

Fabrication of Mono Car

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ABSTRACT:

A design project with close relationship to present technology and the student's environment provides hands-on engineering experience and training of general engineering skills. Electric vehicles are examples of technology. Electric vehicles are a Real-life educational design project. According survey so many are designed and modified the wheel chair for the users comfort and necessity based on our thoughts, firstly we got a idea about the wheel chair, then the modification of wheel chair modified as a simple single user mini car is known as mono car. This car is depend on electric DC motors which is completely runs with mechanical energy by using electric energy this is fully fabricated with acrylic plastic material. The electric car (also known as electric vehicle or EV) uses energy stored in its rechargeable batteries, which are recharged by common household electricity. Unlike a hybrid car—which is fueled by gasoline and uses a battery and motor to improve efficiency—an electric car is powered exclusively by electricity.

KEY WORDS:

D C Motor Principle, , Battery principle, Welding, abrication Work , Motors, Battery, Accelerators, Frame, Chains, Free wheels, Rare wheels, Cranks, Seat.

INTRODUCTION:

The concept of mono car was derived from the development of the wheel chair technologies and their performance. It was developed through the using electric power. Based on the electric motor it works, with a good results and it involves the design, fabrication and construction. It was designed through electric DC motor which used by power battery. The electric battery gives energy to motor and this motor works and runs the wheel chair and having some gear mechanisms and more. According survey so many are designed and modified the wheel chair for the users comfort and necessity based on our thoughts, firstly we got a idea about the wheel chair, then the modification of wheel chair modified as a simple single user mini car is known as mono car.

An electric vehicle (EV), also referred to as an electric drive vehicle, uses one or more electric motors or traction motors for propulsion. An electric vehicle may be powered through a collector system by electricity from off-vehicle sources, or may be self-contained with a battery or generator to convert fuel to electricity. EVs include road and rail vehicles, surface and underwater vessels, electric aircraft and electric spacecraft. EVs first came into existence in the mid-19th century, when electricity was among the preferred methods for motor vehicle propulsion, providing a level of comfort and ease of operation that could not

be achieved by the gasoline cars of the time. The internal combustion engine (ICE) has been the dominant propulsion method for motor vehicles for almost 100 years, but electric power has remained commonplace in other vehicle types, such as trains and smaller vehicles of all types.

LITERATURE REVIEW:

Some scholars suspect that the history of the wheelchair begins sometime between the 6th and 4th centuries BCE. Wheeled chairs may have entered Europe about the 12th century. However, the first recorded use of self-propelled chairs by disabled people in Europe dates to the 17th century. 1655 disabled German watchmaker Stephan Farfler made a three-wheeled chair that he could propel by use of a rotary handle on the front wheel. So-called mechanical "invalid chairs," from the late 17th century. They were designed as a means of transport primarily for the wealthy. About 1750 English inventor James Heath introduced the bath chair intended for use by ladies and invalids.

In the 18th century, wheelchairs began to appear in surgical and medical instrument catalogues, where they were advertised as transport vehicles for patients. In 1932, disabled American mining engineer Herbert A. Everest and American mechanical engineer Harry C. Jennings introduced the cross-frame wheelchair, which became the standard design for tubular-steel folding chairs.

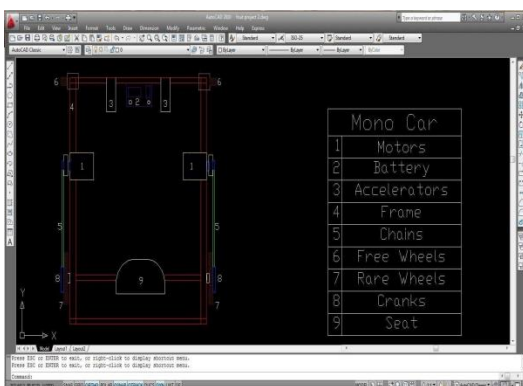
The development of ultra lightweight models. Influential experimental designs included the Quickie, an ultra lightweight rigid-frame wheelchair introduced in 1979 by Marilyn Hamilton, Jim Okamoto, and Don Hellmann. The electric-powered wheelchair was invented by George Klein who worked for the National Research Council of Canada, to assist injured veterans after World War II. Among new designs introduced in the first part of the century was the push-rim-activated power-assisted wheelchair (PAPAW). The PAPAW was a hybrid of electric and manual wheelchair technologies.

Electric motive power started in 1827, when Slovak-Hungarian priest Ányos Jedlik built the first crude but viable electric motor, provided with stator, rotor and commutator, and the year after he used it to power a tiny car. A few years later, in 1835, professor Sibrandus Stratingh of University of Groningen, the Netherlands, built a small scale electric car and a Robert Anderson of Scotland is reported to have made a crude electric carriage sometime between the years of 1832 and 1839. Around the same period, early experimental electrical cars were moving on rails, too. American blacksmith and inventor Thomas Davenport built a toy electric locomotive, powered by a primitive electric motor, in 1835. In 1838, a Scotsman named Robert Davidson built an electric locomotive that attained a speed of four miles per hour (6 km/h). Between 1832 and 1839 (the exact year is uncertain), Robert Anderson of Scotland invented the first crude electric carriage, powered by non-rechargeable primary cells.

In England a patent was granted in 1840 for the use of rails as conductors of electric current, and similar American patents were issued to Lilley and Colten in 1847. By the 20th century, electric cars and rail transport were commonplace, with commercial electric automobiles having the majority of the market. Over time their general-purpose commercial use reduced to specialist roles, as platform trucks, forklift trucks, ambulances, tow tractors and urban delivery vehicles, such as the iconic British milk float; for most of the 20th century, the UK was the world's largest user of electric road vehicles. Electrified trains were used for coal transport, as the motors did not use precious oxygen in the mines. One of the earliest rechargeable batteries - the nickel-iron battery - was favored by Edison for use in electric cars. EVs were among the earliest automobiles, and before the preeminence of light, powerful internal combustion engines, electric automobiles held many vehicle land speed and distance records in the early 1900s. They were produced by Baker Electric, Columbia Electric, Detroit Electric, and others, and at one point in history out-sold gasoline-powered vehicles.

In fact, in 1900, 28 percent of the cars on the road in the USA were electric. EVs were so popular that even President Woodrow Wilson and his secret service agents toured Washington DC in their Milburn Electrics, which covered 60–70 miles per charge. A number of developments contributed to decline of electric cars. Improved road infrastructure required a greater range than that offered by electric cars, and the discovery of large reserves of petroleum in Texas, Oklahoma, and California led to the wide availability of affordable gasoline, making gas-powered cars cheaper to operate over long distances. Also gasoline-powered cars became ever easier to operate thanks to the invention of the electric starter by Charles Kettering in 1912, which eliminated the need of a hand crank for starting a gasoline engine, and the noise emitted by ICE cars became more bearable thanks to the use of the muffler, which Hiram Percy Maxim had invented in 1897. As roads were improved outside urban areas electric vehicle range could not compete with the ICE. Finally, the initiation of mass production of gasoline-powered vehicles by Henry Ford in 1913 reduced significantly the cost of gasoline cars as compared to electric cars. In the 1930s, National City Lines, which was a partnership of General Motors, Firestone, and Standard Oil of California, purchased many electric tram networks across the country to dismantle them and replace them with GM buses.

DESING OF MONO CAR:



WORKING PRICIPLE:

D C Motor Principle:

Working principle of a DC Motor. A motor is an electrical machine which converts electrical energy into mechanical energy. The principle of working of a DC motor is that "whenever a current carrying conductor is placed in a magnetic field, it experiences a mechanical force. It is based on the principle that when a current carrying conductor is placed in a magnetic field, it experiences a mechanical force whose direction is given by Fleming's Left hand rule.

