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COIMBATORE-35

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DEPARTMENT OF MECHANICAL ENGINEERING

COURSE NAME: 19EEO302 Introduction to Hybrid and Electric Vehicles

IV YEAR / VII SEMESTER

“Electric Vehicle Design Initiatives in India” **CASE STUDY**



What We'll Di



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TOPIC OUTLINE



1. Overview
2. Challenge
3. Strategy
4. Education & research
5. Design Integration



OVERVIEW



- The growing environmental consciousness and seeing the adverse effects of climate change, the governments in India are supporting initiatives for development of eco-friendly mobility solutions including electric vehicles.
- To offset the disadvantages of electric vehicles regarding range, weight and charging time, efforts have to be made to orient the use of electric vehicles to niche situations and niche markets where these limitations can be leveraged by design.
- Confined spaces like airports, industrial campuses, gated communities lend themselves easily to vehicle electrification.
- When the technology does not offer major physical constraints as in electric vehicles in comparison to the traditional vehicles, design criteria will have to be predominantly use oriented - psycho-physiological, cultural, contextual and environmental.
- The physiognomy / aesthetics of electric vehicles can be and should be quite different from what we see today in cars or hybrid vehicles to depict the uniqueness of this breed of products. In this presentation some design case studies based on the above would be discussed.



CHALLENGE

- Although first electricity driven car was driven in 1880s, it lost the race to gasoline-powered vehicles due to the deficiencies of range, weight and time of charging.
- Despite having made great strides in technology in more than hundred years, the electric vehicle suffers from same problems even now.
- What is however encouraging is that serious thought is being given to add value and make these vehicles viable ‘somehow’ and ‘somewhere’. The rising cost of crude oil is helping this movement.
- Advantage of this movement is that it is throwing challenges to various technology disciplines, and the persons working in these areas are doing their best to find solutions and attracting research investment. With these inputs, it is bound to yield positive results in due course.

Changes in India – Business Initiatives

India – Business Initiatives

Commercial production of Tata's first electric car to start in Q1 of 2011
–S Kalyana Ramanathan
–| 2010-11-12 01:51:00



*The most keenly awaited **electric car from the Tata Motors stable**, the Indica Vista EV, will go into commercial production from the first quarter of 2011, said a senior official with Tata Motors European Research Centre (TMERC).*

***The electric version of the company's blockbuster mini truck Ace** will go into commercial production from next month. The official said the fuel cell technology in a demonstrable format was being tested now, but the product was far from ready for the market. The fuel cell technology was the most coveted technology among auto makers around the world, he added.*

Will electric car reign in Indian roads?
By Binu Paul, SiliconIndiaSaturday, 05
Bangalore, February 2011, 06:24 IST

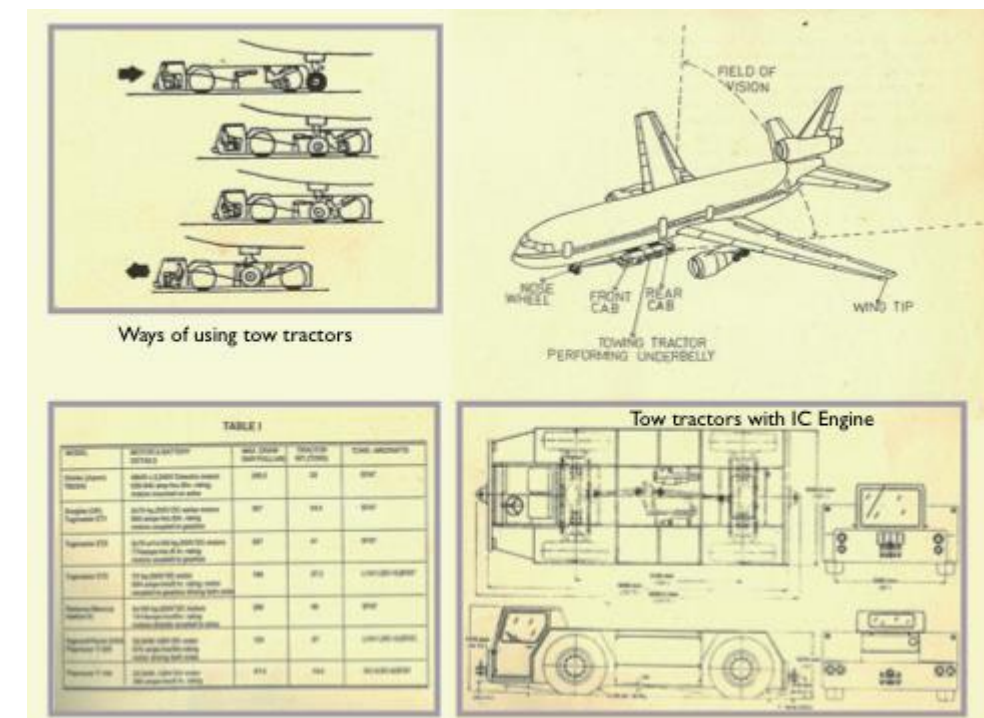
Although still in the nascent stage, the electric car market sees a boom in the coming years as the car makers have realized that in an era of alternate fuels, this will most likely influence the future in a big way. The concept of electric vehicles has proven to be a strong business model with great commercial potential that applies smart technology.

