Automotive Interior Shows and Conferences First Half of 2019

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DVN-I
Automotive Interior

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Table of contents

Executive Overview

The panoply of relevant events DVN-I covered in the first half of 2019 present a wide array of products from production cars that can be bought today, through to exotic previews of what transport might look like in the near (or far) future. All of this is in context of rapidly changing topography in the world of automotive transport: established automakers feel increasingly urgent pressure to prove they are relevant, leading runners in the race for new mobility. New participants in the field, including digital outfits, want to be recognized for the innovative products and services they offer. Meanwhile, the general perception—perhaps fuelled by popular media—is that fully autonomous, self-driving cars are just around the corner, coming soon (of course, the reality is very different).

2019's CES was mostly dedicated to car interiors within the context of connected and autonomous vehicles, with occupants unleashed from the driving task and able to do more or less whatever else they want. Occupant experience is the key within car interiors; the space is at a new crossroads of comfort, connectivity, entertainment, gaming, and everything else to use time previously lost to driving.

In contrast, the Geneva motor show didn't really focus on AVs. Rather, it brought us back to rational, "now" responses to "now" problems, chiefly alternatives to burning oil (electric and hydrogen vehicles).

The Shanghai motor show is surely the best on the planet to get a global view of the auto market, with most of the world's brands—including some little-known outside of China—and a mix of global models with some China-specific designs. Shanghai showed a strong focus on all kinds of EVs and every possible SUV variant. Interiors showed off new amenities and features: bigger displays, voice and gesture controls, alerts, audio, lighting, new ambiance, occupant monitoring, comfort, you name it. Life for the vehicle occupant isn't getting simpler, it's getting more complicated, and sleeker and more elegant designs aren't enough to foster real ease and peace of mind.

Same thing in New York, and vehicles presented for the WardsAuto 10 Best Interior award reflected an industry incrementally integrating technologies and design elements of the future, but retaining traditional cars (SUV or any other body shape), with additional features and technology—and the greater complexity that goes along.

Takeaway points we retain from Automotive Interior Expo held in Stuttgart confirmed the increasing trend of lightweighting, and the growing importance of interior lighting. Light is no longer in the car just to help find things in the dark; now it's central to creating ambiance, providing information, generating alerts, personalizing the cabin according to vehicle occupants' personal choices…all in all, lighting is playing an increasingly important role in the comfort and safety of everyone inside the car.

As far as lightweighting is concerned, it was clearly visible through lighter materials, as well as materials allowing miniaturization of components so as to reduce package space. This, in turn, is creating opportunity for automakers increase interior space and/or reduce the exterior dimensions of the car for a given cabin volume. With CO_2 reduction getting more and more important, these

types of opportunities are crucial to fielding vehicles responsive to today's needs and wants.

From a business perspective, old borders between industries and sectors are changing, no matter whether we're looking at automakers, tier-1 and -2 suppliers, or companies and industries previously wholly outside the automotive realm. There are new automakers and car brands—Byton, Polestar, Nio, Lynk & Co, Qoros, and others; previously unknown Chinese automakers like Aiways, Landwind, and Xpeng; digital outfits like GAFA, entertainment companies like Warner and Paramount, electronics companies including Samsung, Panasonic, Sony, and Pioneer; computer processor suppliers such as Intel, Qualcomm, and Nvidia; mobility service providers, and many startups now jostling to produce and equip tomorrow's mobility interiors.

Industrial design—specifically automotive industrial design—is a discipline whose practitioners must wear many hats in executing their daily jobs. Whether aesthetically integrating visual and textural elements, expressing brand language, or translating consumers' needs into tangible product solutions, their end goal of creating desire is critical to the success of today's automotive interiors and tomorrow's. The DVN-I Design Lounge is a new section of our newsletter, where we will be exploring the design movements, trends, and explorations of automotive Interiors. Welcome!

DVN Interior Report № 1 Comes Now!

Cars have been a source of excitement for many years, mostly by dint of their exterior design, engine performance, and social status. Within today's revolution of CASE (**c**onnected, **a**utonomous, **s**hared, and **e**lectric) vehicles, mobility use cases are changing quickly and dramatically. The car as a living space is gaining traction as an idea as vehicle autonomy steadily grows, while aerodynamic and crash-safety priorities have done away with yesterday's exterior flying buttresses and other suchlike. Therefore, car interiors are becoming the real product differentiator, allowing drivers and occupants to have a wide new array of activities: relaxing, working, phoning, reading, watching movies…the car becomes a mobile lounge. Thanks to all these new usages, car interiors are one of the strongest growing pieces of the vehicle, introducing countless new technologies, apps, and features.

That's the scope of DVN Interior. We are creating a community of car interior experts, communicating through a bi-monthly newsletter, reports and workshops, aiming at compiling and analyzing information that would otherwise be scattered and difficult to access, to help DVN-I members access, absorb, and leverage it quickly and efficiently. It includes the new DVN-I Design Lounge, where we will be exploring the design movements, trends, and explorations of automotive Interiors.

Right this minute you're reading the first DVN-I Report (of many, so mote it be!). We have been globetrotting over the last six months, through the world's auto shows, consumer shows, and conferences; now we reckon it's about time to paint you a picture of the trends and innovations we have seen from an automotive interior perspective. This report is structured through the different events as they happened along the first half of the year.

Enjoy! We'd love to have your feedback; please **drop us a line!**

Introduction

The most recent Consumer Electronics Show in Las Vegas last January held up a mirror to this revolution in the auto industry.

Everything in the automotive industry is increasingly geared toward CASE (**c**onnected, **a**utonomous, **s**hared and **e**lectric) vehicle. These trends are complementing each other, and it was very visible at the 2019 CES that their first aggregated combination will be electric, completely autonomous (obviously connected) robo-taxis (shared by definition).

Old borders between industries and sectors are changing, no matter whether we're looking at automakers, tier-1 and -2 suppliers, or companies and industries previously wholly outside the automotive realm. There are new automakers and car brands—Byton, Polestar, Nio, Lynk & Co, Qoros, and others; previously unknown Chinese automakers like Aiways, Landwind, and Xpeng; digital outfits like GAFA, entertainment companies like Warner and Paramount, electronics companies including Samsung, Panasonic, Sony, and Pioneer; computer processor suppliers such as Intel, Qualcomm, and Nvidia; mobility service providers, and many startups now jostling to produce and equip tomorrow's mobility interiors.

Robo-Taxis

Are Robo-Taxis the First Base of Real AD?

Some time ago, everybody thought high-level luxury cars would be the first Level-5 autonomous cars. Viewed from now, and after further development, and understanding its complexity, collective mobility solutions in major cities are first on the agenda:

- Growing "pool" bookings with Lyft and Uber
- Cities are favoring collective mobility to reduce traffic congestion and parking pressure
- These cars are still expensive, so taxi use maximizes uptime and recoups cost fast
- Connectivity is better in big cities
- Driving conditions are more stable in big cities

As self-driving technology matures, designers have begun to envision what cars can look like without steering wheels, and a lot of the results share a common theme. Robo-Taxis are on their move. They'll be part of a MaaS (mobility-as-a-service) paradigm. They'll be branded or co-branded as such, between a car maker brand and a city or a mobility service. Their interior will reflect this branding, or

the usage scenario of the Robo-Taxi. It will open myriad opportunities to tune the interior to the service, maybe as much as bus, train, and airline companies are tuning the interior and their own passenger experiences.

At CES 2019, almost every manufacturer showed a self-driving lounge concept that promises to turn drivers into riders and shuttle them from A to B in a cube on wheels. Naturally, we had to check them all out, and explore what it could mean for their interior experience at this stage of development

Mercedes Urbanetic: Elegant Mobility Platform

Mercedes presented their new Urbanetic platform as a people mover with distinguished and elegant interior favouring personal interaction and sociability.

Toyota Boshoku MOOX: Flexible, Simple Shuttle

Besides their AceS concept (Active Comfort Engaging Space), interior space model that supports Level-4 autonomous cars, seat and interior technologies, Toyota presented the MOOX (MObile bOX) as an interior design study for a Level-5 car. Catering for everything from business to entertainment with a flexible and simple seat arrangement, it offers stimulation of all senses in response to occupant behaviour and context.

Audi Aicon: Luxurius Robo-Taxi or Premium Sedan

One of the best-looking vehicles on our list, with translucent roof and seats with futuristic appeal, limited screens (except the touchscreen in the door)—It's more of a development car at this stage, to help engineers refine and improve the autonomous driving systems. Will it be a luxury car with Level-5 autonomy? A Robo-Taxi? Both? Too early to answer!

Denso Urban Moves (in mobility service)

The Urban Moves concept is supporting the big push into MaaS: not a car you own, but more like a Lyft solution. A table in the middle makes it a bit like riding in a diner booth, and there's a screen to distract yourself from the awkwardness of riding with other strangers.

Kia READ Reads Emotions

Kia's READ Emotion concept detects your emotions as you enter the car and tailors the experience to your liking. It uses a built-in camera to examine your face and A.I. to divine your emotional status, then changes the color of the lighting, television content, and seating to your state, like vibrating the seat if you're stressed.

