The Effect of Fuel Variations Toward Honda CB 150R Performance

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ABSTRACT
The performance every mmotorcycles is influenced by several factors as usual, including the usage of fuel typed. The study aim was to determine the effect fuels such as pertalite, pertamax, and pertamax-turbo type toward the power performance, torque and exhaust emissions produced by a 4-stroke motorbike. The try-out test with experimental methods was done by using motorcylcle of Honda CB 150 R that produced in 2016 as a sample. A sportdyno V3.3 SD325 is a dynamometer used to measure a power and torque, meanwhile eshbon HG-510 is a gas analyzer to measure an exhaust emissions. The fuel variations are pertalite, pertamax, and pertamax turbo. The research finding of this study show that 4-point results, they are: 1) In the range 4,250 to 11,000 rpm showed the maximum pertalite power on 12.53 kW at 9,414 rpm, pertamax 12.48 kW at 9,265 rpm, pertamax-turbo 12.28 kW at 9,403 rpm. 2) In the maximum torque achieved by the pertamax-turbo is 14.07 Nm at 7,237 rpm, pertalite 13.88 Nm at 7,300, and pertamax is 13.86 at 7,611 rpm. 3) In testing exhaust emissions placed on 1,500 to 7,500 rpm, pertalite fuel decreased CO from 2.92% to 0.61% and HC from 405 ppm to 225 ppm, pertamax CO from 2.79% to 0.46% and HC from 393 ppm to 170 ppm, and pertamax turbo CO from 2.44% to 0.38% and HC from 373 ppm to 158 ppm. And the last, 4) the emission test takes into account the usage of high octane fuel will show the smaller impact on environmental pollution.

Keywords: *Fuel Variations, Motorcycle Performance, Pertalite, Pertamax, Pertamax-Turbo.*

1. INTRODUCTION

The combustion motorcycle itself requires some of factors such as fuel, air, and an ignition system are able to carry out the combustion process in the combustion chamber [1]. In general, the Indonesian vehycle, especially motorcycles, mostly, use pertalite, pertamax, and pertamax-turbo as the fuels [2]. The selection oon determining the fuel consumption as a fuels that appropriated with the type of specifications engine will influenced on the greatly affect the fuel consumptiontoward the vehicle performance [3]. Due to the fuel oil type has beeen appropriated, the maximum engine power can be achieved with just a little fuel spray [4].

The motorcycle power can be seen based on the power and torque numbers that generated by the motorbike [5]. The power and torque numbers can be determined by various measurement methods. One of methods to measure the power and torque of motorcycle is dyno test [6]. The power and torque measurement with dyno test can be done without dismantling the motorcycle engine, and it can help the technican to measure the engine easily with the vehicle wheels running on a roller that rotates on a dynamometer as a replacing tools [7]. In addition, another power and torque, the use of appropriate fuel will affect on the exhaust emissions result [8]. The method of measuring exhaust emissions toward a motorcycle can be done using a gas analyzer [9]. Then, it will be seen how much exhaust emissions itself are produced by these motorcycle [10]. Based on the description above, it is necessary to know about the use of the fuel tah appropriate for motorbikes, especially for Honda CB 150 R motorbikes. In this study, the research will conduct on the use of pertalite, pertamax, and pertamax-turbo fuels to examine the power, torque, and emissions exhaust gas produced [11]. In short, it will be known how the effect on using Pertalite, Pertamax, and Pertamax-turbo fuels toward the performance of gasoline engines on the Honda CB 150 R [12].

2. METHOD

The several methods were used to obtain data, to discussion, and to know the materials needed in order solve research problems are as follows:

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2.1. Literature Reviews

The literature study method is a technique that is carried out by looking for information related to fuel and the combustion system on a motorcycle as a reference [13].

2.2. Documentation Method

The activities carried out in the documentation method are collecting information, information, and evidence during the dyno test at the Mototech Yogyakarta workshop [14].

2.3. Experimental Method

An experimental method is a method used to analyze power, torque, and exhaust gas emissions by pertalite, pertamax, and Pertamax turbo [15].

3. RESULT AND DISCUSSION

3.1. Results

According to the tryout test results based on the motorcycle performance with fuel variations pertalite , pertamax and pertamax turbo, it can be compared that each character of power (P), torque (T) in one graph, and Exhaust Gas Emissions [16].

3.1.1. Power

The power produced by the three types of fuel can be compared in the form of a graphic can be seen clearly in the Figure 1 .

3.1.2. Torque

For the torque tryout test with the fuel variations pertalite, Pertamax, and Pertamax turbo, it can be compared in the form of a graph presented in Figure 2 as follows[17].

