Effect of Types and Gap on Spark Plugs on Exhaust Emissions on the 110CC Double Wheel Vehicles and Its Dissemination Using Website

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Abstract. Based on the formulation of the problem to be discussed by the writer is to know: the influence of 0.4 mm spark gap variation, and standard spark plug type, to CO and HC, the influence of 0.5 mm spark plug gap variation, and variation of platinum spark plug on CO and HC, influence of spark gap variation 0.6mm, and variation of iridium spark plug type to CO and HC emission Method used to obtain data needed to support the writer that is research method with experiment, literature study method or literature study. The result of this research conclude that there is spark gap influence 0.4 mm, with variations of standard plug, platinum and iridium spark plugs against CO and HC emissions, where the lowest CO value is 0.27% and HC 98 ppm, 0.5 mm spark plug gap the lowest CO value of 0.19% and HC 24 ppm. The results of this research will be disseminated using the website.

1. Introduction
At present, ignition is most of the ignition. The combustion devices are started by dividing the gas between a pair of high voltage electrodes[1]. Ignition at high-speed flows is greatly affected by
turbulence, in particular by increasing heat transfer[2]. The impact of environmental emissions, vehicle emissions that pollute the air and the environment can interfere with human health, especially for people living in large cities, who live in industrial areas and dense motor vehicle traffic. In addition, carbon dioxide is the main cause of climate change[3]. Spark plug is one component in the ignition system in a vehicle that is fueled by gasoline. This spark plug is required to burn air and fuel mixtures inside the engine combustion chamber. Spark plugs can spark sparks because of sparks from the middle electrode to the mass electrode, spark plugs are also believed to be able to reduce exhaust emissions with certain types of spark plugs, because good spark plugs will result in a more complete combustion, if the combustion is perfect then the exhaust gas emissions will decrease. There are many different designs of spark plugs on the market today. Understanding the differences between them is beneficial to the proper and efficient operation of the engine[4]. For conventional spark plugs, discharge energy is usually stored at one fixed point or relatively large space, while in modified spark plugs where multiple electrodes are used, the ability to obtain rotating spark at different electrodes helps to improve the durability of spark plugs and expand boundaries stability in addition to the probability of achieving a faster burn rate than was expected. Hori et al. reported that a fine grounding electrode would increase performance but also noted that the resistance requirements cause the construction of a fine wire earth strap[5]. It must be considered that Spark plug ignition device for testing of measuring instruments[6] and also pay attention to resources used [7]. Environmental pollution can harm many people. Therefore, environmental regulations have required prevention efforts against pollution to ensure health and also of course the sense of fairness and correctness of the use of vehicles[8]. This research will discuss more about The effect of types and gap on spark plugs on exhaust emissions on the 110CC double wheel vehicles and the results of this research will be disseminated using website.

2. Related Works
Ceper has conducted research on the effect of spark plug gap on Hyrdogen Fueled SI Engine and can reduce significantly NO Emission[9]. Poggiani et al. have performed an experimental analysis of the multiple ignition systems, which was performed by conventional and optical non-inductive methods, and found that this would affect the development of the combustion core and the deflection of the front stability of the engine. Yi et al. have conducted a survey of the effects of spark plugs scattering on flame development using Schlieren technology and image processing, and the result was that increasing the spark plug gap would lead to better flame development in shorter time, increasing the chances of failure[11]. Natarajan et al. discussed the effect of spark-ignition during firing with sparking support[12].

3. Research Methodology
The research methodology can be seen in Figure 1.
The steps taken in the implementation of research are as follows:
1. Turning on the motorcycle until the working temperature with standard spark plugs and standard spark plug (0.4 mm)
2. Then put the gas analyzer hose to the exhaust tip
   Turn on and calibrate the gas analyzer
4. Reading CO and HC emissions results
5. Turning off the engine, open the spark plug then the spark plug plug will be tested with a slit of 0.5 mm for standard spark plug
6. Turning on a motorcycle
7. Reading CO and HC emissions results
8. Turn off the engine, open the spark plug then the spark plug plug will be tested with a slit of 0.6 mm for standard spark plug
9. Turning on a motorcycle
10. Reading CO and HC emissions results
11. Conducting Activity Number 1 - 10 above for Platinum and Iridium Spark Plug

4. Results and Discussion
4.1. CO Emission Testing
The Result of CO Emission Testing can be seen in Table 1.

| Table 1. CO Emission Testing |
|------------------------------|
| **Number** | **Spark Plug Gap (mm)** | **Spark Plug Type** | **CO (%)** | **Threshold 2.5%** | **R** |
|-------------|------------------------|---------------------|------------|------------------|-----|
| 1           | 0.4                    | Standart            | 0.32       | 0.3              | 0.31|
| 2           | 0.4                    | Platinum            | 0.22       | 0.24             | 0.23|
| 3           | 0.4                    | Iridium             | 0.28       | 0.27             | 0.27|
Based on Table 1, it can be seen as follows.
1. CO emissions caused by Spark Plug Gap 0.4 mm
   a. Standard Type: 0.31%
   b. Platinum Type: 0.23%
   c. Iridium Type: 0.27%
2. CO emissions caused by Spark Plug Gap 0.5 mm
   a. Standard Type: 0.17%
   b. Platinum Type: 0.16%
   c. Iridium Type: 0.15%
3. CO emissions caused by Spark Plug Gap 0.6 mm
   a. Standard Type: 0.21%
   b. Platinum Type: 0.19%
   c. Iridium Type: 0.2%

Viewed from the spark plug gap above the lowest CO between the three gaps is the spark plug with 0.5 mm, Of the three types of spark plug are the lowest CO emission is the Iridium Busi type.

4.2. HC Emission Testing

The Result of HC Emission Testing can be seen in Table 2.

Based on Table 2, it can be seen as follows.
1. HC emissions caused by Spark Plug Gap 0.4 mm  
   a. Standard Type: 101 ppm  
   b. Platinum Type: 98 ppm  
   c. Iridium Type: 101 ppm
2. HC emissions caused by Spark Plug Gap 0.5 mm  
   a. Standard Type: 50 ppm  
   b. Platinum Type: 46 ppm  
   c. Iridium Type: 48 ppm
3. CO emissions caused by Spark Plug Gap 0.6 mm  
   a. Standards Type: 29 ppm  
   b. Platinum Type: 24 ppm  
   c. Iridium Type: 26 ppm

Viewed from the gap spark plugs above the lowest HC between the three gaps is the spark plug with 0.6 mm, Of the three types of spark plugs are the lowest emission of HC is the spark plug Platinum type.

4.3. Website Design
The design of dissemination website is done by using Waterfall Method. The stages of the waterfall method can be seen in Figure 2[13].

![Figure 2. SDLC Method](image)

5. Conclusion
Based on the results of research that has been done, it can be deduced as follows:
1. There is spark gap influence 0.4 mm, with variation of standard spark plug, platinum and iridium to CO and HC emission, where the lowest value CO 0.27% and HC 98 ppm.  
2. There is 0.5 mm spark plug effect, with variation of standard spark plug, platinum and iridium to CO and HC emission, where the lowest value CO 0.15% and HC 46 ppm.  
3. There is a spark plug effect of 0.6 mm, with variation of standard spark plug, platinum and iridium to CO and HC emissions, where the lowest value CO 0.19% and HC 24 ppm.

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Retracted