



Analysis of Differences in Coper, Platinum and Iridium Spark Plugs on Fuel Consumption

Bahtiar Wilantara^{1✉}, Ismail Kholid², Hamid Nasrullah³, Ulfa Nur Fitri Khoiriyah⁴

¹⁻⁴Department of Automotive Engine Study Program, Politeknik Piksi Ganesha Indonesia, Indonesia, 54399

✉ arasiwilan@yahoo.com

doi <https://doi.org/10.37339/e-komtek.v8i1.1778>

Published by Politeknik Piksi Ganesha Indonesia

Abstract

Artikel Info

Submitted:

27-05-2024

Revised:

14-06-2024

Accepted:

21-06-2024

Online first :

26-06-2024

The research aims to determine the effect of different spark plug variations on fuel consumption. The method used is a descriptive method. The tools and materials used are: copper spark plugs, platinum spark plugs, iridium spark plugs, 5 liter measuring cup, and pertalite. Fuel consumption analysis compared copper, platinum and iridium spark plugs with rpm 700, 1000, 1500, and 2000. Test results: 1) Fuel consumption for copper spark plugs with rpm 700, 1000, 1500, and 2000, namely 40ml, 10ml, 15ml and 10ml. 2) Fuel consumption for platinum spark plugs with rpm 700, 1000, 1500 and 2000, namely 20ml, 5ml, 25ml and 20ml. 3) Fuel consumption for iridium spark plugs with rpm 700, 1000, 1500 and 2000 is 50ml, 10ml, 10ml and 10ml. So platinum spark plugs are more fuel efficient than copper and iridium spark plugs.

Keywords: Analysis, Spark Plugs, Fuel

Abstrak

Tujuan penelitian adalah untuk mengetahui pengaruh variasi busi yang berbeda terhadap konsumsi bahan bakar. Metode yang digunakan adalah metode deskriptif. Alat dan bahan yang digunakan yaitu : busi tembaga, busi platina, busi iridium, gelas ukur 5 liter, dan pertalite. Analisis konsumsi bahan bakar dilakukan dengan membandingkan busi tembaga, platina dan iridium pada putaran 700, 1000, 1500 dan 2000 rpm. Hasil pengujian : 1) Konsumsi bahan bakar busi tembaga dengan rpm 700, 1000, 1500 dan 2000 yaitu 40ml, 10ml, 15ml dan 10ml. 2) Konsumsi bahan bakar pada busi platina dengan rpm 700, 1000, 1500 dan 2000 yaitu 20ml, 5ml, 25ml dan 20ml. 3) Konsumsi bahan bakar busi iridium dengan rpm 700, 1000, 1500 dan 2000 adalah 50ml, 10ml, 10ml dan 10ml. Jadi menggunakan busi platina lebih hemat bahan bakar dibandingkan busi tembaga dan iridium.

Kata Kunci: Analisa, Busi, Bahan Bakar



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/).

1. Introduction

Many Indonesian people, especially young people, improve vehicle performance by replacing standard manufacturer components, which can improve vehicle performance, also known as modifications. One of the modified vehicle parts is the spark plug. This is because the spark plug is a part that is quite easy to replace between one spark plug product and another [1].

Spark plugs are one of the components found in vehicle ignition systems. Spark plug construction consists of spark plug terminals, spark plug insulators, spark plug threads, positive electrodes and negative electrodes. Spark plugs have several functions, including burning the mixture of fuel and air that enters the combustion chamber, delivering heat energy out of the combustion chamber, and functioning as a combustion indicator in the engine [2].

Symptoms of spark plug damage will result in the engine feeling limp and powerless, the engine seems to be lurching, the engine difficult to start, and because the sparks are small and unable to burn the air-fuel mixture, which causes fuel to accumulate in the combustion chamber [3]. The spark jump on new and old spark plugs is different if the old spark plug requires a higher voltage because, on the old spark plug, there is a possibility of current leakage in the spark plug cavity or dirty spark plug electrode, thus causing a higher voltage requirement to spark the spark. The higher the engine speed, the lower the induced voltage because the primary current becomes smaller at high speed due to the shorter current flow time [4].

