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CENTER OF MASS (CENTROID) ANALYSIS ON ATV (ALL TERRAIN VEHICLE) TYPE ROKETS WIMCYCLE 110 CC

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Abstract

In an ATV (All Terrain Vehicle) vehicle, the center of gravity is the point at which the vehicle will be in equilibrium. When the vehicle experiences translational and rotational motion at the same time, then at that time The center of gravity will act as the axis of rotation and the trajectory of motion, from the center of gravity This describes the trajectory of the translational motion.

The center of gravity is a point of perfect balance or a center distribution of weight. At this point the gravitational force acts, for objects that are have any shape location center of gravity is searched by calculations, calculations are based on the assumption that we can take some points of the object you want to calculate the center of gravity multiplied by the weight at each point then add up and divide by the total weight at each point. It is said that the center of gravity is also the center of mass near the earth's surface, but for a certain height above the earth center of gravity and center of gravity must be distinguished.

The distance from the center of mass when viewed from the side view is 0.42 m from the front axle and 0.48 m from the rear axle. The center of mass distance from the rear view is 0.35 m from the right wheel axis and 0.35 m from the left wheel. The height of the center of mass from the axis of the wheel axle is 0,39 m.

Keywords: *ATV, Vehicle, Center of Gravity*

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Introduction

Rapid technological developments encourage humans to always studying science and technology (Daryanto, 1999:1). ATV (All Terrain Vehicle) as well as cars and other power planes that are requires balance to move against the frictional resistance of the tire, uneven road surface and other obstacles so that allows a motor that we drive to move and drive on the road well and comfortable to use by the driver.

In an ATV (All Terrain Vehicle) vehicle, the center of gravity is the point at which the vehicle will be in equilibrium. When the vehicle experiences translational and rotational motion at the same time, then at that time The center of gravity will act as the axis of rotation and the trajectory of motion, from the center of gravity This describes the trajectory of the translational motion.

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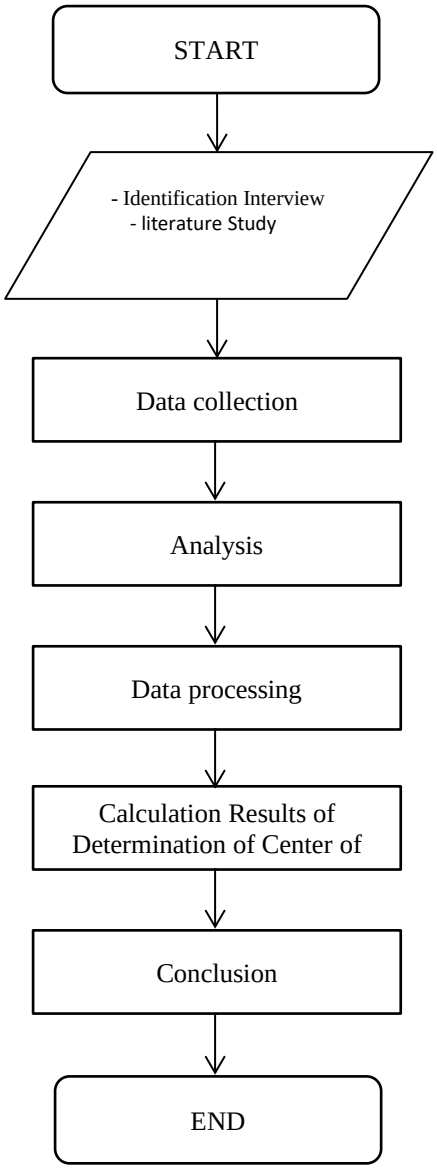
Research methods

Research flow chart



ATV Analysis Process (All Terrain Vehicle)

Before starting the object analysis process, it must be prepared in advance, both measuring devices and supporting elements such as scales to determine the weight of the object to be analyzed. Make sure that the measurement data results are obtained with certainty so that there are no calculation errors for the process of placing the center of mass..

After preparations have been made, the ATV (All Terrain Vehicle) machine object is ready to be calculated with the data that has been obtained. Then record the results that come out as data to get conclusions. Making conclusions based on the results of measurements that have been carried out.

Results and Discussion

- Center of Mass Analysis

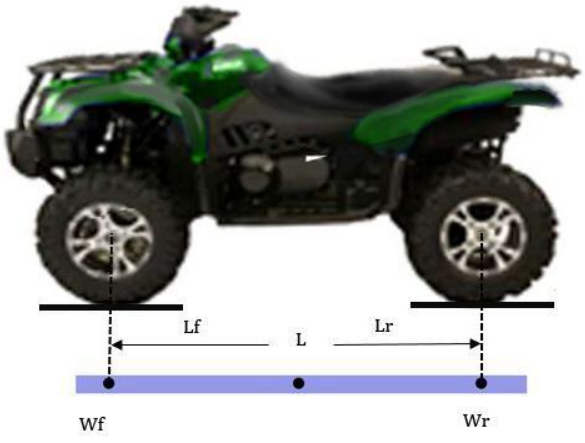


Figure 1 Weighing the front and rear axle axle view Side

Front wheel mass (Wf) : 52 Kg
Rear wheel mass (Wr) : 46 Kg
Total mass weight (Wt) : 98 Kg
Distance between the two front and rear axles (L) : 90 cm

- - Distance from the center of mass to the front axle side view

$$Lf = \frac{Wr \,.L}{Wt}$$

Where,
Lf : Distance from center point of front wheel axle
Wr : Rear axle mass
L : Wheelbase
Wt : Total Mass Weight

$$Lf = \frac{Wr \,.L}{Wt}$$

$$= \frac{46 \,.\, 90}{98}$$

$$= \frac{4140}{98}$$

$$= 42{,}24 \text{ cm} = 0{,}42 \text{ m}$$

the distance from the front axle to the center of mass of the side view is 42,25 cm = 0,42 m

$$Lr = \frac{Wf \,.\, L}{Wt}$$

- The distance from the center of mass to the rear axle is shown side
  Lr : The distance from the center of mass to the rear axle is shown side
  Wf : Front axle mass
  L : Wheelbase
  Wt : Total Mass Weight

$$Lr = \frac{Wf \,.\, L}{Wt}$$
$$= \frac{52 \,.\, 90}{98}$$
$$= \frac{4680}{98}$$
$$= 47{,}75 \text{ cm} = 0{,}48 \text{ m}$$

So the distance from the rear axle to the center of mass of the side view is 47.75 cm = 0.48 m

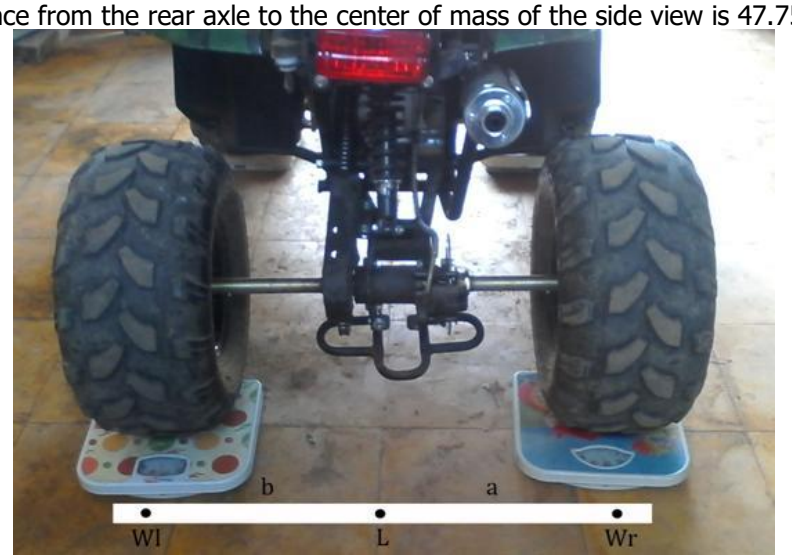


Figure 2 Weighing the front and rear axle rear view

Where,
Wr : rear right wheel mass weight + front wheel mass weight
Wl : rear left wheel mass + front wheel mass weight
a : Distance from center of mass to right wheel axis
b : Distance from center of mass to left wheel axis
L : Distance between the two axles right and left
Wt = Wr + Wl ; total mass weight

Known:
Rear right wheel mass weight + front wheel mass weight (Wr) : 49 Kg
The mass of the left rear wheel + the mass of the front wheel (Wl) : 49 Kg
Total mass weight: 98 Kg
Distance between the two axles right and left (L) : 70 cm

$$a = \frac{Wl \cdot L}{Wt}$$

$$= \frac{49 \cdot 70}{98}$$

$$= \frac{3430}{98}$$

$$= 35 \text{ cm} = 0{,}35 \text{ m}$$

- Distance from center of mass to right wheel axis rear view
  distance from the axis of the right wheel to the center of mass of the rear view is 35 cm = 0.35 m

$$b = \frac{Wr \cdot L}{Wt}$$

$$= \frac{49 \cdot 70}{98}$$

$$= \frac{3430}{98}$$

$$= 35 \text{ cm} = 0{,}35 \text{ m}$$

Distance from center of mass to left wheel axis rear view
distance from the left wheel axis to the center of mass of the rear view is 35 cm = 0,35 m

- To find the height of the center of mass

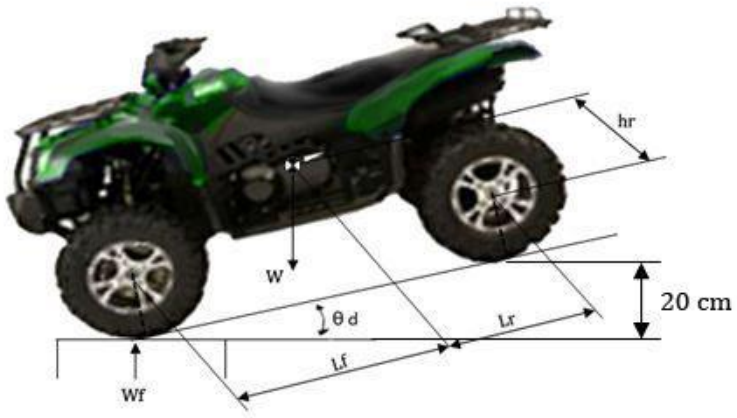


Figure 3 Weighing front and rear wheels jacked upDimana :

Wf : Front wheel mass
W : Total weight of the vehicle
Lf : Distance from center point to front wheel axle
Lr : Distance from center point to rear axle
Hr : Height of center of mass from rear axle axis

data obtained after the rear axle is jacked up is:
Front wheel mass (Wf) : 56 Kg
Rear wheel mass (Wr): 42 Kg
Total mass weight (W) : 98 Kg
Distance from center point to front wheel axle (Lf): 42,25 cm = 0,42 m

Distance from center point to rear axle (Lr) : 47,75 cm = 0,48 m
Distance between the two front and rear axles (L) : 90 cm
find the height of the center of mass use the formula:

$$h_r = \frac{Wf\ (Lf+Lr) - Wr}{W\ tan\ \theta}$$

$$h_r = \frac{56\ (0{,}42+0{,}48) - 42}{98\ x\ 0{,}22}$$

$$h_r = \frac{56\ (0{,}9) - 42}{98\ x\ 0{,}22}$$

$$h_r = \frac{50{,}4 - 42}{98\ x\ 0{,}22}$$

$$h_r = \frac{8{,}4}{21{,}56}$$

$$h_r = 0{,}39\ \text{m}$$

height of the center of mass of the wheel axle is 0,39 m
- Top view center point distance measurement

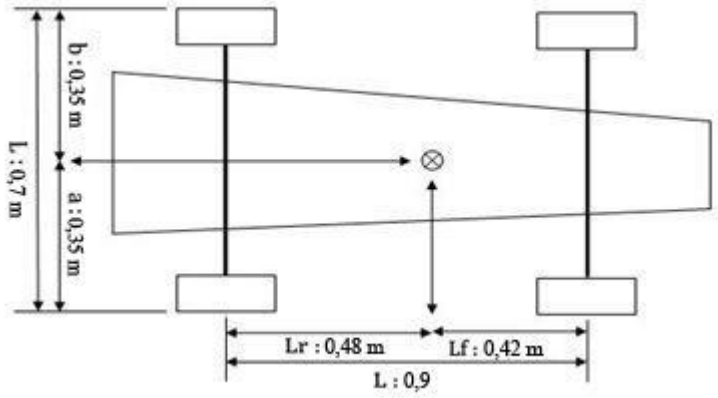


Figure 4 Measuring center point distance above view

Side view of the center-of-mass distance measure

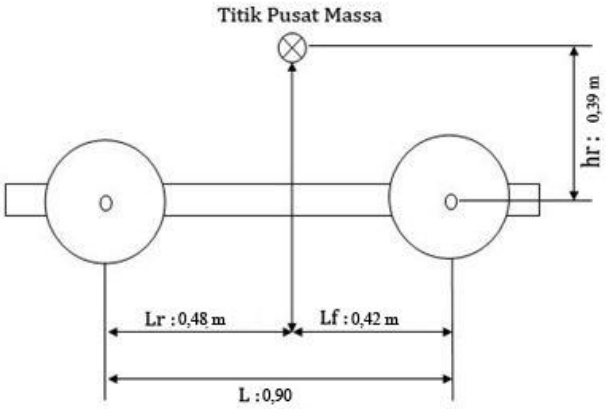


Figure 5 Measures the distance from the center of mass side view

Conclusion

The conclusion obtained from the analysis of the center of mass on the ATV (All Terrain Vehicle) Type Rockets Wimcycle 110 cc is :

1. The distance from the center of mass when viewed from the side view is 0.42 m from the front axle and 0.48 m from the rear axle.
2. The center of mass distance from the rear view is 0.35 m from the right wheel axis and 0.35 m from the left wheel.
3. The height of the center of mass from the axis of the wheel axle is 0,39 m

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