Selection of the Electric Vehicle Engine: A Summary

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ABSTRACT: ***In this analysis, five types of electric motor drive train systems for EVs are addressed. Additionally, the specifications of EVs on electrical motor drives are illustrated. Hence, a study of the types of engines and their drives used in EVs have been developed. Comparative research on efficiency, expense, maximum velocity, and for switched reluctance motor, induction motor, permanent magnet motor, DC motor, reliability is given. Permanent magnet brushless dc motor with axial flux to determine the most suitable electric motor drives for apps on electric vehicles. Some results have been obtained on the basis of these studies.The study shows that axial flux permanent magnet brushless dc motor drives are the prior choice for electric vehicles.***

KEYWORDS:Electric vehicle; induction motor; switched reluctance motor; permanent magnet synchronous motor; axial flux permanent magnet brushless dc motor; speed; efficiency

INTRODUCTION

Using an electric motor, which is an electric motor, electric energy can be converted into mechanical energy. A computer with electricity. The operation of electric motors is due to the interaction between the electric motors. The electrical field of the motor and the current windings that produce force in the rotation form. Utilizing direct current (DC) sources, such as batteries, motor vehicles and alternating current sources. As a power grid, these electric motors can be operated by inverters (AC)[1]. An electric power outlet mechanically, the generator is similar to an electric motor but works in the opposite direction. Accepting mechanical energy and transforming the mechanical energy embraced into electrical energy. For industrial use, convenient mechanical power is provided by using general purpose motors with standard dimensions and characteristics. For pumped-storage applications, pipeline compression and ship propulsion application the largest electric motors are used with ratings reaching 100 megawatts. EV is another name of an electric vehicle, one or more for propulsion. They use electric motors. From off-vehicle sources by electricity and collector systems electric vehicles may be powered by a solar panel or may be self-contained by a battery to change the fuel to electricity[2]. Electric spacecraft, electric aircraft, underwater vessels, road and rail vehicles are not limited so include EVs.EVs first came into existence for motor vehicle propulsion in the mid-19th century, when electricity was one of the favored techniques that offered a degree of comfort and ease of operation that the gasoline cars of the time were not able to do it. For motor vehicles in almost 100 years, the dominant propulsion method has been modern internal combustion engines, but electric power has been other vehicle types, such as smaller buses and trains of all types, have remained commonplace.The overall analysis approach is developed as follows for some of the engines used for the review. Section 2 mentions the electric car. Section 3 deals with the approaches employed. The chapter 4 includes a results comparison. Finally, in conclusion, the entire process is finished[3].

Evaluation of Motor Drive for an Electric Vehicle:

Induction motor:

An asynchronous motor or induction motor with an AC electric motor in which the electric current in the motor is from the magnetic field of the stator winding, the rotor necessary to generate torque is obtained by induction by electromagnetics. An induction motor can be used without electrical connections to the rotor.Fabricated. In an induction motor, the rotor may be either squirrel-cage style or wound type. Seen in Figure 1 the related induction motor circuit. The winding of the stator due to electromagnetic induction the magnetic field is produced and the current induced in the rotor generates the torque that works. The theory of an induction motor[4].

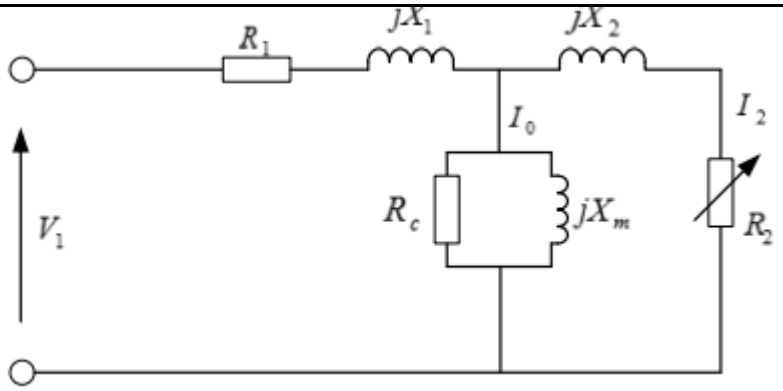

Fig 1: Equivalent circuit of induction motor

The Electromagnetic Induction Act of Faraday is that there is no electrical link between works. Stator and rotor, which vary from other engines (DC, Synchronous). The AC, because of AC oscillations, Power given to the stator generates a magnetic field This shifting magnetic field generates a change in magnetic field as per Faraday's law, an attractive change that incites a current in rotor windings. Table 1 indicates the induction-motor parameters and scores[5].

Table 1: Parameter and Ratings of Induction Motor

Motor parameters	Ratings
Rotor inertia (j)	0.000145 kgm^2
No. of. Poles (p)	4
Stator resistance (R_s)	0.1607 Ω
Rotor resistance (R_r)	0.1690 Ω
Rotor self-inductance (L_r)	7.22 mH
Stator self-inductance (L_s)	7.2 mH
Magnetizing inductance (L_m)	6.38 mH
Rated power	200 W
Rated speed	3621 rpm

Switched Reluctance Motor:

Under torque, a type of stepper motor is operated and a switched reluctance is considered to be Engine (SRM). The harmful power is given to the stator which, when the rotor is greater than the rotor, Compared to the other motors of DC[6]. The mechanical architecture of the engine does not require the Power to the moving portion, since the switching was very complicated in the electrical design, to deliver the power, systems are needed. The electronic devices here are used preciously to have the SRM settings and the switching time are part of the torque ripple.The design structure of the corresponding motor is shown in figure 3. The torque ripples can be minimized through the design of new controllers.The synchronization is takes place in the current flow when the load is switched to the coils, then the generator can run at high speed rather than the conventional type of motors. The prime mover is work with the generator and the motor[7].

Table 2: SRM Parameter and Values

Motor parameters	Values
Maximum efficiency	95 %
Current in rms	241
density of torque	45 Nm/L
Maximum torque	400Nm
Maximum output power	50kW
Maximum speed	1200-6000 r/min
Maximum DC voltage	500V
Slot fill	54.1 %
Strands in one wire	13 turns
Series trans per pole	13 turns
Wire diameter	0.95mm
Winding type	concentrated
Stator rotor gap	0.5mm
Stack length	135mm

The conversion theory is carried out by a DC motor system to render the mechanical energy (Mechanical to electric). The magnetic fields and each form of motor can be generated. The internal mechanism for altering the current flow to the motor. The commonly used engines the DC form, in which the supply is directly from the distribution generators, is referred to. A traditional one when using the supply voltage for the windings, the motor will vary its rpm[8].

CONCLUSION

The above described qualities of the various motor drives used in electric vehicles. An attempt has been made to provide the reader with a superior view of different motor drives.

Used in applications for electric vehicles. The key inference from this paper that can be taken is, the induction motor drive and the brushless DC engine are the most commonly used motor drives. Induction motor drives are the most cost-effective among comparable motor drives. With respect to the brushless motor drive is the most powerful, the most productive. DC motor drives are excellent with a standout among the most advanced technologies, as a great deal of analysis has been done on them throughout the years. An axial flux permanent magnet motor has been intended for vehicle applications. The brushless DC motor drives are the most dependable innovations and require minimum amount ofmaintenance. The composition of axial flux permanent magnet brushless DC motor can gives the preferable performance rather than other motors.

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