3.1.3. Exhaust Gas Emissions

The tryout testing exhaust emissions in the form of carbon monoxide (CO) in pertalite, pertamax, and pertamax turbo fuels are presented in Figure 3 as follows [2]. The tyout testing exhaust emissions result in the form of hydrocarbon (HC) in pertalite, pertamax, and pertamax turbo fuels are presented in Figure 4.

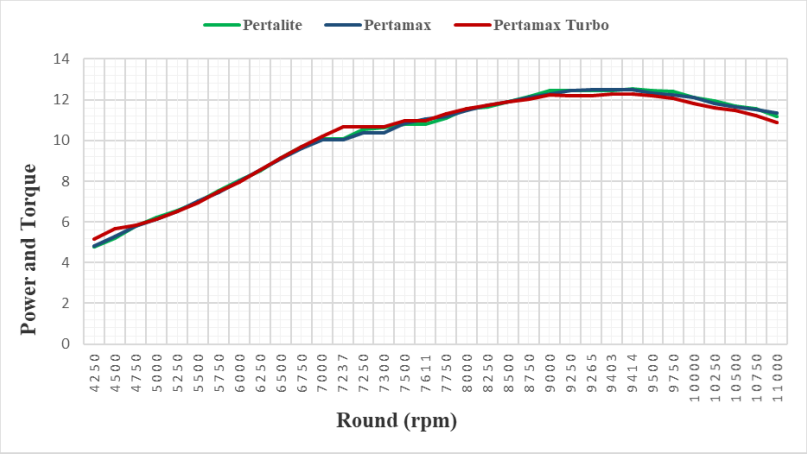

Figure 1 Engine power comparison on fuel variations

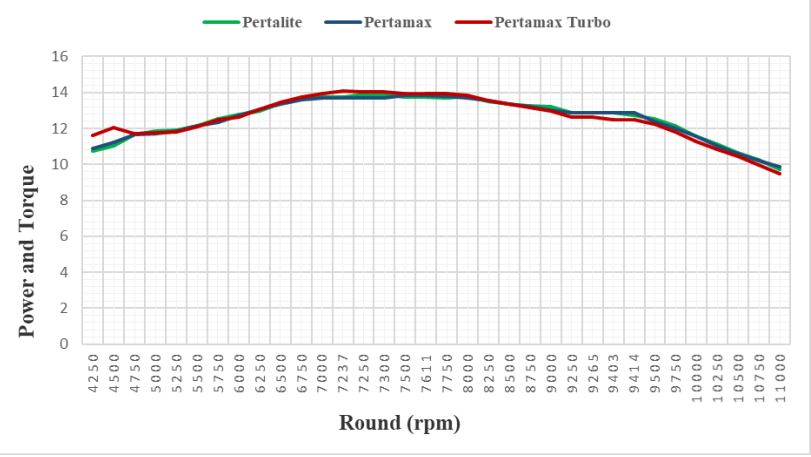

Figure 2 Engine torque comparison on fuel variations

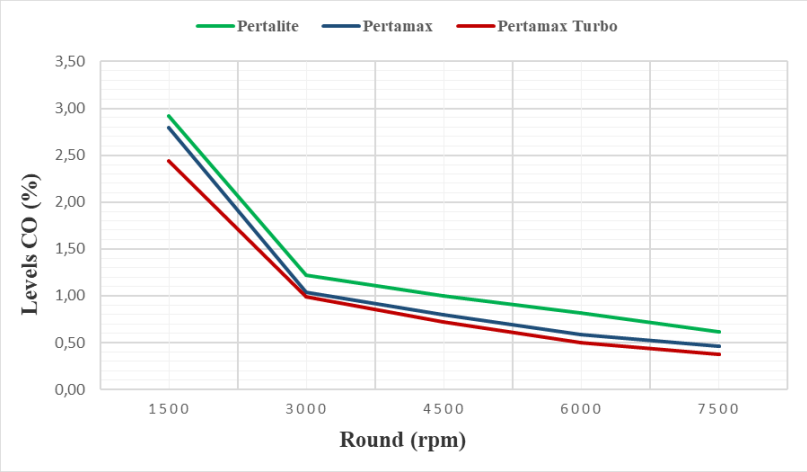

Figure 3 Comparison carbon monoxide on various fuels

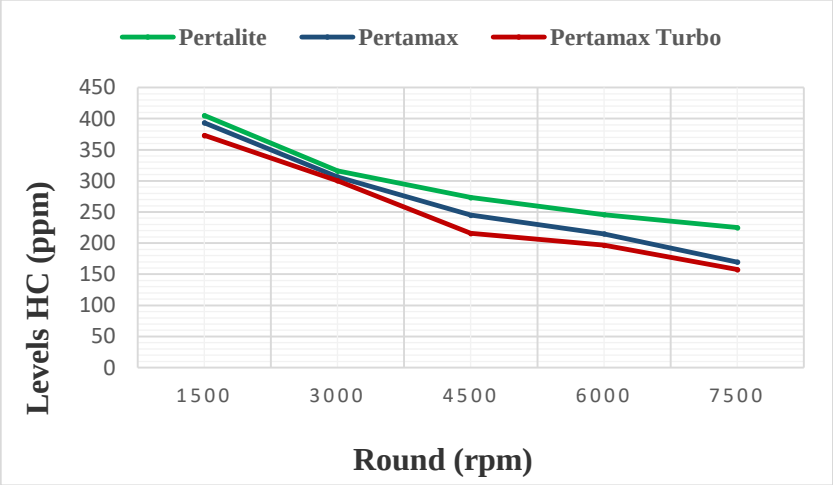

Figure 4 Hydrocarbon Comparison chart on a variety of fuels

3.2. Discussion

3.2.1. Power

Based on the power graph in Figure 1, it can be seen that the highest power is achieved by pertalite fuel on 12.53 kW at 9,414 rpm. The second place is placed by Pertamax fuel with 12.48 kW at 9,265 rpm. Then, the last is Pertamax turbo fuel on 12.28 kW at 9,403 rpm. Power is affected by the value of torque and rotation. The decrease in power is slower than the decrease in torque due to the increase in the value of rotation is still higher than the decrease in the value of torque [18]. So, even though the torque has decreased, the power still rises before finally it is decreasing according to the torque.

3.2.2. Torque

In figure 2, when the gas handle is increased the torque increases sharply from 4,250 rpm to around 4,500 rpm, due to to there is an increase in fuel consumption into the cylinder. After rotating at around 8,000 rpm the torque begins to decrease due to a decrease in the average effective pressure or break mean effective pressure (bmep) due to the high frequency of piston speed, but it is not balanced by the length of time the valve is open. So that there is a decrease in fuel combustion pressure in the cylinder [19]. In the torque graph above, the maximum torque produced by Pertamax turbo fuel is higher than the other two types of fuel, which is 14.07 at 7,237 rpm. Followed by pertalite fuel with a torque of 13.88 at 7,300 rpm and Pertamax fuel with a torque of 13.88 at 7,611 rpm.

