

Hello RCAR members.

I am very pleased to see that we have contributions from 12 RCAR research centres to the January 2022 newsletter.

The Omicron variant of the Corona virus has created new challenges in many countries, including my own.

Despite this, the January 2022 newsletter includes a good mixture of articles on a wide range of technical topics that should be of great interest to RCAR members, including an international study on EV battery replacement conducted by Cesvi Colombia. Thank you to those RCAR members who supplied information.

As usual, my contact for any feedback or questions is rmcdonald@rcar.org



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EU project “L3Pilot” successfully completed

The "L3Pilot" project led by Volkswagen AG and funded by the EU Commission celebrated its successful closing in October at the ITS World Congress in Hamburg.

The goal of the four-year project was to investigate the feasibility of automated driving as a safe and efficient transportation solution and to evaluate the effects of introducing and spreading automated vehicles. The project focused on SAE Level 3 automated driving functions (ADF) on motorways and in urban traffic, while SAE Level 4 functions targeted exclusively parking and close-distance scenarios.

In addition to the Allianz Center for Technology, the project involved vehicle manufacturers, suppliers as well as research institutions, universities and government agencies.

The project equipped 70 vehicles and the test fleet comprised 13 different vehicle brands, from a passenger car to a SUV. More than 400,000 kilometres were driven on motorways including 200,000 km in an automated mode and 200,000 km in a manual mode as a baseline for comparison of the user experience and evaluation of the impacts. More than 24,000 km were travelled in the automated mode in urban traffic.

With the aim to put the focus on the user experience of automated driving functions, over 1,000 persons participated in piloting and complementary virtual environment tests.

Moreover, L3Pilot carried out extensive supplementary tests to also research user experiences that were difficult to address in large-scale piloting due to safety requirements and legal issues. Therefore, supplementary studies were performed in addition to the on-road piloting to be able to study system usage and other relevant user experiences with ordinary, non-professional drivers in safe and virtual environments. The extensive studies comprised some 600 subjects.



Closing event of the L3Pilot at the ITS World Congress in Hamburg

Research evaluation results have shown that increased safety is the main benefit of SAE Level 3 automated driving systems. They also show that an automated driving system consisting of motorway, urban and parking functions for robust hands-off driving will generate a social benefit that is higher than the social costs of installing it.

The Code of Practice for the Development of Automated Driving Functions (CoP-ADF) is one of the major achievements of L3Pilot. It provides comprehensive guidelines for supporting the design, development, verification and validation of automated driving technologies.

AZT's task was, among other things, to evaluate the safety-related effects of automated parking functions. For this purpose, existing accident databases and the Allianz claims contained therein for several years were evaluated to obtain a comprehensive picture of the parking accidents recorded. Based on the knowledge

gained from this, an assessment of the potential impact of future automated parking functions could be given.

For the impact assessment of parking ADF on the occurrence of damage, several factors were taken into account. At first it was necessary to identify the **target accidents**, i.e. the maximum percentage of insurance claims that could be addressed by the mature parking ADF. To determine those addressable accidents fitting accident databases had to be selected. This was challenging, as parking accidents get often not reported to the police and therefore are typically underreported in national accident statistics. In contrast, insurance claims offer a good basis for the assessment, since parking damages are in most cases reported to the insurance company.

In the end, a case-by-case analysis of insurance databases of Allianz Germany was done. Using accident descriptions, the claims were assigned to the respective functionality of the mature parking ADF.

To identify the share of preventable target accidents under real road traffic conditions the parameter **effect** was introduced. It considers limitations (e.g. sensor capability or technical failures) that can reduce the benefit of a system. Several studies on real world effectiveness of current automatic parking systems show a reduction of addressable accidents of up to 50%. Expecting a higher efficiency for future mature parking ADF two scenarios were defined for the calculation, an effect of 75% and 100%.

Finally, the usage of the system and its market penetration had to be considered. The usage represents the extent to which the parking ADF is activated by drivers and market penetration describes the share of vehicles on the road that is equipped with the parking ADF. The experimental procedure of the parking ADF tests in L3Pilot did not allow an estimation on the true degree of usage. Therefore usage and market penetration were combined in scenarios to form the new parameter **penetration rate in use** (5%, 10%, 30% and 100%).

Target accidents parking ADF	Effect	Penetration rate in use	Expected benefit - avoidable share of insurance collision claims
23.2%	75%	5%	0.9%
		10%	1.7%
		30%	5.2%
		100%	17.4%
	100%	5%	1.2%
		10%	2.3%
		30%	7.0%
		100%	23.2%

Expected benefit - share of insurance collision claims potentially prevented through parking ADF (MoD-Coll & TPL)

By multiplying the different ratios the safety impact for the respective scenarios was calculated. The results show that the mature parking ADF has an avoidance potential of 0.9% up to 23.2% of motor insurance collision claims. The broad spread is mostly influenced by the different scenarios for penetration rate in use. In summary, a high penetration rate of parking ADF is expected to lead to a significant decrease in accidents with property damage.

9th Allianz Motor Day: “Automated Driving becomes Reality”

“We need to make our roads and rules fit for automated vehicles across Europe. Therefore, we see the need for European harmonization, because when crossing borders, these cars not only have to know all the relevant road signs and traffic rules and regulations, but it also has to be clear who is liable in the event of an accident”, said Dr. Klaus-Peter Röhler, CEO of Allianz Deutschland AG at the 9th Allianz Motor Day.

The event on September 22, 2021 dealt with the legal and technical risks of autonomous driving and took place in a hybrid format combining an on-site part at the Allianz Center for Technology in Ismaning with an

international broadcast via online stream. In a panel discussion experts from the automotive industry, science, public authorities and Allianz discussed the current status on automated driving, technical and legal conditions as well as challenges for the future. In order to also bring in the international significance of the topic, we had Matthew Avery from Thatcham as one of our guests.

In this context, Allianz presented its positions on automated driving:

- Allianz will insure autonomous vehicles and technical supervision
- Sensor data is essential for clarifying causes of accidents involving autonomous vehicles
- Europe-wide data trustee should facilitate data exchange and accident investigation
- In automated mode, the vehicle owner should also be insured in the event of an accident caused by the vehicle



Expert panel on the topic of "Automated Driving becomes Reality"

In addition to the main topic of the event, Allianz presented innovations in motor insurance for electric vehicles in Germany and Carsten Reinkemeyer from AZT presented the latest research results on claims experience with electric vehicles and discussed the topic of fire risks with a representative of the Berlin fire department.

Key points of the discussion were:

- Repair specifications make accident repairs more expensive
- Expensive follow-up costs after accidents and fires
- No increased fire risk with electric vehicles

Detailed information on the contents, a recording of the event and all press information can be found on the event page: <https://events.techcast.cloud/en/allianz-deutschland/allianz-autotag-2021>

Last but not least, the stage of the Motor Day could be used to honour the 50th anniversary of the AZT as a highlight in this special year for the institute.



Jochen Haug, Chief Claims Officer and Member of the Board of Management of Allianz Versicherungs-AG, congratulates Dr. Christoph Lauterwasser, Managing Director AZT, on the company's 50th anniversary

A summarizing film (in German language) of the 9th Allianz Motor Day can be found here: [9. Allianz Autotag / Motor Day „Automated driving becomes reality“, Allianz Autotag 2021 - YouTube](#)

Study about repairability of high voltage batteries and electrical components in Colombia

To find out how in international markets is handle the reparation, availability, and substitution of the main components high voltage systems in hybrid and electric cars; CESVI Colombia approach the RCAR members and inquiring them referring to data mention previously, but also about collection, recycling, and the disposal of high voltage batteries in their countries. Likewise, it is important to mention that the company also investigate about the local market consulting directly with importers.

