Drive cycle analysis

The drive cycle (velocity vs time) was obtained on Activa 6G. The drive cycle obtained is to be studied and relevant parameters for alternate electric vehicle option are to be evaluated.

First of all, the input data in arranged in excel sheet with velocity in kmph.

The vehicle data which will be used in further evaluation is tabulated here.

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| --- | --- | --- |
| Sr No | Parameter | Value |
| 1 | Total mass (Mass of vehicle + mass of rider) | 185 |
| 2 | Coefficient of rolling resistance (fr) | 0.004 |
| 3 | Air density (rho) | 9.81 |
| 4 | Aerodynamic drag coefficient of Vehicle (Cd) | 0.6 |
| 5 | Frontal area of vehicle | 0.8 |
| 6 | Road angle, alpha (degree) | 0 |
| 7 | Radius of wheel, r ( in m ) | 0.217 |
| 8 | Gear ratio | 1 |
| 9 | Transmission efficiency | 0.93 |
|  |  |  |

The longitudinal forces to be considered are:

1. Force due to rolling resistance, Fr

Fr = fr \* m \* g \* cos(alpha)

= 7.2594 N

1. Force due to Aerodynamic Drag, Fd

Fd = 0.5 \* rho \* Af \* Cd \* V^2

1. Force due to Grading Resistance, Fg

Fg = m \* g \* sin(alpha)

1. Force due to acceleration, Fa

Fa = m \* a

From this at each point the maximum value of force required is estimated and from the speed of vehicle we get the RPM of the wheel. Assuming gear ratio and from the torque obtained from the Total force we get the power required at each point of time.