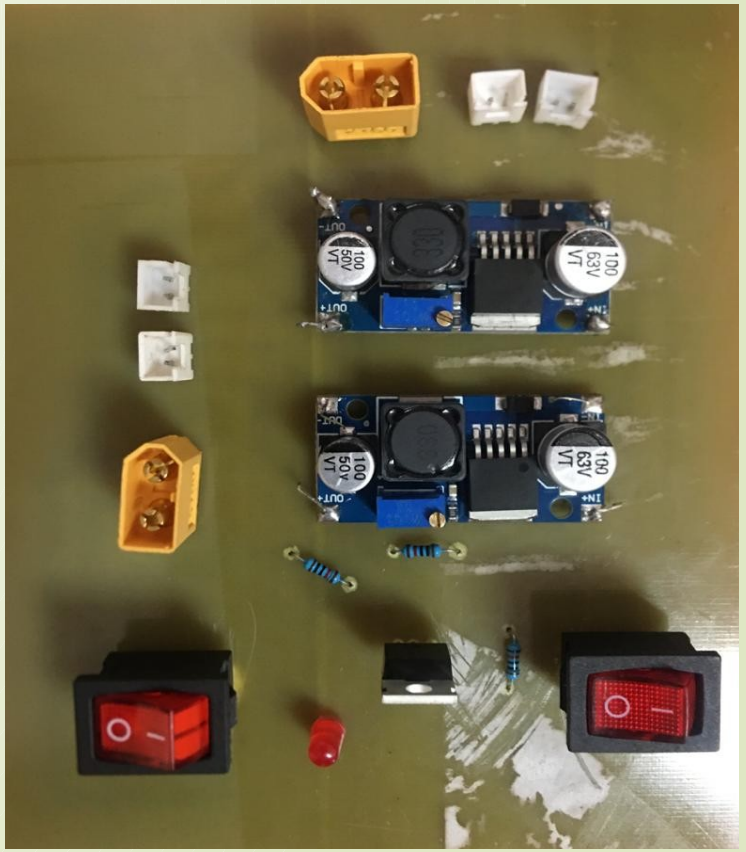
LIQUID PROPULSION PROGRESS REPORT

TASKS FOR THIS WEEK

- Remake the power board pcb
- Redesign the loadcell holder and design to attach to the engine
- Simulate the current test stand design
- pressure sensor calibration

