By Changing Design of Radiator and Observe Output Cooling Effect.

Kalase R.S..[1], Dr. Uttarwar S.S[2], Prof. Kathwate S.D.[3]

[1]*P.G. Student, Mechanical Department , Heat power,GHRCOEM ,* ***rajesh.kalase@raiosni.net***
[2]*Principal, Mechanical Department,GHRCOEM,* ***sanjay.uttarwar@raiosni.net***
[3]*Assiatnt Professor, Mechanical Department, GHRCOEM,* ***shrikant katwate@raiosni.net***

ABSTRACT

Temperature From First Law Of Thermodynamic Heat Is Transfer From High To Low. Heat Exchanger In Which Heat Transfer From Flow In Which It Will Be Parallel, Counter Flow, And Mixed Flow. Under The Sarath It Studied For Cooling System. Tracked Vehicle Generally Used In Military System Now We Design Engine=E Radiator For That Changing Design Of Radiator. Basically For Cooling System Required Mechanical Instruments Are Ejector, Heater Cock, Louvers, Water Storage Tank, Pump, Radiator Which Is Heart Of Cooling System. Engine produce heat during power strokes this is transfer to outer surface and problem will created so power strokes produce before stroke due to that noise and vibration produce and breakdown of engine possibilities increases so cooling system is This Is Heat Transfer Device Which Transfer Heat. Heat Exchanger Is Device Is Transfer Heat From High Temperature To Low important in vehicle. Tracked vehicle system produce large power so efficiency as well as life reduce. Required of tracked vehicle is it should compact space with powerful engine. 33Percentage energy loss in heat due to that overheat of engine which also leads breakdown or engine oil tank, metal weakling of engine parts wear produce. So to reduce it radiator redesign for that purpose with compact size and high transfer rate.

Keywords: Radiator, Engine, Heat Transfer, Heat Exchanger. .

---

1. INTRODUCTION

Compact engine is objective of research so theoretical calculation is based on engine specification. And modify heat exchanger as per requirement. After calculation it will manufacture and carry out effectiveness of heat exchanger. target of radiator considering temperature is from 125 degree Celsius to 105 degree celsius.in automobile sector radiator is very important part for cooling of engine. Radiator use water or other coolant as fluid which transfer heat. If overheating reduce effectiveness will increase. Two type of position for radiator first is vertical and second is horizontal but for effective result generally vertical is best which observed by case study and literature survey. But by compact space we use here horizontal type radiator .

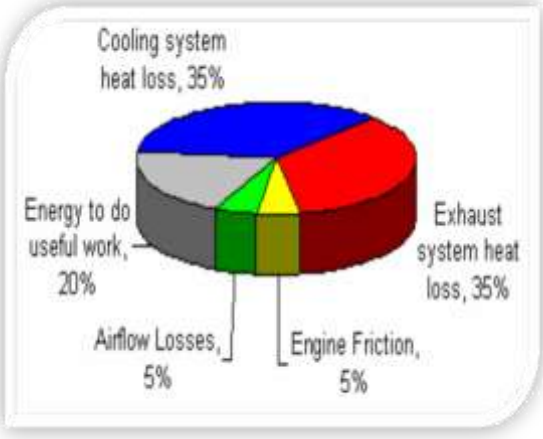

Fig. 1 Energy Distribution in Engine

Generally in radiator we use cooling fan for coolant cooling purpose but weight and space will increase so here in this tracked vehicle we does not use fan for cooling purpose. This tracked vehicle use in Rajasthan where atmospheric temperature is also high as compare to other state so its challenging to design heat exchanger device means radiator.