3.2.3. Exhaust Gas Emissions

In the exhaust emission test presented in Figure 3, for carbon monoxide (CO) using pertalite fuel, it decreased on 0.61% and still on below the standard at 4.50%. Pertamax fuel has decreased on 0.46% and still on below the standard at 4.50%. Meanwhile, Pertamax turbo fuel has decreased on 0.38% and still on below the standard at 4.50%.

In the exhaust emission tryout test presented in Figure 4 showed that for hydrocarbons (HC) using pertalite fuel, it has decreased on 225 ppm and still on below standard

at the 2,000 ppm. Pertamax fuel has decreased to 170 ppm and still on the below standard at 2,000 ppm. While, in the Pertamax turbo fuel has decreased on 158 ppm and still on the below standard at 2,000 ppm.

4. CONCLUSION

Based on the research has been conducted, in short, it can be caonclude in three points that can be read as follows:

a. The tryout test results show that pertalite is better than Pertamax and Pertamax turbo in terms of power. It is indicated by pertalite fuel producing a maximum power of 12.53 kW, followed by Pertamax which is on 12.48 kW, and Pertamax turbo which is on 12.28 kW.

b. The tryout-test results show that the Pertamax turbo is better than Pertalite and Pertamax in terms of torque. It is indicated by the fuel Pertamax produces a maximum torque of 14.07 Nm, followed by pertalite which is on 13.88 Nm and Pertamax is on 13.86 Nm.

c. The results of the exhaust emission tryout test showed on 1,500 rpm, 4,500 rpm, 7,500 rpm. In additon, CO and HC have decreased. It can be seen on the Pertalite fuel on decrease in CO from 2.92% to 0.61% and HC on 405 ppm to 225 ppm. Pertamax fuel has decreased CO from 2.79% to 0.46 and HC 393 ppm to 170 ppm. Pertamax turbo fuel has decreased CO from 2.44% to 0.38% and HC on 373 ppm to 158 ppm.

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