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A Modified Cylinder Block-IC Engine Experimentation

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Abstract: ***In Internal combustion Engines, the adequate cooling plays vital role for proper functioning and enhanced efficiencies. In the present scenario, the demand for Air cooled Engines with higher powers is increasing and hence necessity for Augmented heat transfer through fins. The present work confined to fins mounted on the cylinder block.In the present work, Internal Combustion Engine test rig is used, which consist of 4S, single cylinder, vertical, air cooled, SI Engine with Instrumentation panel, Throttle control mechanism and Electrical Loading system. The performance test on IC engine is carried out for three various configurations of cylinder blocks i.e., 1. Actual cylinder block 2.Cylinder block with triangular profile fins 3. Cylinder block with perforated triangular profile fins. Performance parameters are evaluated, plotted and compared & eventually conclusions are made.***

Keywords: Cylinder Block with Perforated Triangular Profile Fins.

I. INTRODUCTION

Engines are broadly classified into internal combustion engines and external combustion engines. In internal combustion engines, combustion takes place inside the cylinder. During combustion hot gases are produced at temperature of about 2500^{o}C. Consequently heat is absorbed by cylinder walls, piston, cylinder head and valves and further, temperature of these parts increases. Subsequently leads to malfunctioning of the engine. Hence this necessitates the proper cooling system. Cooling system can be either water cooled or air cooled. Due to light weight and other advantages, air cooled engines are mostly used for automobile applications.

II. ENGINE SPECIFICATION

TABLE 1: IC ENGINE SPECIFICATION

Number of Cylinders	One (1)
Bore Dia	57.30mm
Stroke Dia	57.80mm
Displacement of Piston	149.2 Sq. cm
C.R (Compression Ratio)	9.1:1.0
Fuel	Petrol
Position of the Engine	Vertical

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III. EXPERIMENTAL APPARATUS AND METHODS

Experimentation is being carried out with internal combustion Engine test rig which consists of following components

1. I.C Engine
2. Instrumentation panel, which consist of burette, manometer, rpm indicator and energy meter.
3. Throttle control mechanism
4. Anemometer
5. A.C Generator with electrical load bank.

once the test rig is being prepared, internal combustion engine is started with self stator with the help of battery.

The below mentioned parameters are noted after observation for different wind speeds at constant speeds of the I.C engine

1. Fuel consumed in the burette
2. Water level difference in manometer
3. Speed of the engine
4. Energy meter reading
5. Wind speed

Fig.1: IC ENGINE TEST RIG

With the aide of above parameters, performance factors like,$\eta_{Br.th.}$, B.S.F.C etc., are evaluated. The above experiment is repeatedly carried out for three various configurations of cylinder blocks i.e., 1. Actual cylinder block 2.Cylinder block with fins of triangular profile. 3. Engine block with perforated fins of triangular profile.

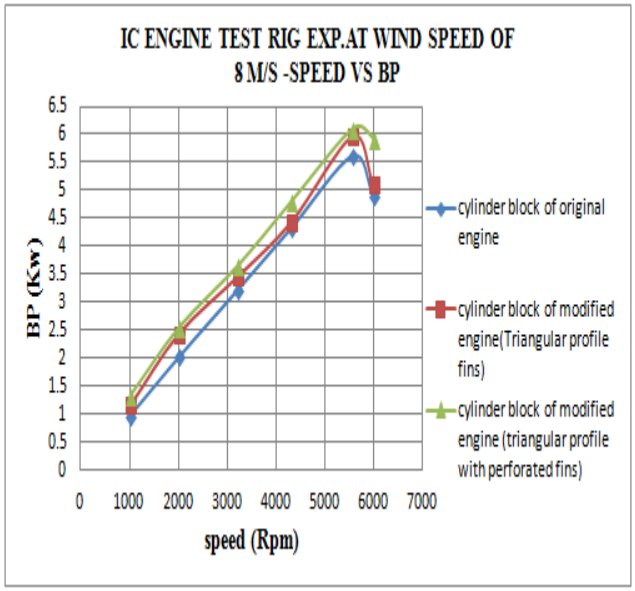
Fig. 2: IC Engine Cylinder Block

IV. RESULTS AND DISCUSSIONS

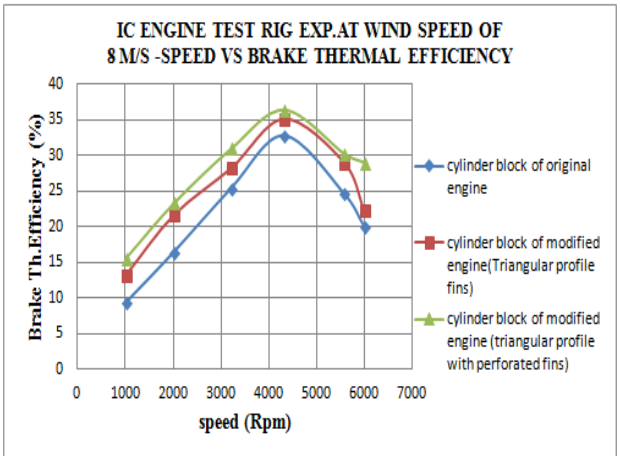
For the same wind speed, pitch, number of fins., brake thermal efficiency, brake power of altered engine with engine block of perforated fins of triangular profile are more than the original engine (Engine block of rectangular profile fins).

For the same wind speed, number of fins., B.S.F.C. of altered I.C. Engine with engine block of perforated fins of triangular profile are lower than the original engine (Engine block of rectangular profile fins).

