METALOGRAM
-Mechanical Engineering and Energy-
August 15th 2025. Vol.01 No.03
August, 2025

Performance Analysis of Standard Camshaft Engines and Modified Camshafts on 110 Cubic Centimeters Motorcycles

Muhammad Derrio[1], Aser Eben Ezer Sihombing[1], Jumiati Ratuloli[1]and Fardin Hasibuan[1]
mderrio2003@gmail.com, aser.sihombing23@gmail.com, jumiati077@gmail.com,
fardin.hasibuan123456@gmail.com

[1)] *Program Studi Teknik Mesin, Fakultas Teknik, Universitas Riau Kepulauan, Indonesia*

*Corresponding author: mderrio2003@gmail.com

Paper History

Received : January 31th 2025
Received in revised form : February 09th 2025
Accepted : August 11th 2025

ABSTRACT

Currently, motorcycles are the maximum extensively used approach of transportation in Indonesia. apart from being a way of transportation and for delivering items, of direction, it has unique settings from motorbikes which might be used for daily purposes via making overall performance upgrades by using modifying the noken axle (camshaft) on motorbikes which are used each day. The characteristic of the camshaft is to manipulate the valve opening, both the consumption and exhaust valves at the time decided with the aid of the four stroke engine cycle. at the changed engine, numerous adjustments have been made to several systems and components to improve the performance of the bike. The cause of this take a look at become to determine the performance of the Honda Absolute revo 110 cm^3 (cc) combustion engine which incorporates torque, strength and gasoline intake with the aid of comparing the standard camshaft and The changed camshaft which has modified the lift top by using 1mm has changed in the absolute revo 110cc engine, adjustments occur amongst them in torque, energy and greater gasoline intake enter the combustion chamber. The studies was received from a tool which can decide power called Dynotest. Dynotest serves to measure the torque strength of a motorcycle that has been modified by means of camshaft so as to understand better which is the modified camshaft and the usual camshaft on a 110 cm^3 REVO absolute motorcycle.

KEY WORDS: Camshaft, Power, Torque, Fuel consumption, Dyno test

1.0 INTRODUCTION

The camshaft's cause is to regulate the hole and remaining of the valves at the right time, which is meant to fill the cylinder with a aggregate of gas and air earlier than combustion occurs and empty the cylinder after the combustion manner has happened. That sounds quite sincere, however how this function is achieved could have a huge impact at the engine's torque, strength, operating variety and functionality.

A four-stroke engine is an internal combustion engine, which in one combustion cycle will experience 4 piston strokes. currently, inner combustion engines in automobiles, motorcycles, vans, airplanes, ships, heavy system and so forth, normally use a four-stroke cycle. The four strokes include the consumption stroke, compression, electricity and exhaust stroke. Which ordinary calls for crankshaft rotations in keeping with cycle on a gasoline engine or diesel engine.

The feature of this camshaft is to regulate the hole and last time of the intake/intake valve and exhaust valve. There are numerous lobe components on the character camshaft that have to be definitely distinguished from each other, because the lobe is divided into three distinct regions, specifically: heel, nostril, base circle (basic circle of commencing and remaining time factors and wings). Figure 1 illustrated camshaft.

Figure 1: Camshaft

Torque is the rotary stress pressure on the rotating element, the motorcycle is pushed by means of torque from the crankshaft (Stevansa, 2014). Torque is a measure of the engine's potential to do work. The importance of torque is a derived amount this is commonly used to calculate the strength produced through an item rotating on its axis. The unit of torque is normally expressed in N.m (Newton meters). because there is this torque that reasons the item to rotate on its axis, and the object will stop if there's an attempt to counter the torque with the identical value within the

METALOGRAM
-Mechanical Engineering and Energy-
August 15th 2025. Vol.01 No.03
August, 2025

opposite direction. In a combustion engine, to decide the shaft strength, the torque have to first be regarded. Measuring torque at the combustion engine shaft uses a tool referred to as a Dynamometer. The running principle of this tool is to provide a load that is contrary to the route of rotation till the rotation processes zero rpm. This load is similar to the shaft torque. In a real engine, the weight is the engine additives themselves which includes engine add-ons (water pumps, lubricating pumps, radiator enthusiasts), electric generators (battery charging, power, lights, spark plugs), engine friction and other additives. From the calculation of torque, the quantity of energy produced by means of the engine at the shaft can be decided using the system for calculating.

