METALOGRAM
-Mechanical Engineering and Energy-
December 15th, 2024. Vol.01 No.01
December, 2024

EFFECT OF OIL VISCOSITY AND FUEL OCTANE VALUE ON FUEL CONSUMPTION IN MOTOR CYCLE

Rizki Haryanto [1], Arif Rahman Hakim[2], Muhammad Safii[3]*, Asral[4]
rizkiharyanto@gmail.com, arhakim88@yahoo.com, muhammadnasoetyon@gmail.com, asralst2@gmail.com

[1,2)] *Mechanical Engineering, Universitas Riau Kepulauan, Indonesia*
[3)] *Agriculture Technology, Universitas Riau, Indonesia*
[4] *Mechanical Engineering, Universitas Riau, Indonesia*

*Corresponding author: muhammadnasoetyon@gmail.com

Paper History

Received: December 1st, 2024
Received in revised form: December 8th, 2024
Accepted: December 15th, 2024

ABSTRACT

The oil that is so widely circulated on the market and so many advertisements placed in the TV media makes us as consumers confused about what kind of oil is suitable for use in the daily life of consumers The purpose of this research is to find out how far the maximum mileage of each viscosity value in the oil that is tested for different viscosity levels is also when using fuel with different octane values. After trying all the oils that I used during the testing process, it can be concluded that the oil that has a viscosity code SAE 20w-50 is more efficient in fuel use than oil with viscosity codes such as 10w-30 and 15w-40, the results that obtained the longest distance by using 1 liter of fuel consumption, the farthest distance that can be traveled with fuel with 88 octane, which is 54.3 Km at a speed of 40 km/h and fuel consumption rate each hour is 0.740 liters/hour and for a speed of 60 km/h and 80 km/h the distance that can be traveled is 52.1 Km and 47.7 Km fuel consumption is 1.174 liters/hour and 1.711 liters/hour and for fuel use with an octane value of 95 which is 63.4 km at a speed of 40 km/h and for a speed of 60 km/h and 80 km/h 59.6 Km, fuel consumption per hour is 0.637 liters/hour and 1.015 liters/hour and 1.0882 liters/hour respectively that here seen that the faster a vehicle will be the greater the fuel consumption that will be used.

KEY WORDS: *faster, fuel consumption, oil, greater, SAE*

NOMENCLATURE

cSt	centistokes
km/hr	kilometre per hour
Km	kilometre

1.0 INTRODUCTION

In the modern era when the field of transportation has emerged and has not been separated from humans since ancient times, this is because humans have mobility in various places.

In today's era, motorized vehicles are one of the most widely used means of transportation by the public. Motorized vehicles are also faster and cost less than taking public transportation. To be used optimally, motorized vehicles are supported by several interrelated systems.

One of these systems is the fuel system and the lubrication system. The fuel system is one of the most important systems in the vehicle. The fuel system functions as a distributor as well as a supplier of fuel and air mixture that will be channeled into the combustion chamber to be burned, so that the combustion process occurs. In this study, the problems how oil viscosity affect engine performance in terms of fuel efficiency and How does the octane value affect the maximum speed. In the purpose of compiling this report, the author provides the intention for the pedicab to understand the purpose of making this report, as for the purpose of writing the title of this study determine the effect of oil viscosity on fuel and knowing the effect of octane value on the maximum speed that can be traveled by a Honda mega pro 150 cc motorcycle. The author tells the reader to understand the benefits obtained in the preparation of proposal writing and hopefully the preparation of this proposal writing will be useful in the reader's life in the future as for the benefits in this writing as follows keep the motorcycle engine durable and durable even if it is used in difficult terrains, knowing the fuel that will save costs in the long term of using the Honda mega pro motorcycle and knowing the oil and fuel that makes the Honda mega pro motorcycle engine even though it is used for a long time and for a long time is still optimal like a new engine.

A gasoline motor (Spark Ignition Engine) or Otto motor is an indirect energy conversion engine, namely fuel energy into heat energy and then into mechanical energy so the chemical energy of the fuel is not directly converted into mechanical energy. The standard fuel of gasoline motors is gasoline or iso-octane and how to find out the fuel consumption of each km traveled can use this formula.

1.1. SAE Code on Motorcycle Oil

Lubricating Oil Viscosity is the most decisive thing when choosing Motorcycle Oil, Lubricating Oil Viscosity is one of the most important physical characteristics of engine oil. In

METALOGRAM
-Mechanical Engineering and Energy-
December 15th, 2024. Vol.01 No.01
December, 2024

engine oil terms viscosity commonly known as viscosity SAE (Society of Automotive Engineers) is a standardization body such as ISO, DIN or JIS, specializing in the automotive field.

Not many people know for sure what the code means SAE in Lubricating Oil. many people know that it is only cheap oil and expensive oil as well as dilute oil and viscous oil. even though each engine from the factory has different viscosity and SAE recommendations. The SAE code actually indicates the ability of an oil to maintain its viscosity stability to the influence of ambient temperature/hot or cold engines. Oil has its own grade (degree) regulated by the Society of Automotive Engineers (SAE).

In more detail about this SAE code is as follows:

1. SAE 10W-30 means that at low temperatures (cold) it has properties like SAE 10W oil, at high temperatures such as SAE 30. The properties of SAE 15W oil are able to start at cold temperatures up to -20 ºC and are able to flow with pumping up to -30 ºC. The properties of SAE 30 oil at high engine temperatures of 100 ºC have a viscosity ranging from 9.3 cSt-12.5 cSt (0.0093 Kg/m-s ~ 0.0125 Kg/m-s).
2. SAE 15W40 means that at low temperatures (cold) it has properties like SAE 15W oil, at high temperatures such as SAE 40. The properties of SAE 15W oil are able to be started at cold temperatures up to -15 ºC and are able to flow by pumping up to -25 ºC The properties of SAE 40 oil at high engine temperatures of 100 ºC have a viscosity ranging from 12.5 cSt – 16.3 cSt (0.0125 Kg/m-s ~ 0.0163 Kg/m-s).
3. SAE 20W50 has a general meaning of an oil that is able to adjust its viscosity, at low temperatures (cold) it has properties like SAE 20W oil and at high temperatures such as SAE 50. The properties of SAE 20W oil are able to be started at cold temperatures up to -10 ºC (non-freezing) and are able to flow by pumping up to -20 ºC. The properties of SAE 50 oil at high engine temperatures of 100o C are not very dilute, with a viscosity ranging from 16.3 cSt - 21.9 cSt (0.0163 Kg/m-s ~ 0.0219 Kg/m-s).

2.0 METHOD

Determining the tools and materials to be used.

1. SAE 10W30 XXX 2. SAE 15W40 XXX

3.SAE 20W40 XXX 4. Fuel oil octane number 88

5. Fuel oil octane number 95

Figure 1. Lube oil dan fuel oil to be used

The tests carried out in the process of chapter the results obtained in this data collection are the average results of each type of oil and material used in the testing process in this data collection I will display in the form of a table of 3 types of oils and materials as well as the speed during the testing process in the testing process with 3 oil specimens of different viscosities. This study uses a fuel that has an octane value of 88 which is also called with gasoline and using 3 speeds when conducting engine tests, namely at a speed of 40km/h, 60km/h, and also 80km/h to see the distance that can be traveled by consuming fuel which is only used 1 liter at each speed and the author also made 3 tests on each test using a certain speed by using 3x test repetitions to get accurate test results while, the results of the first test I conducted using oil with a viscosity value of SAE 10w-40. After carrying out the testing process and taking the average mileage from each oil and fuel test used, the author also calculated the total distance and time of each test and calculated the fuel consumption per hour and also the fuel consumption rate used how many gr/h the motorcycle 150 cc used in the year of assembly 2021.

3.0 RESULT

3.1 Results of The Type of Oil, Octane, Speed and Travel Time Achieved

The result of experiment about type of oil, octane, speed and travel time achieved can be seen at table below.

Table 1. The effect of the oil lubrication to speed, distance and time

No	SAE	Octane	Speed (km/hr)	Distance (kms)	Time (hr, min, sec)
1	10W-30	88	40	53.2	1: 9: 8
2	15W-40	88	40	53.6	1 : 20 : 6
3	20W-50	88	40	54.3	1 : 21 : 0
4	10W-30	88	60	51.2	0 : 51 : 0
5	15W-40	88	60	51	0 : 51 : 0
6	20W-50	88	60	52.1	0 : 51 : 6
7	10W-30	88	80	45.3	0 : 34 : 6
8	15W-40	88	80	46.1	0 : 34 : 2
9	20W-50	88	80	47.7	0 : 35 : 4
10	10W-30	95	40	57.9	1 : 20 : 4
11	15W-40	95	40	59.1	1 : 28 : 2
12	20W-50	95	40	63.4	1: 34 : 8
13	10W-30	95	60	54.3	0 : 54 : 6

METALOGRAM
-Mechanical Engineering and Energy-
December 15th, 2024. Vol.01 No.01
December, 2024

14	15W-40	95	60	56.1	0 : 55 : 8
15	20W-50	95	60	59.6	0 : 59 : 4
16	10W-30	95	80	52.2	0 : 39 : 0
17	15W-40	95	80	53	0 : 39 : 6
18	20W-50	95	80	56.4	0 : 42 : 0

3.2 The Fuel Consumption Used In Each Oil Lubricant Is Different Using 88 Octane

This table show fuel consumption compare with the type oil lubrication.

Table 2. The effect of the oil lubrication to speed, distance and time using fuel 88 octane number

No	Oil lubrication	Speed (km/hr)	Distance (mm)	Oil Cons. (l/hr)	Fuel (gr/hr)
1	SAE 10W-30	40	53.2	0.758	563.9
2	SAE 15W-40	40	53.6	0.749	557.2
3	SAE 20W-50	40	54.3	0.740	550.56
4	SAE 10W-30	60	51.2	0.7494	874.9
5	SAE 15W-40	60	51.0	1.176	874.9
6	SAE 20W-50	60	52.1	1.174	873.4
7	SAE 10W-30	80	45.3	1.8126	1348.5
8	SAE 15W-40	80	46.1	1.762	1310.9
9	SAE 20W-50	80	47.7	1.711	1272.9

3.3 Fuel consumption used in each oil lubricant is different using 95 octane number

This table show fuel consumption compare with the type oil lubrication

Table 3. The effect of the oil lubrication to speed, distance and time using fuel 95 octane number

No	Oil lubrication	Speed (km/hr)	Distance (mm)	Oil Cons. (l/hr)	Fuel (gr/hr)
1	SAE 10W-30	40	57.9	0.697	518.5
2	SAE 15W-40	40	59.1	0.681	506.6
3	SAE 20W-50	40	56.9	0.635	473.9
4	SAE 10W-30	60	54.8	1.109	825
5	SAE 15W-40	60	58.2	1.088	809.6
6	SAE 20W-50	60	59.6	1.015	755.1
7	SAE 10W-30	80	52.2	1.538	1144.2
8	SAE 15W-40	80	55	1.501	1141
9	SAE 20W-50	80	56.4	1.428	1062.4

4. DISCUSSION

After trying all the oils that I used during the testing process, it can be concluded that the oil that has a viscosity code SAE 20w-50 is more efficient in fuel use than oil with viscosity codes such as 10w-30 and 15w-40, the results that I obtained the longest distance by using 1 liter of fuel consumption, the farthest distance that can be traveled with fuel with 88 octane, which is 54.3 Km at a speed of 40 km/h and fuel consumption rate each hour is 0.740 liters/hour and for a speed of 60 km/h and 80 km/h the distance that can be traveled is 52.1 Km and 47.7 Km fuel consumption is 1,174 liters/hour and 1,711 liters/hour and for fuel use with an octane value of 95 which is 63.4 Km at a speed of 40 Km/h and for a speed of 60 km/h and 80 km/h 59.6 Km, and 56.1 Km fuel consumption rate per hour is 0.637 liters/hour and 1,015 liters/hour and 1088.2 liters/hour here it is seen that the faster a vehicle will be the greater the fuel consumption that will be used. After seeing the results obtained from the testing process, it turns out that fuel or octane affects the speed of the Honda mega pro motorcycle in the test that I did when I did the maximum speed top speed test at a distance of 1 Km with straight road conditions as a result of the speed that I could travel with this motorcycle was 117 Km using fuel with an octane value of 88 and then I did a test using fuel with an octane value of 88 Different days are also different of course and as a result the data I got using 95 octane is 120 Km maximum speed with a distance of 1 Km.

5.0 CONCLUSION

This study obtained the longest distance by using 1 liter of fuel consumption, the farthest distance that can be traveled with fuel with 88 octane, which is 54.3 Km at a speed of 40 km/h and fuel consumption rate each hour is 0.740 liters/hour and for a speed of 60 km/h and 80 km/h the distance that can be traveled is 52.1 Km and 47.7 Km fuel consumption is 1,174 liters/hour and 1,711 liters/hour and for fuel use with an octane value of 95 which is 63.4 km at a speed of 40 km/h and for a speed of 60 km/h and 80 km/h 59.6 Km, fuel consumption per hour is 0.637 liters/hour and 1.015 liters/hour and 1.0882 liters/hour respectively that here seen that the faster a vehicle will be the greater the fuel consumption that will be used.

5.1 Recommendation

It is recommended to test vehicles with various manufacturer brands that have the same capacity or can also use a smaller capacity than the test conducted by the author in this thesis so that consumers like us can know which motorcycle with manufacturer is more profitable in terms of speed and fuel consumption.

Use vehicles with various manufacturer brands that have the same capacity or you can also use a smaller capacity Try with different types of vehicles such as the automatic type which is now starting to be in demand.

REFERENCE

[1] ASTRA HONDA MOTOR P.T, Technical Training Level 1, Divisi Perawatan Sepeda Motor, Jakarta
[2] Arends, BPM, H. Berenschot (1980) ‘’Motor bensin’’ Erlangga,
[3] Edi Sigar,1998, Buku Pintar Otomotif,Jakarta : Pustaka

Delapratasa
[4] Dasar motor bakar http://www.scribd.com/doc/72782873/DASARMOTORBAKAR,
[5] Giancoli, Douglas C.,2001, ‘’Viskositas Oli’’ Erlangga
[6] Haryono, G. 1997.’’ Uraian Praktis Mengenal Motor Bakar’’. Aneka Ilmu Semarang
[7] H.WINING, Januari 1992 ‘’Motor bensin auto mobil’’, CV.ARMICO,
[8] Mathur M.L; Sharma R.P., Internal Combution Engine, 2nd Edition, Dhanpat Rai & Son, New delhi ,1980
[9] Prof.Dr.Djam’an satori, M.A-Dr.Aan komariah,M.pd : ‘’Metodeologi Penelitian’’. Mei 2009.
[10] WARTAWAN,Anton L. Juli 2002, ‘’Bahan bakar bensin’’,