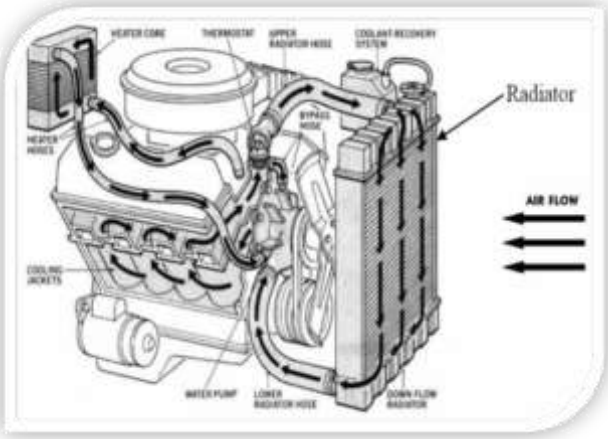

Fig. 2 BMP2 Engine

1.1 Review Stage

Existing stage engine having radiator but losses is large so change in fin type as well as size then after heat exchanger will modified by changing material also. By finding effectiveness cooling rate will increase. Radiator is heart of engine we can change coolant also and improve efficiency but if temperature will stable by same coolant and efficiency will improve. Redesign heat exchanger and use high efficiency radiator.

1.2 Methodology

To change effectiveness of engine cooling capacity firstly we studied about existing cooling system. By kays and London method we can find calculation means dimension of heat exchanger. By NTU method also find design of heat exchanger which is mostly used in industry. Air flow is also important factor in heat exchanger like counter flow , parallel flow and mixed type flow. Validation we can use various software like ansis and hypermesh. For that we system which use for cooling system. There are basic two method s which are very easy for design heat exchanger like reference kays and London and NTU method. For that there is important part in cooling system is fin parameter itd depend on material and dimension of fin. Fin depended on pressure drop and air flow. Effectiveness will be check by analytically and software use.

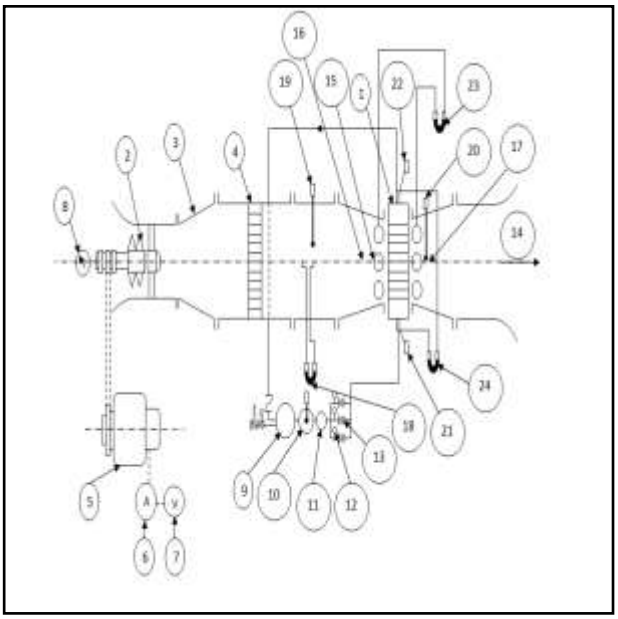

Fig.3 Experiment Set Up

It consist of Test Radiator, Fan, Body Of Wind Tunnel, Rectifying Lattice, Shunt Motor, Ampere Meter, Voltmeter, Speed Counter For Fan, Hot Coolant Tank, Supplementary Hot Coolant Tank , Coolant Pump And Motor, Coolant Flow meter, Coolant

Flow Adjusting Valve, Wind Direction, Connecting Tube, Upstream End, Downstream End, Liquid Column Gauge (Water) For Air Flow meter, Thermometer For Inlet Air Temp, Thermometer For Outlet Air Temp, Thermometer For Inlet Coolant Temp, Thermometer For Outlet Coolant Temp, Liquid Column Gauge (Water) For Air Side Pressure Loss, Liquid Column Gauge (Mercury) For Water Side Pressure Loss .

Centrifugal type fan use which are external source active type so efficiency will be increases. Motor are use to rotate fan. Volt and current measure by voltmeter and ampere mater. External coolant supply give for best cooling system so to store coolant there are hot coolant tank and cold coolant tank use. For coolant transformation for two point pump are use. To control coolant so by varying we can observe output cooling system so coolant flow meter are use. Wind is important parameter in cooling system so mixed type wind direction use. Thermometer are use for temperature measurement for inlet air and outlet air as well as hot and cold coolant. Pressure losses measure by water column.