Aisin Type C in Two Flavors

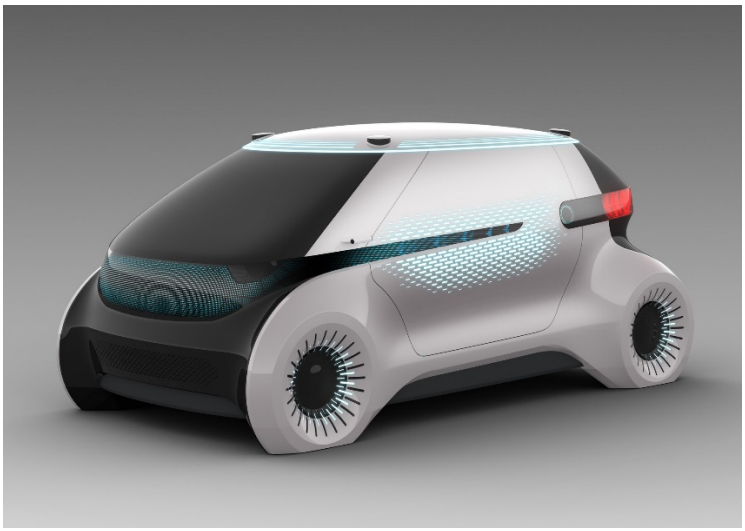
Aisin is a Japanese company in the Toyota constellation. They make components from

brakes to batteries, including interiors. Aisin showed two versions of their concept at CES: An automated passenger car and an automated limousine (robo-taxi). The seats swivel to greet passengers, but a front-facing driver seat and steering wheel suggest the Type C would still rely on some human intervention.

Continental Urban Mobility Experiment (CUbE): Already On Frankfurt's Roads

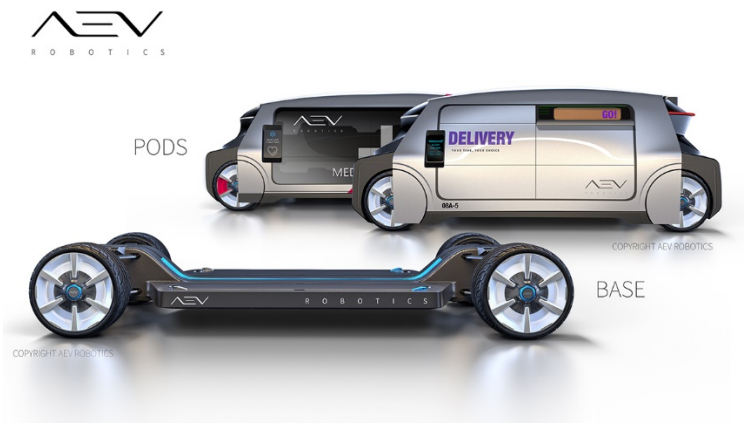
CUbE, Continental's Urban Mobility Experience, was put together in conjunction with Easymile, the Toulouse-based specialist in autonomous vehicle technology. It's already testing around Frankfurt, Germany right now, with a shuttle-like interior design.

Hyundai Mobis Concept Monitors Occupants



The Future Interior Concept, with Hyundai Transys seat was built in partnership with Stradvision, who specialize in occupant monitoring through face & body deep learning. The windshield has a giant TV, and a loudly clanging Pachinko-like game made it seem like a casino on wheels (after all, it was being shown in Las Vegas). Exterior lighting changes colors to communicate with pedestrians.

AEV Robotics MVS E-Skateboard Platform



Much like Mercedes, AEV sees autonomous vehicles as an electronic skateboard platform that can handle everything from food to people with different pods. Their concept is called the MVS (Modular Vehicle System). The Australian company broke cover with this concept at CES

last year, but few details have been released on what remains very much a prototype.

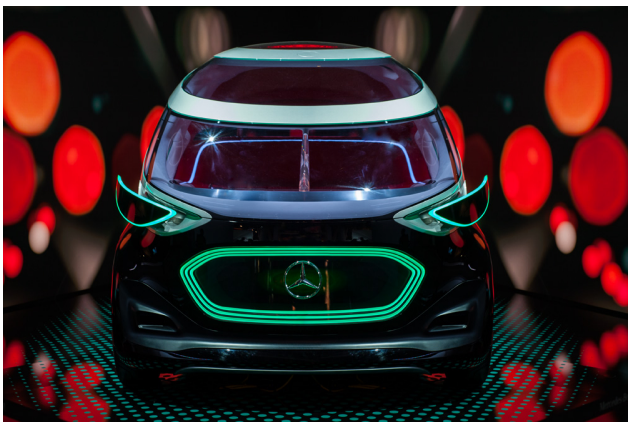
ZF E.Go Mover: Already On Sale

ZF expects to deliver 400 of the new E.Go Mover in 2019 alone, mostly to European cities. Not surprisingly, they do have steering wheels, but they should be able to make the leap to fully autonomous operation within the next two to three years. With room for 10 people sitting and an additional 5 standing, ZF hope the Mover can help to minimize traffic congestion.

CES Interior News

Mercedes in All Future Car Segments?

Mercedes highlights at CES included the world premiere of the new CLA; the US premiere of the battery-electric EQC electric SUV; the Urbanetic mobility concept platform for autonomous transport of people (robo-taxi), and the Silver Arrow electric performance car concept, as well as news about Daimler's strategy for automated trucks.



The CLA coupé is a traditional vehicle in its class. Nevertheless, its interior is full of new technologies: it has intelligence from MBUX Interior Assist, a high-resolution widescreen cockpit with touchscreen operation, a navigation display with augmented reality technology, and intelligent voice control with natural speech recognition activated by saying "Hey Mercedes". It has gestural controls and provides an array of clever solutions through augmented reality for navigation and understanding indirect voice commands. There's even an "energizing coach" that provides individual fitness recommendations. Software and firmware updates are handled over the air.

The EQC SUV's high-tech interior comprises the MBUX dual wide screen, new design of the air vents, and luxurious materials of leather, wood, and aluminum. The Urbanetic is an all-electric autonomous platform with interchangeable bodies including a people mover (robo-taxi). It can transport up to 12 people within a circular luminous interior. There's a glass roof and a spectacular round red sofa.

The Vision EQ Silver Arrow show car is a one-seater vehicle is an homage to the record-breaking W 125 car from 1937, demonstrating that electric vehicle can perpetuate the history of speed of performance and luxury car.

Kia: Emotion adaptive driving

Kia's interactive ‘Space of Emotive Driving' exhibit looked to a future when autonomous driving is the norm and priority is given to improving the human mobility experience. Central to this concept is Kia's new READ (Real-time Emotion-Adaptive Driving) system, a world's-first technology developed in joint research collaboration with the Massachusetts Institute of Technology Media Lab's Affective Computing group. It can analyze a person's emotional state in real time through bio-signal recognition technology and artificial intelligence, through valence—intrinsic attractiveness/goodness is positive valence; averseness/badness is negative—of an event, object, or situation.

Sensors continuously monitor facial expressions, heart rate and electrodermal activity. The system thus makes it possible to adapt certain æsthetic and functional aspects of the interior environment of the vehicle.

Albert Biermann, President and Head of Research & Development Division of Kia Motors, said the READ system was developed to "create an interactive future mobility in-cabin space by converging cutting edge vehicle control technology and AI-based emotional intelligence. Consequently, READ will enable continuous communication between drivers and vehicles through the unspoken language of ‘emotional feeling', thereby providing an optimized human senses-oriented space for drivers in real time".

Hyundai's AR Enhancements to In-Car Experience

Hyundai Motor Group, in collaboration with Swiss deep-tech startup company WayRay, have unveiled the world's first holographic augmented reality navigation system in the Genesis G80.

The biggest benefit of a holographic AR navigation system built into the vehicle is that the stereoscopic image is displayed on the actual road and appropriately adjusted in accord with the specific viewing angle of the driver, thereby delivering accurate driving guidance. The driver can enjoy vivid and precise holographic images without wearing a headset. The direction of movement is kept precise through the vehicle speed in real time, and projecting

navigational alerts through the windshield onto the road allows drivers to navigate safely while looking ahead undistracted.

The windshield is becoming much more than a piece of transparent material, it's now a display space for new services and can help create completely new in-car experiences. It's different from head-up displays, as it projects an image directly rather than by reflection. It can show navigation features like destination and lane guidance, warnings (proximity detection, lanekeeping, weather, V2X, etc) and others.

Through their cocoon-shaped cockpit, Hyundai believes personalized vehicles are not a luxury but a necessity for customer lifestyles in the age of autonomous driving technology. The "Style Set Free" concept helps personalize the vehicle space for every customer, allowing selection of initial software as well as hardware of their vehicles and equip upgrades according to specific needs and wants.

