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Comparison between Performance Characteristics of MG Astor and MG ZS EV

Mayur Deshpande[a], Prathamesh Killedar[b], Shreerag Kulkarni[c]*

[a,b,c]KIT's College of engineering, Mechanical engineering, kolhapur-416002, India

A B S T R A C T

Diversification of vehicle drive trains is pushed globally in order to turn the current transportation system into a more sustainable one. Automobiles powered by internal combustion engines must be replaced with vehicles powered by an electric motor and battery system. However, whether electric vehicles are better in the long run than conventional automobiles is a hot topic of debate. This study focuses on comparing numerous aspects of both automobiles in the current situation and in more favorable conditions according to the Indian market. This methodology is based on combining existing studies of numerous elements with additional assessments to give consumers with a comprehensive analysis. The findings of this study will give decision-makers with precise comparative data by pinpointing particular angles relevant to each vehicle's overall performance.

Keywords: electric vehicles, battery system, MG Astor, MG ZS EV, performance characteristics

1. Introduction

In the last few decades, the Indian automobile industry has experienced tremendous expansion. As a result of this expansion, the amount of pollutants produced in the environment has increased. Although the presence of developing technology and stricter emission standards has made the situation manageable, it is now past time to embrace technological developments. The cost of operating the automobiles is also rising due to the progressive rise in fuel costs. As a result, a viable alternative to traditional internal combustion engines is urgently required. However, in order to avoid rebound effects and issue shifting, these options must be assessed holistically, that is, not just in terms of certain features but also in terms of overall viability. As a result, the overall compatibility of an electric car can only be determined through a comparison of conventional and electric vehicles. The findings of this study will be based on specific features of an automobile from the same brand. Morris Garages manufactures two vehicles in the same niche in the Indian market: the MG ZS EV and the MG Astor. The MG ZS EV is an electric vehicle, whereas the MG Astor is a vehicle powered by a gasoline-fueled internal combustion engine. The main reason for choosing the aforementioned two models is that they belong to the same segment, are manufactured by the same company, and have similar physical characteristics. Aiming to complete an assessment that is as comprehensive, robust, and near to real-world use patterns of both vehicles as possible.

2. Literature Review

1] J. Martins, F.P. Brito, D. Pedrosa, V. Monteiro, Joao L. Afsonso have compared the diesel car with the electric car energy consumptions. Due to the dwindling fossil fuels they decided to compare the ICE with EV to check the efficiency of the vehicles. They have considered various functionality tests. The authors performed comparison of energy consumption between ICE and EVs. They have considered short distance test which has leveled ground with 6 % uphill and long distance test for various fixed vehicle speeds. Performance characteristics like average energy consumption, required power and energy supplied were analyzed for both the vehicles. They concluded after conducting various tests that the electric power trains are more energy efficient than the diesel power trains.

2] Umeshkantute, Nilaj N. Deshmukh, Mrs. S.H. Kulkarni have studied the hybrid vehicles as there was the need to save the fossil fuels due to scarcity. Due to the pollutants emitted by ICE and the rise in the prices of the fossil fuels there was the need to switch to hybrid vehicles. The hybrid vehicle is

* *Corresponding author.*
E-mail address: mayurdeshpande94@gmail.com

more efficient than the ICE vehicles. The amount of pollutants emitted by hybrid vehicles is less as compared to ICE. The authors have discussed the various types of hybrid vehicles and their classification based on their various aspects, their comparison with their advantages and disadvantages.

3] Adrian BALTATANU, Leonard Marin FLOREA studied the electric motors used for electric vehicle propulsion system is popular. The authors have discussed the working and types of electric motors which are used in vehicle propulsions systems like DC motors, synchronous motors with permanent magnets or electromagnetic excitation, switched reluctance synchronous motors, squirrel cage induction motors. It is required to consider the performance characteristics of the electric vehicles. So the authors have made the comparative analysis which are trending the vehicle propulsion systems.

4] Dennis Wilken, Matthias Oswald, Patrick Draheim, Christian Pade, Urte Brand, Thomas Vogt have compared EHV with ICE considering multidimensional assessment of passenger cars. The authors considered different types of assessments that affect directly or indirectly on vehicle by assuming different assessments criteria from environment and human health assessment. According to the criteria they compared EV and ICE vehicles according to their properties. After assessing performance characteristics they concluded that the every vehicle gives different results in different assessments. The authors assessed the result in Gantt chart with values and tests performed. They found EV,BEV are more renewable in charging and shows good characteristics as compared to ICEV.

5] Adesh Jadhav have analyzed the techno-commercial parameters of the MG ZS EV. The author have compared the MG ZS EV with TATA Nexon and Hyundai Kona EV and analyzed the best car in the market.

3. MG ASTOR Engine Specifications:

ENGINE	VTi-TECH	220TURBO
Engine Displacement (cc)	1498	1349
Transmission	5MT, CV	6AT
Max Power (PS @ rpm)	110 @ 6000	140 @ 5600
Max Torque (Nm @ rpm)	144 @ 4400	220 @ 3600
Fuel Tank Capacity (L)	48	45

Fig. 1. Astor Engine

4. MG ZS EV Specifications :

ELECTRIC MOTOR	
Electric Motor Type	3 Phase Permanent Magnet Synchronous Motor
Max. Power (PS@rpm)	142.76@3500
Max. Torque (Nm@rpm)	353@5000
HIGH VOLTAGE BATTERY	
Battery Capacity (kWh)	44.5
Charger Connection Type	Type 2 plus CCS
Estimated 7kW Charge Time (0-100%)**	Type 2 plus CCS
Estimated 50kW CCS Charge Time (0-80%) @ 50kW	Type 2 plus CCS
Range In Single Charge (km)	419

Fig. 2. MG ZS Electric 2019

5. Comparison characteristics between MG ASTOR and MG ZS EV :

DIMENSIONS	**MG ASTOR**	**MG ZS EV**
Length (mm)	4323	4314
Width (mm)	1809	1809
Height (mm)	1650	1620| 1644 (With Roof Rails)
Wheelbase (mm)	2585	2585
SUSPENSION	MG ASTOR	MG ZS EV
Front	Macpherson Strut	Macpherson Strut
Rear	Torsion Beam	Torsion Beam
BRAKES	MG ASTOR	MG ZS EV
Front & Rear	Disc Brakes	Disc Brakes
TYRES & WHEELS	MG ASTOR	MG ZS EV
Main Wheel	215/55 R17 Alloys	215/55 R17 Diamond Cut Machined Alloy Wheel
Spare Wheel	215/60 R16 Steel Wheel	T125/90 R16
TRANSMISSION	MG ASTOR	MG ZS EV
Transmission	Automatic/ Manual	Automatic

Fig. 3. MG Astor Interior

Fig. 4. MG ZS EV Interior

6. MG Astor

Fig. 5. MG Astor

MG calls Astor as India's first car with personal AI assistant.MG makes a subtle reference to this with a robot perched atop the dashboard, where idols are usually seen. More telling, despite the fact that the Astor is effectively a petrol version of the ZS EV, it carries no badges indicating this, instead openly displaying 'AI Inside' and ADAS monikers. A sign of the times, but that doesn't mean there's not much to say about the engines.

To compete with the Creta and Kushaq mid-size SUVs in Indian automobile market, MG offers two petrol engines: a 1498cc normally aspirated engine producing 110hp and 144Nm, and a more powerful 1349cc turbocharged engine producing 140hp and 220Nm. The 1.5 includes a 5-speed manual transmission and an 8-step CVT automatic transmission; however the Turbo has only a 6-speed torque converter automatic transmission. While competitors like as the Creta and Seltos have diesel engines, the Astor, like the Kicks, Taigun, and Kushaq, will only be available in petrol form.

The Advanced Driver Assistance System (ADAS) is a collection of safety and convenience features designed to increase driver comfort and road safety while also preventing or minimizing the severity of future accidents. ADAS can accomplish all of this by warning the driver, implementing possible vehicle safeguards, and automating driving controls*.
Autonomous Level 2 features not only make driving more comfortable, but they also prioritize your safety. Level 2 systems can not only conduct accelerating and braking operations, but they can also engage steering control to aid the driver. Following are the autonomous features,

Lane Functions
The multipurpose camera recognizes lane markers, notifies you when your car deviates from the lane, and can even adjust your route. It can also actively steer the vehicle to maintain it in the centre of the lane.

Rear Drive Assist

Rear Drive Assist features monitor the vehicle's surroundings to remove blind spots that might otherwise go undetected by the ORVM, reversing camera, and sensors. When the system detects a potential hazard, whether it is a car currently in the blind zone or an incoming vehicle at high speed while changing lanes or reversing, or a vehicle approaching from the rear left or right, it informs the driver via visual and audio alerts.

Adaptive Cruise Control

Adaptive Cruise Control is a more sophisticated type of cruise control. It detects and monitors the road ahead and automatically accelerates and decelerates to keep a safe distance from the car in front.

Forward Collision Prevention

When the gap grows too close, the system warns the driver of a possible accident with a four-wheeler, two-wheeler, or pedestrian and performs autonomous deceleration if the driver does not take action.

Speed Assist System

The Speed Assist System will watch traffic signs on the route to determine the speed limit. The technology warns the motorist if he or she is driving too fast by using visual and audio cues. In intelligent mode, it may also automatically slow the car down to the speed limit. In manual mode, you may even set your own speed limit.

Intelligent Headlamp Control

Depending on the impending traffic and environmental conditions, Intelligent Headlamp Control activates and deactivates the high-beam. As a result, other road users are not blinded by high-beams.

7. MG ZS EV

Fig. 6. MG ZS EV

MG ZS EV is first electric vehicle of MG which is launched in India in January 2020. The MG ZS EV is a family-friendly electric SUV that offers all the benefits of a zero-emission car without sacrificing practicality or appearance. The ZS EV combines elegant design with great technology, drawing significant experience of electric SUVs.

MG ZS is pure electrical based vehicle which works on battery which is 44.5kwh capacity. This runs on the Three Phase Permanent Magnet Synchronous Motor which having max power 140.8bhp@3500rpmand max torque 350Nm@5000rpm which gives most relevant output to user. The car accelerates 0-100kmph within 8.5sec. Transmission for these car is fully automatic as well as there is no paddle shaft for transmission hence very easy and comfortable to user. MG ZS provides special feature to private costumer over150,000kmwarranty on the lithium-ion battery and 24x7 roadside assistance for five years.

In MG ZS there are more important features as follows-:

Performance and Drive: MG ZS provide three driving modes which are Eco, Sports and Normal. In Eco mode gives better performance to battery and holds SUV to normal and smooth on road .In Sports mode maximizes the performance of SUV. At normal SUV manage the balance performance and economy of vehicle.

Battery and charging - MG ZS EV range is 340 km as per MG. Range is changes according to driving conditions and atmosphere. We can charge battery 80% in 8 hours from household supply.

Normally battery can recharge 0-80% with 50 min by DC charging which is more impact full.

For DC supply 50kW DC fast charger is installed at dealerships. For household charging we set the setup of 7.4kW AC home charger at home or in office .In India also MG provide on-board portable cable free with the ZS EV that can be plugged into a wall socket that more convenient.

Safety standards-

MG ZS EV provides 6 airbags, which include dual front airbags, front-seat side-impact airbags, and side-curtain airbags that work according to seatbelt indication. As safety purpose MG provide us best safety factors.

ABS with EBD & Corner Stability Control –

In MG ZS EV introduce ABS coupled with EBD is more relevant and beneficial for user and vehicle as well as for safety purpose. ABS can control breaking pressure according situations and conditions on road also it keeps you smooth while skidding when situation is out of control.

Corner stability control which detects uneven things which affect to car and driver it can make car full of stable with reducing the traction on it. It also detects loss of steering which control it by itself and reduce some major or minor losses.

Intelligent battery temperature control management

The battery of the MG ZS EV has an inbuilt Temperature Control Management System that ensures optimal battery output irrespective of extreme hot or cold temperature conditions.

8. Conclusion

An approach was provided for evaluating MG Astor and MG ZS EV based on a variety of parameters and performance characteristics. Results were integrated and aggregated over a wide variety of parameters to aid decision-making for numerous prospective viewpoints. The data referred to has been tried and tested, and the results have been predicted and hypothesised for the future. While all of the measures of both vehicles utilised in the evaluation demonstrate that each vehicle has its own set of advantages and disadvantages, but the performance characteristics of the MG ZS EV outweighs those of the MG Astor.

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