Analysis of and Reflections over the Development of New Energy Automobile and Intelligent Manufacturing

Qiu Yayu*
Nanjing Institute of Information Technology, Nanjing 210000, Jiangsu Province

Abstract: With the rapid socio-economic development and technological upgrading, various advanced technological achievements have emerged. Nowadays, people are paying more attention to a low-carbon environment, especially the new energy, when faced with energy shortages and serious environmental pollution. It is known to us all that cars can cause serious environmental pollution. That’s why great attention has been paid to the development and application of new energy vehicles, which can not only save energy and protect the environment, but also meet people’s basic needs. The Chinese government has given strong support to new energy vehicles in terms of funding, technologies, policies, and incentive measures. At present, new energy vehicles are in the stage of development and manufacturing. Its industrial chain has been formed and is now moving towards intelligent manufacturing, with various supporting units progressing rapidly. This paper focuses on the issues related to the development of new energy vehicles and intelligent manufacturing.

1. Introduction
The automobile industry has been supporting the national economic development. At present, China’s industry has embarked on a path featuring low-carbon development and intelligence by making full use of information technology. We have also seen the emergence of new energy vehicles. By integrating the information technology and intelligence technology, we can promote the standard manufacturing and effective application of new energy cars. In this way, we can not only meet the requirements for a low-carbon environment and the market demand, but also contribute to social development to some extent.

2. Development of new energy automobile
Nowadays, automobile consumers are paying greater attention to driving safety. Compared with traditional cars, new energy vehicles are not only convenient to use, but are more energy-saving and environmentally friendly. For example, new energy cars can run for a further distance and are faster and safer in terms of battery charge. As for technological innovation, the rise of self-driving automobile technology is inevitably related to the intelligent Internet technology. The adoption of the intelligent system can fully reflect the advantages of new energy vehicles in terms of meeting consumer needs and endowing the car-using experience with greater sense of technology.

From the latest sales data released by CPCA in November 2018, it can be seen that the sales of passenger vehicles in November were 20.2 million, a decrease of 18.0% from November 2017 and an increase of 3.4% from October. Contrary to the sharp year-on-year decline in the overall automotive market, the new energy vehicle market has emerged rapidly. Wholesale sales of new energy passenger cars in November totaled 131,000, a month-on-month increase of 10.1% and a year-on-year increase of 60%. At the same time, the total sales of new energy passenger vehicles from January to November...
reached 858,000, almost double that of the same period last year and far exceeding the total sales in 2017.

From the trend of monthly sales of new energy passenger vehicles from 2016 to 2018, the new energy vehicle market in China as well as worldwide is rapidly developing. In the first 10 months of 2018, its sales has reached 1.47 million, a year-on-year increase of 58%, to which new energy vehicles have contributed a lot. From January to October 2012, the sales of generalized new energy passenger car in China totaled 730,000, a year-on-year increase of 60%, accounting for 50% worldwide. The development of China’s new energy vehicles is also prominent on the global stage. The improvement of the charging service system affects the promotion and application of new energy cars. During this process, an important restricting factor is that consumers are worried about battery life. To solve this, it is necessary not only to increase the battery life and charging time, but also to improve the system and quality of the charging service. The evaluation and incentives for the operation of public charging facilities for electric vehicles from 2018 to 2019 issued in the Beijing Enforcement Regulations aim at improving the operation of charging stations in Beijing and lifting the charging service to level I by rewarding the charging stations that meet related standards. In October, since the number of fast-charging piles for taxis in Shenzhen only achieved 20% of its annual target, Shenzhen accelerated the construction of charging piles and simplified the application process so as to ensure the use of new energy taxis. New energy vehicles have an important position at the International Auto Show and also in China’s export. From January to September 2018, a total of 514,000 vehicles were exported, of which 94,000 were new energy vehicles, among which passenger vehicles that were mainly sold to Southeast Asia took the major part.

The main reason is that the wide use of two-and three-wheeled vehicles in Southeast Asia has caused severe traffic jams and air pollution. In these areas where the economy is not well developed, the roads are often narrow, therefore a high demand for small new energy vehicles.

