International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878 (Online), Volume-4 Issue-1, March 2015

Case Study: TO Improve The Performance of Bajaj Kawasaki 4-S Auto Vehicle

Chirag A Panchal, D.C. Gosai

Abstract*— Energy conservation and efficiency have always been the quest of engineers concerned with internal combustion engines. Energy crisis has been matter of concern to all over the world and it is better understood by more and more energy users. Almost 90% of energy needs of the world are provided by fossil fuels which are depleting at an alarming rate. The efficiency of most commercially IC engine ranges from 38% to 42%. Therefore, between 58% and 62% of the fuel energy content is lost in the form of west heat. Approximately 30% is retained in the exhaust gas and the reminder is removed by the cooling etc. More than 55% of the energy which is produced during the combustion process is removed by cooling water/air and through the exhaust gas. Recently much attention have been focused on achieving higher efficiency by reducing energy loss to coolant during the power stroke of the cycle. Experimental effect appears on actual practice of Bajaj Kawasaki 4-S champion two wheeler. By doing different maintenance case, it focuses that 18.22% increase in fuel efficiency and exhaust emission also improves.

***Index Terms*—fuel efficiency, emission, average, Bajaj Kawasaki 4-s champion bike**

I. INTRODUCTION

Energy conservation means to reduce the quantity of energy that is used for different purposes. This practice may result in increase of financial capital, environment value, national and personal security, and human comfort. Individuals and organizations that are direct consumers of energy may want to conserve energy in order to reduce energy costs and promote economic, political and environmental sustainability. Industrial and commercial users may want to increase efficiency and thus maximize profit. Energy conservation reduces the rise in energy costs and energy demand per capita. The reduced energy demand can provide more flexibility in choosing the most preferred methods of energy production. By reducing emissions, energy conservation is an important method to prevent climate change. Energy conservation makes it easier to replace non renewable resources with renewable energy. Energy conservation is often the most economical solution to energy shortages. [1] This concept is very useful in two wheeler auto vehicle with proper servicing and maintenance will give better fuel efficiency and reduce emission.

Revised Manuscript Received on 30 March 2015.
***** Correspondence Author
Prof. D.C. Gosai, Mechanical Department, Bharuch, India.
Panchal Chirag, Post Graduate Student, S.V.M.I.T Bharuch, India.

Two wheelers – motorcycles, scooters, mopeds, and similar vehicles are a growing form of transport in Indian cities. Now a days two wheeler are very crucial vehicle in the city traffic. Two wheeler can easily run at very Narrow Street as well as very high traffic.

Two wheeler can give high fuel efficiency then the cars, trucks, jeeps etc. and produce less pollution then other type of vehicles. So, now a days people concern two wheeler compared to four wheeler. With proper servicing and maintenance of two wheeler, energy conservation can be reduced and fuel efficiency can be increased.

II. EXPERIMENTAL PROCEDURE

A. Technical specification

Engine: engine of Kawasaki 4s champion
Model: 1997
Type: single cylinder
Piston displacement: 726 cm^3
Bore stroke: 78 mm × 76 mm
Seating capacity: 2 persons

The experiment was carried out on bajaj Kawasaki 4s champion bike. A wet sump forced lubrication and 4 speed gear box transmission is used. Maximum net power of the engine is 7.02 hp at 8500 rpm. An experiment of road test for fuel efficiency was carried out on this bike, at before maintenance and after maintenance condition and different tyre inflation condition and result obtained were compared. For each test bike is driven three time on city area and six time on highway road. The average reading is considered for finding fuel efficiency with one persons seating on bike during each test.

III. ROAD TEST FOR FUEL EFFICIENCY WITH RESULT AND DISCUSSION

A. Comparison of fuel efficiency Before Maintenance and after maintenance case

In this phase bike was tested for getting fuel efficiency. The bike road test was taken before proper maintenance of engine with three different tyre inflation condition at different speed and after proper maintenance of engine with three different tyre condition.

A.1 Under inflation (front 20 and rear 24 psi)

Published By:
Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP)

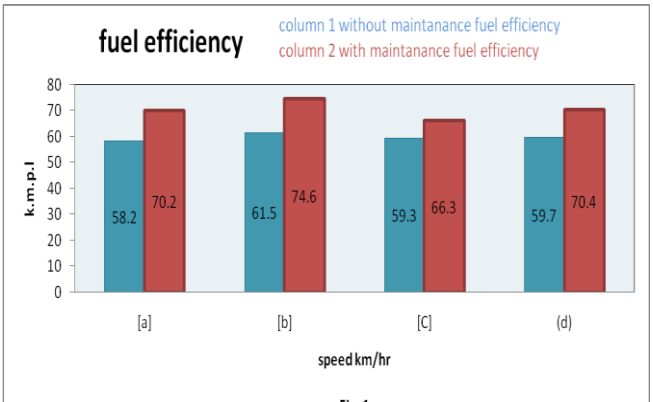

FIg. 1

Figure 1 shows that the comparison of fuel efficiency of bike at before maintenance and after maintenance condition at under inflation respectively. Figure 1 [a] indicate that at 30 km/hr speed, the fuel efficiency increased about 20.619%, figure 1 [b] indicate that at 50 km/hr speed fuel efficiency increased about 21.301%, figure 1 [c] indicate that at 80 km/hr speed fuel efficiency increased about 11.804% and figure 1 [d] shows average increased fuel efficiency is about 17.923%. Having a tyre, 25% under inflated, will reduce tyre life by 50% because of tyre walls which results in their cracking and in cord breakage. Heat generated between cord layers inside tyre leads the failure of tyre by increasing rolling resistance and therefore reduce fuel economy by as much as 10%. It also reduces braking performance about 20%. The other adverse effects besides reduces tyre life may resulted from under inflation are as follows: lake of directional stability of the vehicle, Uneven tread wear, also in a severe case tyre may creep on its rim and with a conventional tube may rip the valve out.

A.2 Proper inflation (front 25 and rear 28 psi)

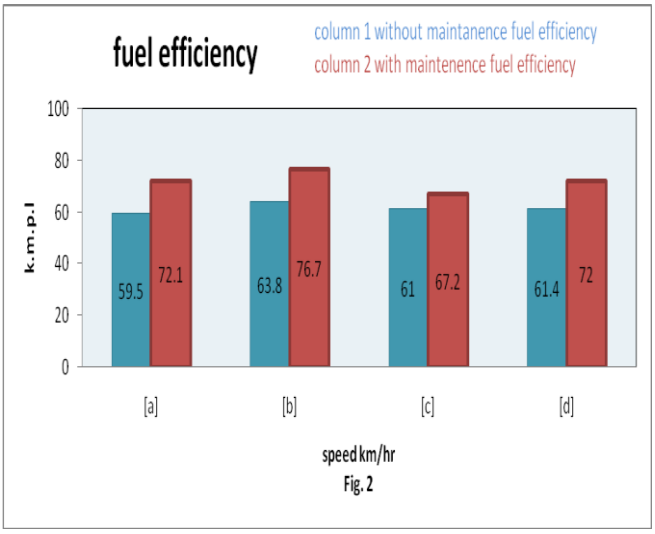

Fig. 2

Figure 2 shows that the comparison of fuel efficiency of bike at before maintenance and after maintenance condition at proper inflation respectively. Figure 2 [a] indicate that at 30 km/hr speed, the fuel efficiency increased about 21.176%, figure 2 [b] indicate that at 50 km/hr speed fuel efficiency increased about 20.219%, figure 2 [c] indicate that at 80 km/hr speed fuel efficiency increased about 10.164% and figure 2 [d] shows average increased fuel efficiency is about 17.264%. Correct tyre pressure for your bike (proper inflation of tyres) helps to reduce the risk of poor handling, blowouts and accidents. It also improves fuel economy and tyre life. Amazing advantages: increased fuel economy, reduces wear on tyres, reduced braking distance, and maximizes vehicle control.

A.3 Over inflation (front 30 and rear 34 psi)

In this phase, bike was run at different speeds with 25% over inflated of tyre in both wheels.

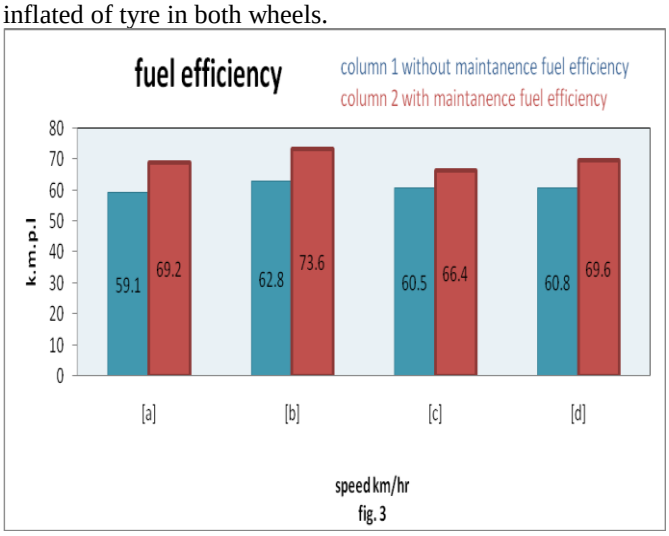

fig. 3

Figure 3 [a] shows that at 30 km/hr speed, the fuel efficiency increased about 17.09%, figure 3 [b] indicate that at 50 km/hr speed fuel efficiency increased about 17.197%, figure 3 [c] indicate that at 80 km/hr speed fuel efficiency increased about 9.752% and figure 3 [d] shows average increased fuel efficiency is about 14.474%. It is found that with 25% over inflation of tyre pressure, there is very little effect on fuel efficiency but it produces excessive stress on the cord plies and rubber covering due to which they can not take the repeated impacts to which the tyre is subjected. A prolonged journey with overloaded over inflated tyres would eventually cause failure of the walls. Also with over-inflated tyre, the cushioning is less and the ride is harder. The over-inflation causes the following problems: tyre cushioning properties are reduced, greater chance of fracture and cutting, as casing and tread are subjected to greater tension, impact resistance is reduced, road holding properties are reduced.