Basically there are two system first is water circuit and second one is air side circuit which is also known as wind tunnel circuit. Four is very important measuring instrument we are use for water flow measurement use water flow meter and air flow measurement air flow meter , pressure measurement pressure gauges and temperature measurement thermometer.

There are some test will be conducted when experiment is going on like atmospheric pressure and humidity. Atmospheric changes with position and humidity also change with position so it is very essential to measure humidity and atmospheric pressure . Second ting is coolant temperature we can measure inlet and outlet coolant temperature. Flow rate we can vary so it is very important to measure inlet and outlet rate of air flow and coolant flow. For airside we use air for cooling so inlet and outlet air temperature will measure. Wind velocity test will take. And last very important is pressure loss for water and air side.

3. CONCLUSION

For heat exchanger some assumption will consider during design procedure like surfaces are clean and no allowance for fouling. Second one is effect of longitudinal conduction is neglected. Some properties of coolant and air are taken from standard table. While calculating properties it is assumed that there linear interpolation. Between values or properties for various temperature. Here we select fin material which is aluminum based. Now after design manufacture will done and compare result with exiting model. By changing design cooling system for BMP 2 studied and observe parameter. Easiest method to find design is NTU method and find effectiveness of radiator. Analytically done design by assuming statements and best efficiency radiator ill manufacture by analytical and physically. So cooling effect will increase.

ACKNOWLEDGEMENT

I am highly gratefully thanks to Hon. Prof. Dr. Uttarwar S. S. for their guidance, support and Motivation behind this work. His encouragement and useful suggestion, which helped me I would also like to mention Prof. Kathwate S. D. for their encouragement and cooperation in carrying out project work.

REFERENCES

[1] JP Yadav and, Bharat Raj Singh, “Study on Performance Evaluation of Automotive Radiator”, S-JPSET: ISSN: 2229-7111, Vol. 2,2011 Issue 2.
[2] Matthew Carl, Dana Guy, Brett Leyendecker, Austin Miller and, Xuejun Fan, (2012) “The Theoretical and Experimental Investigation of the Heat Transfer Process of an Automobile Radiator”, ASEE-GSAC.
[3] P. S. Amrutkar and, S. R. Patil, “Automotive Radiator Sizing and Rating-Simulation Approach”, IOSR-JMCE, ISSN: 2278-1684
[4] Pawan S. Amrutkar, Sangram R. Patil and, S. C. Shilwant, (2013) “Automotive Radiator-Design and Experimental Validation”, IJAUERD, ISSN: 2277-4785.
[5] Upendra Kulshrestha, Gaurav Kumar, Manu Auguatine and, Sanjay Mittal, (2014) “CFD Analysis of Automobile Radiator-A Review”, IJERA, ISSN: 2248.
[6] Bengt Sunden, Department of Energy Sciences, Heat Transfer, Lund University, Lund, Sweden, International Journal of Numerical Methods for Heat and Fluid Flow, Vol. 20 No.5, 2010
[7] Ramesh K Shah and, Dusan P. Sekulic, “Fundamentals of Heat Exchanger Design”, (2003) John Wiley & Sons, Inc., pp no 1-209, 378-418.
[8] Frank P. Incropera and David P. Dewitt, 4th Edition “Fundamentals of Heat and Mass Transfer”, pp no 581-603.
[9] W. M. Kays and A. L. London, “Compact Heat Exchangers”, Third Edition, McGraw-Hill Book Company.
[10] S.R.Durai Raju #1, Durai Balaji.M#2, Jaya Prakash.N#3, Jeevanandan.I.G#4, Review On Engine Cooling System.
[11] Engineering Design handbook, Military Vehicle Power Plant Cooling,headquarters United States army Materiel Command.