

NEWSLETTER

NEWS FROM 14
RCAR INSURANCE
RESEARCH CENTRES

KIDI / KART

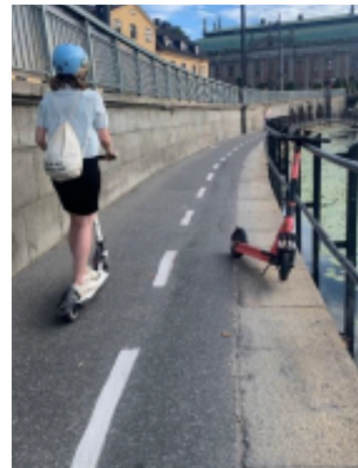
Research to revisions
on RCAR structural
barrier

Generali Jeniot

Raises awareness
on road safety

Cesvi Mexico

Record breaking
attendance at EXPO
CESVI Pro Street 2024



Hello RCAR members.

Welcome to the June 2024 RCAR Newsletter. In this issue, there are 24 articles from 14 contributing RCAR member centres on a wide variety of subjects including vehicle safety, repair, damageability and public events. As usual, please feel free to contact me on rmcdonald@rcar.org



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RCAR Research Centres



Allianz Zentrum für Technik (AZT), Germany



Finans Norge Forsikringsdrift / Bilskadekontoret, Norway



Folksam Sweden



Thatcham Research United Kingdom



Liikennevakuutuskeskus (LVK), Finland



The Jiken Center Co., Ltd. Japan



IAG Research Centre Australia



CESVIMAP Spain



Generali Jeniot Italy



Centro Zaragoza Spain



KTI Germany



KIDI / KART South Korea



State Farm Research USA



CESVI Argentina



Insurance Institute for Highway Safety (IIHS), USA



CESVI Mexico



CESVI France



CESVI Colombia



MRC Malaysia



AXA Versicherungen AG Switzerland



Samsung Traffic Safety Research Institute, South Korea



CIRI Auto Technology Institute, Chin



Measurement of the State of Health (SoH) of a high-voltage battery at AZT

Electric vehicles are becoming more and more common in the streets around the world. Different from conventional cars, it is imperative to know about the state of the part which holds up to 50% of the car's value - the high-voltage battery. The so-called State of Health (SoH) of a car's high-voltage battery is a parameter that interests many stakeholders - the industry, body shops, insurers and of course the car owners.

All batteries age over time and by usage, but not all batteries are affected in the same way, because there are so many different battery types. Sometimes they only differ by a bit, sometimes it is a completely new type. Last year a sodium-ion battery was placed in an electric test car for the first time. It's known that the relative size of the battery, the type of chemistry as well as charging and discharging parameters affect the ageing of the traction battery.

Unfortunately, there is no common understanding which data is relevant for SoH and no standardised measurement method is established. However, in Europe a raising number of third-party providers offer measuring tools and "certificates" to document battery health.

In a first assessment AZT evaluated what the current providers for SoH-testing are capable of based on a benchmark test. We chose 4 providers and 10 cars to make 30 test runs in total. The effort for the test varied from about 15 minutes to a full charge and discharge, taking rather days than hours.

The results showed cases, where the battery allegedly scored over 100%, then there were cases with considerable health degradation. In one case the difference between the providers was as high as 10%. Since there is no common standard for determining the SoH, the rating methods are different and might explain the spread of results. In fact, some providers only consider the capacity, others factor in the internal resistance, which seems reasonable.

AZT's most important but trivial finding is, that a common definition of an EV's battery health is dearly needed in the interest of our customers. The spread of results as well as the delivered technical background is insufficient today and AZT will continue to communicate this unsatisfying situation towards the industry.

AVILOO
Flash test
Premium test



DEKRA
Battery Test



Provider X



Provider Y



Overview of available tools and methods for SoH assessment

Crash Test Awards 2023 The safest cars in Argentina

The 17th edition of the Crash Test awards distinguished the models with the best price-safety relationship and the one with the highest level of protection of all, among the models launched in 2023.

The awarding of the Safest Cars 2023 was held for the first time at CESVI ARGENTINA, the only Road Safety and Experimentation Center in the country where new vehicles launched in the local market are evaluated and analyzed. It was the appropriate place to gather the leading players of the automotive industry, the insurance market and the press.



Since the beginning of the Crash Test awards, in 2006, CESVI established as an objective to increase the safety levels of the entry-level versions of those models launched in Argentina. In this way, the requirements were extended, and the parameters of choice were modified according to what is measured by international organizations.

The award was supported by the National Road Safety Agency, the Argentine Association of Insurance Companies (AACS), Insurers of the Interior of Argentina (ADIRA) and Latin NCAP, together with CESVI's partners: Galicia Seguros, La Segunda, Mapfre, RUS, Sancor Seguros, San Cristóbal Seguros and Seguros Rivadavia. Also Pilkington and Würth sponsored this edition.

Who participated?

- Brand new vehicles launched in the local market between January 1 and December 31, 2023, in their base versions.
- New models have taken part in this selection as well as restyled models that have improved some important safety aspect.
- Vehicles that exceeded 35 points in the Safety Index.

All participating vehicles had to visit CESVI ARGENTINA's facilities where they were disassembled, checked and analyzed in order to elaborate CESVI's Safety Index and thus determine the winners.

Who were the winners in each category?

MIDSIZE CAR: Toyota Corolla

COMPACT SUV: DS 3

MEDIUM SUV: Citroën C5 Aircross
LARGE SUV: Volkswagen Tiguan AllSpace
MEDIUM PICK UP: Ford Ranger
EXCELLENCE IN SAFETY: Mercedes-Benz EQA
GOLDEN CAR: Toyota Corolla



What aspects were evaluated for the Safety Index?

The protocol for determining the Vehicle Safety Index includes 225 items according to their influence on safety. They are divided into two large groups, with four subgroups each:

PASSIVE SAFETY

- Supplementary restraint systems (seat belts, airbags).*
- Structural behavior (materials used, structures).*
- Supplementary safety systems (post-collision systems and electrical protections).*
- Crash Test: results of tests carried out by international organizations.*

ACTIVE SAFETY

- Dynamic systems: stability controls, traction, hill assist, among others).*
- Preventive safety-ADAS: collision warning, lane keeping, autonomous braking, blind spot sensor, among others.*
- Complementary active safety systems: mirrors, locking systems, safety locks and window lifters.*
- Comfort systems: air conditioning, parking sensors, among others.*

Based on the points evaluated, CESVI determined a Safety Index -ranging from 1 to 100- and then linked it to the commercialization value as of December 2023, to establish the price-safety ratio that defined the winner in each of the categories.

The GOLD award went to the model with the best price-safety ratio among all the winners. On the other hand, as every year, for the Excellence in Safety award, only the index (pure safety) was taken into account and the models that obtained more than 80 points participated.

Live Crash Test

As part of the event, a vehicle with a structural design from the 1980s was side-impacted against a rigid column at a speed of 26 km/h and contrasted with another vehicle tested under the same conditions, but with a current configuration.



Crash Test of vehicles from the 80's and today.

In this way, it was intended to demonstrate that the structures of the new vehicles are more resistant, becoming visible through a significant decrease in structural deformation with respect to the vehicle with a configuration that exceeded four decades of life.

For more information:

<http://www.automasseguro.com.ar/>

<https://home.cesvi.com.ar/Posts/ViewPost/CrashTest234Junio>

CESVIMAP organises a press conference on Road Safety and Sustainability

CESVIMAP and Fundación MAPFRE organised a conference for journalists on two topics researched by the MAPFRE R&D centre: road safety and sustainability. In front of the press, a motorbike with two occupants -driver and passenger- was crashed at 40 km/h and head-on into a vehicle. The occupants of the motorbike were equipped with a mechanically operated airbag waistcoat. The objective was to test the effectiveness of this safety system, as well as to ascertain the feelings of the motorcyclists who use it, which directly or indirectly affect their safety.

The CESVIMAP report, "*Ergonomics and sensations in the use of motorcyclist airbags*", shows that 66% of motorcyclists who have tried it (two out of every three) say that this safety element provides them with greater safety. The figure rises to 93% when it comes to recommending it to other drivers of these two-wheeled vehicles.

The report was compiled from a series of dynamic tests carried out on 83 volunteer motorcyclists, equipped with an airbag similar to the one tested during the press day, for use on their rides, on all types of motorbikes and in a variety of weather conditions.



The day ended with the experience of various live workshops in which a CESVIMAP technician carried out repairs to the motorbike headlights and plastic fairings, to commemorate World Recycling Day and the repair that we always advocate before replacement, as long as it is technically and economically feasible.

CESVIMAP conducts dynamic and static research on microcars

Given the growing increase in the number of two- and three-wheeled vehicles and quadricycles - and therefore their repair and insurance - CESVIMAP has for some time now been investigating these vehicles in the L category, which the European Union regulates under Regulation 168/2013.

We have dynamically tested two different models: the Citroën Ami light quadricycle, leader in sales in Spain, and the Xev Yoyo heavy quadricycle. We tested their AEB braking systems at 15, 20 and 30 km/h on both models. We also simulated what it would be like to run over an adult pedestrian walking at a speed of 15 km/h with these vehicles. We also caused the Citroën Ami to hit the rear of the stationary XEV Yoyo at 15 km/h and vice versa.





After the front and rear crash test under RCAR standards for both models, we have analysed their constructive particularities at a structural level, their bodywork, as well as their singularities when it comes to repairing them, what kind of technical information is available for their appraisal and repair, how the spare parts supply process works for their brands and its deadlines, etc.

It can be said that, after adding the experience and sensations of driving them, CESVIMAP has a thorough knowledge of this type of vehicle, allowing MAPFRE to build a bespoke insurance policy.

Analysis of the reparability of Chinese vehicles at CESVIMAP

The growing presence of Chinese-brand vehicles on our roads is undeniable. With sales figures increasing year after year, the share of Chinese manufacturers in the overall vehicle fleet is significant. This increase means that the involvement of these vehicles in accidents is also increasing.

As part of CESVIMAP's research work, we have analysed several of these vehicles at our facilities in order to compare them with models from other manufacturers. In addition, in order to find out how they respond to an impact and how all the processes are developed after the impact, we have impacted them with front and rear RCAR crash tests.

Some of the conclusions of these studies are that the assessment and repair times are increased due to several situations: these vehicles are not available on the assessment platforms, there is a lack of technical information from their manufacturers, and the delivery times for spare parts are long, delaying the repair process considerably.



Comparativa estructural BYD ATTO 3 vs MG4

Record-breaking attendance at EXPO CESVI PRO STREET 2024

Thanks to successful marketing strategies such as the activations: MasterCraft and Diseña el auto EXPO CESVI, Zaky's Live Garage, Demonstration Zone and Autoshow, EXPO CESVI PRO STREET 2024, managed to attract more than 12,000 automotive collision repair enthusiasts from 6 to 8 June at the WTC in the CDMX. This figure exceeds all expectations with more than 50% over last year's edition attendance.

With this effort we have responded to the demand of the participating brands who wanted to see a larger number of people at the event and vice versa, visitors wanted to see more exhibitors.

In this 2024 edition, we managed to create a memorable experience for all participants. In numbers, we had +20% more exhibitors, from 54 to 65; we presented 35 demonstrations of products, materials, tools and systems for the collision shop; we delivered 15 productivity lectures, including one on our newest educational product: the Painter's Seedbed. In parallel, we held the 9th cycle of road safety conferences with speakers from the public and private sectors sharing their knowledge and experience in accident prevention and the implementation of best practices in safe mobility.

For the first time, the IBIS Latin America seminar was integrated into the programme of activities at EXPO CESVI with an outstanding response from the attendees.

The event turned into a family repair party where all players in the automotive ecosystem were able to converge and interact in an unbeatable atmosphere.

It was reported that the organizing committee is looking for new venues to take EXPO CESVI to other parts of the Mexican Republic so that more and more professionals and enthusiasts of automotive collision repair have the opportunity to experience the "repair party".



CIRI Holds C-IASI 2020 Protocol Summary Conference and Launches 2023 Protocol Tests

On May 11, 2024, the China Insurance Automobile Safety Index (C-IASI) 2020 protocol Summary Conference, organized by CIRI Auto Technology Institute, was successfully held in Beijing. Over a hundred expert representatives from academia, insurance, and the automotive industry attended the conference.

At the conference, CIRI released the results of the fourth batch of ten vehicle evaluations for the C-IASI in 2023, marking the completion of the release of all test results under the 2020 protocol. A total of 75 vehicle models were evaluated under 2020 protocol, including 30 Chinese brand models and 45 joint venture brand models. Compared to the results of the 2017 protocol, the percentage of vehicles with GOOD and ACCEPTABLE ratings in damageability and reparability increased from 13% to 22% during the 2020 protocol period. The GOOD rate for pedestrian protection improved from 79% to 92%, the GOOD rate for occupant protection inside the vehicle increased from 79% to 92%, and the GOOD rate for active safety rose to 95%. Chinese brand vehicles showed significant progress, with GOOD rates in all categories surpassing those of joint venture brand vehicles.



President Shulin Liu giving speech



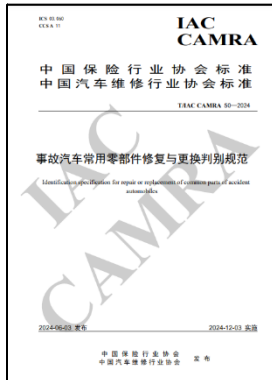
Vehicles achieved GGGG ratings and AGGG ratings

As part of the summary for the 2020 protocol, CIRI announced the awards for GGGG and AGGG ratings during the 2020 protocol testing period. The vehicles that achieved the GGGG rating include: Volkswagen ID.4X and Volkswagen Lavida XR. The vehicles that achieved the AGGG rating include: Changan UNI-K, Toyota C-HR, WEY Tank 300, Lynk & Co 09, Volkswagen ID.6 CROZZ, NIO ET5, Volkswagen Lamando L, Zeekr 001, GWM POER, Audi Q4 e-tron, Ford Edge L, and Volkswagen ID.7 VIZZION.

This conference marks the conclusion of the C-IASI 2020 protocol testing and the commencement of the 2023 evaluation protocol.

