

Attachment of Liquid Cooling System and Air Pre Heater in Two Wheeler

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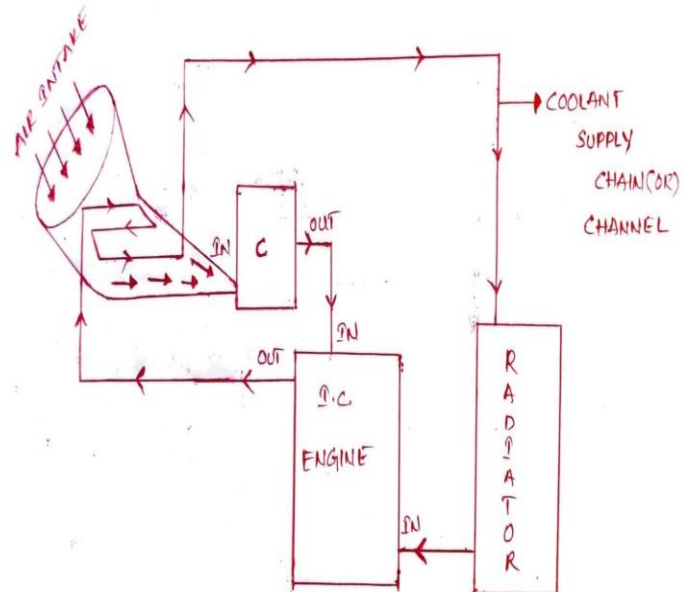
Abstract: In this modern generation the usability of automobiles in every sector has a key role for transporting from one place to other, but the efficiency of those automobiles are not much good for the procurement majorly two wheelers are affordably used by the people for fullfilling their needs, but the efficiency of the two wheelers may not be a satisfactory factor to the consumers in order to satisfy the customers in the era of efficiency as well as engine life span, we made an advancement to the two wheeler (ROYAL ENFIELD CLASSIC 350 CC) to increase the efficiency and the life span i.e., we made an attachment of liquid cooling system to the engine for direct cooling and a air pre heater to increase the mechanical efficiency of the two wheeler.

1. INTRODUCTION

Now a days the people are more prominent in saving the time to improve them selves, but there is big problem for transportation from one place to other by road the number of people coming out are increasing day to day , as the people are favourably using their own automobiles for transportation like cars, bikes, scooty etc .. mostly two wheelers are affordably used in order to move quickly because the space required for the two wheelers are less compared to cars buses etc., but the people are not much satisfactory about the efficiency of the automobiles due to some traffic and road issues the milage offered by the two wheelers are may not satisfying the people, in order to satisfy the people we made an advancement to the two wheeler automobile engine , as we choosen (ROYAL ENFIELD CLASSIC 350) we made an attachment of liquid cooling directly to the engine for more effective cooling of the engine and also we added an another feature AIR PRE HEATER where the air is pre heated by the coolant passed through the engine so that the air entering into the engine is raises it's temparature by the liquid coolant it self so that by attachment of a single equipment we are probably getting two benefits cooling the engine far better than air cooling system with a greater performance

2. We are increasing the milage of the two wheeler so that for the same amount of fuel the bike produces more milage

BLOCK DIAGRAM OF ATTACHMENTS FOR TWO WHEELER:



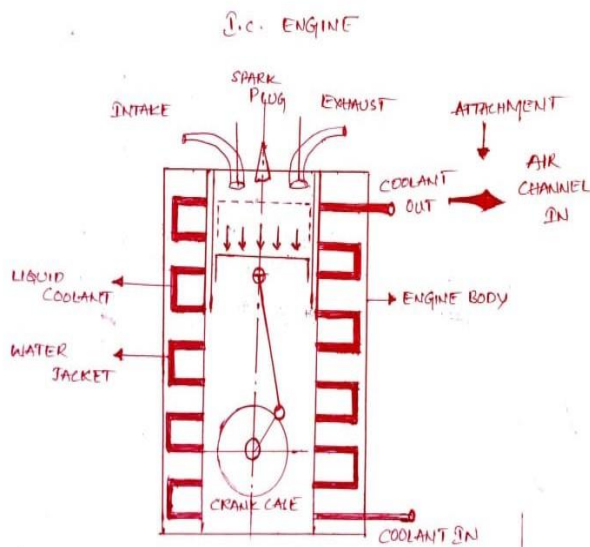
2. BRIEF DESCRIPTION ABOUT THE ATTACHMENT OF LIQUID COOLING SYSTEM AND AIR PRE HEATER