Battery Principle:

Batteries operate by converting chemical energy into electrical energy through electrochemical discharge reactions. Batteries are composed of one or more cells, each containing a positive electrode, negative electrode, separator and electrolyte. The state-of-charge of a battery is the percentage of its capacity available relative to the capacity when it is fully charged. By this definition, a fully charged battery has a state-of-charge of 100% and a battery with 20% of its capacity removed has a state-of-charge of 80%. The state-of-health of a battery is the percentage of its capacity available when fully charged relative to its rated capacity.

Fabrication:

In fabrication process we have taken the plastic sheet which is made up of acrylic material (Acrylic fibers are synthetic fibers made from a polymer) according to the dimensions which we required for our project that was taken on the sheet. The sheet has been cut into 4-rectangular pieces of Dimensions: 18x30(inches), 22x30(inches), 4x30(inches) & 13x30(inches) Two triangular pieces of base 8 inches& height 10 inches .The above pieces are joined to the frame with the help of nuts and bolt necessary joints are attached with industrial glue.

Welding:

Welding is the most economical and efficient way to join metals permanently. It is the only way of joining

two or more pieces of metal to make them act as a single piece. Welding is vital to our economy. It is often said that over 50% of the gross national product of the U.S.A. is related to welding in one way or another. Welding ranks high among industrial processes and involves more sciences and variables than those involved in any other industrial process

Cutting:

We used hand cutting machine to cut acrylic sheet with the help of abrasive cutting wheel. Abrasive particles are brittle, and fracture after some amount of use, creating new sharp edges that will again perform. Abrasive materials have two properties: high hardness, and high friability. Friability means that the more abrasion.

Fixing:

In this outer fabrication process we had done the acrylic plastic sheet into required dimension pieces according to our design after that it fixed to the chassis with the help of nuts and bolts the arrangement is done with all our requirements. Maintenance, repair and operations (MRO) or maintenance, repair, and overhaul involves fixing any sort of mechanical, plumbing or electrical device should it become out of order or broken (known as repair, unscheduled, or casualty maintenance). It also includes performing routine actions which keep the device in working order (known as scheduled maintenance) or prevent trouble from arising (preventive maintenance). MRO may be defined as, "All actions which have the objective of retaining or restoring an item in or to a state in which it can perform its required function. The actions include the combination of all technical and corresponding administrative, managerial, and supervision actions.

Finishing:

After all arrangements like painting, cutting, drilling and fixing the seat. we had given the outer body shape and model and also we had done the stickering for looking purpose as shown below the fig



PARTS AND ITS WORKING:

Motor:

To minimize overall weight and size, miniature PM motors may use high energy magnets made with neodymium or other strategic elements; most such are neodymium-iron-boron alloy. With their higher flux density, electric machines with high-energy PMs are at least competitive with all optimally designed singly fed synchronous and induction electric machines. Miniature motors resemble the structure in the illustration, except that they have at least three rotor poles (to ensure starting, regardless of rotor position) and their outer housing is a steel tube that magnetically links the exteriors of the curved field magnets.

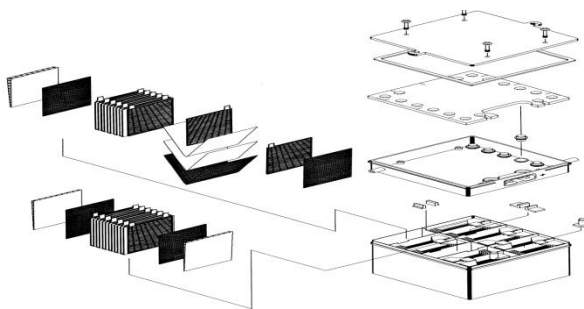


Specifications:

- It is a DC motor
- Power is 350 waltz
- Geared side shaft motor with 82% efficiency
- speed of motor without load 2700rpm
- with load of body 80 rpm
- with load of total body 40 to 70rpm
- torque is 60 to 120kg

Battery:

Lead-acid aircraft batteries are constructed using injection-molded, plastic monoblocs that contain a group of cells connected in series. Monoblocs typically are made of polypropylene, but ABS is used by at least one manufacturer. Normally, the monobloc serves as the battery case, similar to a conventional automotive battery. For more robust designs, monoblocs are assembled into a separate outer container made of steel, aluminum, or fiberglass-reinforced epoxy. Cases usually incorporate an electrical receptacle for connecting to the external circuit with a quick connect/disconnect plug. Two generic styles of receptacles are common: the "Elcon style" and the "Cannon style." The Elcon style is equivalent to military type MS3509. The Cannon style has no military equivalent, but is produced by Cannon and other connector manufacturers. Batteries sometimes incorporate thermostatically controlled heaters to improve low temperature performance. The heater is powered by the aircraft's AC or DC bus. Assembly drawing of a typical lead-acid aircraft battery; this particular example does not incorporate a heater.



Assembly Drawing of a Lead-Acid Battery

Specifications:

- It is a power zone battery
- Weight of battery is 8.7kg
- It gives 12volts output
- It runs on 28 amp hours

Wheels:

A wheel is a circular component that is intended to rotate on an axle bearing.

The wheel is one of the main components of the wheel and axle which is one of the six simple machines. Wheels, in conjunction with axles; allow heavy objects to be moved easily facilitating movement or transportation while supporting a load, or performing labor in machines. Wheels are also used for other purposes, such as a ship's wheel, steering wheel, potter's wheel and flywheel. In this wheels format we used polymer wheels and caster wheels in our project the polymer wheels are used as rear wheels and caster wheels are used for front wheels.



Specifications:

- Front wheels are caster wheels with 20 to 180kg withstand
- Back wheels are polymer wheels with 200 to 600kg withstand
- Weight of mono car:-
- Chassis weight is 12kg
- Total body is 22kg
- With load of human weight it can run 50 to 80kg.

Chains:

A bicycle chain is a roller chain that transfers power from the pedals to the drive-wheel of a bicycle, thus propelling it. Most bicycle chains are made from plain carbon or alloy steel, but some are nickel-plated to prevent rust, or simply for aesthetics.



Accelerators:

The ECM is a type of electronic control unit (ECU), which is an embedded system that employs software to determine the required throttle position by calculations from data measured by other sensors, including the accelerator pedal position sensors, engine speed sensor, vehicle speed sensor, and cruise control switches. The electric motor is then used to open the throttle valve to the desired angle via a closed-loop control algorithm within the ECM.



Other Parts:

Acrylic Plastic Sheet, Cast Iron Rods, Washers, Nut and bolts, L-clamps, Thread rods are used to fix at appropriate position to support and fixing purpose. These fixing is based on initial drawing dimensions. We can more care while assembly process is going on.



STEERING SYSTEM:

In this project we used the two motors which are arranged in accelerator is connected to the negative terminal of another accelerator and vice versa. These two terminals are connected to the battery positive & negative terminal. The project is meant to produce a simple moving vehicle called mono car and which is used for single user purpose and it can run with the speed of 40 to 70rpm.

When the terminals of accelerators and battery are connected alike (positive to positive & negative to negative)

Right Motor	Left Motor	Direction
1	1	Forward
1	0	Left
0	1	Right
0	0	Stop

When the terminals of accelerators and battery are connected alternate position (positive to negative & negative to positive)

Right Motor	Left Motor	Direction
1	1	Backward
1	0	Left
0	1	Right
0	0	Stop

RESULT & CONCLUSION:

The project is meant to produce a simple moving vehicle called mono car and which is used for single user purpose and it can run with the speed of 40 to 70rpm We designed a simple vehicle called mono car which costs less than that available in the market. We are very good at what we have done and had fun in doing it. Our mono car can carry up to a load of 120kg's it can run simply without any noise. We had tested our project by several times with various loads.

FUTURE EXTENSION:

- It can used for regenerative system by using solar panels we can produce electricity, by this electricity, the vehicle moves.
- We can include the braking system with some modifications it will help to control the vehicle

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