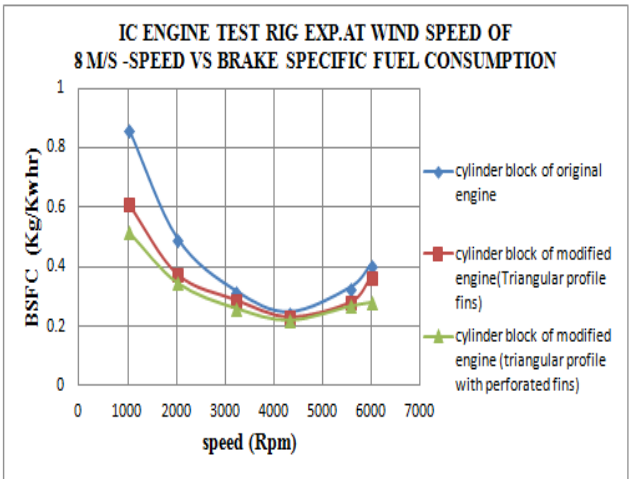
Performance factors like Brake Thermal Efficiency (BTF), Brake Power (BP) and Brake Specific Fuel Consumption (B.S.F.C.) of modified engine with engine block of fins of triangular profile are lies between other two configurations.



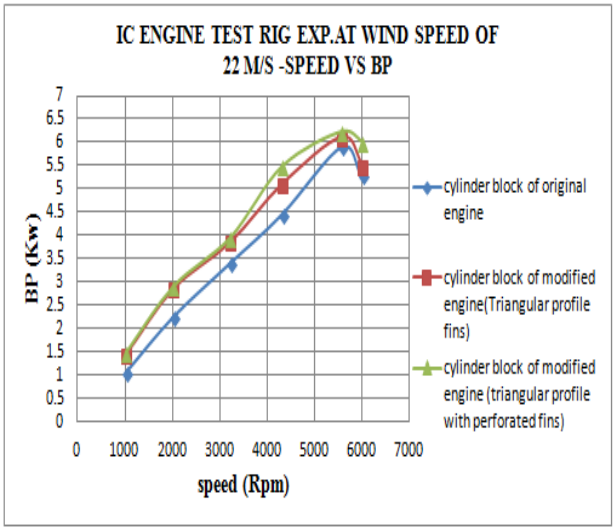
Graph 1: Speed - Bp at (wind speed 8 m/s)



Graph 2: Speed -$\eta_{Br.th.}$(wind speed 8 m/s)



Graph 3: Speed –B.S.F.C.(wind speed 8 m/s)



Graph 4: Speed - Bp (wind speed 22 m/s)

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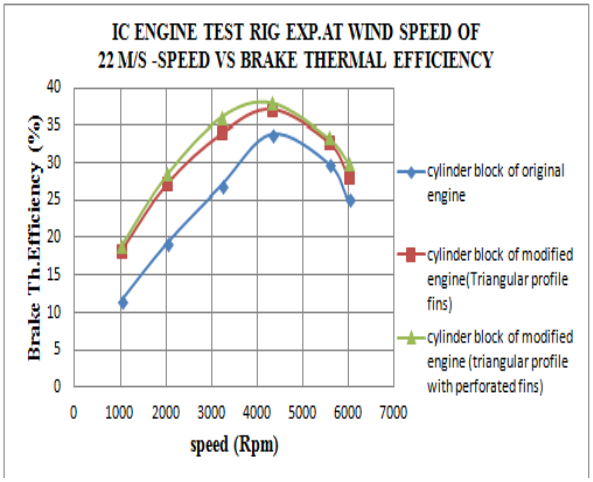
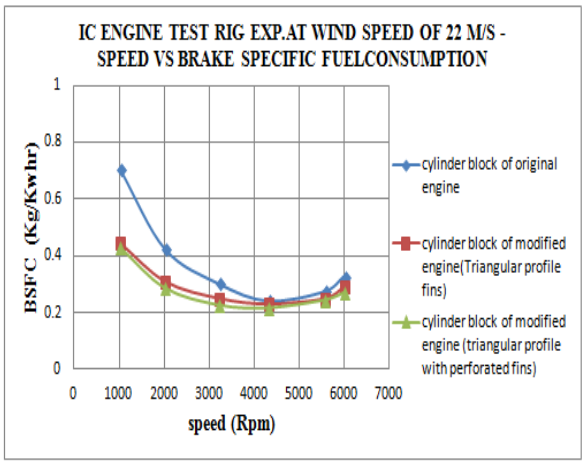


Graph 5: Speed -$\eta_{Br.th.}$(wind speed 22 m/s)



Graph 6: Speed vs B.S.F.C. (wind speed 22 m/s)

When all three configurations subjected tohigh wind speeds, optimum results i.e. B.P, $\eta_{Br.th.}$, B.S.F.C., obtained. During high wind speeds, the performance of altered I.C. Engine with engine block of perforated fins of triangular profile is higher compared to other two configurations.

V. CONCLUSIONS

Experimentation is carried out with I.C. Engine test rig by using actual and modified cylinder blocks.
The following conclusions are made:

1. The performance of the modified engine with cylinder block of perforated fins of triangular profile is maximum, due to augmented heat transfer.
2. When perforated fins are used, the load of the fins array on the engine becomes less, which increases the fuel efficiency.
3. Due to increase in rate of cooling and engine operation at controlled temperatures, the breathing ability of the engine increases, therefore volumetric efficiency of the engine also increases. Further, because of complete combustion, apart from increase in fuel economy, pollution levels also comes down.

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