EV Remote Internship
Project Report

Created by

Bharath, **Simulation Engineer**

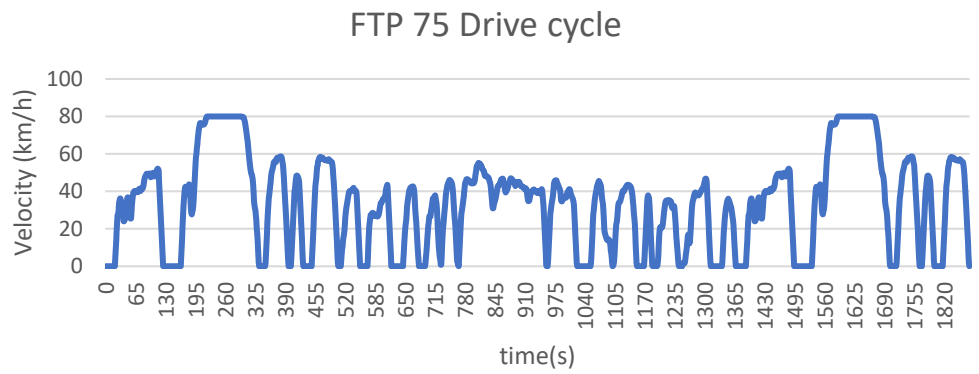
Project Name

Ather Energy 450

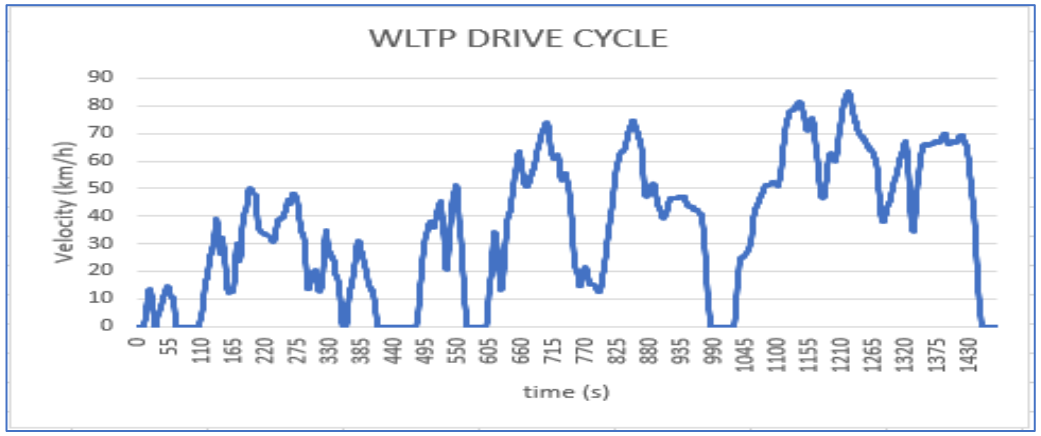
Case Studies: FTP-75/MENDC/WLTP Drive Cycle

Drive Cycles

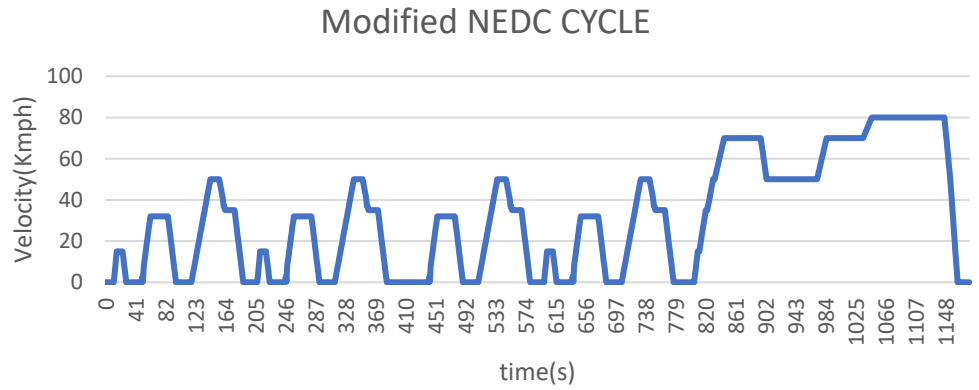
FTP-75 Drive Cycle



WLTP Drive Cycle



NEDC Drive Cycle



This Simulation was performed with respect to drive cycle Distance

- FTP-75 = 17.5 km
- MNEDC = 10.274 km
- WLTP = 14.664 km

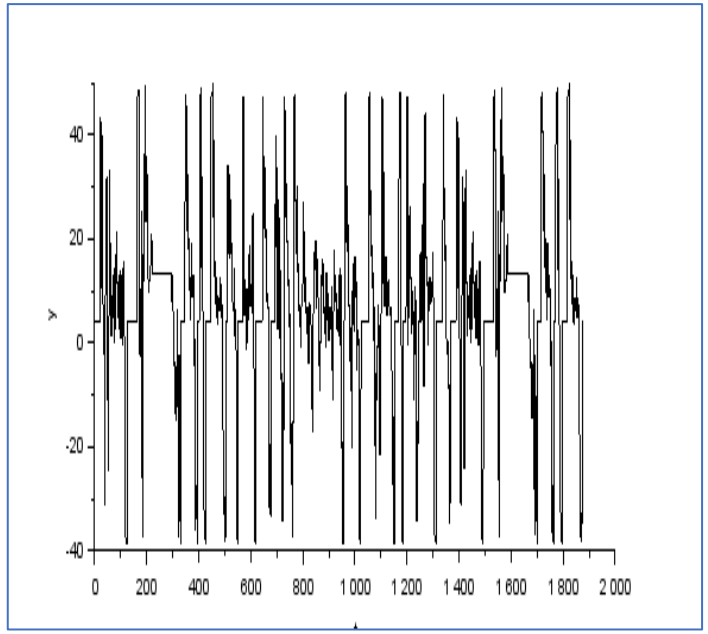
Model Inputs

Sl No	Parameter	Value	Units
1	**A. Chassis**		
2	• Coefficient of rolling resistance	0.015	
3	• Mass of Vehicle	111	Kg
4	• Mass of Driver	80	Kg
5	• Gravity constant	9.81	m/s
6	• Grade Angle	0	degree
7	• Velocity	From the FTP Drive Cycle data	Kmph
8	• Area	0.875	m^2
9	• Air Density	1.225	Kg/m^3
10	• Drag Coefficient	0.22	
11	• Radius of wheel	0.1524	m
12	**A. Transmission**		
13	• Gear Ratio	7.8	
14	• Transmission Efficiency	85	%
15	**A. Motor**		
16	Motor Efficiency	90	%