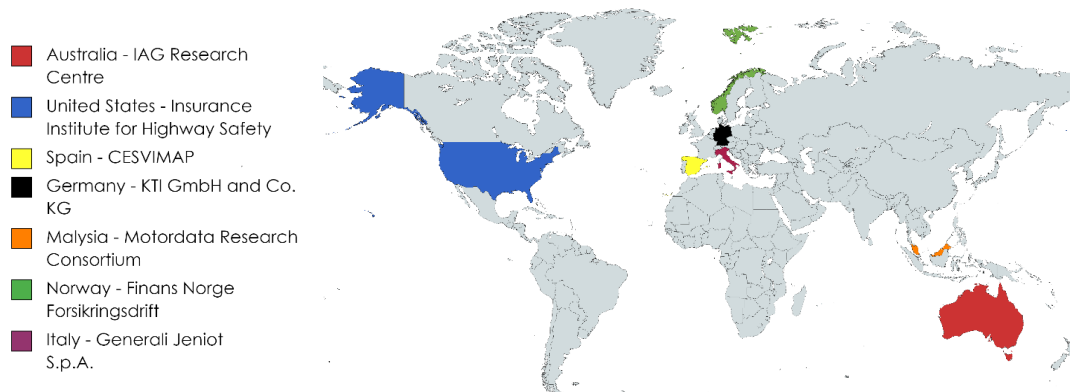


Figure 1. Participation of RCAR members in the high voltage batteries and components survey

Availability of spare parts for batteries and electrical components:

The forms were analyzed in search of the brands that supply the casing of their batteries and electrical components such as motors, inverters, compressors, among others, since it is the battery part with the greatest vulnerability, obtaining the following general observations:

- Brands that supply the housing or case for their batteries are Toyota, Kia, BMW, Nissan and Renault.
- Brands that do not supply the battery housing are Ford (in Hybrid Vehicles HEV) and Mercedes Benz (in Plug-in Hybrids PHEV).
- In general, devices such as motors, inverters, compressors, are not supplied exploded.

Equally, in the event of major battery damage, some brands such as BMW, Renault, KIA, and Nissan supply the battery pack or module, which also influences the final cost of repairing the car.

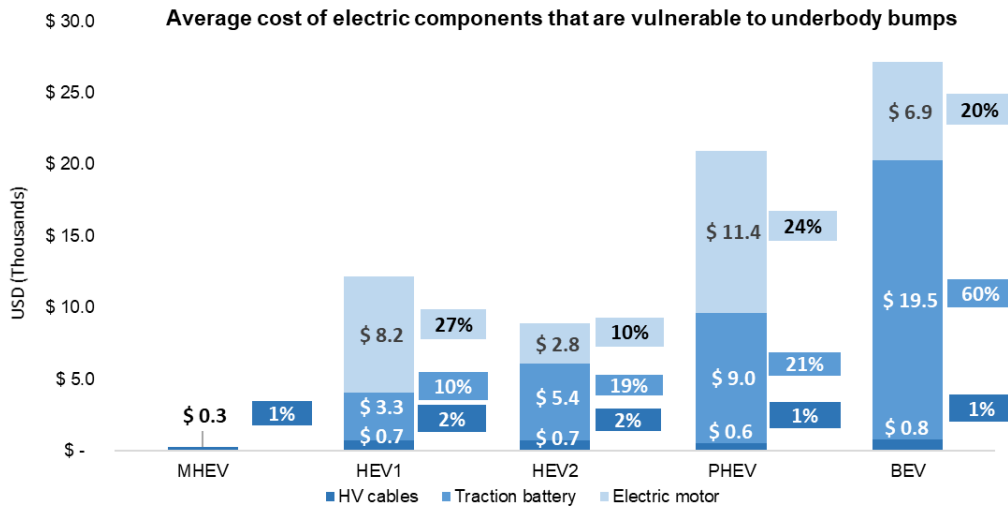
Electrical components vulnerability at collision

After a considerable severe collision, plenty of the electrical components may result affected. Below in the table, those components with the highest probability of damage after a frontal, rear and underbody impacts will be described by technology. Emphasizing that the components most vulnerable to damage after a collision are the components of the cooling system, especially heat exchangers such as radiators or condensers, which represent approximately 2% of the commercial value of the vehicle. Further clarifying, that several of the components can be repeated in several columns, due to the variety of locations depending on the vehicle.

Technology	Frontal Collision	Rear Collision	Underbody bump
MHEV	✓ Starter - generator	✓ Medium Voltage Battery	✓ High voltage wiring
HEV	✓ Hybrid Starter Generator ✓ Electrical A/C compressor ✓ Cooling system	✓ Traction Battery	✓ High voltage wiring ✓ Traction battery
PHEV	✓ Electrical A/C compressor ✓ Cooling system	✓ Electric motor ✓ Gear reducer	✓ High voltage wiring ✓ Traction battery ✓ Electric motor
BEV	✓ Cooling system	✓ Electric motor ✓ Gear reducer ✓ Electrical A/C compressor	✓ High voltage wiring ✓ Traction battery ✓ Electric motor

Of these components previously mentioned, it is important to focus on those that have the higher cost such as the traction battery; and the electric motor, in those HEV and PHEV vehicles in which it is supplied only with the transmission gearbox, which represents a substantial cost increase in the replacement of this electrical component.

In the study of repairability two major problems were found mainly related to the electrical component spare parts supply. The first affects hybrid and plug-in hybrid vehicles, where in some cases, after damage to the underbody of the vehicle, the electric motor is not supplied individually, but together with the transmission gearbox; this can increase the cost of the spare part by up to 27% with respect to the commercial value of the vehicle (HEV1), compared to some cases where the electric motor as independent spare part is available (HEV2), case where the spare part only represents the 10% of the commercial value of the vehicle.

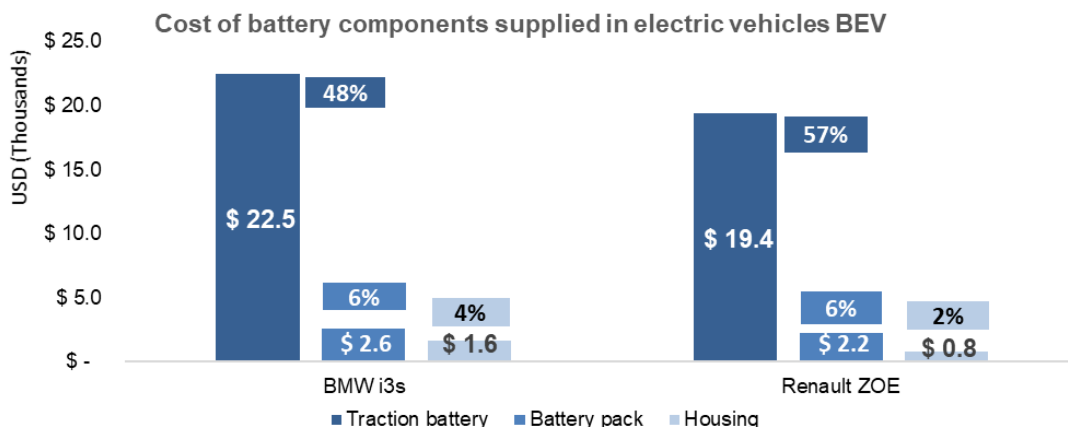


The vehicles taken as an example for the representation in the figures and the calculation of the average value, are the following ones:

Technology			
MHEV	HEV	PHEV	BEV
<ul style="list-style-type: none"> ✓ Kia Stonic ✓ Kia Sportage 	<p>HEV1:</p> <ul style="list-style-type: none"> ✓ Ford Fusion ✓ Ford Escape ✓ Toyota Corolla <p>HEV2:</p> <ul style="list-style-type: none"> ✓ Kia Niro ✓ Hyundai Ioniq ✓ Toyota Corolla 	<ul style="list-style-type: none"> ✓ BMW 330e ✓ Mini Cooper Countryman SE ALL 4 	<ul style="list-style-type: none"> ✓ BMW i3s ✓ Renault Zoe ✓ Nissan Leaf ✓ Renault Kangoo Z.E.

The second problem identified is related to the supply of battery cases and battery modules or packs in HEV and BEV

vehicles. Whereby supplying these components, the cost of the spare part can be reduced from 53% of the commercial value of the vehicle (entire traction battery), up to 6% or 3% corresponding to the cost of battery packs and housing or cover respectively.



As an example, in the local market, after an underbody bump in the Ford Escape (Hybrid vehicle HEV), the high voltage battery housing was affected and although the internal components and the functional state were optimal, because the housing is not supplied as spare part, the component had to be replaced. The battery value is equivalent to 10% of the commercial value of the vehicle.



Figure 2. Ford Escape HEV high voltage battery damaged due to an underbody bump.

Other highlights:

The impossibility to supply housings (cases) and internal parts of electrical components that may be affected in a frontal collision may represent a replacement cost equivalent to 16% or 11% of the market value of the vehicle. Being the HEV and PHEV vehicles the most affected.

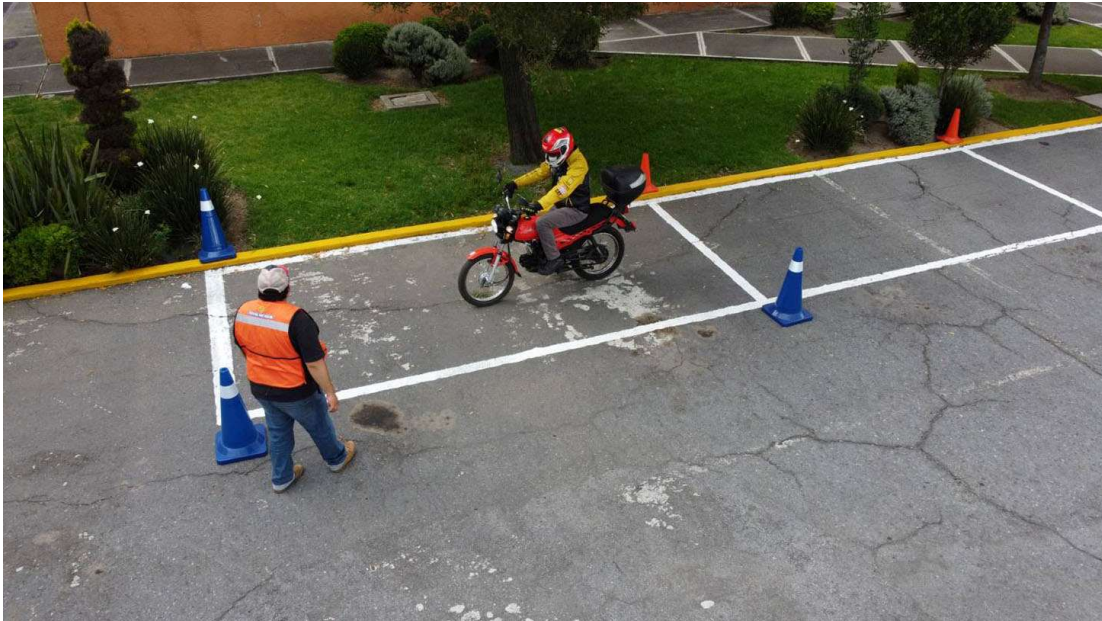
Regarding to rear impacts, the non-supply of housings of certain components such as batteries in MHEV and electric motors in some models of PHEV and BEV vehicles, leads to considering the replacement of components that represent from 11% to 18% of the market value of the vehicle.

By having a supply from the brands, each component of the electric batteries substantially reduces the cost of repair, a notable aspect especially in BEV vehicles whose cost of the energy accumulator could lead to the technical loss of the vehicle.

Electric batteries final disposal and recycling

This topic is regulated by the policy of each country or the geopolitical entity that embrace them, where in some countries there are already robust high voltage batteries collection networks and defined plans. On the other hand, some other countries in which hybrid and electric models are so far entering, including Colombian market, each importer of the brand has developed its battery collection plan and the battery repairing or second use are handled by third parties.

SEMOVI CDMX enables CESVI Mexico as an evaluation center to certify as a motorcyclist before CONOCER



With the purpose of continuing to contribute to the promotion of the best practices of sustainable mobility and in full harmony with the launch of the second decade of action for road safety 2021-2030 whose ambitious objective is to prevent at least 50% of deaths and traffic injuries by 2039, CESVI Mexico (Centro de Experimentación y Seguridad Vial) announced the opening of its Evaluation Center for the competence standard EC01331 Motorcycle vehicle driving for use on roads, basic level.

The Ministry of Mobility of Mexico City (Semovi) has published that the evaluation is a necessary requirement for all people who need to obtain a motorcycle license (A1 or A2) for the first time.

In addition, its objective is to ensure that motorcyclists have the minimum knowledge and skills to drive this type of vehicle safely, minimizing the chances of having an accident.



Ing. Ángel Martínez, general director of CESVI clarifies that this requirement is based on the Standard of Competences in driving the motorcycle vehicle for use on roads, issued by CONOCER (National Council for Standardization and Certification of Labor Competencies), the which consists of an evaluation that includes components such as: physical-mechanical review of the condition of the motorcycle, review of the helmet and protective equipment, knowledge test, and skill test.

“The truth is that a certificate of these characteristics was already very necessary, in view of the boom that motorcycles have had for a decade. According to INEGI data, we went from around 1 million units in 2012 to more than 4 million in 2020; and of these, more than half a million circulate only in the capital of the republic.”

“As if that were not enough, there was no certainty that the applicant for a motorcyclist license knew how to operate it properly, however, today that will be a thing of the past since the CONOCER certificate is already required and from CESVI Mexico we applaud public initiatives such as these which will undoubtedly reduce the risks associated with the circulation of these vehicles. In addition, each year around 43,000 accident reports are generated per year, which places the motorcycle as a vehicle with a high-risk factor for death and serious injuries, so riding a motorcycle is not a minor thing, " he said. Martínez engineer.

CESVI Mexico warns of the risks associated with micromobility

- Electric skates or e-scooters are not toys.
- It will be necessary to normalize their circulation by increasing their presence on the streets.
- Cesvi Mexico performs the first crash tests of electric skates in Latin America.



Within the framework of the press conference "Vehicles of individual mobility", in which the first impact tests of electric scooters in Latin America were presented, Miguel Guzmán Negrete, director of road safety of CESVI Mexico explained that one-person vehicles known as electric skates or e-scooters reach speeds of up to 35 km/h in just 3 seconds, and technically speaking, they generate considerable kinetic energy capable of causing significant injuries to both the driver himself in the event of a fall or crash, as well as the pedestrian who ran over.

“Part of the discussion in the design and redesign of new roads in large cities lies in deciding where these vehicles should circulate. What is clear is that not for the sidewalk, and for the bike lanes they will have to be made wider so that both means of transport can coexist”, clarified Mr. Guzmán Negrete.



The new hierarchy of mobility in which pedestrians are given priority over motorized vehicles is the new model that will gradually replace the current system in which cars are the "owners" of the road.



Under this scheme, people are located at the top of the pyramid, followed by cyclists and non-motorized vehicles, with public passenger and freight transport in the middle, while private motorized vehicles remain at the bottom as those who should in the future, adjust to roads designed for the first levels.

Miguel Guzmán explained that the transformation of cities is due to the fact that pedestrians are the ones who suffer the most from the consequences of the current mobile system and clarified that of the deaths that occur due to traffic accidents, 41.6% correspond to pedestrians and 33% to occupants. of vehicles, which means that more people who travel on foot perish than those who travel in a car and that is not consistent.

Micromobility, a concept that we must familiarize ourselves with

In addition, the road safety director of Cesvi Mexico presented the concept of micromobility, a neologism that refers to the way people will be moving in the near future. Engineer Guzmán specified that, although the final concept is still being worked on, the idea refers to a variety of light vehicles that generally operate at speeds below 25 km/h and are ideal for trips up to 10 km, according to the ITDP (The Institute for Transportation & Development Policy).

Other aspects of micromobility is that it can be electric or human-powered, it can be private or shared and, in general, the vehicles drive speeds between 25 and 45 km/h. What is not micromobility, are displacements based on internal combustion engines and that exceed speeds of 45 kilometers per hour.

“Micromobility is about giving more people more access to the city, increasing access to public transport and replacing the private car on short trips.”

Electric vehicles make micromobility more attractive for people who do not usually use mechanical bicycles or tricycles. It also expands the areas that people can easily get around without a car.

Crash Tests

Regarding the impact tests or crash tests carried out by the Cesvi Mexico experts, they were carried out in two formats: 1) the skater was run over and 2) the scooter collided with a car. In the first, a Renault skid was used, which was hit and run over by a sedan at 15.24 km/h. While, in the second, a Bird skate was studied that reached a speed of 19.5 km/h. In both experiments, the final posture of the dummy suggests serious injuries and minor damage to the car.

In the coming days, Cesvi Mexico will share more relevant information thanks to the telemetric measurements carried out by the Car Store company.

Auto Parts Price Index in China

Under the guidance of China Insurance Industry Association, CIRI studies Auto Parts Price Index for all vehicle consumers, and insurance companies. At Dec 27th 2021, CIRI released the 13th Auto Parts Price Index, and the 100 vehicles results are same as the before.

The current study found that the growth of " Auto Parts Price 100 Index " and "Common Parts 100 index" began to slow down. The research shows that the Auto Parts Price 100 Index is 351.46%, it increase 0.53%. And the Common Parts 100 index is 17.32, it increase 0.01. Overall, the two Indexes were basically the same as the previous, and the growth rate began to slow down.

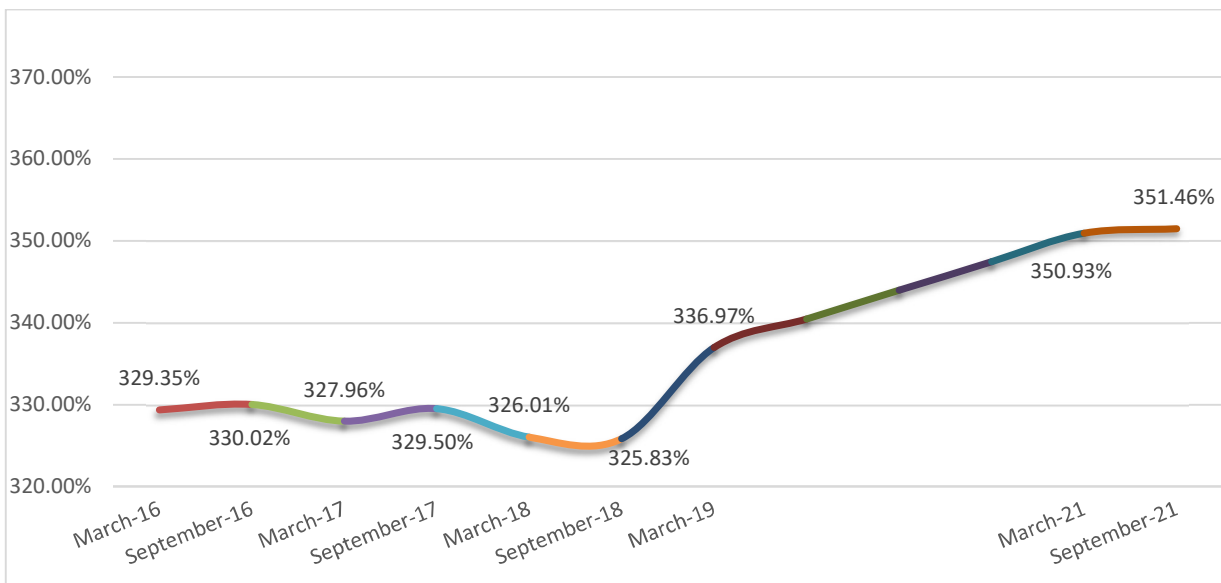


Figure 1 The Auto Parts Price 100 Index

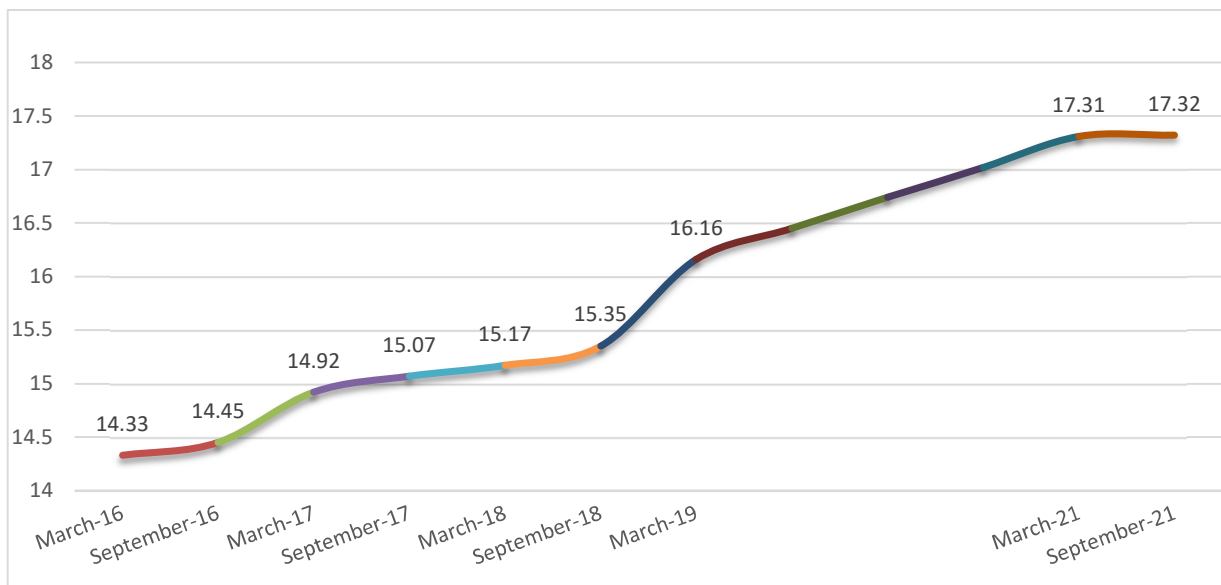


Figure 2. The Common Parts 100 Index

In addition, the study shows that the 15 Parts price are higher than the previous in the 18 Common Parts. The top 5 growth rate parts are front fog light(1.16%), taillight (0.72%), radiator frame (0.51%), side mirror (0.46%) and condenser (0.41%).

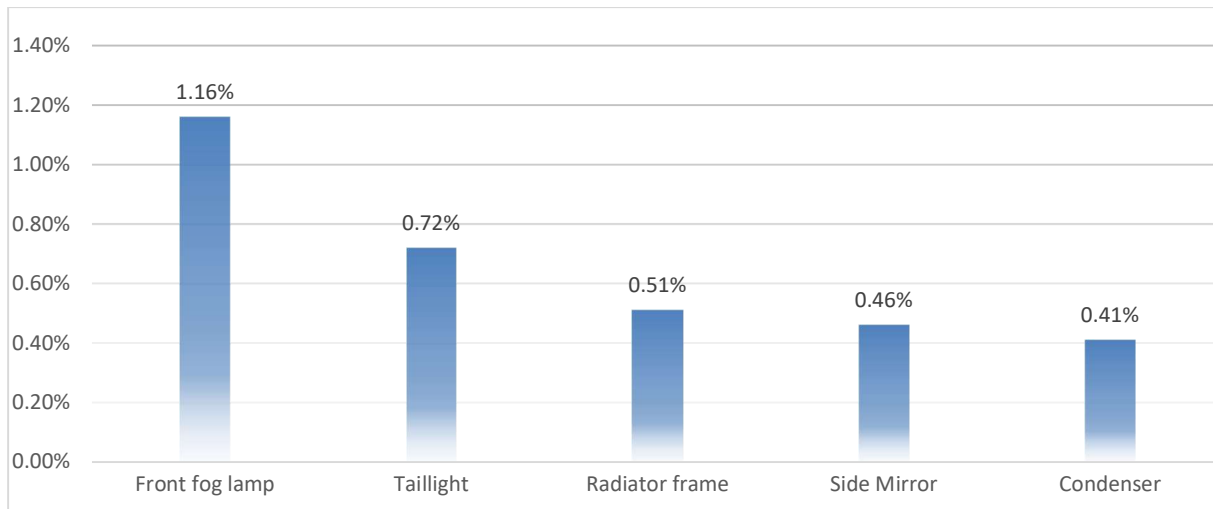


Figure 3. The Top 5 Growth Rate Parts

Some parts price did not decrease compared with the previous, for example front bumper cover, front lamp, rear bumper cover. And the front bumper cover index is 2.92%, front lamp index is 10.56%, and the rear bumper cover index is 3.49%.

For the development of the Chinese insurance and vehicle industry and protecting the consumers, CIRI will continue to study the Parts Price Index and release the results to the public.

CESVIMAP real car research into flood-related damage

CESVIMAP conducts research on real cars to find out about damage from partial flooding. We have experimented on traditional and electric cars to find out how water entry affects their mechanical and electromechanical components, and the state of the bodywork.

Analysis of each flooding process is approached from the viewpoint of the bodywork, electromechanical and paintwork departments.

In the three flooding experiments we have placed the water level above the height of the running board. In this way, the water can have access to the passenger compartment and come higher than the level of the exhaust pipe. The first flooding takes place with a parked vehicle; the other two with the engine running.

These two dynamic tests are carried out on two models with different methods of propulsion: traditional (combustion) and electric.

Our research is available in Cesviteca, CESVIMAP's online library; subscription to this service is [via this link](#).



CESVIMAP exceeds 8 million reproductions on YouTube

The [CESVIMAP YouTube channel](#) has passed the 8 million reproductions milestone, reinforcing its position as a space devoted to learning from Cesium's research and innovation in the automotive sector and in after-sales, making it a point of reference for professionals.

The number of reproductions has been reached after over 14,000 subscribers joined on YouTube.

In many cases YouTube uses CESVIMAP content as its information source in a sector in which technology advances at great speed and where it is vital to keep your knowledge up-to-date. Workers in repair shops and other after-sales services, in vehicle and component manufacture, or in appraisal, are some of the professionals who consult the centre's videos.



The YouTube profile of CESVIMAP, MAPFRE's R+D centre, includes various play lists, adapted to the audience's interests.

- **Training:** This covers the advances in the different areas of R+D which CESVIMAP carries out. These are cutting-edge features such as ADAS (Advanced Driver Assistance Systems) or electric vehicles, and they are of great value to professionals in departments such as vehicle appraisal, repair or after-sales management. The reconstruction of traffic accidents and fires are another of the subjects which are shown, in passenger cars, motorcycles or industrial vehicles.
- **Crash tests:** Low speed collisions, the starting point for CESVIMAP's research, comprise some of the most popular audiovisual content. The centre acquires passenger cars, vans, motorcycles, scooters (PMDs) and other vehicles (such as small trucks) and crashes them against a rigid 35 Tn wall, at 15 kph, to analyse which parts are damaged and study the repair process.

- **Other channels:** On *Aprendemos* (Let's Learn) users can learn the basics in matters of vehicle repair, and on *Banco de Pruebas* (Test Bank) the analyses of the latest repair shop tools and equipment are shown.



If you want to join the thousands of subscribers to the channel, [follow this link](#):

As part of its research and publication work, CESVIMAP lends great importance to the generation of quality content for after-sales, with which it contributes to training and to the development of the sector. As a multimedia producer, it also undertakes video production for external companies.

Young Drivers in Spain – The Great Change



Centro Zaragoza has conducted a research, in collaboration with the Linea Directa Foundation, that reaches interesting conclusions that may change the link between young drivers and accidentality.

Some of the main conclusions of the study indicate that, despite being the group that has the worst reputation among Spanish drivers (58%), young Spanish drivers from 18 to 29 years old are the age group with the lowest mortality rate among motorists (0.5%), an indicator that has fallen by 41% in the last decade. This great change in trend is accentuated even more if today's young people are compared with previous generations, since, in the last 30 years, traffic accidents have gone from accounting for 31% of young people's deaths (1989) to 17% (2019), which would mean saving around 35,000 lives.



Regarding the evolution of injuries, it also yields good data for drivers from 18 to 29 years old, since the rest of the age groups have a serious injury rate a 10.6% higher than that of younger motorists.

However, there are still important areas of improvement for younger motorists: they have a higher accident rate than the rest, they commit more speeding (72%), they are the ones who use the mobile phone the most while driving (47%) and they use in lower percentage the belt as occupants (16%).

The typical accident in young people from 18 to 29 years old: rear end crashes due to not maintaining the safety distance (30%), in quite old cars and on urban roads (61%). They are usually suffered by men (70%) aged 25 to 29 years.

CZ leads a project on Driving Style Monitoring based on a mobile App

The Centro Zaragoza Chair at the University of Zaragoza, in collaboration with the Department of Informatics and Systems Engineering, has funded a Project for prototyping a system for evaluating the driving quality of bikers.

The objective of the project was to demonstrate the feasibility of developing a cell phone application, without the support of any other hardware external to the smartphone of the user, driver of a motor vehicle, to monitor and evaluate the driving style. With the developed prototype it has been possible to verify that, in fact, the style of different drivers can be monitored and evaluated, scoring each of them.



Specifically, the development carried consisted of the creation of a functional prototype of a mobile application, implementing an algorithm of Centro Zaragoza, in which speeding and using the smartphone was monitored. Speeding over the limit that ruled in each area, determined from smartphone GPS and digital mapping, as well as the use of the phone to hold conversations, with and without hands-free, measuring the duration of the calls, and also the use of instant messaging applications, all during the driving of the vehicle, were monitored variables.

These actions deducted more or less points, depending on the increase in accident rate assigned to each of them, starting from an initial score of 100, during the period of time established for the monitoring of the participants in the test, so that the volunteers who used the mobile application during their testing stage obtained scores according to the number of "infractions" committed.

Small SUVs struggle in new, tougher side test

The Insurance Institute for Highway Safety (IIHS) recently introduced a new, tougher side crash test to address higher-speed crashes that continue to cause fatalities. In the first tests of 2020-21 vehicles, only one out of 20 small SUVs, the 2021 Mazda CX-5, earns a good rating.



“We developed this new test because we suspected there was room for more progress, and these results confirm that,” IIHS President David Harkey says. “The good rating for the CX-5 shows that robust protection in a more severe side crash is achievable.”

Nine vehicles earn acceptable ratings: the Audi Q3, Buick Encore, Chevrolet Trax, Honda CR-V, Nissan Rogue, Subaru Forester, Toyota RAV4, Toyota Venza and Volvo XC40.

Eight others — the Chevrolet Equinox, Ford Escape, GMC Terrain, Hyundai Tucson, Jeep Compass, Jeep Renegade, Kia Sportage and Lincoln Corsair — earn marginal ratings. Two more, the Honda HR-V and Mitsubishi Eclipse Cross, receive poor ratings.

All 20 small SUVs earn good ratings in the Institute’s first-generation side test.

The updated side test uses a heavier barrier traveling at a higher speed to simulate the striking vehicle. The new barrier weighs 4,180 pounds — close to the weight of today’s midsize SUVs — and strikes the test vehicle at 37 mph, compared with a 3,300-pound barrier traveling at 31 mph in the original evaluation. Together, those two changes mean it involves 82 percent more energy.

The honeycomb striking surface of the new barrier also has a different design that acts more like a real SUV or pickup when it hits another vehicle.

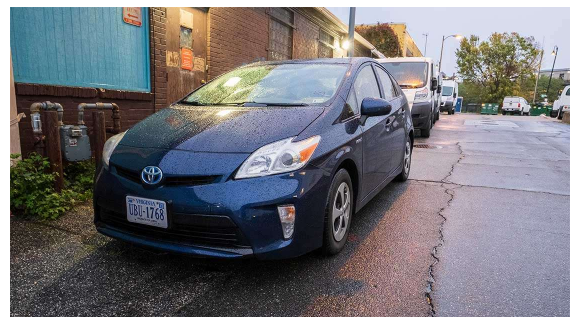
Like the original test, the updated side rating is based on how well the occupant compartment structure holds its shape during the crash, injury measures collected from dummies positioned in the driver seat and the rear seat behind the driver, and a supplemental measure of how well the airbags protect the heads of the two dummies. The SID-IIs dummy used in both seating positions represents a small woman or 12-year-old child.

For more information, visit <https://www.iihs.org/news/archive/2021>

Catalytic converters make 2004-09 Toyota Prius unlikely theft target

A spike in demand for precious metals has made Toyota Prius vehicles that are more than 10 years old an unlikely target of thieves, a recent report from the Highway Loss Data Institute (HLDI) shows.

Theft claim frequency for 2004-09 Prius models was more than 40 times higher in 2020 than in 2016, HLDI analysts found. As a hybrid car, the Prius is being targeted for the precious metals in its catalytic converter. The catalytic converters of hybrids need more of the precious metals to work properly because they don’t get as hot as those installed on conventional vehicles, since the combustion engines of hybrids only run part of the time.



Thanks to higher prices for platinum, rhodium, palladium and other metals found in the components, catalytic converter thefts have been rising in recent years. While thieves hit all kinds of vehicles, the catalytic converters from some models command higher prices from the recyclers who process them because they contain more of the high-priced metals.

Theft claim frequency was 58.1 claims per 1,000 insured vehicle years for 2004–09 Toyota Prius models in 2020, compared with 1.4 claims in 2016. Overall theft losses for those Prius vehicles in 2020 were nearly \$137 per insured vehicle year — a more than 45-fold increase from \$3 in 2016, HLDI found. In contrast, theft claim frequency for all other 2004-09 vehicles hardly changed from 2016 to 2020, and overall losses remained about \$7.

The HLDI database does not include information about the specific component reported stolen in insurance claims, but the dollar value of the typical claim provides some clues. For the high-theft years of 2019–20, there was a spike in claims in the \$2,501 to \$3,000 range (about the amount needed to replace the catalytic converter and exhaust system, minus the deductible). For calendar years 2016-17, most claims were for losses of less than \$500 or between \$1,501 and \$2,500.

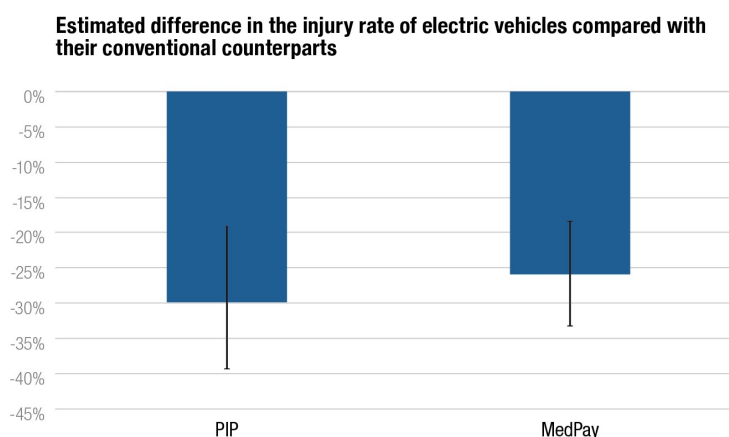
For more information, visit <https://www.iihs.org/news/archive/2021>

EV crashes are less likely to result in injuries

When electric vehicles (EVs) crash, the crashes are less likely to result in injuries than when conventional vehicles powered by gasoline engines crash, a new HLDI analysis shows.

HLDI looked at nine all-electric models that also have conventional counterparts and compared the rate of first-party injury claims per collision or property damage liability (PDL) claims. Injury rates were calculated separately for vehicles with medical payment (MedPay coverage) and personal injury protection (PIP) coverage.

The analysts found that the injury rate under PIP was 30 percent lower for electric vehicles than conventional vehicles. Under MedPay, the EV injury rate was 26 percent lower.



Previous HLDI studies have shown that EVs have lower claim frequencies under all kinds of coverage, including collision and PDL. That would suggest that they crash less frequently. However, the difference in claim frequency under MedPay and PIP is even greater than under collision and PDL, and the new study shows that more is at work than simply a lower propensity to crash.

One possible explanation is that the higher weights of EVs protect their occupants when two-vehicle crashes occur. Because of their batteries, the EVs in the study were 9 percent heavier than their conventional counterparts on average.

Another possible factor is that the range limitations of the EVs meant that they were more likely to be driven on low-speed, local roads than on high-speed roads where more severe crashes are likely to occur.

Finally, it's also possible that the electric vehicles were more likely to be owned by suburban residents with garages for convenient charging. Vehicles kept in locations with higher vehicle densities tend to have higher injury rates.

To request the full HLDI report, "Injury rates of electric vehicles and their conventional counterparts," email researchpapers@iihs.org.

“Design Evaluation Tool (DET)” : Virtual presentation given at the congress of the Society of Automotive Engineers in Japan (JSAE)

The Society of Automotive Engineers in Japan (JSAE) held an autumn congress from Oct 13th through 15th, 2021 in a virtual format and JKC gave a presentation titled “Design Evaluation Tool (DET)” at this congress. JSAE was established in 1947 to promote the progress of automotive technology and currently consists of more than 40,000 members, such as researchers and engineers. In order to encourage productive exchange between the members, research congresses are held twice every year. We would like to introduce the outline and the purpose of our given presentation.

In our presentation, we explained what DET is, and the background and purpose of its development. DET is a kind of tool to evaluate the vehicle’s Damageability and Repairability (D&R) performance. By investigating the structure of vehicles in accordance with the DET score sheet, it can evaluate how robust the vehicles are and how easy it would be to repair them without conducting an actual crash test. For example, let us introduce the front fender situation. Three items (FB2-1, FB1-1, FB6-1) on the left side of the Figure 1 show the ideal conditions/positions that prevent the front fender from damages. Primary factors or the structural component parts preventing damages are allotted with high scores in the DET score sheet. The higher the total scores, the better the outcome of vehicle’s D&R performance.

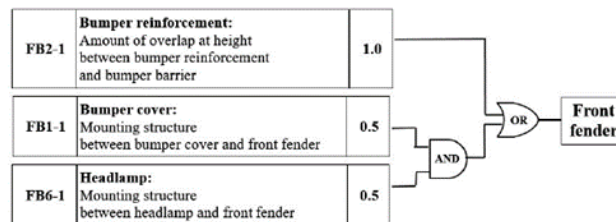


Figure 1

The reason why we developed this DET is to provide a useful information about D&R performance to car manufacturers in the early stages. So far, we have discussed many times with car manufacturers about notable points of new car models. If car manufacturers obtain useful information after the vehicle has been introduced to the market, they will not be able to promptly change its structure. Therefore, we needed a tool so that we can evaluate the D&R performance of new models early during the designing stage. DET enables car manufacturers to design vehicles with good D&R performance without knowing the crash test results.