Nissan Intelligent Mobility to See the Invisible

Nissan says their Intelligent Mobility is about building a better experience for their customers wherein cars are their partners and drivers are more confident and more connected—with manual control still possible. Key to the setup is their "see the invisible" technology which uses virtual reality, in-vehicle sensors, and connected car technologies to create a virtual world around the visible world for the driver. This technology is named Invisible-to-Visible (I2V)

Here as well, the windshield becomes a platform to a new visible virtual world. I2V is a way to overlay information from a car's onboard sensors, as well as the cloud, onto the driver's field of view, all in large scale augmented reality (AR). I2V relies on a system called Omni-Sensing, hub for the relevant data, developed by Unity Technologies, using experience and visual techniques of the gaming business. Drivers can also connect to the Nissan "Metaverse," a virtual environment shared with other users. And virtual avatars can appear inside the car: show sun when raining, local information, traffic warnings, coaching, etc. Maybe too much, but at least it shows the many potential applications. Invisible-to-Visible (I2V) shows how VR can be used to enhance driver awareness. Maybe a necessary step to build confidence in fully autonomous vehicles?

Byton's M-Byte Will have a 48-inch Screen

Byton, the startup founded in China by former BMW people, showed their almost-production-ready electric SUV with a refined exterior design. But the main attraction is coming from the interior.

The centerpiece of the cabin is the gigantic 48-inch high-resolution screen that occupies the entire dashboard. It will be standard equipment from the entry-level announced for the launch at the end of this year. This large screen has the size of 7 large side-by-side tablets, and is located almost behind the dashboard and close to the windshield.

What's more, the interior of the car has five(!) screens, including one located directly in the middle of the steering wheel on a fixed hub. There's also a camera on the surface of the dashboard, monitoring the driver to ensure vigilance especially in level 3 autonomous driving scenarios.

Gesture and voice commands, with Amazon Alexa, complete the offer of possible interactions with this giant display. Graphics are voluntarily simplified in a home operating system, complete with a smartphone application gathering all interactions outside the vehicle. Byton has partnered with many expert suppliers including Faurecia for development and commercialization of this, their first model.

Faurecia Turns Car into Comfort Bubble With Cockpit of the Future

Next-generation adaptive displays on a new, morphing instrument panel introduce the first freeform large format high definition screen, made in partnership with Japan Display. When the driver switches to autonomous mode, the instrument panel surface smoothly adapts its shape and the display moves out from the instrument panel, creating a large central display. During driving mode, the display can be used as an instrument cluster giving driving information and safety signals as well as offering a central screen for navigation and media. To enhance relaxed travel during autonomous mode, the display transforms into a large-format entertainment screen. Combined with front seats that can swivel inwards, this creates a new shared ‘onboard cinema' experience for all occupants. Intuitive HMI uses voice, gesture and touch; adjust interior settings via the smart touch pad on the center console, tactile surfaces in the door panel, or voice activation (Alexa helps here), or by gestures via camera integrated in the IP, including facial recognition and occupant data tracking to personalize light or audio settings and services. The technology was demonstrated in a modified Volvo XC90 interior.

The Optivent seat-based ventilation system uses natural body aerodynamics to direct airflow to and around the occupant. It includes a Mahle eHVAC and fragrance diffuser, an e-vent cooling system that gives greater precision in directing and diffusing airflow, and an air purification system. Sound surface activation technologies and advanced software algorithms work to provide the sensation of being totally immersed in sound. There are no discrete speakers; instead, exciters are integrated into the surfaces. Dedicated software developed by Parrot Faurecia, bass enhanced by Subpac high fidelity vibrations in seat, headrest with integrated spatialized sound producers, and active noise control (ANC) reduces external noise.

Valeo's Interior Focus is on Interior Air Quality & Comfort

Besides many innovations presented by Valeo at the 2019 CES, Valeo's "Smart Cocoon" and "Oxy'Zen" will transform car interiors into a cocoon protecting from exterior air pollution, and keeping the occupants at the most comfortable temperature.

Smart Cocoon offers a localized thermal comfort bubble adapted to each passenger according to their physiological characteristics. Biosensors and infrared cameras gauge the thermal profile of each passenger based on heart and breathing rates, clothing, age, gender, and body type to fine-tune the vehicle's internal temperature. Light color plays an important role to enhance the sensation: red lighting gives the sensation of a 2°C increase and blue light an impression of a 2°C decrease.

With EVs where thermal management doesn't fit well with car range (there's no engine waste-heat; all heat must be electrically generated), the system aims to minimize the energy impact for the vehicle. In summer, a water atomizer and fans following the movements of passengers are activated automatically. To reduce overall consumption, radiant panels complete the heating of the passenger compartment to quickly reach the desired level of warmth and comfort.

Valeo's Oxy'Zen is used to activate air purification systems inside the vehicle cabin; according to research, air inside a car can be up to four times as polluted as the air outside—which may already be unacceptably bad! Passengers can trigger the remote air purifier from their smartphone for pre-cleaning the cabin.

Gentex's Connected and Biometric Tech

"Mirror as a module" is the motto, with a lot of content stuffed into inside and outside mirrors including HomeLink, toll payment, biometric driver identification, and live monitoring of all individual settings.

HomeLink is the industry's most widely used car-to-home automation system. More than 80 million HomeLink-equipped vehicles are on the road today around the world.

Among the new offerings is a new HomeLink Connect connection platform that's designed to pair a vehicle and home, beyond the garage door, now with any connected devices through the car's embedded touchscreen, or even through a Bluetooth-enabled rearview mirror. Meanwhile, an integrated toll module is designed to act as a multi-protocol transponder tag for national toll roads, allowing drivers to easily access such roads without the need to acquire physical tags that can clutter a windshield.

Gentex also showed a biometric driver identification system. Based on iris recognition, the system is designed to be embedded into a mirror, and to automatically identify a driver with just a glance. The car's interior settings can then be adjusted as per the driver's personal preferences, and to enable access to cloud-based services.

HomeLink uses two transmission modes: radio frequency (RF) to activate entry-critical appliances such as garage doors and security gates, and cloud-based wireless transmission to operate home lighting, thermostats, smart outlets, security systems, and other IOT devices.

The mirror offers bi-modal functionality. In mirror mode, the product functions as a standard rearview mirror, but with the flip of a lever, the mirror enters display mode and a clear, bright, LCD display appears through the mirror's reflective surface, providing a wide, unobstructed rearward view.

Mahle Makes a Splash

Mahle presented advances in powertrains and in comfort technology at CES 2019, including MEET, a city car concept. Thermal comfort in a car has always been a challenge in winter as combustion engine calories need time to heat the interior cabin, making it not efficient for short city trips. With EVs the challenge is even bigger as engine waste heat is no longer available. The same challenge exists for cooling, where energy is needed whatever the engine technology.

MEET demonstrates that efficiency and economy can be combined with driving pleasure and comfort in a single concept. A new surface heating and cooling technology means maximum efficiency and individual comfort are not mutually exclusive in an electric car. The targeted heating or cooling surfaces are located close to the body in the passenger cabin (door trim/instrument panel/seat), reducing time to comfort while minimizing energy consumption.

Mahle also presented technology in other domains like smarter charging of EV via chargeBIG, a corporate startup, and electric drives for city bikes.

Pioneer: Car Interior as Entertainment Platform

Pioneer is well-known for their audio devices, but at CES they showed other kinds of technology, including an automotive advanced UX cockpit showing a vision of the comfortable transportation space with Level-5 autonomous driving. Their target is to enter a market of available people to bring along some of the entertainment products they're already known for.

One idea they've been working with: using traffic jam downtime to preview or even replace planned visits (Japanese temples or whatever other attractions) through virtual reality. The system has adjustment capabilities through the driver's mood, measured by EDA (electro dermal activity via hand base) and with proprietary devices such as cameras, heat imaging cameras, pressure sensors, odour sensors, and analytics algorithms, this technology can estimate emotions, thermal sensation, body motion, stress, and suchlike with great accuracy. Then it can change the seat position, vibrate it, shift

the steering wheel padding, change lighting, temperature, audio, air aromas, and entertainment programs.

It also includes the "StreetSmart" door, conceived in partnership with IAC (International Automotive Components Group) and AGC Automotive Europe, and built in cooperation with FICOSA, a Panasonic subsidiary. It's got seamlessly integrated, shaped glass surfaces in the door panel, a display for a digital side camera monitoring system, and comfort and lighting controls.

Geneva Motor Show

Introduction

Geneva Motor Show Focused on EVs, Not AVs

The Geneva Motor Show is traditionally the show for all concept cars, the moment to exhibit many new vehicles, a place of trends, a test site also to validate the welcome of innovative technologies or trends of style. The 2019 version was no exception. But where we expected variations on the concept of autonomous vehicles widely advertised in 2018 and CES, Consumer Electronics Show in Las Vegas, we saw especially variations on electric vehicles.

The 2019 Geneva motor brought us back to rational now-responses to now-problems: alternatives to burning oil including EVs (electric vehicles) and hydrogen technology. This isn't the first time the letter "e" appended to a car's model signified advanced new technology; years ago it stood for "einspritzung", German for "fuel injection" before all cars had it. Now it means "electric", and it's showing up on popular-price models from long-established brands (Peugeot 208, Renault Clio, Kia e-Soul…). New EV-specific brands are popping up, like Volvo's Polestar and the new Chinese Aiways, while longtime design leaders are looking to electricity as well; Pininfarina launched a super sporty electric Battista. An EV—Jaguar's i-Pace—was voted Car of the Year, and numerous makers showed EV concepts (Honda e-prototype, VW Buggy…).

