

# Electric Vehicles on Manual Gears System

Mohd Jawaad Khan

*4<sup>th</sup> year student of Electrical Engineering from Swami Vivekanand Institute of Engineering & Technology, (Punjab) and Founder Director of Electric Cars Works India Pvt Ltd.*

-----\*\*\*-----

**Abstract :-** This paper provide the information of running electrical vehicles on the manual gear system. The paper describes the the experiment which I had done on a car and run it on manual gear system. The major componenets are the gear box bldc motor car frame, bearing, axel and lead acid batteries. The paper shows a prototype which run on manual gear system.

**Keywords:-** electric vechile, manual gear box, batteries, BLDC motor, braking system, transmission system.

## 1. INTRODUCTION

Electric vehicles are that vehicles in which no internal combustion are used. All the power is directly from motor to tyres through specific system. These days electric vehicles are quite famous.

So first electric car was made around 1832, Robert Anderson develops the **first** crude **electric vehicle**, but it isn't until the 1870s or later that **electric cars** become practical.

What was the problem during in 19<sup>th</sup> century that these cars were not that famous.

The reason is pollution is very low ,oil is cheap and is in very huge quantity. Before that the horse cabs were used but these cabs are polluting cities with there raw material which cause various health problems and also causing pollution. So that time combustion engines are very beneficial and generation oved to combustion engines, but now in 21<sup>st</sup> century same problem is here but we are facing it in other manner that is air pollution. Now we are shifting to electric cars are many countries are using these cars but in India it will take time to establish full era of electric cars.

Now in the market we see electric cars with automatic system but this paper is about electric car which works on manual gear system.

Before we discuss how electric car work on manual gear. We have to know about manual and automatic transmission system.

- **Easier to use** – Although there’s nothing inherently difficult about shifting gears and working a clutch, it still takes a bit of practice before most drivers are comfortable learning to use each of their limbs independently in order to control a manual transmission vehicle. Automatic transmissions, by comparison, are much simpler and take drivers significantly less time to learn.
- **Less manually restrictive** – Most new drivers are taught that the safest way to drive is to keep both hands firmly on the wheel at all times. This is possible when driving an automatic transmission vehicle, but is not possible with a manual transmission.
- **Better for hilly areas** – If you’re a less experienced driver, you may find that navigating steep inclines in a manual transmission is difficult, especially if you’re attempting to do so from a dead stop. Automatic transmissions take care of this issue, enabling your car to operate efficiently no matter how steep the hill might be.
- **Greatly reduced risk of stalling** – There are few things more embarrassing and awkward than accidentally stalling your vehicle right when the traffic light changes. This isn’t a common problem for those driving automatic transmission, where stalling will only occur if there’s a mechanical problem in the vehicle.
- **Easier to use in heavy traffic** – Overall, more work goes into starting, accelerating, decelerating, and stopping manual transmissions. This isn’t normally a problem, but in heavy traffic where a car isn’t able to get up to speed, drivers may notice that the constant starting and stopping becomes a difficult chore. Automatic transmissions allow the driver to move through heavy traffic without having to do more than push a single pedal

- **Less expensive to purchase** – If you're car shopping on a budget, then there's really no contest between the manual and the automatic. On average, a manual transmission will cost you about a thousand dollars less than an automatic of the same model.
- **Cheaper to maintain** – With all of the added machinery that goes into the automatic transmission, it can end up costing you big bucks just to keep it running properly. Manual transmission cars require very little maintenance, and generally maintenance and repairs end up being significantly less costly. Be warned, however, because one thing that a manual has that the automatic doesn't have to worry about is the clutch, and if that thing quits on you, then you could be in trouble.
- **Better fuel efficiency** – Overall, manual transmission engines are less complex, weigh less, and have more gears than automatics. The end result is that you'll end up getting more kilometres out of the petrol you pump in than you would with an automatic. Manual transmissions have been known to save drivers between 5% and 15% on their fuel costs.
- **Less likely to be stolen** – With the increasing number of automatic transmissions finding their way onto roads, there's an entire generation that has never learned the finer points of manual transmission operation. This means that should a car-thief decide to give your car a closer inspection in preparation for stealing it, there's a fairly good chance that simply having a manual transmission will be enough to deter the criminal.
- **Better control** – Automatic transmissions are designed to choose the best gear for any situation, but they tend to err on the side of caution, shifting to too high of a gear and wasting engine power. At the same time, they are built to respond to conditions as they are encountered, which doesn't allow for drivers to either anticipate an oncoming condition, or to purposely select a lower gear for an added boost of power. Manual transmissions give drivers greater control over the vehicle.

Basically, automatic transmissions are easier to use and more comfortable for the driver, while manual transmission vehicles are less expensive and more involved.

Now what happens in manual gear system, if we shift transmission to heavier gear, we will get more torque and low rpm and if we shift transmission to lighter gear we will get low torque but high rpm.

#### **NOW WHAT HAPPEN IF WE USE ELECTRIC CAR ON MANUAL GEAR SYSTEM?**

If we use electric car on manual gear system we will get very interesting results, which are

Higher speed

Good torque

Better efficiency

Smoothness

Now recently I have done this practically I transform a scrap into electric car with this manual gear system and give it a name volta.

## Master innovator



Mohd Jawaad, a student of Swami Vivekanand Institute of Engineering and Technology, poses with an electric car, conceptualised by him, at Sector 27 in Chandigarh on Wednesday. TRIBUNE PHOTO: MANOJ MAHJAN

- Mohd Jawaad, a student of Swami Vivekanand Institute of Engineering and Technology, developed an electric car.
- Named as SVIET Volta, it took more than 15 months to develop this car, which can touch the speed of 110 km per hour.
- Jawaad is a student of B Tech (sixth semester) at the Electrical Engineering Department of the institute.
- The prototype of the car has been successfully tested. The research and development of the car was fully funded by the institute.

This car consist of 3000w of bldc motor with 280ah of controller and batteries contain lead acid batteries of 12V and 110ah connected in series.

Now what what happen when we test this car on road, the results are very amazing

The car gross weight is 550kg and the engine lift weight upto 1100kg over all weight and its speed with 2 person goes upto 110km/h and as I have used lead acid batteires so the mileage is between 50/60km.

According to theories the 3KW motor can't lift that much of weight and also the theoretical speed is 50-60km/h max. But why this car speed goes upto 110km/h?

The answer is the manual gear system. The manual gear system increases the rpm of motor from 3000 to 6000

And also gives basic torque which it need for moving.

### ENGINE DESIGNING

Engine design is not too complicated as I have use only gear box of manual transmission car. What I have did is that I had removed the transmission system which was attached to the gear box and design extra parts which were fitted with the box and engine use of bearing set and a steel plate which full up the whole remaining area of gear box.

This way our combustion engine is converted into electrical with higher speed and higher efficiency by using less power of motor.



**ABOUT VOLTA:-**

VOLTA is the India’s first electric car which works on manual gear system. This car has four gear and one reverse gear. This car can also run on solar and also has inverter feature.

The most amazing thing is if this car is commercialized it will cost only 2.5 with all features and it will be the second most economical car after Tata nano.

The design and all looks has been made by Mr. Jawaad Khan. This car is full hand made. This car is made up of full iron no fibre is used.

**Features:-**

<b>SPEED</b>	<b>110km/h (while testing)</b>
<b>BACKUP</b>	<b>60km (Depend on Batteries)</b>
<b>TORQUE</b>	<b>24NM</b>
<b>MAX LOAD LIMIT</b>	<b>1200kg</b>
<b>SPEED WITH LOAD</b>	<b>60km/h</b>
<b>NET WEIGHT</b>	<b>550kg</b>
<b>GEAR RATIO</b>	1: 43/12, 3.583 2: 39/18, 2.166 3: 32/24, 1.333 4: 27/30, 0.900 Reverse: 37/22x22/11, 3.363 Final : 87/20, 4.350
<b>MOTOR</b>	<b>3000W</b>
<b>BATTERIES</b>	<b>Li-ions 48V</b>
<b>ELECTRIC POWER</b>	<b>440Ah</b>

This car is two seater while this can made it four seater but according to its looks two seater is perfect. This car took 6 months for making and 2 years for research

**TECHNICAL POINTS:-**

**POWER TRANSMISSION**

Clutch type: Dry, single disc

Transmission: 4-Speed (forward all-synchromesh) F8B gearbox

**Gear Ratios:**

1: 43/12, 3.583

2: 39/18, 2.166

3: 32/24, 1.333

4: 27/30, 0.900

Reverse: 37/22x22/11, 3.363

Final: 87/20, 4.350

**BRAKE SYSTEM**

Type: 4-wheel hydraulic

Brakes: [Front] Tokico single piston disc brakes, [Rear] mechanical drum brakes (leading and trailing)

**WHEEL AND SUSPENSION**

Tire Size: 145/70 SR12 (tubeless tire)

Tire Pressure: [Front] 27psi, [Rear] 31psi

Suspension: [Front] Koni shock absorber struts, dual; [Rear] Fiberglass leaf-spring suspension with KYB dampers, dual

**WEIGHT**

Gross Vehicle Weight: 550kg kg

Maximum Loading Capacity: 600kg (including passengers)

Ground Clearance: 175mm

**STEERING**

Turning Radius: 4.4m

Steering Gear Box: Rack and Pinion

Toe-in: 2~4mm

Camber Angle: 1 degrees, 20 minutes

Caster Angle: 3 degrees, 15 minutes

Trail: 13mm

King Pin Angle: 12 degrees,

Batteries:- 12x4=48v series combination

Motor:- BLDC 3000w