Thu, 25 May 2023
Weekly Newsletter

DVN-I
Automotive Interior

NEWSLETTER #162

Editorial

Second-Row Riders Deserve First-Class Safety

BENTLEY IMAGE

Recent IIHS research shows rear passengers are not as safely protected as front-seat riders. That's not new; U.S. regulations failed to require shoulder belts for rear passengers until 1991(!), or head restraints for rear passengers until 2011(!!). Over years and car generations, much of the development attention has been put on the driver. That's also true for safety, where car manufacturers have gone to huge lengths to improve the safety of drivers and front-seat passengers, most notably by the introduction of new airbag technology. Clearly, more efforts should be put on rear passenger passive safety (like in-cabin radar, or occupant positioning).

Safety, in any and all positions, must take precedence over all the new fancy features such as dynamic lighting; HUDs; rear seat entertainment; massage seats, and all else what creates a unique user experience—we are going to talk about all of it at the next DVN-Interior event in San Francisco on 29-30 August. If you're up for participating in the interior deep dive session, **please let us know**. The event will focus on how interior lighting contributes and interacts for user experience; safety, and comfort in the car. We're looking forward to seeing you there!

Sincerely yours,

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Rear Safety Lags: IIHS

2022 SUBARU CROSSTREK AFTER TEST CRASH (IIHS IMAGE)

The notion of individualized environments for each vehicle occupant is not new, but it is now more important than ever before, as ride-hailing and car sharing grow more popular. Car interior design and technology development is now committed to deploying aspects of the individual-space ideal safety; comfort; audio; connectivity, and so on in new vehicle development.

We previously reported on the maturation of passive safety, and how future gains will be made by combining passive and active safety. However, that's not fully true for rear occupants, and recent IIHS test demonstrate that rear-seat safety is lagging, and needs improvement.

The Insurance Institute for Highway Safety (IIHS) is a U.S.-based independent, nonprofit scientific and educational organization dedicated to reducing deaths; injuries, and property damage from motor vehicle crashes through research and evaluation and through education of consumers, policymakers, and safety professionals.

IIHS recently found that compact cars don't protect rear occupants well in overlap front and side-impact test crashes. For the front crash, no car earned the top ("Good") rating; all tested models were rated either Acceptable or Poor. For the side-impact test, four models turned in a Poor performance, and seven of 11 small cars tested earned a Good or Acceptable rating. IIHS president David Harkey said, "In all the small cars we tested, the rear dummy 'submarined' under the seat belt, causing the lap belt to ride up onto the abdomen and increasing the risk of internal injuries".

To incentivize manufacturers to improve rear-seat safety performance, the IIHS' updated test involves placing a dummy in the back seat behind the driver. This dummy represents a small woman or a 12-year-old child, while the driver dummy represents an average-sized adult man. IIHS researchers also developed new metrics that prioritize injuries commonly observed in backseat passengers.

For a vehicle to receive a Good rating, there must not be excessive risk of injury to the head; neck; chest; abdomen; or thigh, as recorded by the second-row dummy. During the crash, the dummy should remain

properly positioned without sliding forward ('submarining') under the lap belt, and the head should maintain a safe distance from the front seatback and the rest of the vehicle interior. A pressure sensor on the rear dummy's torso allows IIHS analysts to determine whether the shoulder belt is positioned too high, which can reduce the effectiveness of the restraint system. The structure of the cabin must also maintain adequate survival space for the driver, and measurements taken from the driver dummy should not indicate an excessive risk of injuries.

Dangerous Submarining

IIHS IMAGES

The Moderate Front-overlap test simulates a head-on collision of two vehicles of similar weight traveling at just under 64 km/h (40 mph).

The test vehicle travels toward a barrier with a deformable face made of aluminum honeycomb. Forty per cent of the vehicle's width strikes the barrier on the driver side.

In each of the five tested vehicles, the rear dummy submarined under the seat belt—the lap belt shifted upward from the hip bones to the abdomen, increasing the likelihood of internal injuries. And in the three vehicles which received a Poor rating, the rear dummy indicated a moderate to high risk of head; neck, or chest injuries.

