Self-driving Vehicle Actuator Industry Report, 2016

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STUDY GOAL AND OBJECTIVES

This report provides the industry executives with strategically significant competitor information, analysis, insight and projection on the competitive pattern and key companies in the industry, crucial to the development and implementation of effective business, marketing and R&D programs.

REPORT OBJECTIVES

- To establish a comprehensive, factual, annually updated and cost-effective information base on market size, competition patterns, market segments, goals and strategies of the leading players in the market, reviews and forecasts.
- To assist potential market entrants in evaluating prospective acquisition and joint venture candidates.
- To complement the organizations' internal competitor information gathering efforts with strategic analysis, data interpretation and insight.
- To suggest for concerned investors in line with the current development of this industry as well as the development tendency.
- To help company to succeed in a competitive market, and

METHODOLOGY

Both primary and secondary research methodologies were used in preparing this study. Initially, a comprehensive and exhaustive search of the literature on this industry was conducted. These sources included related books and journals, trade literature, marketing literature, other product/promotional literature, annual reports, security analyst reports, and other publications. Subsequently, telephone interviews or email correspondence was conducted with marketing executives etc. Other sources included related magazines, academics, and consulting companies.

INFORMATION SOURCES

The primary information sources include Company Reports, and National Bureau of Statistics of China etc.

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Abstract

The report mainly highlights the following:
1. ADAS and self-driving vehicle chassis and braking system
2. Traditional braking system
3. Braking system for new energy vehicles
4. Global EPS Industry
5. Global braking system and EPS manufacturers

As far as ADAS is concerned, a simple alarm is not enough, and even at the critical moment, active braking system, active deceleration or steering system are needed, for machines are more reliable than people. And controllers and actuators are thus introduced. An actuator is very simple, consisting of brake caliper, steering gear, and air valve, while a controller involves ETC (Electric Throttle Control) and EPS (Electric Power Steering). The brake system is very complicated, and the brake system for the ordinary gasoline and diesel passenger vehicle is controlled by hydraulic system and vacuum servo. But for passenger vehicles, passive safety is superior to active safety. Hence, ESP (ESC, Electronic Stability Control) needs standard configuration, and the brake control system is ESP, which can also control ETC.

To enable active ADAS and self-driving, deep communication between ADAS and controllers is indispensable, which requires controller manufacturers to provide deep support. Of course, they can also create a new system to bypass the original controller. However, the original controller has gained safety certification for scores of years, and the new system has not been certified, which greatly adds costs and complexity. Moreover, it is not realistic for vehicles to be mass-produced. Therefore, it is necessary to win the great support from controller manufacturers. But these controller manufacturers have their own ADAS, unwilling to give up this market. As a result, controller manufacturers do not make available some ports or provide support, so that customers are forced to choose their full set of ADAS. So we can see that the whole ADAS, including sensor algorithm, of Chang'an and Geely is all from Bosch, which has a great impact on China-made sensor manufacturers.

Given the ESC system is paramount, most vehicle manufacturers have related technology. Various names for ESC, hence, have sprung up. Although the prices for these ESC systems are higher than those of Bosch and Continental, manufacturers still use them to maintain their own independence, with Hyundai, for example, adopting Mando's ESC system. It takes more than 20 years to develop a new ESC system, during which period large amount of capital and practice cost will be incurred.

Most electric vehicles still adopt the braking system of fuel vehicles and gain additional braking power with EVP or Bosch iBooster. As for these electric vehicles, ESC is still the master controller of braking system. But things have changed. As electric vehicles can, through AC motor, achieve reverse deceleration and recover braking energy, the load of EV braking system reduces considerably. And the new technology drive-by-wire braking system can thus be used.

Drive-by-wire braking system has been extensively used in F1cars, and is replaced when the driving range reaches less than 2,000 km, which causes high costs. Its braking sensitivity is much higher than that of traditional braking systems. Moreover, its flexibility increases dramatically. Hence, the braking system is very practical in the field of ADAS and self-driving. This is why Tesla can achieve intelligentization more easily. Drive-by-wire braking system substitutes ESC system or TCS (traction control system), which allows vehicle manufacturers to get rid of dependence on ESC manufacturers. Tesla Model S, Porsche 918 Spyder, and Audi R8-ETRON adopt this design. There are two systems inside the car: one is traditional front wheel hydraulic brake without EVP, which has the function of ABS; the other is rear-wheel drive-by-wire braking system, which uses electrical signal and motor to control brake calipers.

The disadvantages of drive-by-wire braking system are also evident: first, small braking force due to limited motor power; second, high requirements for heat resistance of brake discs. Porsche 918 Spyder and Audi R8-ETRON adopt ceramic brake discs while Tesla uses high-grade ITT brake discs. Third, due to small volume left for braking motor, only permanent magnet motor can be used. And when you put on brakes, permanent magnet has long been working under the high temperature, thus leading to demagnetization. The reliability of drive-by-wire braking system is yet to be tested. At present, the system, which incurs high costs, can not be used as main braking system but only as auxiliary brake.

In the field of EPS, things get better. China acquired Nexteer, and some enterprises can produce low-end C-EPS. However, the future development of EPS is targeted at R-EPS. There is still an obvious gap between at home and abroad. EPS market is highly concentrated, with the top four manufacturers holding a combined market share of over 75%. The market share of Jtekt exceeded one third. After selling ZF Lenksysteme, ZF still has TRW steering business, reflecting that it has placed emphasis on steering system.

For fuel vehicle design, if you want to develop ADAS or self-driving, it may well be the fastest and most cost-effective way to cooperate with Bosch rather than Continental, whose ESC system is rare in China. As for independent sensor design companies, it is the best choice to partner with manufacturers capable of developing ESC braking system, and the same is true of international companies. Take Sweden-based Autoliv, which invested JPY30 billion in April 2016 to cooperate with Japan's Nissin Kyogo. With regard to China-made vehicle design, we suggest the cooperation with South Korean Mando.

In terms of hybrid electric vehicle design, it is best way to adopt ZFTRW IBC and Continental MK C1 to develop ADAS or self-driving. At the early stage of promotion. Continental and ZF are eager to get support from vehicle manufacturers. Moreover, due to its high integration level, the self-driving function can easily be set in drive-by-wire hydraulic brake.

For electric vehicle design, if you adopt permanent magnet motor, given the narrow working range and poor high-temperature resistance of permanent magnet motor, braking system cannot depends too much on the opposing torque of the motor, hence the need to use the powerful booster brake system like Bosch iBooster. If you use AC induction motor, braking system can rely heavily on the opposing torque of the motor, and rear wheel can use the most advanced EMB, or the real drive-by-wire brake.

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