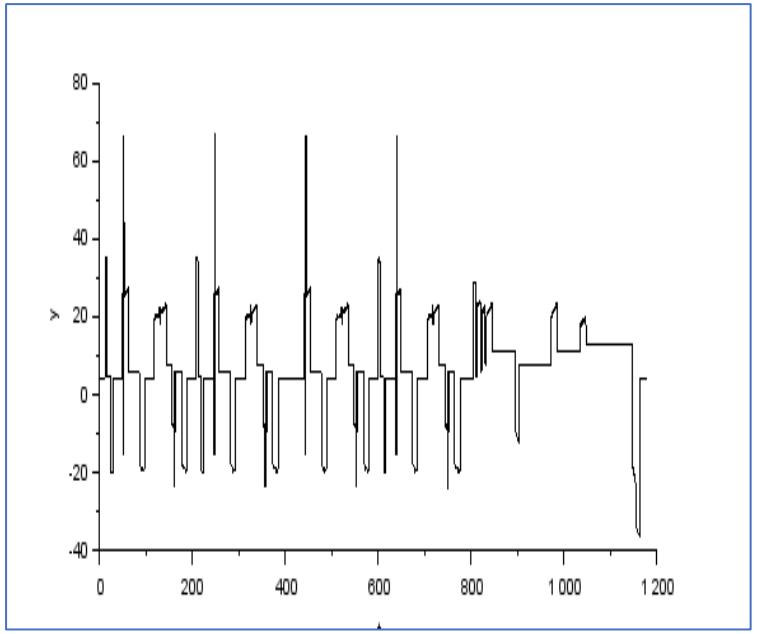
Sl No	Parameter	Value	Units
17	**A. Battery**		
18	• Motor Controller Efficiency	85	%
19	• Battery Capacity	2400	Wh
20	• Battery Voltage	51.1	V
21	• FTP drive cycle distance	17.5	Km
22	• Battery Initial SOC	100	%
23	• Drive Cycle time or Simulation time	1875	s
24	**A. Cell**		
25	• Cell Voltage	3.6	V
26	• Cell Capacity	2.7	Ah

Wheel Torque for different Drive Cycles

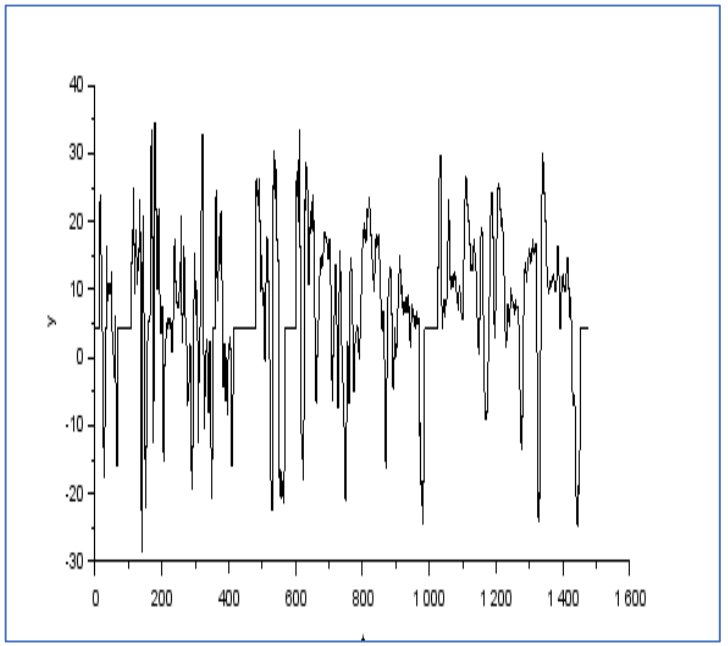
FTP-75 Drive Cycle



MNEDC Drive Cycle



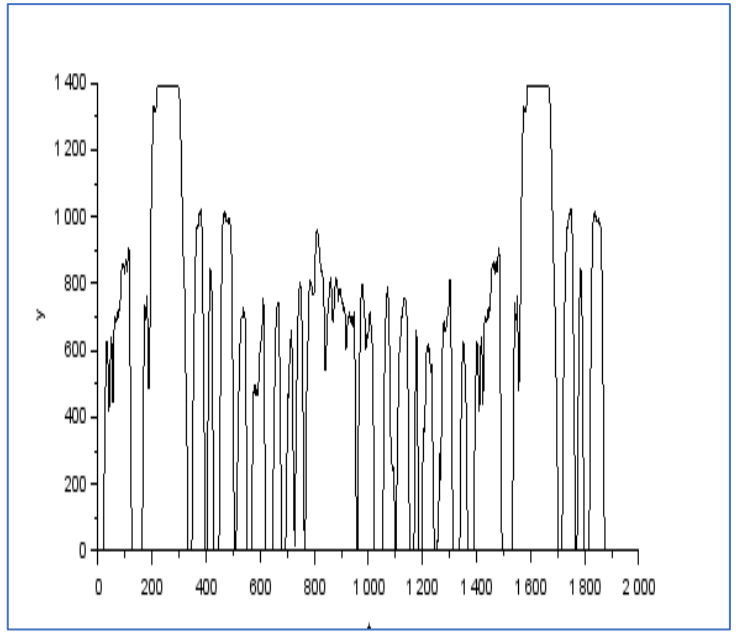
WLTP Drive Cycle



Nominal Torque = 50	Nominal Torque = 70	Nominal Torque = 35
Average Nominal Torque = 35 to 70 Nm		