CIRI-Led Automotive Repair Industry Standard Released

On June 3, 2024, the Insurance Association of China (IAC) and the China Automotive Maintenance and Repair Trade Association (CAMRA) jointly released the "Identification Specification for Repair or Replacement of Common Parts of Accident Automobiles" in Beijing. This standard was developed in response to the Chinese government's "National Standardization Development Outline," which aims to create a new framework for standardization across broader, deeper, and higher-level fields. It addresses the technical and operational needs of accident vehicle repairs, supports the sustainable development of the insurance and automotive repair industries, and promotes the healthy development of the automotive aftermarket. Under the guidance of the two associations, CIRI took the lead in uniting 62 maintenance companies and insurance companies to participate in the compilation work.



The standard specifies the general requirements for identifying repair and replacement of common parts in accident vehicles, damage measurement methods, and criteria for repair and replacement decisions. It clearly defines the overall technical requirements for safety, strength, durability, appearance consistency, and repair economy as the fundamental basis for judgment. This standard is applicable to the appraisal and repair work of common parts in accident vehicles within the insurance and automotive repair industries.

Standard cover



Day on ‘CZ Certification’ for Alpha Scale France

On the 14th of May, we were visited by a group of 24 people invited by the company Alpha Scale France to know our certification processes for spare parts and paintwork.

Alpha Scale France, a digital platform for car parts, organized the visit to show the rigor of the certification process carried out by Centro Zaragoza, with the aim of increasing the use of certified spare parts in the French market.

The day began with a presentation of Centro Zaragoza's activities and the parts certification processes we are working on, highlighting the criteria and tests that are carried out to ensure that a body part is of equivalent quality to that of the vehicle manufacturer, which are based on “RCAR Technical criteria for the certification of body replacement parts” document.

Practical sessions were also held in the workshop where the attendees had the opportunity to see different tests, such as the pre-inspection, adaptability or crash test, as well as the process followed for the certification of the two-coat paint finish systems.



Fig. 1. Presentation of Centro Zaragoza's activities



Fig. 2. Carrying out a crash test

Microcar (light quadricycle) crashes in Sweden

There are about 17 000 Microcars in traffic in Sweden, of the total amount of 5 million registered passenger cars in traffic. The number has increased in later years with higher number of fatalities and severely injured consequently according to national statistics. Their damage cost has increased with many total losses of the crashes Microcars. In Sweden you need to be at least 15 years of age and Microcars are not allowed to drive faster than 45 km/h.

Folksam has investigated 102 randomly selected Microcar crashes with personal injury reported to Folksam between 2017 and 2022. Most accidents were single-vehicle crashes (47%), followed by rear end collisions (30%). In 90% of the crashes, the Microcar driver was at fault (80% of the two-car crashes). The majority of the crashes involved another passenger car, only a small proportion involved pedestrians. Six of the collisions were with a HGVs and buses. The seatbelt wearing rate among those possible to check was 75%. Six out of ten crashes occurred in cities on roads with 50 km/h or below. Most of the crashes occurred during daylight conditions. All injuries were minor or moderate, no reported severe injuries among the investigated crashes. Other studies have shown that Microcars mostly are used for daily commuting to school and social activities in built up areas.



Euro NCAP has tested Microcars with very poor results. Although their crashworthiness is poor in comparison to passenger cars, the number and proportion of fatal and severe injuries is lower than expected according to national statistics. However, there is a need for improved crashworthiness, both regarding their structure and fitment of safety technology such as airbags. There is also a need for improved training possibilities of both driving and risk perception.

Electric scooter accidents in Sweden



Electric scooters have since 2019 becoming popular in Sweden, as in many other countries, with several operators active in the larger cities in Sweden. Between 2019 and 2023, there were about 10853 accidents of which 13 were fatally injured according to official national statistics. In a study by Folksam, single accidents accounted for most accidents with e-scooters (84%). In 13% of the crashes another road user (mostly pedestrian or bicyclist) was injured. In 70% of the e-scooter-to-car crashes, the e-scooter was hit by a car and in 17% of the e-scooter was riding into the car. 61% occurred when the paths of the passenger car and the e-scooter crossed (not in same direction). One out of 5 crashes occurred when the driver of the passenger car was making a left or right turn. The majority of injuries were to the upper and lower extremities, followed by face and skull/brain injuries. Folksam has also found preliminary results that Autonomous Emergency Braking (AEB) system are not effective in detecting e-scooters.

Many injury crashes occurred at intersections and zebra crossings. Infrastructure measures such as elevated zebra crossings may help to reduce the burden of e-scooter and passenger car collisions. It is important to prioritize scenarios where the car goes straight and hits an e-scooter with its front at intersections and on zebra crossings. In line with previous research, head injuries remain most prevalent at the highest injury severity and are therefore a priority for prevention. An increase in helmet use among e-scooter riders is therefore important. Extremity injuries were the most common injury at moderate injury severities. Inflatable vests with shoulder protection are today available and might offer some protection for upper extremities. Furthermore, AEB for vulnerable road users needs to be developed to detect e-scooters more effectively.

Reference: H. Stigson, I. Malakuti, M. Klingegård, Electric scooters accidents: Analyses of two Swedish accident data sets, Accident Analysis & Prevention, Volume 163, 2021, Internal accident data E-scooter- claims (2022)

H. Stigson, A. Kullgren, N. Nubbe. Descriptive Statistics on Crashes of E-Scooters with Passenger Cars in Sweden. IRCOBI, 2024

Generali jeniot raises awareness on road safety

The issue of road safety is becoming increasingly important, thanks in part to the European Union's commitment to reducing the number of road deaths and injuries through the Vision 0 goal of zero road fatalities by 2050. Today, this goal appears to be a long way off; the mortality rate in Europe is 46,3 deaths per million inhabitants; Italy, to date, has outperformed this average with 53,6 fatalities for a total of 3.159 victims and just under 300.000 injured; however, a significant decrease in injuries and fatalities can be observed between the pre and post pandemic periods.

On the 5th and 6th of June, the Advanced Road Safety Training Programme was held at the jeniot Technology Centre in collaboration with ANIA (National Association of Insurance Companies), with employees from companies, including Allianz, Sara Assicurazioni, Reale Mutua, and ANIA Safe, as well as, of course, Generali Italia, for approximately 40 participants.

The training sessions were divided into two macro-areas: the first covered driving safety and safe driving procedures, and the second focused on the impact that insurance companies can have on road safety.

In terms of safe driving, there was a more theoretical section in the classroom, that covered topics such as the importance of the driving position, hand position on the steering wheel, gaze direction and vehicle physics topics. In addition, the topic of driving when psychophysically impaired was discussed. Following this more theoretical introduction, the participants were able to test and apply the advice presented to them using a static and a dynamic simulator that accurately replicated the car's feedback and car behaviour in a road context.



Theoretical session and dynamic driving simulator

Generali jeniot technicians led discussions on several key topics. First, they described the evolution of ADAS technologies, which will become mandatory for all new vehicles registered in Europe from July 2024. They explained the different performance of assistance systems under realistic conditions, evaluated by jeniot with track tests on over 350 car models, and discussed ADAS insurance impacts (e.g. reduction of traffic accidents, calibration and sensors damageability).

The second major topic was the potential risks concerning electric vehicles. The team delved into the unique features of electric and hybrid cars. They presented the results of studies conducted at jeniot Technology Centre, supplemented with information from international research. They highlighted data regarding driving with harsh accelerations, the implications due to damage to the high-voltage battery and the greater difficulty of extinguishing fires.

