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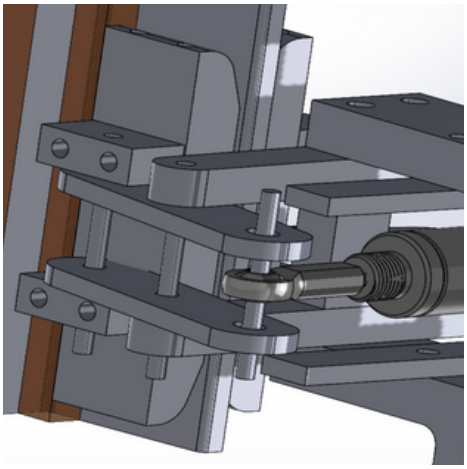
Mechanical and Emergency Brakes- Cornell Hyperloop

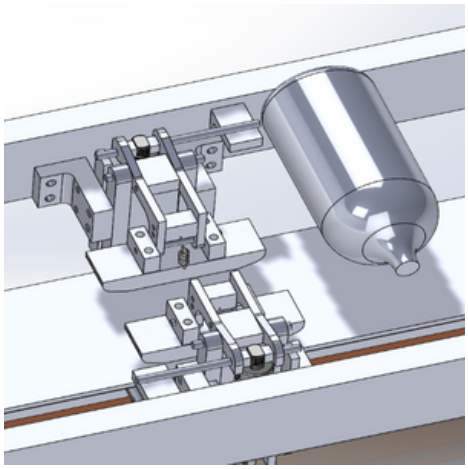


What?

- **Mechanical Brakes** of the Hyperloop pod, which has two functionalities.
- As a normal brakes helping the magnetic brakes to **full stop** the pod.
- Stopping the pod **automatically** in case of **emergency**(power disruption in the pod).

How?

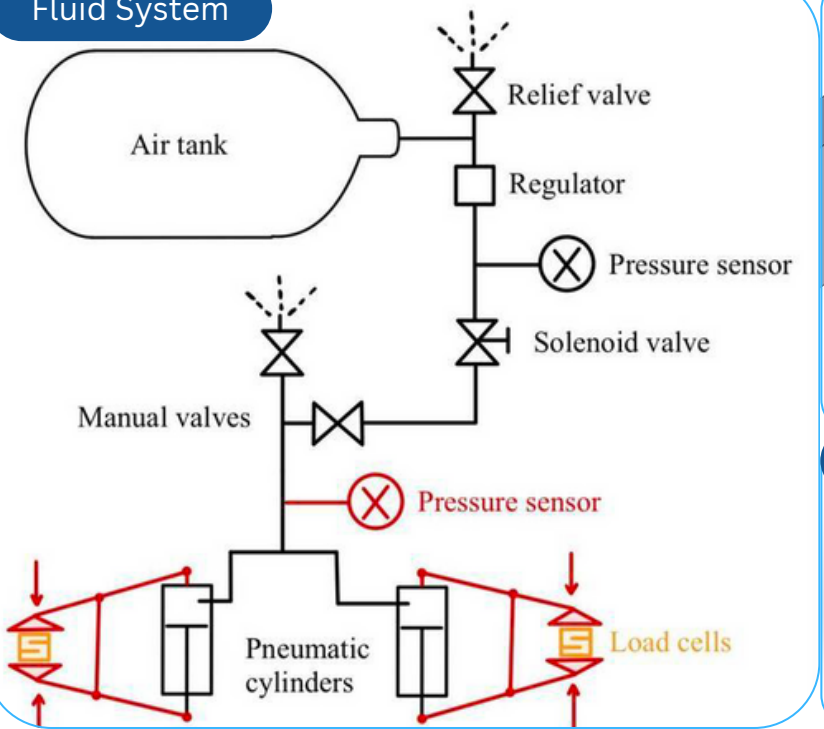
- Used a **Normally Open Valve** on the fluid system of the brakes.
- Used **Arduino** for **pressure sensor** testing.
- Designed on **SolidWorks.**
- Used **Ansys** for simulations and factor of safety of mechanical parts.

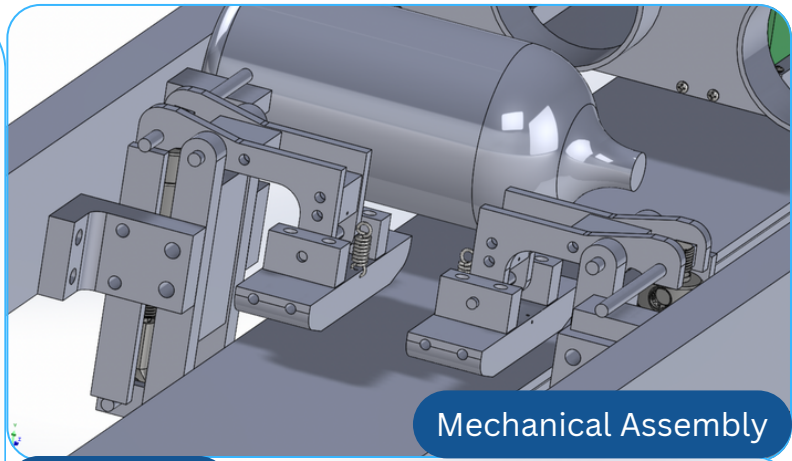


Result!

- Made a high efficient braking system that has two functionalities.
- Increased **safety** of the Hyperloop pod.
- **Reduced the cost** by **machining** parts using school machine shop.