In order to promote the development of new energy vehicles, some countries and regions in Southeast Asia have issued corresponding policies. For example, India introduced a preferential policy of 12% consumption tax (conventional consumption tax is 28%), simplified the purchase procedure of new energy vehicles, and reduced the car purchase deposit so as to achieve full electrification by 2030 and achieve national electrification by 2047. India has also widely laid out charging facilities to promote the use of new energy cars. Thailand has waived import tariffs on electric vehicles since 2016, exempted BEV/PHEV manufacturers from income tax for more than three years, and planned to establish a global green car production center. In Philippines, the preferential tariff on imported cars is 5% (usually 30%) and new energy manufacturers are exempt from income tax for 6 years. Malaysia has exempted locally assembled new energy vehicles from consumption tax (usually 50%) and implemented the construction of the Port of Malacca, thereby providing logistical support for the production of new energy vehicles and components.

3. Development Status of China’s New Energy Vehicle Industry

In 2017, the output of new energy vehicles was nearly 820,000, representing a year-on-year increase of 58.7%. In 2017, 560,000 new energy passenger cars were sold, including 450,000 pure electric passenger cars and 110,000 plug-in hybrid passenger cars, with a ratio of 4.5:1.1. The sales of new energy vehicle for special use reached 152,000, a year-on-year increase of 279.39%. In 2017, all niche markets delivered a total sales of 148,000 units. The operating vehicles such as sanitation vehicles account for similar sales proportions, about 1,800 units, all of which are pure electric cars. About 100,000 coaches were sold, which were basically pure electric buses and commuters. There were 83 power battery supporting companies in 2017, and the number increased 33% year-on-year when power batteries reached 37.4 billion kWh. According to data released by the China Automobile Industry Association on January 11, the total supporting capacity of power batteries of new energy vehicles in 2017 reached 37.06 billion WH, of which 13.98 billion WH was for passenger cars, accounting for 37.72%, 4.57 billion WH was for public transportation, accounting for 39.31%, while 8.51 billion WH for special vehicles, accounting for 22.95%. The supporting capacity of the lithium-ion battery is 36.9
billion WH, accounting for 99.56% of the total, of which 16.56 billion WH was for ternary, accounting for 44.87%, 18.07 billion WH was for lithium iron phosphate, accounting for 48.96%, 1.54 billion WH was for lithium manganate, accounting for 4.17%, while 740 million WH was for lithium titanate, accounting for 2%. In 2017, China once again became the world’s largest market for power battery applications.

The scale of new energy vehicles represents the comprehensive level of the industrial chain. An annual production capacity of over 800,000 vehicles with a year-on-year increase of 58.7% already stands as the No.1 in the world. The annual power battery reached 37.4 billion kWh, a year-on-year increase of 33%, which reflects the growth of the power battery industry in China.

4. Analysis of Intelligent Manufacturing of New Energy Vehicles
The application of intelligent manufacturing technology in the production of new energy vehicles not only facilitates the production, but also promotes the development of the intelligent manufacturing technology itself. The application degree of intelligent manufacturing systems determines the future development of the national intelligent manufacturing industry. Breakthroughs have been made in the application of technology of intelligent manufacturing in new energy automobile companies, but further analysis is needed in this respect.

(1) The application of intelligent manufacturing technology in the new energy automobile industry is in line with the times
According to relevant statistics, China has reached a cumulative production of more than 320,000 new energy vehicles by the end of October 2015; it has cumulatively produced over 200,000 vehicles from January to October this year, a three-fold year-on-year increase. From 2013 to August 2015, the number of new energy vehicles promoted in the demonstration cities exceeded 160,000, representing a completion rate of 47%. The consumption proportion of private new energy vehicles has increased significantly, jumping from 54% in 2014 to 72% in 2015, which means that private consumption is already in a dominant position.

The application of intelligent manufacturing technology in the new energy automobile industry has promoted the development of the automobile manufacturing industry. From the current development of intelligent manufacturing technology in the automotive industry, it can be seen that the level of new energy technologies of independent brands and joint ventures are basically the same. The adoption of intelligence technology in the production of new energy vehicles can help to build a relatively comprehensive information management system and integrate the use of intelligence technology and new energy technology.

New energy automobile companies have established intelligent manufacturing systems in order to better meet consumers’ needs. Engineers and technicians master smart and new energy technologies during their working process. Foreign technicians bring their technologies into the development of new energy technologies, thereby establishing independent brands, which can play a role in promoting the development of the local market of new energy vehicles and facilitating the long-term stability of enterprises that have their own brands [3].

Compared with joint ventures, China New Energy Vehicle Corporation has a certain difficulties in achieving intelligent manufacturing. Its lack of reasonable planning in this aspect has affected the development progress of new energy vehicles [4]. For Chinese auto brand companies, it is necessary for them to make technological innovations while digesting and absorbing technologies. With the wide application of intelligent manufacturing technology in new energy automobile enterprises, it is necessary to simplify the practical technologies and conduct intelligent management by using simulation technologies.

(2) Intelligent manufacturing technology for new energy vehicles
Intelligence technology has been applied in the management of new energy automobile enterprises. In the early construction of the joint venture automobile brands, intelligent management model used in foreign-funded enterprises has been introduced into Chinese enterprise. For example, human resource management systems and intelligent production process need to be executed in the intelligent
management system for integrated management. The high operation efficiency of the information system of new energy vehicle enterprises is due to the use of products provided by leading international suppliers and the operation of a self-developed management system. When the system is adopted by China’s new energy vehicle companies, it is important to make innovations based on introduction so as to improve the management efficiency of new energy vehicles [6].

(3) Intelligent management of new energy vehicle manufacturing

For new energy vehicle companies in China, the application of intelligence technology is still in the transitional stage. The application of this technology for virtual design and the establishment of the collaborative development platform is the process of making use of virtual technology in the production of new energy vehicles. For example, an automobile company applies intelligence technology for production, operation and management, thereby completing the initial stage of intelligent management of independent brands. Foreign new energy vehicle companies are relatively advanced in the application of intelligence technology, while China still has a lot of room for innovation in this respect.

R&D goals for power batteries and battery management: The target for the year 2020 is to achieve high specific energy for cars. For lithium-ion battery, it shall reach 300 watts/kg, 1500 times; the cost of living shall be 0.8 yuan/kg, 50% lower than the present level; its energy shall be greater than 200 watts/kg, one time higher than the current level. Special attention will be paid to the management of the power battery and power battery system technology of electric cars, especially the safety management technology.

The most important goal of technological R&D of pure electric vehicles by 2020 is to reduce the power consumption of 100 kilometers by 20% and enable A-class vehicles to achieve 12kwh/100km. After the production of small pure electric vehicles achieves industrialization, they can run 200~250 km. This also involves cost issues, such as initial purchase costs and life-cycle usage costs (electricity is much cheaper than fuel). From the perspective of the R&D goals of automation technology, we aim to fully develop the intelligent platform technology of new energy vehicles by 2020, lift the intelligent level of electric vehicles to SAE level III (self-driving on the highway), and realize 100-level electric driverless vehicles and 1,000-level intelligent driving assisted electric vehicles.

5. Conclusion

It can be concluded from the above that better development of China’s automobile companies relies on catering to the current trend of low-carbon and environmental protection. The combination of the new energy technology and the intelligence technology not only creates new opportunities for automobile development, but also facilitates the development of intelligence technology. The development of new energy vehicles relies on intelligence technology, which is mainly provided by suppliers. However, that may lead to limitations in technological application, which is mainly reflected in intelligent manufacturing. In the production of automobiles and components, although foreign advanced technology has been introduced and intelligence technology has been adopted, certain deficiencies still remain in practice. China lags behind in the manufacture of new energy vehicles compared with foreign auto companies, thereby calling for greater technological innovation. Based on the above, it is necessary to explore the issues concerning intelligent manufacturing of new energy vehicles.

Author's introduction

Qiu Yayu (1979-), male, Jiangsu, Wuxi, lecturers/ professional leaders are mainly engaged in the research of the intelligent control technology of new energy vehicles

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