That's not to say the whole of the future is here yet. Selling prices and even business models (outright sale? Car sale/battery rent? Whole-vehicle lease?) are not always announced. New EV announcements are blossoming everywhere, but buyers are not yet very numerous. It's something of a bind; Makers need to sell EVs to meet the European emission regulations, but if sales will really take off, infrastructure isn't ready (cities, charging stations, electricity network, maintenance…) Many potential buyers are still unconvinced of range adequacy. How to fashion and implement a virtuous circle for EV offerings and uptake is the main challenge of all the stakeholders of this industry.

Geneva Interior News

Fiat's 120 Concept: Unprecedented Modularity

Fiat, generally not very productive in concept cars, presented at the Geneva motor show their new concept Centoventi ("120" in Italian, to mark Fiat's 120th anniversary) in possible anticipation of a future Panda. Or perhaps this is a forecast of their forthcoming 100% electric platform, to go along with their recently-announced new electric 500. In any event, what surprises the most is the modularity of the vehicle designed to be adapted to the personalized, evolving needs of anyone. Batteries can be added to increase the driving range, housed under the floor of the vehicle and even under the front seat thanks to sliding storage on rails. The roof can be a glass panel, solar panel, cargo carrier, or sliding roof. Especially the dashboard is imagined like lego games: each piece of equipment is plugged onto and into the dashboard and doors. The dashboard is full of lockable holes on which you hang the speakers, clips, and various storage bins. The door panels can also be fitted as fridge doors and can accommodate different storage bins; the location next to the driver can accommodate a traditional passenger seat, a small office space with a computer platform, a baby seat which replaces the usual backrest, or even an animal cage clipped onto the seat. The seats are themselves built in a modular way with an integrated but removable and washable cover made by 3D knitting. Drivers can use their smartphone or personal tablet as a browser, or opt for a giant smart digital cluster.

Citroën Ami-One, "Liberty Electricity Mobility"

Then there's the interior of Citroën's Ami-One concept, which astonishes with its bold and cheerful design more inspired by the interior design of a house or a garden than that usually found in vehicles. The Citroën design crew collaborated on the seatbacks with Dutch designers Studio Plott, who designed and manufactured carpets using a fluted yarn extruding a molten plastic filament; the result is lighter weight, with infinite latitude in geometric frames and colors. The questions of deformation, solidity, and washability of the seatbacks remain open.

As for the rest of the vehicle, the design of the seats follows a rationalization of the investments and a simplification of the manufacture intended to limit the costs and so be opened to the small series. The Ami-One has been designed for a license-free and/or car-sharing

vehicle application. Citroën joins the movement of the electric city car used for short durations according to their concept "LibertyElectricityMobility" (echoing the French national motto, in English "Liberty, Equality, Fraternity").

Regarding the dashboard, a smartphone serves as an interface with the vehicle. The car is unlocked or locked by reading the QR code off the aluminum door handles. Once in the vehicle, the driver docks the smartphone into a housing behind the wheel to access a range of services. It recharges by induction while the display on the screen is projected on a glass cover-slip for a head-up function. On the right side of the Drive pod, a simple cylindrical handle includes the start/stop pushbutton and automatic gearbox selector.

Kia e-Soul: Sound & Mood System

The new Kia e-Soul offers a combination of classic style and visual and technological innovation in its interior. The upper door panels use an aesthetic frame 3D-patterned surface included in the mass of the panel material and remind of fish-scales. When the vehicle is running, the fish scales light up at the same time as a stripe all around the lower part of the door panel. The music played in the car is visualized on the panel doors; Kia calls it the Sound Mood Ambient System.
We note that despite the presence of a touch screen, driving is associated with many, many buttons: pushbuttons and shift paddles and knobs on the armrests, center console, on and under the steering wheel. The screen is mainly used for infotainment rather than control. The customizable touch screen provides connected information including the live charging stations.

Kia presented their UVO connect application, new in Europe but already existing in the United States. This telematics system allows a real exchange with the driver's smartphone. The driver can retrieve information from the vehicle: battery state of charge, geolocation, status report including tire pressure and any other detected issues. They can also program and transmit remote instructions to the vehicle—not only a destination for its navigation but also HVAC settings like air conditioning, heating or ventilation for the seats and backs, windshield defogging and other suchlike from the smartphone. Seat heaters aren't much use when the trip is too short to let them heat up, but now this remote system could change that for the better by allowing preheating.

Honda e-Prototype: Premium Urban Techno-EV

The e-prototype concept car from Honda is announced to be very close (95%) to the small electric vehicle they launched last September at the Frankfurt motor show, both in terms of technology and design.

The target of Honda here is a premium positioning in the segment of the small urban electric vehicle to compete against the BMW i3. The choice of interior design contributes to it: it juxtaposes both the simple retro style with the use of a wooden dashboard and center console, and futuristic style. The wood appearance should remain in the produced vehicles but probably in a less expensive, more manufacturable form rather than genuine wood. Honda has aggressively gone in for digital screens with this dashboard consisting of three 12" screens: one for instrumentation, and two for the multimedia. Then there are two side screens that transmit the image of the external cameras in place of side mirrors. Regulations allowing cameras instead of sideview mirrors came into force in 2018 in Europe (and much of the rest of the world where UN Regulations are used). Cameras stand not only to improve aerodynamics but also to improve the driver's view by compensating for bad lighting conditions, attenuating glare, and eliminating blind spots. No word yet on whether or when they'll be legal in the U.S.

In this concept car the driver will face five screens, which may constrain the manufacturer to set up lockouts to stave off driver distraction. This massive use of digital displays announces maybe the use of multimedia for a future autonomous car rather than for a vehicle soon produced in series, even if the Byton M-Byte already presented a screen across the width of the vehicle with two touch keypads at center of the steering wheel and on the center console.

Polestar 2: A Vegan Scandinavian

Polestar is Volvo's new brand for premium EVs that target the Tesla market. The name Polestar originally applied to an independent race-preparer of Volvos cars, and Volvo wanted to keep this image of sport and performing cars with the launch of a new fully-electric vehicle, the Polestar 2, produced in China and available from 2020.

Inside the vehicle, the design is very modern and minimalist except for the goldtone seat belts and here again, a great centralized portrait tablet (11") enhanced by a highly stylistic tunnel mount. One

of the big details is that this is an Android-based system, using the Google automotive solution. That means no struggling with in-house mapping because it uses Google Maps and Google Assistant. It can get relevant search results like charging stations, so it's not just for entertainment.

There's no start button. Instead, there's a sensor in the seat so it knows when you're behind the steering wheel and ready to drive. What may seem anecdotal or marketing announcement may mark a renewal in the upholstery of high-range vehicles. Polestar is the first brand to use vegan-friendly fabrics instead of leather while keeping the appearance of perceived quality. New materials have been created—including something called WeaveTech—better for the planet but also saving weight, making the vehicle more efficient.

Renault Clio and 208: Alternative Energy, and What About Interiors?

The Clio and the 208 are moving towards alternative energies with a new all-electric 208 and a Clio proposed in hybrid "e-tech" available within a few months. The design of the Clio 5 remains deliberately in line with the Clio 4, leader of its segment in Europe, while the 208 makes a more pronounced break in its exterior design. What about the indoor atmosphere?

Renault Clio V

The interior of the Clio offers great livability including a rethinking of the rear space layout with a new, hollowed-out design of the front seatbacks so as to free space for the rear passengers' knees.

At the dashboard level, the Clio 5 vs the Clio 4 evolution is really noticeable with a central touchscreen with vertical layout from 7" to 9.2" depending on the vehicle trim level. It uses Bosch's new Easylink multimedia system, which will be shared with Nissan. 100% of Clios will be connected in 4G which will permit an automatic update of the cartography. Easylink still uses Tomtom software for navigation and driver services (info-traffic, parking lots search as well as gas stations with display of fuel prices) but also uses Google Maps for automatic search with a few keywords. The screen with customizable features uses a simplified search in the menu: driving aids with customization of alerts (more or less strong vbration) or ambience (like resistance of the steering wheel). Several user profiles can be configured for each setup.

Peugeot 208

Here again, we find a touchscreen that ranges from 5" to 10" depending on the level of equipment in any specific car, but the innovation is mainly based on the display dashboard called 3D I-cockpit available from level 3. The visualization of the information of the dashboard appears on three layers of display superimposed as a hologram, with a system of reflections deposited on a semi-transparent mirror: the most important information remains on the first layer and appears dynamically if necessary, to attract attention: for example, navigation in the short term also appear on these screens. There is no accumulation of information: the information disappears as it becomes unnecessary.

We also note the light signature that runs throughout the dashboard with a large choice of colors which contributes to a personalized atmosphere.

