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Effect of pulley primary angle variation and roller 11 grams on 110 cc Scoopy injection engine

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Abstract. Transmission automatic or known as (CVT) is a transmission that makes us feel comfortable because we only need to pull the gas without moving the transmission because the transmission is automatic. Automatic motors not only make driving easier but also facilitate the maintenance of the transmission. However, among racing motorbike lovers, this automatic transmission type motor is lacking in power. So, it needs to be modified to the CVT component to improve the performance of the machine. To improve this performance, we analyze pulley and standard roller manufacturers and primary pulleys with 3 kinds of pulley, namely standard angles of 14^{o}, 13^{o}, 12^{o} and roller 11 gram variations to determine the comparison of Performa (horse power and torque). To find out the comparison of the test, we do the test using the Dyno test. From the test results, 13^{o} pulley and 11 gram roller have increased significantly compared to standard 14^{o} and 13 gram roller standard pulleys. This can be seen from the results of an increase in horse power and torque when using pulley 13^{o} and 11 grams roller can be obtained on the highest horse power (Hp) at 3246 rpm, which is the highest 9.0 hp and torque (Nm) at the engine speed 2087 rpm which is 22.16 Nm. While the standard pulley of the factory is 14^{o} and the standard 13 grams roller can be seen the highest horse power (Hp) at 3923 rpm round, which is 7.8 Hp and the highest Torque (Nm) at 2972 rpm engine speed which is 16.99 Nm. then from the results of this test analysis has increased horse power 1.2 hp and torque of 5.17 Nm.

1. The first section in your paper

Motor cycle modification often been done, both of motorcycle and car. This modification have specific purpose to increase engine performance [1]. The modification include CAT, body kit, and engine modification [2]. For racing contest, modification of engine is needed to increase engine power [3], effectivity of fuel consumption [4], engine acceleration [5-7]. Automatic transmission widely used to the motor engine vehicle, because of massive growth of technology to engine transmission. Now the performance of automatic transmission needed to be developed.

Continous Variabel Transmision (CVT) is a transmission to move the level without requiring manual control, but the transmission moves automatically [8,9]. The automatic transmission motor has the advantage of being easy in operation and easy to maintain the transmission [2]. The weakness of the automatic transmission is that the power produced is lower than the manual transmission [10]. Modifications to CVT components are needed to improve the performance of the automatic transmission engine [11,12].

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Primary pulley is a CVT component that blends with the crankshaft. Primary pulley works due to the rotation of the engine through the crankshaft [13]. When the engine speed increases, the weight roller will be pressed upwards by the slide piece located on the ramp plate. As a result of the centrifugal force, the weight roller will press the movable drive face, so that the gap of the two pulleys narrows [14]. This results in changes in the diameter of the belt drive.

One way to increase pulley torque forces can be done by changing the tilt angle of the primary pulley on the CVT component [15]. The standard slope of the primary pulley is 14 degrees according to industry standards, and is still possible to be modified to get better performance.

Figure 1. Primary pulley.

The Working Principle of the Primary Pulley as:

a. Primary pulley serves to regulate the speed of a motorcycle based on the centrifugal force of the roller.
b. Drive belt component
   - The outer wall of the driving pulley and cooling fan is a fixed moving pulley component, in addition to functioning as a ratio comparison magnifier, on the edge of this component there is a cooling fan that functions as a CVT space cooler so that the belt does not heat quickly and wear out.
   - The inner wall of the driving pulley is a pulley component that pressing CVT to get the desired speed.
   - Bushing / boosh is a wall shaft in the pulley so that the inner wall can move smoothly when moving sliding.
   - 6 centrifugal (roller) bullets are gravity balance pads to press against the inner wall of the primary pulley when high rotation occurs.

The working principle of the roller is that the heavier the roller is, the faster it moves, pushing the movable drive phase on the drive pulley so that it can press the belt to the smallest position, but the belt can be pressed down to the maximum need for a roller that weighs [16]. The new matic motorcycle can run if the engine speed reaches 2400 rpm, whereas conventional motorbikes already can run above 1500 rpm" [17].

2. Method

The working principle of the roller is that the heavier the roller is, the faster it moves, pushing the movable drive phase on the drive pulley so that it can press the belt to the smallest position, but the belt can be pressed down to the maximum need for a roller that weighs [5]. the Matic motorbikes can run well if the engine speed reaches 2400 rpm, while conventional motorcycles can run at a lower speed of 1500 rpm. This study used an engine of 110 cc standard injection scoopy motorcycle in 2015. In this study the motor components to be tested were three pulley variations, namely 14o, 13o, 12o, and 11 gram rollers. The modification of the pulley tilt angle aims to obtain the characteristics of the torque produced [18]. The modifications show at figure 2.

