

# Analysis of *Groundstrap* Installation on Fuel Consumption Efficiency and Exhaust Gas Emissions on Motorcycles

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## Keywords

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## Abstract

Efforts to improve performance on the system ignition motorbike already Lots done, one of them Can done with installation *Groundstrap* on cable spark plug For as cable *grounding* spark plugs for voltage fire from coil will focus going to spark plugs. Research This use method study descriptive For know difference use *Groundstrap* ( *Groundstrap* Aluminum and Copper ) against characteristics voltage cable spark plug. Testing done as much as three trials, 4000 Rpm, 6000 Rpm, and 8000 Rpm. Data analysis techniques using descriptive statistics For knowing the average and percentage the changes. Based on results analysis of research data that has been discussed in the section previously, can withdrawn conclusion with use *Groundstrap* Copper capable reducing CO exhaust gas by -3.58% reduction. while *Groundstrap* Aluminum experience increase in CO exhaust gas by 4.48 %. Likewise with HC exhaust gas, *Groundstrap* Copper capable reducing HC exhaust gas by -4.63 %. While *Groundstrap* Aluminum experience increase in HC exhaust gas by 6.66%. So it can be concluded the more the good thing is system ignition on a vehicle so will the more low exhaust emissions released. On consumption material burn *Groundstrap* Copper capable lower consumption material fuel consumption on motorbikes decreased by -6.1%. Meanwhile, *Groundstrap* Aluminum consumption material burn become increase by 1.53%.

## 1. Introduction

Vehicle motorcycle system ignition required high voltage for can create spark flower strong fire on the spark plug (Kurniawan, 2022). As explained that, voltage the electricity required must enough strong, so that can to awaken flower strong fire between gap electrode spark plugs. Because voltage big electricity said, when pass cable spark plug the direction leaning out and not everything is focused going to spark plug (Jama, 2020). At the time flow electricity through cable spark plug, occurs Medan electromagnetic which will result in damage spark flower fire at the end electrode spark plug in the form of the decline peak burning (Bernawati, 2019). One of the method overcome problem the is with stabilize current electricity generated by the coil with method use ignition booster. There is various type type Ignition Booster is one of them is groundstrap (Khabiburrahman, 2022).

In general physique difference between magnetic ring and groundstrap is this magnetic ring is a permanent magnet whereas groundstrap is innovation that adopts making electric magnets or electromagnet. Difference that's it become profit from groundstrap, namely the magnitude magnetism can changed with various way, for example with variation ingredients and quantity the coil that will made into coil electromagnet, so that automatic will increase motor performance (Multazam, 2019). With installation groundstrap quality spark flower fire will the more increases, and the current flowing electricity from coil going to spark plug will more focus to spark plugs. So that spark plug will produce a flame sharp blue and focused on the spark plug. From the results treatment this will influence work more burning Good (Varis Dwi Isnanto, 2023).

Groundstrap is a type of Ignition booster, the function of which is stabilize current electricity generated coil so that spark spark plug can more big and stable (Syah, 2022). Function from groundstrap almost The same with function magnetic ring that is stabilize current electricity generated by the coil system ignition motorbike, throw away wild frequency or voltage not of course from coil, focusing and

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narrowing current, so that become point shoot going to to spark plug for used as fire combustion. Stable current produce good fire, so that explosion burning become perfect and almost no there is molecule wasted gasoline useless. Combustion chamber become clean and the piston works light (Bloom & Reenen, 2019). Consumption material burn is the amount material fuel used during the burning process in progress (Andeka, Martias, 2019). Another opinion was expressed (Khairi, 2019).

State consumption material burn is number show how many lots kilometers that can be covered by a motorbike with one liter gasoline. Exhaust emissions is a gas product from the combustion process in the a machine that is poisonous and very dangerous, namely consists of from exhaust emissions Hydrocarbons (HC ) and Carbon monoxide (CO), as well as other pollutants. Exhaust emissions measured with take notes How many percent (%) of CO and HC (ppm) produced in 4- stroke motorbikes (Jayanti & Hakam, 2020). Testing each and every sample previously has been carried out by (Chomphan, 2019). With round machine namely 4000 rpm, 6000 rpm and, 8000 rpm. Winding wire copper and aluminum with 100 turns.

## 2. Method

This Study Uses Descriptive Statistical Data Analysis Techniques To Determine The Average Value And Percentage Of Change. The Study Was Conducted To Determine The Effects Of A Treatment Given Intentionally By The Researcher (Ilmy & Sutantra, 2018). The Experimental Research Method Is A Way To Find A Causal Relationship (Causal Relationship) Between Two Factors That Are Intentionally Caused By Researchers By Eliminating Or Reducing Or Setting Aside Other Interfering Factors (Arikunto, 2006). The Study Was Conducted By Changing The Standard Components Into Modified Components So That The Resulting Research Data Can Be Known. Changes Were Made To Important Components, Namely The Coil And Groundstrap. Research object *groundstrap* on cable spark plug Yamaha Jupiter Z FI 2022 motorbike which will be will given treatment in the form of installation with variation materials. The data to be taken is characteristics voltage cable after use *Groundstrap*. Study This use study descriptive, stating that Study descriptive is a form research that aims For describe existing phenomena, both phenomenon natural and also phenomenon artificial human. Phenomenon That can in the form of form, activity, change, characteristics, relationships, similarities, and differences between one phenomenon with phenomenon other (Titting, 2019).



**Figure 1.** *Groundstrap*

Testing each and every sample done with round machine namely 4000 rpm, 6000 rpm and, 8000 rpm with wire coil Copper and Aluminum with 100 turns. Testing done with use Fourgas test equipment The analyzer was carried out by the Mechanical Engineering Laboratory, Malang. Data Analysis Techniques Analyzing data in study This is with use calculation mean or average statistics. The formula used is as following :

$$\bar{X} = \frac{\sum X}{n}$$

The data analyzed with statistics descriptive use formula calculation percentage. Percentage aiming For get description or find something as existence about object of study. Formula :

$$P = \frac{n - N}{N} \times 100\%$$

### 3. Result and Discussion

**Table 1.** Fuel Consumption and Exhaust Emissions

Standard coil			Groundstrap Copper				Groundstrap Aluminum		
Round machine (RPM)	Contents gas emissions throw away		Consumpti on Fuel	Contents gas emissions throw away		Consumptio n material burn	Contents Exhaust emissions		Consumptio n material burn
	CO	HC		CO	HC		CO	HC	
4000	3.17	154	7.9	3.08	140	7.5	3.32	172	8.2
6000	3.42	95	11.8	3.31	95	10.7	3.58	102	11.2
8000	4.68	104	15.3	4.46	97	14.7	14.2	105	16.2

Based on the table and figure above can seen that use cable spark plug standard, *groundstrap* Copper and *groundstrap* Aluminum own results level different exhaust emissions, with use *Groundstrap* Copper can seen own level more exhaust emissions (HC). small compared to with cable spark plug standard. After done study got the results show there is influence use *groundstrap* to level exhaust emissions. In overall results study show that the occurrence good change with use *groundstrap* Copper If compared to with cable spark plug standard. For know how much big influence use *Groundstrap* Copper to level exhaust emissions can seen in the table and figure following This.

**Table 2.** Percentage of exhaust gas emission levels *Groundstrap* Copper from standard

Change from Standard			
Round Machine (Rpm)	Gas Emissions Throw away	Difference	Percentage (%)
4000	CO %	0.09	- 2.83
	HC ppm	14	-9.09
6000	CO %	0.11	-3.21
	HC %	0	0
8000	CO %	0.22	-4.7
	HC PPM	5	- 4.80

Whereas results study show the occurrence change not enough Good with use *groundstrap* Aluminum If compared to with cable spark plug standard. For know how much big influence use *groundstrap* Aluminum to level exhaust emissions can seen in the table and figure following This

**Table 3.** Percentage Analysis of Exhaust Gas Emission Levels *Groundstrap* Aluminum from Standard

Change from Standard			
Round Machine (Rpm)	Gas Emissions Throw away	Difference	Percentage (%)
4000	CO %	- 0.15	4.73
	HC ppm	- 14	11.68
6000	CO %	- 0.16	4.67
	HC %	-7	7.36

8000	CO %	- 0.24	5.12
	HC PPM	-1	0.96

**Table 4.** Percentage Analysis consumption material burn *Groundstrap* Copper from standard

Change from Standard		
Round Engine (Rpm)	Exhaust Gas Emissions	Difference
4000	0.4 ml	- 5.06%
6000	1.1 ml	- 9.32%
8000	0.6 ml	- 3.92%

In general overall results study show that the occurrence increase in consumption of materials burn with use *groundstrap* Aluminum If compared to with cable spark plug standard. For know how much big influence use *Groundstrap* Aluminum to consumption material burn can seen in the table and figure following.

**Table 5.** Percentage consumption material burn *Groundstrap* Aluminum from standard

Change from Standard		
Round Engine (Rpm)	Exhaust Gas Emissions	Difference
4000	0.4 ml	- 5.06%
6000	1.1 ml	- 9.32%
8000	0.6 ml	- 3.92%

#### 4. Conclusion

Copper *Groundstrap* can better ground the spark plug wire compared to Aluminum *Groundstrap*, this is because it is influenced by the resistance value or resistance of an electrical conductor used. Here the Copper *Groundstrap* has a smaller resistance and resistance value than Aluminum. So that it makes fuel consumption slightly higher than the standard.

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