Historically, rear-seat occupants were cushioned in a frontal crash by the front seats and the front crumple zone. Since 2007, though, IIHS tests have found that fatal injury is 46 per cent higher for belted occupants in the rear seat than for those in front.

Most of new passive safety technologies has been applied to the front compartment—airbags and new restraint technologies like seatbelt pre-tensioners; active head restraints, and so on.

Side Crash

Last year, the IIHS instituted a tougher side-impact test to reflect the faster speeds and heavier, taller vehicles —pickup trucks and SUVs—proliferating in American traffic.

Seven of 11 small cars tested earned Good or Acceptable ratings, but four models got a Poor grade.

“Doors tend to be weaker than the B-pillar and the frame surrounding the occupant compartment. Small cars have less of that weaker space because of their shorter wheelbase and occupant compartment,” said Raul Arbelaez, vice president of the IIHS Vehicle Research Center.

IIHS developed the updated side-crash test after research showed that many of the side-impact crashes that account for nearly a quarter of passenger vehicle occupant fatalities are more severe than the previous IIHS evaluation.

The updated test hits the vehicle with a heavier barrier traveling faster. The new barrier weighs 1,905 kg (4,200 pounds, close to the weight of today’s midsize SUVs, and strikes the test vehicle at 60 km/h (37 mph). Previously, a 1,500-kg (3,300-pound) barrier hit test cars at 50 km/h (31 mph).

An older IIHS study showed that rear-seat passengers of SUVs and crossovers aren't all that safe either, despite being bigger than sedans.

Rear seats have been considered the safest for young children, who are more likely to be injured than protected by an airbag designed to save the life and limb of a grownup riding in the front seat. So improving rear-seat safety requires a careful, delicate balance. In light of advancements in safety features, a **recent study** took a new look and found that the rear middle seat is still the safest one for children.

MURATA IMAGE

Conclusion

For all the test results, and as rear seat is the area with the highest likelihood of out-of-position occupants, the future of passive safety in vehicle is to focus on new technology developments for rear passengers. Occupant status technology like in-cabin radar is one technique already in development to improve rear safety by dint of occupant position monitoring to tailor airbag deployment and facilitate safety during occupant activity changes, and so on.

Next steps rely on advances in electronics and sensors, along with control algorithms and other technology being developed to make vehicles more autonomous. In that respect, rear occupants' safety will become more occupants' safety, included in a holistic view of autonomous safety, focused on reducing the likelihood; frequency; severity, and consequences of car crashes.

Interior News

Cariad China's Digital Cockpit Innovations

INTERIOR NEWS

CARIAD IMAGE

At Auto Shanghai 2023, Cariad China exhibited their future digital cockpit technologies on a simulator. The solutions were developed at Cariad China's Forward! Lab, intended to provide a "progressive digital in-car experience with new software features for all Volkswagen Group brands in China, for China, at China speed".

The Forward! Cube simulator enabled visitors to test the company's new infotainment system, which includes gaming and other in-car experiences.

The Racing app was developed in collaboration with partner Vivo; it is started on a smartphone and connected to the vehicle's smart cockpit using Bluetooth. The Racing game is then mirrored on the vehicle's central display, with the smartphone being used as a controller. Cockpit functions including sound and ambient lighting adapt to the game to deliver a more immersive experience through the infotainment display without additional hardware. Computing power is delivered by the smartphone.

Then there's the Moments application, described as an intelligent cockpit infotainment tool. It combines vehicle body control functions; information services; entertainment content, and 'artificial intelligence' processing power to provide occupants with a customized, personalized cockpit. The driver and front passenger can tailor these features individually.

The company also has created the Beats application, which enables users to flexibly and individually control the lighting in different parts of the vehicle. Integrated into the vehicle's function control, Beats is activated when music is played, and adapts light and screen animations on the infotainment system to the rhythm of the music.

