



Secure Cup Holder

Group F2.2

The Cup Crew

| Carolina | Sarah | Noah |

| Léa | Abby | Victoria |

Client details

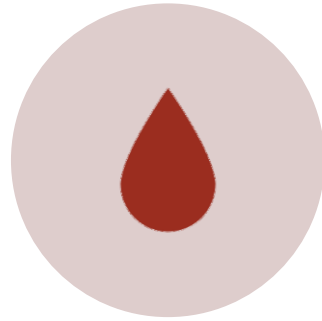
- **Client is in a wheelchair**
- **Client uses a metal coffee cup**
- **Client has limited arm mobility**



Client Statements



"My cup often gets knocked over."



"My straw needs to reach the cup."



"I want to easily replace parts."



"I worry about hitting the cup holder."

The cup holder...

1. Is very secure

2. Can fit the client's cup

3. Places the cup within reach

4. Prevents injuries if hit

5. Parts are replaceable



Develop a secure and accessible cup holder for a wheelchair user with limited arm mobility.

Target Specifications



Total Dimensions

Marginal: <(25 Dia x25 H) cm
Ideal: (15 Dia x 25 H)cm



Time to Install

Marginal: <60 sec
Ideal: 30 sec



Time to Remove

Marginal: <60 sec
Ideal: 25 sec



Number of Tools Required

Marginal: <2
Ideal: 0



Anchor Point Dimensions

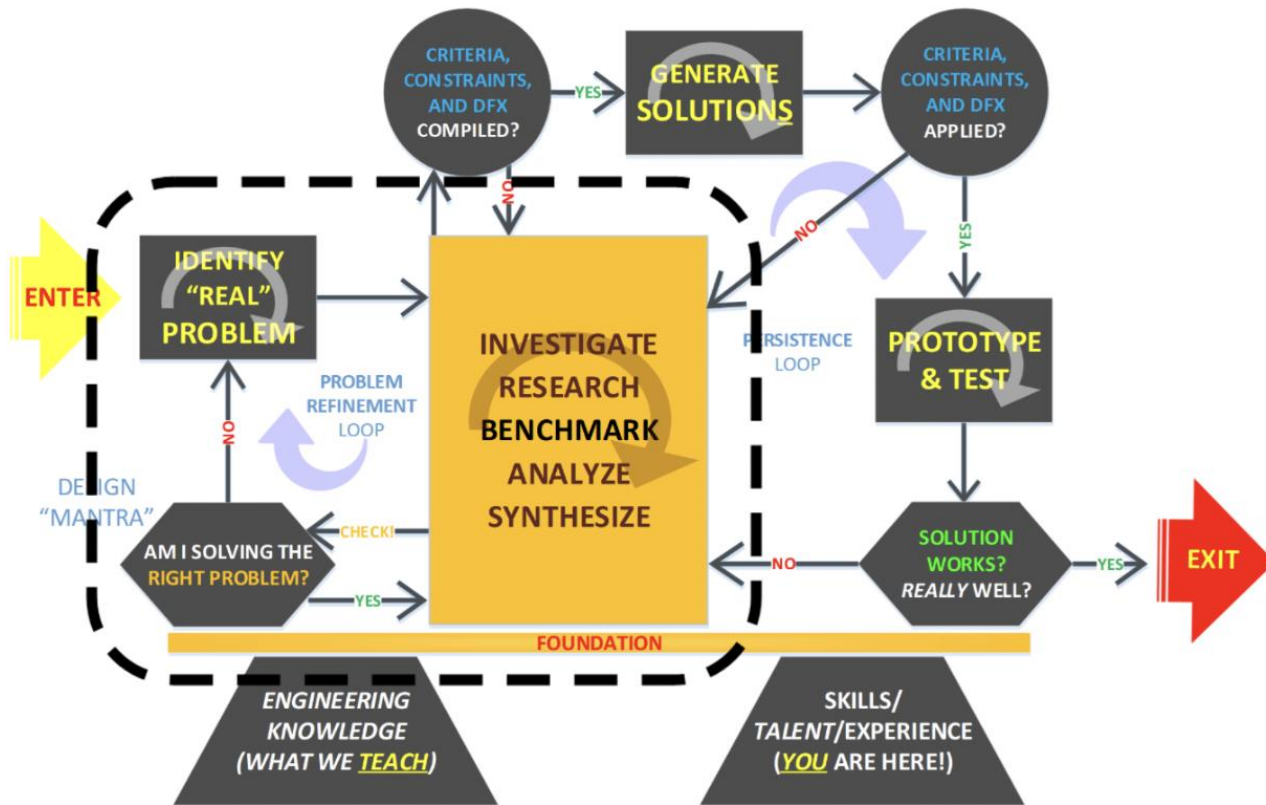
Marginal: (0.5-3) cm x (0.5-3) cm
Ideal: 2 cm x 2 cm



Amount of 3D Printed Parts

Marginal: > 80%
Ideal: 100%

Iterative Design Process



User centered approach

Risk Reduction

- Identify / fix issues early
- Refine weak areas

(3)

Client Problems (eg.)