Normally a bike consists of an IC engine where it produces mechanical energy by the process under going combustion of fuel inside the engine cylinder so that the energy generated inside the engine cylinder is converted to mechanical energy for the advancement of the bike , as the combustion process is taking place inside the engine cylinder continuously the amount of heat generated is greater than the required amount of heat , as we know that the heat more than the required stage is not at all usable, that was exhausted by the exhaust pipe to the atmosphere but some amount of the heat is absorbed by the engine cylinder , cylinder body , piston etc.. due to this rapid generation of energy most of the energy is absorbed by the engine cylinder and further the fins and those are exposed to the atmosphere and the atmospheric air cools the fins and the excess heat is expelled or sent away by the fins. But, it was applicable for upto certain limit the efficiency of the engine decreases due to the excess heat absorbed by the engine.

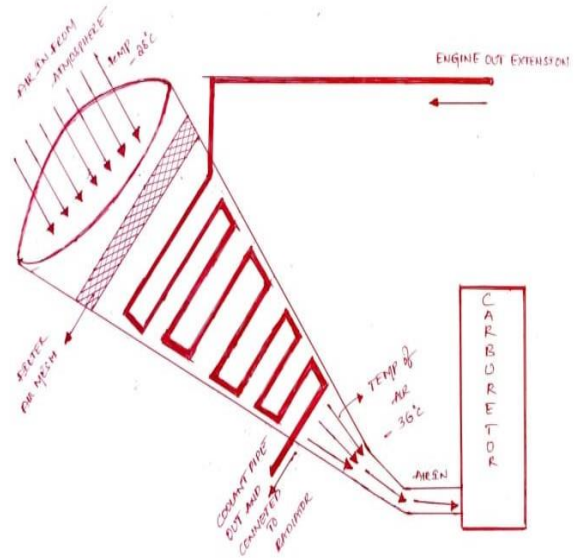
Now, we are made an attachment of liquid cooling system to the engine by producing some values around the engine body so that the coolant passes directly around the engine cylinder and it absorbs the maximum amount of excess heat produced by the engine i.e., the engine cylinder produces nearly 2300° - 2500°c and it should be cooled up

to 100°-150°c that was absolutely cleared with liquid cooling system.

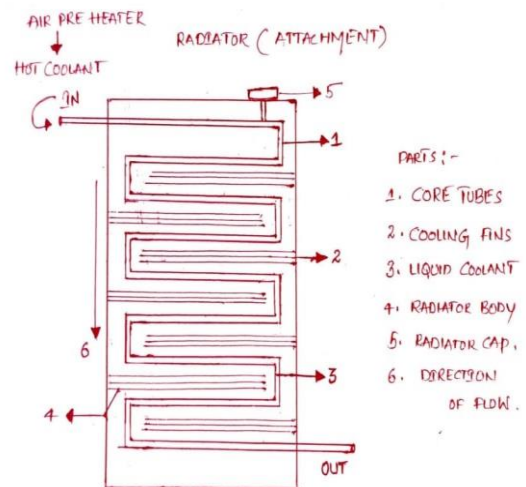
The liquid coolant which absorbs the heat from the engine is passed from engine to the air intake valve by a passage of pipe in it so that the air which flows in contact with the pipe having liquid coolant with a greater temperature, then the temperature of the air inside the air tube will rise so that pre heated air enters into the carburettor, due to this the air is initially heated before entering into the carburettor this pre heated air takes low amount of fuel to produce air fuel mixture due to this the amount of fuel required for the cycle will become less so that the number of cycles per litre will increase due to this the mileage of the vehicle



HERE, the fig describes the passage of liquid coolant passing through the engine for the removal of heat, and the fig representing outlet of the coolant from engine moves to the air intake channel for raising the temp of intake air by unwanted heat absorbed by the coolant.



This fig describes that the coolant rises the temperature of inlet air and the coolant flow out to the radiator for further cooling to run the cycle.



Here we absorb that the coolant coming out from the air pre heater section enters into the radiator for further cooling for the next cycle.