Maserati interior: Best Place to Live

Maserati presented at the Geneva show their Levante Trofeo. Besides its traditional motorization, and a progressive move to electrification, the interior is reinforcing the image of sport/luxury/made in Italy.

By combining their own expertise and that of their partners, Maserati strove to create a new standard of the Italian luxury automobile. The rise in range since the years 2000 is still gaining momentum and seeks to conquer a clientele usually buying English or German cars. Maserati worked along the principle that the interior of the car should become the best living space in the owner's life. To that end, a great deal of

personalization is facilitated through high-level Italian handcraft. Partners in development included De Castelli, Giorgetti, and Zegna.

De Castelli is a metalworking specialty house in the North of Italy. By using natural oxidation processes without dyes, they manage to give sumptuous gradients to brass, copper, and steel. The result is astounding; metal has never been so expressive, creating a new level of beauty in a car. Giorgetti, specializing in woodwork, already have experience working with Maserati; their wares are used on the Interior coverings of the Quattroporte. The use of solid wood, rare essences from around the world, all fully assembled and finished by hand will allow everyone to shape a unique environment of Italian finesse. Leather trim is typically the cabin signature of a car interior. Here, through partnership with Zegna, it's going to beyond combinations of leather and silk already seen on the 2018 models. Here, Zegna has developed a leather weave sufficiently flexible and resistant to dress the seats and furniture of the car, the Pelle Tessuta. specifically designed for Maserati.

Aston Martin Lagonda's Flying-Saucer Key

Aston Martin recently revealed the All-Terrain Concept for their Lagonda luxury brand. This concept must inspire a car that will be marketed by 2022 and produced in a new facility in Wales, the St Athan site. The fully-electric SUV stands out for its sleek design. In the cockpit, a normally mundane feature surprises visitors: the key. There is no physically-accessible lock and of course an EV has no starter, but there is a key. It's a disk placed on the center console so as to levitate with electromagnets. The key contains information like the destination and the driver's agenda. The visual effect is unusual and aesthetically pleasing, but of course it remains to be seen if the levitating key will make it to production.

The interior of the vehicle develops many of the bold design elements first seen in the Vision Concept presented by Aston Martin in 2018. For example, the two front seats can swivel to face the rear sets during autonomous driving.

Aston Martin want to innovate even with the type of interior materials. Chief Creative Officer Marek Reichman says the Lagonda brand is "unconstrained by the traditional values of current luxury products, it is not about wood and leather, we tried to design the interior with soft, natural materials like Cashmere. Lagonda reflects a future that is full of unique materials that are not set in the past". And indeed, in addition to the Cashmere, we can find silks and crystals.

Ultimate Interior Luxury: Mercedes-Maybach Pullman

When visiting an auto show there are two kinds of dream cars to be seen: high-performance hypercars and ultraluxury vehicles. Both are unaffordable to most, but so attractive to visitors.

With the new Mercedes-Maybach Pullman interior, the market is getting to a new record. Within a 6.5-metre long body, there's space to accommodate the best. The four rear passengers can sit facing one another, with the VIP occupants seated on front facing executive seats, enjoying the longest legroom in the segment, and all the comfort features you can imagine: numerous adjustments, massage, heat/cool, and much more. The seating arrangement can be electrically adjusted, while the audio system allows completely personalized rear cabin music, enjoyed amidst a selection of unique leather quality and colors.

This new jewel is supposed to be chauffeur driven. Will this market segment go one final day to autonomous and create a high-luxury mobility tool along the lines of an exclusive private aircraft?

Jaguar I-Pace: Interior of the Year?

Jaguar's first 100% electric vehicle clearly impressed the jury of the 2019 Car of the Year competition. Competition was tough, and the Jaguar I-Pace took the prize versus the Renault Alpine A110.

The interior design harmonizes quite well with the exterior: a careful balance between sportiness and elegance, between performance and quiet EV driving, all underlined by the Jaguar luxury with elegant leather, twin-needle stitched upholstery, and a sleek low instrument panel. Unconstrained by a transmission tunnel, spaciousness has been maximized within the SUV architecture for leg and knee room.

The "Touch Duo Pro" package includes two touch screens, a 10" infotainment screen above the lower panel line, and a 5" screen underneath for settings (climate and suchlike). Smart settings personalize

the car to its driver(s) and learn along trips. The car can be precooled or preheated to have an ideal temperature inside before anyone even gets in it. In case of preconditioning when the vehicle is being charged, the battery is not used, thus avoiding a prolongation of charge time. Among a long list of other new features, the I-PACE offers an ionization system that improves air quality and neutralizes odors.

De Luxe BMW 7 Parks by Memory

It is not a surprise to announce that the interior of the restyled BMW 7 Series exudes luxury, its leather upholstery with extended stitching reminiscent of the handbags symbol of Chanel; its extra-thick side and rear windows to increase acoustic comfort. Concerning technology, the new 7 has upgraded its services, especially with an evolving semi-autonomous driving system: the standard-equipment Park Assist system now includes a Reversing Assistant, which steers the vehicle in reverse by following the path taken beforehand in the forward direction. This system is the only one of its kind in this segment and offers the highly convenient facility of automated reversing in confined spaces or situations where the driver does not have a clear view, such as multi-story parkades, entrances to courtyards, and narrow mountain passes. This is done by storing the steering movements made during the vehicle's last forward maneuver when travelling at speed up to 36 km/h. The system can then reverse the vehicle for distances of up to 50 meters by steering it along exactly the same line it took when moving forward. All the driver has to do is operate the accelerator and brake pedals.

The operating system also includes the BMW intelligent personal assistant. Activated by the voice command "Hello BMW", it helps the driver use the various features of the car. In addition, thanks to the Remote Software Upgrade, the system is updated remotely and continuously acquires new features over time. The driver and passengers can also use the natural voice commands of the BMW Intelligent Personal Assistant to activate Experience modes as well as Vitality and Relaxation programs. Depending on the program chosen, the system adjusts the settings of the mood lighting, air conditioning, room air, brightness, as well as massage, heating and ventilation of the seats.

Shanghai Motor Show

Introduction

At the 2019 Shanghai Auto Show, some of the biggest manufacturers some you've never heard of displayed their newest vehicles alongside very familiar Western brands. China is focused to claim their stake in the world's most lucrative automotive market and they doing just that—with design innovation.

The show is massive in scale. It certainly the best auto show to attend on the planet if you are interested in new designs, Electric vehicles awesome innovations and global trends.

Long gone are the days when Shanghai was an exhibition of copycat cars. The impressive quality of new Chinese creations is beginning to pose a very real threat to more established manufacturers. The 2019 edition of new Chinese vehicles was significant, with an increasing number of Chinese models being prepared for European launches challenging that market. Global manufacturers like Volkswagon, are expanding models that will be specifically adapted for sale in China.

Given the importance now placed on Shanghai motor show as an automotive showcase with international reach, this show dwarfs Detroit which has long been the gem of the auto show world. Shanghai has more significance in terms of design trends, lighting trends and technology. Every key Chinese car maker, including the five state-owned heavyweights SAIC, FAW, BAIC, Dongfeng and Chang'an, all presented new or improved production models this year. The private own rivals headed by Geely, GAC, Great Wall Motors and BYD also had key introductions. Joint venture operations such as those operated by Volkswagen, BMW, Toyota, and Honda also made their mark within this show.

The American brands had no significant introductions compared to previous years of showing. In stark comparison, the Chinese and European automakers had significant new designs that showcased the floor. Perhaps American brands will have a stronger showing next year in Beijing?

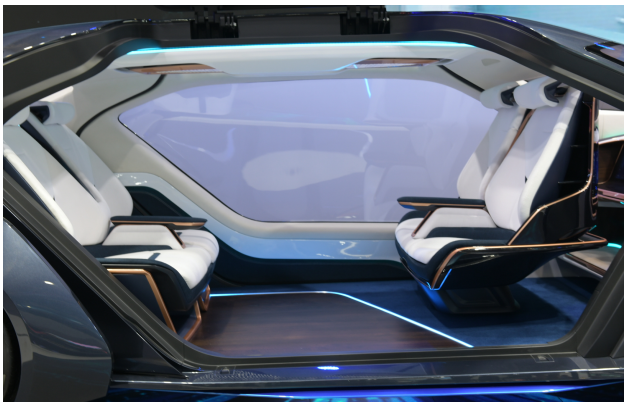
China's growing number of increasingly well-funded electric vehicle start-ups stole the limelight once again. But just as electric vehicles are seemingly coming into their own, China is looking further ahead in a bid to outdo its western rivals with innovation and stylish design.

CASE (**C**onnected, **A**utonomous, **S**hared and **E**lectric) Vehicles

The evolution of interiors to the next phase has started and very evident from the vehicles that were on exhibit at the 2019 Shanghai Automotive Exposition.
It's clear that CASE evolution has started and will occur in stages over the next years.