This spark plug has a thin and sharp electrode, making it easy for this type of spark plug to release electrons. With a very thin diameter, the mixture of fuel and air becomes richer, its durability reaches 30,000 km, so it is suitable for traveling long distances [5]. This spark plug has a thin and sharp electrode, making it easy for this type of spark plug to release electrons. With a very thin diameter, the mixture of fuel and air becomes richer, its durability reaches 30,000 km, so it is suitable for traveling long distances [6].

Iridium plugs are spark plugs with tip electrodes made of nickel and center electrodes made of iridium alloy. Iridium spark plugs are usually used by large motorbikes of 150 cc and above [7]. The relationship between spark plug heat and fuel consumption is that if the spark plug produces a strong spark and the resulting explosion is very large, then the temperature in the combustion chamber increases and produces high heat so that you will get perfect combustion which will ultimately increase the efficiency of fuel consumption. Fuel consumption is closely related to vehicle efficiency, and an engine's fuel consumption level is often one of the considerations when choosing a vehicle [8].

2. Method

The research uses a descriptive method to test spark plugs and presents facts about the differences in fuel consumption between copper, platinum, and iridium spark plugs. The research flow is presented in [Figure 1](#).

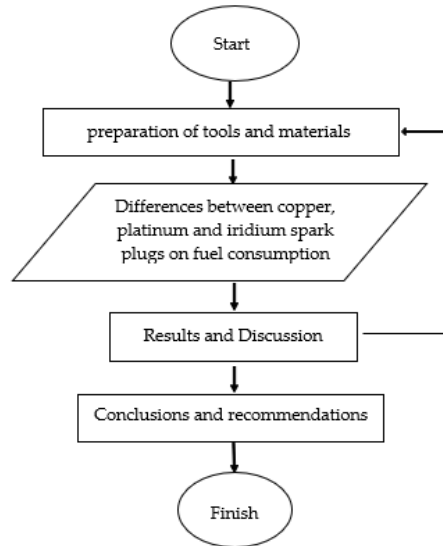


Figure 1. Research Flow

In preparation for this test, the author started by determining the title. After that he prepared all the tools and materials to be tested, such as Peralite petrol, spark plugs, petrol pumps and so on, using a 2011 Xenia Xi car at the Politeknik Piksi Ganesha Indonesia. For testing, the author analyzed copper, platinum and iridium spark plugs for fuel consumption. In this test the author used Idle and 1000, 1500, 2000 RPM, and used peralite fuel.

3. Results and Discussion

The results of this test are used to see the difference in fuel consumption with different spark plugs. The table of fuel consumption test results with different spark plugs is presented in [Table 1](#).

Table 1. Test Results on Spark Plugs on Fuel Consumption

No	RPM	Time (second)	Fuel Consumption (ml)		
			Copper	Platinum	Iridium
1	Idle	60 second	40	20	50
2	1000	60 second	10	5	10
3	1500	60 second	15	25	10
4	2000	60 second	10	20	10

The test above explains the test results of 3 different spark plugs, namely copper, platinum and iridium spark plugs. The author uses RPM from idle, 1000, 1500, and 2000 for 1 minute. From the test above, it will be higher from idle or normal rotation to 2000 RPM. So, the higher the RPM,

the more wasteful the fuel consumption will be. The temperature is always below RPM 1000 for idle rotation, usually called normal rotation.

3.1 Copper Spark Plugs

The results of testing the copper spark plug on fuel consumption can be presented in

Figure 2.