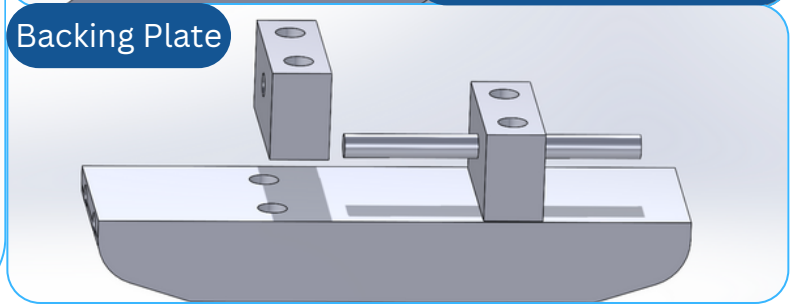
Fluid System





Mechanical Assembly

Backing Plate



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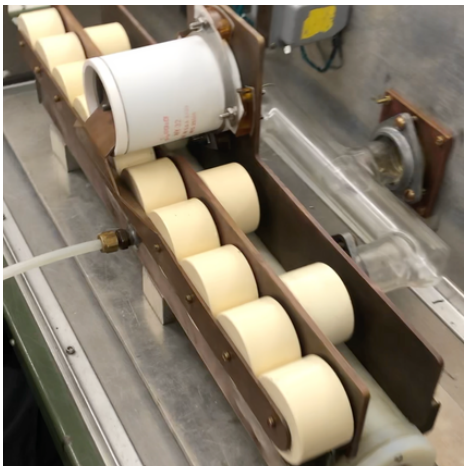
CO2 Laser, Lasers & Photonics Lab- Cornell University

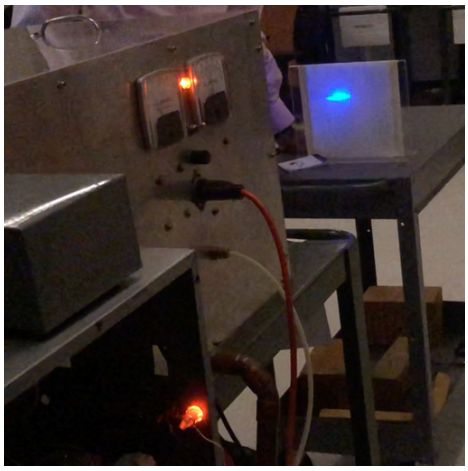


What?

- CO2 laser is a type of **high-power gas laser** capable of continuous-wave operation.
- involves exciting the CO2 gas molecules with an electrical discharge, which causes them to emit photons.
- The laser is pumped by a plasma discharge that typically contains nitrogen and helium in addition to CO2 .

How?

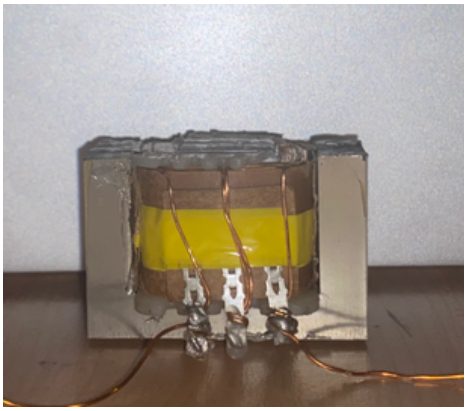
- The laser works by **exciting the CO2 molecules** with a plasma discharge. This creates excited states in the molecules, which then release energy in the form of light as they relax back to lower energy states.
- Used 14 capacitors, a **Thyratron**, Pulse amplifier, Pulse generator, vacuum, optics, Capacitors, resistors.



Result!

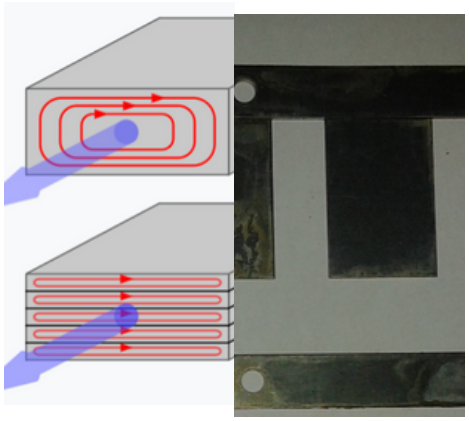
- Widely Used in **industrial**, **medical**, and **scientific applications**.
- Can be used to **weld human tissues** as an alternative to traditional sutures.

Magnetic Brakes- Cornell Hyperloop



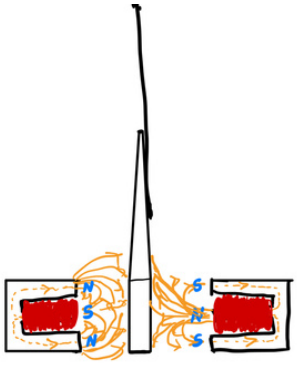
What?

- Making a **Strong Electromagnet** to generate **Eddy Current** on the track of the Hyperloop pod and take advantage of it to **slow down the pod.**



How?

- By **repurposing Transformers**.
- High **permeability materials** and **laminated sheets** of Transformer helps to make a strong electromagnet.



Result!

- Generates much more **stronger magnetic force** compare to normal electromagnets.
- Reduced the **cost** and increased **efficiency** of the magnetic brakes.