The Forward! Lab will continue to test and develop pre-development products for the entire Volkswagen Group in China. The lab works in 'innovation sprints' to develop new applications as quickly as possible.

Faraday Future AI Product Stack for Personalized Applications

INTERIOR NEWS

FARADAY FUTURE IMAGES

California-based Faraday Future has launched their Generative AI Product Stack, which will be integrated into the company's FF 91 vehicle. FF has integrated their AI capabilities with advanced models including ChatGPT; GPT-4, and others from OpenAI and Microsoft. They say FF can scale to additional advanced generative AI models to deliver more capabilities and features for its customers.

FF's head of corporate strategy Prashant Gulati says, " To use generative AI in a car, you need a powerful computing platform, robust operating system, internet connectivity and suitable displays. [Our] Generative AI Product Stack will empower users to gradually utilize advanced generative models for a range of personalized applications in the vehicle—from complex text and voice queries, to image and video generation, stock analysis, live translations, search, entertainment, education, e-commerce, and more. The possibilities are limitless".

Through future updates, FF will expand the use of generative AI applications. The company plans to release additional generative AI features at an upcoming launch event.

CorrActions to Develop Volvo In-Cabin Sensing Solutions

INTERIOR NEWS

VOLVO IMAGE

Volvo has invested in CorrActions, an Israel-based brain monitoring startup seeking to better understand drivers to reduce the chances of an accident.

CorrActions has developed new AI-powered software that can detect abnormalities in the cognitive state of drivers and passengers, based on muscle micromovements that reflect brain activity. CorrActions and Volvo will work together to further develop the software and commercialize the technology.

Alexander Petrofski is head of the Volvo Cars Tech Fund, which is the automaker's venture capital arm. He says, "We aim to be a strategic partner of choice for exciting startups that can help boost our position as a tech leader in our industry. CorrActions fits the bill perfectly and focusses on a mission that is close to our heart: making cars and the people in and around them safer".

Meridian's VibroHaptic Comes to Car Seat Audio

INTERIOR NEWS

JAGUAR DOOR SPEAKER (MERIDIAN AUDIO IMAGE)

Meridian Audio is a British audio supplier, creating innovative audio technologies since 1977. They work with many of the world's leading auto marques, including Jaguar Land Rover; Kia, and Rivian.

The supplier says their new Vibrohaptic technology for automotive seating will greatly enhance the in-car media experience while eliminating the compromises associated with earlier systems. By combining an analysis of psychoacoustic responses with a review of existing technologies, Meridian has created a software-focused approach that can be configured to work with any haptic hardware to create an engaging and customizable experience.

The system processes signals from the audio amplifier to control the haptic drivers in the backs of the seats. Take them away, and the reduction in perceived sound quality is immediately apparent. Meridian's automotive business director Paul Andrews says, "We have conducted tests when we haven't told the participants that they are sitting in our Vibrohaptic seat. They generally don't notice any haptic inputs, but when we turn it off, they immediately notice a reduction in the quality of the audio experience".

Dr. Laurence Hobden, leader of Meridian's Research and Applied Technologies team, emphasizes that the focus of his group's approach has been to understand the frequency ranges to which people have the most significant haptic responses and how haptic and audio jointly create the sensory landscape to which our minds respond. The result is a unique signal processing technology that precisely selects the most relevant elements of the audio signal and tailors them to control haptic inputs. These inputs can be broadly categorized as either transient—the punch of rock music or drums—or steady state, which enhances rumble and lower frequencies.

Meridian's next-generation Vibrohaptic Audio technology can be configured for any number of actuators, which can weigh as little as 80 g each, and is compatible with most DSP amplifiers. Actuators can be sourced from Meridian's manufacturing partners or from the vehicle manufacturers' established suppliers. The recently launched in-house automotive consultancy, Engineered by Meridian (EbM), mobilizes to work with customer engineering teams to optimize hardware integration and system tuning. Vibrohaptic Audio technology will enter production in 2025 with a European luxury vehicle manufacturer, followed by a new luxury vehicle from a Chinese manufacturer.