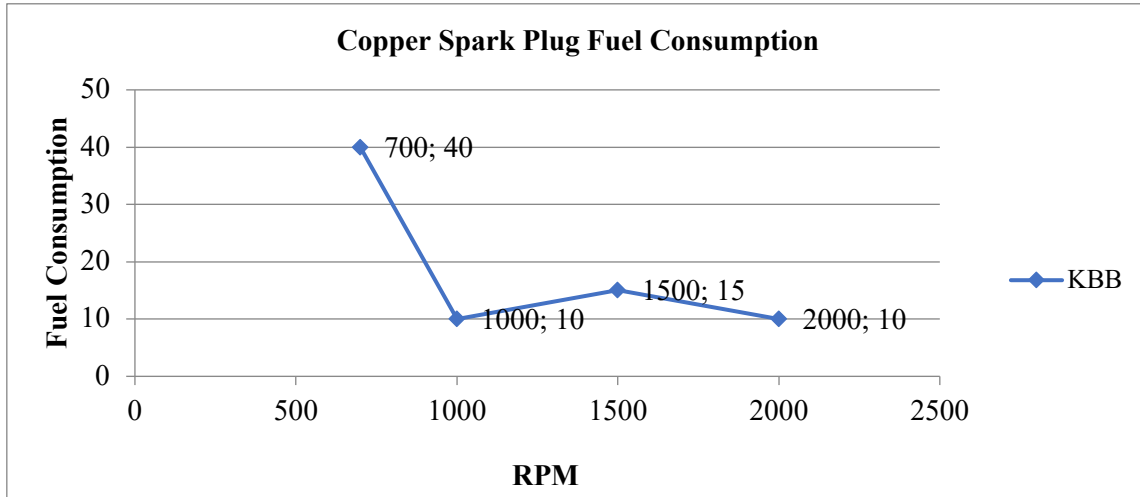


Figure 2. Fuel Consumption Graph for Copper Spark Plugs

Based on the fuel consumption test results in the graphic image, fuel consumption using copper spark plugs at 700 rpm is 40 ml, 1000 rpm is 10 ml, 1500 rpm is 15 ml, and 2000 rpm is 10 ml. In a matter of one minute, fuel consumption is reduced from 700 to 2000 rpm, namely consuming 75 ml of fuel. Based on the fuel consumption test results in the graphic image, fuel consumption using copper spark plugs at Rpm 700 is 40 ml, Rpm 1000 is 10 ml, Rpm 1500 is 15 ml, and 2000 is 10 ml. In a matter of one minute, fuel consumption is reduced from 700 to 2000 rpm, namely consuming 75 ml of fuel.

3.2 Platinum spark plugs

The fuel consumption test results on platinum spark plugs are presented in **Figure 3.**

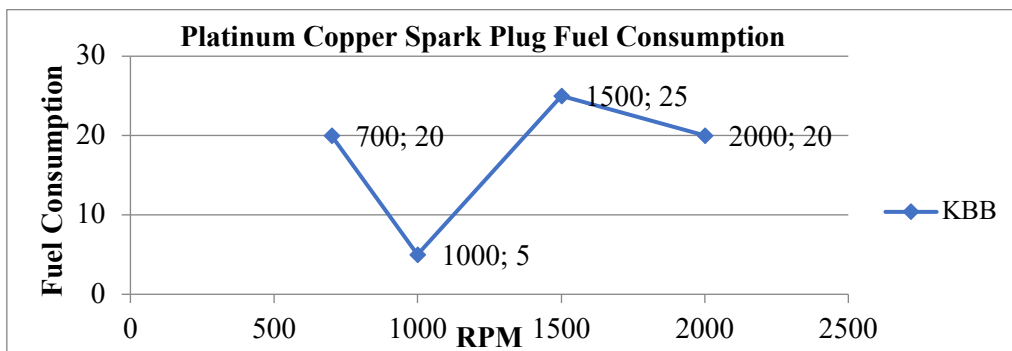


Figure 3. Platinum Fuel Consumption Graph for Platinum Spark Plugs

Based on the fuel consumption test results in the graphic image, fuel consumption using platinum spark plugs at 700 Rpm is 20 ml, 1000 Rpm is 5 ml, 1500 Rpm is 25 ml, and 2000 Rpm is 20 ml. In a matter of one minute, fuel consumption is reduced from 700 to 2000 rpm, namely by a difference of 70 ml.

