

Vehicles Emerging Technologies from Maintenance Perspective

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Abstract: New technologies in the vehicle are appearing every day, as well as the requirements of present-day transport systems become more and more complex. Engines used at today cars are becoming more and more electronic and mechatronic based, and the business is heading for a future completely electronically controlled digital devices. The development of vehicles brings a new concept to maintenance. E- support became the ultimate solution, there is a check list that is necessary to follow, most of the maintenance operations is possible to undertake through the internet/ remote support. Everything is a subject of changing today and the only option is to adapt to these new trends. In developing countries, insufficient maintenance activities are often one of the factors that slow development of the economy down. It is necessary to study the introduction and use of emerging technologies in different scenarios, including: advanced technologically places, quasi poor/ weak technology places, non/ weak infrastructure and technical culture and others. Not all users from various countries are ready to use and follow the today technology development and procedures not always written by practicing. The following of the technological changes requires knowledge and access to technological equipment, the development requires an order. This paper intends to study the evolution and introduction of electronic devices specially for vehicles maintenance assistance, looking for past today and future evolution aspect, taking under consideration human feature and skills, and operational environmental, to understand and verify the benefits and drawback in different scenarios.

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1. INTRODUCTION

Sustainability is an urban development priority. Consequently, energy and carbon dioxide emission reduction is becoming more significant in urban transportation systems. However, urban transportation systems are complex and involve social, economic, and environmental aspects (Cheng et al., 2015). Sustainable development has become a worldwide priority, it is viewed as the development that meets the current needs without compromising the ability of future generations to meet their own needs (Morelli, 2013).

The transportation sector has the largest share of total energy consumption growth in the world. Most of the energy consumption growth in transportation sector is due to the high economic and population growth (EIA, 2013). The rapid increase of energy demand will result in excessive carbon dioxide emissions and energy crisis (IEA, 2012). According to Key World Energy Statistics, the aggregate energy demand of the global transport system increased from 23% in 1973 to 28% in 2012. The World Energy Outlook, reported that the transportation sector will account for 30% of the growth in petroleum consumption between 2004 and 2030. This finding indicates that the increasing use of motor vehicles will accelerate resource exhaustion and global warming, despite its promotion of road transportation mobility (Cheng et al., 2015).

Fossil fuel reserves are estimated to be depleted by the year 2045 (Shafiee and Topal, 2009). Other estimates suggest that the conventional crude-oil production could be terminated by 2090 in the US, and the world's oil production will be close to exhaustion by 2100 (Edwards, 1997). For over four decades, energy efficiency has contributed significantly in reducing customer and utility costs, creating jobs, and decreasing environmental impacts. Its role is becoming even more important as we focus on the urgent need to reduce Green House Gas (GHG) emissions and to ensure reliable and affordable grid operations. Although certain developed countries, such as the United States, the United Kingdom, and members of the European Union, have focused on improving fuel efficiency using advanced technologies (Atabani et al., 2011; Subic et al., 2012).

In order to reduce greenhouse gases emission and reduce fuel consumption new vehicles technologies have been developed (Yinhui et al., 2016). Technologies application in vehicles is becoming more and more complex and new, the infrastructures and logistics will accelerate development (Ricken and Gessner, 1999). The introduction of new vehicles technologies has been projected for advanced technologically places. Developing countries with quasi poor/ weak technology, with non/ weak infrastructure and technical culture are being affected with the technological development. The introduction/ use of new vehicles

technologies is a theme of a big concern especially for developing countries, most of developing countries purchase vehicles from developed countries, they have to follow the advancement with no condition to ensure a proper functioning and operation of vehicles, creating a new concept of problems in vehicles operation and maintenance.

This work intends to study the evolution, introduction and acceptance of new vehicles, especially vehicles maintenance assistance, looking for past today and future evolution aspect, taking under consideration, human feature and skills, and operational environmental, to understand and verify the benefits and drawback in different scenarios.