Lear Signs Agreement for Low-CO2 Steel

INTERIOR NEWS

Lear is an American company that manufactures automotive seating and automotive electrical systems.

Now, they're partnering with Klöckner & Co. and subsidiary Becker Stahl-Serviceto provide CO_2-reduced steel. The sustainable alternative to conventionally produced steel has a potential carbon footprint reduction of 80 per cent. Lear steel is mostly used in seat structures.

Along with committing to the Science Based Targets initiative (SBTi) and aligning corporate climate goals with the Paris Climate Agreement, Lear says decarbonizing the supply chain is the next important step in working to achieve their carbon-neutral goals by 2050.

Beojun 'Joy Box—Play Cabin'

INTERIOR NEWS

SGMV IMAGES

SAIC-GM-Wuling recently released interior images of the Baojun Yep, a mini all-electric SUV to go on sale this May in China. To cater to younger urban buyers who pursue individuality and quality, the Baojun Yep has an interior design language the maker calls 'Joy Box—Play Cabin' to create a comfortable and relaxed atmosphere through clever layout and rich configurations.

DUBAI ('MONOLOGUE') INTERIOR SCHEME

The Yep offers two interior color schemes, called Zihei ("Self-Mocking") and Dubai ("Monologue"), showcasing the self-enjoying life attitude of young people. The "Self-Mocking" interior combines overall physical black with functional green, creating a sense of free enjoyment reminiscent of wandering in an outdoor forest, according to the automaker. The "Monologue" interior combines sandy beige with gunmetal gray, rendering a comfortable and relaxing atmosphere for self-enjoyment in the city.

The entire interior of the Baojun Yep, especially the areas frequently touched, is fully covered with soft leather, with a total coverage area of 1.16m^2. The cabin incorporates eco-friendly materials with a skin-friendly level, and the automatic variable-frequency air conditioning system is able to create a comfortable and quiet space for users.

The Yep has elastic large seats, which feature a total back contact area of 946 cm^2 and a seat cushion contact area of 1,109 cm^2. The seat cushion length is 406 mm, the longest in its class. The entire model series comes standard with 6-way adjustable electric seat at the driver's position, while the high-spec trim's passenger seat features 4-way power adjustment.

As for driving and riding space, the maximum headroom for the front and rear rows is 1,011 mm and 986 mm, respectively. Additionally, distance from the front seat cushion to the ground is up to 712 mm, resulting in a maximum legroom of 1,045 mm. In the rear, the cushion is 769 mm above the ground.

Each rear seat of the Yep can be independently folded down in a 50/50 split configuration. When fully folded down, it creates a spacious rear space of up to 715 liters, capable of accommodating two 28-inch and two 20-inch suitcases simultaneously. The vehicle also provides up to 15 user-friendly storage spaces.

The Yep has a steering wheel with baseball-style stitching on the inner perimeter. The narrow-edge 10.25-inch dual-screen display comprises the instrument cluster and the infotainment screen.

Ford E-Tourneo Courier Has 'Digiboard' IP

INTERIOR NEWS

FORD IMAGES

The Ford E-Tourneo Courier is an EV developed from scratch by the Ford Design team in Köln for exterior, and Ford Otosan in Turkiye for interior (**video**). It features a spacious cabin and practical design aesthetics to carry five adults and a large amount of luggage, thanks to trunk space 44 per cent larger than that of the Tourneo Courier it replaces.

There's a 'Digiboard' instrument panel comprising a fully digital instrument cluster and Ford's SYNC 4 infotainment system, which is controlled using a 12” touchscreen.

The rear bench seat is split 60/40 to ensure the vehicle can cater to different customer needs.There's enhanced shoulder room and headroom for passengers; a configurable center console; a hidden cubby in the trunk, and a frunk (front trunk) with a 44-liter capacity. Users can choose from a wide range of seat fabrics to customize their vehicles.

The vehicle’s fully connected cabin supports wireless Android Auto and Apple CarPlay integration and includes a phone charging pad. The car is OTA-upgradeable.

Amko Leenarts, Design Director at Ford of Europe, says the E-Tourneo was designed "to help customers get the most out of life, whether out with family and friends or coming home with the rear seats flipped and bikes in the back, and the exterior design expresses that ‘no-nonsense’ character. The SUV-inspired design is rugged outside and roomy inside, while the modern EV details add exclusivity".

The Design Lounge

Machimoto

By Athanassios Tubidis

THE DESIGN LOUNGE

COFFEE CORNER
DVN
Interior

Because cars move often fast and straight forward, the second row is likely where you would want to be in case of an accident. That statement today is wrong. Studies prove that rather the opposite happens: over years and car generations, much of the attention, in terms of safety, has been certainly put on the driver. Car manufacturers have gone to huge lengths to improve the safety of front-seat passengers and drivers, most notably by the introduction of new airbag technology. Meanwhile, the safety of backseat passengers has not enjoyed the same level of attention. Rear-seat passengers are less likely to have safety features like airbags, three-point seatbelts with pre-tensioners and adjustable head restraints. Rear seats are less occupied and so automotive development is founded on this statistic certainty, ever since seat rows were put one behind the other.

If the two rows were one next to the other instead, maybe things would have turned out differently. Not easy to imagine, but the closest I have ever been in such driving experience was in 1988 in Moncalieri, while preparing my design thesis—my graduation project—at Italdesign Giugiaro. Machimoto is two words (and two worlds) in one: car and motorcycle, but it is neither of them. It is something like two Olympic **bobsleighs** put side-by-side and the two longitudinal rows of seats become the dominant element of the interior. Whether there are other occupants or not, once seated in the vehicle we completely lose the sense of rows.

My personal experience as a passenger in the Italdesign facility, was curious and quite different than anything else. Seating up high in a motorcycle posture with great visibility over the surrounding space was certainly a great feeling. I remember though cornering was more peculiar. We then tried it with more passengers on low speed and we noticed that everyone and all together, were instinctively leaning towards the opposite side. Neither a car nor a motorcycle could cause such unusual reaction to its occupants at every turn.

It was built on a VW Golf GTI 16v 1.8-liter 139-hp platform and mechanics. During its first public appearance at the 1986 Turin motor show, it triggered diverging opinions. It was partly accepted for its character as an intelligent provocation and in other cases considered utopic. In today's context, its reception might have been very different. No one knows how rear passenger safety would have evolved if we had chosen such interior

layout for our cars, but certainly, in the contemporary urban mobility context, the case of Machimoto fitting up to 9 people in less than 4 meters, might have been very intriguing.

** A.Tubidis (alias Industrious) studied design in Italy in the mid'80s_*

*** Giuliano Molineri graduated as a philosopher from the University of Turin, then from 1974-81 he was director of the industrial design department of the renowned studio Italdesign-Giugiaro and from 1981-99 he was CEO of Giugiaro Design. In 1998-99 he also served as executive director of the local committee for the Turin Winter Olympics.*

Mini's New EV Theme: 'Charismatic Simplicity'

THE DESIGN LOUNGE

MINI IMAGE

Mini has a new design language for their upcoming all-electric model range, one which focuses on the essentials. It's called 'Charismatic Simplicity', and it will feature new seating materials; a reinterpreted central OLED display, and revised steering wheel options.

The central instrument display features a 24-cm-diameter OLED touchscreen. Mini says they're the first marque to use a display of this type with a fully useable, round surface. The frameless display features a minimal user interface to control infotainment and climate settings.

The standard steering wheel has two spokes, and the optional wheel adds a fabric finish and sporty geometry. There's a range of new patterns and colors for the seats; options include a nostalgic houndstooth pattern, and laminated seat side panels. Armrests are integrated into the seats for the first time.

Mini design chief Oliver Heilmer says, "Our purist, progressive approach combines the simplicity of functional elements with the emotionality that Mini is renowned for. We are convinced that the conscious reduction to a few but expressive elements enable innovations that would have been unthinkable before".

News Mobility

Cruise, Waymo Close to Charging Robotaxi Fare

NEWS MOBILITY

CRUISE IMAGE

Self-driving vehicle companies Waymo and Cruise are close to securing final approval to charge fares for fully autonomous robotaxi rides throughout the city of San Francisco at all hours of the day or night.

On backdrop of the city's mounting resentment of AVs and resistance to their presence, the California Public Utilities Commission (CPUC) published two draft resolutions to extend Cruise's and Waymo's hours of operation and service areas for their robotaxi services.

City agencies have called out the string of vehicles that have malfunctioned and stopped in the middle of intersections or even on light rail lines, blocking traffic and obstructing public transit and emergency responders. These include incidents where a Cruise AV obstructed a fire department vehicle traveling to an emergency, ran over a fire hose, or improperly entered an emergency scene. The series of incidents, documented on social media and online forums, has led to an investigation into Cruise by the National Highway Traffic Safety Association.

Armed with these examples, the city urged the CPUC move cautiously—set up workshops, collect more data, prohibit robotaxi deployment downtown and during peak hours, and limit the expansion of fleet sizes.

Cruise's current permits allow it to offer a fared passenger service in limited areas of San Francisco from 10 p.m. to 6 a.m., as well as a free passenger service throughout the city at any time of the day, all without a safety driver present. As of late April, Cruise has opened the fully-autonomous citywide service only to employees.

Waymo's paid service, available throughout San Francisco at any time of day, has a human safety driver present. The company's fully autonomous (no safety driver) robotaxi service that operates throughout the city is still free. Waymo also offers a free service with a safety driver present in parts of Los Angeles and in and around Mountain View.

Clearly, the implementation of AVs will be a bit of a rocky ride.

General News

Luxit, Prettl in Platform Pact

GENERAL NEWS

Luxit Group, a U.S.-based supplier of innovative small lamps and interior lighting, and Prettl Lighting & Interior, a European specialist in decorative lighting, have entered a strategic alliance to produce global platforms to better serve customer needs.

Prettl also is active in automotive cables; coils and magnetic actuators; metal technology; seat structures, and components for electric motors. CEO Daniel Haag says, "This is the perfect time to join with another highly regarded lighting supplier to ensure that our customer needs are met. With this partnership, we will be able to support our customer demands in every part of the world without the spend required to open a green field facility. This will help ensure competitiveness and future growth".

And Luxit CEO Stephane Vedie says, "This strategic alliance comes at a time that our customers are requiring product comes from the region in which the vehicle is manufactured. Working together with Prettl will ensure that our customers are getting the best possible product, at the best cost, in the region that they are manufacturing their vehicles".

Prettl Lighting & Interior has production locations in Poland; Portugal, and Mexico, with a development center in Czechia. Luxit Group has production locations in the United States; China; Taiwan, and Mexico, and a development center in the United States.

VW Group Fully Onside With Mobileye

GENERAL NEWS

PORSCHE MACAN PRODUCTION IN LEIPZIG (PORSCHE IMAGE)

The Volkswagen Group is expanding their cooperation with the Israeli Intel subsidiary Mobileye, who will produce driver assistance systems with Porsche. This builds on Mobileye's existing supply to VW Group of automatic lanekeeping and -changing system components.

Porsche intends to offer L^{2+} automated assistance as well as navigation functions. Called "SuperVision," the technology is intended to provide a bridge for upcoming levels of autonomous driving and will be used in future models. The system uses eleven cameras and supporting radar detection to monitor the vehicle's surroundings. At its core is a high-performance chip (EyeQ6) that controls the assistance functions. The system works on different types of roads in both the Western world and Asia, including China. It can change lanes on its own; navigate at intersections; park automatically, and steer or brake preventively.

For the development of more extensive automated driving functions, the Volkswagen Group has also forged alliances with Bosch and Qualcomm, as well as in China with Horizon Robotics.