VEX Make It Real Pneumacups

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Define Problem

- Pneumatics are a huge advancement into this seasons game
- Many teams use 2-3 one time zip ties to secure reservoirs
- Very wasteful in the long run
- Zip ties do not lock the reservoirs in place; slides up and down
- Reservoirs slide and shift around easily
- Zip ties become undone after enough wear
- Not aesthetically pleasing



Generate Concepts



Pros DESIGN 1

- Clips on very easily
- Can be taken off easily
- Doesn't use lots of filament

DESIGN 2

- Cups the reservoir from the bottom
- Uses only a little bit of filament
- Has a more stiff hold

All are reusable

DESIGN 3

DESIGN 4

- Uses little filament
- Circles around the whole reservoir
- Can be taken off easily

- Incases the whole reservoir
- Reservoir is tightly secured

Cons DESIGN 1

- Can break easily
- Reservoir still slides around
- Can pop off the clips in the match

DESIGN 3

- Hard to 3D print with latch
- Reservoir not tightly secured

DESIGN 2

- You would have to unscrew the bolt at the bottom
- Does not waste a little more filament

DESIGN 4

- Would use a ton of filament
- Doesn't lock it inplace can still slide up and down

Generate
ConceptsDecision Matrix

1 is the the lowest 4 is the highest

Designs	Size	Material	Durability	Stability	
Design 1	4	4	1	1	
Design 2	3	2	3	3	
Design 3	3	3	2	1	
Design 4	1	1	4	4	

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Develop a Solution



- Multiview was able to detail what the pneumatic cup was going to look like.
- Also gave us a isometric view of the cup with gave us furter detailing

Develop a Solution



- We used the sketch feature to outline the edge of the reservoir.
- Then we used the extrude feature to create the bottom base for the reservoir.
- And used fillet feature to create the rounded off edges.
- We also made two new construction planes that were used to make the things with the that actually get screwed in.
- Then we used another sketch and extrude cut for holes were the screws would go.

Fusion 360 CAD

APPROVED CHECKED

DRAWN

TITLE

SIZE

Α

Gustavo Chavez 1/15/22 SCALE 1:2

Pneumatic Clips V1

DWGNO

WEIGHT

CODE



REV

SHEET 1/1

■ ■

DESIGN

SOLID

SURFACE

 We were able to also make a multi-view of the components that gives details drawings the inside.

Pneumatic Clins V1 v4

VEX CAD LIRPAR

0 0 1 0

Construct and Test Prototype

- 3D printed with PLA (Polylactic acid)
- Used only 15 grams of PLA
- Took around 1 hour and 30 minutes to finish printing
- Support was needed to create the extruded screw part
- Parts were printed on a Geeetech A10M



Construct and Test Prototype



- Cup fits nice and prevented the reservoir from moving
- Clip is too loose and doesn't hold the reservoir from falling off
- Reservoir falls out easily
- You have to take the bolt at the bottom off for the cup to work
- Clip was very not sturdy and can bend very easily

Evaluate

Pros

- Reservoir didn't rotate freely
- Didn't waste a lot of filament
- Only took 1 hour and 30 minutes to make
- Can be used multiple times
- The reservoir can be screwed onto a C Channel

Cons

- The bolt has to be detached from the reservoir
- The Clips doesn't hook around the reservoir securely
- The reservoir can still slide up and down
- Print quality is bad
- Support in the screw holes was hard to get out
- Develop better solution

Fusion 360 CAD

- We used the sketching tool in order to create the general shape of the cup from a bottom view.
- Then we used the extruder feature to cut a hole for the top of the reservoir and make a case that surrounds it.
- After we used the fillet tool to create a smoother way for the reservoir to slide in.
- Then we create a tangent construction plane so we could add the screw holes for to attach the reservoir.
- We then used a fillet for the extruded screw mount.



Develop a Solution Fusion 360 CAD 2.0





into was we were going to produce on the 3D printer.

Construct and Test Prototype 2.0

- Only took 1:14 minutes to make on the printer
- Made of PLA (Polylactic Acid)
- Only needed 18 grams of PLA
- No supports needed if you choose
- Durable from the mount
- Parts were printed with a Geeetech A10M





Construct and Test Prototype 2.0



- Fits nicely on the robot
- Only 1 is needed per reservoir
- The screw is now being used to secure the revoir in place.
- The nob for the air slides nicely into place
- Didn't break under a load of weight.

Evaluate 2.0

Pros

- You no longer have to separate the bolt from the reservoir.
- The reservoir doesn't slide up and down
- Doesn't rotate freely
- Reusable
- Doesn't use a lot of material
- No longer can fall off of the cup

Cons

- Has to be lined up with a C-channel to be mounted
- Can break under extreme load.



Present Solution

Through the use of Pneumacups, users are now able to hold pneumatic reservoirs without the worry of them falling off or sliding around so you don't have to worry of the air pressure leaking. As a plus, the Pneumacups are reusable so you won't have to worry about wasted material. The Pneumacups are also aesthetically pleasing with the sleek PLA martial and rounded edges that make up the design. It can even withstand enough load so that it won't come undone.