Following this technical discussion, the focus shifted to car safety. They showcased the crash test area at the jeniot Technology Centre and explained its use in verifying car safety and damageability. They also discussed data from connected cars and other safety-related studies, such as analysis on whiplash injuries.

Lastly, they turned their attention to aftermarket black boxes. They discussed the validation technique using *JADA* (a testing robot patented by jeniot) and presented the various services offered through the black boxes. These include emergency calls, real-time coaching and driving style monitoring, which can reduce claims by 32% by transitioning from a risky to a safe driving style, according to Generali Italia data. They also explained the benefits of the Smartphone-as-a-Sensor solutions like jMobility, the new jeniot app which can detect smartphone distractions and driving behaviour using only the smartphone's sensors.



On field explanation on Smartphone-as-a-Device and ADAS

The event was well received and actively participated in, offering an important training opportunity and contributing to the growth of skills and awareness of professionals in the sector on the issues of sustainability and innovation related to road safety.

The feedbacks received were very positive, in particular, considering the different technical abstraction of the participants, for many of them it has been an opportunity to discover the strong impact that some of the technological innovations of the automotive world have on the insurance and safety field. Furthermore, the location of the event allowed other insurance companies to learn about the reality of the Generali jeniot Technology Centre.

Few small SUVs excel in new IIHS front crash prevention test

This spring, the Insurance Institute for Highway Safety (IIHS) released the first batch of ratings in its updated vehicle-to-vehicle front crash prevention test. As mentioned in the January RCAR newsletter, IIHS revamped the test after finding that most automatic emergency braking (AEB) systems struggle to avoid crashes with large trucks and motorcycles.

The new evaluation includes a motorcycle target and an actual semitrailer in addition to a passenger vehicle target. It also uses higher test speeds than the original IIHS front crash prevention evaluation.

The first results to be released are for 10 small SUVs. Only the Subaru Forester earns a good rating.

The original vehicle-to-vehicle front crash prevention evaluation was developed when the technology was relatively new. By the time that evaluation, with test runs at 20 and 40 km/h, was discontinued at the end of 2022, all tested vehicles were earning the top rating of superior.

The updated test includes trials run at 50, 60 and 70 km/h. Trials are conducted with the motorcycle or passenger car target positioned in the center of the lane and offset to the left or right, while the trailer is always positioned in the center of the lane.

The trials using targets evaluate both the forward collision warning and AEB systems. In all the test runs using the trailer, only the forward collision warning system is evaluated, and the driver steers out of the lane to avoid a crash.

The Forester was the only vehicle to ace all trials with the passenger vehicle target, and not a single model managed to entirely avoid the motorcycle target. Most vehicles issued a timely warning with the trailer, though four SUVs failed to warn early enough at the slowest speed. The poor-rated Volkswagen Taos did not issue any timely warnings with either the trailer or the two targets.

Updated front crash prevention ratings: small SUVs	
2023-24 Subaru Forester	G
2023-24 Honda CR-V	A
2023-24 Toyota RAV4	A
2023-24 Ford Escape	M
2023-24 Hyundai Tucson	M
2023-24 Jeep Compass	M
2023-24 Chevrolet Equinox	P
2023-24 Mazda CX-5	P
2023-24 Mitsubishi Outlander	P
2023-24 Volkswagen Taos	P

G Good **A** Acceptable **M** Marginal **P** Poor

First partial driving automation safeguard ratings show industry has work to do

IIHS has introduced a new ratings program designed to encourage automakers to incorporate more robust safeguards into their partial driving automation systems. Out of the first 14 systems tested, only one earns an acceptable rating. Two are rated marginal, and 11 are poor.

“We evaluated partial automation systems from BMW, Ford, General Motors, Genesis, Lexus, Mercedes-Benz, Nissan, Tesla and Volvo,” IIHS President David Harkey said. “Most of them don’t include adequate measures to prevent misuse and keep drivers from losing focus on what’s happening on the road.”

The Teammate system available on the Lexus LS is the only system tested that earns an acceptable rating. The GMC Sierra and Nissan Ariya are both available with partial automation systems that earn marginal ratings. The LS and Ariya each offer an alternative system that earns a poor rating. The Ford

Mustang Mach-E, Genesis G90, Mercedes-Benz C-Class sedan, Tesla Model 3 and Volvo S90 also earn poor ratings, in some cases for more than one version of partial automation.

The ratings only apply to the specific models tested even though systems with the same names may be used on multiple vehicles from the same manufacturer.

While most partial automation systems, which combine adaptive cruise control, lane centering and various other driver assistance features, have some safeguards in place to help ensure drivers are focused and ready, these initial tests show that they're not robust enough.

The new ratings aim to encourage safeguards that can help reduce intentional misuse and prolonged attention lapses as well as to discourage certain design characteristics that increase risk in other ways — such as systems that can be operated when AEB is turned off or seat belts are unbuckled.

IIHS teams up with Consumer Reports on teen vehicle recommendations

An annual collaboration between IIHS and Consumer Reports helps families in the U.S. choose safe, reliable and affordable vehicles for young drivers. The two organizations recently issued their latest list of recommended new and used vehicles for teens.



This is the fifth year the two groups have teamed up for the recommendations and the first time they have strengthened the safety criteria. All of the recommended used vehicles now have a good or acceptable rating in the IIHS driver-side small overlap test. That's in addition to good ratings in four other IIHS tests and passing marks for braking, handling and reliability from Consumer Reports.

In recent years, soaring vehicle prices made it difficult to find good options at reasonable prices. Now that the market has stabilized, consumers can find more safety for less money. A total of 58 used models ranging from \$5,800 to \$19,900 are on this year's list.

The top tier of recommended used vehicles also come with standard AEB, a good backstop for all drivers, but especially for young, inexperienced ones, who are more prone to mistakes.

Those who can and want to splurge for a new vehicle have 22 recommended 2024 models to choose from — all winners of the 2024 IIHS *TOP SAFETY PICK* or *TOP SAFETY PICK+* award that offer state-of-the-art crash protection and crash avoidance. These vehicles are also great choices for families with younger children who want something they will be able to hand down to them when they are ready to drive.

Whatever list teens and their parents are shopping from, IIHS and Consumer Reports advise people to look for vehicles that aren't too small, too big or too fast. Sports cars and anything with excessive horsepower relative to its weight are excluded from the recommended list. The list also has no minicars or vehicles under 2,750 pounds because small, light vehicles may not provide enough protection in crashes with other vehicles.

Large SUVs and large pickups don't make the cut either. Although these vehicles offer greater protection in some crash configurations, they can be hard to handle and take longer to stop. They also pose more risk to others on the road, including pedestrians, bicyclists and people in smaller vehicles.

For the full list of recommended vehicles for teen, go to <https://www.iihs.org/teenvehicles>

For more information on all of these topics, see <https://www.iihs.org/news>.

Contributing to Regional Safety through Collaborative Training with the Local Fire

Department

From November 2023 to February 2024, JKC collaborated with the local Fire Department by providing training sites and vehicles. During this period, they conducted the following four types of rescue training exercises:

1. Occupant extraction from a large truck
2. Rescue using car jacks
3. Vehicle lifting with a passenger car
4. Occupant rescue involving vehicle destruction

Purpose of the Training

The fire department conducts various training exercises, but training involving vehicles has been challenging due to the need to prepare vehicles that can be destroyed and the technical expertise required. In this collaboration, we used vehicles that were scheduled for disposal after our experiments to simulate rescuing victims from car accidents. This allowed for efficient and safe vehicle stabilization and destruction, enabling the rapid rescue of victims during training exercises.

Contribution to the Community and Future Outlook

Our company has not only contributed to regional safety but also strengthened our cooperative relationship with the local Fire Department. In fact, in April 2024, the local Fire Department gave a lecture on vehicle fires to our company, allowing us to deepen our understanding of vehicle fire incidents.

Moving forward, we will continue to build cooperative relationships with various organizations to gain new insights and contribute to our stakeholders.



Survey on Fuel Cell Electric Vehicles (FCEVs)

JKC conducted research on the Toyota MIRAI, the world's first mass-produced fuel cell electric vehicle (FCEV). The first-generation MIRAI was released at the end of 2014, and the second-generation MIRAI was released at the end of 2020. We have investigated both models. Through our company magazine, which is aimed at professionals in auto repair and insurance, we have been providing information about the MIRAI and FCEVs.

FCEVs generate electricity by causing a chemical reaction between hydrogen and oxygen in the fuel cell stack, which then powers the motor. The only byproduct emitted during operation is water (water vapor), making it an exceptionally clean mode of transportation as it produces no harmful substances such as CO₂.

Background and Purpose of the Survey

This survey was conducted to introduce the basic structure and characteristics of FCEVs.

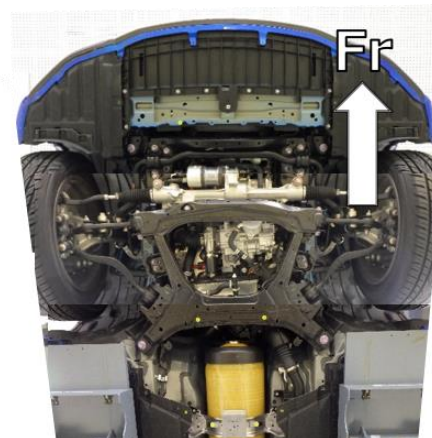
In Japan, it has already been ten years since the first generation MIRAI was introduced to the general market, but the recognition of FCEVs remains low. On the other hand, Toyota predicts that the fuel cell market is expected to expand, particularly for commercial vehicles, by 2030. As interest in FCEVs is expected to grow, we provided the following fundamental information:

1. Basic structure and operating principles of FCEVs
2. Major manufacturers and released models both domestically and internationally
3. Technical characteristics differing from conventional vehicles
4. Precautions during repairs

We will continue to disseminate information to ensure the sound development of automobile insurance.



TOYOTA MIRAI



TOYOTA MIRAI

Drilling of Ultra-High Strength Steel Sheets

Since around 2010, ultra-high strength steel sheets with a tensile strength of 1500 MPa have been used and adopted in many vehicle models. Ultra-high strength steel sheets are extremely hard, making drilling difficult. In collaboration with a testing and research company, we conducted verification tests on drilling holes in ultra-high strength steel sheets with tensile strengths of 1500 MPa, 1800 MPa, and 2000 MPa.

The surface of ultrahigh strength steel sheets is coated with either zinc plating or aluminum plating, with the latter being highly harder and posing challenges for drilling holes. The thickness of the aluminum plating ranges from 20 μ m to 30 μ m, and it can be removed by sanding off the coating.

The presence of aluminum plating affected the drilling process. By removing the aluminum plating before drilling, we were able to successfully drill holes using a spot cutter. Additionally, the use of a pressure-arm-equipped hand drill minimized variations in the drilling process.

Comparison of Drilling with Aluminum Plating vs. Without Aluminum Plating:

with Aluminum Plating



Without Aluminum Plating



The presence of cutting oil also influenced the drilling process, with drilling being more efficient when cutting oil was used (except for the 2000 MPa case, where the possibility of slippage was considered and drilling was conducted without cutting oil).

The adoption of ultra-high strength steel sheets is progressing due to the need for vehicle lightweighting and collision safety. Efficient operations can be achieved through the removal of aluminum plating and the appropriate use of tools. It is important to note that conditions and methodologies may vary in different workplaces, so please consider this information accordingly.

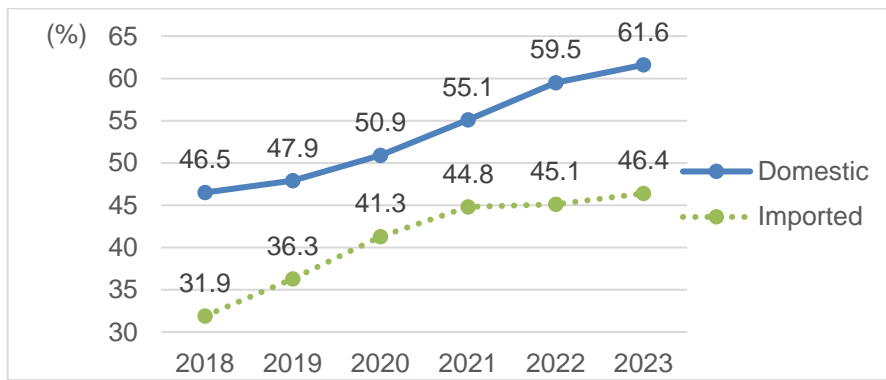
Research on

revision of RCAR structural Barrier

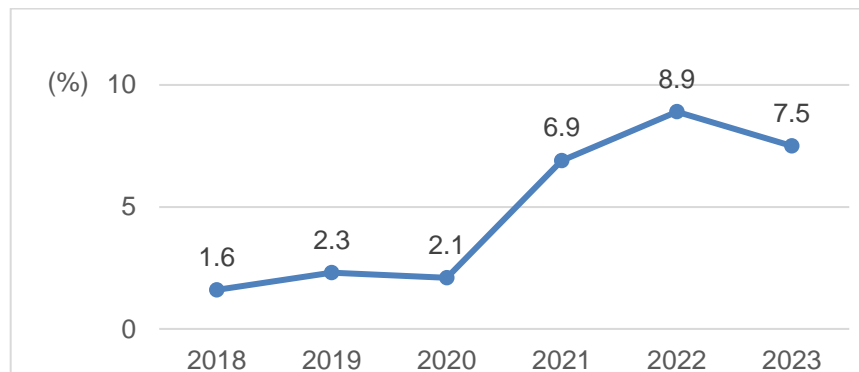


The weight standard of the RCAR barrier was revised from 1,000kg to 1,400kg in 2006. It has been many changes in vehicle sales trend in Korea since 2016. People prefer SUVs to sedan with the increase of people interested in leisure culture, and started purchasing new type of vehicles with the government aggressive subsidy policy. As the number of SUVs and EVs, which are heavier than ordinary sedans, has been dramatically increasing, it is time to consider actualizing the RCAR barrier specification. To support this idea, KART analyzed recent market changes and structural changes of new vehicles.

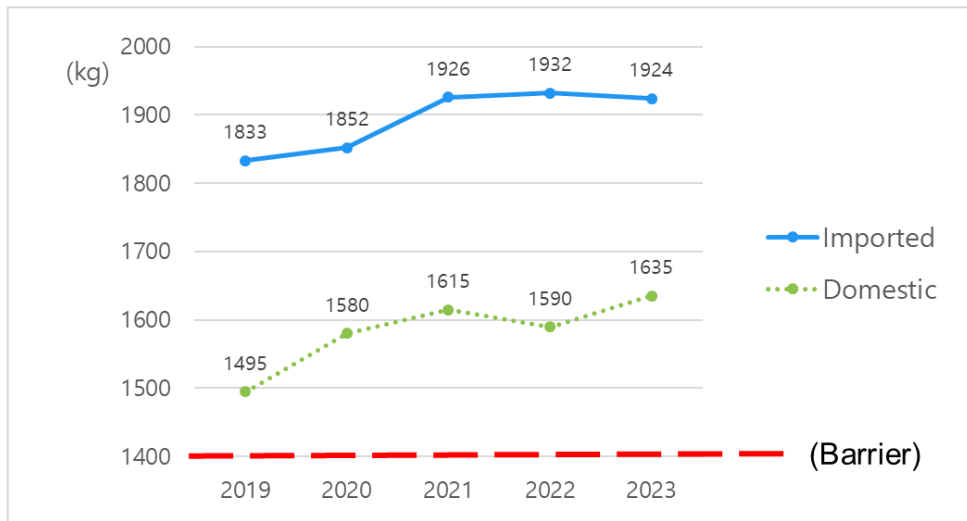
In Korea, sales volume of domestic SUVs in passenger cars has exceeded it of domestic sedans. The ratio of SUV sales among domestic new vehicle sales increased by 15.1%p, and in the case of imported SUV, it increased by 14.5%p in the last 5 years.



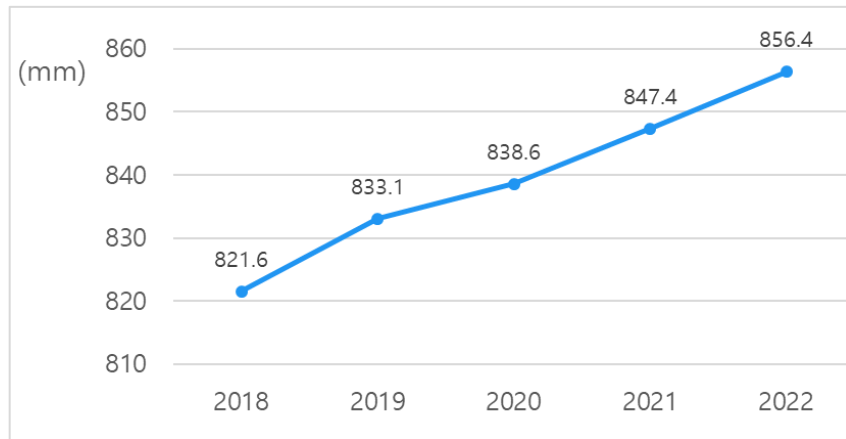
EV sales ratio is also on the rise as shown on the chart below although it fell in 2023 due to the subsidy cuts, lack of charging infrastructure etc., but it is expected to rise again due to the government's interest and support for the eco-friendly vehicle industry.



KART performed an analysis on the structural change of the vehicle, especially the curb weight and the hood height. Firstly, we calculated a weighted average curb weight by year based on sales volume for the car models of which sales ratio is over 1% of whole domestic car sales and imported car sales each. As a result, curb weight of both domestic and imported car models was founded to largely exceed the weight of the RCAR barrier.





Secondly, we calculated annual weighted height of hood for domestic cars also based on sales volume. As shown on the chart below, the average height of new car's hood is over 800mm(height of RCAR barrier is 700mm), and goes up constantly year by year. Therefore, the contact height in rear-end crash is bound to be higher.



We also went through statistical repair cost analysis with AOS(Automobile Repair Cost Online Service) data. We compare 2 types of rear-end collision cases. Type1 is cases of which a small vehicle struck by a small vehicle. Type2 is cases of which a small vehicle struck by an MPV. Here, the small vehicle means vehicles with engine displacement less than 1,000cc, and MPV means 7~10 seater vehicles. As you can imagine, average repair cost of type2(810,000KRW) is higher than it of type1(734,000KRW) as type2 vehicles weighed twice more than type1 vehicles on average.

Lastly, we went through the rear-end crash test with the RCAR barrier and one of best selling mid-size SUVs(Kia Sorento) with in compliance with the RCAR rear low-speed test protocol. The weight of striking vehicle was 1,770kg, which weighs 300kg more than the barrier, and the height of it was 919mm. The struck vehicle was Spart, a light vehicle from GM Korea. Damaged parts after the test are shown on the table below. Damage to the rear bumper in the SUV test was much severe. Therefore, it caused damage to the back panel after the SUV test, but no damage to the back panel found in the RCAR barrier test. In case of right tail lamp, unlike the RCAR barrier test, which caused damage to the lower end of the tail lamp, the SUV test showed overall damage to the tail lamp. These caused higher repair cost to the damaged vehicle of the SUV test.

Barrier (1,400 kg)	SUV (1,770 kg)
	
Bumper cover rear	Bumper cover rear
Rear bumper rail	Rear bumper rail
Rear combination lamp(R)	Rear combination lamp(R)
-	Back panel (panel beating)
(Repair cost) 536,000 KRW	(Repair cost) 589,000 KRW

From now, we will conduct further research as follows. First of all, we are going to survey vehicle sales trend and structural changes in the global market with damageability working group. Crash test with other segment vehicles will be also performed to compare the difference of damage severity and repair cost. And then, we will review specific height and weight value of the barrier that need to be changed and share it with RCAR members to revise the specification of the RCAR structural barrier standard.

Insightful visit by Korea Automobile Insurance Repair Research & Training Centre (KART) to MRC Malaysia

On February 21, 2024, MRC Malaysia was honoured to host Mr. Sangwoo Shim, the Managing Director of the Korea Automobile Insurance Repair Research & Training Centre (KART) of the Korea Insurance Development Institute (KIDI). He was warmly welcomed by Mr. Hairul Abdul Majid, MRC's Chief Automotive Technologies Officer.

During his time with us, he shared valuable insights about his Automobile Repair Cost Online Service (AOS). It was indeed a delightful experience exchanging thoughts and suggestions aimed at further enhancing the automotive sector.

In addition to sharing his expertise, our MRC's Chief Automotive Technologies Officer had the pleasure of showcasing MRC Malaysia's facilities and initiatives.

As part of his visit, Mr. Shim was given an insightful office tour, providing him with MRC Malaysia's latest facilities and demonstrating MRC Malaysia's dedication to excellence in automotive research and development.

We extend our sincere gratitude to Mr. Sangwoo Shim for gracing us with his presence and sharing his valuable insights. We look forward to the potential collaborations and endeavours that may arise from this meeting, as we continue our commitment to excellence in the automotive industry.



Mr. Sangwoo Shim of KIDI/KART with MRC Malaysia team

MRC Malaysia Participation In Malaysia Teacher Training In Beijing, China and Acquisition of BYD Qin EV Chassis Training Vehicle

MRC Malaysia has participated in the Malaysia Teacher Training Program in March 2024 at Beifang Automotive Education Group, Beijing, China. This training provides an exclusive opportunity for participants with diverse automotive backgrounds to gain hands-on experience in theory and practical of BEV skills.