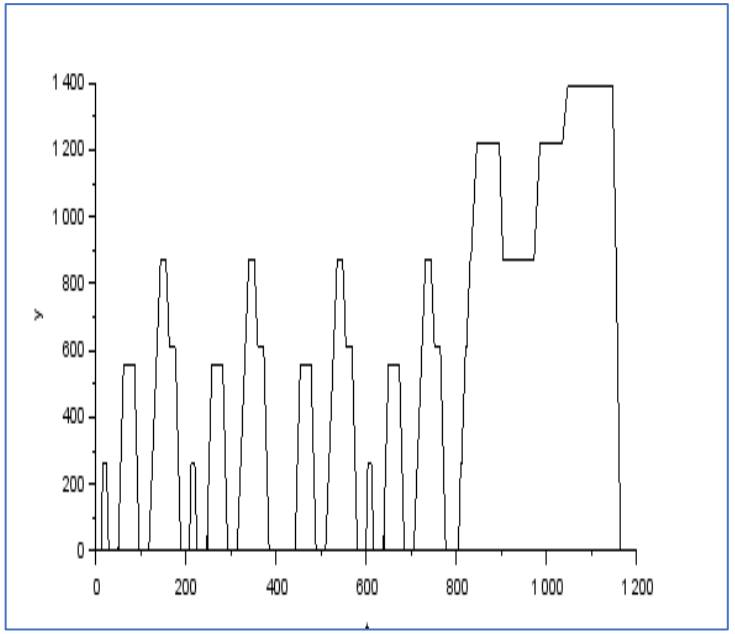
Wheel Speed for different Drive Cycles

FTP-75 Drive Cycle



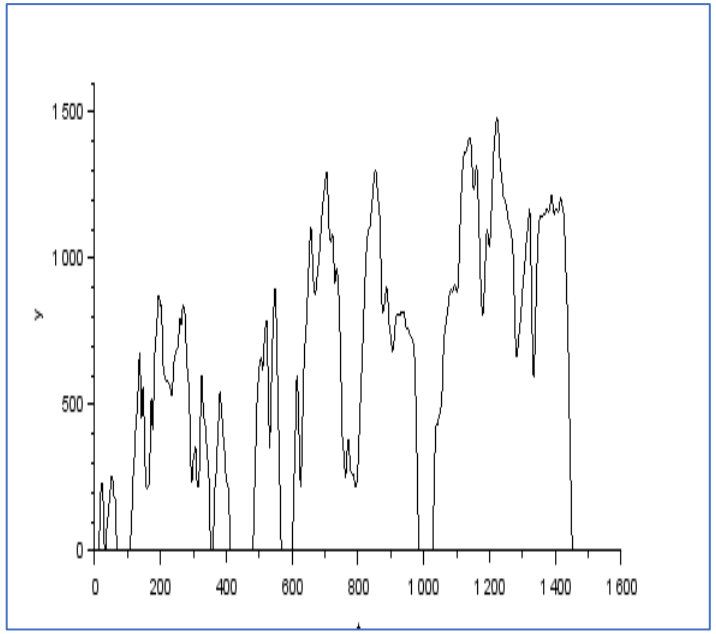
Wheel Speed = 1400

MNEDC Drive Cycle



Wheel Speed = 1400

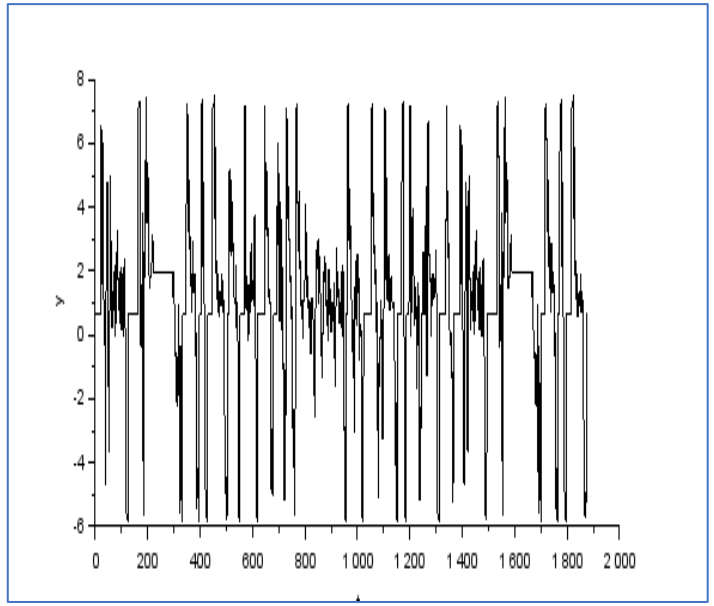
WLTP Drive Cycle



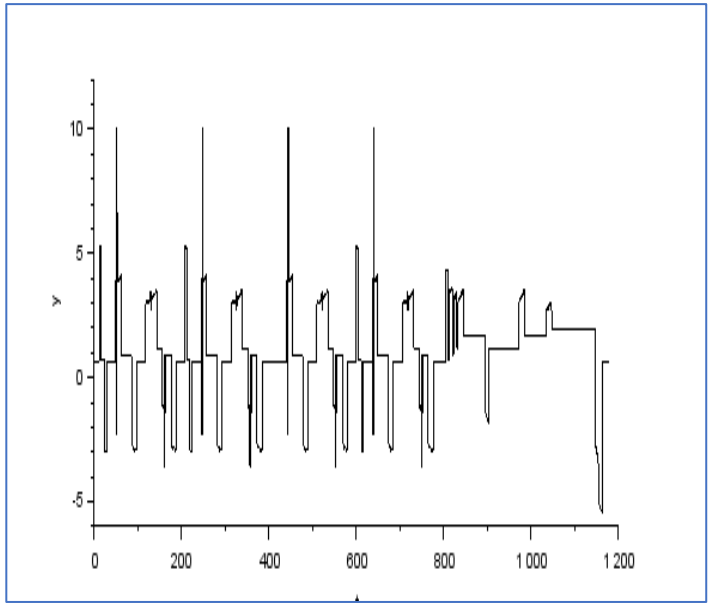
Wheel Speed = 1500

Motor Torque for different Drive Cycles

