EV Remote Internship
Project Report

Created by

Bharath, **Simulation Engineer**

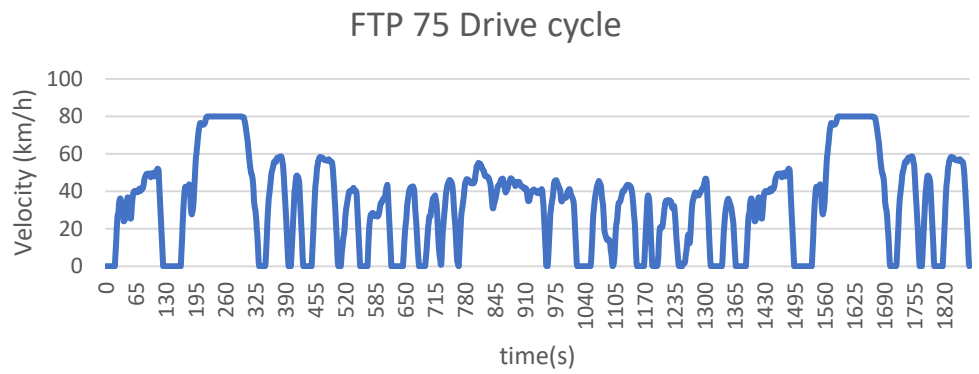
Project Name

Nissan Leaf

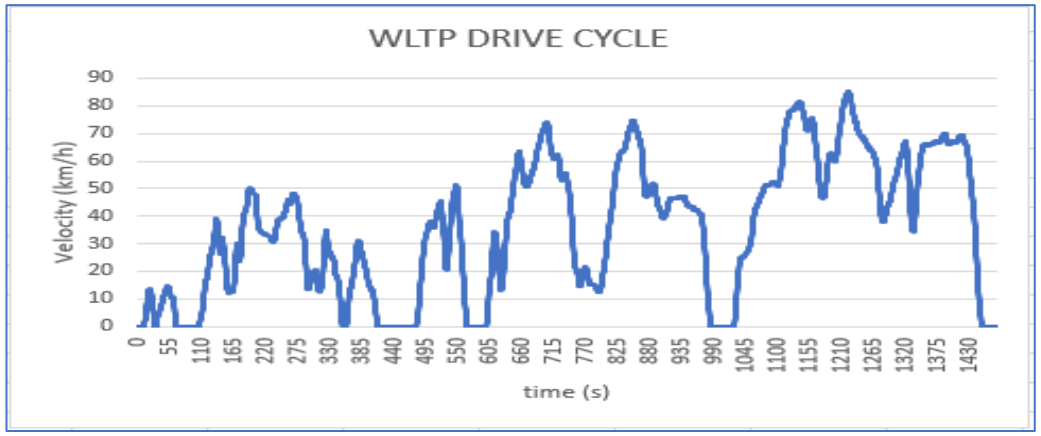
Case Studies: FTP-75/MENDC/WLTP Drive Cycle

Drive Cycles

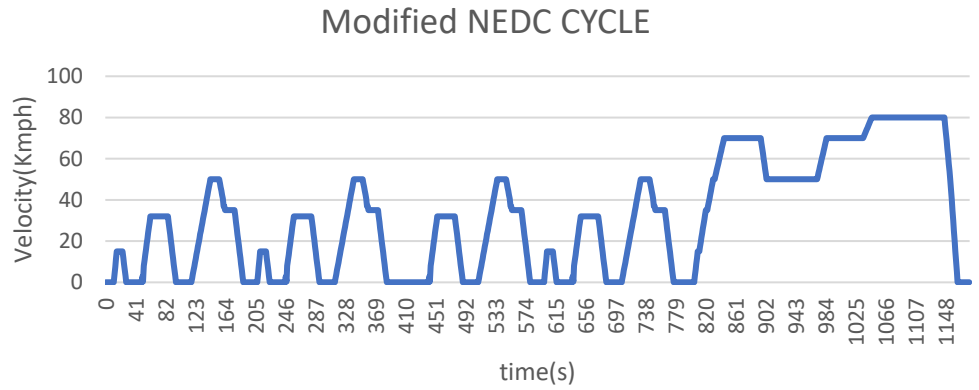
FTP-75 Drive Cycle



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

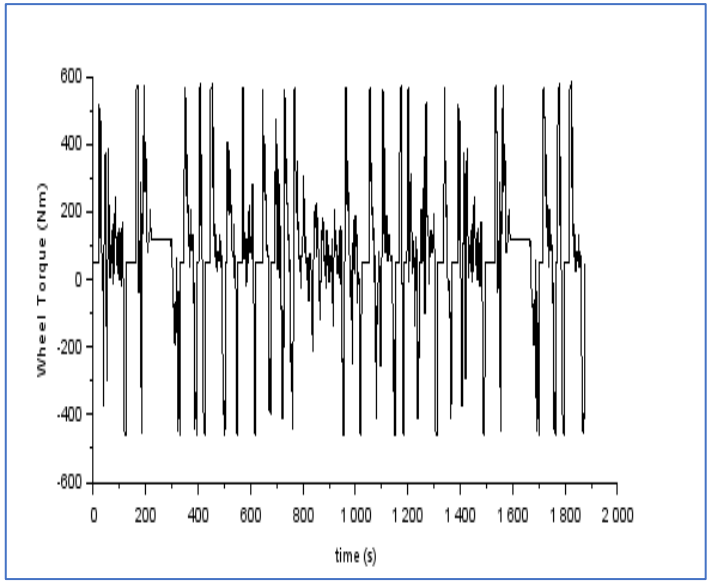
Model Inputs

Sl No	Parameter	Value	Units
1	**Chassis**		
2	• Coefficient of rolling resistance	0.015	
3	• Mass of Vehicle	1630.665	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	• Frontal Area	3.8056	m^2
9	• Air Density	1.225	Kg/m^3
10	• Drag Coefficient	0.28	
11	• Radius of wheel	0.2032	m
12	**Transmission**		
13	• Gear Ratio	7.9377	
14	• Transmission Efficiency	89	%