- Cup gets knocked over
- Clamp was not adjustable
- Holder isn't deep enough

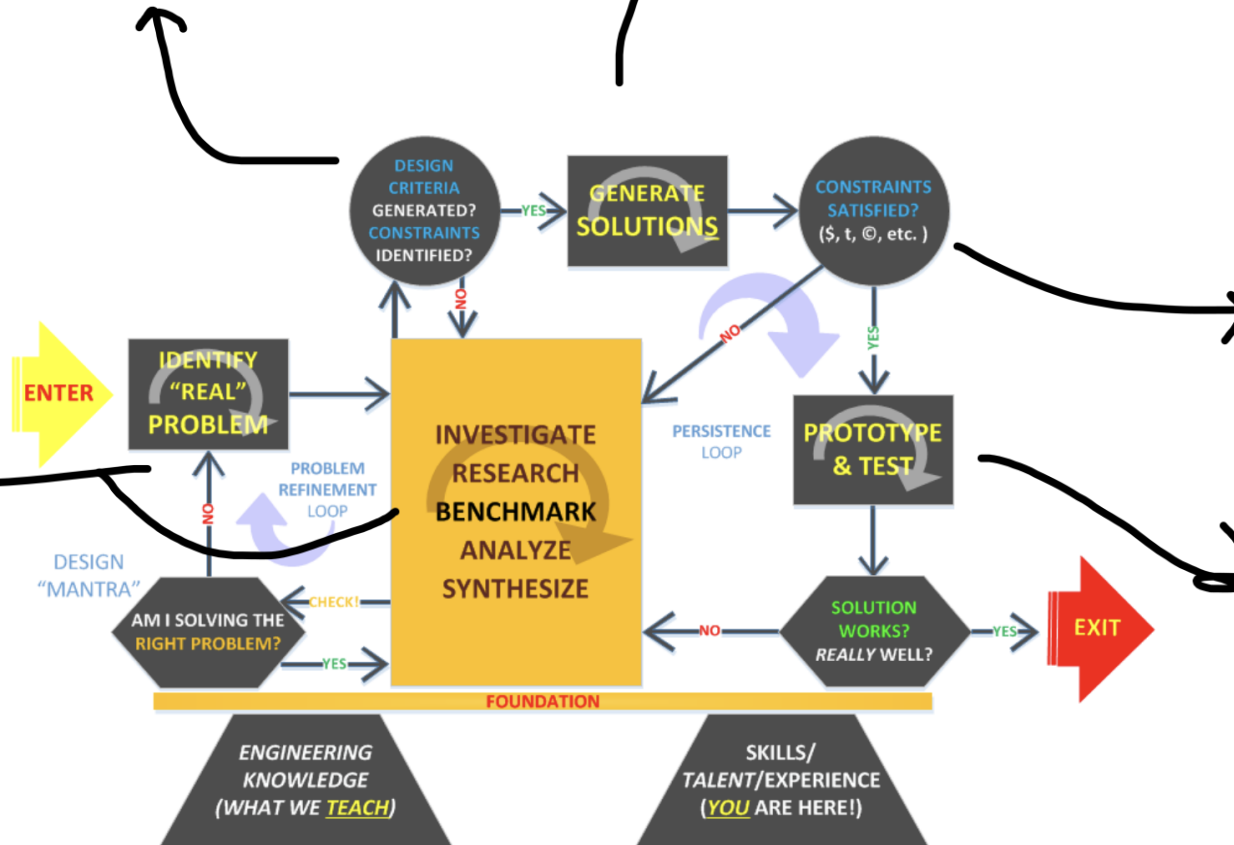
(2.3) Designs for installability, reparability, durability, usability

(3.2.1) *Clamp mechanism*, suction cups, magnetic attachments

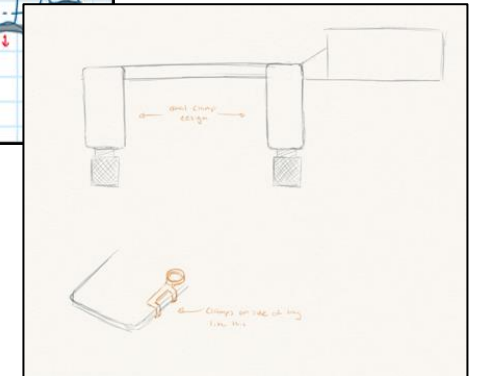
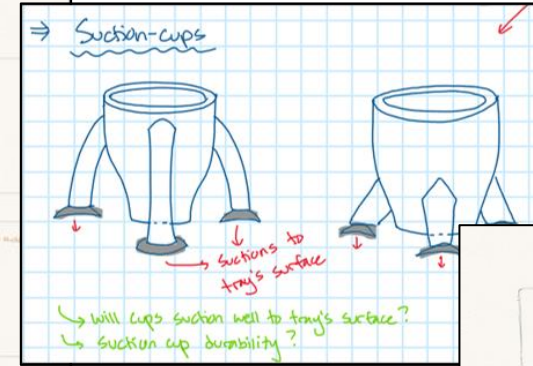
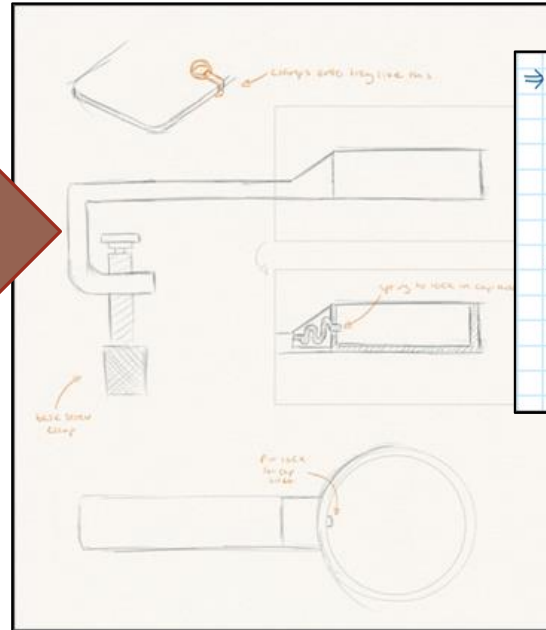
(3.2.3) addressed target specs.

- Eg. Installation, tools required, straw holding

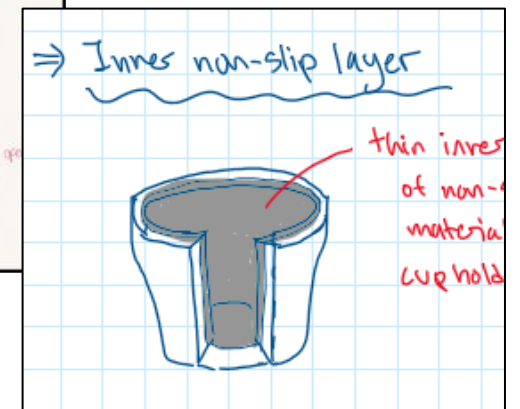
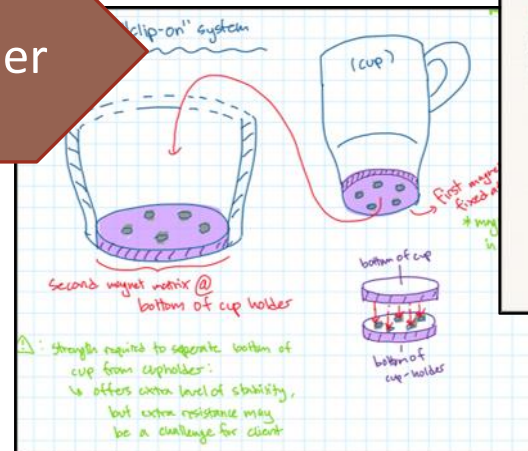
(4.1.2) Design for support arm, clamps, swivel arm, swivel lock, cradle



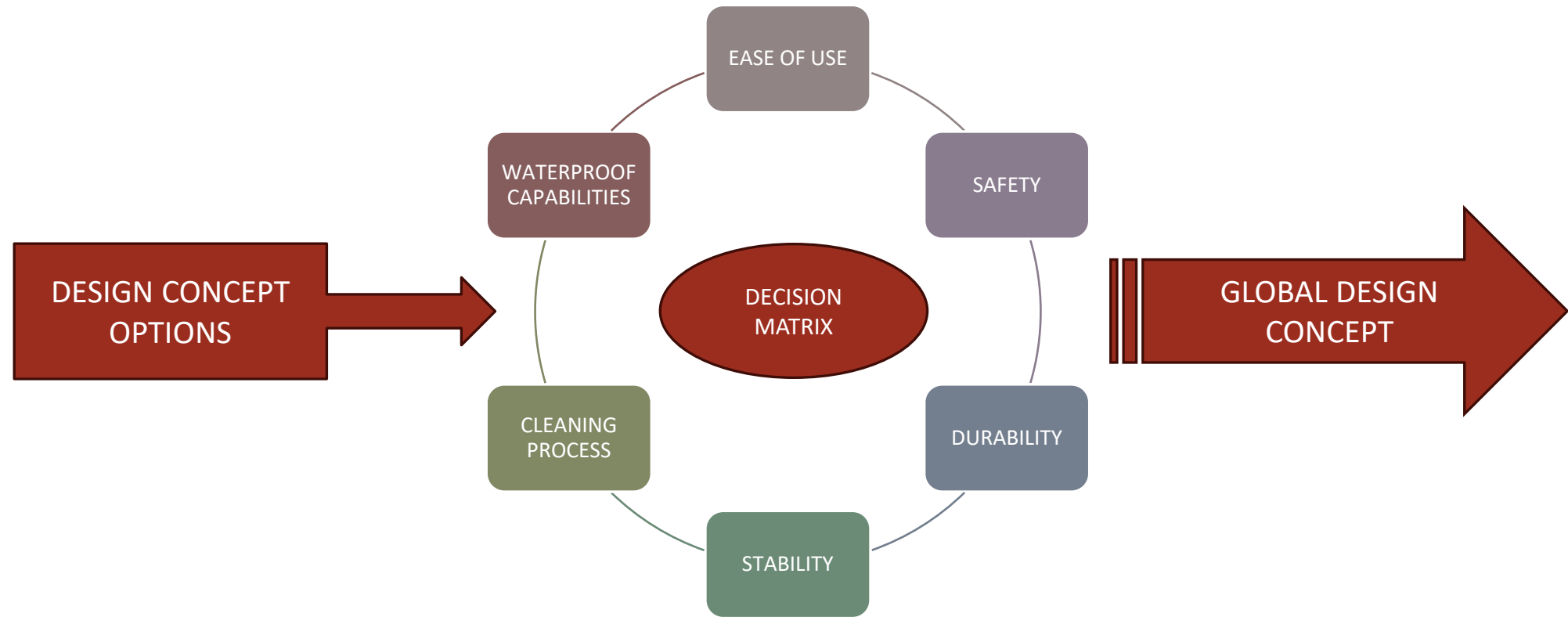
Secure cup holder to tray



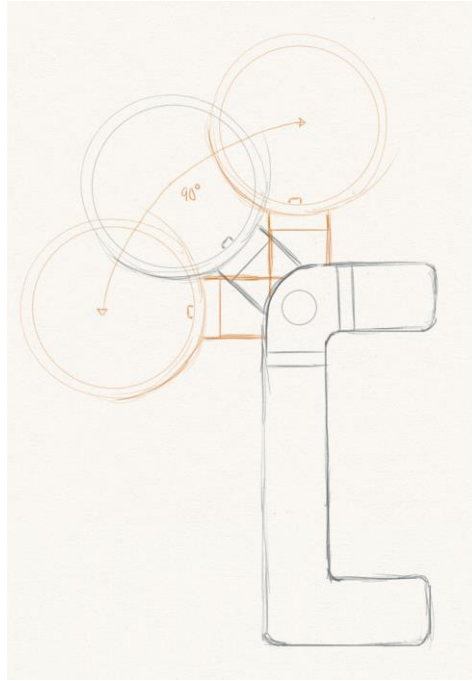
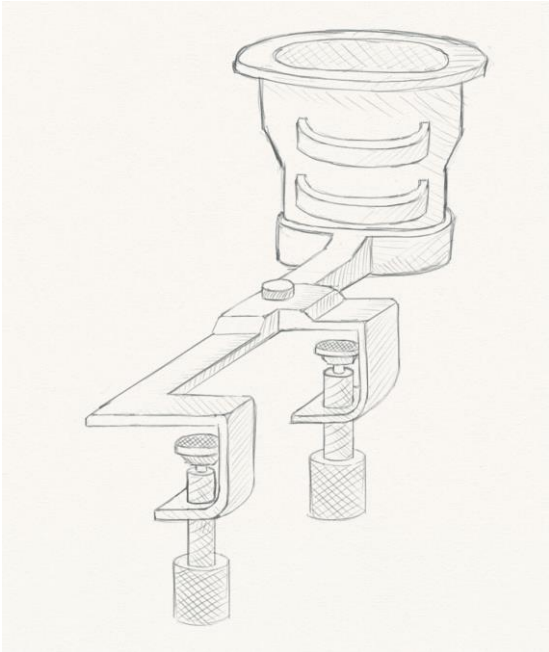
Stabilize the cup in cup holder