3.3 Iridium Spark Plugs

The results of fuel consumption testing on iridium spark plugs are presented in **Figure 4**.

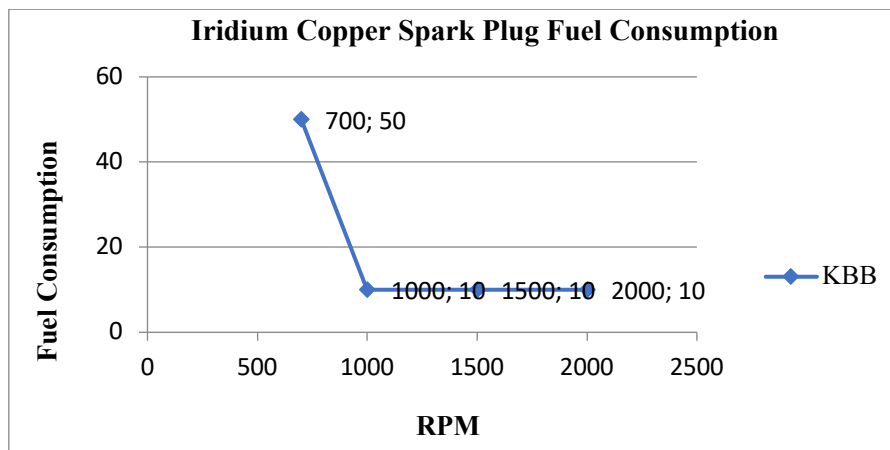


Figure 4. Fuel Consumption Graph for Iridium Spark Plugs

Testing fuel consumption in the graphic image shows that the iridium spark plugs at 700 Rpm 50ml, 1000 Rpm are 10ml, 1500 Rpm are 10ml, and 2000 are 10ml. Within one minute, you can see that fuel consumption decreased from 700 to 2000 rpm, namely by a difference of 90 ml.

4. Conclusion

After carrying out the analysis process, you can see the comparison of fuel consumption with copper spark plugs. At 1000 RPM the fuel is reduced by 50ml with a duration of 1 minute, at 1500 RPM the fuel is reduced by 15ml with a duration of 1 minute, at 2000 RPM the fuel is reduced by 10ml with a duration of 1 minute. Then compare the consumption with platinum spark plugs. At 1000 RPM the fuel is reduced by 25ml with a duration of 1 minute, at 1500 RPM the fuel is reduced by 25ml with a duration of 1 minute, at 2000 RPM the fuel is reduced by 20ml with a duration of 1 minute. Then compare the consumption of iridium spark plugs. 1000 RPM with fuel reduced by 10ml with a duration of 1 minute, at 1500 RPM with fuel reduced by 10ml, at 2000 RPM with fuel reduced by 10ml. The test results of the three copper, platinum and iridium spark plugs are that the most fuel-efficient spark plug is the platinum spark plug which consumes 70ml of fuel. Meanwhile, the most wasteful spark plugs are iridium spark plugs with 90ml of fuel.