Going by the experts' estimates, India will see a five-fold growth in population in the urban areas that will further worsen the problem of air and noise pollutions – a condition that can only be addressed by the electric vehicles that are free of pollution with low running and maintenance costs and easy to handle.



STRATEGY

- As a strategy to make the electrical vehicles acceptable and usable, efforts can be made to design and orient the use of specialized electric vehicles to niche situations and markets, where these vehicles can have an edge over petrol driven conventional vehicles.
- This needs to be understood well. If the limitations of the electric driven vehicles is leveraged by design, special vehicles for special applications / special situations can become viable and common-place, thereby relieving the pressure on oil, environment (pollution), health & carbon footprint.
- The limitation of range if understood, can let us identify areas where range of a vehicle is not important. One such example is airport.
- Airports have become an essential infrastructure of a city however small. Airports are highly traffic and surface vehicle intensive and therefore one of the most polluted area of a cityscape.





EDUCATION AND RESEARCH

- If analysed, the airport can lend itself very easily to vehicle electrification. It is now easy to think that all busses running in the airport for ferrying passengers to and from aircraft to the terminals could be electric vehicles. One can argue that aero-bridges obviate the need for such traffic.
- But then aero bridges in the context of developing countries like India are available only in a few large city airports.
- The rest are still dependent on gas guzzling, Carbon Dioxide fuming buses for ferrying millions of passengers across the airports all over the country.
- Although it seems so obvious that we should have ‘electric ferry busses’ on the airports, but I have not seen even one electric bus on any Indian airport, despite paying so much lip service to pollution and carbon footprint by government, media and civil society.
- Not only busses, but all the vehicle at the airports could be electricity driven, which can include aircraft tow tractor, baggage and food trolley towing tractors, maintenance runabouts, crew vehicles etc.
- It could be a small but a very important beginning.



- A new Masters and Doctoral level program was started from last year for education and research into ‘mobility and vehicle design’ issues at Industrial Design Centre, IIT Bombay, to create a body of specialist vehicle designers, who can address the problems of future mobility in the country, and also to develop the research culture in this discipline.
- Special emphasis is given to eco-friendly vehicle development and research. Light weighting is a very important criterion for electric vehicles, to make them run cheaper and longer. Initiatives to develop small electric vehicles are undertaken for situations like campuses, gated communities, industrial estates where heavier vehicle are not necessary for transport and smaller ones are adequate enough.
- Research is being conducted on light weighting of these vehicles to reduce the power consumption further.
- Integrated single unit reinforced plastic bodies for 2-wheelers and 3-wheelers are built and tested to achieve this objective. By designing ‘single-seat mini electric scooter’ and similar small vehicles, examples were created, and prototypes were developed to prove the concepts.
- These concepts can be adopted and developed by ‘research-shy’ companies for manufacture and marketing. _x0002_



DESIGN INTEGRATION

- Integrating computer and communication technologies with electric vehicle can become a big driver for development.
- One such example can be the development of autonomous road trains for small tourist destinations / archeological locales, which are sensitive to pollution from high traffic during the season.
- Pollution free transport seems to be an imperative need.
- A project is being undertaken at IIT Bombay to develop a mobility facility at Elephanta Island, a small tourist spot near Mumbai, for tourists who visit the ancient caves there.
- An autonomous mini road train running on battery bank charged through Solar panels and following a ‘tour line’ is being contemplated.
- Besides being a facility for tourists, it offers an additional means of livelihood to the local community who are dependent on tourism.
- It is to be showcased as a prototype for mobility solution in small towns particularly the tourist towns.



THANK YOU