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Weekly Newsletter

DVN-I
Automotive Interior

NEWSLETTER #151

Editorial

Interior Passive Safety Is Still Crucial!

A vehicle's interior, ideally, is a symphony of design; comfort; convenience; utility, and safety. Active safety is built into the machine that is the car, to limit the likelihood and severity of a crash; very fine. Passive safety, on the other hand, is largely built into the cabin, naturally, as that is the space built around and for the occupants. This week's in-depth report looks at passive safety technologies and techniques, including business news in that field. And in the Coffee Corner, there's a perspective on the historical development of passive safety along the century of automotive history.

Car interior architecture and layout are strongly influenced by passive safety regulations; best practices; dimensions, and occupant range-of-position. The complexity of interior design is to comply with all these constraints and still choreograph the architecture; material types and qualities; the functionalities, and aesthetics to create desirable vehicles with an outstanding user experience.

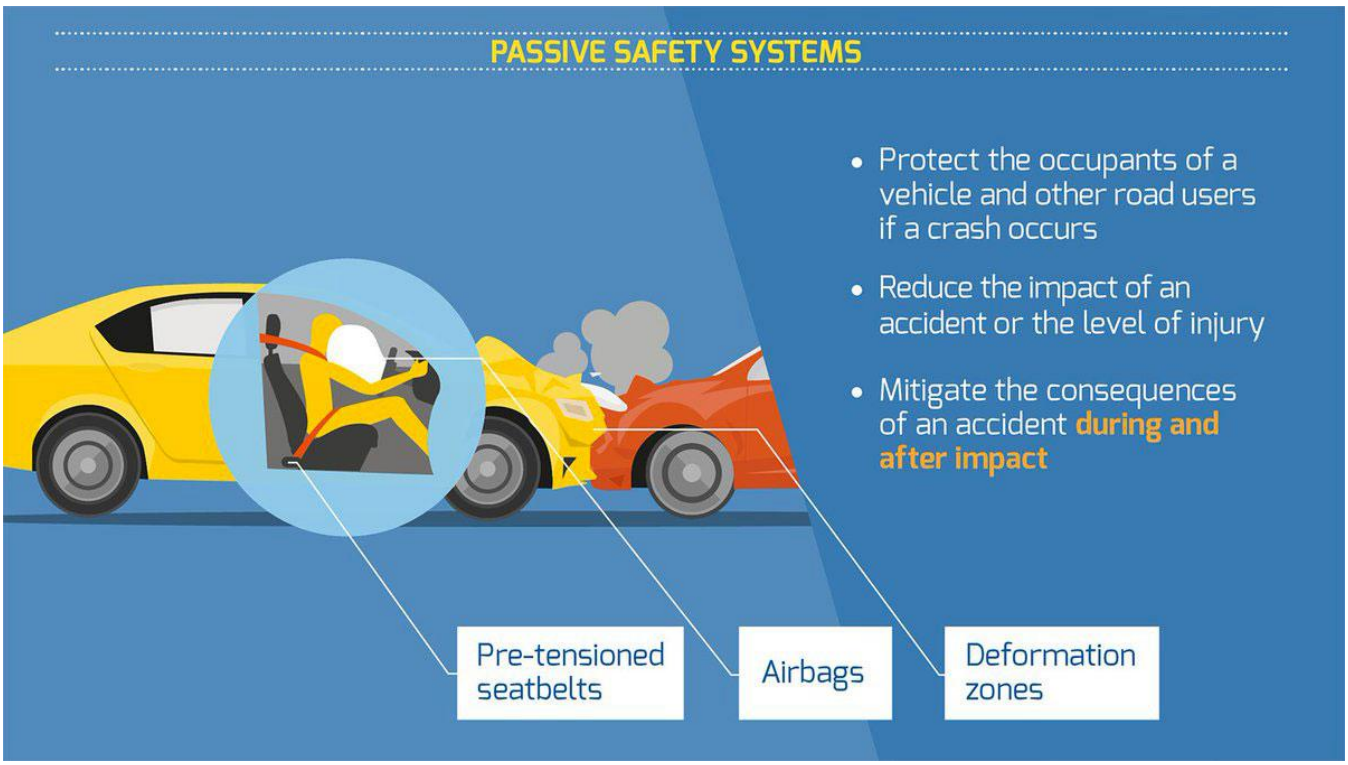
The upcoming DVN-I Workshop will address this constellation of issues in sessions devoted to HMI; 'smart' surfaces; safety and driver monitoring systems; interior lighting; comfort and wellbeing, and materials and sustainability, with design a common factor to them all. It's to be held in Köln on 25-26 April; we're putting the finishing touches on the plans. Surely you won't want to miss it; come and **register** now!

Sincerely yours,

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Passive Safety: Is It Reaching Maturity?



The European automotive industry invests a large part of its annual €54bn R&D budget in making passenger cars and commercial vehicles safer and safer, in response to tightening regulations and consumer demand spurred by non-governmental testing programs like NCAP. When looking at vehicle design, safety measures can be classified as active or passive.

Active safety includes ADAS to help drivers reduce the severity of accidents or avoid them entirely by managing steering; braking, and propulsion. It includes antilock brakes and electronic stability control; automatic emergency braking; lanekeeping assistance, and driver monitoring systems (often discussed here in DVN-I). Passive safety systems are all about minimizing and mitigating injury to the vehicle's occupants during and after impact—traditionally starting the instant first contact is made, but with pre-collision passive safety increasingly feasible.