Interiors will gradually transform, with more technology adeptness and employ more innovative lighting for ambient, communication and safety uses. Several concepts showed innovative materials that are chameleon in nature, that is, will illuminate with light when needed. Touch-sense technologies will become critical element for occupant control or acknowledgement to the vehicle that the occupant is aware of the emerging condition requiring a response.

The move toward CASE has started
At Shanghai, there were a number of concepts one notability was the Chinese company Fenyr, who displayed a vehicle that resembled what we see now in production but with a twist: the rear seats were together separated by a small console but the front seats were rear-facing and turntable so that the vehicle could be driven in a traditional way. While there are many autonomous interiors represented that showcase this design, subtle interior changes are starting to happen that were very noticeable throughout the exposition.



Dubai-based W Motors and Iconiq Motors teamed up to unveil the Muse, a fully-electric self-driving car, at the Shanghai auto show. Development partners included Akka Technologies, Magna Steyr, and Microsoft. A fleet of Muses cars is being manufactured for use during the Dubai Expo 2020, with commercialization of production vehicles set for 2023.

The interior of the Muse features an advanced infotainment system and smart onboard services, innovative wide-screen user interfaces, and advanced cloud-computing connectivity. Two large screens and four personal tablets enable individual connectivity through what the makers call "CEO.UX", which stands for Comfort, Entertainment, and Office User eXperience—a designation probably targeting Chief Executive Officers. The car has three-meter-wide gullwing doors, along with two front seats that can revolve and a small movable console, so the car can be reconfigured into a mobile meeting room.

The interior will increase in size, and it's happening now

Autonomous interiors will grow in size as to accommodate the free movement of seating and consoles and people. We're starting to see this in some of 2019 interiors in the luxury brands. Incorporating movement and flexibility will offer more space for the occupants and this "flexibility" will require new design thinking for ergonomics. Lexus LM, Leap Motor and others have achieved this.

What was evident, the concepts like VW ID Roomzz that offered more spacious interior. It's a large electric car and is expected to go on sale in China in 2021. The interior space was impressive and was thoughtfully designed signaling that VW understood people want more living space inside their vehicles.

What was also noticed was autonomous interior simplification. OEMs are design signaling, they will need to take away excess, cluttered designs to create a minimalistic space that can take full advantage of flexibility and movement of interior components and passengers. And this very trend will be welcomed by passengers. With the mass adoption of CASE vehicles, expect to see a shift from traditional interior to a more living room environment. Higher ceilings more spacious roofs will allow more fluid movement and a feeling of openness. Consoles can instantly be rearranged on the go, and their new position will automatic trigger the correct lighting for the space. Smart lighting will reflect the desired mood and instantly communicate critical function. Sensors technology will be employed and relied on like the integrated sensor pack that is now found on our e-watches will monitor your temperature, heart rate, actions, and more, and share that information with the AI.

The biggest challenge...autonomous vehicles will generally be of the shared-use variety and need to accommodate many different people and their varied interests. We even noticed a 360-degree roof mounted camera that had a lot of interest and would support streaming live images inside the vehicle. One can

imagination on a traditional display but extending this idea further—with a little imagination a center mounted interior projector that could cast a 360-degree image in the interior for an immersive experience by its occupants.

Like being on a train...three areas of use: productivity (email, work), relaxation (read a book, taking a nap), and social (interacting with the vehicle or other individuals). Perhaps an autonomous pod built for four scenarios: living room, office, party, and sleeper car. The autonomous cabin will amplify whatever parts of life accompany you into it, becoming a spa-like oasis after work, a rolling wet bar for a party on the move. Several pod designs were shown and offered visitors to enter and experience the first tastes of what his environment could offer. It was evident, people were having fun exploring and experiencing the inside of the pod.

Window glass will become really important, in new ways.
Multi-purpose windows: we might call them SCS windows, for See, Communicate, and Share. It's a strong trend indicator that glass or polycarbonate will become smarter and more useful especially in the CASE vehicle. Glass and polycarbonate companies are looking at ways to use these materials and incorporate communication, illumination, and displays inside the actual glass panel.

The windshield, side and rear glass will become more important for the occupants and it will be their window to the real and virtual worlds. With CASE vehicles, the occupants will become more relaxed like being on a train. As you drive through a new city, your windshield will communicate to you, via the glass, where relevant services are located, show information on history and culture, and then use virtual-reality services to tour the sites en-route. Whether, projected or integrated directly into the glass laminate of the windshield, it's clear more information content must occur to make the occupants feel integrated with the exterior environment.

Motion sickness a real issue. Surround-glass that showcases the world passing by you, controlling the windows and lighting will play a major role in controlling or eliminating motion sickness. Windows could be made of polycarbonate or glass and most likely will include energized opacity and tint, projecting images of the outside world via a roof mounted 360-degree camera, darkening to opaque when you ask. The interior lighting will kick in automatically making sure the light is constant and functional.

With image stabilization, this entire experience could actually control motion sickness and provide an immersive experience for the occupants.

But as always, there is always the exception to design thinking; in this case that would be the windowless pod.

Seating

Seating that twists, slides and rotates in the cabin to support both active driving and autonomous relaxation. I saw several examples of a fabric like skin that would stretch over a "flexible skeleton," and the seats would conform to body any body shape. If it's a ride share, then specific seat illumination with occupant awareness will instantly communicate where your seat is would be needed. Several examples were shown inside the various pods that were exhibited. Also shown was the integration of accent lighting that will aid in ambient illumination during dark periods and provide ride share communication "this is your seat."

Audi AI:ME Concept

Infiniti QX Inspiration Concept

Seatbelts

Seatbelts weren't to be seen in any of the future concept vehicles resembling CASE type vehicles. Will cars be so safe that there's no need to buckle up? That would require a highly intelligent airbag cocoon system that will know immediately how each individual passenger is sitting at that particular moment during the ride. Or will the car be as safe as today's trains?

It's evident that the future of CASE interiors and the designs will help blur the line between young and old. Interiors that offer full connectedness for the young and brings new freedoms to the older set of individuals with limited mobility and disabilities. Every person on this planet, will age into some kind of health issue and disability, and the future CASE designs is a perfect platform to accommodate all of us by providing mobility on all scales. Restating the larger interior size and the flexibility of the interior will make this all possible.

New Chinese vehicles made a strong showing, with an increasing number of Chinese models being prepared for European launches. Examples include Jiangling's Landwind E315 5-seater (called the Rongyao in China), or Lynk & Company's "05" SUV coupe, seemingly targeting BMW's X6 and positioned as "Simpler, Smarter, Sharable".

Global manufacturers like Volkswagen are putting a lot of attention and resources into models that will be specifically adapted for sales in China, like the new Jetta VS5 inspired by Škoda's Kamiq, and the VS7 7-seater that draws heavily on the new Seat Tarraco, targeting family-oriented buyers between 25 and 35 years old; first-time buyers looking for practicality with a bit of emotional fulfillment. Or Renault with their K-ZE, first shown last year in Paris as a concept; now it's an production-ready electric city vehicle based on the Kwid SUV already selling in India.

New EV sedans were on display, too, including Nio's ET (left) and the Xpeng P7 (right), the Enovate ME-S, and Qoros Mile II reminding that there's still a market for people who value being comfortably anchored to the road and don't require cavernous interiors. China's established car makers are creating their own EV brands, such as BAIC's Arcfox, GAC's Aion and Geely's Geometry (not to mention Geely-owned Volvo's Polestar).

Valeo's IAQ Solutions

At the Shanghai auto show, Valeo showed a variety of IAQ (interior air quality) solutions to reduce the impact of ambient pollution on a vehicle's occupants. The EV revolution is well under way in China, but for now urban areas are often still heavily polluted, so improving air quality is a major concern in Chinese cities; 65% of respondents to a recent local study by Sigma use personal

protection against pollution while in their cars. Moreover, IAQ is often worse than outdoor air quality because the airflow into a car comes from the lowest layers of city areas.

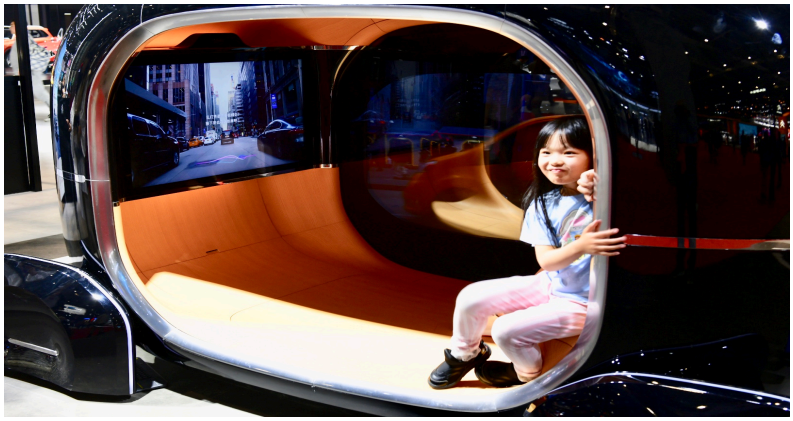
Valeo's Shanghai demo car offered a number of solutions to detect and neutralize harmful pollutants inside a vehicle. One of them is a high-efficiency cabin air filter system, which Valeo says stops 98% of PM2.5 (particles smaller than 2.5 nm) and virtually 100% of VOCs (toxic volatile organic compounds). The Valeo IAQ technology suite also allows for dynamic digital monitoring of cabin air quality that can measure pollution levels, to take preventive measures and anticipate maintenance. A sensor automatically activates the air-recirculation mode when PM2.5 particle concentrations are too high, for instance. There's also a Valeo in-cabin purification system with an ionizer diffusing negative ions to clean the cabin as well as cabin fragrances customized to the

passengers' tastes.