Torque: M = F x L, wherein:
M = torque (N.m)
F = force acting on the piston (N)
L = ½ piston stroke (m)

Figure 2 illustrated moving of camshaft.

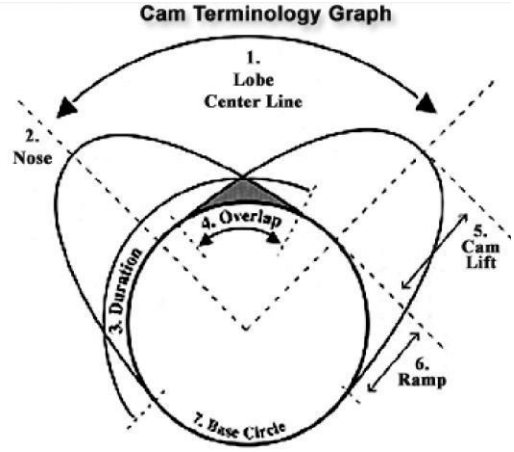


Figure 2: Moving camshaft

2.0 METHODOLOGY

Electricity is the amount of motor work consistent with unit time (AA Busono, 2010). The unit of electricity is hp (horse power). energy on a motorcycle can be measured the usage of a Dyno tester, so that you could calculate the axle energy can be recognized by means of the use of the following method.

$$Pi = (P \times L \times a \times n) / 2$$

Where:
Pi = motor power (watt)
P = motor pressure (pascal)
a = piston surface area (m)
L = piston stroke (m x 10-3)
n = working speed (Rpm)

2.1 Fuel Consumption

Gasoline is a fabric used inside the combustion procedure. without gas, combustion would no longer be feasible. gas is a hydrocarbon compound processed from petroleum. The gasoline usually utilized in bikes is gas. the principle factors of fuel are carbon and hydrogen. the choice of fuel as a gas is primarily based on attention of features, specifically calorific fee, which is the quantity of heat electricity that may be used to provide work/effort, and volatility, which measures how easily gasoline will evaporate at low temperatures. those matters need to be considered because the better the calorific fee, the decrease the volatility, while low volatility can reason gasoline to be hard to burn (Stevansa, 2014).

For fuel consumption, handiest the quantity of gasoline consistent with unit time (l/hour) with the system:

$$FC = \frac{V_f \times 3600}{t \times 1000} = L/h$$

Where:
FC = Fuel Consumption
Vf = Consumption volume (L/h)
t = Consumption time (mL)

3.0 DISCUSSION

3.1 Power Results

From the data table underneath (Table 1), the effect of changing the perspective period at the modified camshaft manner that the valve opens longer and reasons greater gas to enter and reasons greater efficient combustion, accordingly producing more energy than the same old camshaft (Table 2).

Table 1: Before Modification

No	Rotation (RPM)	Standard Camshaft Power (hp)	Modified Camshaft Power (hp)
1	5500	8.6	8.9
2	6500	10.5	11.0
3	8500	12.3	12.7

Table 2: After Modification

No	Rotation (RPM)	Standard Camshaft Power (hp)	Modified Camshaft Power (hp)
1	5500	9.4	10.7
2	6500	11.6	12.3
3	8500	11.8	12.3

Standard Camshaft Power Graph and Modified Camshaft Lift 1mm used Pertalite Fuel as shown at Figure 3.While Standard Camshaft Power Graph and 1mm Lift Modification used Pertamax Fuel shown at Figure 4.

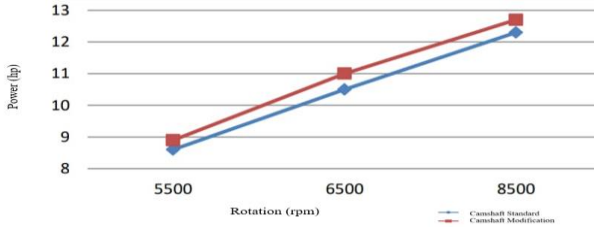


Figure 3 : Camshaft power for Pertalite fue

METALOGRAM
-Mechanical Engineering and Energy-
August 15th 2025. Vol.01 No.03
August, 2025