Concept Selection Process



Global Design Concept



- **Characteristics:**
 - Double-clamp design
 - Non-slip layer in base and inner walls of cup holder
 - Swivel Motion

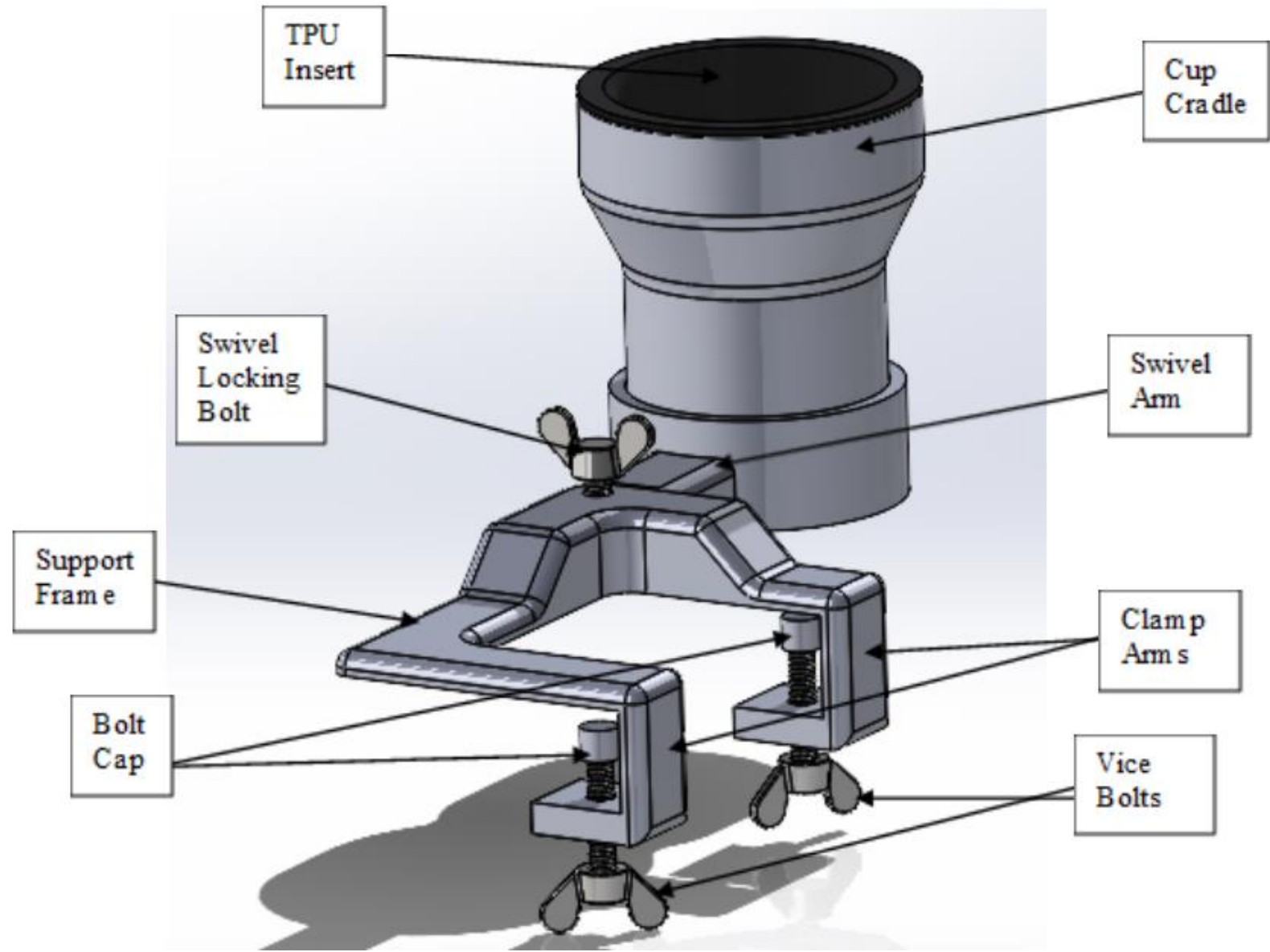


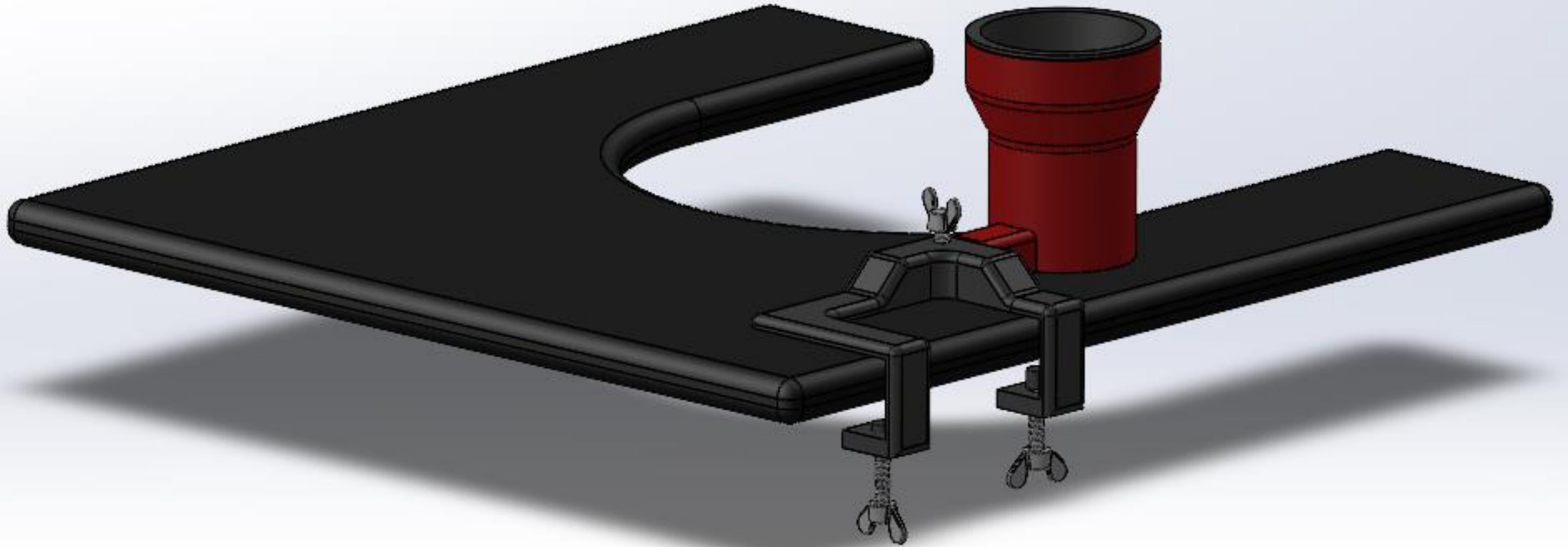
Prototype 1 (CAD Model)

- Cup Holder Subsystem
 - TPU Insert
 - Swivel Mechanism
- Vice Clamp Subsystem
 - 2 Clamps (Wing Bolts)
 - Embedded Nuts for Threads
 - Print in Parts

