IC ENGINE TERM PAPER

TOPIC: To study efficiency, performance rating, exhaust gasses etc for a IC Engine using Diesel as fuel

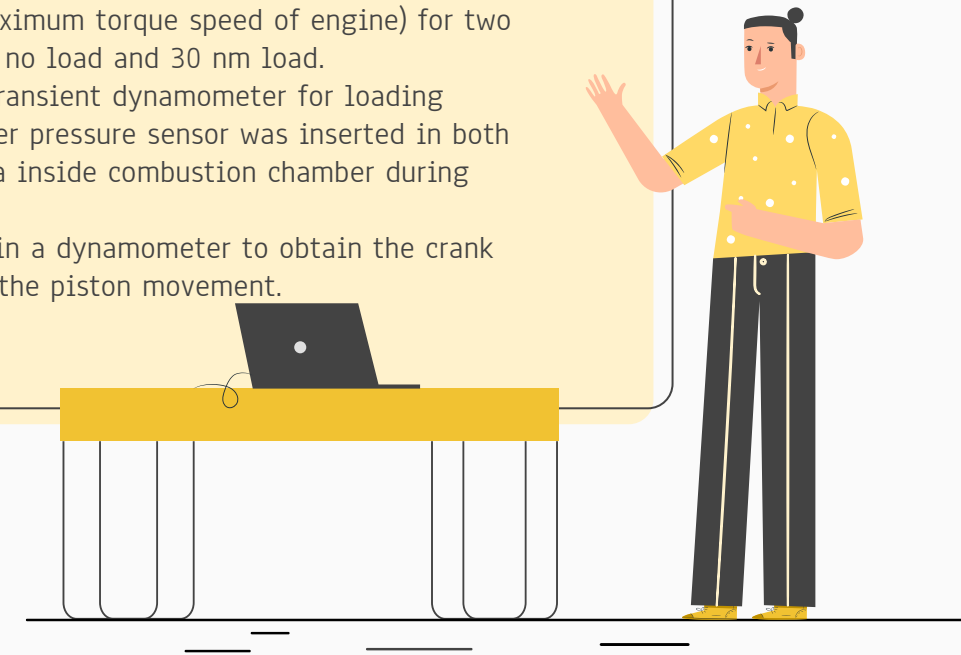
BY: Unique Heera
Unnam Jessica

INTRODUCTION

- Life today has become very dependent on various modes of transport.
- As of now most of the fuels that we use for our IC Engines are generated from fossil fuels,but with fossil fuels diminishing at a high rate day by day we need to think of a substitute.
- Thus as an alternative to this Diesel is currently being used in various places and applications.
- Initially, diesel engines typically ran on cheap fuel oils. In the United States, these were distilled from petroleum, whereas in Europe, coal-tar creosote oil was used.
- Diesel fuel is also created from crude oil. During the refining process, the viscous dark thick crude oil is turned into the much lighter diesel fuel.

METHODOLOGY

- Experiments were performed in twin cylinder water cooled CI engine
- Test were performed at 2000 rpm (maximum torque speed of engine) for two difference engine loading conditions no load and 30 nm load.
- The test engine was combined with transient dynamometer for loading condition and piezoelectric in cylinder pressure sensor was inserted in both cylinders to acquire the pressure data inside combustion chamber during combustion of fuel.
- A crank angle encoder was installed in a dynamometer to obtain the crank angle degree and top dead centre of the piston movement.



FORMULAS USED:

$$Swept\ volume\ Vs = \pi d^2/_4 \Delta x^2 = 396cc$$

$$\text{Clearence volume } \mathrm{Vc} = {}^{\mathrm{Vs}}/_{\mathrm{CR}-1}$$

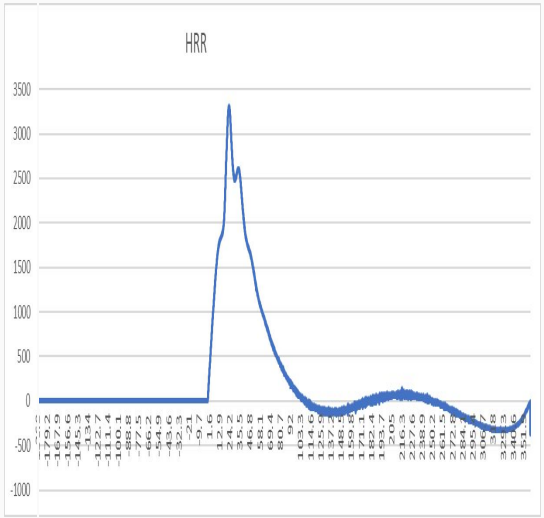
$$\mathrm{R} = \frac{2\mathrm{l}}{\Delta \mathrm{x}} = 3.24$$

