to access.

Problem:

- Imagine a ziplock bag of M&M's in zero-g. All the candies are floating around in the bag. When the bag is opened, the action of the bag pushes the candies out toward your face. These could now be accidentally inhaled or smaller pieces could get into your eyes. These are daily difficulties on orbit.
- Keeping track of small loose items like nuts and bolts in zero-g can be difficult. Losing them during maintenance could prevent the equipment from working so science or functionality could be lost. Although Velcro, zippers, pouches, zip lock bags, and occasionally magnets can be helpful but doesn't solve all the problems for all people.
- Nuts and bolts can be purchased that stay with a panel when unscrewed—these are called captive fasteners because they are contained on the hardware. Captive fasteners are required for equipment that has planned maintenance. Occasionally astronauts are asked to do repairs to equipment that wasn't suppose to fail and doesn't have captive fasteners. So when doing maintenance on equipment with loose screws, crew will often double up some tape and stick loose items on it to prevent them from floating away. This is a great temporary solution but sometimes also attracts hair floating past or stick to the clothes when bumped.
- Just about every garage or work shop has slightly different tools to match the owner's needs and style. One person's invaluable tool is a different person's junk. This is why it is important to have a variety of options available for astronauts to containing their stuff.

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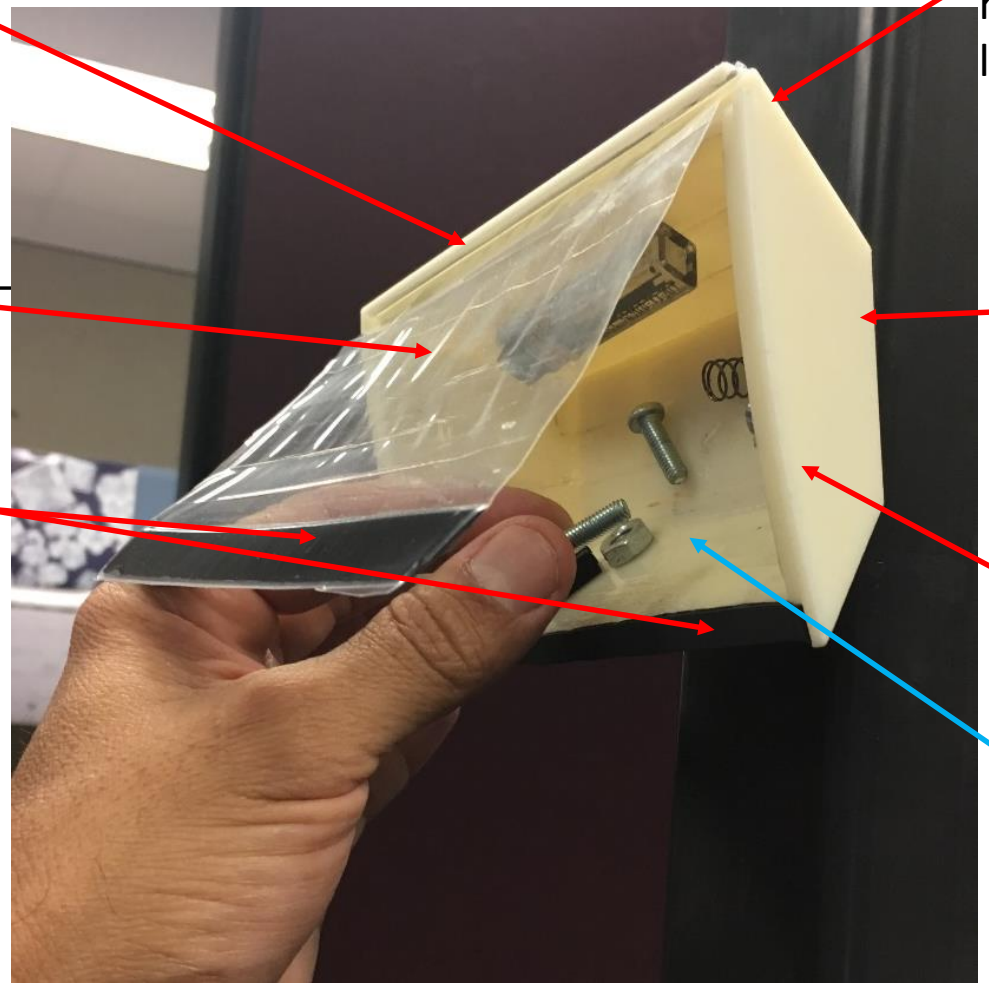
Sticky Box—rigid box with double sided tape on the inside to keep loose objects from floating away. The cover keeps dust out but allows for visibility inside. Magnetic latch allows for one handed placement and retrieval of items.

