

JIM: Jurnal Inovasi Mesin

The Effect of Stroke Up and Bore Up on The Performance of Honda Verza Motorcycle

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Keywords:

Honda Verza Motorcycle
Stroke Up
Bore Up
Torque and Power
Performance.

Abstract

Many young people make bore up and stroke up modifications to improve the performance of their motorbike engines. which is used for daily activities and racing contests. Apart from that, this modification is necessary for some people, especially men, because most of the people in Juwana work as farmers in fish ponds. Apart from that, the condition of the roads in the pond is still dirt, which makes the roads muddy when it rains. Because motorbikes are used to transport fish harvests and as transportation, their motorbikes also require more power. This research uses an experimental research design by changing the stroke length and piston diameter on a Honda Verza motorbike with variations of Stroke Up, Bore Up and Stroke Up Bore Up. With testing steps using a dynotest 3 times on each motorbike variation to determine the performance of the Honda Verza motorbike. The results of this research show an increase in torque and power produced after modifying the stroke up and bore up. The resulting modification of increasing the piston diameter (bore up) affects the torque and power values produced by the Honda Verza motorbike. The torque value increased by 1.34% at 10,000 rpm and the power value increased by 1.39% at 13,000 rpm. Meanwhile, the stroke up variation affected the power and torque produced by the Honda Verza motorbike. The results obtained from testing the stroke up engine experienced an increase in torque value of 1.36% at 11000 rpm and the power produced increased by 3.16% at 13000 rpm.

1 Introduction

Technology has developed very rapidly, especially in the automotive sector. This development process will certainly continue to innovate and develop more widely, one of which is motorcycles [1–3]. The motorcycles are one of the most popular types of transportation in society. Motorcycle production which increases every year will certainly be balanced with motorcycle product upgrades.

The Central Statistics Agency (2017) noted that in 2015 motorcycle production in Indonesia reached 98,881,267 units, in 2016 it increased by 6.34%, and in 2017 it increased by 7.49% so that the number of products became 113,030,793 units [4]. Every year factories launch vehicles with their latest innovations. In the vehicle production process, many factories release vehicles with the most fuel-efficient use possible which often has an impact on reducing the performance of the motorbike itself. This has triggered the public or consumers to innovate to improve or update the motorbikes they own, so that the motorbikes they own are not much different from the latest motorbikes.

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The habit of changing engine specifications for motorcycle lovers is very common, changing engine specifications because the condition of the engine is starting to show signs of damage [5–7]. Most people, especially young people, modify their motorbikes to engine performance. Motorbikes that are decreasing in performance are due to age and daily use. Young people make modifications to improve performance without having to buy a new vehicle to get good performance.

Many young people do bore up and stroke up modifications to increase performance to the condition of the motorbike engine. Which is used for daily activities and racing competitions. Not only that, but this modification is also needed for some people, especially fathers, to work, where most of the people in Juwana have professions as farmers in fishponds, besides that some of the conditions of the roads in the ponds themselves are still dirt, which when it rains the road is muddy. Motorbikes are used as transportation and tools to transport fish harvests. So, the motorbikes used also require more power.

The condition of the engine that has been stroked up and bored up is not compared between the standard engine performance conditions and after oversize modification. So that only the result is important. Without knowing the performance before and after the modification has been done.

The lack of modification actors who do not prioritize knowledge about the comparison of the characteristics of the standard engine condition and after stroking up and bore up. So, they do not know what effects and comparisons occur in the standard engine condition and after oversize [8]. State that Stroke-Up or what is called over stroke is a change in the position of the crankshaft (big end) to be further away or shifting the standard big end closer to the edge of the crankshaft leaf. Conditions like this are done so that the piston up and down distance becomes longer. Bore-Up is to increase engine capacity by increasing the piston diameter which is followed by changes in the inner diameter of the liner on the cylinder block.

Increasing engine capacity also increases torque and power. The torque is a measure of the engine's ability to do work. The work in question is the ability to move or move a vehicle from a stationary position to running [9]. The torque unit is expressed in Nm (Newton meters).