2. ELECTRIC VEHICLES AND EMERGING TECHNOLOGIES

The transport sector, is a key contributor to both greenhouse gas emissions (GHGs) and local pollution. The increasing concerns on rising GHG emissions and security of oil supply make the development of low-carbon and carbon-free technologies for transportation a high priority for policy makers around the world.

The development of Electric Vehicles (EVs) is one of the components of a successful strategy to limit long-term global temperature increase and dependence from fossil fuels. It has only been over the past decade that key technologies advanced sufficiently to enable the development of viable electric vehicles (Tuttle and Baldick, 2015).

Electric vehicle (EV) uses electric motor and battery energy for propulsion, which has higher efficiency and lower operating cost compared to the conventional internal combustion engine vehicle. Concerns have been expressed that the electric car will not deliver the promised environmental benefits, because of the emissions associated with coal power station electricity generation. Strategies have been described, including Home Energy Management, car and battery recycling and Eco Driving, to address these concerns and provide further environmental benefits, to ensure the electric car is truly zero emissions transportation, Figure 1.

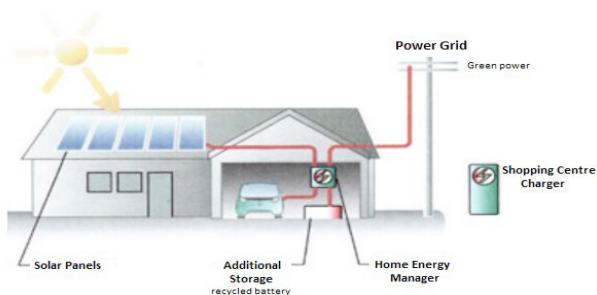


Fig. 1. Home energy management (Spark, 2012)

The continual development of lithium ion battery and fast charging technology will be the major facilitators for EV roll out in the near future (Tan, 2015).

The study made by Wu et al. (2013), compares the economic and environmental benefits of electric and hybrid electric

vehicles with that of conventional vehicles. The environmental benefits provided by the electric and hybrid electric vehicles should satisfy consumers interest in protecting the environment, reducing the dependence on imported fossil fuels, and switching from traditional to alternative fuel vehicles.

Electric vehicles (EVs) and hybrid electric vehicles (HEVs) are more environmentally friendly transportation means with low tailpipe emissions of air pollutants and greenhouse gases (GHGs). When compared to conventional internal combustion engines (ICEs), EVs are rated by higher energy conversion efficiency and better running performance, but can be limited by short driving range, long recharge time, high battery cost, and heavier curb weights (Wu et al., 2013). In comparison to HEVs, EVs may be more advantageous provided the required electrical charge can be obtained from renewable energy sources or with on-board electricity generating operations (Granovski et al., 2006).

There are a number of societal motivations for the adoption of plug-in electric vehicles (PEVs): reduced emissions, a more diverse mix of fuel types and sources, reducing the dependence on unstable regions with the greatest oil reserves, reducing petro-dollar funding of activities counter to national interests, increased economic security from a more assured continuity of fuel supplies plus more balanced trade, and fuel price stability (Tuttle and Baldick, 2015), Figure 2.



Fig. 2. Plug in battery electrical vehicle (Brown, 2012)

Electric-mobility is often framed as an important component in a successful societal transitions toward deep greenhouse-house reductions (Williams et al., 2012). The uptake and use of hybrid (HEVs), plug-in hybrid (PHEVs) and electric vehicles (EVs) in the passenger vehicle market will involve meaningful shifts in social and technical systems (Sovacool and Hirsh, 2009). Before the introduction and use of this new vehicles technologies a deep study is necessary in order to ensure that the society is ready for their introduction, use and operation.

The growth of electric vehicle sales at the global level is still heavily dependent on state-sponsored incentives programs. Diesel technology has become ever more complicated and expensive, in contrast, electric engines conform to the much demanded principle of simplicity. this can go a long way toward compensating for the currently high cost of batteries, a cost that can be expected to fall significantly by 2020 (Schoettle, 2016).

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