The test was done using a dyno test equipment in the RAT Motorsport workshop. Dyno Test Machine is a device that measures Horse power (Hp) and Torque (Nm) which is used to measure the speed produced by the engine.

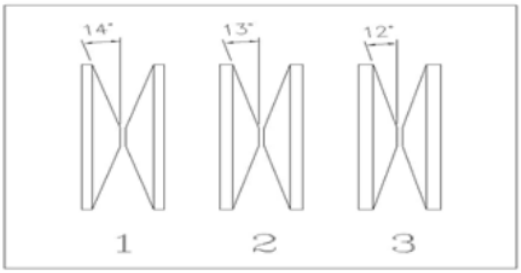


Figure 2. Design of pulley modification angle.

Torque

$$T = \frac{5250.HP}{n} \quad (1)$$

Maximum velocity

$$v = \frac{s}{T} \quad (2)$$

After the motor was installed with the dyno test the data collection testing process began with the order of testing the standard manufacturer's pulley and standard roller first followed by the standard pulley manufacturer 14° then pulley 13°, 12° and each using a roller 11grams. Before the testing process begins, it is checked again on the safety and cable - the cable that is attached to the motor is functioning properly to reduce errors when retrieving data. This test aims to determine the amount of horse power (Hp) and torque (Nm) obtained on each primary pulley.

3. Result and discussion

The test conducted aims to determine the magnitude of power or torque obtained in the test results on each primary pulley. The experiment was conducted by comparing between standard pulleys, modified primary pulleys and which industrial standard pulleys had better results. Pulley variations were analyzed for the level of influence on the increase in horse power and increase in torque.

- The factory/industrial standard pulley has an angle of 140 compared to a standard pulley with a 13 grams roller
- Factory/industrial standard pulley has an angle of 140 compared to a standard pulley with an 11 grams roller
- Factory/industrial standard pulley with 130 angles compared to standard pulley with 13 grams roller
- Factory/industrial standard pulley with 130 angles compared to standard pulley with 11 grams roller

The test results using a dyno test tool of 14o standard pulley and 13 grams standard roller in figure 3. In testing A dyno test machine, the highest horse power (Hp) was obtained at 3452 rpm, which was 7.6 Hp and Torque (Nm), the highest at 2683 Rpm engine speed of 18.15 Nm. The graph 3 in is A test data on standard pulleys and standard roller manufacturers.

From the testing table using standard 14o pulley and 11gram roller on the B test on the dyno test engine above, we can see the highest horse power (Hp) on the 3148 Rpm rotation which is 8.4 hp and torque (Nm) the highest at 2129 Rpm engine speed which is 21.71 Nm.

The test results using a dyno test tool on 13o pulley and 11 gram roller can be seen in figure 5.