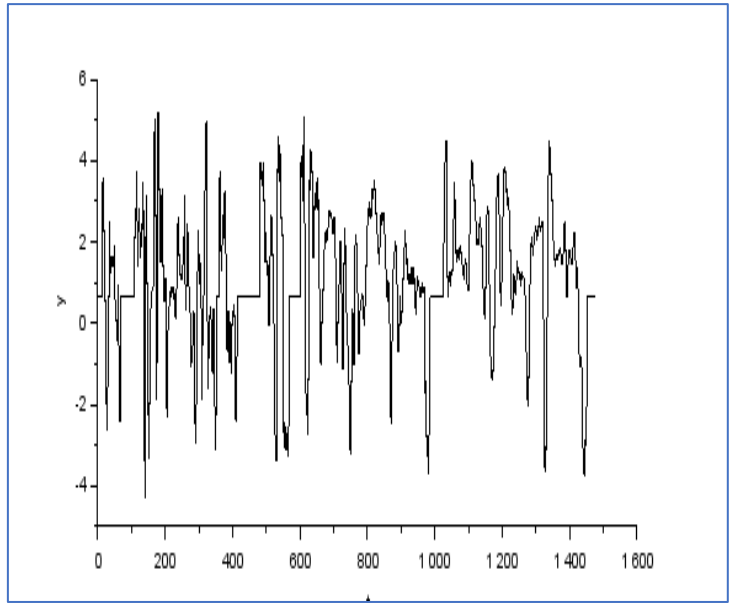
FTP-75 Drive Cycle



MNEDC Drive Cycle



WLTP Drive Cycle

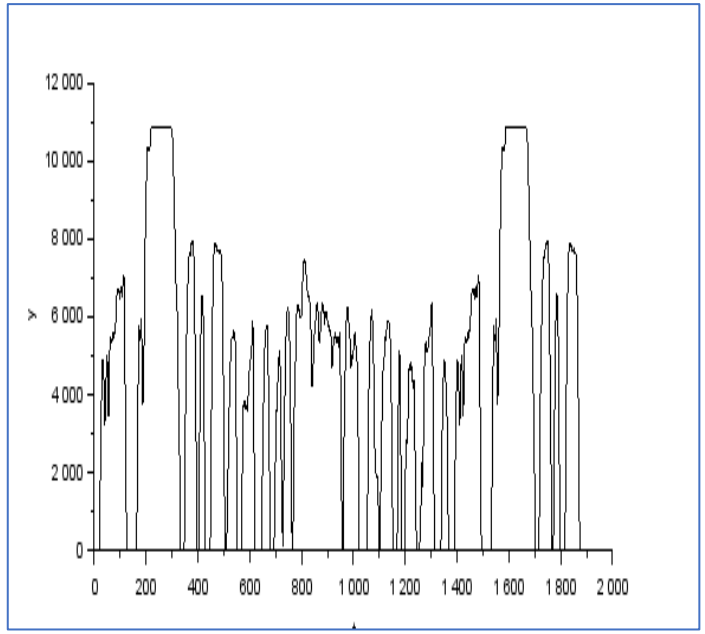


Nominal Torque = 7.5	Nominal Torque = 10	Nominal Torque = 5
Average Nominal Torque = 5 to 10 Nm		

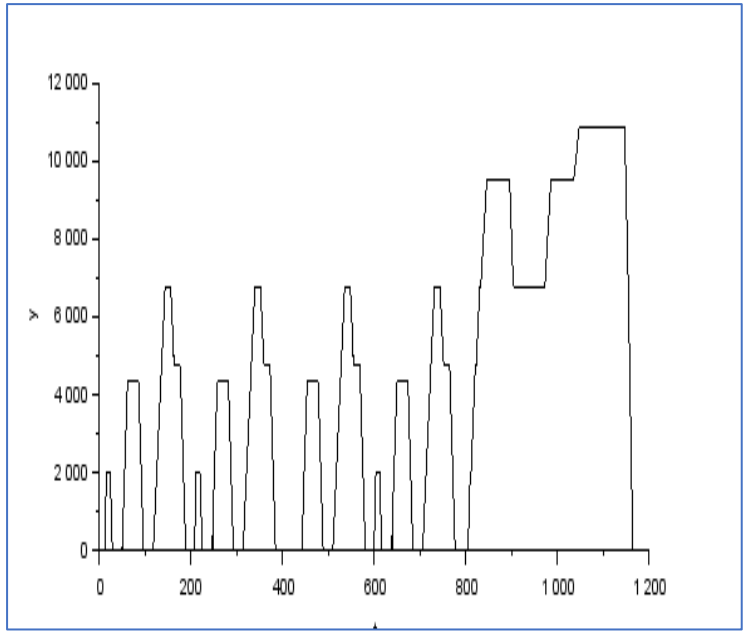
Note: Maximum acceleration for the drive cycle is 2.15 m/s^2
Maximum Acceleration for the Acceleration Test is 5 m/s^2