A.4 Power petrol

In this phase, bike was run at different speeds using the fuel of extra premium (power petrol with energy boosters).

Published By:
Blue Eyes Intelligence Engineering
and Sciences Publication (BEIESP)

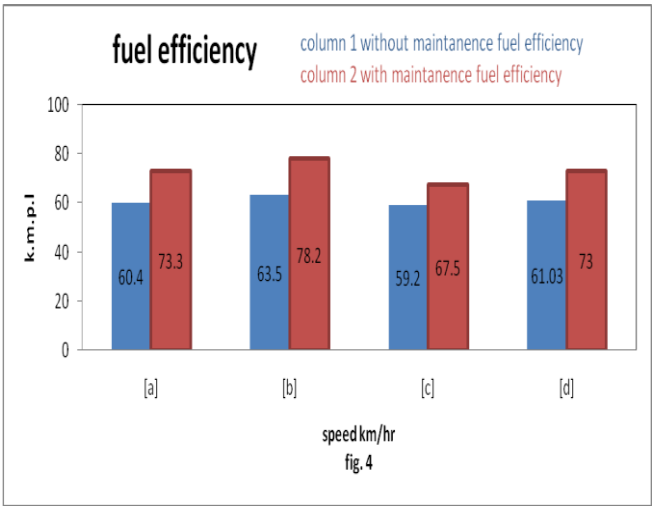

Figure 4 [a] indicate that at 30 km/hr speed, the fuel efficiency increased about 21.358%, figure 4 [b] indicate that at 50 km/hr speed fuel efficiency increased about 23.15%, figure 4 [c] indicate that at 80 km/hr speed fuel efficiency increased about 9.752% and figure 4 [d] shows average increased fuel efficiency is about 19.607%.

IV. Comparison of Pollution from the Engine Before and After Maintenance

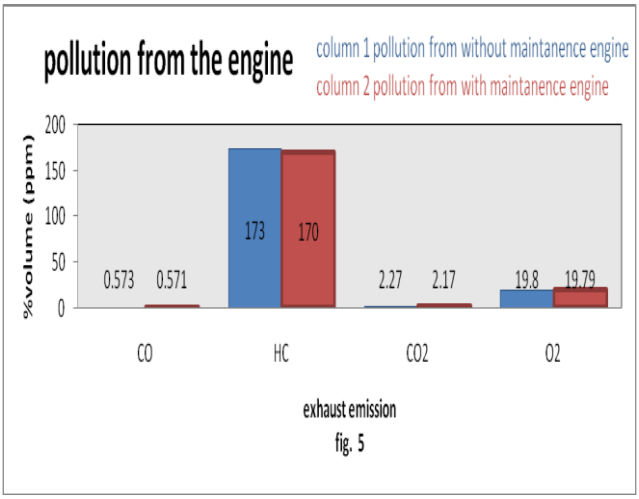

Figure 5 shows that after proper maintenance pollution emitted by the engine such as CO, HC, CO_2 reduced.

V. TIPS FOR GETTING BETTER PERFORMANCE OF THE AUTO VEHICLE

- Regular maintenance required.
- Run vehicle at economic (50 km/hr) speed.
- Run vehicle at standard air pressure.
- Run vehicle at minimum load.

VI. Conclusion

The main objective of this study is to improve the fuel efficiency, vehicle average/liter of petrol. For achieving this, there are number of test can be carried out on the bike then conclude that, without maintenance of Kawasaki 4-s champion two wheeler, the average is found around 60 km/hr. the two wheeler average at condition of proper maintenance is around 71 km/hr. so it can clearly shown from the experiment on the Bajaj Kawasaki 4-S champion two wheeler that the fuel efficiency improved up to 18.33%. it also improved vehicle emission like CO, HC, CO_2 and O_2. It is also found that under inflation without maintenance at low speed condition, ordinary petrol fuel use, the fuel efficiency is found pour. The most important thing is that, if the vehicle is operating at economic speed with maintenance it is found better fuel efficiency. By adopting proper maintenance, better vehicle performance can be achive and exhaust emission also reduce. By regular maintenance engine life, vehicle component life and tyre life can increase.

VII. Future Scope

- Adiabatic concept can adopt.
- Change the engine design.
- Change the engine piston design.
- Change the engine head design.
- Change combustion chamber design.
- Change ratio.
- Better accessories can adopt.
- Better system can adopt.

References

1. http:// simple.m.wikipedia.org/wiki/Energy conservation
2. Auto India magazines, june 2005, pp14-18.
   Motor India Motor India journal of the automobile industry & trade, sept. 2005 pp 5
3. service booklet & owner's technical manual of Kawasaki 4s champion bike.
4. K.M.Gupta "Automobile engineering", Vol – II, pp372-374.

Published By:
Blue Eyes Intelligence Engineering
and Sciences Publication (BEIESP)