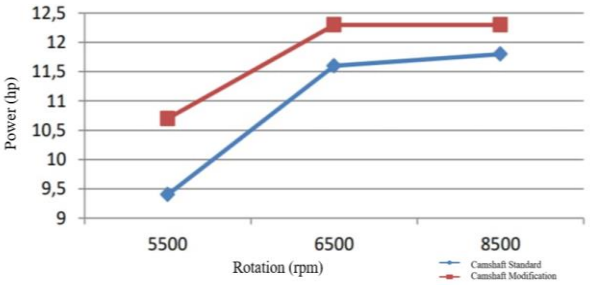


Figure 4: Camshaft power for Pertamax fuel

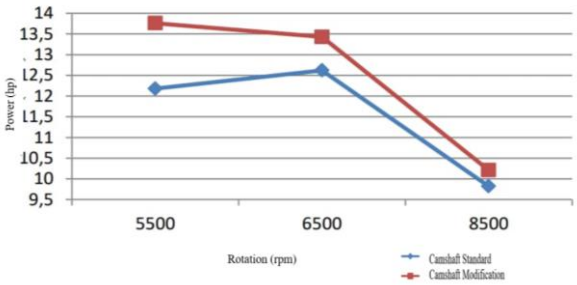


Figure 6: Standard torque for Pertamax Fuel

3.2 Torque Data Results

The information table under shows the effect of changing the perspective period on the camshaft. changes make the valve open longer and reason more gas to go into and cause greater efficient combustion, resulting in more torque than the standard camshaft. Table 3 shows the standard torque for Pertalite fuel, while Table 4 shows the standard torque for Pertamax fuel.

Table 3: Torque of Standard and Modified Camshaft with Pertalite Fuel.

No	Rotation (RPM)	Camshaft Standard Torque (Nm)	Camshaft Modified Torque (Nm)
1	5500	10.11	11.48
2	6500	11.51	11.99
3	8500	10.24	10.59

Table 4: Torque of Standard and Modified Camshaft with Pertamax Fuel

No	Rotation (RPM)	Camshaft Standard Torque (Nm)	Camshaft Modified Torque (Nm)
1	5500	12.18	13.76
2	6500	12.62	13.43
3	8500	9.82	10.21

Standard Camshaft Torque Graph and Modified Camshaft for Pertalite Fuel shown at Figure 5.

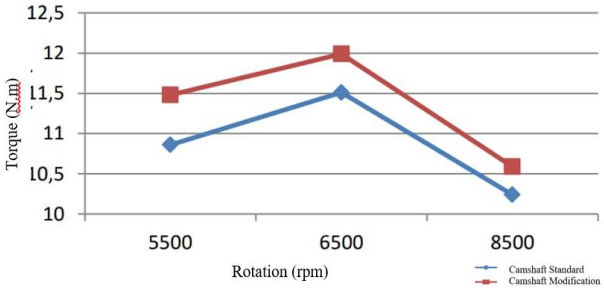


Figure 5: Standard torque for Pertalite Fuel

Standard Camshaft Torque Graph and Modified Camshaft Lift 1mm Pertamax Fuel shown at Figure 6.

3.3 Fuel consumption

From the data table received beneath, it can be seen that the impact of changes within the angle duration on the changed camshaft is that the valve opens longer and reasons extra gasoline to enter, so that the modified camshaft makes use of extra gasoline than the same old camshaft. gasoline intake is also inspired by means of the octane content material, the better the octane content material, the greater wasteful it's miles, for the octane content of Pertalite gas is 88 whilst the octane content for Pertamax is 91. Table 5 and 6 demonstrate fuel consumption of Pertalite and Pertamax fuel respectively.

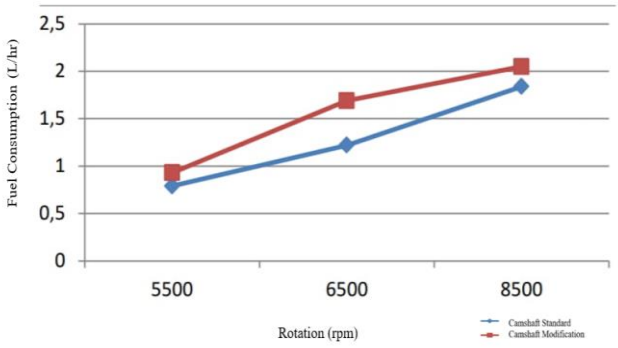
Table 5: Fuel Consumption on Standard and Modified Camshaft with 1 mm Lift using Pertalite Fuel

No	Rotation (RPM)	Camshaft Standard Fuel Consumption (L/h)	Camshaft Modified Fuel Consumption (L/h)
1	5500	0.79	0.93
2	6500	1.22	1.69
3	8500	1.84	2.05

Table 6: Fuel Consumption on Standard and Modified Camshaft with 1 mm Lift using Pertamax Fuel

No	Rotation (RPM)	Standard Camshaft Fuel Consumption (L/h)	Modified Camshaft Fuel Consumption (L/h)
1	5500	0.72	0.92
2	6500	1.08	1.39
3	8500	1.73	2.08

Pertalite Fuel Consumption Graph on Standard Camshaft and Modified Camshaft demonstrate at Figure 7.