Motor Speed for different Drive Cycles

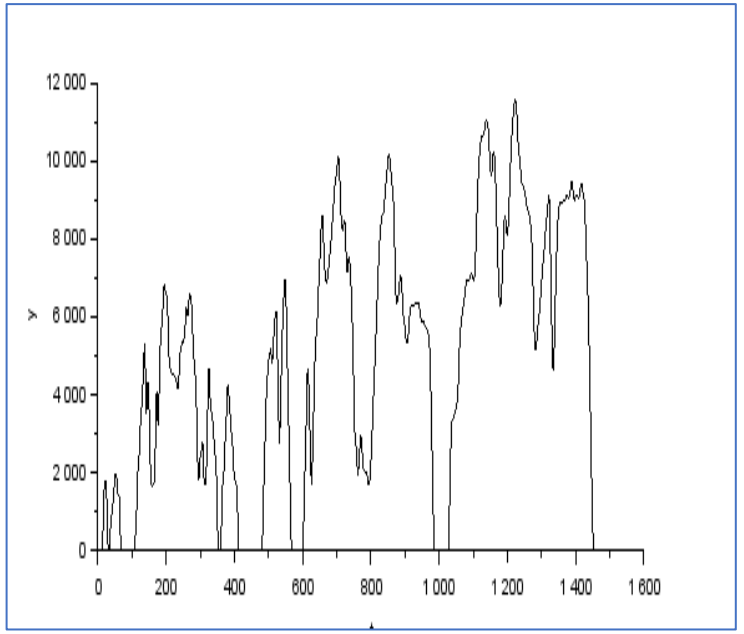
FTP-75 Drive Cycle



MNEDC Drive Cycle



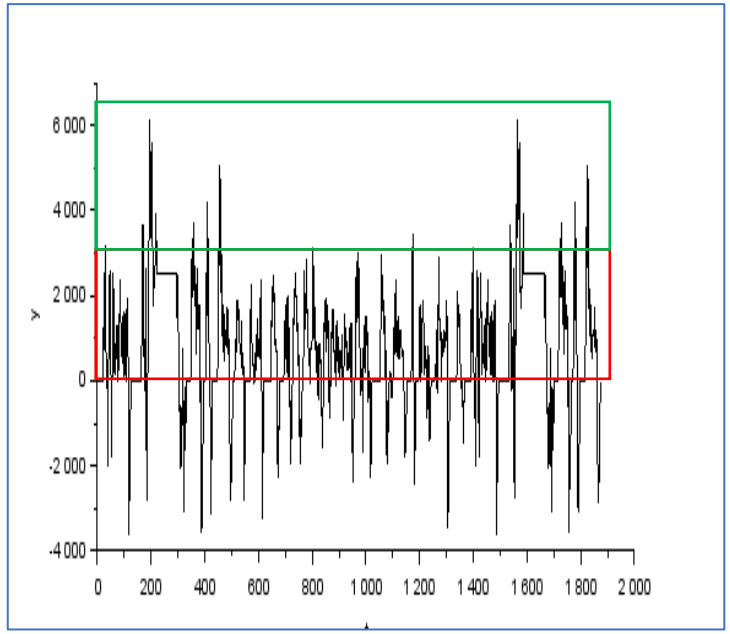
WLTP Drive Cycle



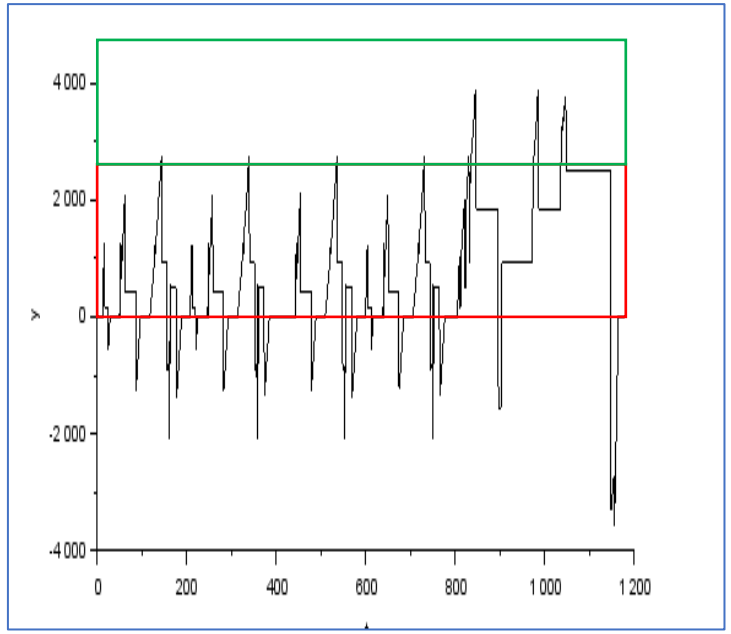
Motor Speed = 11000	Motor Speed = 11000	Motor Speed = 11500
Motor Speed (for 80 kmph) = 11000 rpm		

Motor Power for different Drive Cycles

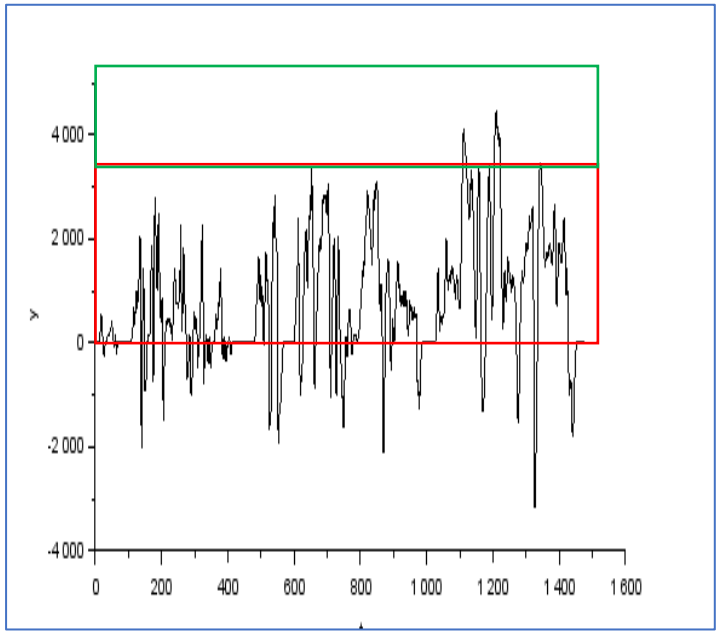
FTP-75 Drive Cycle



MNEDC Drive Cycle



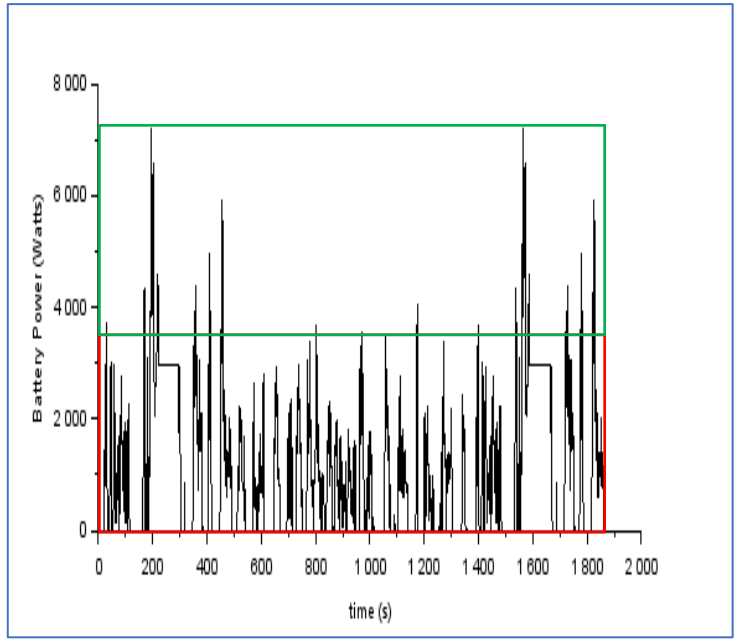
WLTP Drive Cycle



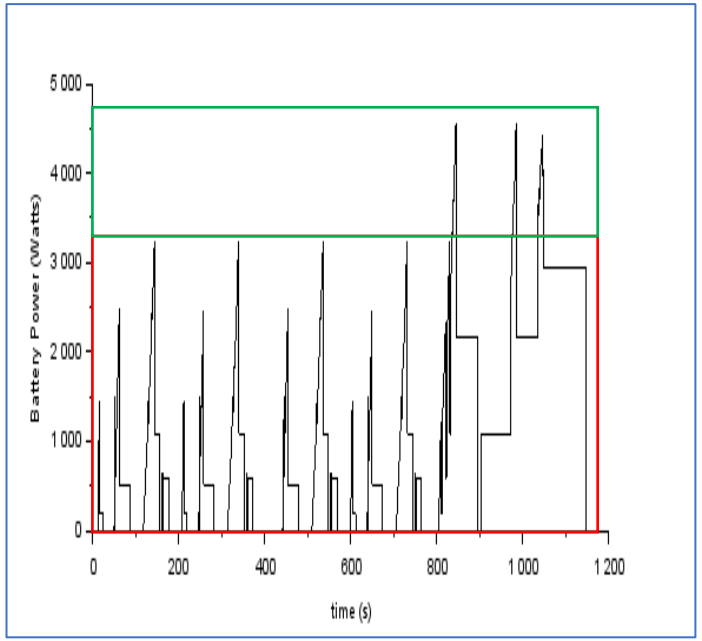
Nominal Power = 3000	Nominal Power = 2700	Nominal Power = 3300
Average Motor Nominal Power = 2700 to 3300 Watts		

Battery Power for different Drive Cycles

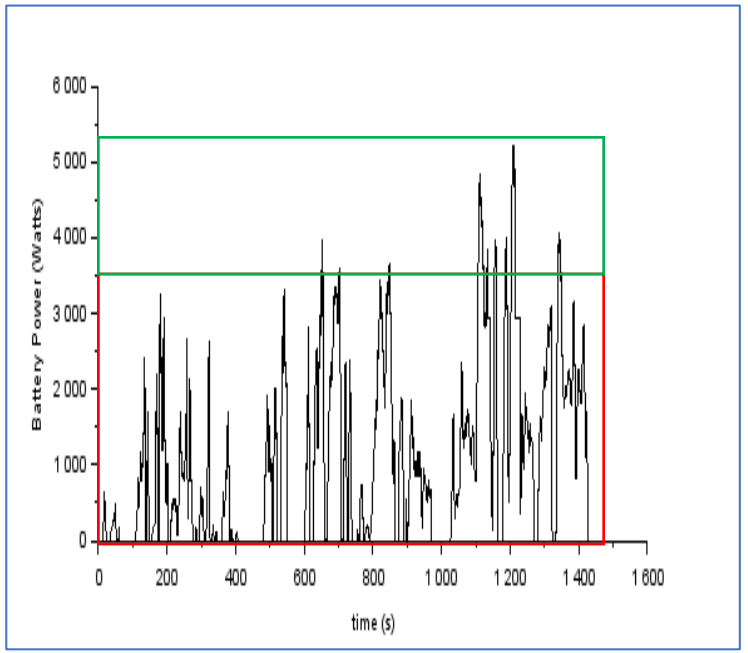
FTP-75 Drive Cycle



MNEDC Drive Cycle



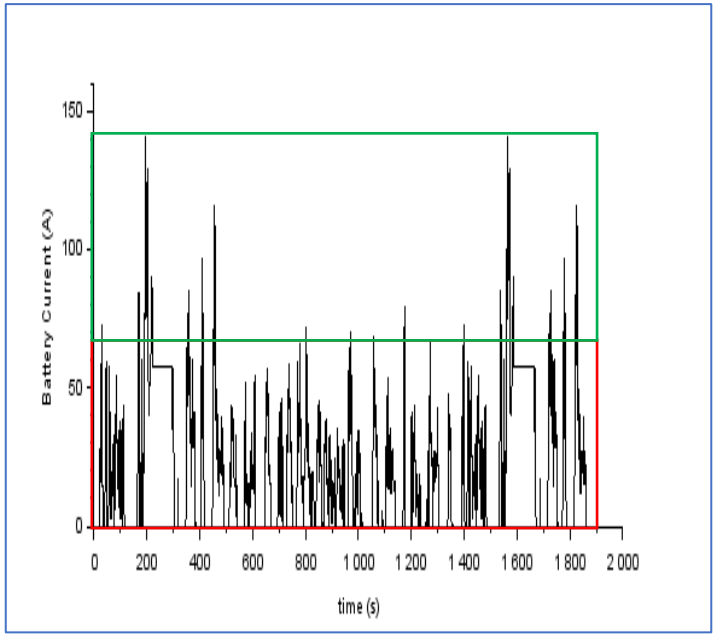
WLTP Drive Cycle



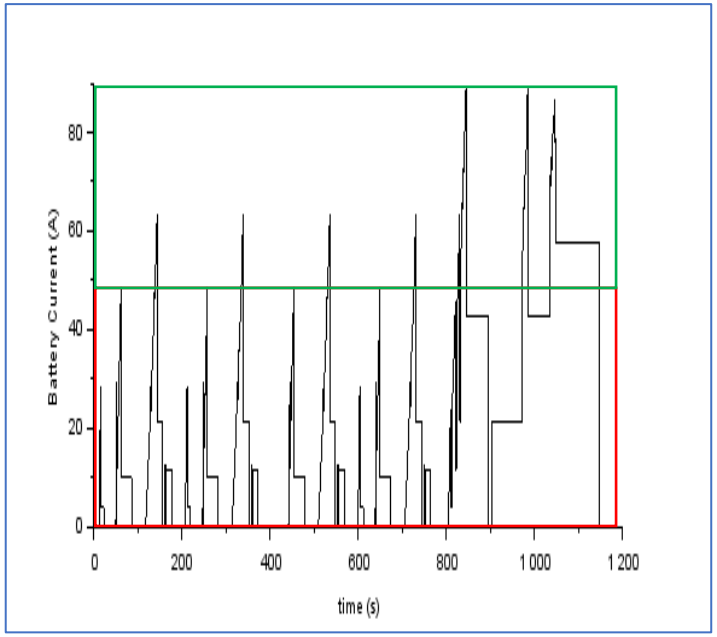
Nominal Power = 3800	Nominal Power = 2600	Nominal Power = 3500
Average Battery Nominal Power = 2400 to 3800 Watts		