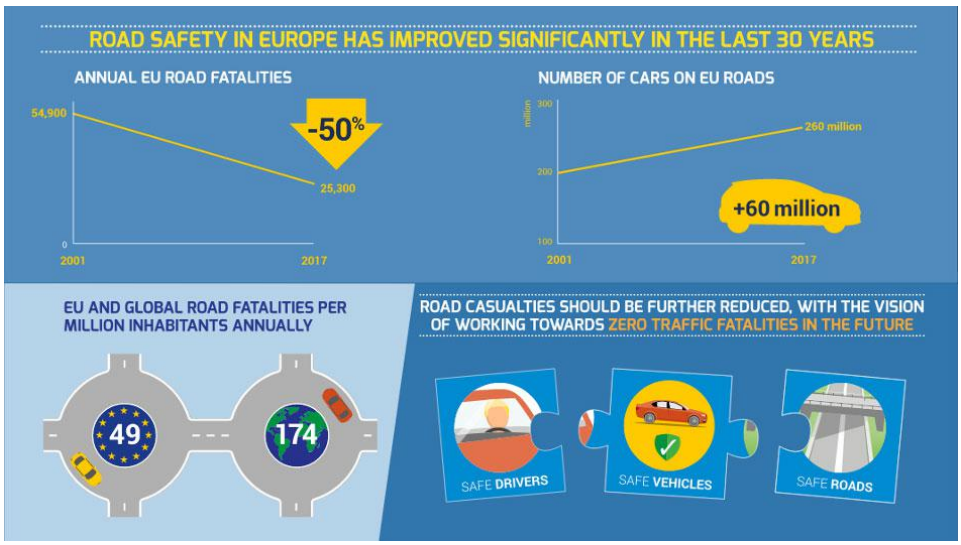
Passive safety systems include every part of a vehicle's restraint system—seatbelts, front and side airbags; seats and head restraints; steering wheels; battery cable cutters, and protection systems for vulnerable road users such as pedestrians and cyclists.Let's have a quick brush-up on major passive safety items:

Seatbelts (or safety belts) were the first-ever automotive passive safety system, and still the primary, most important one. They keep vehicle occupants correctly positioned (and much more likely conscious), so the driver stands a better chance of remaining in control after a first collision to avoid subsequent ones. They

prevent occupants being ejected from the vehicle. They stretch at a controlled rate under tension, spreading and slowing the force applied to an occupant's body on vehicle impact.

Seatbelts have significantly evolved since they were first introduced. Today's seatbelts are pre-tensioned: they are tightened almost instantly upon impact in order to prevent passengers from hitting a loose-but-locked belt with excessive, injurious force.

Airbags inflate instantly (in 20-30 milliseconds) upon impact, then deflate. They form a soft cushion between the occupant and the vehicle interior during the crash, which can prevent or at least reduce injuries. Early airbags protected front-seat occupants from frontal collisions. Since the turn of the century, they are combined with more advanced side-impact airbags as well.



EU road fatalities have been cut by more than half since 2001—from 54,900 to 25,300 in 2017, even as the number of passenger cars on Europe's roads increased from just over 200 million to 259.7 million during the same period. That makes the numbers even better: from 275 fatalities per million vehicles in 2001, to 98 fatalities per million vehicles in 2017, which is most of a two-thirds reduction. In general, the European Union has the safest roads in the world: 49 fatalities per million inhabitants annually, versus the global average of 174 (and the comparatively pathetic U.S. 2017 figure of 114, particularly interesting in terms of country's insistence that their unique safety regulations are superior to the rest-of-world UN standards).

There's broad consensus in the mobility community that road casualties should be further reduced, with the vision of working toward zero traffic fatalities in the future. The only way to reach this goal is by ensuring that safe vehicles are driven by safe drivers on safe roads. Indeed, further improving road safety depends on more than just equipping vehicles with more and more safety features.

Human errors—distraction; poor anticipation; violation of traffic rules, and suchlike—are said to cause 90 per cent of today's crashes. This means we need to combine cutting-edge vehicle technology with improved driver behavior; better road design and maintenance, and better enforcement of existing traffic regulations.

Passive Safety Suppliers

Autoliv is the market leader in passive safety with an estimated global market share of 42 per cent. ZF's safety division is ranked № 2; they generated €3.8bn worth of revenue in 2021 with a market share of around 25 per cent. Then there's JoysonQuin, a Chinese-owned result of Key Safety Systems having bought Takata in 2018.

In Japan; Brazil; South Korea, and China, there are local suppliers closely tied with domestic vehicle manufacturers. Toyota uses 'keiretsu' (internal) suppliers like Tokai Rika for seat belts, and Toyoda Gosei for airbags and steering wheels. Likewise, Hyundai-Kia buys a substantial proportion of their passive-safety equipment from Hyundai Mobis.

Other main competitors include Nihon Plast and Ashimori from Japan; Jinheng from China; Samsung from South Korea, and Seguranca in South America

Airbag Symposium

Fraunhofer's international symposium and exhibition on sophisticated car safety systems is one of the most important in the vehicle safety industry. It takes place every second year as the venue for engineers; scientists; legislators; managers, and marketing experts to exchange information; to make new contacts and refresh old ones, and to promote integral safety for road users on an impartial platform.

Airbag 2022 was the 15th edition of the conference, in Mannheim from 28 to 30 November. More than 450 international experts exchanged views on product innovations and new trends from industry; research, and development. The docket of topics included:

- Global challenges and requirements as EURO NCAP of passive and active safety systems
- Current system challenges for side impact protection, deep oblique crash and rollover crashes and their answers
- Tools and methods in the field of gas generators and airbag systems for integrated safety
- New component technologies in the field of gas generator propellants, airbag-fabrics, and inflator safe service life
- Signal processing and algorithms for autonomous vehicle handling, automated emergency steering, occupant safety solutions, and real time injury risk index estimation
- New systems for future occupant safety
- Passive safety aspects and new applications for autonomous driving

The program committee includes Volkswagen; Mercedes-Benz; Autoliv; Audi; Joyson Safety Systems; Continental Automotive; Bosch; ZF Friedrichshafen; Ingenieurbüro Spies; Karlsruhe Institute of Technology, and Fraunhofer Institute for Chemical Technology. The next, 16th iteration will be in Mannheim in November 2024.

Autoliv

Autoliv participated at the Airbag 2022 to showcase the latest safety innovations for mobility safety. Watch Alexander Gulde, Senior Director of Global Engineering Airbags at Autoliv, present the Autoliv's Seat-Centric Restraint System (SCRS) that protect occupants regardless of vehicle interior design, video, seat position and recline angle in future highly autonomous vehicles. The SCRS is a protection cocoon, which completely enwrap the occupant.

(the video also present the Airbag Integration in Bicycle Helmet)

AUTOLIV IMAGE

IIHS Upgrades Side-Crash, Rollover Criteria

IIHS IMAGE

New cars withstand crashes better than ever, yet U.S. traffic fatalities hit a 20-year high in the first half of 2022. This is one reason why the IIHS (Insurance Institute for Highway Safety) has toughened the criteria for their Top Safety Pick and Top Safety Pick Plus endorsements. This time last year, 101 vehicles had earned one of those two grades. This year, only 48 vehicles have qualified under the new criteria meant to acknowledge the reality heavier vehicles such as SUVs traveling at higher speeds and driver-assist technology that mitigates or avoids collisions with pedestrians at night. Pedestrian fatalities spiked to record highs during the pandemic, accounting for an estimated 7,485 out of 42,915 traffic fatalities in 2021, or 17.5 per cent.

In 2021, the IIHS introduced a tougher side test meant to simulate a T-bone crash into the driver's side. The test hadn't been updated since 2003, and since then heavier crossover SUVs that ride higher than cars have proliferated on American roads. The moving crash barrier increased from 1,500 to 1,900 kg, to model the

average new car weight, and the strike speed increased from 50 to 59 mph to reflect today's higher average speeds.

When the original test was introduced in 2003, most vehicles failed with a Poor rating. By 2021, virtually every vehicle tested had earned top Good ratings on the old test—progress which, in itself, warranted toughening the test to spur further progress. When the IIHS launched the new test in 2021, side-on crashes accounted for 23 per cent of traffic fatalities.

Rollover crashes can't be mitigated much with airbags, because such a crash can last up to seven seconds—far longer than the time duration an airbag can effectively offer protection. The IIHS eliminated the roof strength and rollover crash tests recently, for automakers had met the criteria for years with stronger roofs and thicker pillars—though that's something of a left-hand-gives/right-hand-takes situation, as thick pillars make it hard for drivers to see pedestrians crossing the street at a junction.

The head restraint test has also been relaxed for widespread compliance, for now, and they've stopped awarding points for automatic emergency braking, as most automakers have equipped 95 per cent of their new vehicles with AEB in line with a voluntary agreement. Late last year, a study found vehicles equipped with AEB reduced rear-end crashes by 49 per cent compared to vehicles without the driver-assist tech. (It will be interesting to see whether compliance wavers now IIHS is no longer looking; consider the case of Federal Motor Vehicle Safety Standard № 107, enacted in the late 1960s to prohibit chrome metallic surfaces on components in the driver's field of view, such as instrument panels; windshield wiper blades, and horn buttons The idea was to prevent drivers being exposed to intense glare from sunlight reflections. FMVSS № 107 was rescinded in the 1990s, with NHTSA's rationale being that everybody had shifted to plastics and black-painted metal rather than chrome anyway. Not long after the standard was quashed, chromed *plastic* elements re-entered the driver's line of sight on horn buttons, dashboards, HVAC duct handles, and elsewhere. "Why do we need to hold up this umbrella? It's not as though we're getting wet…!")

Back to the IIHS rankings: Toyota and Lexus led the pack with nine TSP+ and six TSP awards, while Honda and Acura had six TSP+ and two TSP winners. Toyota is a much larger brand with several more models than Honda, however, so it's all relative. Every 2023 Mazda except for the MX-5 Miata earned a TSP.

Passive Safety – General News

ZF

MODERN CRASH DUMMIES (ZF IMAGE)

ZF Friedrichshafen last year announced plans to carve out their passive safety unit by the end of 2023 to open up new strategic options, as part of a review of their portfolio. They've hired Citigroup to advise on the possible sale of their passive safety systems, which may be worth more than €3bn (USD $3.2bn). ZF became one of the world's largest suppliers after buying TRW Automotive's (mostly passive) safety division for $12.9bn in 2015.

A separation would create "the best conditions to generate stronger growth and a sustainable expansion of the market position of the world's № two in the passive safety technology business by involving external investors", according to ZF. No final decision on outcome; timing, or valuation has reportedly been made.

ZF takes their name from Zahnradfabrik Friedrichshafen, (Zahnradfabrik = "Cogwheel Factory"), with headquarters in Friedrichshafen, the southern German town on Lake Constance, and can trace their roots back to airship pioneer Ferdinand von Zeppelin.

JoysonQuin Electronics

JOYSON ELECTRONICS IMAGE

The Joyson Group, founded by Jeff Wang in 2004 and based in Ningbo, China, is among the 30 largest global automotive suppliers. Divisions include JoysonQuin (automotive components); Preh Group (automotive electronics), and Joyson Safety Systems.

Quin was founded in 2003, following the merger of Rössler & Weissenberger and Grossmann, both based in Stuttgart, Germany. Quin, specializing in high-quality auto interior trims, has been part of the Joyson Group since 2015. In March 2019, Quin merged with sister company Joyson Automotive to become JoysonQuin Automotive Systems with headquarters in Rutesheim, Germany. The company employs 4,000 people.

Joyson Electronics announced on 10 October 2022 their expectations of substantial year-on-year growth in their net profit and revenue in the first three quarters of 2022. In the third quarter of the year, their revenue was estimated at around C¥12.8bn (USD $1.8bn).

Conclusion

CELLBOND IMAGE

Over the past decades, passive safety systems have made a major contribution to road safety by reducing the consequences of accidents. As a result, most vehicles now score highly in crash tests and passive safety technology is reaching a level of maturity. Passive safety includes vehicle body deformation, which absorbs energy and protect the occupant cabin. Passive measures will remain essential in the future and will not disappear from vehicles. Technologies and design measures that limit the impact of a crash may be taken for granted today, but it takes only a **quick look** at **what happens** to occupants of cars in countries without up-to-date safety standards to understand quite viscerally that without passive safety, the death toll on the world's roads would be far greater.

Interior News

Ford’s BlueCruise as DMS

INTERIOR NEWS

FORD IMAGE

Ford's BlueCruise is L^2 driver assist technology suite theoretically comparable to Tesla’s 'Autopilot'—except, as **recently reported** in DVN-I, BlueCruise actually does as claimed. Ford’s driver assist is unique in offering a hands-free mode, in which the driver needn't stay in contact with the steering wheel.

Instead, BlueCruise uses a driver-facing camera and infrared lighting to monitor the driver's eyes and head position to determine if they're paying attention, acting as a DMS. If the system decides you're distracted, it will alert you to return your eyes to the road. At the time of first product release, two years ago, Ford joined BMW in joint first place for DMS technology, with Tesla running dead last using a system that cannot even see in the dark.

Ford’s BlueCruise is set to be activated by an over-the-air (OTA) update over time, which is somewhat unconventional. Probably as Ford may be fine tuning testing the latest and most sophisticated version of the Seeing Machines driver monitoring software, which uses a neural processing unit called Occula, that can be downloaded via OTA onto the Xilinx FPGA-based Fovio processor.

Cariad App Store for the VW Group

INTERIOR NEWS

CARIAD AT CES 2023 (CARIAD IMAGE)

The MWC (Mobile World Congress) roared back for 2023. It's known as the world's largest and most influential exhibition for the connectivity industry. This year's main themes were 5G Acceleration; Reality+; OpenNet; Digital Everything, and Fintech. Cariad, the automotive software and technology company that bundles together Volkswagen Group's software competencies, showcased there for the first time ever. They've launched a new uniform application store in cars of the Volkswagen Group brands. Audi is the first brand to implement the experience, and the other VW Group marques will follow.

Their open ecosystem supports integration of third-party services such as Spotify, TikTok, Yelp, Webex by Cisco, The Weather Channel, and the Home Assistant 'smart home' platform in addition to proprietary apps from Volkswagen Group.

Cariad is working with Harman to create an open ecosystem for apps that drivers can use in their cars' infotainment systems. Together, they have already secured numerous partners for the application store. Whether music & video, gaming, navigation, parking & charging, weather apps or remote work—the store offers essential and popular functions that turn the car into a smart companion for drivers. In addition, the VW brands will integrate their own apps, such as online traffic light information or navigation services. In future, they can also offer their customers additional services via the store. As a result, customers will experience a car that will always be improving through frequent updates.

The app store integrates with the Harman Ignite Store for automotive infotainment systems, which allows the VW Group brands to maintain control of 3rd-party content, the user experience, and the primary relationship with the end user.

Warwick's Electrostatic Loudspeaker Technology

INTERIOR NEWS

WARWICK ACOUSTICS IMAGE

Warwick Acoustics, based near Coventry, England, is continuing with the commercialization of their Electrostatic Loudspeaker technology, following several R&D and product development phases. After a series of fully subscribed funding rounds, the company is currently scaling rapidly, and as a result, investing in new talent, company capabilities and advanced facilities to support its developing commercial pipeline.

Unlike conventional audio technology, the company’s ElectroAcoustic Panels are up to 90 per cent lighter and consume up to 90 per cent less power while providing improved interior design and packaging options. The ElectroAcoustic Panels support automakers' sustainability targets, as they use fully upcycled and recyclable materials, and they do not use any of the unsustainable rare-earth metals used extensively in conventional kinds of speakers.

To support their commercialization phase, Warwick has assembled a team of over 40 people, consisting of experts in mechanical, electrical, acoustical and systems engineering to enhance the company’s electrostatic technology, in-car acoustic system design and manufacturing production techniques.

Over the next year, the company aims to build on their commercial progress and successful funding rounds to boost its growth trajectory. Plans are to expand their in-house team by another 50 per cent over this year, to support the development of their commercial pipeline.

CEO Mike Grant says, "It is an exciting time for Warwick Acoustics as, following successful R&D and product development phases, we are well under way with the commercial introduction of audio systems based on our revolutionary ElectroAcoustic Panel technology. Following a series of fully subscribed funding rounds, we are scaling rapidly, investing in top talent and state-of-the-art facilities to support the substantial commercial pipeline that is developing".

Designworks to Open California Studio for BMW Interiors

INTERIOR NEWS

BMW IMAGE

DVN-I **recently reported** that BMW has moved the U.S. headquarters of their design studio, Designworks, to Santa Monica, California.

Now Designworks will open the new studio, where they will draw inspiration from the surrounding environment of Silicon Beach, near LA, and its design, media and technology companies. Designworks will work on behalf of the BMW Group to develop auto interiors spaces and components, and provide “inspiration in the fields of innovation, design and sustainability” across automotive and other industries.

BMW Group Senior VP of Design Adrian van Hooydonk says, "Santa Monica is a test bed for the innovative and sustainable mobility solutions of tomorrow. Designworks will generate valuable impetus, inspiration and new ideas for the design of the BMW Group brands right here".

Covering 1,500 m^2, the new design studio is the largest of the three global Designworks studios, which includes buildings in Munich, Germany, and Shanghai, China. The structure and equipment at each facility is designed to support the transformation from physical to digital design and development.

“Our new studio allows us to fully exploit the freedoms digitalization gives us,” said Holger Hampf, head of Designworks. “Personal interaction remains a focal point, but we do work differently in Santa Monica: In this new workspace, our processes are geared toward virtual communication, and we are able to bring the results of our work to life for clients in an entirely new way.”

Through this process, Designworks developed two seat studies for BMW which combined both sustainability and design. Working collaboratively with startups, the studio is experimenting with brand new production methods and environmentally compatible, recyclable materials, including bacteria-based, plastic-free and non-animal textiles which provide high-quality looking and feeling surfaces with a high durability.

Indie Semiconductor Buys Silicon Radar

INTERIOR NEWS

California-headquartered auto-tech provider Indie Semiconductor has bought Silicon Radar, a German company specializing in advanced, highly integrated, high-frequency system-on-chips (SoCs) for automotive radar applications.

The radar industry is transitioning to 120GHz for in-cabin sensing, and to 140GHz for external sensing. These higher frequencies enable the use of antenna-on-chip techniques, greatly raising the integration levels. This enables indie to create products with a complete radar on a chip to expand into new market areas.

Specifically, operation at 120GHz or above enables antennas to be integrated in package or on-die, simplifying the PCB design and dramatically reducing cost especially for in-cabin occupant monitoring systems, where industrial design often cannot allow external antennas optimized for RF performance at lower frequencies.

Established in 2006, Silicon Radar, based in Frankfurt (Oder), Germany, works on the semiconductor design of 60GHz, 120GHz and 140GHz high-frequency circuits for radar, sensor and wireless communications. To date, Silicon Radar has developed 10 radar-related patents and has previously worked with indie to co-develop radar solutions for emerging radar applications, including 120GHz and 140GHz frequencies.

Indie cofounder and CEO Donald McClymont says, "Radar is a fundamental sensor modality for ADAS and automotive safety applications. The growing number of radars per vehicle require high-performance and highly integrated semiconductors capable of supporting ever higher frequency of operation with the lowest power consumption while supporting the increasing demand for resolution in both external and in-cabin radar systems".

Mercedes E-Class: AI, Ambient Lighting, and…Selfies!

INTERIOR NEWS

MERCEDES-BENZ IMAGES IN THIS ARTICLE

Alas, poor Hyperscreen, we barely got a chance to know you. Now the wide set of displays behind a single glass surface is called the *Superscreen*. The digital instrument cluster is a 12.3" item; the center display is 14.4”, and the passenger display is another 12.3”. This passenger screen allows for streaming video or one of many digital decorative features like a premium, digital screensaver.

The passenger screen is designed so the driver won't see it. Also new is the Active Ambient Lighting including what Mercedes calls 'sound visualization'. The ambient lighting illuminates the top and bottom of the dash, as well as both sides of the center console. Light is everywhere! The system can now change colors for a fast sequence of beats. Or, if you're listening to something a bit more relaxing, the light will slowly change its color.

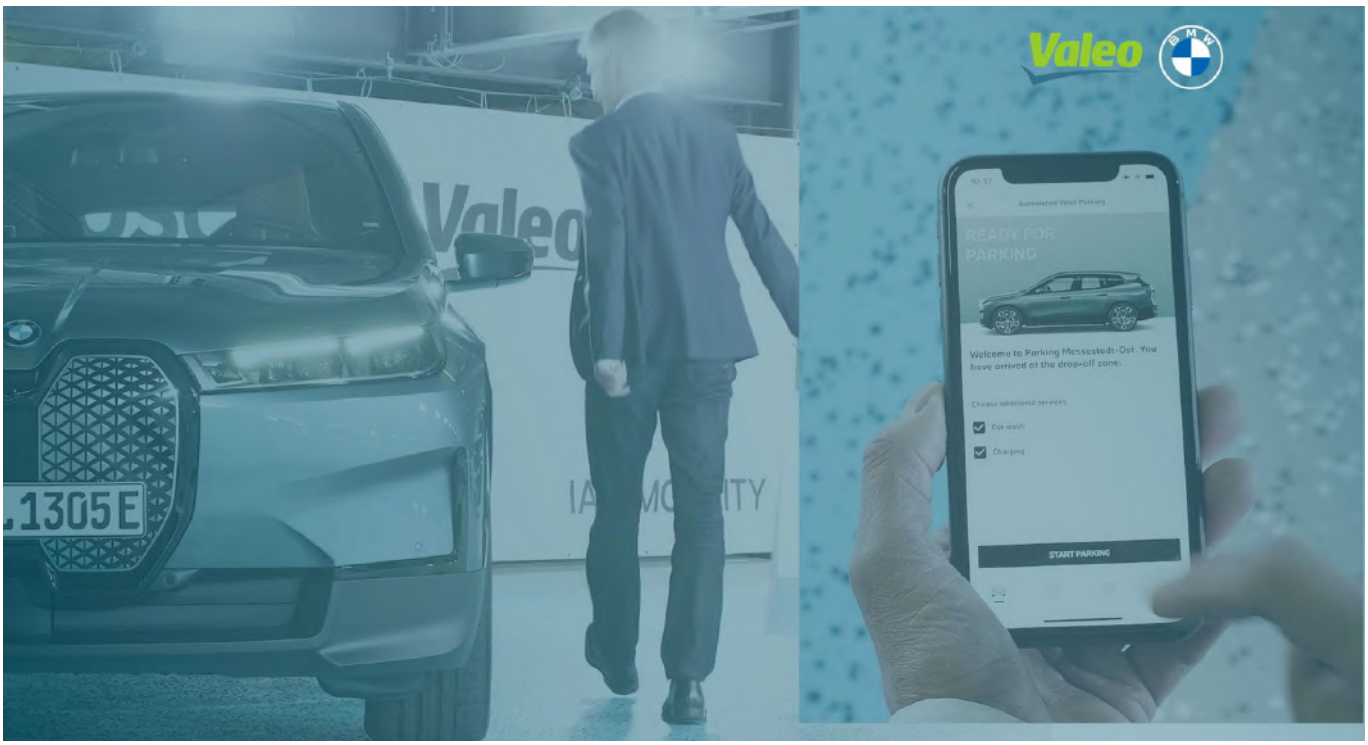
Another new feature is that the E-Class can take a selfie of you. When the car isn't moving, the driver can take photos, video, or participate in a Zoom meeting. Mercedes says they're still looking into whether having an occasional roadtrip photo or video check is allowed in various markets.

High-trim E-Class models may have Zync, an entertainment portal that can keep people engaged with games, news, video streaming, and interactive experiences on the central touchscreen and available passenger display.

As for the artificial intelligence (AI) integration, Mercedes notes that will depend on the market. You can tell the E-Class to turn on the ventilated seats and set the ambient lighting color to purple if the temperature reaches 26°C. There are very few physical buttons in this vehicle interior. The driver and front passenger should be able to easily increase the temperature, change a radio station, or turn up the volume, thanks to a new 'Just Talk' feature which can hear your voice commands without saying "Hey Mercedes".

BMW and Valeo: L4 Full Auto-Park

INTERIOR NEWS



BMW Group and Valeo, having already announced their collaboration on ADAS controllers; sensors, and software for parking and maneuvering of the the automaker's 'Neue Klasse' platform, the two companies now announce cooperative development of L^4 fully automated parking technologies.

In January, both companies signed a strategic cooperation agreement for joint development of a range of high-end 'parking user experience' for customers on private grounds and in parkades. Including the likes of automated maneuver assistance and L^4 automated valet parking, all functions will be based on technology and sensors in the car. Infrastructure-based services will also be jointly developed to experience fully automated parking and charging in enabled public parking facilities and sites.

The software functions are based on the current automated parking software stack first launched with the BMW iX in 2021. It will be further extended by a powerful computing platform hosting the jointly developed algorithms.

Automated valet parking offers a fully automated and driverless parking experience. At a drop-off zone the driver leaves the car and the vehicle takes over tasks such as autonomously finding a parking spot; making the maneuvers for parking, and driving back to a pickup zone to return the vehicle to the driver. To optimise use of the parking time, additional services like fully automatic charging or washing can be performed, as well.

The Design Lounge

Design and Luxury from Hispano Suiza

THE DESIGN LOUNGE

HISPANO-SUIZA CARMEN (HISPANO-SUIZA IMAGES IN THIS ARTICLE)

Hispano-Suiza (Spanish for 'Spanish-Swiss') is a Spanish automotive engineering company founded in 1904 by Marc Birkigt and Damian Mateu as an automobile manufacturer. They eventually had several factories in Spain and France which produced luxury cars; aircraft engines; trucks, and weapons. In 1923, its French luxury car arm became a semi-autonomous partnership with the Spanish parent company. Between 1904 and 1946, Hispano-Suiza built more than 12,000 luxury vehicles and 50,000 airplane engines. In 1946, the

Spanish parent company sold all their Spanish automotive assets to Enasa, a Spanish state-owned vehicle manufacturer, and the French arm continued as an independent aviation engine and components manufacturer under the Hispano-Suiza name. In 1968, Hispano-Suiza was taken over by the aerospace company Snecma, which is now part of the French Safran Group. An attempt to relaunch the marque was made by the company Hispano Suiza Cars associated with the Peralad a Group (owned by the Suqué Mateu family) in 2019 with a fully-electric car: The Hispano Suiza Carmen shown here.

The Carmen is a pioneer in the new 'hyperlux' vehicle segment, which combines hypercar-rivalling performance with exquisite luxury, painstaking craftsmanship and meticulous attention to technical and engineering details. The maximum expression of classically inspired design, the cutting-edge technology of the chassis and power train, the invigorating power and dynamic design are all engineered by experts in the field.

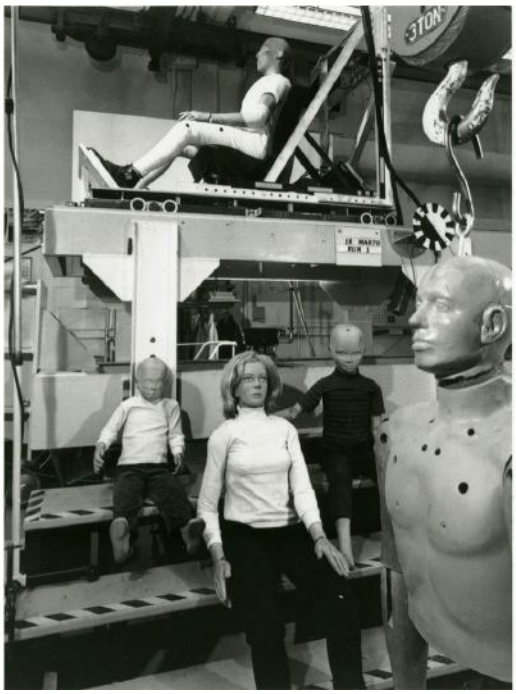
Hispano Suiza portfolio also includes the Carmen Boulogne, a fully-electric supercar with the latest technology derived from Formula E; 820kW of power, and an avant-garde design inspired by the brand's heritage.

Mr. Suqué Mateu has lived the Hispano Suiza brand for his entire life, and the production of the Carmen is the realization of a lifelong ambition for him. President of Hispano Suiza, he is the great-grandson of the brand’s founder. CEO Sergio Martínez Campos posted a definition of luxury borrowed from Angelo Bonati, former CEO of Officine Panerai, an Italian luxury watch brand: "Luxury is about so much more than the materials used, the price tag, or the connotations associated with a brand. Luxury is about displaying true elegance through the finishing touches; it's about listening to your audience to understand the details that mean the most to them at each step. If we're all so fundamentally different, luxury can't mean the same to each of us. For this reason, luxury is about creating a completely user-centered, enjoyable experience. Ultimately, we treasure the opportunity to offer such a varied take on luxury".

Passive Safety
By Athanassios Tubidis

THE DESIGN LOUNGE

COFFEE CORNER
DVN
Interior



CRASH TEST DUMMIES IN MARCH 1970 (WIKIMEDIA COMMONS IMAGE)

Neanderthals could theoretically drive a car. Aside from their social-brain particularity and bad luck, their cognitive assets are described as being very similar to ours. Today even though we drive cars, while live streaming on Twitch and doing all these complicated things simultaneously, most of us don't have a clue of how cars are built. We are merely aware of the series of inventions and discoveries accomplished systematically through hard work, accumulated knowledge but also ingenuity, creativity, vision and intense human interaction within complex social schemes and corporate structures; for just over a hundred, intense yet astonishing, automotive years. The dampest of us all, today, can drive a car. It might be that our relation to progress is simply because we made it all the way here. Besides just being the lucky ones, our key priority, survival, translates in modern terms to, safety.

Anthropomorphic crash test dummies have been developed over the years on the purpose to occupy the place of these that wouldn’t have made it to the next stage of technical evolution. Prior to that, cadavers (modestly named 'postmortem humans' in the automotive research); animals, and live volunteers were used to improve car safety. In the early 1970s, passing from fatal to factual, GM engineers created the first crash test dummy to figure out how to comply with the American federal motor vehicle safety standards. Based on previous experiments, it featured a steel ribcage; articulated joints, and flexible spine.

At that time, several protection applications had already made their way to the very car interiors that the first dummies occupied, for brief yet impactful moments. Laminated safety glass, for instance, existed since 1930 (Ford). In 1948 the first padded dashboard was presented (Tucker), along with the beginning of a new car-interior era. Interiors shifted from sheet metal dashboards conceived and designed just like exteriors, to a novel distinctive approach, differentiating the two design disciplines. In 1951, the crumple zone (Mercedes-Benz), was invented to absorb energy, protecting the occupants during impact. The first modern 3-point seatbelt was introduced in 1959 by Volvo. Seat head restraints were mandated for all new cars in America in 1968 to limit whiplash during collision; previously they had been unregulated headrests on luxury cars or accessory add-on devices. Chrysler put a driver airbag in all their American models in 1989. Volvo launched their side impact protection system in 1991. Chrysler did integrated baby seats in 1992. Volvo brought in side (1994) and side curtain (1998) airbags, more or less completing the passive safety checklist for interiors.

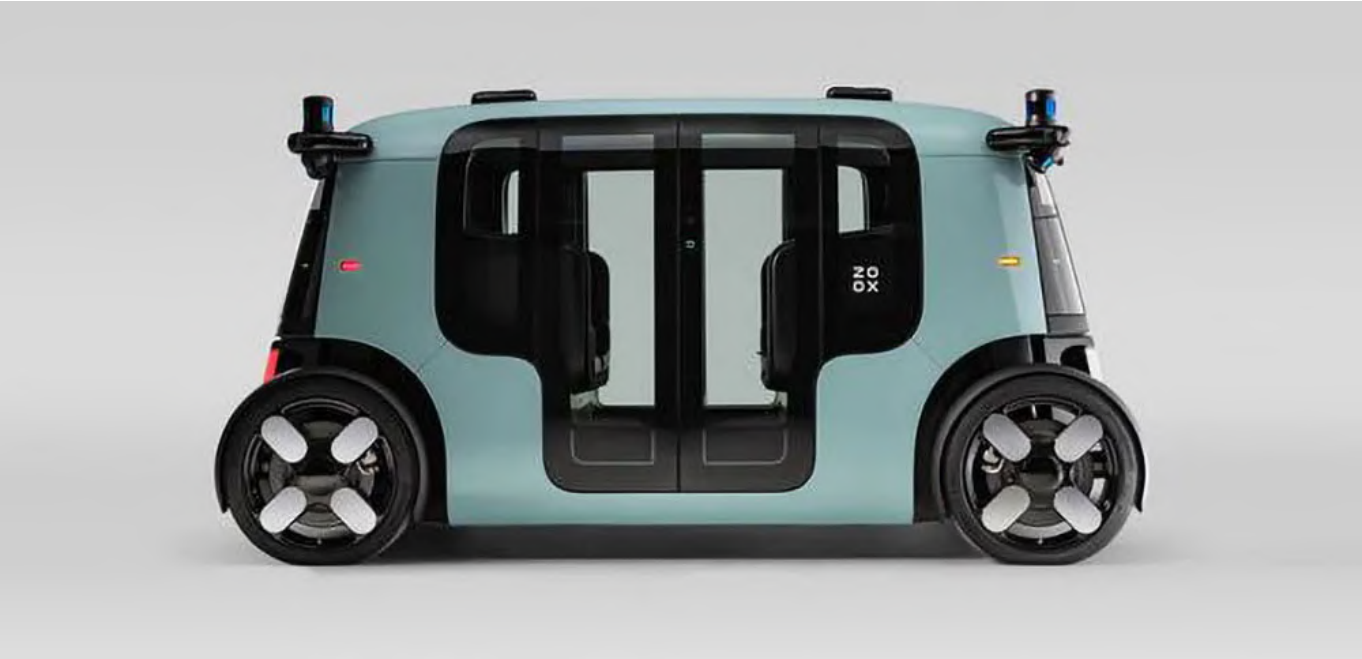
On car exteriors equally, the anatomy of pedestrian crash constitutes a determining factor of car body design and its aesthetic appearance. It is depicted by a sequence of events: vehicle bumper vs lower limbs, the leading edge of the hood vs upper thigh or pelvis, head, and upper torso vs the upper hood and/or windshield, and so on.

Burning acetylene in front of mirror reflectors, prior to electric headlights, was the first manifestation of active safety, in 1880, aiming to alert pedestrians of the upcoming vehicle, preventing possible accidents. Passive safety though features lessen the chance of death and serious injury in instances where an accident is unavoidable. With pedestrian injuries and fatalities rising dramatically in the US in recent years, perhaps because of increasingly distracted driving with entertainment and communication systems in cars, the idea of banning cars from city centers created a new perception of safety. Certainly, car interiors become the main territory of research, concerning passenger safety in all possible scenarios, however, it might be that car exteriors and pedestrians will not interact as much in future mobility ecosystems and new pedestrian safety protocols may become widespread. What are the crash test dummies of electric scooters?

News Mobility

Zoox Starts RoboTaxi Trials

NEWS MOBILITY



ZOOX IMAGE

Zoox, an Amazon-owned company, is moving to the next phase of testing their driverless taxicabs, with real passengers on public roads: this spring, full-time employees will be able to ride in the self-driving taxi between offices during business hours. The testing is being done in terms of a driverless-testing permit from the California Department of Motor Vehicles.

See video

Zoox CTO Jesse Levinson says "Getting to be the world's first passenger in a robotaxi with no manual controls on open public roads (…) was one of the highlights of my life. I can't wait for everyone to experience that magic".

Unlike vehicles used with some other driverless taxi services already offering rides to passengers, Zoox's pod-shaped conveyance has no steering wheel; pedals, or other controls; it is configured solely for riders, not drivers.

Zoox said the testing brings them a step closer to having ther robotaxi rides available to the general public.

General News

TactoTek, JoysonQuin in Light-Based UX Pact

GENERAL NEWS

TACTOTEK IMAGE

Finnish IMSE experts TactoTek and JoysonQuin (read about them in this week's in-depth article), have signed a licensing agreement to develop light-based user experiences for luxury and electric vehicles. JoysonQuin will apply TactoTek's injection molded structural electronics (IMSE) technology to create innovative; decorative, and functional trim parts that leverage light to meet the premium automakers' requirements and whims. With TactoTek's '*Let Light Live*' family of platforms, JoysonQuin can develop thin; lightweight; 'smart', and sustainable trim parts wherein light can act as a key communication medium.

Konstantin Schmidt is JoysonQuin's advanced development manager for Europe. He says, "The demands from our premium [automaker] customer require us to continuously seek up-to-date technologies. With light being a key differentiator, we need a technology that can create standout designs with integrated functionality. Premium designs require border-to-border lighting with the ability to customize the light to the needs of our end users. There are not many technologies that can provide this capability. With TactoTek's IMSE technology and platforms, we will bring trim parts to life with light, allowing us to meet the future trends in this segment".

TactoTek's SVP of field operations, Dr. Thomas Vetter, says "This agreement with JoysonQuin is proof of our ecosystem expanding. With a clear product-market fit, we have been able to address the key pain point for the [automakers], and Tiers see a benefit in having IMSE technology to design and develop solutions that meet newer market needs. Our strategy to develop a rich base of IMSE solutions is a step further with this agreement, making differentiable technology possible with an added sustainability benefit".

IMSE techniques integrate printed circuitry and electronic components into 3D injection-molded 'smart' surfaces. TactoTek develops and industrializes IMSE technology; creates production-ready IMSE prototypes, and licenses IMSE technology for 3rd-party IMSE part design and global mass production.

Circularise Joins Audi MaterialLoop

GENERAL NEWS

Circularise, a Dutch provider of digital 'product passports', has joined the MaterialLoop project initiated by Audi for their circular economy strategy

Together with 14 other research; recycling, and supplier partners, Circularise participated in a pilot project to investigate the possibility of using materials recovered from vehicles at the end of their service life, in the production of new cars. Circularise has brought their expertise in end-to-end supply chain traceability with blockchain technology.

Audi CEO Markus Duesmann says, "It is our goal to recover as many materials as possible at a high level of quality and reuse them in production. This will save valuable primary materials and lower the products' ecological footprint. Simultaneously, direct access to secondary materials can contribute to increased security of supply. Raw materials would no longer have to be extracted".

In October 2022, 100 vehicles—including former development cars—were dismantled as part of the MaterialLoop project. After disassembly, the car bodies were shredded and sorted into material groups like steel; aluminum; plastic, and glass. With the aim of testing the reuse of such materials in the production of new cars, Audi defined and piloted the further recycling process together with project partners from the recycling industry; the Audi supply chain, and academia.

Digital 'product passports' will play a key role in bringing the circular economy into reality, especially for electric vehicles. With the EU's battery passports regulations to take force in 2026, and the Inflation Reduction Act 2022 in the US, Circularise aims to support manufacturers; suppliers; regulators, and consumers with information to improve compliance and quality assurance, and accelerate the transition to a circular economy.