CASE interiors will be reminders of the home we just left...the direction we are seeing in the showcase of designs in 2019 is CASE interiors will resemble handcrafted trim woodwork, nice comfortable surfaces, expanded interior size, displays, connectivity etc, etc. Ambient interior lighting, (mood, functional & safety) will play a large role for CASE and expect to see more use of metals that can illuminate softly to communicate to passengers. With so much sophistication and pleasure we receive in our homes; you can bet this will need to transform into an autonomous experience.

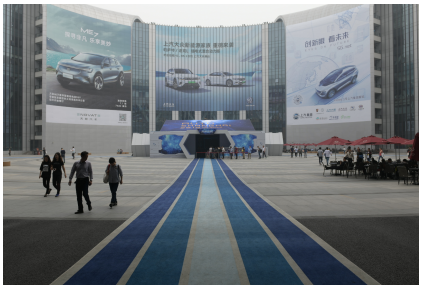
Currently, people stream millions of hours of data. Surely this trend will continue and increase over time. It has to be seamless, and immediately work in the interior environment. To do this, some design-thought leadership will need to happen with AI, touch sensing, haptics, displays and data streaming. I'm sure, there are technologies that are not yet thought of or developed will greatly aid in this area. We saw a number of examples on how the interior is evolving in this area with IP displays, touch sensing features and the use of hepatic feedback. This POD concept shows the gesture operation being enjoyed by its occupants.

The interior of the automobile will increasingly integrate into our future lives. We are seeing these trends now in 2019 and over the next few years, we will see much no more. The CASE vehicle will be our play space, work space, and family space. The car will be more integral to our lives than ever before, We'll spend more time in cars, actually have more fun with the experience. Hopping into the family autonomous vehicle will allow everyone to become involved with each other. Dad will not need to focus on the drive and mom should not be nervous about his driving. Hopefully the family can share, plan and enjoy quality time together unlike ever before.



Summary

The list of unknowns that must be dealt with autonomous vehicles is almost overwhelming. At the 2019 Shanghai Auto Show we saw real opportunities for unprecedented growth especially seeing the first glimpses of the fast-emerging autonomous market. The issues and development will be tackled on a global scale. It's not if this is going to happen, it's when. And the current 2019-2021 vehicles that are being presented now are starting to showcase what is about to come. In the next year there will be again another significant leap to share as we evolve into the future of CASE.



WardsAuto Interiors Conference • Novi, Michigan

Introduction

Most of the cars presented at the WardsAuto 10 Best Interior award reflected an industry incrementally integrating technologies and design elements of the future. With interiors adding amenities, features, and capabilities but mostly not yet containing new-generation HMIs, life for the vehicle occupant isn't getting simpler—it's getting more complicated, and sleeker and more elegant designs aren't enough to foster real ease and peace of mind.

In parallel, the event holds a variety of conferences around how new generation of automated and connected and shared vehicles will influence design, technology, safety, business models, and vice versa as well.

So our long way to disruption is slow and incremental for the time being and the foreseeable future, and industry must take care not to overload and overwhelm consumers, or there could be a general backlash that would slow down acceptance and demand for new equipment. Hereafter are the summary of the presentations which were the mostly relevant for us.

See Vehicle Occupants as Living: Ford's Sartorello

Dennis Sartorello, Ford's Global Strategic Design chief, has spent the past five years driving a cultural revolution inside the automaker's design studio. It's targeted at creating more user-friendly vehicles that better connect emotionally with buyers. Ford is turning its Global Strategic Design Studio into a playground, Sartorello says; he believes that's the best way to create interiors that meet customers' quickly-evolving mobility needs.

At the WardsAuto Interiors Conference, Sartorello said the goal is to stop regarding drivers and passengers as two-dimensional data points and see them more as living beings. To that end, Sartorello and his team have been looking beyond traditional assumptions in interior design to look at how to promote free thinking, experimental play, and better communication with outside world. "We're doing things that are driving us to be better human-centric designers," he says.

The team is encouraged to find inspiration from interactions throughout their daily lives and share those impressions with others when they enter the studio. "There are no filters; look for clues everywhere," Sartorello says. The goal isn't to discover the next innovation, he suggests, but to develop designs that work better for the customer. "We're not necessarily looking for new features to add, but to create new choreographies with existing elements", he says.

This reboot on designers' thinking has them creating more immersive three-dimensional prototypes and computer-generated, virtual-reality-type drawings. Designers are getting out in the

field to see how consumers act in Ford vehicles or to test concepts themselves; they're encouraged, Sartorello says, to "break the spaces and redraw on the fly", adding "We watch what people do and then work backward." Ford also is bringing customers into the studio, observing them as they play with vehicle simulators and react to futuristic concepts and sketches.

WardsAuto Interior: Virtually Enhancing Interior Reality

L-R: Stewart (Tachi), Collins (Lectra), Baron (Immersionary Enterprises)

Technologies such as immersive environments, virtual reality, computer design, and Industry 4.0 are transforming the way designers and engineers create the latest automotive interiors. Innovative technologies and digitalization are quickly improving the development of automotive interiors, affecting every part of the process from design to manufacturing.

Using physical knobs, switches, touchscreens, and other controls, engineers can provide touchpoints needed to make interacting with computer-generated models as close as possible to reality, says Elizabeth Baron, founder of Immersionary Enterprises: "The goal is to interact in immersive environments, being able to cheat the natural world to study any potential reality, seeing data in context and being as free and natural in your interactions as you can". Baron spoke on a panel called "Advanced Design and Manufacturing" along with Jim Collins, Automotive VP at Lectra, and Graeme Stewart, Senior Engineering Director at Tachi-S NA.

Pressure-sensing mats in a seat prototype, for example, allow engineers to measure seat comfort by identifying pressure points. CAD, virtual reality, artificial intelligence, and interconnections made possible by Industry 4.0 will enhance those design efforts in the future.

Lectra, which manufactures machines used to razor-cut leather for automobiles, already is applying Industry 4.0 connectivity and troubleshooting technologies to the operation of its equipment, Collins says. Industry 4.0 technology prevents downtime due to machine breakdowns, permits quick response to changes in production needs, Collins says. The system also allows maximum optimization of raw materials, using some 85% of each leather hide while cutting up to 20 hides per hour

How to Build Driver-Vehicle Trust

With every upstep in vehicles' autonomous ability must come an increase in drivers' willingness to trust the technology; studies have robustly shown this to be a key bottleneck in the adoption of self-driving technology. That, as well as desire and necessity for simplification and minimization of distraction, together with ever-increasing infotainment demands, are major forces shaping the evolution of the driving deck. At the same time, industry is trying out ideas for the interior layout of AVs.

That topic was emphasized during a panel discussion at the WardsAuto Interiors Conference by Michael Schoenherr, Continental's head of North American Instrumentation and Driver HMI R&D. Consumers want vehicles to serve as an extension of their homes and offices, Schoenherr said, and providing a seamless experience will help them to trust the technology they experienced daily in the car.

With automakers jostling for unique selling points, display screens are getting larger, and the quantity of displayed information is increasing, leading to distraction and information overload. So, drivers need technology that can help them get the right information at the right time, in the right

way—some kind of assisted information-triage to prioritize what matters on a dynamic basis. New approaches could include:

• Head-up displays that can present more information closer to the main act of driving (HUD sees what the vehicle sees)

• Smart surfaces offering controls that respond to a touch with active haptic feedback

• Function-on-demand controls shown only when needed

• Precise illumination, possibly embedded behind surface material

• 3D-shaped controls that can be operated without looking

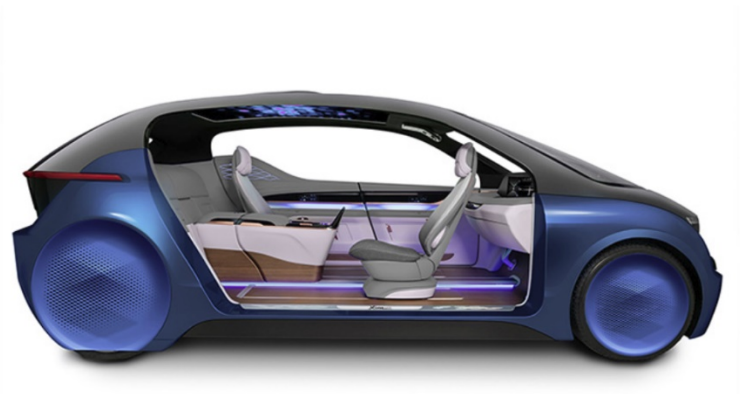
New Driving Scenarios Require New Safety Architecture

A big challenge arising from expected new driving scenarios is that vehicle occupants will be in a much wider variety of positions than they have traditionally, as they relax, work, sleep, and do other non-driving activities. Traditional safety architecture is based on the assumption, usually valid up to now, of a rather narrow range of seat, occupant, and belt positions. Now new and varied seating positions will require a new approach to protect occupants wherever they are, and whatever they are occupied with.

