

G5 Rough Surface Plate

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Problem Statement

- Individuals who have limited motor function in one arm are unable to eat independently because plates and bowls tend to slide or tip over when used.
- Although there are devices that can be used to stabilize containers, they cannot be used with certain types of tables, so a new device needs to be developed for these individuals to successfully eat independently.

Level 1 Requirements

#	Requirement Statement	Dycem v2.2	Dycem v3.2 B	Strap v1	Strap v2.2
1	The device does not slide when eaten from a rough surface.	Yes	Yes	No	Yes
2	The device does not tip when eaten from a rough surface.	No	Yes	Yes	Yes
3	The device is made of all food-safe materials.	Yes	Yes	Yes	Yes
4	The device is easy to clean.	Yes	Yes	Yes	Yes
5	The device is comfortable to eat from.	Yes	Yes	Yes	Yes

How to Create the Deliverables

To create the strap plate, simply 3D print the CAD file of the strap design. Apply ArtResin to the plate and let dry. Then, adhere furniture pads to their designated locations on the base of the strap plate.

To create the Dycem plate, first 3D print the CAD file of the Dycem plate and the corresponding quarter pieces. Apply ArtResin to the plate and the quarter pieces. Pull a Dycem mat taut over the base, and screw quarter pieces in to secure Dycem. Cut off all excess Dycem.

Strap Design 1

This design involves utilizes a 3D-printed plate with a 3D-printed bottom piece with a strap that runs through it to tie across a table. See Figure 1

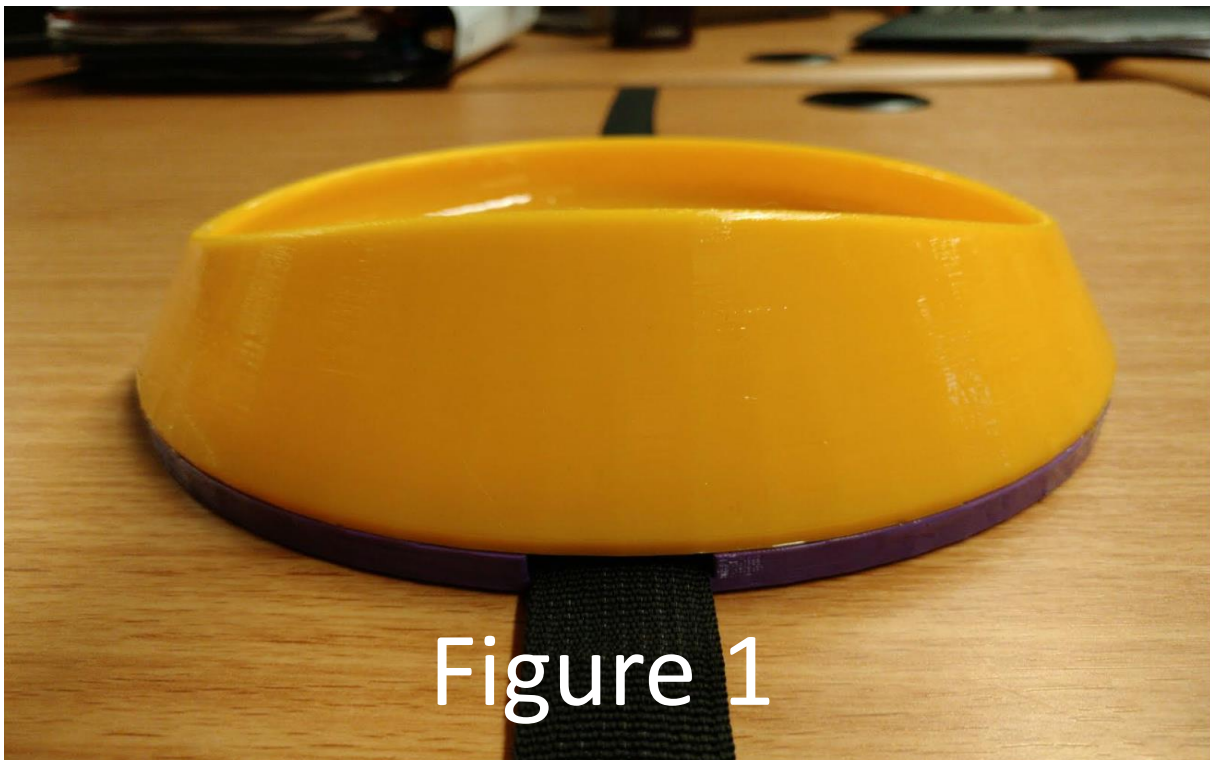


Figure 1

Strap Design 2

This design involves utilizes a 3D-printed plate with supports on the sides which allows straps on either side to hold on the plate and furniture pads for friction. See Figure 2

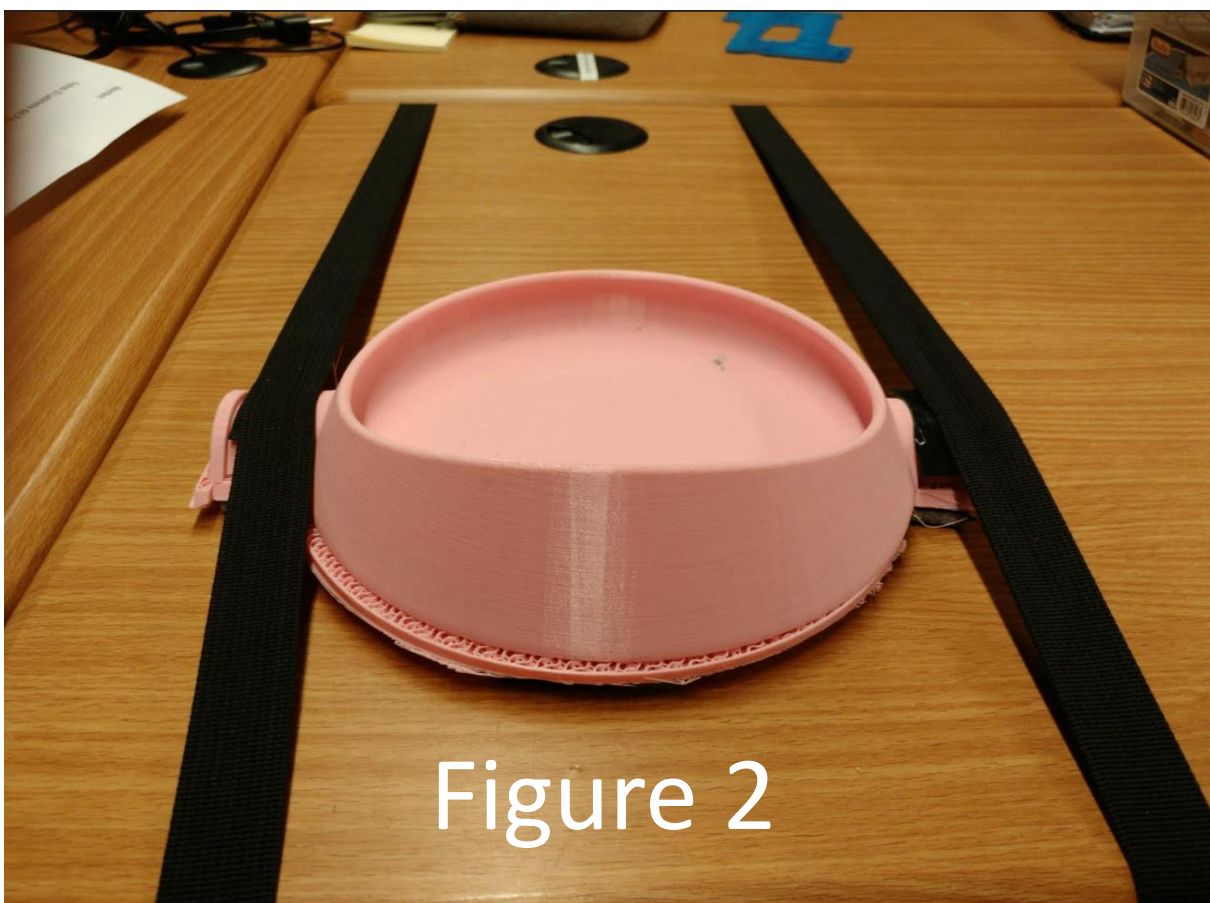


Figure 2

Unweighted Dycem

This design involves utilizes a 3D-printed plate with the high friction Dycem material secured to the bottom with 3D-printed fasteners on the side. See Figure 3