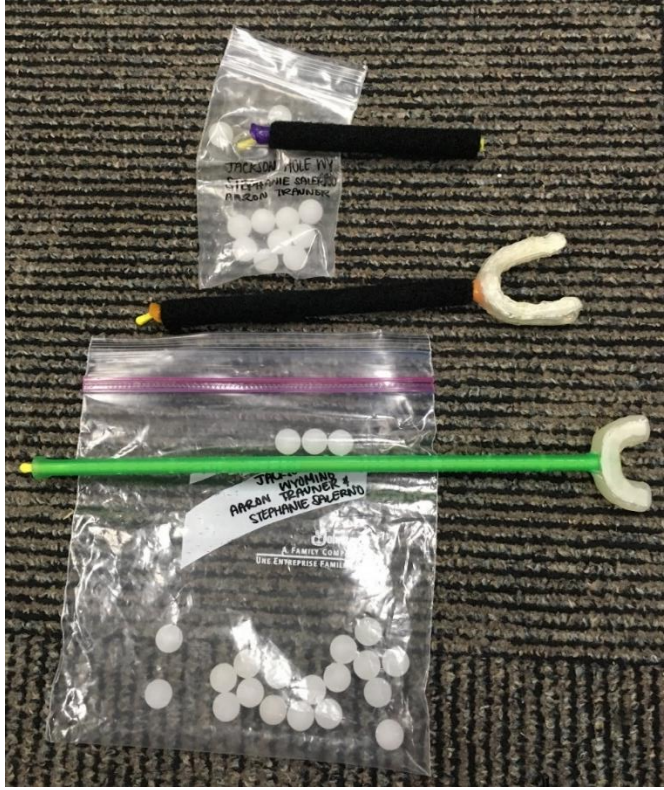
The original design concerned me because it was a rigid box and we don't normally fly rigid boxes because they take up more space and can hurt when bumped into. Once Logan and Blake convinced me of the value of their design, I showed it to one of the astronauts who had the same concern as I did but was also convinced of the value after examination. After a few iterations of hearing good suggestions from astronauts and engineers we came up with a simple, good design.



When the double sided tape is over used, it is replaceable with on orbit supply of tape or the crew can throw it away and we send up a new one.

Zip Clip—a chip clip that seals a bag by folding the bag over a rod within a partial tube. Adding the finger hold and Velcro may provide the versatility needed for the ISS.

Different sizes, more available

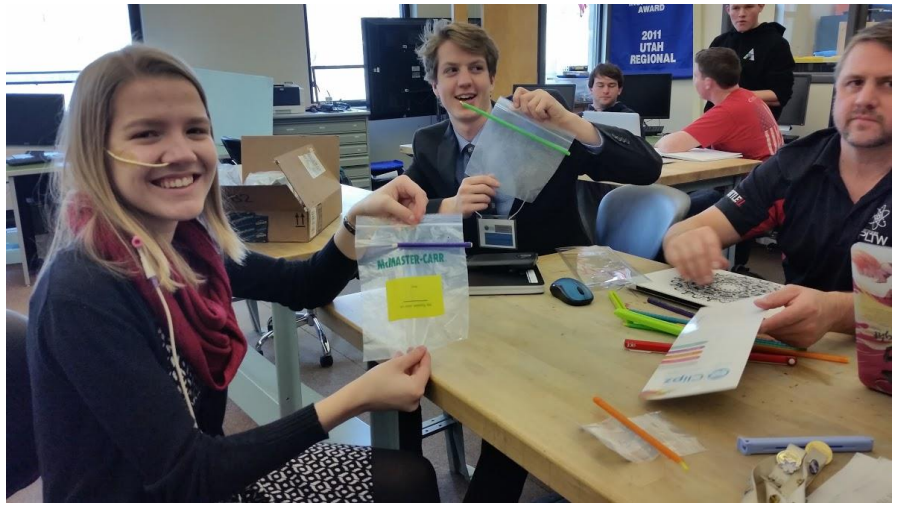


Engineering a solution to a problem should always start with researching existing products similar to what you want. Stephanie and Aaron in Jackson Hole Wyoming wanted to help the astronauts with organizing their floating objects in a bag and found these chip clips on the internet. The plastic rod down the center of a tube with slot running the length is great for keeping your potato chips from getting stale and also from letting your washers and bolts float out of the zip lock bag. The plastic bag is nearly air tight when folded over and slipped over the rod and slid into the slotted tube.

Velcro was added to the length of the stick—less may be better but a good idea. Although the astronauts were not interested in putting their teeth on the bite tip the students added on the end, they did like how easy it was to hold and manipulate with a thumb and finger in the curved shape.

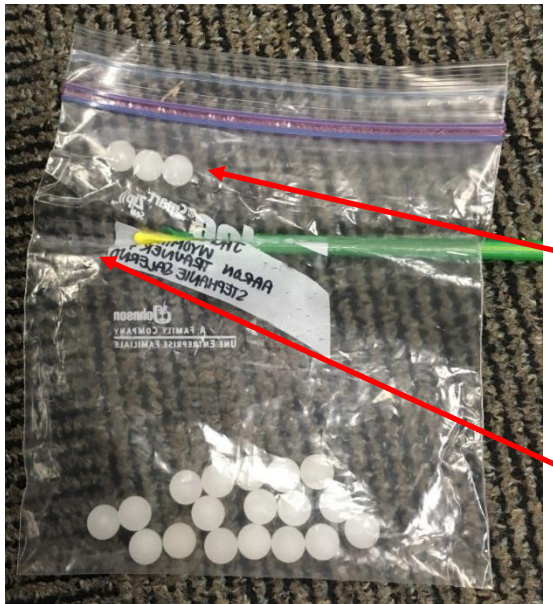
Bite tip or finger hold

- Currently many small objects for experiments, replacement parts, pills…are packaged in many small bags to alleviate the problems of losing some of the contents when opening up the bag. These many bags take up lots of trash space when throwing away all the trash. Opening up all those little bags also takes up time.
- This Zip Clip is a great idea that could be helpful in decreasing the amount of trash since the contents of a larger bag could be controlled with the clip. Researchers and payload scientists are always looking for ways to make their experiments easier to deal with.
- These clips come in a variety of sizes and could even handle some of the larger 24” bags on the ISS.
- Good ideas!!



The longer the stick, the bigger the bag it can close.

The zip lock bag folds over yellow part and slides inside the green part



Loose items can be pushed into the smaller section leaving behind the larger quantity.

Smaller opening