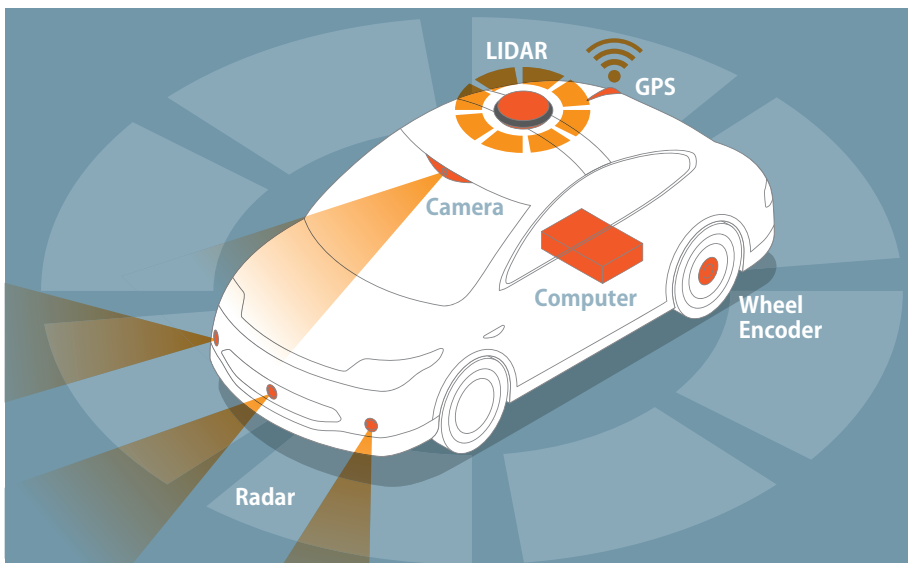


ADAS SYSTEMS

Opportunity Begins With Forward-Collision Warning

By Mike Imlay



■ Forward-collision avoidance technologies are credited with a historic reduction in rearend-type accidents and are a fast-growing niche within the aftermarket safety performance category.

Although still in its infancy, the U.S. aftermarket for advanced driver assistance systems (ADAS) and connected vehicle technologies (CVT) can be expected to grow into a \$1.5 billion industry within the next five years, according to SEMA research. With so much at stake in these rapidly emerging technologies, SEMA has made identifying ADAS/CVT opportunities for association members a key priority.

In this fourth installment of our eight-part SEMA News series highlighting key “SEMA Advanced Vehicle Technology Report” findings, we take a look at forward-collision avoidance technologies, along with the aftermarket trends surrounding them. An interview with SEMA Vice President of Technology John Waraniak further explaining forward-collision technologies and their implications for the aftermarket can be found on p. 120. Readers are also encouraged to download the full report at www.sema.org/avt-opportunities. —Ed

Forward-collision warning/avoidance (FCW) systems have the ability to reduce vehicle accidents and their resulting injuries and fatalities by a large percentage, especially when separate systems are used together to improve the safety and ADAS functionality of a vehicle. These systems can be divided into two categories: passive and active. There are three basic types of systems within the passive category. Going from lower to higher levels of functionality, they are:

- **FCW, Camera Only:** The most basic form of the technology, this has the highest aftermarket adoption rate due to the ease of installation. Cameras are used to detect objects in front of a vehicle to warn the driver of an impending accident.

- **FCW, Camera and Radar:** Radar assists the system in detecting objects or other vehicles in a car’s path in variable weather conditions that can “blind” other systems.
- **FCW, Camera and Lidar:** Lidar (light detection and ranging) measures the distance to a target using a pulsed laser to light up the object ahead and measure the distance using onboard sensors. Lidar systems combined with camera systems recognize lane markings and detect other objects or vehicles.

Beyond those, the most advanced levels of functionality can be found in the active category, where FCW is combined with automatic emergency braking (AEB). FCW/AEB systems deliver the highest rated safety because the vehicle is able to stop itself if the driver is unable to react in time. The most advanced AEB systems can also take over the throttle, brakes and/or steering

when faced with an imminent collision.

In general, FCW systems saw limited integration into vehicles from the early '00s, with large-scale market penetration beginning around 2011. We should again emphasize that, unlike active FCW/AEB systems, passive systems merely alert drivers to impending danger. In active systems, multiple types of AEB technologies are combined with FCW, such as dynamic brake support and crash-imminent braking.

Dynamic brake support activates when a driver has not applied the brakes hard enough to avoid a collision, automatically increasing braking to assist in lessening an accident's severity. Crash-imminent braking systems activate when a driver is not able to apply the brakes at all, automatically braking in an effort to avoid or reduce speed at impact. Available since the mid-'00s, these active systems have been tremendous advances in consumer safety.

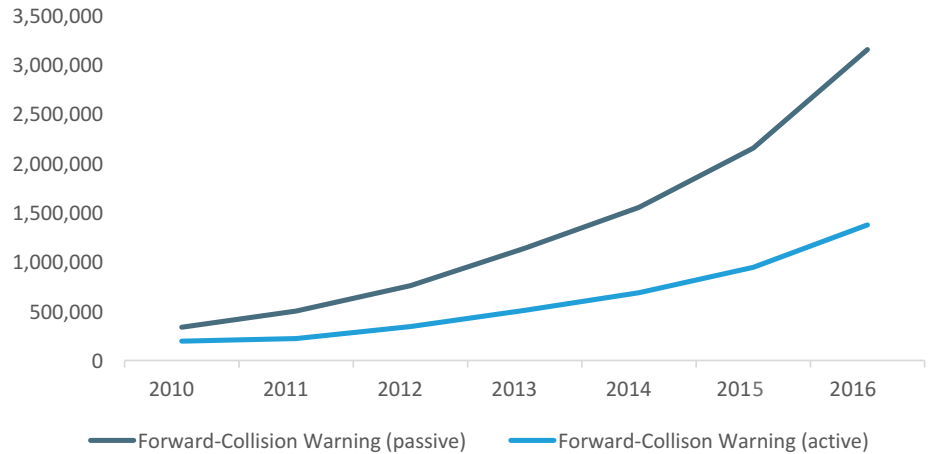
Adoption, Drivers and Barriers

Forward-collision avoidance systems are playing an ever-greater role in OEM vehicle offerings. In fact, research credits them with a historic 10%–15% reduction in rear-end-type accidents—and an injury-reduction rate of 15%–20%. Research has also shown that pairing AEB systems with FCW can cut rear-end accidents by as much as 50%.

When accidents can't be avoided, these systems nevertheless can reduce the severity of accidents and bodily-injury claims by approximately 30%. Adoption of these systems has therefore accelerated recently, with the National Highway Traffic Safety Administration, the Insurance Institute for Highway Safety and major automakers agreeing to standardize these technologies on every vehicle by 2022. That said, there are still as many as 230 million vehicles on the road that could potentially use aftermarket solutions. (See charts: OEM Adoption Rate by Vehicle Year, Total Systems in Vehicle Population.)

Increased adoption of FCW systems at the OEM level is expected to continue to dramatically decrease accidents as time goes on. These systems are most effective when combined with multiple technologies to assist drivers who may be distracted or slow

OEM System Adoption Rate by Vehicle Year



Source: NHTSA, AAA, Ducker Analysis

■ After a slow start, OEMs have dramatically increased production of both active and passive FCW systems as they race to meet their 2022 standardization target.

to react to potential collisions on their own. One of the main challenges in the aftermarket adoption of these systems are the false positive or negative readings they have been known to give, which can discourage drivers from using them. (See charts: Drivers for Aftermarket Adoption, Barriers to Aftermarket Adoption.)

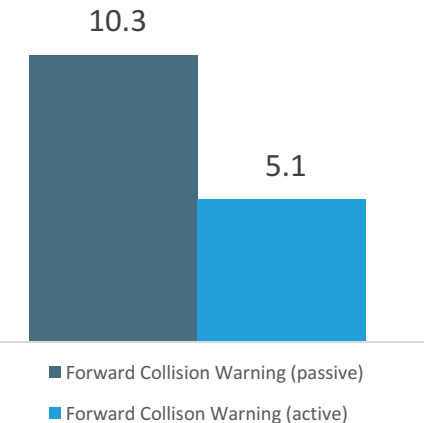
Aftermarket Presence

While a growing number of OEMs offer FCW systems as standard or optional equipment on their vehicles, consumers are expected to fill gaps on lower-trim or older models with aftermarket solutions. In such cases, passive FCW technologies will be the more common aftermarket systems due to lower complexity and cost. In fact, SEMA research foresees limited aftermarket adoption of FCW/AEB technologies, since they require integration with OE brake and powertrain control systems, making installation difficult.

Supplier Landscape

Market share for aftermarket FCW systems is currently maintained by a few leading suppliers, with secondary participants accounting for a relatively limited presence. Brandmotion, in particular, offers an ADAS system featuring not only FCW but also lane-departure warning, integrated camera and other similar technologies. Mobileye, another popular aftermarket ADAS supplier, has set itself the goal of eventually providing fully autonomous aftermarket systems.

Total Systems in Vehicle Population (millions of vehicles)



Source: NHTSA, AAA, Ducker Analysis

■ The number of vehicles currently equipped with passive versus active FCW systems.

Secondary participants often bring options to market with lower price points, but those systems may sometimes lack the same functionality and/or durability of brand leaders. (See Chart: FCW Aftermarket Share Estimates.)

Aftermarket Penetration

Despite the approximately 20% installation rate at the OEM level, only 2%–3% of total vehicles in operation currently have FCW systems installed. However, with such equipment set to be standard on all new vehicles produced within four years, aftermarket sales of FCW units are expected to climb alongside growing consumer safety awareness

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and demand for lower-cost alternatives.

Aftermarket FCW systems presently cost an average of \$800. By contrast, market participants have noted increased costs at the OEM level at approximately \$2,500, with systems often bundled with AEB to meet the standardization target. An aftermarket selling point for FCW systems is that end users can often install them and they can be bundled with other technologies, such as lane-departure alerts and various camera-based features. (See chart: Potential Aftermarket Passive Systems Sales.)

Summing Up the Data

In a nutshell, FCW systems are already proving their safety potential and dramatically cutting accidents, injuries and deaths on the highways. OEMs have stepped up deployment of these systems, with the goal of making them standard on all new vehicles by 2022.

On the OEM side, the systems are increasingly “active,” incorporating AEB to apply braking and other evasive measures. Aftermarket systems tend toward lower “passive” complexity, providing an alert or warning without affecting vehicle braking or control. Still, consumer demand for passive aftermarket systems is expected to climb as buyers seek simple, cost-effective alternatives for their lower-trim vehicles and older models.

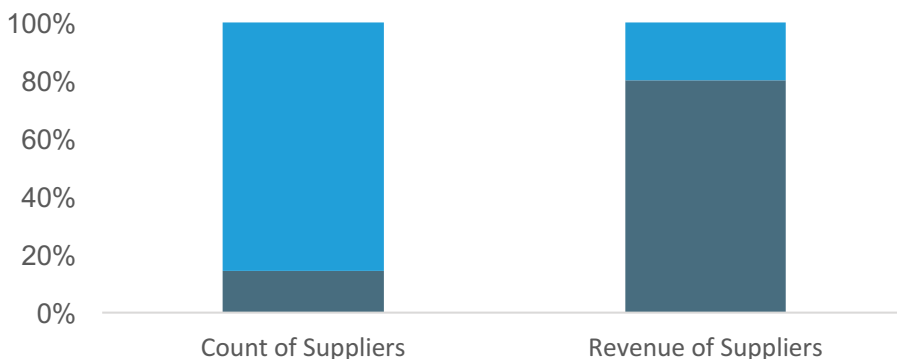
Current aftermarket suppliers are limited to a handful of major players, but their number is expected to increase as consumer demand grows. In short, FCW and other ADAS technologies are not only here to stay but also will soon impact every segment of the aftermarket, from supplier to jobber. Now is the time to evaluate your business readiness for this technological revolution.

Stay Informed!

The tremendous potential ahead for the specialty-equipment industry is detailed in the “SEMA Advanced Vehicle Technology Opportunities Report.” To download your copy, go to www.sema.org/avt-opportunities.

For additional information about ADAS technologies and how they may impact your business, visit the SEMA Garage Vehicle Technology webpage at www.semagarage.com/services/vehicletechnology.

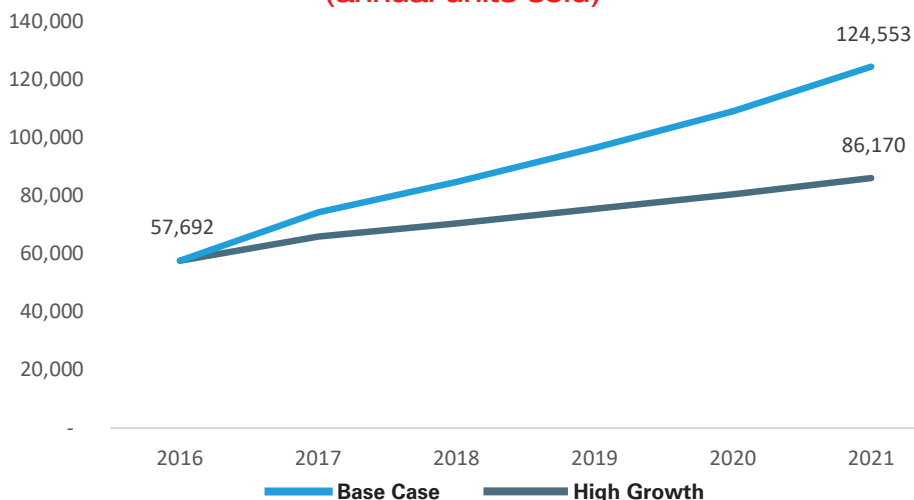
FCW Aftermarket Market Share Estimates



Source: Market Feedback, Ducker Analysis

■ Although secondary FCW suppliers far outnumber primary market leaders, the leaders currently dwarf the secondary participants in terms of revenue share.

Potential Aftermarket Passive FCW Systems Sales (annual units sold)



Source: Market Feedback, Ducker Analysis

■ SEMA research indicates that the aftermarket can expect a tremendous rise in passive FCW system sales through 2021.

Drivers for Aftermarket Adoption

- FCW systems alone reduce rear-end crashes by a significant percentage.
- FCW systems pose relatively little liability concern.
- When FCW and Automatic Emergency Braking (AEB) systems are used together, rear-end crashes are reduced by up to 50%.
- Forward-collision avoidance systems are helpful for drivers who have trouble reacting to unexpected situations on the road.
- Commuters who are more likely to be distracted in high traffic situations may find these systems very helpful.

Barriers to Aftermarket Adoption

- FCW systems not being able to accurately determine when crash risk warrants a warning.
- FCW systems relaying a warning enough in advance for the driver to respond appropriately.
- AEB software is complicated and requires heavy integration, which creates high liability concerns.
- False positive and/or negative warnings or autonomous reactions may cause a driver to disable the systems or have them removed. 🚫