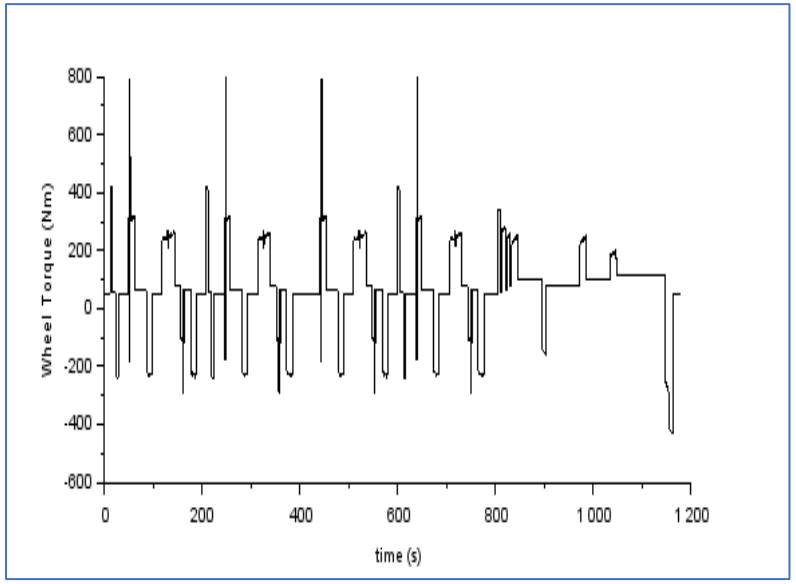
14	**Motor**		
15	Motor Efficiency	92	%
16	**Battery**		
17	• Motor Controller Efficiency	90	%
18	• Battery Capacity	24000	Wh
19	• Battery Voltage	364.8	V
20	• FTP drive cycle distance	17.5	Km
21	• Battery Initial SOC	100	%
22	• Drive Cycle time or Simulation time	1875	s
23	**Cell**		
24	• Cell Voltage	3.8	V
25	• Cell Capacity	33.1	Ah

Wheel Torque for different Drive Cycles

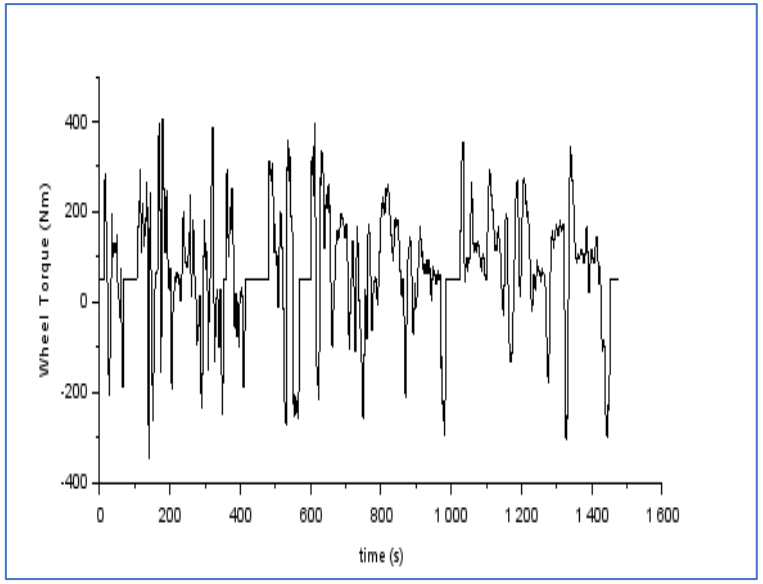
FTP-75 Drive Cycle



MNEDC Drive Cycle



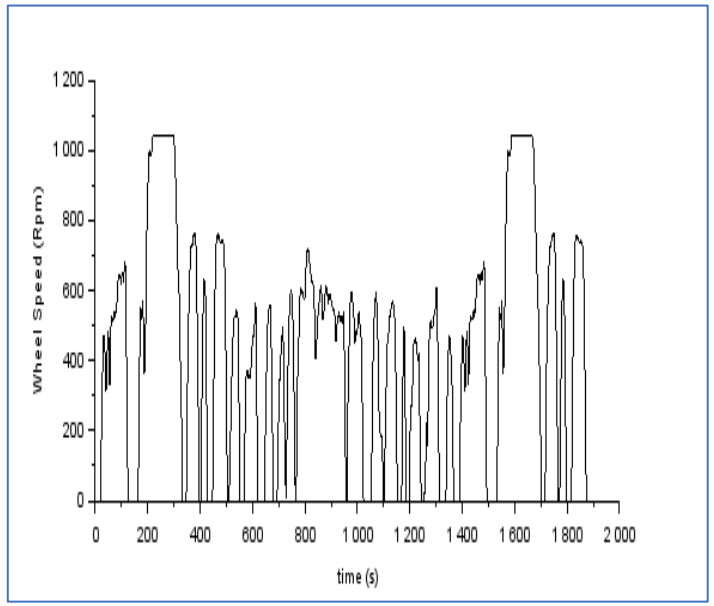
WLTP Drive Cycle



Nominal Torque = 400	Nominal Torque = 400	Nominal Torque = 350
Average Nominal Torque = 350 to 400 Nm		

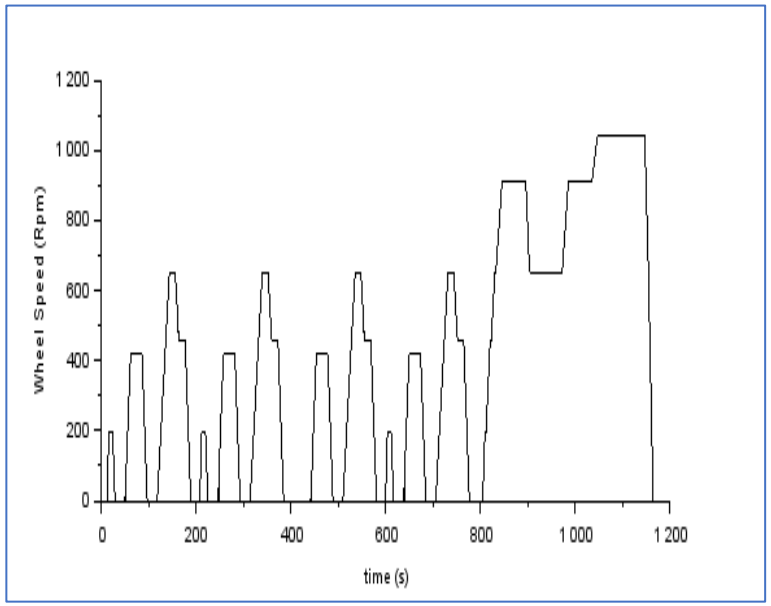
Wheel Speed for different Drive Cycles

FTP-75 Drive Cycle



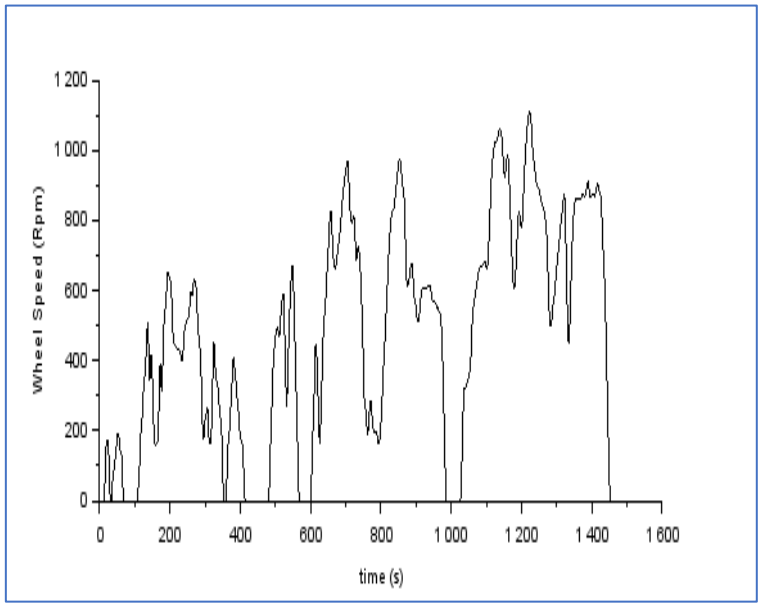
Wheel Speed = 1050

MNEDC Drive Cycle



Wheel Speed = 1050

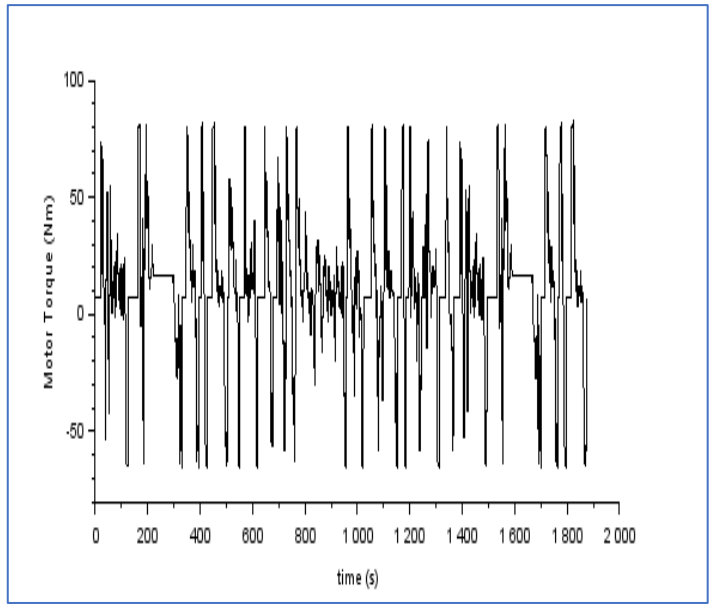
WLTP Drive Cycle



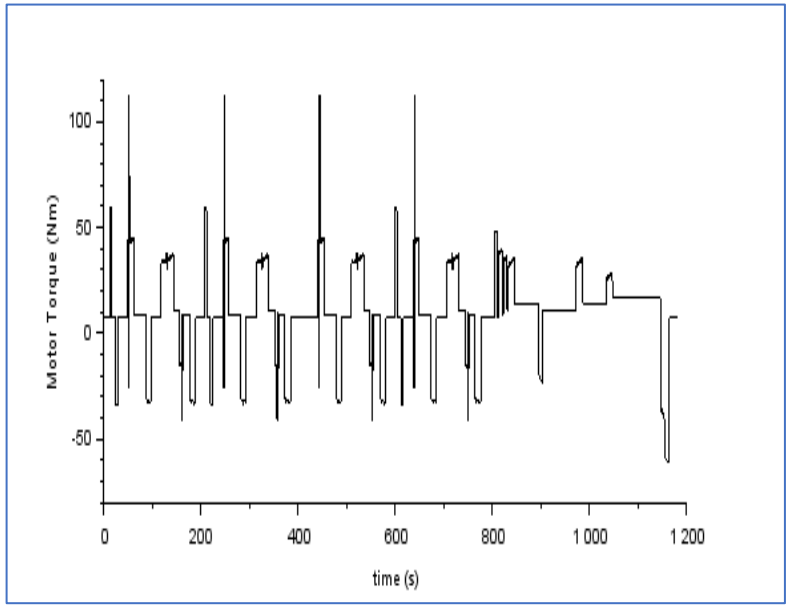
Wheel Speed = 1100

Motor Torque for different Drive Cycles

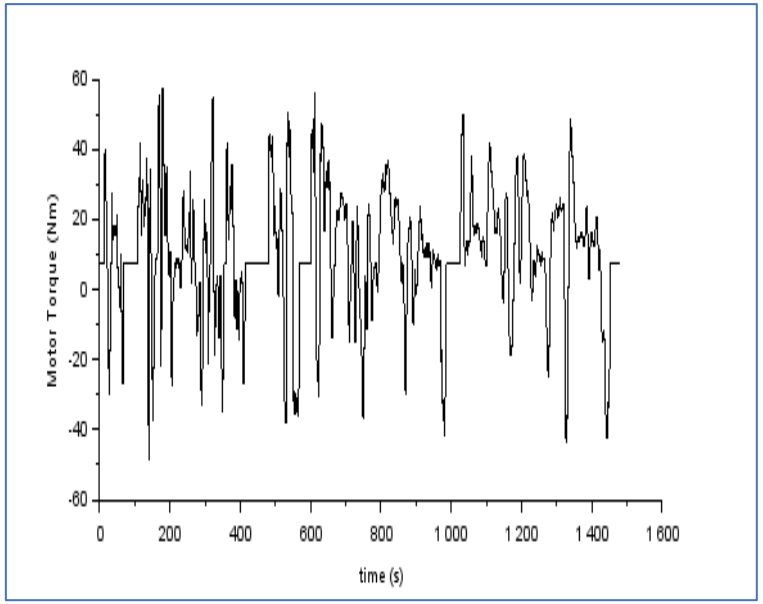
FTP-75 Drive Cycle



MNEDC Drive Cycle



WLTP Drive Cycle

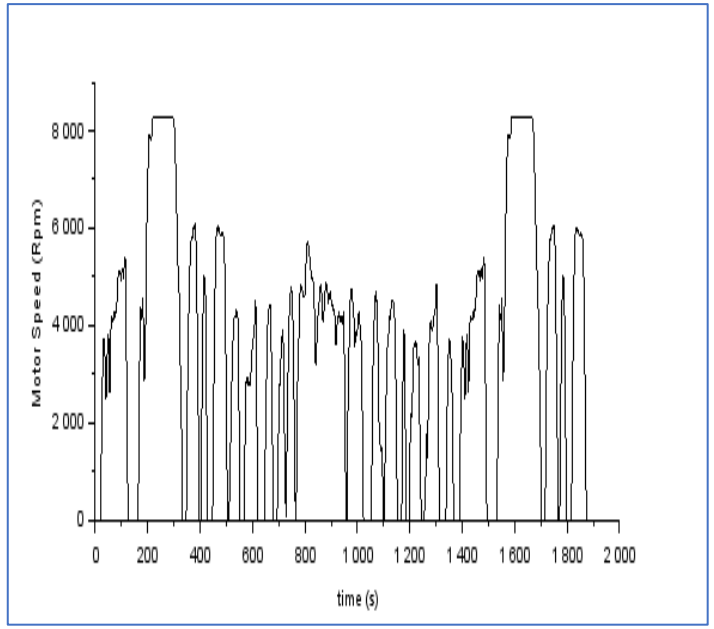


Nominal Torque = 80	Nominal Torque = 110	Nominal Torque = 58
Average Nominal Torque = 58 to 110 Nm		

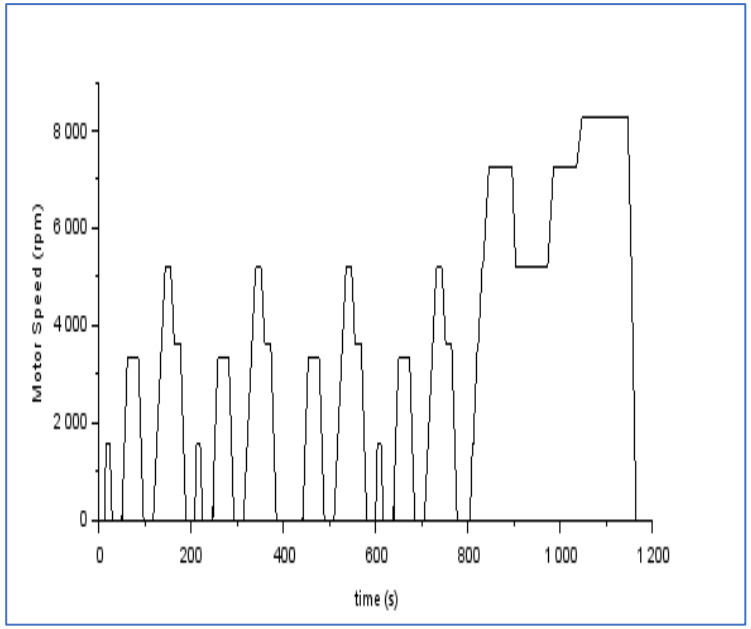
Note: Maximum acceleration for the drive cycle is 2.15 m/s^2
Maximum Acceleration for the Acceleration test is 5.3 m/s^2

Motor Speed for different Drive Cycles

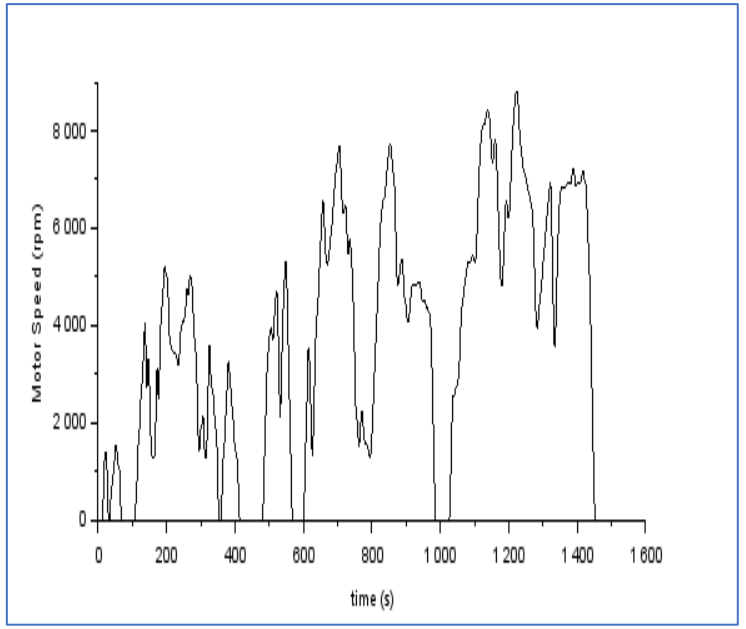
FTP-75 Drive Cycle



MNEDC Drive Cycle



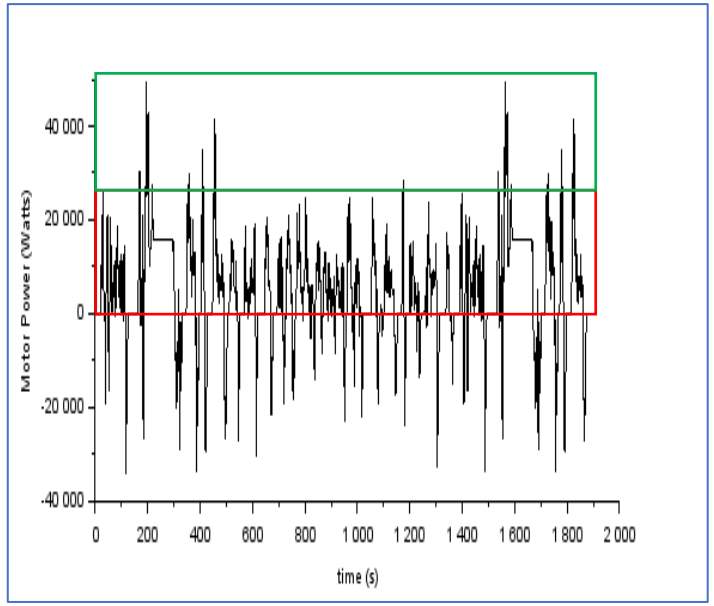
WLTP Drive Cycle



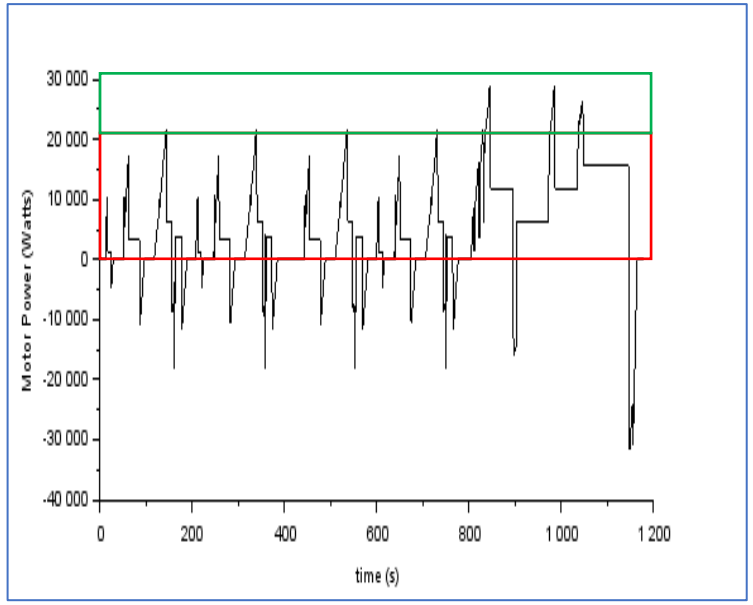
Motor Speed = 8100	Motor Speed = 8100	Motor Speed = 8300
Motor Speed (for 80 kmph) = 8300 rpm (for 91 Kmph, Motor Speed = 9700 rpm)		

Motor Power for different Drive Cycles

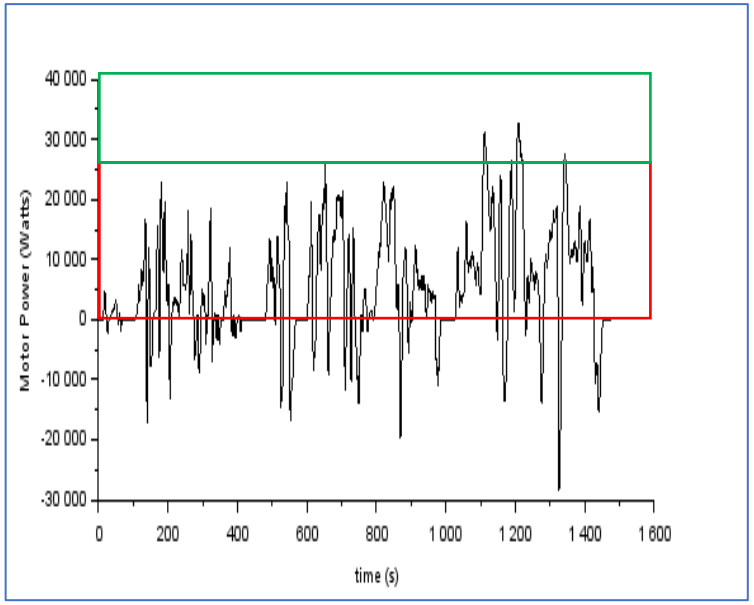
FTP-75 Drive Cycle



MNEDC Drive Cycle



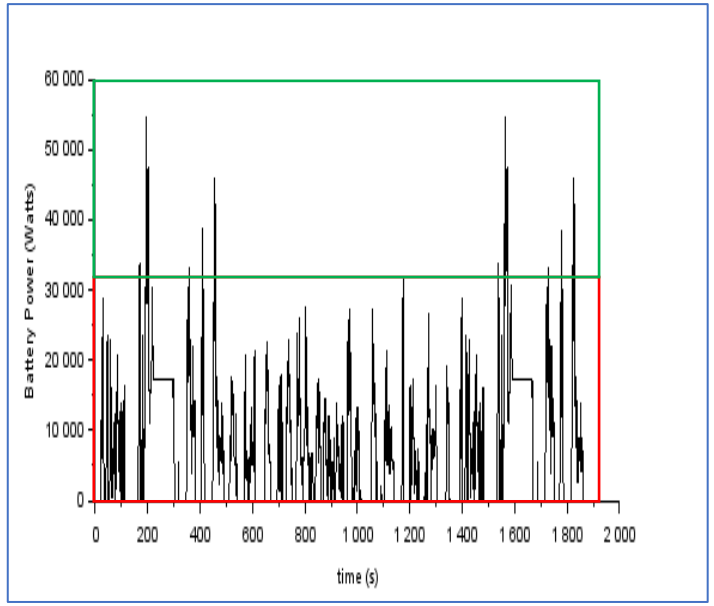
WLTP Drive Cycle



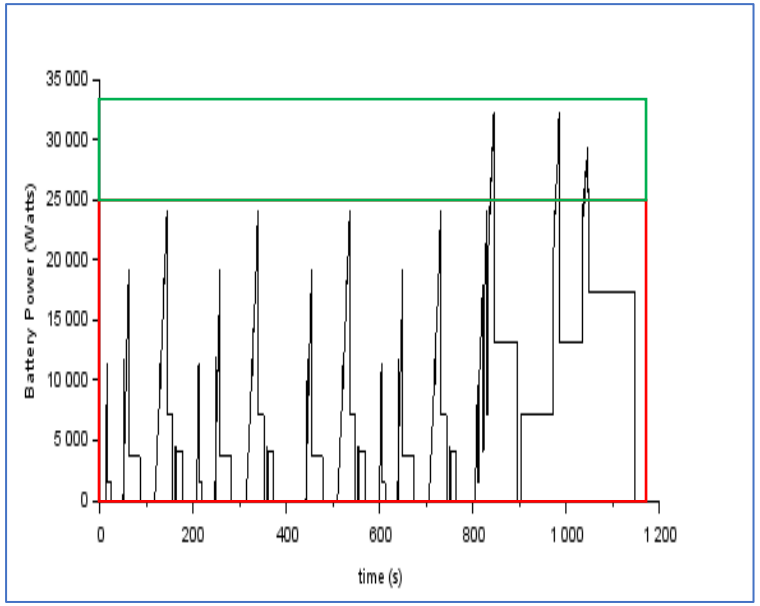
Nominal Power = 23000	Nominal Power = 21000	Nominal Power = 26000
Average Motor Nominal Power = 21000 to 26000 Watts		

Battery Power for different Drive Cycles

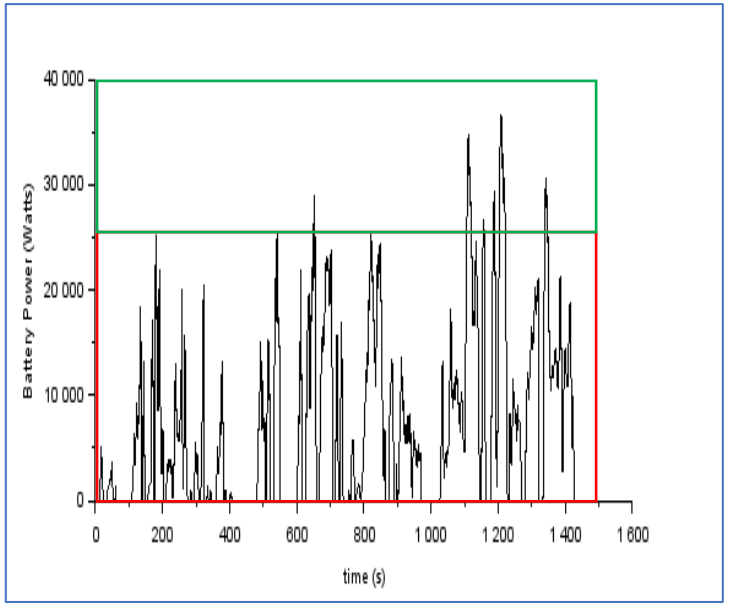
FTP-75 Drive Cycle



MNEDC Drive Cycle



WLTP Drive Cycle

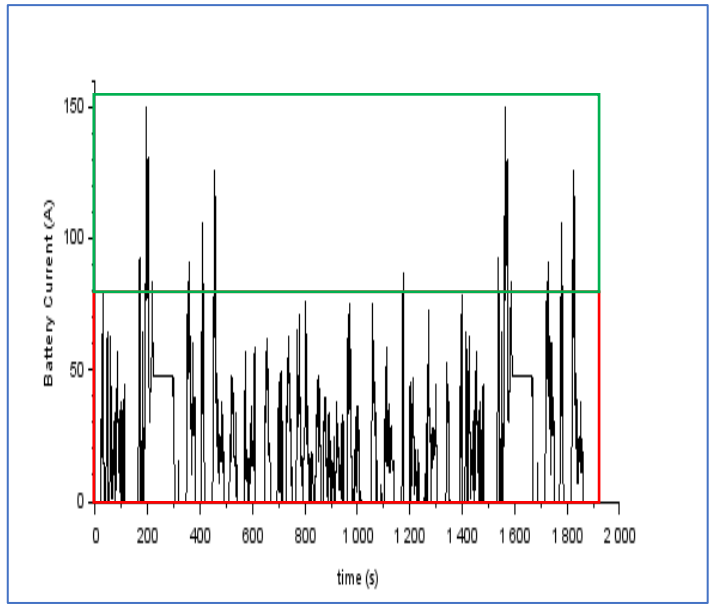


Nominal Power = 31000	Nominal Power = 25000	Nominal Power = 26000

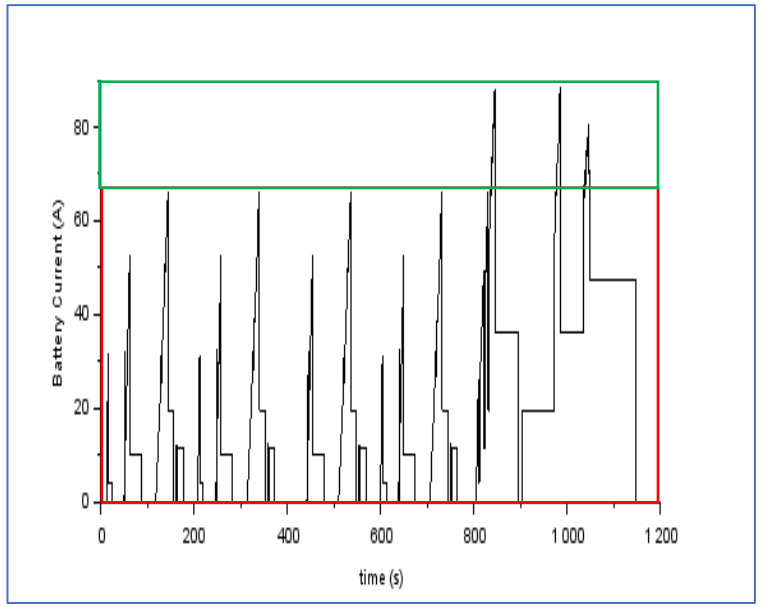
Average Battery Nominal Power = 25000 to 31000 Watts

Battery Current for different Drive Cycles

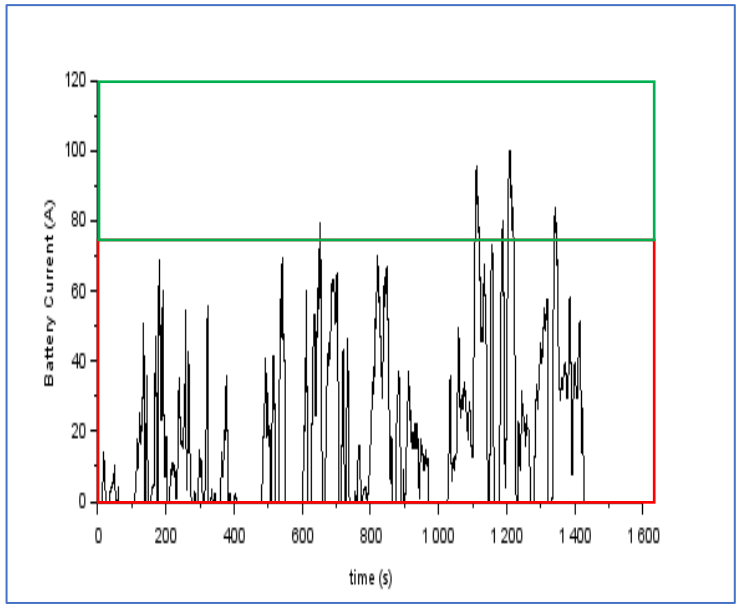
FTP-75 Drive Cycle



MNEDC Drive Cycle



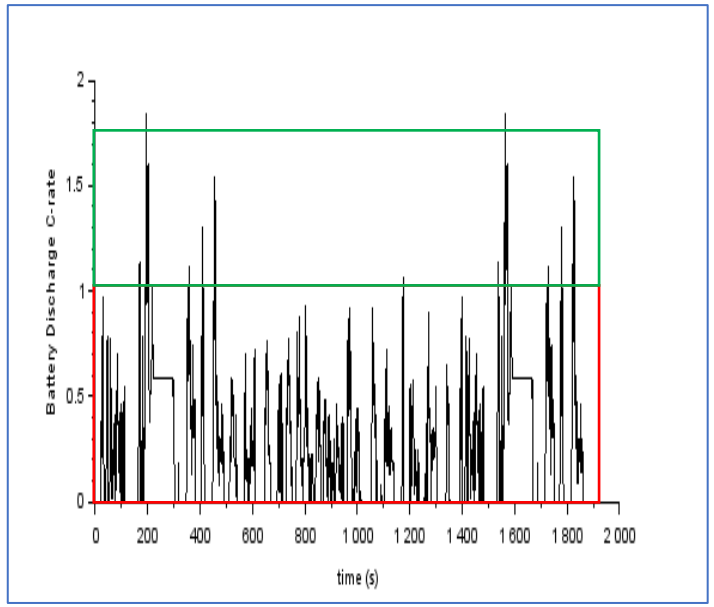
WLTP Drive Cycle



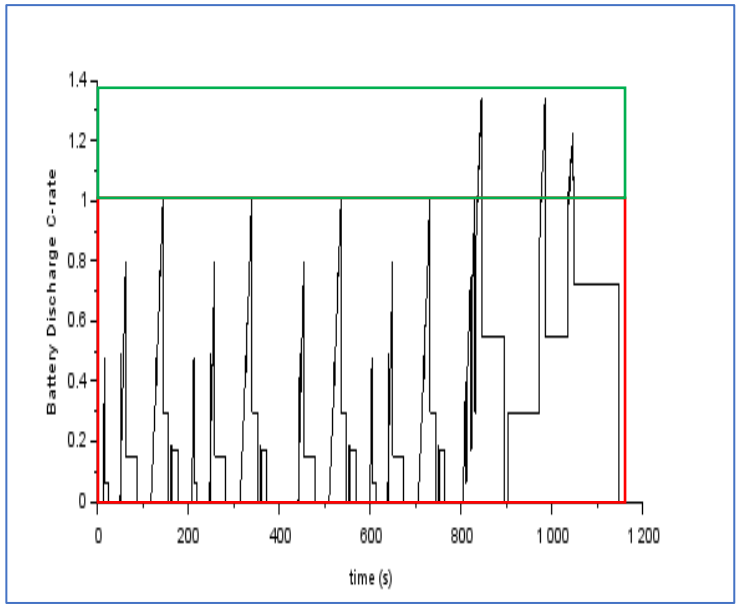
Nominal Current = 75	Nominal Current = 63	Nominal Current = 73
Average Battery Nominal Current = 63 to 75 A		

Battery Discharge C-rate for different Drive Cycles

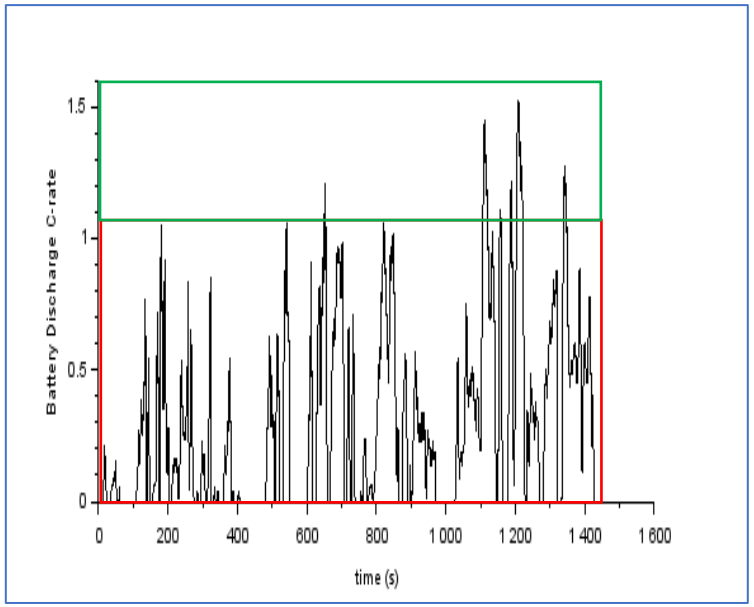
FTP-75 Drive Cycle



MNEDC Drive Cycle



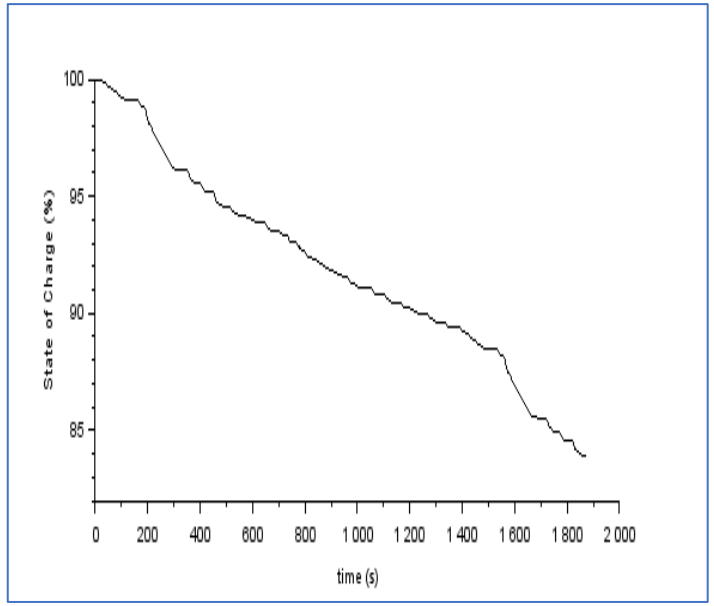
WLTP Drive Cycle



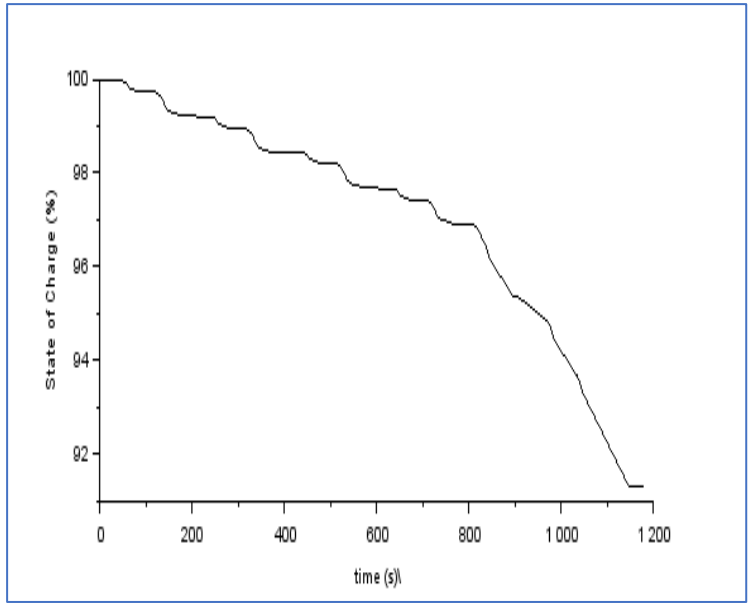
Nominal C-rate = 1	Nominal C-rate = 1	Nominal C-rate = 1.1
Average Battery Nominal C-rate = 1 to 1.1 C		

Battery SOC for different Drive Cycles

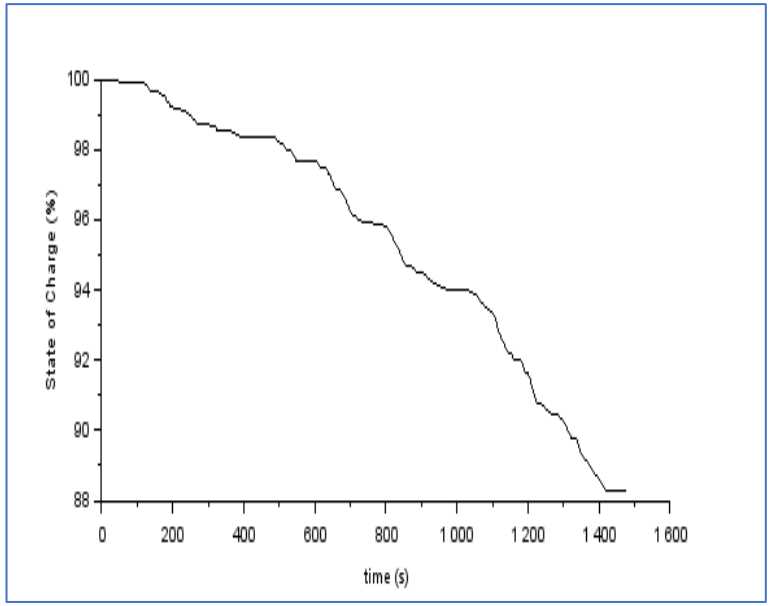
FTP-75 Drive Cycle



MNEDC Drive Cycle

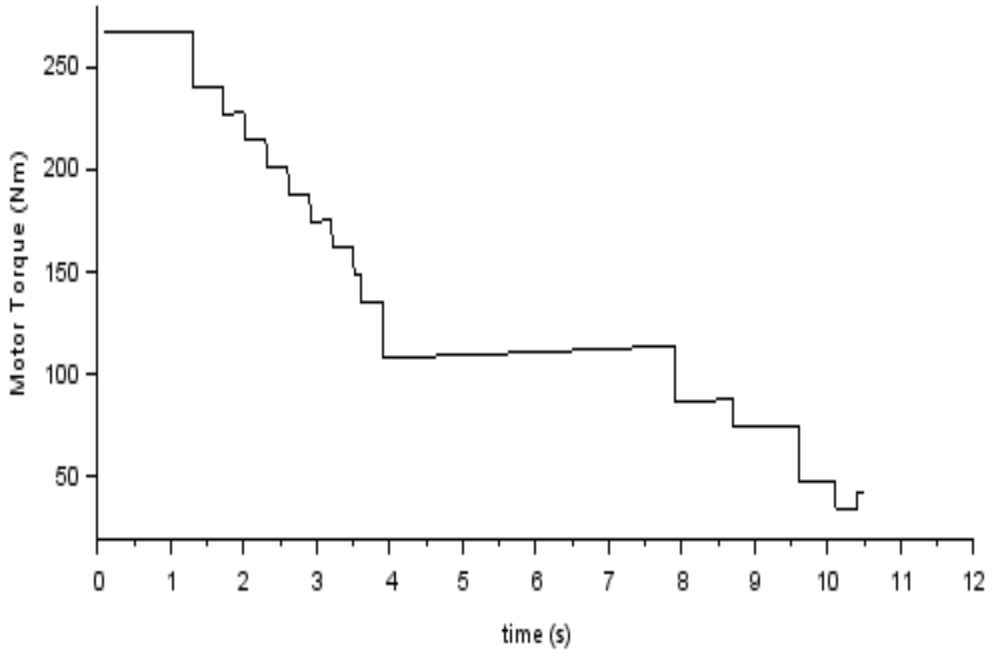


WLTP Drive Cycle



SOC = 84	SOC = 91	SOC = 88
FTP Distance = 17.5 km	MNEDC Distance = 10.274 Km	WLTP Distance = 14.664 Km

Acceleration Test



Motor Torque = 267 Nm

Range for different Drive Cycles

FTP 75	MNEDC	WLTP
108.7 Km	118.2 Km	124.9 Km

Thank you

Email-id :
Mobile no.: