

Electric Automobiles

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History of Electric Cars

- The proclaimed perfected electric car was built in 1884.
- Electric cars existed before the Internal Combustion Engine was built for cars.
- Exceeded the 100km/h (62mph) in 1899 by Jamias Contente.
- Electric car industry was first developed and widely accepted in Europe.

"Electric car -." Wikipedia, the free encyclopedia. Web. 30 July 2009.
<http://en.wikipedia.org/wiki/Electric_cars#1830s_to_1900s:_Early_history>.

History of Electric Cars (cont.)

- In 1895 interest in electric cars began in the United States. Which many innovations followed this interest.
- First fleet of electric cars was the New York taxis system in 1897.
- Once oil was found in Texas the electric market started to decline because gasoline was cheaper and more accessible.
- The emergence of the Lithium-Ion battery made it possible for electric vehicles to begin to compete with the Internal Combustion Engine.

History of Electric cars (cont.)

Even though the early electric vehicles could only go slow and had limited mileage they still were better than gas cars in that:

- They did not have the smell, vibration or level of noise that gas engines did.
- They also did not require a crank start so turning the car on was easier.
- It was considered a car a woman could drive because they were easy to drive.
- In major cities the limited mileage did not matter so electric cars became mostly town cars.



Improvements To The Lithium-Ion Battery

- Alan Gotcher's company produced a advancement to the Lithium-ion battery.
- His company uses nano-titanite which does not require a membrane layer allowing for more lithium ions in the cells.
- The battery has four times as many watts per kilogram and operates safely in a wider variety of temperatures(-50-75°C as opposed to the 0-40°C).
- Alan's company has tested the battery intesively to make sure it is safe.

Improvements to the Lithium-Ion Battery (cont.)

- A group out of MIT lead by Dr. Gerbrand Cedar, developed a way to move the ions from the cathode side to the anode side and back faster.
- The cathode side contains small tunnels that are perfect for the travel of the ions. To speed this up they spread a Lithium Phosphate glassy surface on to the cathode side.
- 200C 18s, 400C 9s full discharge.
- Tested only 50 times but no signs of degradation.
- Requires 180w of power for the five minutes it takes to charge.

"100-Fold Lithium-ion Battery Breakthrough | GM-VOLT : Chevy Volt Electric Car Site." [GM-Volt: Chevy Volt Electric Car Site](http://gm-volt.com/2009/03/11/100-fold-lithium-ion-battery-breakthrough/). 14 July 2009 <<http://gm-volt.com/2009/03/11/100-fold-lithium-ion-battery-breakthrough/>>.

Safe Batteries

- Produced in Japan where there are strict Environmental laws
- Uses no lead and no heavy metals or toxic metals
- When life is mostly used up it can be used to power a backup grid.
- Tesla is trying to maximize the amounts reused and recycled from the battery, and minimize the amount thrown out.
- The batteries are ground up and the materials that can be reused or recycled are then taken out such as the aluminum.

Battery Replacement

- A company called Better Place produced an automated battery swapping station that can replace a dead battery in less time than pumping gas.
- The unit will cost 500,000 dollars per station. This company also charges the batteries as though they are being leased. The company buys the electricity and the batteries and the consumer must pay for the miles that the electricity gives them.

Squatriglia, Chuck. "Better Place Unveils an Electric Car Battery Swap Station | Autopia | Wired.com." Wired News. 14 July 2009 <<http://www.wired.com/autopia/2009/05/better-place/>>.

New Motors

- Most electric car motors are in one piece either in the front or back of the car. A new paper was written on a possible way to solve the problem of the wasted power in between the motor and wheels.
- This paper proposed that each car should have four motors or two directly in the tires that propel the car. This lessens the required materials by needing less copper to be wound and less stator core iron.

- These motors allow for a higher power density and efficiency.
- Since the two motors can rotate at different speeds they can act as a mechanical differential.
- Meant for small European towns where pollution is a issue.

S. Sakai, H. Sado, and Y. Hori, "otion control in an electric vehicle with four independently driven in-wheel motors," *Mechatronics, IEEE/ASME Transactions on* 4, no. 1 (1999): 9-16.

The End

Electric Cars Presentation
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