References

- [1] A. Elvan, E. Pradana, A. Mufarida, and A. Finali, "PENGARUH VARIASI CELAH BUSI TERHADAP EMISI GAS BUANG PADA MESIN TIPE K3-DE THE EFFECT OF SPARK PLUG GAP VARIATION ON EMISSION OF EXHAUST GAS IN K3-DE ENGINE".
- [2] B. Budiyo, "Pengaruh kerenggangan celah dan pemilihan jenis busi pada mobil xenia 1.0 terhadap gas buang," *Tek. J. Sains dan Teknol.*, vol. 16, no. 1, p. 122, 2020, doi: 10.36055/tjst.v16i1.7701.
- [3] T. Ginting, "Pengaruh Jarak Celah Busi Terhadap Daya Mesin Kijang Innova Bensin," *J. Tek. Inform. Kaputama*, vol. 3, no. 1, pp. 42–50, 2019.
- [4] A. Triyono, *Pengaruh Jarak Celah Busi Terhadap Emisi Gas Buang Pada Mobil Toyota Avanza Vot-i 2010*. 2020, p. 54.
- [5] P. Studi, T. Mesin, U. Nasional, F. Teknik, and D. A. N. Sains, "Pengaruh Penggunaan Busi Elektroda Tembaga dan Iridium Terhadap Unjuk Kerja Motor Bakar 4 Langkah Kapasitas 150 cc . Oleh : Wismanto Setyadi , ST , MT .," 2020.
- [6] R. Kurniawan, "PENGARUH VARIASI CELAH BUSI DAN JENIS BUSI TERHADAP PERFORMA DAN EMISI GAS BUANG PADA MOBIL BENSIN SISTEM INJEKSI," *Pemutusan Hub. Kerja*, no. 1, pp. 1–12, 2018.
- [7] Budiyo and A. E. Mahfudin, "Perbandingan Busi Standar Dengan Busi Platinum Pada Sepeda Motor Honda Cb 150 Terhadap Power Dan Konsumsi Baha Bakar," *Surya Tek.*, vol. 3, no. 1, pp. 1–5, 2018.
- [8] "PENGARUH PENGGUNAAN BUSI TERHADAP KONSUMSI BAHAN BAKAR PADA SEPEDA MOTOR HONDA BEAT TAHUN 2012 Diajukan kepada Tim Penguji Skripsi Jurusan Teknik Otomotif Sebagai Salah Satu Persyaratan Guna Memperoleh Gelar Sarjana Pendidikan Oleh RAHMAT AUFA UNIVERSITAS," 2014.
- [9] P. Name *et al.*, "Analisis Variasi Busi Terhadap Performa dan Bahan Bakar Motor Bensin 2 Langka h Yamaha F1ZR 110CC Rudi Kurniawan Arief 2549 Words The combined total of all matches , including overlapping sources , for each database . Crossref database Crossref Posted Con," 2023.
- [10] F. R. Andardi and L. S. Mahabella, "Pengaruh Limbah Busi Sebagai Bahan Tambah Agregat Kasar Terhadap Kuat Tekan Beton," *Sentra*, vol. 4, no. 2, pp. 27–33, 2018.
- [11] M. F. Faizi *et al.*, "Pengaruh Penggunaan Busi Standar, Busi Racing, Dan Busi Iridium Terhadap Kinerja Mesin Sepeda Motor 4 Langkah 110Cc Pada Berbagai Tekanan Kompresi," *مجلة اسبوط للدراسات البيئية*, vol. العدد الحا, no. 1, p. 43, 2017.
- [12] R. Sihombing, M. S. Putra, A. Fatmawati, and S. Lolongan, "PENGARUH PENGGUNAAN BUSI IRIDIUM SC16HR11 , LIBEN PLATINUM LZKAR6X DAN DURATION DOUBLE IRIDIUM LDR7TD1 TERHADAP KONSUMSI BAHAN BAKAR PADA MOBIL AVANZA 1300 CC TAHUN 2016 THE EFFECT OF USING IRIDIUM SC16HR11 , LIBEN PLATINUM LZKAR6X AND DURATION DOUBLE IRI," pp. 357–363, 2017.
- [13] A. N. Syaief, M. Adriana, and A. Hidayat, "Uji Emisi Gas Buang Dengan Perbandingan Jenis Busi Pada Sepeda Motor 108 Cc," *Elem. J. Tek. Mesin*, vol. 6, no. 1, p. 01, 2019, doi: 10.34128/je.v6i1.82.
- [14] A. Бонев and С. Александров, "No TitleБагачина – тракийски култов център (предварително съобщение)," *Археология*, vol. 1, no. August, pp. 117–125, 1993.
- [15] "ANALISA PENGARUH JARAK CELAH ELEKTRODA BUSI TERHADAP PERFORMA MOTOR BAKAR 4 LANGKAH STUDI KASUS PADA MOTOR BAKAR HONDA GX-160."