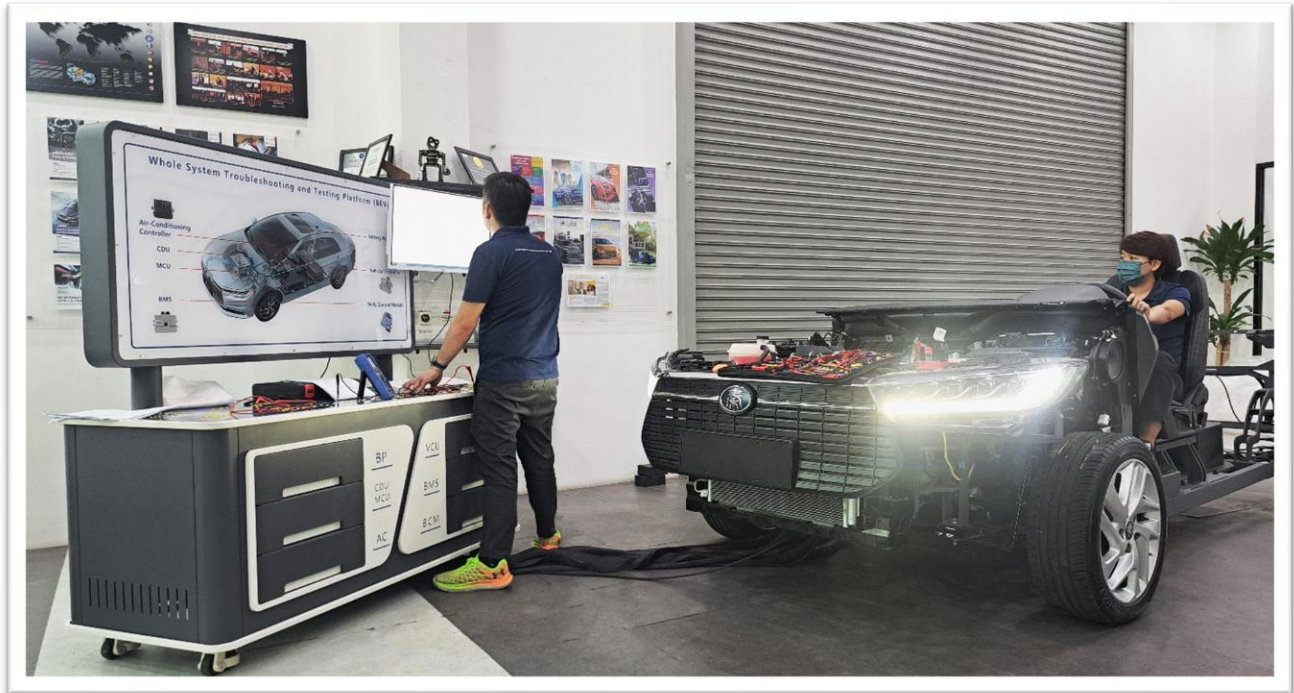
Participants of the Malaysia Teacher Training Program

This training has been attended by Mr. Ng Yuet Seng, Mr. Adam Leow and Ms. Lim Mei Jing from MRC Academy and also Mr. Daniel Loh, MRC trainer. There were also participants from ESnet Training together with 19 automotive professionals from various sectors including repair technicians, insurance specialists and technical instructors from Malaysia, for an immersive experience in cutting-edge battery electric vehicle technology training.

While attending the training program, MRC Malaysia was also looking for new opportunities to bring this area of education back to Malaysia. Other than training content and syllabus, new training apparatus and equipment were also in our consideration. As such, MRC Malaysia has acquired a training aid for BYD Qin EV Chassis Training Vehicle.

This BYD Qin EV Chassis Training Vehicle is designed and developed based on the original car structure. It is equipped with a digital meter, bright LED lights, detection terminals and a fault simulation system that can realize real-time operation and display functions. The device comes with a high-definition LED TV and testing simulator, which can be used with the multi-integrated teaching platform. The teaching platform includes a battery management system, main positive contactor, temperature sensor, high-voltage relay, etc.; including fault setting device, data acquisition devices, training guidance, etc. to meet the vocational education assessment standards and training programs.

The chassis system includes front and rear suspension assemblies, a distributed battery management system, a four-in-one controller system and an intelligent touch-screen system. Observe the high-voltage power-on sequence through the dynamic light movement direction, and learn about the series-parallel structure of the ternary lithium battery pack.



BYD Qin EV Chassis Training Vehicle in MRC Malaysia

This training simulator is able to perform various functions such as:

- Detection and diagnosis of a drive motor controller, electronically controlled dual-clutch transmission, drive motor, charging and discharging systems, high-voltage control module and lithium iron phosphate power battery packs.
- Analysis and diagnosis of control logic of the IGBT system.
- Recognition and testing of principal structure of the battery management system.
- Inspection of power battery modules.
- Able to diagnose and read voltage, current and temperature data of the battery pack.
- Power-on logic and component testing of high-voltage battery packs.
- Recognition and troubleshooting of the four-in-one controller.
- Recognition and detection of the steering system

Press Release on the Need for Partial Repair High-Voltage Batteries

In April, Samsung Traffic Safety Research Institute conducted a briefing for several media, including TV and newspapers, to propose the necessity of activating partial battery repairs based on an analysis of electric vehicle claims covered by motor insurance in the past five years (2019-2023). During this briefing, the Institute mentioned the current status and prospects of insurance claims for high-voltage battery damage, analysis results on the types and causes of damaged batteries, problems with high-voltage battery protection components, and the need for high-voltage battery replacement standards.

Status and Outlook of High-Voltage Battery Damage Insurance Claims

Last year in South Korea, the number of insurance claims for damage to high-voltage batteries in electric vehicles increased 14 times compared to five years ago. During the same period, the number of registered electric cars only doubled. Based on the insured vehicles and claims registered with Samsung, it is estimated that about 2,500 insurance claims for battery damage occurred in 2023, and this number is expected to increase to 5,000 cases by 2025.

Analysis Results of Damaged Battery Types and Causes

To analyze the types and causes of high-voltage battery damage, the Institute investigated insurance claims using special high-voltage battery diagnostic equipment, visual inspection results, battery performance, leakage test results, and the occurrence of fault codes. The results showed that around 80% of claims for battery replacement were due to minor scratches, some of which could be repaired. Some claims were even made without fault codes. The main causes of damage to high-voltage batteries were identified as road debris such as stones or splinters (46.0%) and road installations such as curbs or speed bumps (38.9%) while driving. Only 5.6 % of the cases of damage involved the replacement of the battery due to collisions with other vehicles.