Prototype 1 CAD Model

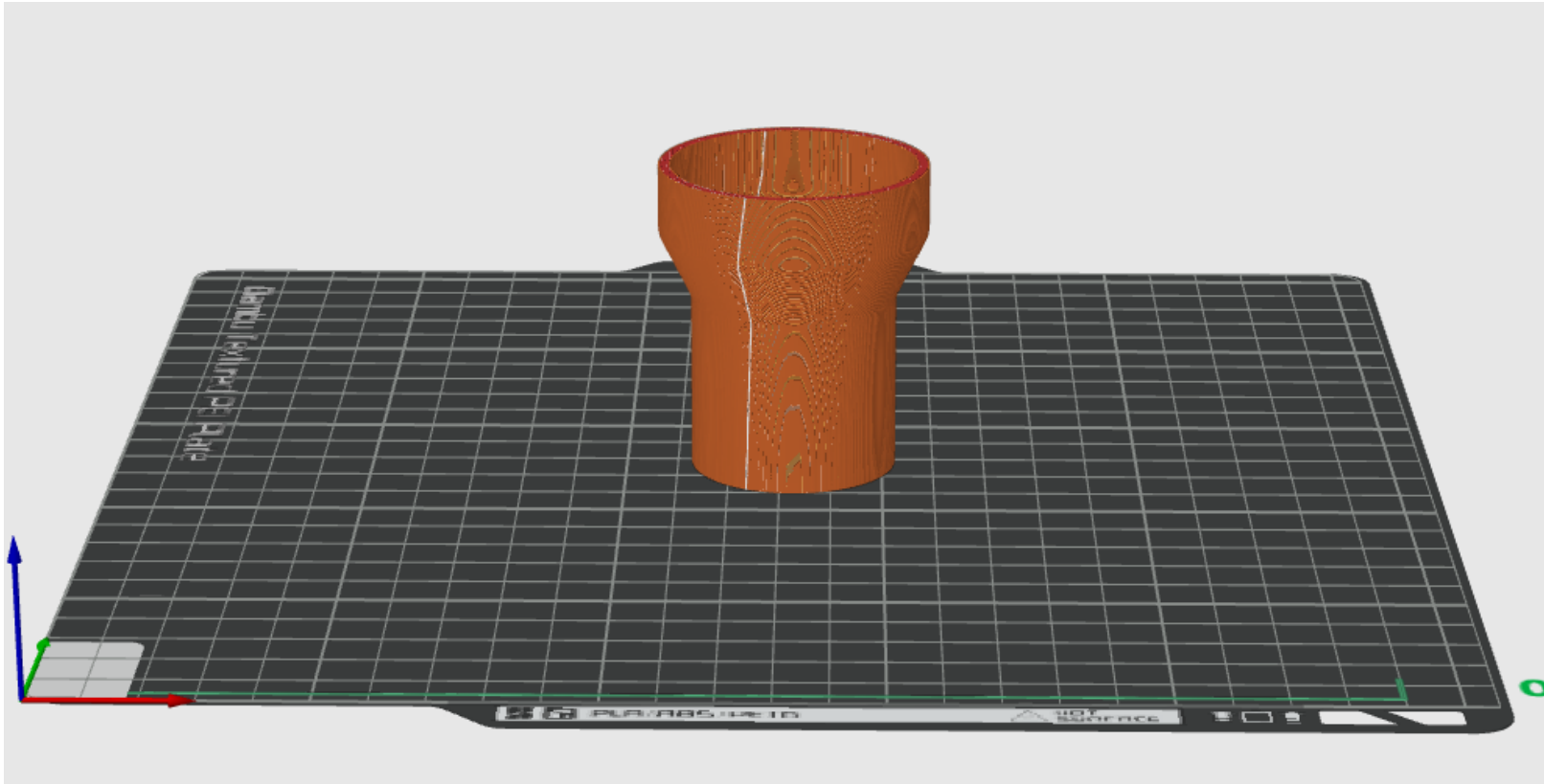
Group F2.2 - The Cup Crew





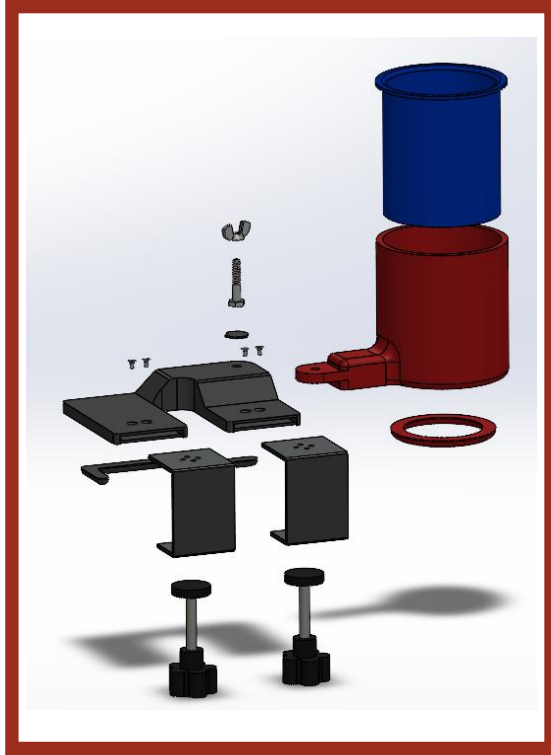
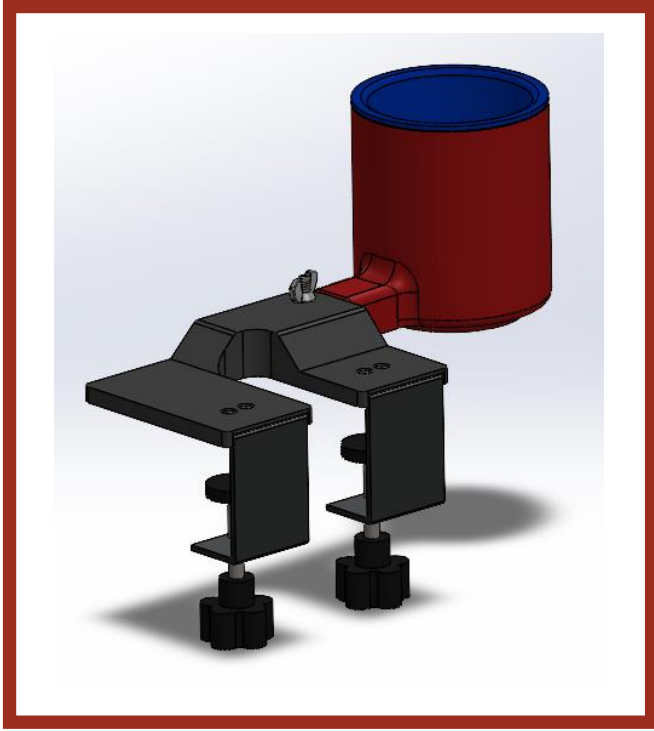
Prototype 1 – CAD Model

Group F2.2 - The Cup Crew



Prototype 1: Tests

DFX: Design for Reparability



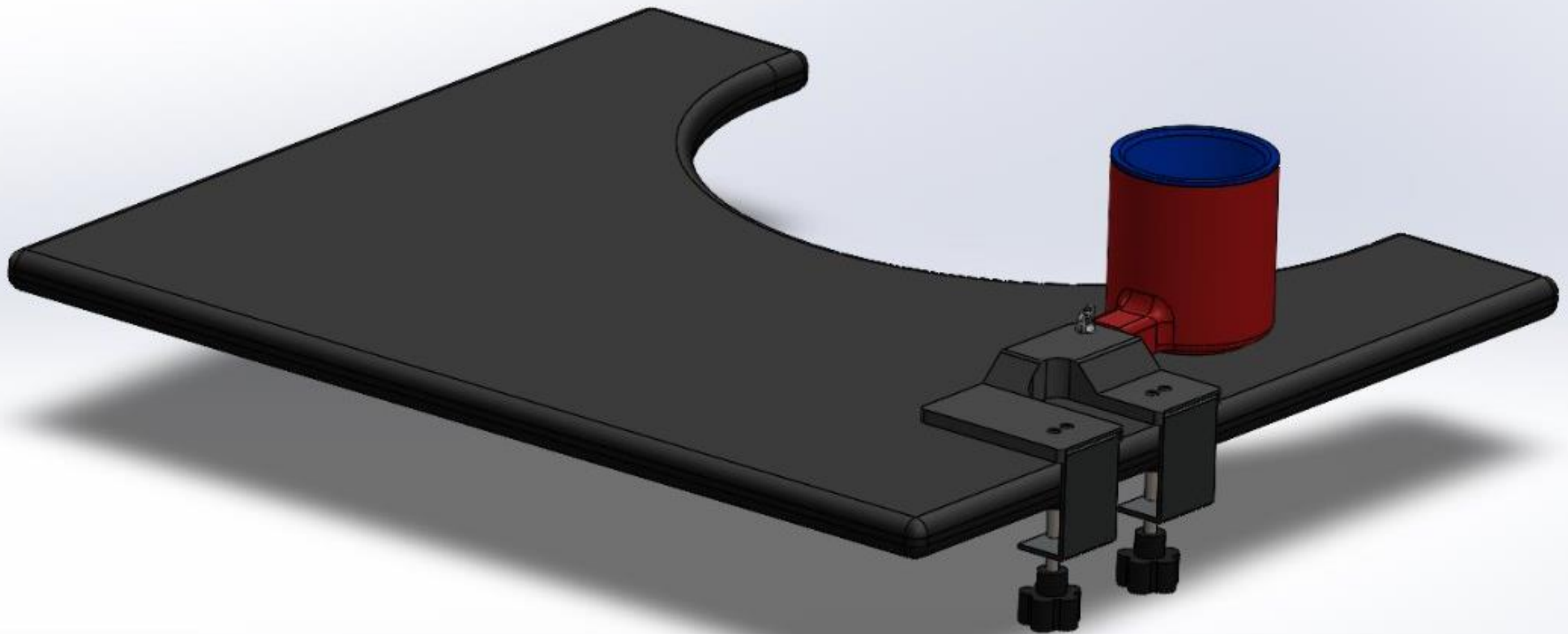
Prototype 2

- **Cup Holder Subsystem**

- TPU Inserts accommodating different cup sizes
- Swivel-lock Mechanism for cup positioning

- **Vice Clamp Subsystem**

- 2 Slotted Metal Clamps
- Embedded Nuts for Threads
- Print in Parts



Prototype 2 -

GROUP F2.2 - THE CUP CREW