However, many consumers or motorcycle owners do not know how much the engine performance has increased by considering the description above, researchers are interested in making efforts to improve engine performance by increasing the cylinder volume or bore-up and increasing the piston stroke or stroke-up on the Honda Verza motorbike. This study took from journals that had been studied and studied from modification workshops around. Thus, in this study the researcher took the title "The Effect of Stroke Up and Bore Up on the Performance of the Honda Verza Motorcycle". This study aims to determine how much the Honda Verza engine performance has increased by doing bore-up and stroke up.

2 Research Methods

The method used in this study is the experimental method. Experimental research is a type of quantitative research used to determine the causal relationship between one variable and another [10–12]. In this study, the researcher manipulated the independent variable (X).

This research was carried out with the steps Testing carried out in this study was carried out three times on each variation of the motorcycle engine. By using a dynotest tool to determine the torque and power produced by each motorcycle that has been tested.

Modifications were made by increasing the stroke length on the Honda Verza to 70 strokes and the piston diameter to 73.3 mm. Where the initial stroke on the Honda Verza motorbike is 57.8 mm, and the initial diameter is 57.3 mm.

In the process of collecting data, the Honda Verza motorbike used 4 types of engine conditions, ECU remap engines, bore-up engines, stroke-up engines and stroke-up bore-up engines. Bore-up engines with a

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diameter of 73.3 mm and a stroke length of 57.8 mm. Stroke-up engine with a diameter of 57.3 mm and a stroke length of 70 mm. Stroke up – bore up engine with a diameter of 73.3 mm and a stroke length of 73.8 mm.

The research data that has been produced in this study was then processed using descriptive analysis techniques. Descriptive analysis techniques display data in graphs or diagrams with conclusions made according to the graphs that have been displayed.

3 Result and Discussion



Figure 1. Experiment Setting process

Figure 1 is the process for set up the experiment, the maximum torque produced on a motor with an ECU remap engine is produced at 11000 rpm with an average torque value of 13.29 Nm and an average maximum power value produced at 13000 rpm with a value of 23.38 HP. The maximum torque produced increased by 2.09% and the power increased by 4.33%.

Stroke-Up testing was carried out by changing the value of the stroke length to a step of 70 mm. The maximum torque produced on a Honda Verza motorbike with a stroke up engine was produced at 11000 rpm with an average value of 13.58 Nm and an average maximum power value of 22.76 HP. Where the torque value increased by 1.36% and the power increased by 3.16%.

Bore-Up engine testing was carried out at the Barokah Teknik workshop. Changes were made to the piston diameter value to 73.3 mm. The maximum torque produced on a motor with a bore up engine is produced at 10000 rpm with an average result of 14.86 and the maximum power produced at 13000 rpm with an average of 24.65. Where the torque increased by 1.34% and the power increased by 1.39%.

The Stroke-Up Bore-Up engine test was carried out at the Barokah Teknik workshop. Changes were made to the piston diameter value to 73.3 mm and the stroke length to 70 mm.

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Based on the table above, the maximum torque produced on a motor with a stroke up bore up engine is produced at 8000 rpm with an average value of 27.32 Nm and an average value of the maximum power produced of 41.16 HP. Where the torque increased by 0.18% and the power increased by 0.79%.

1. Torque Data Analysis

Torque data analysis aims to facilitate the determination of the effect of the type of Standard Remap ECU engine, Stroke-Up, Bore-Up and Stroke-Up Bore-Up on the torque produced by the Verza 150 motorcycle. From the torque test values that have been obtained, they will then be converted into a graph containing the engine rotation parameters with torque values to make it easy to compare and prove the differences in torque test results on each Standard Remap ECU engine, Stroke-Up, Bore-Up and Stroke-Up and Bore-Up. The following is a comparison graph obtained for each sample:

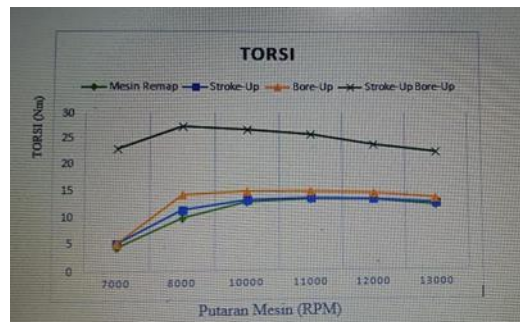


Figure 2. Torque analysis

The image above from figure 2 shows the results of the average torque test of the Verza remap, stroke-up, bore-up and stroke-up bore-up motorcycle engines. Where the remap, engine is represented by the color green, stroke-up blue, bore-up yellow and stroke-up bore-up green.

Testing on the remap ecu engine, the maximum torque produced at rpm 11000 with an average torque value of 13.29 Nm and the minimum value shown at rpm 7000 with an average torque value of 4.29 Nm experienced an increase in torque of 2.09%. The stroke-up engine maximum torque produced at rpm 11000 with an average torque value of 13.58 Nm and a minimum value at rpm 7000 with an average torque value of 5.74 Nm experienced an increase in torque of 1.36%. The maximum torque bore-up engine produced at 10,000 rpm with an average torque value of 14.86 Nm and the minimum value produced at 7,000 rpm with a torque value of 6.34 Nm experienced an increase in torque of 1.34%.

2. Power Data Analysis

The purpose of power data analysis is to make it easier to determine the effect of the oversized engine on the power produced by the Verza motorcycle. From the power test values that have been obtained, they will then be changed into a graph containing engine rotation parameters and power values to make it easy to compare and prove the differences in power test results on each standard ECU remap and oversize engine sample. The following is a comparison graph obtained for each sample:

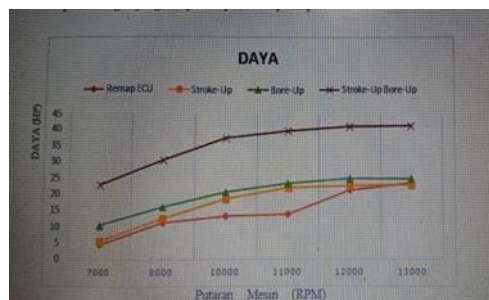


Figure 3. Power analysis

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The figure 3 shows the average results of the power test of the Verza motorcycle engine ECU remap, stroke-up, bore-up and stroke-up bore-up. Where the ECU remap, engine is represented by the color green, stroke-up blue, bore-up yellow and stroke-up bore-up green.

Based on the image above, it shows that the engine with oversize modification can increase the maximum power on the Honda Verza motorcycle. The sample that shows the highest power on the stroke-up bore-up engine with an average power value of 41.16 HP at 13000 rpm.

While at 7000 rpm the lowest average power value is obtained on the ECU remap motorcycle engine with a power value of 3.78 HP. While the bore-up stroke-up engine has a maximum value produced at 8000 rpm with an average torque value of 27.32 Nm and a minimum value at 13000 rpm with a torque value of 22.42 Nm experiencing an increase in torque of 0.18%. The oversized engine will produce a higher torque value. The larger the oversize on the engine, the greater the torque produced. The highest torque value is obtained on the stroke-up bore-up engine type with an average torque value of 27.32 Nm at 8000 rpm. And the lowest torque is produced by the remap engine with an average torque value of 13.29 at 11000 Nm rpm. From the results of the analysis of the torque test value, oversizing the Honda Verza engine can affect the torque value produced.

4 Conclusion

Modification by adding piston diameter (bore up) affects the torque and power values produced by the Honda Verza motorbike. The torque value increased by 1.34% at 10,000 rpm and increased the power value by 1.39% at 13,000 rpm. The addition of piston stroke length (stroke up) affects the power and torque produced by the Honda Verza motorbike. The results obtained from testing the stroke up engine showed an increase in torque value of 1.36% at 11,000 rpm and the power produced increased by 3.16% at 13,000 rpm.

5 Acknowledgement

The author would say thank to Universitas Negeri Semarang for supporting the research.

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