The purpose of our presentation on DET at the research congress was to make this DET well-known across the Japanese auto industry. Recently, car manufacturers are promoting integration of vehicle platforms among the group companies and DET will surely play an important role in such business environment. We will further improve the DET and hope that it will be accepted widely as a global standard tool.

Development of Standard Repair Time for ADAS Reconfiguration

In Japan, there had been four types of standard repair time (RT) created by JKC, which are 'Removal & replacement RT', 'External panel RT', 'Internal frame RT' and 'Paintwork RT.' In October 2021, we newly created a fifth type of repair time applicable for the work related with reconfiguration of Advanced Drive-Assistance Systems (ADAS). Recently, it became mandatory in Japan to install the ADAS to new car models and therefore, the opportunities for the car repair shops to work on the ADAS were increasing. This led us to develop the ADAS reconfiguration time, our fifth type of standard RT, in meeting the needs of auto insurance companies and repair shops. Here, we would like to introduce the outline of this new type of RT that we created.

ADAS is equipped with a wide variety of sensors, and JKC classified them into following five categories depending on their functions and mounting positions.

- (1) Omnidirectional Camera
- (2) Ultrasonic Wave Sensor
- (3) Front Camera
- (4) Front Radar
- (5) Blind Spot Monitor

At first, we focused on the following three radar sensors showing high installation ratios* in many of the passenger cars in the Japanese market and created the RT for each of them.

- (1) Ultrasonic Wave Sensor (Installation ratio: 54%)
- (2) Front Camera (Installation ratio: 91%)
- (3) Front Radar (Installation ratio: 41%)

*2020 data from the Ministry of Land, Infrastructure, Transport and Tourism (Japan).

ADAS reconfiguration time had already been provided by car manufacturers and industry associations. When damaged car repair was involved, however, inconsistencies occurred and they were not easy to use together with aforementioned four types of standard RT. Our ADAS reconfiguration time was made in line with the certain conditions we set to make these four types of standard RT. We are hoping that this new type of RT will be well accepted in the Japanese market as a standard tool in order to maintain appropriate auto repair costs.



**The analysis service of personal injury risk
in case of minor damage accidents**



In 2021, a total of 155 cases of engineering analysis data on the risk of injury to vehicle occupants in the event of a minor accident were provided to give a service for auto insurance companies to support appropriate insurance payments.

The scope of the service is an accident in which damage less than a scratch or a dent of the bumper cover or the exterior panel that meets the 'minor damage repair standards' occurs, or an accident in which the struck vehicle's 'velocity change(ΔV)' is 8 km/h or less. The 'minor damage repair standards' were included on July 1, 2016 in the auto insurance terms and conditions, and are used to repair bumper covers and exterior panels of vehicles with minor damage.

KART was asked to analyze 175 cases of personal injury risk from insurance companies to determine the level of injury risk of passengers in rear-end, contact, and reverse collisions. Among them, 155 cases were returned, excluding 20 cases that were out of analysis scope or lack of sufficient accident-related information.

As a result of using the analysis report, 35 cases were returned from insurance companies, and consequently, about \$95,200 in insurance payments was saved. In 3 cases, insurance claims were abandoned, and in 32 cases, the settlement amount was reduced. Thus, an average of approximately \$2,720 in insurance money was saved. If the average savings per case is applied to 155 cases, it is judged that about \$421,470 of overpaid insurance money per year can be reduced.

As a result of the 5 analysis cases requested by the court, the insurance company won in 1 case, the compensation amount was compulsorily adjusted in 2 cases, and reconciliation between the perpetrator and the victim was recommended in 2 cases.

Two examples of court cases are as follows.

The first case is an accident that striking vehicle lightly scrapes the rear bumper cover of a stopped vehicle while exiting the parking lot. Accordingly, it was a minor damage type 2 in which only the paint layer was damaged without any damage to the plastic material of the bumper cover. The victim received long-term treatment and demanded a settlement money of approximately \$1,677. The court recommended reconciliation in which the settlement money was not recognized in addition to the treatment cost.

The second case is an accident in which the striking vehicle was slightly collided with the struck vehicle due to taking off the brake pedal while waiting for a signal. As a result, it was a minor damage type 1 in which only the clear coat layer was damaged on the bumper cover. The victim demanded long-term treatment and a large settlement amount. The court did not accept the settlement money but only about \$210 for treatment costs was recognized.



Striking vehicle



Struck vehicle(minor damage type 2)

[First case]



Striking vehicle



Struck vehicle(minor damage type 1)

[Second case]

P-AEB-Test with BEV (VW ID.3)



Figure 1: Volkswagen ID.3 test vehicle

P-AEB tests have so far only been published for combustion engines powered passenger cars. In order to gain experience regarding the test procedure with battery electric vehicles, the KTI carried out the test procedure with such a vehicle.

The vehicle is a Volkswagen ID.3 model year 2021 with 150kW power in the ProS equipment. This includes an 82kWh battery and the "Plus" assistance package (ACC, Front Assist, Front and Rear Parking Assist, Rear View Camera System, Lane Change Assist, Lane Keeping Assist incl. Emergency Assist and Traffic Jam Assist). The flank protection now available as part of the "Plus" assistance package is not part of the test vehicle's equipment. The sensor installation of the parking assistance is shown in Fig. 2. There are 4 sensors each at the front and rear of the vehicle. The system is activated when reverse gear is engaged. It is possible to deactivate the system again by pressing the button shown on the touch display. For forward travel, the system is also only active after reverse gear is engaged and switches off automatically when a speed limit is reached.



Figure 2: Sensor installation parking assist

The software status of the parking assistance of the ID.3 was read out (software version number: 0208). In the future, VW states that vehicle updates will be carried out over-the-air, which can lead to a change in functions over the life cycle of the vehicle.

In the ID.3, Volkswagen implements a new operating concept that does completely without physical buttons. It is controlled either via the 10-inch touch display in the center console or via touch-sensitive surfaces in the multifunction steering wheel. Voice control is also possible.

Furthermore, the ID.3 has rear-wheel drive, which, thanks to the larger steering angle, results in better maneuverability compared with front-wheel-drive vehicles. Assuming that this means less maneuvering, the number of parking damages could also be reduced.

The low-slung rear spoiler restricts visibility to the rear. However, the test vehicle has a rear-view camera that compensates for the impaired view in parking situations.

Test realization

The tests were carried out in accordance with the current R-CAR P-AEB test standard (version 2.2; 07/2021). When simply releasing the brake (Auto-Hold function switched off), the required speeds for the distances 2m and 6m were achieved without any problems. It should be noted that for the tests to be successful, the vehicle must be operated in "D" mode and not in "B" recuperation mode, so that the recuperation stage does not unnecessarily brake the vehicle before reaching the target. In principle, therefore, the recuperation stage should be switched off for all BEVs during the test.

Test results

In the short-range area, the ID.3 performed very well, only when driving forward C2B 0.4m inbound and C2C 0.4m overlap could not be braked in time. In the long range area, the test results were the opposite, here the vehicle was only able to brake in time in 3 scenarios (reverse: C2B 0.4m inbound; C2C central; forward: C2C central).