Media Briefing Overview of Small Electric Truck

Issues with High-Voltage Battery Protection Components

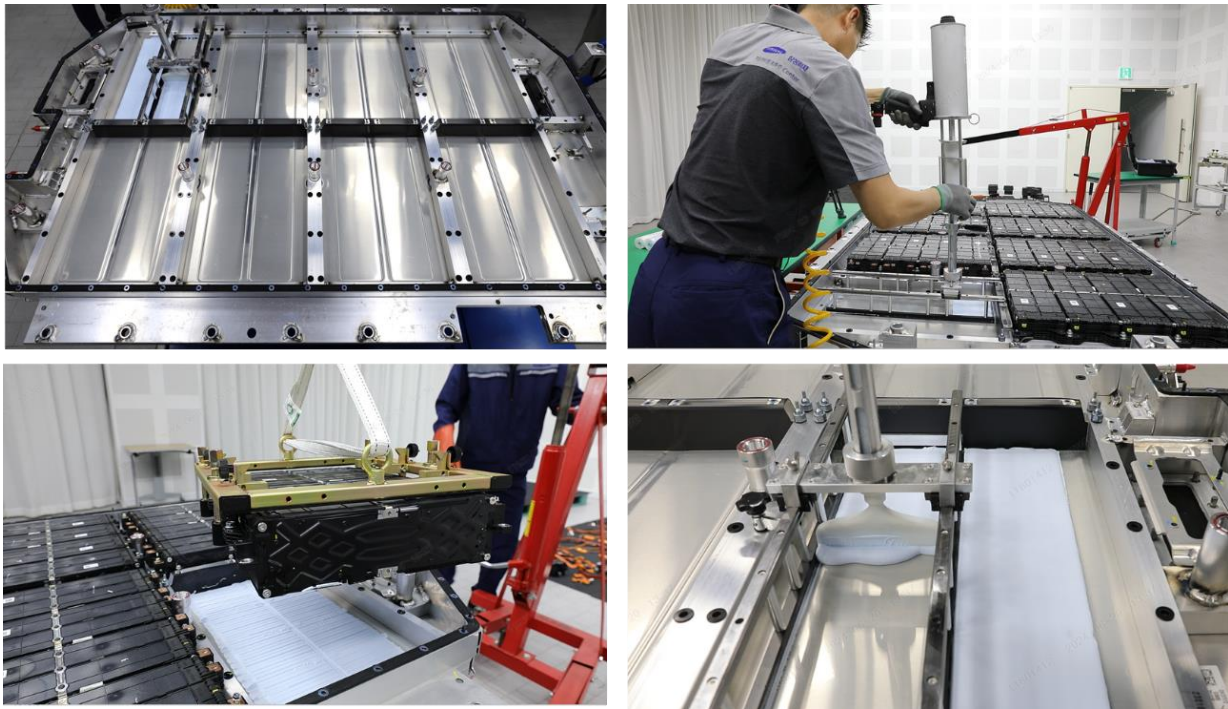
The most popular electric vehicles sold in the last three years have been small trucks. However, the batteries of these electric trucks are installed in a structure that is very fragile to side and bottom impacts, and the protective parts are made of plastic, which does not provide sufficient protection against external impacts.

Need for High-Voltage Battery Replacement Standards

Car manufacturers' repair manuals generally recommend replacing high-voltage batteries with new batteries even if there is minor external damage to the sides and bottom. However, car manufacturers do not specify or standardize partial repair or replacement standards for high-voltage batteries, which leads to new replacement procedures. The Institute proposed the following solutions:

1. Test standards for impact and abrasion resistance of high-voltage batteries during ground impacts.
2. Supply of repair manuals and diagnostic equipment for partial repairs of high-voltage batteries.

The number of electric vehicles sold in South Korea is increasing rapidly every year, leading to a continuous rise in demand for high-voltage battery insurance claims. However, new replacements are recommended without considering the type and severity of battery damage. With this media campaign, the Institute emphasized the need to present specific repair standards depending on the type of damage to reduce repair costs and minimize the generation of battery waste given the environmental benefits of electric vehicles. The Institute has recently discussed these issues with the Korean government, which is pushing for the establishment of safety standards for ground impacts on high-voltage batteries, and is supporting government research and development projects for improvement.



Procedure for Partial Repair of High-Voltage Batteries

See more: sts.samsungfire.com

Collaborative Insights on Automotive Technology Challenges

In the past month at Thatcham Research we had the immense pleasure of hosting our colleagues from both CIRI and CESVI Mexico where we discussed the challenges and opportunities presented to us by the rapidly evolving automotive market. Our discussions spanned a wide spectrum as we discussed our research, touching on critical topics such as Advanced Driver Assistance Systems (ADAS), automation, and the intricacies of Electric Vehicle (EV) adoption alongside vehicle repairs and the challenges and opportunities provided by the diversification of materials and body construction techniques such as mega-castings.

Despite the distinct characteristics of our respective markets, it was heartening to discover that many of the insurance and repair themes resonated across borders. Managing the escalating complexity of modern vehicles emerged as a universal concern—a challenge that transcends geographical boundaries. As the automotive landscape continues to transform, collaboration with global partners becomes increasingly important for ensuring the safe, secure, and sustainable integration of new automotive technologies.

ADAS Real World Challenges

A large percentage of new vehicles on UK roads are fitted with active safety technology; AEB, LSS etc, with the vast majority gaining high performance scores in Euro NCAP's 5-star safety rating. Also, as of July 2024 under General Safety Regulation 2 requirements all new vehicles in Europe are mandated to be fitted with a basic level of active safety technology.

Whilst technology such as AEB has helped reduce the number of accidents on the road, it potentially is not as effective as it could be with different reports citing front to rear accident reduction due to AEB between 25%-50% (Tan, et al., 2020). UK accident road data suggests that the two largest proportion of accident types of modern vehicles are still car-to-car front-to-rear and impacts with vulnerable road users, the exact type of accidents modern systems are optimised for.

To investigate modern AEB systems and their level of robustness, physical track testing was conducted with two different vehicle manufacturers in a range of scenarios using industry known, Euro NCAP active safety tests as a benchmark; these tests were then modified based on real world environments. Each scenario was performed at a single speed of 40 km/h to replicate the city speed at which they commonly occur. Each scenario was repeated 25 times to generate the true failure rate of the systems. Based on the accident data it was chosen to investigate the AEB performance in car-to-car and car-to-pedestrian scenarios. The standard scenario was then modified to introduce a 20° rotation of the target vehicle to represent a stationary vehicle at the entrance to a roundabout.

The two vehicles that we initially tested had achieved a 5 star Euro NCAP rating however when tested one of the vehicles showed inconsistent performance across 25 runs in the standard Euro NCAP test scenarios, as well as inconsistent performance in the modified scenarios. The inconsistent performance in the baseline Euro NCAP test was not expected, as the hypothesis was that these systems would be optimised for these scenarios. The second car produced a few runs which showed reduced performance and only mitigated the collision, however it still had an avoidance rate of 84% or higher, which is in line with expected performance as these systems are not 100% effective. A hypothesis as to why active safety systems, particularly AEB, are not as effective in the real-world is the robustness of the system to handle complex scenarios outside of controlled track testing. This research shows this may still be a factor, however it also outlines the need to investigate the consistency and repeatability of these systems even in basic scenarios. The testing performed within this research only added a single variable change at a time in order to allow for comparative results, whereas real-world environments will have multiple variables which this system will have to deal with. There was a clear difference in performance and consistency between the two vehicles used for testing, potentially outlining the differences between the development and quality of the components use between manufactures. Going forward Thatcham Research will repeat the testing across a range of vehicle makes and models to give a greater insight into and significant differences between vehicle manufacturers or show outliers in the market.