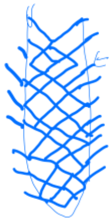
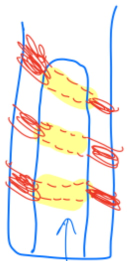
Thread patterns

We wanted to maximize the grip of the stake while using the least amount of materials possible.



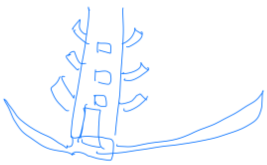
Barbed Beams provide structural support while reducing material costs

Bottom view



screw w traditional thread pattern but w hollow thread base (minimizes) material usage

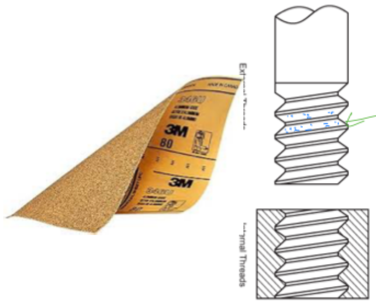
thread pattern overlaps the hole. This is a cut out of the tail.



Barbed on edges & anchor system on bottom to maximize grip on lunar regolith

Screw Design

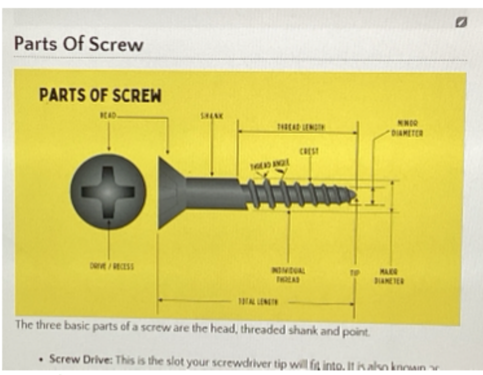
Some problems require simple solutions. The thread is simple to print, structurally sound becuase there aren't failure points, it is easy for the astronauts to drill into the soil, and it doesn't use too much material. We have some modifications to these threads, we want the cuts to be deeper so there is less material we must print out, we want there to be more threads for maximum hold on the lunar regolith.



Coarse thread infill pattern so surface catches on lunar regolith

Screw Parts & Specifics

Screw- fastener capable of


Parts Of Screw

PARTS OF SCREW

HEAD
SHANK
THREAD LENGTH
MINOR DIAMETER
CREST
THREAD ANGLE
DRIVE / RECESS
INDIVIDUAL THREAD
TIP
MAJOR DIAMETER
TOTAL LENGTH

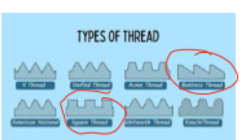
The three basic parts of a screw are the head, threaded shank and point.

- Screw Drive: This is the slot your screwdriver tip will fit into. It is also known ...

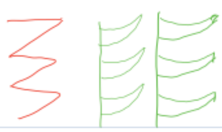
Different Heads

cable wire runs through screws

Thread Angle



Buttress Modified



Must be angled high enough to catch enough lunar regality but not so high as to prevent the lunar regolith from entering the ridges.

Thread Width

Wide- Holds more materials but more difficult to set into soil

Narrow- Ez to get in soil but holds less material

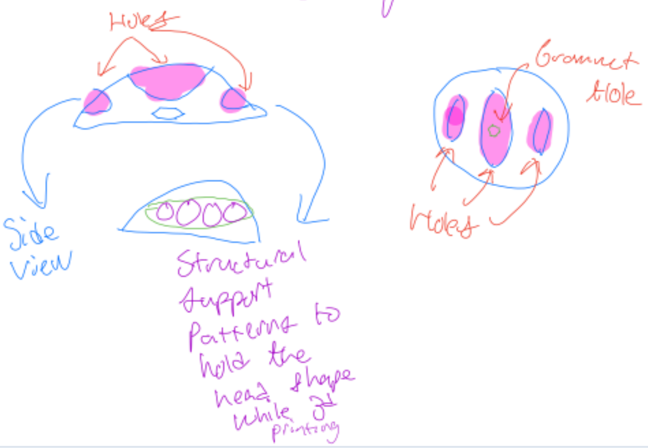
Head Size & Patterns

We needed the screw to be accessible via a grommet hole and not a tripping hazard while being material

Smaller Diameter
Pros: Lighter,
Cons: Harder to hook cable through could be more fragile