An overview of the overall results of the ID.3 versus a selection of some other vehicles tested at KTI (test periods are also shown in the table) is provided in the tables below. The tests with the VW Arteon and the Jeep Grand Cherokee were still carried out according to the old test procedure. The results here are only comparable to a limited extent, as one test procedure is no longer part of the procedure and another has been added. Nevertheless, it can be seen that the P-AEB system of the VW ID.3 with 64% passed tests performs differently than that of the Jeep Grand Cherokee with 79%. VW Arteon and VW Golf 8 achieve fewer passing tests. It is the comparison between VW Golf 8 and VW ID.3 that shows the biggest differences. Possible reasons for this behavior are the different network structures, software versions and sensor installation locations. A direct exchange with the OEM is planned for this purpose.

			VW Arteon	Jeep Grand Cherokee	VW Golf 8	VW ID.3
			2,0l TFSI	3,0l D	1,5l eTSI	Pro S
Time of test realization			Sep. '17	Oct. '18	Dec. '21	Oct. '21
Reverse						
Car-to-Bollard	central	2m	fail	pass	fail	pass
		6m	pass	pass	fail	fail
	0,4m inbound	2m	fail	pass	fail	pass
		6m	fail	pass	pass	pass
Car-to-Pillar	central	2m	fail	fail	-	-
		6m	fail	fail	-	-
	0,4m inbound	2m	fail	pass	fail	pass
		6m	fail	fail	fail	fail
Car-to-Car	central	2m	-	-	fail	pass
		6m	-	-	pass	pass
	0,4m overlap	2m	pass	pass	fail	pass
		6m	pass	pass	fail	fail
	45° central	2m	fail	pass	fail	pass
		6m	pass	pass	fail	fail
10° B-Pillar	2m	fail	pass	fail	pass	
	6m	fail	pass	fail	fail	
Percentage of tests passed			29%	79%	14%	64%

			VW Arteon	Jeep Grand Cherokee	VW Golf 8	VW ID.3	
			2,0l TFSI	3,0l D	1,5l eTSI	Pro S	
Frontal							
Car-to-Car	central	2m	-	-	fail	pass	
		6m	-	-	pass	pass	
	0,4m overlap		2m	-	-	fail	fail
			6m	-	-	fail	fail
Car-to-Bollard	0,4m inbound	2m	-	-	fail	fail	
		6m	-	-	fail	fail	
Percentage of tests passed			-	-	17%	33%	

Contact

KTI GmbH & Co. KG

Kraftfahrzeugtechnisches Institut
Waldauer Weg 90a
34253 Lohfelden

Phone: +49 561 51081 0

Email: info@k-t-i.de

URL: www.k-t-i.de

Advanced Driver Assistance Systems (ADAS) Calibration and Awareness Program by MRC Malaysia

In November 2021, MRC Malaysia has organised a 2-days course of Advanced Driver Assistance Systems (ADAS) Calibration and Awareness Program which was held at ESnet Academy, Ipoh, Perak.

At the time of writing, Malaysia has introduced a National Recovery Plan (PPN) where several changes have been made to standard operating procedures (SOPs) involving the automotive sector following positive development on the national vaccination rate. Aligned with the announcement, the government allowed the training to be conducted at the training centre by following the Standard Operating Procedure (SOP) issued by the Ministry of Health.



Left: ADAS Calibration training with participants and presenter. Right: During the training, participants has been exposed with the hands-on practise.

The objective of the program is to understand and identify the importance of ADAS and to create awareness of different types of ADAS, and ADAS calibration tools and equipment in the market. In addition, this program can educate the importance of ADAS calibration and reset process. Also, it exposed the participants to the ADAS features in the vehicle's manual and able to identify calibration requirements and OEM information.

This seminar has been attended by 95 participants from various sectors i.e students, lecturers, repairers, etc. The training modules consist of both theory classes and hands-on practice. The seminar has been conducted by MRC Malaysia's academy, together with UNIPAC Engineering, ESnet Academy and Perak Automobile Workshop Owners Association (PAWOA).

Corporate Social Responsibility (CSR) : Post-flood Relief Mission By MRC Malaysia Sports Club

On December 16, 2021, Malaysia was hit by a major flash flood and many areas are affected especially in the Klang Valley area. One of the worst hit areas is Taman Sri Muda Middle School which is located within the vicinity of MRC Malaysia in Shah Alam, Selangor.



Flooded neighbourhood of Taman Sri Muda in Shah Alam, Selangor.

As part of the corporate social responsibility (CSR) program, MRC Malaysia has organised a post-flood relief mission on December 30, 2021 to clean the affected areas. There are 13 members from MRC Malaysia Sports Club who volunteering themselves together with MRC Malaysia's COO, Suzana Mohamad to clean the affected school.



Left: Clearing away all debris . Right: Dismantling the damaged notice board process.

A safe journey along the road to Automation

Automated Lane Keeping Systems (ALKS) will be the first true step towards Automated Driving. ALKS will legally allow the driver to take their hands and eyes off the road, enabling them to participate in other activities such as watching media content on the in-vehicle display and the system functionality has been defined by the UN under Regulation 157. Initially, ALKS will only be functional in certain conditions, such as on a fully-fledged motorway where oncoming traffic is physically separated, at a maximum operational speed of 37 mph (60 Km/h).



ALKS is designed as a traffic-chauffeur system, which will enable drivers to relax during monotonous traffic jams and allow them to capitalise on this “dead” travel time for work or leisure purposes. ALKS and future automated systems are forecast to bring enormous societal benefits, but there are fundamental barriers which must be overcome to ensure the safe introduction of these technologies.

These systems will however be limited in their capabilities and will not be capable of fully self driving. For instance, ALKS will only be able to be used on motorways and these must be mapped into the system – they can’t be used just anywhere. Although they allow the driver to undertake “secondary tasks” like answering emails and watching Netflix, they rely on the driver to be ready to take back control. The vehicles will not be able to change lanes and will be forced to “stop-in-lane” should the driver fail to respond to a take-back request.

The first vehicle to be Type Approved to R157 is the Mercedes W223 – the latest S-Class to you and I, which received its international approval in December last year. Daimler have however stated that this will be for German use only and is likely to be on sale by mid 2022. Other international markets are likely to follow. At CES in January, Volvo announced their intention to add “self-driving” capabilities with their “Ride Pilot” technology following their recent tie up with Luminar and Zenseact. And so 2022 will be the tipping point for automation.

The UK has set out to be a leader in connected and automated mobility, and it is already dealing with complex topics such as amendments to its “Highway Code” and other legal structures to allow drivers to be “hands off the wheel and eyes off the road.” However, enabling the technology is only part of the battle. Ensuring safe adoption and use is vital to its success. Consumers must be empowered with information, to foster trust in the technology and understanding of its capabilities and limitations – to trust the system but understand its limitations and be ready to take back control.

Thatcham Research is leading a UK Government funded project to create an independent rating system for Automated Driving systems, starting with ALKS vehicles, by which buyers can compare performance and capabilities. These ratings will be suitable to be used in Insurance Group Rating systems and Euro NCAP. Building on the Assisted Driving Ratings now used by Euro NCAP, this new system will endeavour to rate *Automation Competence* and will look at how an ALKS-enabled vehicle operates in certain driving scenarios and how the transition of the driving task between vehicle and driver is handled. *Safety Backup* will explore collision detection, sensor degradation and event data recording.

Mercedes

W223



A key and wholly new element to these tests is the need to integrate Virtual Testing into the assessment. Virtual Testing uses computer modelling to predict precise vehicle performance and means that a far greater diversity of scenarios can be considered than those recreated on the test track. Therefore, instead of the 10+ scenarios featured in our Assisted Driving ratings, over 1000 scenarios could be modelled. Adding night time or poor weather testing adds robustness that can only really be reliably undertaken by a computer. The trick of course will be to develop trust and validate these computer models through spot testing. Automation is now technically and legally possible. It is however vitally important that consumers and insurers can trust these systems and its hoped that this new project will promote the safe adoption of Automated Driving.