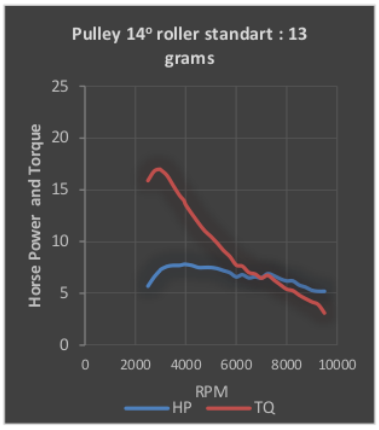


Figure 3. Pulley 14^0 roller standard 13 grams

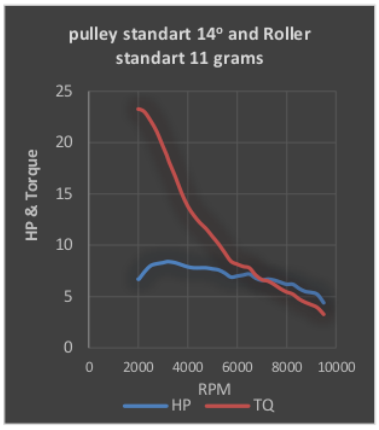


Figure 4. Pulley 14^0 roller standard 11

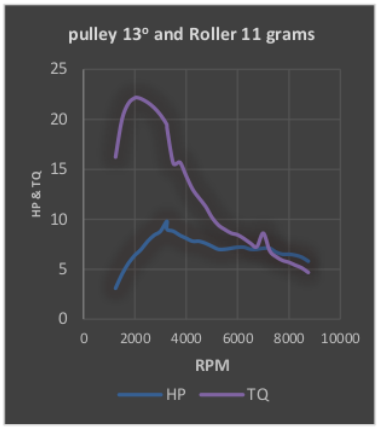


Figure 5. Pulley 13^0 roller standard 11 grams

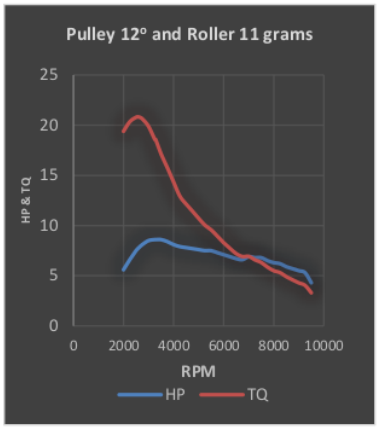


Figure 6. Pulley 12^0 roller standard 11 grams

From the results of research and analysis in general it can be concluded that the value of increasing horse power and torque, then sorted from standard pulley testing and modification as follows:

From the results of processing 14° standard Pulley testing data and a 13 grams standard roller obtained that the highest horse power is 7.8 hp at 3923 rpm and the highest torque is 18.15 Nm at 2683 rpm, this data is a comparison of testing from other pulley test data.

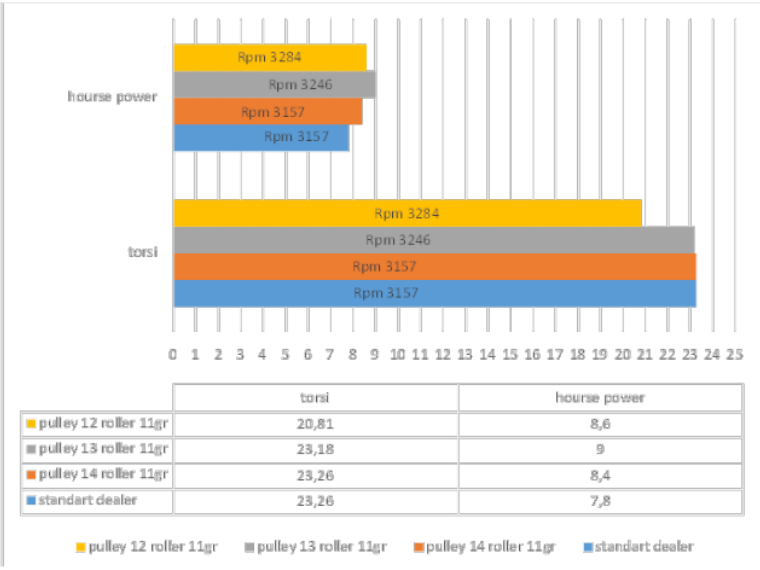
Standard 14° Pulley testing and 11 grams roller obtained that the highest horse power is 8.4 hp at 3157 rpm and the highest torque is 23.26 Nm at 2616 rpm rotation. Data on standard 14° pulley test and 11 grams roller have increased horse power and torque compared to 14° standard manufacturer pulley and 13 grams standard roller.

Data for testing 13° pulley and 11 grams roller obtained that the highest horse power is 9.0 hp at 3246 Rpm and the highest torque is 22.18 Nm at 2087 rpamm rotation, Data on standard 13° pulley testing

and 11 grams roller have increased horse power and higher torque compared with standard pulley testing and another pulley.

Data testing of 12 grams 12° roller pulley obtained that the highest horse power is 8.6 hp at 3284 rpm and the highest torque is 20.81 Nm at 2616 Rpm rotation, Data on standard pulley testing 12° and 11 grams roller has increased horse power and torque compared to standard 14° pulley and 13 grams standard roller.

13° pulley and 11 grams roller have increased significantly compared to 14° standard manufacturer pulley and 13 grams roller. This can be seen from the comparison of the increase in horse power and torque when using a 13o and 11 grams pulley obtained in the highest horse power (Hp) at 3246 Rpm rotation which is 9.0 hp and torque (N * m) highest at engine speed 2087 rpm, which is 22.16 N * m. Whereas the 14° standard factory pulley and 13grams standard roller can be seen from the highest horse power (Hp) at 3923 Rpm rotation which is 7.8 hp and torque (N * m) the highest at 2972 Rpm engine speed, which is 16.99 N * m. The results of the analysis of this test experienced a horse power increase of 1.2 Hp and torque of 5.17 N * m, then from the results of the analysis this test has a horse power increase of 1.2 Hp and torque of 5.17 N * m.



	torsi	hourse power
pulley 12 roller 11gr	20,81	8,6
pulley 13 roller 11gr	23,18	9
pulley 14 roller 11gr	23,26	8,4
standart dealer	23,26	7,8

Figure 7. Torque and horsepower comparative graphics.

4. Conclusion

The test results with dyno test and data analysis can be concluded that the increase in horse power (Hp) and torque value (N * m) are sorted from the largest and smallest increase in value of the test on each of the tested materials or components obtained valid data that shows improvement. The highest horse power and torque increase at Rp. 2000 - 4000 can be tested when using 13° pulley and 11 gram roller, Horse power and lowest torque can be obtained at 14° standard factory pulley testing and 13 gram roller.

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References

[1] J E Smith, P Igniter, V Mucino and G J Thompson 1999 *Acceleration Simulation of a Vehicle with a Continuously Variable Power Split Transmission*.
[2] K Asano 2004 Koyo's Approach to Continuously Variable Transmissions (CVT) for Automobiles. *Koyo Eng J English* **164**(5) 14–8.
[3] N H Sari 2018 Pengaruh Daya Motor Bensin Terhadap Kapasitas Produksi Mesin Pemipil Jagung *REM (Rekayasa Energi Manufaktur) J*. **3**(2) 79–83.
[4] D Yuliyanto and E Widodo 2018 Pengaruh Jenis Bahan Bakar Terhadap Viskositas dan TBN Pelumas SAE10W-30 pada Motor Bakar 125cc. *REM (Rekayasa Energi Manufaktur) J*. **3**(1) 1–5.
[5] B K Van, T Fujii, T Hofman and M Steinbuch 2011 Belt-Pulley Friction Estimation for the Continuously Variable Transmission. *In: 2011 50th IEEE Conference on Decision and Control and European Control Conference (CDC-ECC) Orlando* Orlando, FL, USA 6672–7.
[6] G Carbone, L Mangialardi and G Mantriota 2003 EHL visco-plastic friction model in CVT shifting behaviour **1**.
[7] A Rahman, S S Bin, A Hossain, A K M Mohiuddin, A H M Z Alam 2012 *Kinematics and nonlinear control of an electromagnetic actuated CVT system for passenger vehicle* **26**(7) 2189–90.
[8] V Seelan 2015 Analysis, Design and Application of Continuously Variable Transmission (CVT) Vishnu Seelan. *Int J Eng Res Appl* **5** (3) 99–105.
[9] S Nomura, K Okubo and T Fujii 2018 Shifting Speed and Belt Behavior of Model CVT (Continuously Variable Transmission) with Push and Pull Type V-belt Driven on Semi-Transparent Pulleys. *In: Proceedings ofthe 4th International Conference on Vehicle Technology and Intelligent Transport Systems (VEHITS 2018). SCITEPRESS – Science and Technology Publications, Lda. All rights reserved* 474–80.
[10] L L L He and L Y Y 2013 Nonlinear sliding mode control of switched systems on continuously variable transmission shifting Nonlinear sliding mode control of switched shifting. *Int J Veh* **62**(5) 289–311.
[11] G Mantriota 2014 *Fuel consumption of a vehicle with power split CVT system Fuel consumption of a vehicle with power split CVT system*.
[12] B M P D P S Trivedi 2018 Increase performance of all-terrain vehicle by tuning of various components. *Int J Appl Eng Res* **13**(8) 76–80.
[13] R S Kulkarani 2018 Performance Studies Of Custom Continuously Variable Transmission For All- *Terrain Vehicle Applications* **13**(6) 1651–64.
[14] H R Patil, P N I Jamadar 2018 *Planetary Ball Continuously Variable Transmission System* 1626–30.
[15] B T M Engineering and M Engineering 2015 Analysis , Design and Application of Continuously Variable Transmission (CVT) Vishnu Seelan. *Int J Eng Res Appl* **5**(3) 99–105.
[16] K M C Dantas, E P Machado, W L A Neves, L C A Fonseca, Recursive Digital Filters Design to Compensate CVT Frequency Response : An Application for Transmission Line Controlled Switching. *In: International Conference on Power Systems Transients. Cavtat, Croatia* 1–6.
[17] B Trivedi 2018 Increase performance of all-terrain vehicle by tuning of various components. *Int J Appl Eng Res* **13**(8) 76–80.
[18] V Wicke, C J Brace, M Deacon and N D Vaughan 2016 Preliminary Results from Driveability Investigations of Vehicles with Continuously Variable Transmissions. Marie Curie Res Fellow (TMR Progr Eur Comm).

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