Rate of change of volume w.r.t crank angle

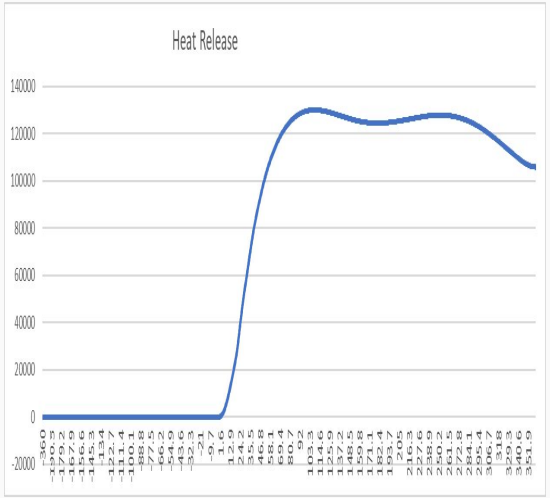
$$\frac{\mathrm{dV}}{\mathrm{d}\Theta} = \frac{\mathrm{Vs}}{2}\sin(\Theta)(1 + \frac{\cos(\Theta)}{\sqrt{\mathrm{r}^2 - \sin(\Theta)^2}}$$

$$\mathrm{HRR} = \frac{\mathrm{dQ_{net}}}{\mathrm{d}\Theta} = \frac{\gamma}{\gamma - 1}\mathrm{P}\frac{\mathrm{dV}}{\mathrm{d}\Theta} + \frac{1}{\gamma - 1}\frac{\mathrm{dP}}{\mathrm{d}\Theta}$$

HRR AND HR GRAPH FOR ONM:

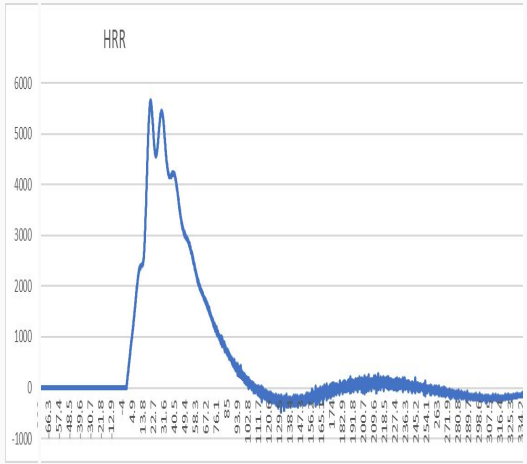


HRR

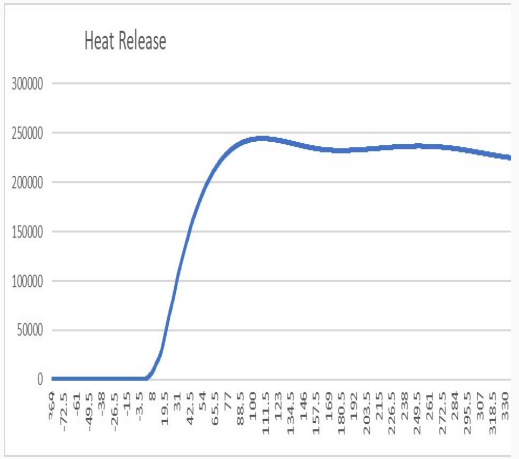


HR

HRR AND HR GRAPH FOR 30NM:



HRR



HR

RESULTS

For 0Nm Load:

Fuel Flow Rate=38.11g/s

CA5	6503
CAD	8.9
CA50	65,030
CAD	33.5
CA90	1,17,057
CAD	67

For 30Nm Load:

Fuel Flow Rate=71.59g/s

CA5	12,215.45
CAD	10.5
CA50	1,22,154.54
CAD	35.6
CA90	2,19,878.10
CAD	69

Brake Specific Fuel Consumption (bsfc) for 30Nm load=0.014g/W

ANALYZING EMISSIONS

- Diesel engines emit less CO2 and greenhouse gasses than petrol engines.
- This happens because of the particular type of fuel and the internal efficiency of the diesel engine.
- More specifically, the fuel used in diesel engines has a higher compression ratio than petrol and it also performs better than petrol engines.
- As a result, less fuel is used to travel the same distance, allowing to save more CO2.
- Most estimates indicate that diesel engines emit about 10% less than the petrol engines of the same category

CONCLUSION

- In this experiment we have experimentally found the values of heat release rate ,CA values,bsfc value and fuel flow rate at two different loads.
- These can be used to increase the efficiency of the combustion.
- With higher load we got higher HRR values.
- Based on these data and values that we found it is proven that Diesel is a safer and better fuel provided certain precautions and safety measures are taken in consideration.
- The major issues related to this can be about the environmental hazards but with the help of further enhancements in science it is sure that it will be solved as its already proven to be better than the regular petrol.

THANKS!