Battery Current for different Drive Cycles

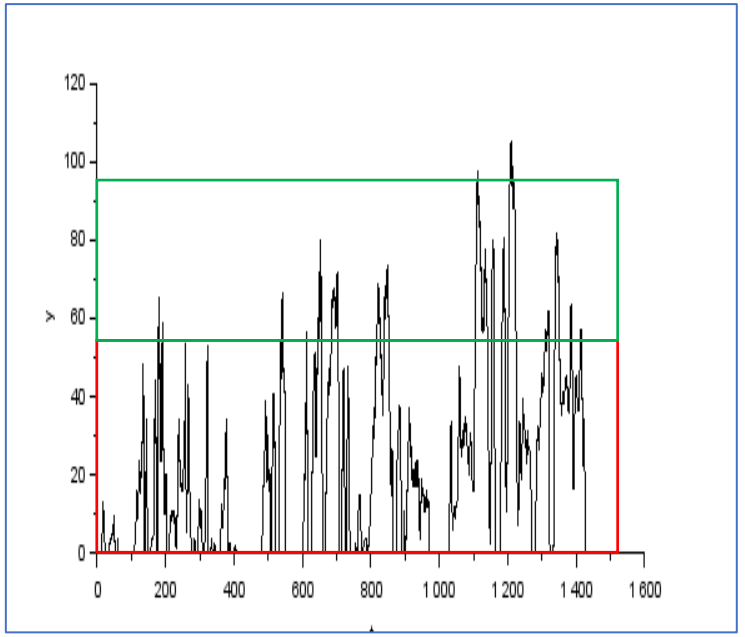
FTP-75 Drive Cycle



MNEDC Drive Cycle



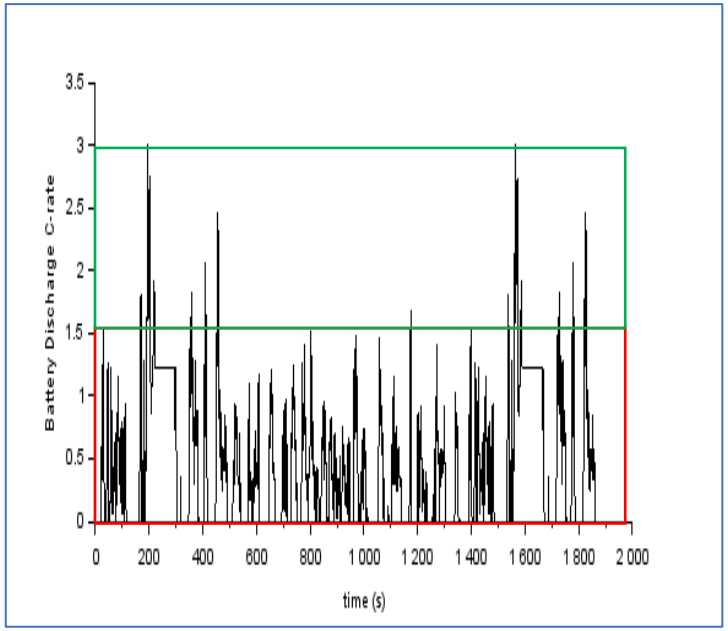
WLTP Drive Cycle



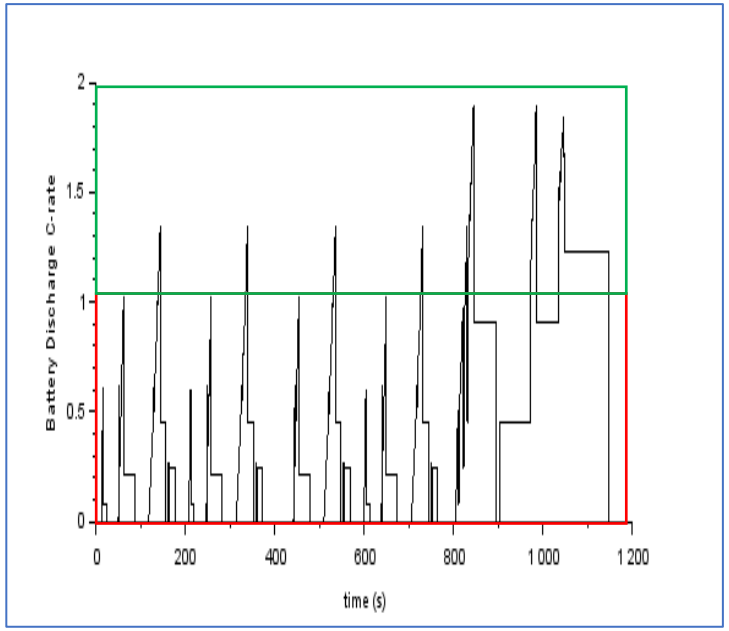
Nominal Current = 60	Nominal Current = 50	Nominal Current = 53
Average Battery Nominal Current = 50 to 60 A		