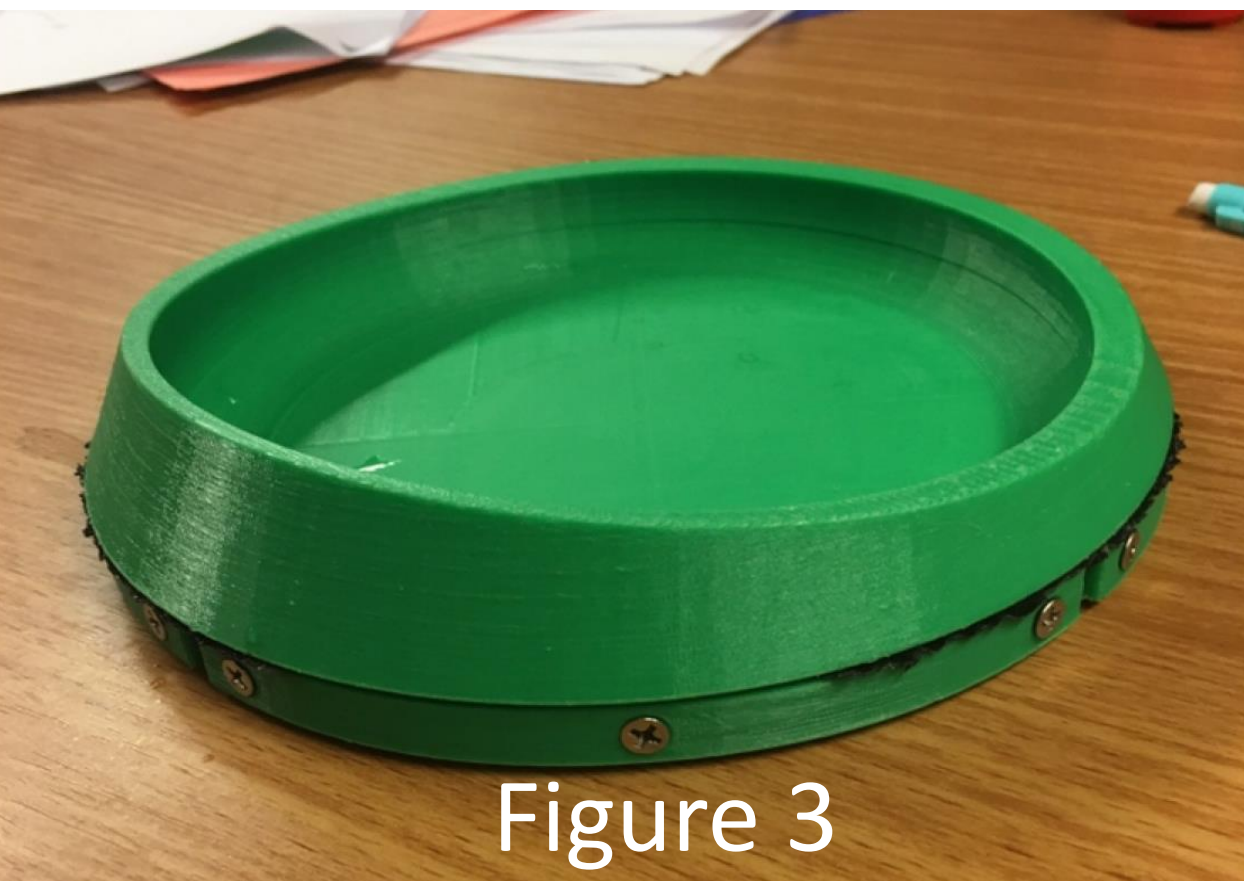


Figure 3

Weighted Dycem

This design involves utilizes a 3D-printed plate with the high friction Dycem material secured to the bottom with 3D-printed fasteners on the side and an inner layer of weights. See Figure 4

