

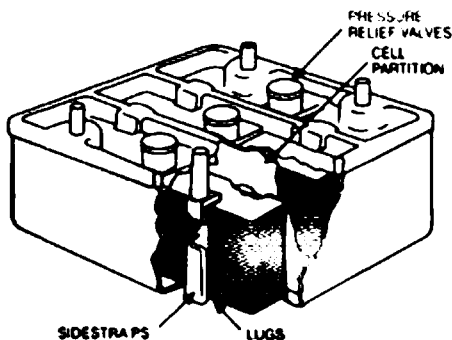
CURRENT TRENDS IN BATTERY TECHNOLOGY IN ELECTRIC VEHICLES

The so-called classic accumulator is not yet exhausted concerning development possibilities. The newest trends in research and development indicate that new production methods offer more cost-efficient methods for production of batteries than present production techniques, corresponding with presumptive large production numbers [1].

Battery technology for EVs has developed from early lead-acid batteries used in the late 19th Century to the 2010s, to lithium-ion batteries, which are found in most EVs today[2]. Nowadays, there are two big sides in battery technology. The first one is lead-acid battery technology (picture 1).

The main application of the lead-acid battery is vehicles for materials handling, such as forklift trucks, transporters, and so on, inside manufacturing plants and warehouses. Passenger transportation in areas where no pollution from exhaust gases can be tolerated is a further field of application for electric vehicles powered by batteries.

The lead-acid battery is attractive for its comparatively low cost and an existing infrastructure for charging, servicing and recyclable disposal.



Picture 1 – The lead-acid battery [3].

Over the years battery manufacturers have introduced a range of additives such as Calcium, Antimony and Selenium to improve various battery performance parameters. For the same reason, different cell and battery constructions such as AGM, Gel battery, VRLA have been developed to optimise various aspects of battery performance [4].

The second side of battery technology is lithium-ion battery or Li-ion battery (abbreviated as LIB). LIBs are also growing in popularity for military, battery electric vehicle and aerospace applications [5]. Roughly speaking, this is modern technology, which has a plenty of followers in technical world.

There are many advantages to use a li-ion cell of battery (picture 2). These advantages include high energy density, lifetime, low self-discharge, low maintenance, and variety of different types. Nevertheless, some disadvantages need to be balanced against the benefits. The li-ion batteries disadvantages are high cost, ageing, and required protection. Li-ion batteries may suffer thermal runaway and cell rupture. In extreme cases this can lead to leakage, explosion or fire. This fire cannot be extinguished and leads to total destruction of vehicle and nearest objects.



Picture 2 – Nissan Leaf LIB cell

The battery technology takes its own place in modern vehicles development. A lot of famous manufactures looking for new technology. For example, Honda presents new battery chemistry that could succeed lithium-ion and rechargeable fluoride-ion batteries could be a breakthrough [6]. However, there are some doubts that this type of battery will come out in 2010's.

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