Battery Discharge C-rate for different Drive Cycles

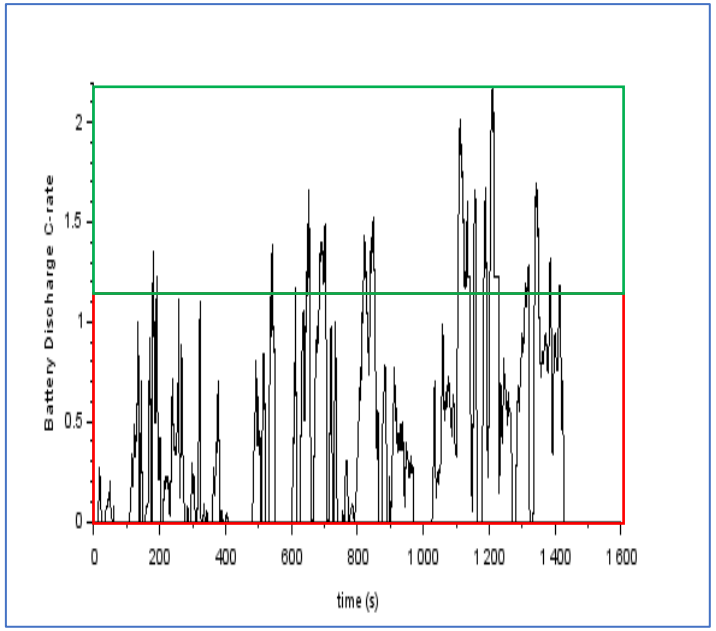
FTP-75 Drive Cycle



MNEDC Drive Cycle



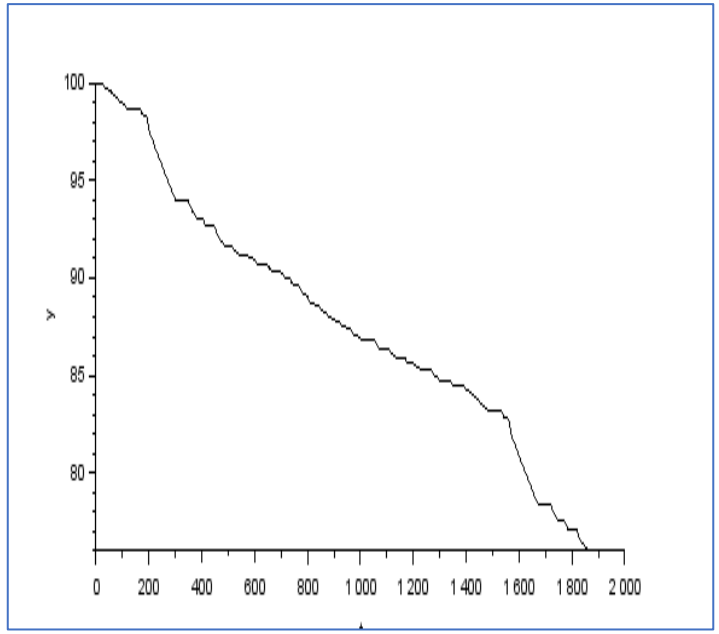
WLTP Drive Cycle



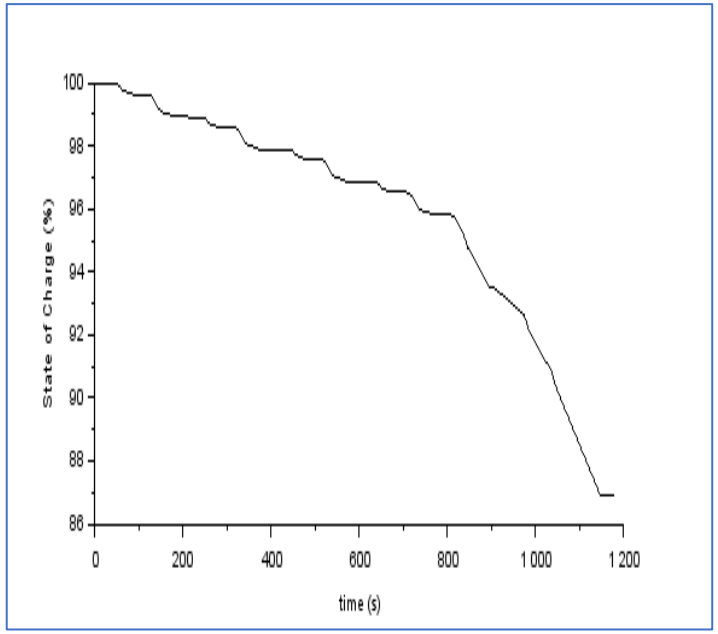
Nominal C-rate = 1.5	Nominal C-rate = 1.1	Nominal C-rate = 1.1
Average Battery Nominal C-rate = 1 to 1.5 C		

Battery SOC for different Drive Cycles

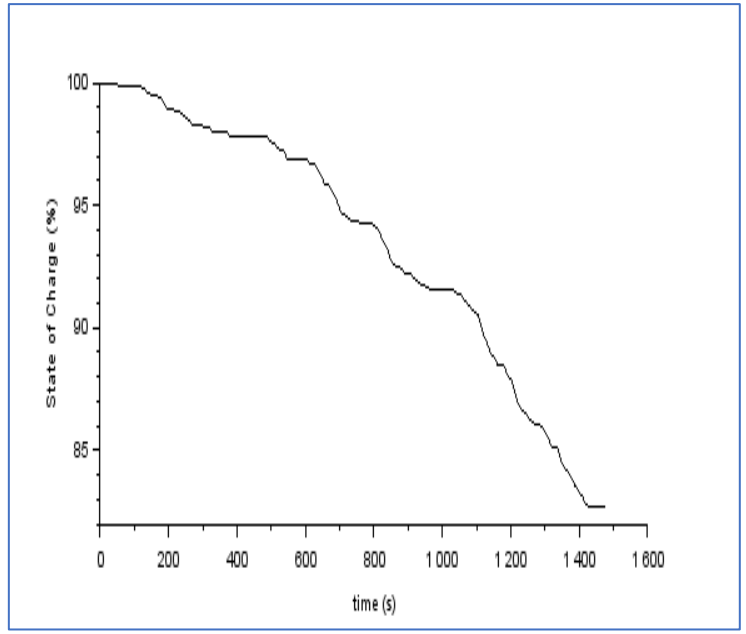
FTP-75 Drive Cycle



MNEDC Drive Cycle

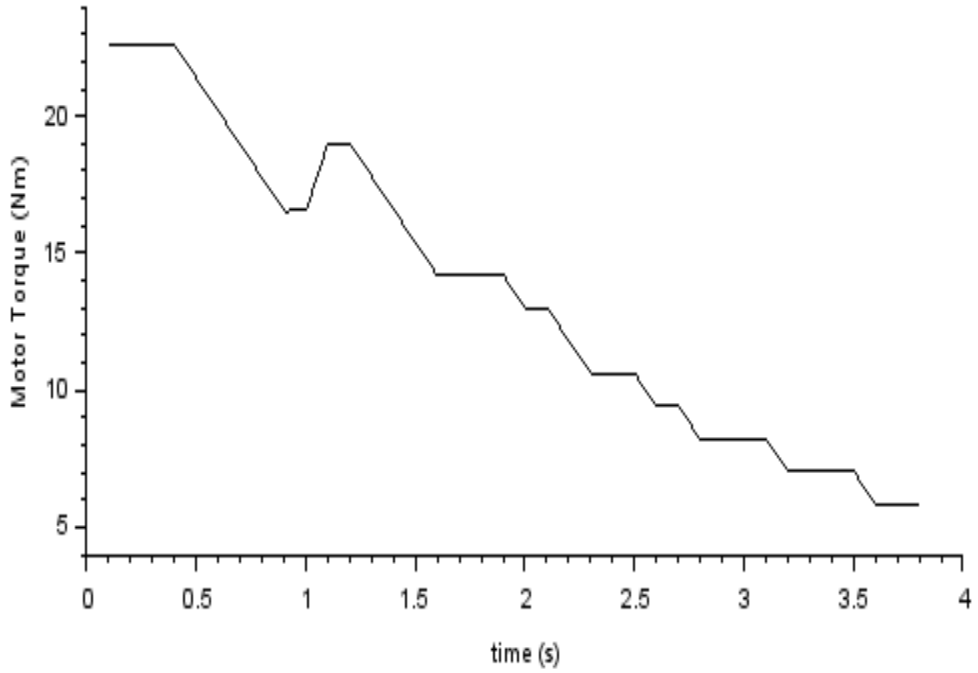


WLTP Drive Cycle



SOC = 76	SOC = 87	SOC = 82
FTP Distance = 17.5 km	MNEDC Distance = 10.274 Km	WLTP Distance = 14.664 Km

Acceleration Test



Motor Torque = 22.5 Nm

Range for different Drive Cycles

FTP 75	MNEDC	WLTP
75 Km	76.4 Km	84.8 Km

Thank you

Email-id :
Mobile no.: