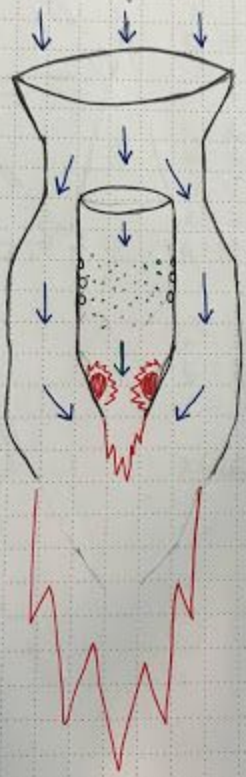
Eco-friendly Jet Engine

- uses ethanol as fuel
- ethanol can be converted into ethylene then oligomerization to form hydrocarbons.
- This fuel can be ignited in a Ram Jet Engine



- air
- ethanol based fuel
- ignition
- fuel nozzle

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$C_{12}H_{26} + 18.5O_2 \rightarrow 12CO_2 + 13H_2O$

$C_{12}H_{26}$ mm = 170 g/mol

density = 0.88 g/mL = $\frac{0.004706 \text{ mol } C_{12}H_{26}}{1 \text{ mL}}$

0.08705 mol O_2
0.0565 mol CO_2
0.0612 mol H_2O

$PV = nRT$

$V = \frac{nRT}{P}$ = $V = \frac{0.08705 \times 8.314 \times 273K}{100 kPa}$ = 1.98 L

1.98 L × 1000 = 1980 mL = 1980 cm^3 O_2 × $\frac{100 \text{ air}}{21 O_2}$ =

$\frac{12 CO_2}{18.5 O_2} \times 1980 cm^3 O_2 = 1284 cm^3 CO_2$

$\frac{13 H_2O}{18.5} \times 1980 cm^3 O_2 = 1391.4 cm^3 H_2O$

2675 cm^3 ea

Velocity:

1 cm^3 $C_{12}H_{26}$ → $\frac{9428 cm^3 \text{ air}}{8.56 cm^2}$ = $\frac{1100 cm}{5}$ × $\frac{1 \text{ air}}{160434}$ × $\frac{36}{1}$

↑ area of cylinder

24.6 mph @ 1mL/5

Title: Calculating P

22.4 L : 1 mol
1.95 L : 0.087

$V_{O_2} = \frac{1}{5}$

$V_{CO_2} = 1$

$V_{H_2O} =$

$V_{C_{12}H_{26}} =$

P =

m =

$\rho_a = \frac{m}{V}$

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Title: Calculating Pressure

22.4L : 1 mol
1.95L : 0.08705

$VO_2 = 1.95 L$

$VCO_2 = 1.27 L$

$VH_2O = 1.87 L$

$VC_{12}H_{26} = 0.001 L$

Kerosene releases 3960 kJ per 1mL

3962.67 J

$Q = mC\Delta T$

$3962.67 J = (0.0078 kg)(2000 J/kg)(\Delta T)$

$\Delta T = 254 K$

$m = m_a + m_{combust}$

127.42 − 53.23 =

74.19 cm³

243.83 − 21.87 = 223.96

$\rho_a = \frac{m_a}{V_a} \Rightarrow m_a = \rho_a \times V_a$

$m_a = 1.225 \frac{kg}{m^3} \times 5.4 \times 10^{-4} m^3$

$m_a = 6.6 \times 10^{-4} kg$

$P_{total} = \frac{nRT}{V}_{H_2O} + \frac{nRT}{V}_{CO_2}$

$M_{O_2} = 0.00274 kg$

$M_{CO_2} = 0.06249 kg$

$M_{H_2O} = 0.00110 kg$

$M_{C_{12}H_{26}} = 0.0008 kg$

$M_{total} = 0.0078 kg$

$P_{total} = 248 psi$
or
560 psi using
$PV = nRT$

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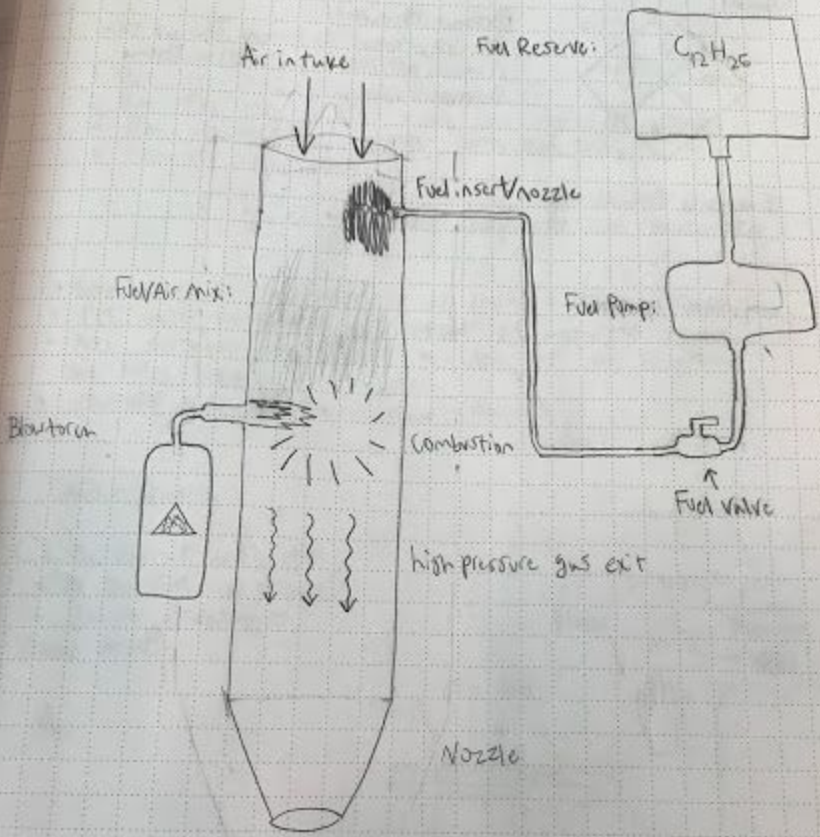

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Test Plan

Procedure

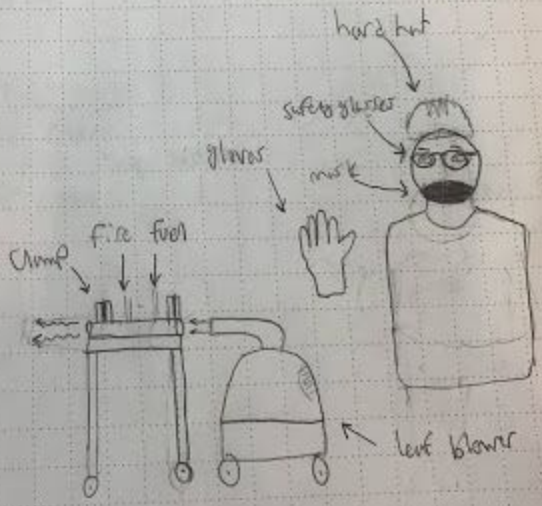
1. Run air Provider in Correct position
2. Run fan for 5 secs making sure mixture is Completed
3. Run Ignition for 20 secs with fuel running
4. Turn off all systems

Safety:

- Engine must be held down by at least 2 Clamps
- PPE must be used
- Area surrounding Engine must be clear of all flammable and living entities
- Shutoff Valve will be in place

Central Question:

Can the Current Configuration ignite the fuel and produce the power necessary to Produce thrust?



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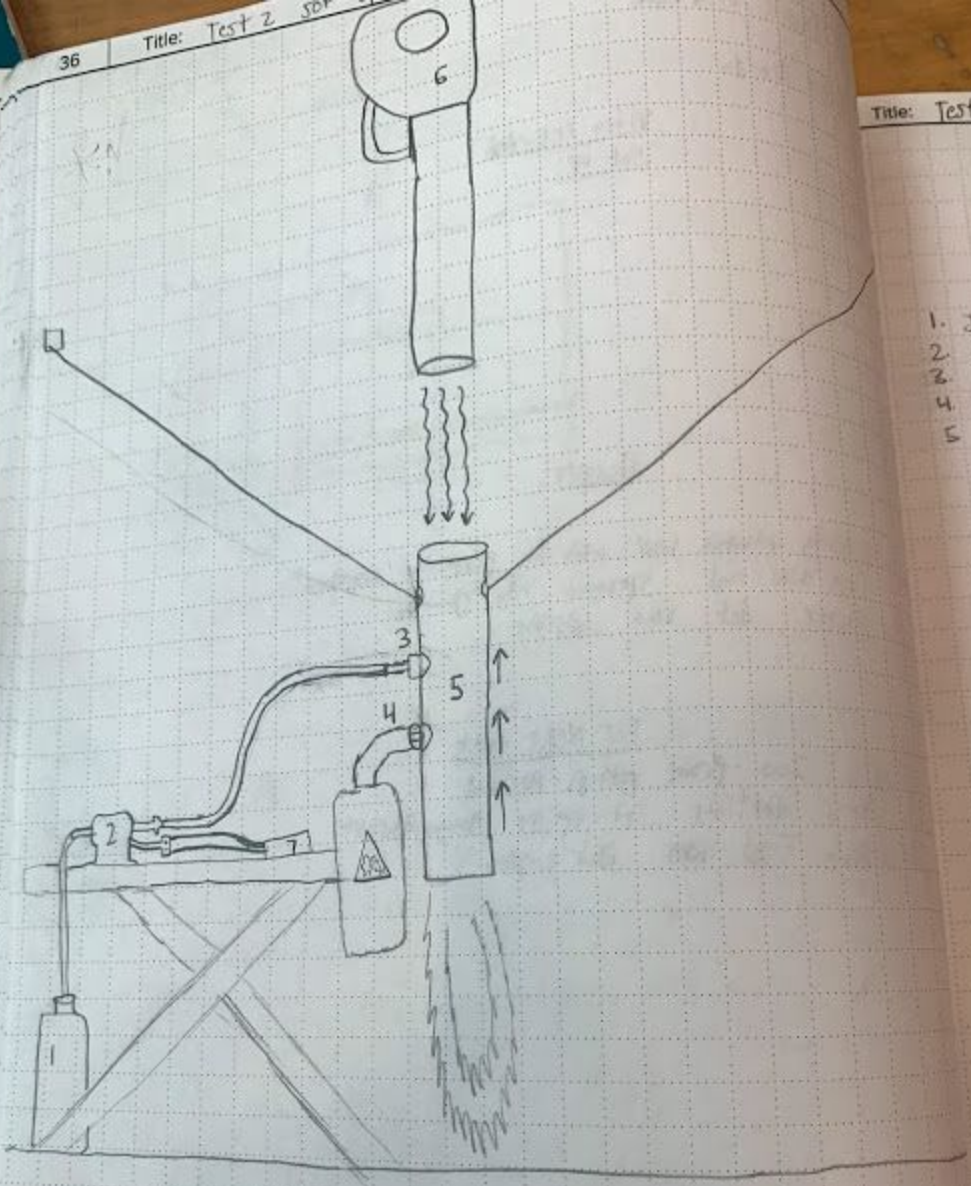

1: Pure ethanol
2: Fuel Pump
3: Nozzle
4. Torch
5. Jet engine
6. Leaf Blower
7. Battery

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