METALOGRAM
-Mechanical Engineering and Energy-
August 15th 2025. Vol.01 No.03
August, 2025

Figure 7: Fuel consumption for Pertalite Fuel

Pertamax Fuel Consumption Graph on Standard Camshaft and Modified Camshaft as shown at Figure 8.

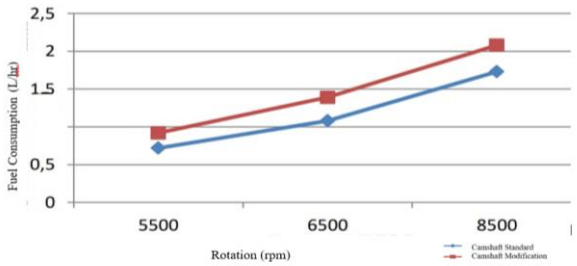


Figure 8: Fuel consumption for Pertamax Fuel

4.0 DISCUSSION

From the records received above, it shows that the changed camshaft is more wasteful than the same old camshaft because the exchange inside the attitude of the length is longer, in phrases of combustion, the modified camshaft is greater green than the standard camshaft. In phrases of economic system, the same old camshaft is extra cost-efficient than the changed camshaft. It has to be referred to that this modified camshaft is higher used for purchasers in mountainous regions and for couriers delivering goods.

5.0 CONCLUSION

After checking out the standard camshaft and changed camshaft with 1mm raise on a Honda Absolte Revo 110 cc motorcycle, the subsequent conclusions were obtained:

The effect of variations in popular camshaft and changed camshaft can be concluded from the evaluation of camshafts consisting of electricity, torque, and gasoline consumption, from modifications inside the modified camshaft, power and torque have changed a good deal better than the changed camshaft than the same old camshaft and for gasoline intake, the changed camshaft is extra wasteful than the standard camshaft due to modifications in period experienced by means of the modified camshaft which has been delivered with a 1mm raise which influences the valve establishing and closing period longer than the standard camshaft.

From the check on the absolute revo a hundred and ten cc motorcycle, the motorbike engine experienced a totally green boom within the modified camshaft as compared to the standard camshaft which affects the particular gasoline intake of energy, it can be seen that the fuel consumption is more wasteful at the modified camshaft than the standard camshaft. In phrases of economy, the usual camshaft is greater green than the changed camshaft due to the fact it's far greater low-priced.

REFERENCE

[1] AA Busono. 2010. *Analisis Variasi Intake Manifold Standard dan Porting Pada Piston Standard dan Racing Terhadap Kinerja Sepeda Motor Honda GL100*. Thesis. Universitas Muhammadiyah Surakarta.

[2] Aditya, G., & Darlis, D. 2015. Perancangan Dynotest Portable Untuk Sepeda Motor Dengan Sistem Monitoring Menggunakan Modul Ism Frekuensi

[3] Stevansa, P. A. 2014. *Pengaruh Penggunaan Camshaft Standard dan Camshaft Racing Terhadap Unjuk Kerja Motor Bensin Empat Langkah.* Tugas Akhir, (September), 1–18.

[4] Gunawan, A., & Sutopo, W. (2021). The effects of camshaft modification on engine performance in automatic transmission motorcycle. ResearchGate. https://www.researchgate.net/publication/356742317_The_effects_of_camshaft_modification_on_engine_performance_in_automatic_transmission_motorcycle

[5] Widodo, S., & Sugiyanto, H. (2018). The effect of camshaft overlap degree on performance of Otto engine 4 stroke 1 cylinder 110 cc. International Journal of Applied Engineering Research, 13(12), 10415–10420. https://www.ripublication.com/ijaer18/ijaerv13n12_66.pdf

[6] Prakoso, D. A., & Nurhadi, A. (2018). The effect of increasing cylinder volume to engine performance on 150 cc motorcycle. Advances in Engineering Research, 157, 119–123. Atlantis Press. https://www.atlantis-press.com/article/126001918.pdf