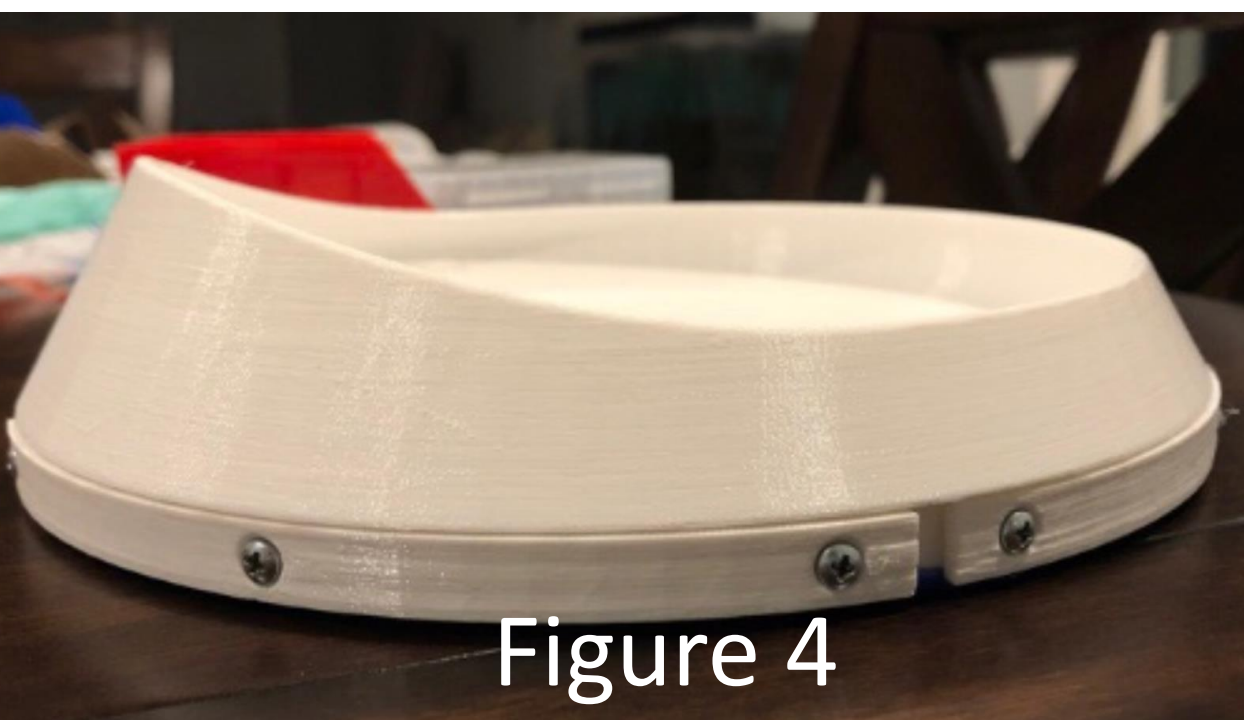


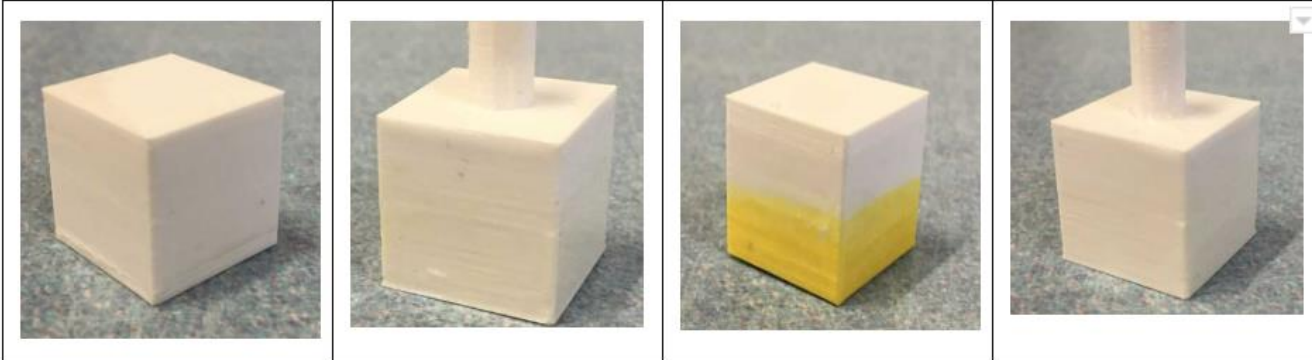
Figure 4

Force Test

The purpose of this test was to determine which of the prototypes was most effective in staying static when a certain force was applied. It can be used as a metric to determine which of the prototypes is most effective at not slipping when eaten from.

Stain Test

This test was conducted to determine if certain foods will stain the prototype. The following were used to stain: Hot Sauce, Balsamic Vinegar, Marinara Sauce, Turmeric Solution. The results proved that lighter filaments like white are very susceptible to staining.



Drop Test

The purpose of this test was to determine which of the prototypes was most durable when dropped from a logical height of 1 meter (approximated value of the height of a table.) Also, this test was conducted to discover which angles were the most prone to damage in each prototype. The tests showed that the unweighted Dycem plate, with the modified scoop lip barely sustained any damage.

Conclusions and Future Work

The purpose of this test was to determine which of the prototypes was most durable when dropped from a logical height of 1 meter (approximated value of the height of a table.) Also, this test was conducted to discover which angles were the most prone to damage in each prototype. The tests showed that the unweighted Dycem plate, with the modified scoop lip barely sustained any damage.

Future designs could incorporate the properties of both plates, working simultaneously as a strap design and a dycem design.