3. WORKING PRINCIPLE

In the above paragraph it is stated that the energy is generated by the heat energy which is produced by the combustion of air fuel mixture in the engine cylinder and the energy generated by the cylinder has a greater temperature of nearly 2300°- 2500°c so those higher temperatures are of to be cooled down to 200°c, in order to cool down from a greater temperature to a lower temperature we are arranging liquid cooling system to the engine where this system goes direct contact to the engine

hence the fixed liquid coolant moves from radiator to the engine valves and the higher temperatures are absorbed by the coolant due to this the temp of coolant raises by absorbing cylinders temperature and this temperatured coolant, normally goes to the radiator to cool down but , we are extending the heat coolant flow to the air intake pipe with a zig Zag shaped tube of coolant into the larger air passage tube so that the air entering into the vehicle in the channel gets contact with the hot coolant tube due to this the heat around the tube transfers to the air so that the air flowing in the channel get raises it's temperature from atmosphere temperature to a greater temperature due to this the air fuel mixture mixes fuel with a low amount with a temperatured air sure to this the mechanical efficiency of the vehicle increases , then the coolant is sent back to the radiator for further cooling of the coolant and the process to be cycled.

4 .WORKING OF LIQUID COOLING SYSTEM

In general the liquid cooling system are mostly used for the removal of higher excess amount of heat produced by the engine so, we are implementing this system to the two the two wheeler for the increment of life of the engine majorly the life of a common two wheeler vehicle has a life span of 2 - 5 years where every care is taken place, if not it may reduced it to 1 - 3 years as we implemented a liquid cooling system to the engine the risk taken by the engine is transferred to the cooling system so that the engine is free from risk after attachment of cooling system so that the engine works for more life time ie., 4 - 6 years so that the people are more satisfactory for the product they purchased for full filling their needs

The coolant inside the system circulates around the engine cylinder to absorb the excess heat so that the engine will be in its required condition so that it works smooth and fine.

5 . CALCULATIONS

Amount of heat dissipated by the engine using liquid cooling system:

$Q = \text{heat rejected (KW)}$

$Q = MC_p(T_2 - T_1)$

Mass flow rate = $A \cdot V$

Flow of air = 2m/s

Flow of coolant = 3l/min

Area (A) = $A = \pi r^2$

Here diameter = 20mm

There fore the mass flow rate = 1250kg/hr
= 0.3472kg/sec

Hot water inlet temperature = 325k

Hot water outlet temperature = 390k

$Q = M \cdot C_p \cdot (390 - 325)$

$Q = 0.3472 \cdot 2.518 \cdot (65)$

$Q = 56.82 \text{KW}$ is rejected by using liquid cooling system as we absorbed that the amount of heat dissipated by the engine using liquid cooling system is far better than air cooled engines.

Now, we are calculating the efficiency by raising the temperature of inlet air by using air pre heater, Earlier we discussed that the coolant pipe uid extended to the air intake channel so that the coolant passes through the

channel due to this air gets contact with it and the temperature raises.

1. BEFORE ATTACHMENT OF AIR PRE HEATER

The number of kilometers / liter = 36km/ lit (avg)

Number of kilometers / day = 50km (avg)

Distance travelled / week = 350km

Number of liters fuel consumed / liter = 350/36 = 9.72 lit

Cost of petrol for 1 liter = 80 rupees

Cost of petrol for a week = 9.72*80 = 778 rupees

In an average the cost of travelling 50 km per day for a week took 778 rupees of fuel .

AFTER ATTACHMENT OF AIR PRE HEATER

Number of kilometers/ liter = 42km

Number of kilometers/ day = 50 km

Distance travelled for a week = 350km (avg)

No of liters fuel consumed per week = 350/ 42 = 8.34 liters

Cost of petrol for 1 liter = 80 rupees

Cost of fuel for 8.34 liters = 667 rupees

On an avg transport of 50km per a day takes 667 rupees of fuel for a week

NOTE

After the attachment to the vehicle it takes 667 rupees and before it took 778 rupees for the same transport of a week

Amount of rupees saved after attachment = 778 - 667 = 111 rupees

It saves 111 rupees for a week and 444 rupees for a month .

6 . RESULT

After attachment of cooling system and air pre heater to the two wheeler the mechanical efficiency as well as the life span of the engine increases, as the cooling system decreases the maximum amount of heat from the engine to the atmosphere as that excesses heat is utilised by us to increase the temperature of the air taking inside the engine due to this the temperature of the intake air rises so that the milage of the two wheeler increases this parameter helps a lot for the people who are utilising the vehicle more for travelling .

Hence , we made two parameters new by a single attachment is cooling system

That cooling system cools the engine heavily and raises the temperature of the intake air.

7. REFERENCES

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