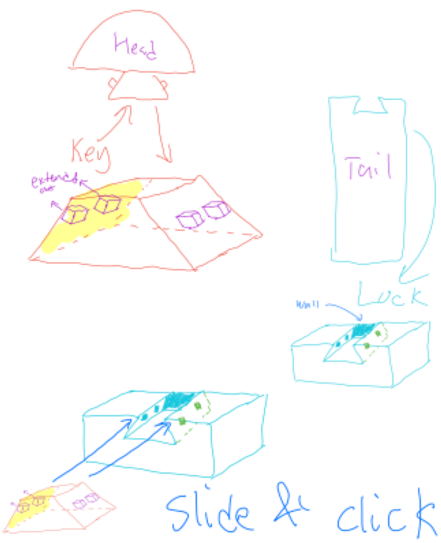
Bigger diameter
Pros: Easier to put hook cable through, stronger
Cons: More material needed

Head Shape



Infill Patterns & Percentages

Head-Tail Connection

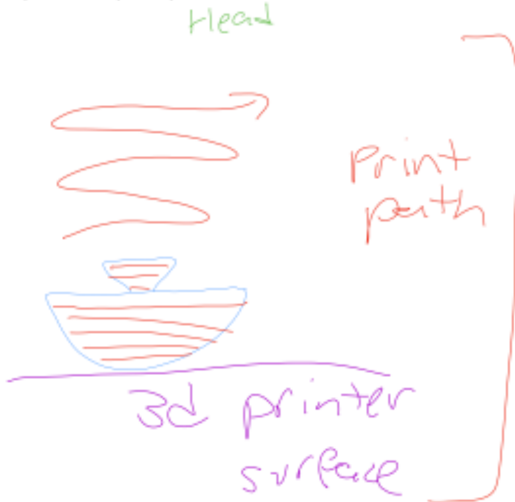


Slide & click
Mechanism to connect Head/Tail

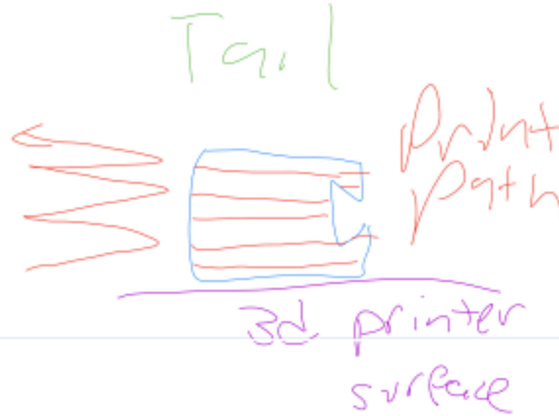
Pros: provides a simple but stable mechanism to connect the head and the tail. Clicking mechanism makes it very stable. Friction from the pieces provides additional support. Mechanism doesn't require much material.

Infill Patterns

Head and tail printed in separate pieces.



to be tested

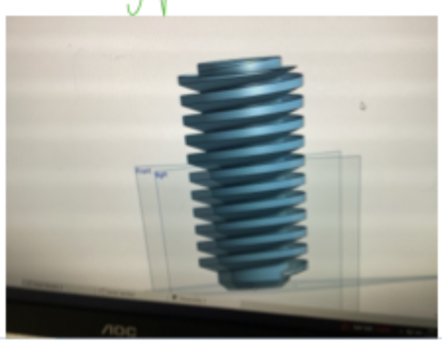


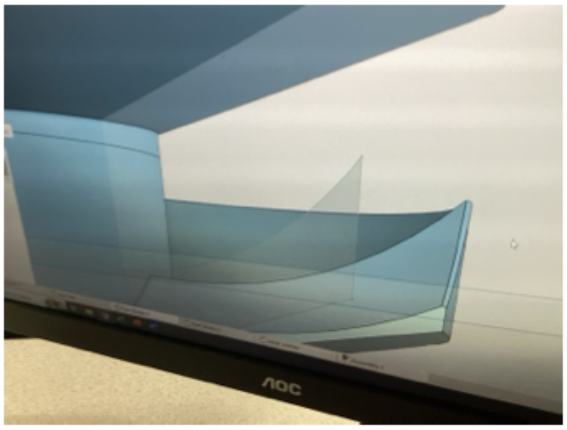
Infill Research

Honey comb and the triangle patterns are the most promising for tensile strength. However even with the strongest patterns, infill percentage directly correlates with tensile strength. Less infill percentage decreases tensile strength.

Hypothetically, 100% infill has the highest strength so we used

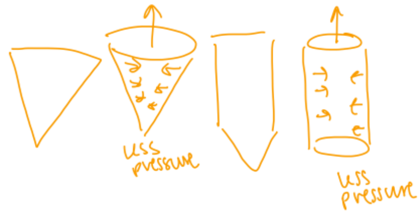
Prototype 1

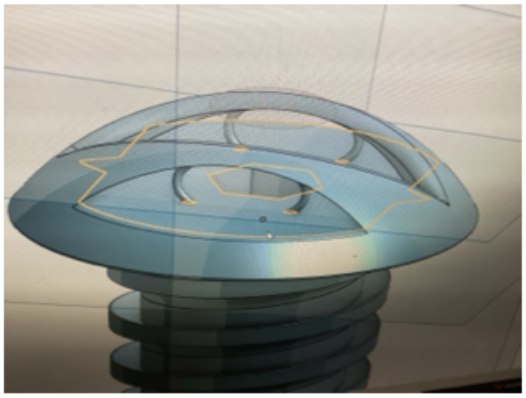


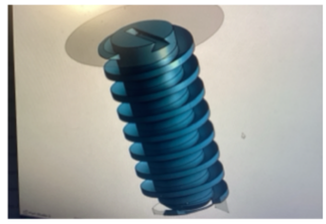


Potential improvements

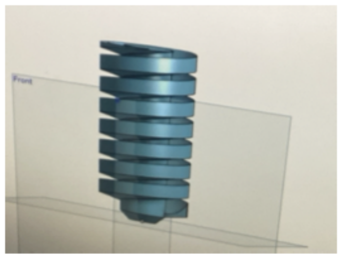
Have bigger pitch between the coils, make the tarp sharper, create holes within the coils to catch more sand, make it hollow on the inside. Create a little flap at the end to make it catch dirt better

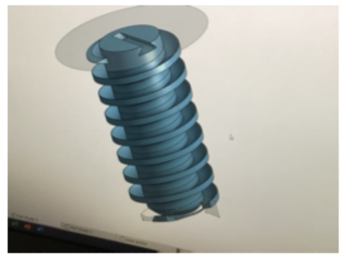


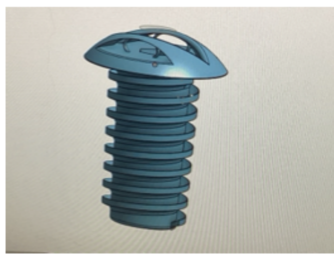




Prototype #1

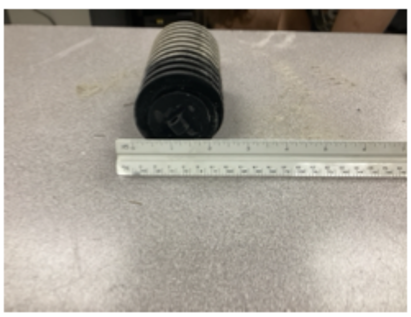






Our first 3D print

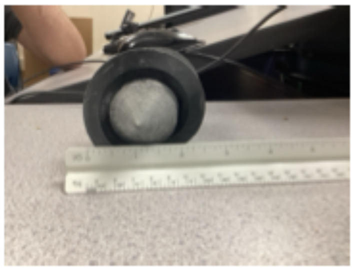
Very hard to drill into the lunar regolith because it is super dull, the drill in method doesn't work very well because it takes a lot of force. The biggest rocks will not slide into the crevices of the tarp. Must make the distance between points much bigger. We also must make the tarp sharper and more pointy. It also doesn't hold a lot of material and must weigh less



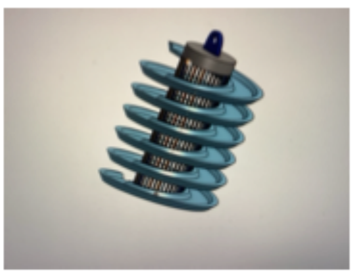
Force req to remove:
12.272N
12.279N
↓
2.7614J
Def not enough

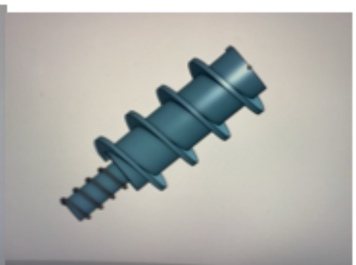
3/4 1/4
3/16 in pitch

Prototype #2



additional Prototypes





Results

Prototype	Mass (g)	Earth Vert Force (lbs)	Guy Wire Force
#1	99	2.5lbs	Null
#2	92	8.5lbs	Null

Testing Methods