Power PCB RE-fabrication

Previous board

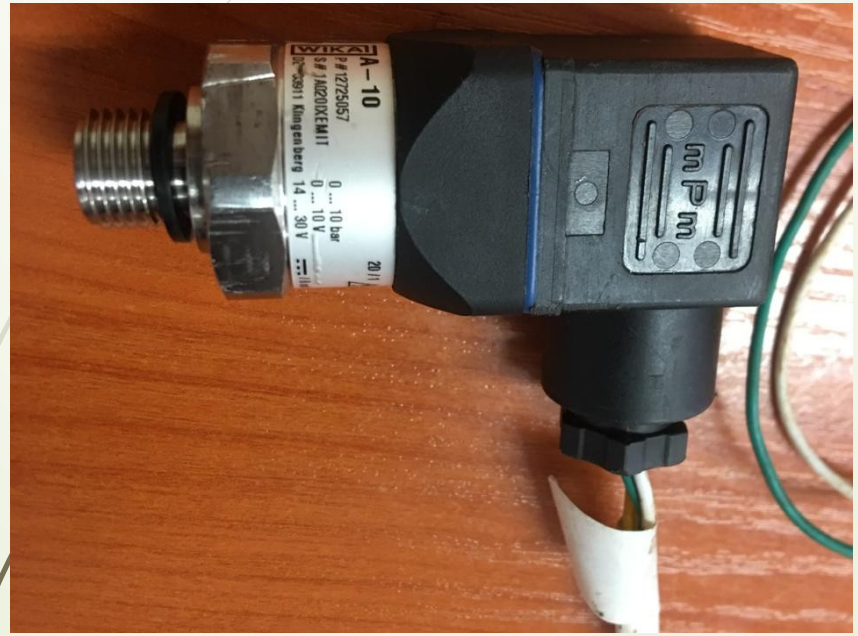


Current board

Solenoid valve test

Ignition coil PCB test

Pressure sensor

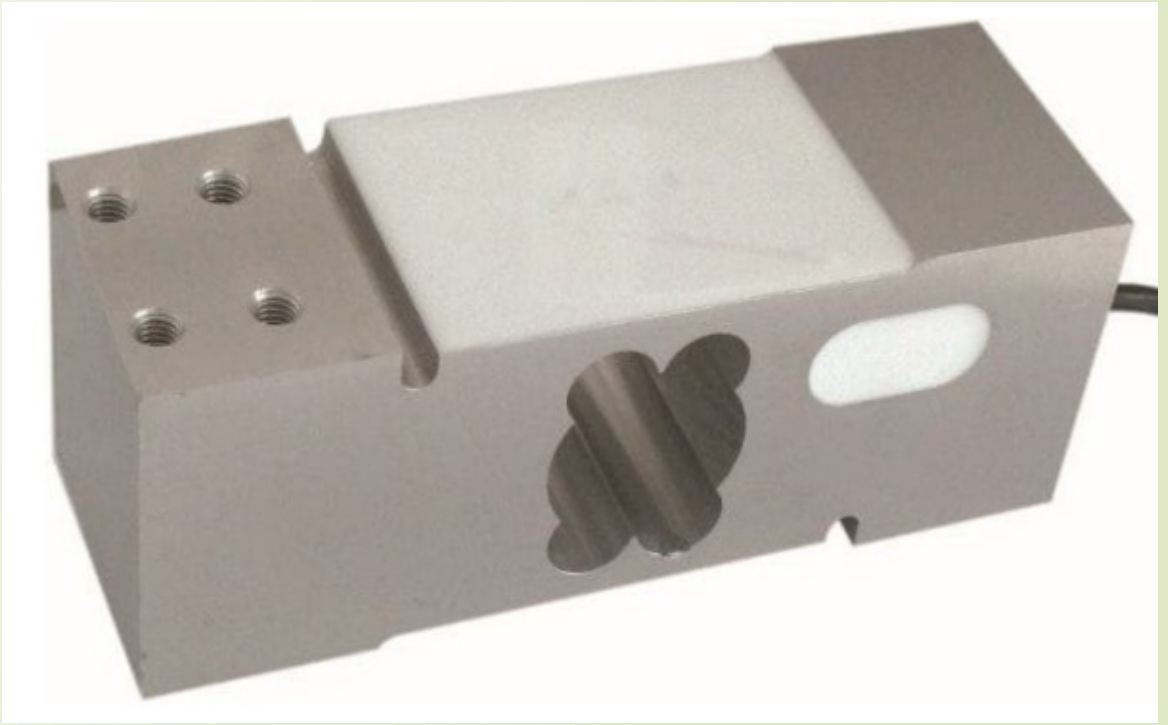


Wika A-10 pressure transducer

FR-01-752 Pressure transducer

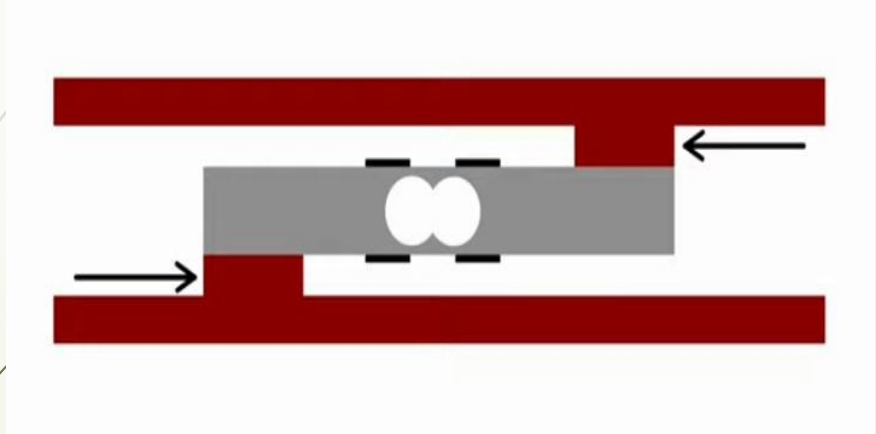
LOAD CELL TYPE

Compressive load cell

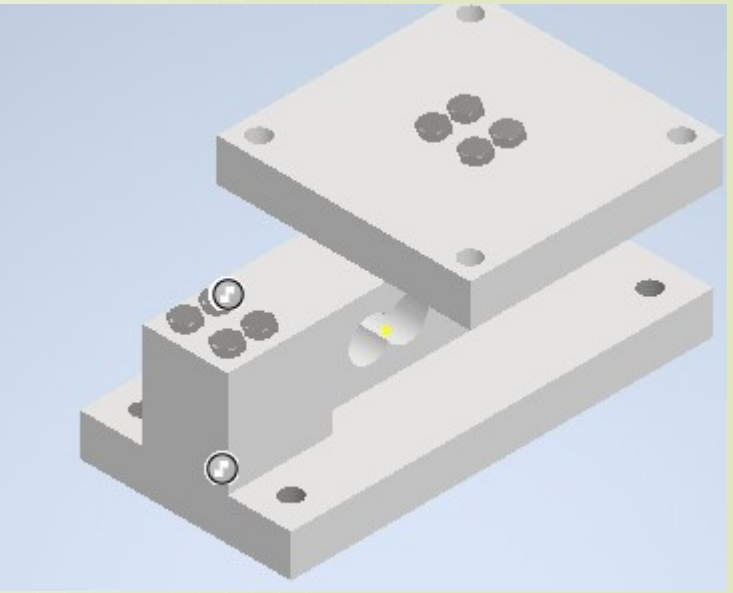


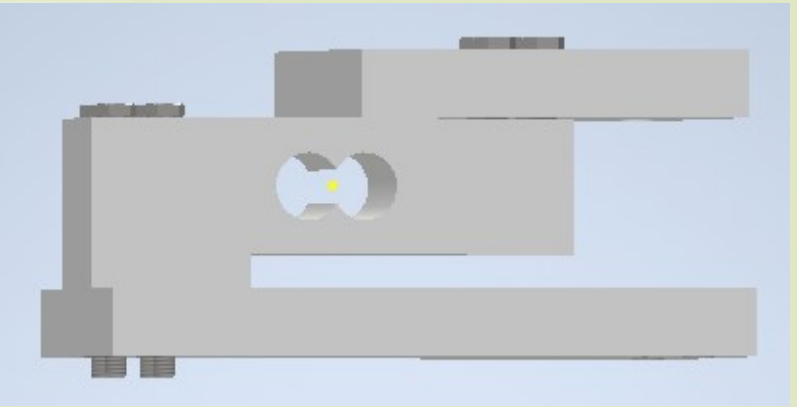
Strain gauge based load cell

Load cell holder



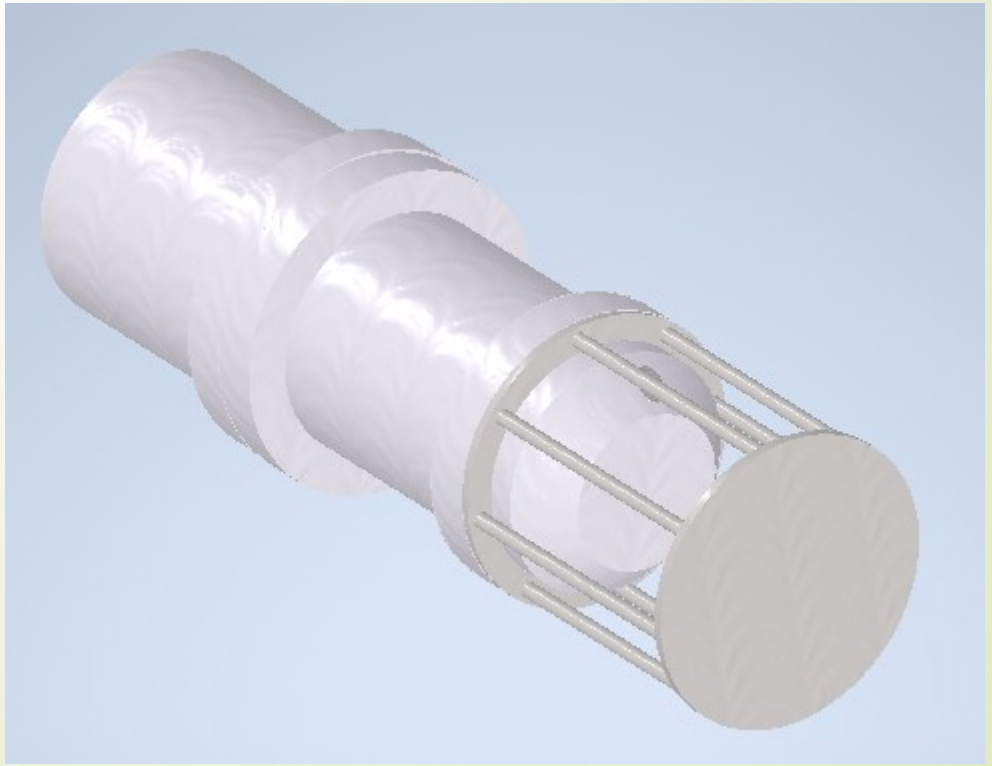
As shown in the image above that's just a sketch on what we are working on.



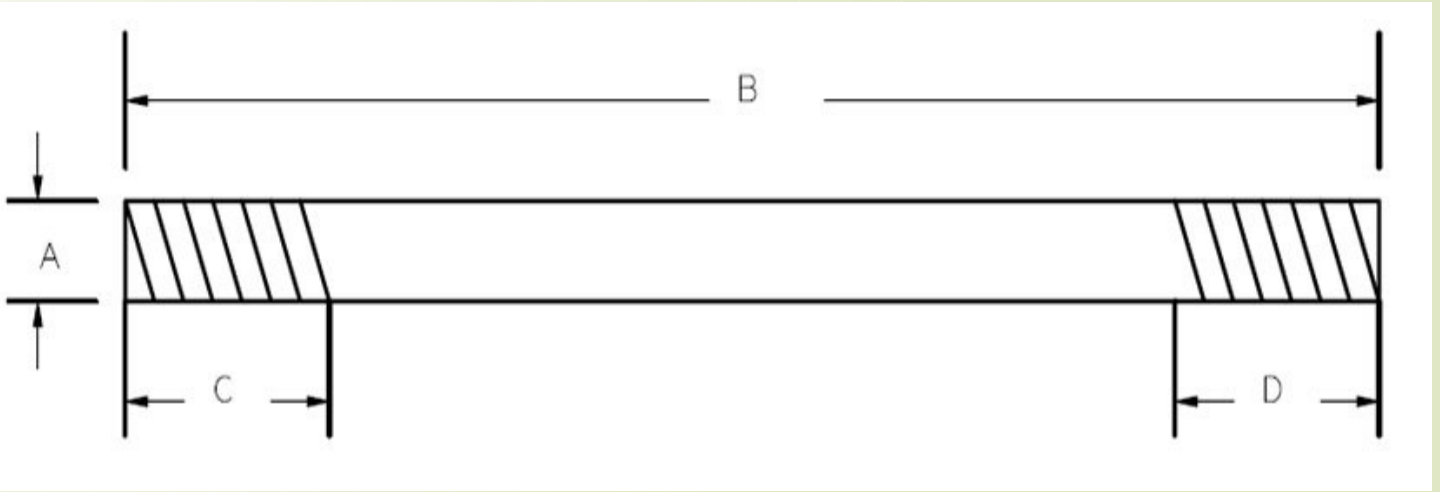


The design we came up wih

Engine load cell connector



DOUBLE-END THREADED ROD



Rod strength calculation

Rod strength calculation

We are M8 double-end threaded rod.

D = 8 mm , F = 2kN, N = 4 rods, Force per rod = 500 N
yield strength = 250 Mpa
safety factor = 1.5

stress on each bolt
σ=Force / Area

A=π×(4mm)2
A=π×16mm2 A≈50.27mm2

stress per rod
σ = 500 N / 50.27 = 9.94Mpa

Allowable Stress=250MPa / 1.5
Allowable Stress≈166.67MPa

stress on each rod is way below allowable stress.

Buckling load

To determine if the four steel rods can withstand buckling under a compression load of 2 kN

L = 10 cm K = 0.5 E = 200GPa , $I=\pi\times(4mm)^4 / 4$

$P_{critical}= \pi 2\times E\times I / (K\times L)2$

$P_{critical}$ = 157kN

Applied compression load < $P_{critical}$

Next weeks task

- Storing of pressure sensor data
- Programming and fabricating the control circuit
- Simulate the final design
- If possible buy the frames to fabricate the test stand

THANK YOU