For example, a dashboard-mounted airbag could land like a vicious punch to the back of the head if an occupant has swiveled their chair around to talk to rear-seat passengers. It's fun to imagine lounging in our cars once they start driving themselves, but safety engineers are worried about how to make sure we'll still be protected if there's a crash. Autoliv, a major supplier of interior safety systems, has developed a new "life cell" airbag, which provides protection regardless of how a driver or passenger is seated. A comparable approach is found in a new "dual lobe" passenger airbag which envelopes passenger in a range of positions.
These cocoonlike safety solutions could help shield the passenger from free-flying objects, including unbuckled backseat occupants or loose items in the vehicle.

Other systems are in development by a variety of suppliers, and there's intense interest and development in seat-integral belts and airbags to assure optimally need-responsive protection no matter the position of the seat or its occupant.

Lighting Beautifies Car Interiors



A theater scene, a movie set, or a monument is transformed by thoughtfully-designed lighting. The Sistine Chapel's artwork, for example, is set off by vertical, well-placed, beautiful lighting. Osram Senior Application Engineering Manager Kimberly Peiler said "That can be brought to car interiors. Future vehicles will have lighting where it wasn't before".

Human-centric lighting is a question of light quantity and colors, position with respect to vehicle occupants, and controls. Light influences the human experience with physiological and psychological effects on activity, concentration, and relaxation. Light can re-energize occupants—it already is used to speed recovery from jet lag and to prepare before a sporting event.

Automotive applications could include low-resolution ambient lights and LED illumination throughout the car. But consumer research indicates people are put off by the sight of rows of exposed light points. So, the first objective is task lighting to help see what you're doing, when you're doing it. Then, depending on automation scenario realization, drivers and passengers could control the lighting to make the interior either a productive office or a homey living room on wheels.

Home…office…and the vehicle interior is the third living space. Now light is shaping it, as it has for many years with the other two.

Seat Versatility for New Mobility

Seat configurations have been more or less static for many years—some can be removed or folded flat, but that's about it. That's not good enough to support all the new use cases brought on by the advent of autonomous, connected, and shared vehicles.

Personalized mobility is becoming as important to people as their smartphones, says Magna advanced technical engineering VP Dino Nardicchio at Ward Auto Interior. His company studied 54 families in the U.S. and China and learned static seat configurations aren't meeting all their needs.

Magna already has experience with what Nardicchio calls "smart adaptability" with the Stow-and-Go seats available in FCA minivans. The supplier is extending a variation of that concept to car sharing by developing second- and third-row seats that fold up and slide to the front of the cabin, creating cargo room that could be shared with a package-delivery company renting the vehicle from its owner for the day (using peer-to-peer car rental services popping up everywhere, such as Drivy, as soon as insurance system will allow it). That, in turn, brings a need for easy cleanability of the car interior, from a material and architecture standpoint.

Magna has also determined there's a need for more complex seating arrangements, such as a "campfire configuration"—wherein all occupants can interact while sitting in a rough circle—and conference seating, in which the occupants sit across from each other in a mobile meeting room of sorts. Nardicchio says he expects to see demand increase for new arrangements like this, what he calls "mobile office features" in forthcoming vehicles.

Auto Interiors Expo Stuttgart

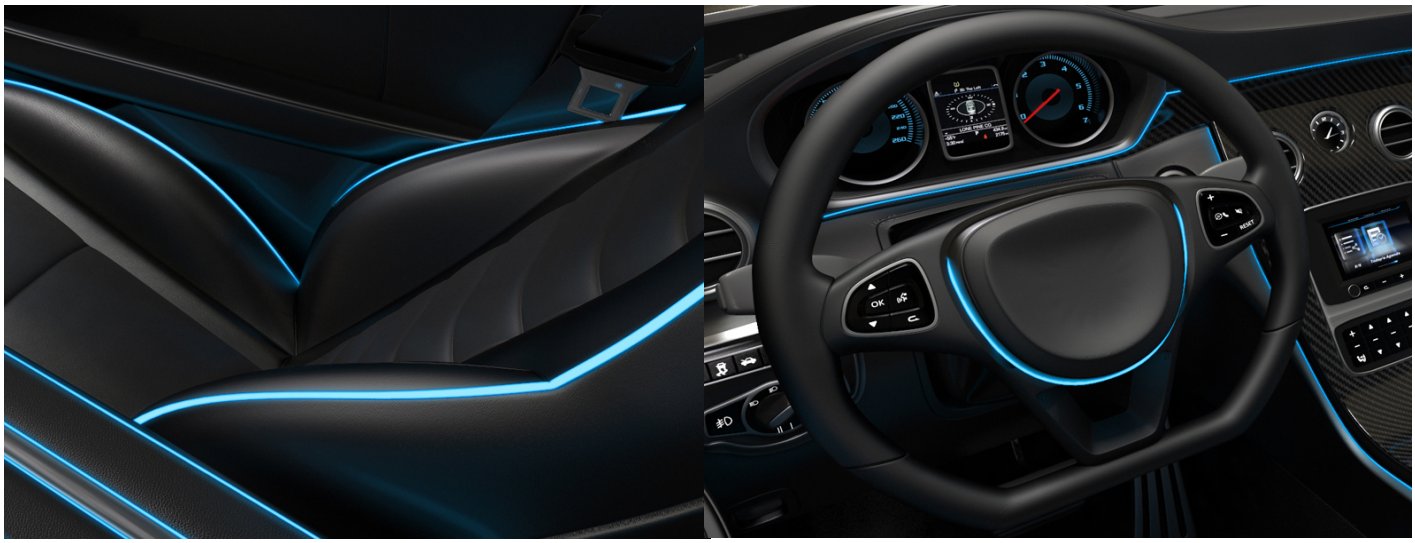
Introduction

The auto interiors trade fair in Stuttgart is dedicated to the tier-one and -two suppliers of the vehicle cabin. What characterizes their products and components? The ability to answer to the design and cockpit technologies trends as the choice of materials, the ergonomics of the driving position, the enlarging features possibilities, the differentiation of style within a range of vehicles or the differentiation linked to the corporate signature of each car manufacturers, drive for ever greater safety, digital expansion, and the rest of today's trends.

In Stuttgart, practical and rational solutions to these needs and their rational constraints are explored. To the increase of components generated by additional features, meets the ever-renewed need to gain mass on other organs. It was clearly visible through lighter materials, as well as materials allowing miniaturization of components so as to reduce package space. This, in turn, is creating opportunity for automakers increase interior space and/or reduce the exterior dimensions of the car for a given cabin volume. With CO_2 reduction getting more and more important, these types of opportunities are crucial to fielding vehicles responsive to today's needs and wants.

With the increase in the number of screens and their size, and the growing camera count, the need increases to preserve the legibility of the reported information regardless of the positioning and brightness parameters of the vehicle interior. This is where the designers and manufacturers of highly technical films come in.

To the need of differentiation, meets the growing importance of interior lighting. Light is no longer in the car just to help find things in the dark; now it's central to creating ambiance, providing information, generating alerts, personalizing the cabin according to vehicle occupants' personal choices…all in all, lighting is playing an increasingly important role in the comfort and safety of everyone inside the car.



EFI light guide

The Automotive Interiors Expo Europe 2019 saw visitors discovering the latest product launches and innovations from over 150 exhibitors specializing in everything from fabrics to leather, lighting to controls, foams to fasteners, veneers to laminates, seating to switches. The most prominently visible trends are in interior lighting, cockpit personalization technology, and user screen visibility through new technical films.

Vehicle interior designer-specifiers have long had to work under very tight budget allotment, which historically reduced the offer to a dome light or two and maybe a couple of reading lights. But LED technology has opened new opportunities by dint of versatile lighting capabilities in small packaging at an affordable cost, while the functional role of lighting has evolved beyond just a glorified flashlight to help find things in the dark. Now lighting personalizes the interior, presents information, creates ambiance, conveys alerts, and more functions are being added to this list all the time.

EFI Lighting, for example, offers both light guides and luminous textiles which cover large areas with a luminance of uniform quality. The optical fibers are connected to an LED module integrating the LED sources, an optical coupler, a power controller and connectors. It can provide anything from ambient lighting to alert lighting. The light guide, meanwhile, is a flexible tube in which is inserted a network of optical fibers specially designed to diffuse a homogenous light along its entire length.

Webasto, a longtime leader in sunroof technology, now presents its products as a platform for overhead lighting, showing various possibilities to highlight the sunroof perimeter, creating a light signature via light guides. Lighting effects create a

new and individual atmosphere inside the cabin, as the roof offers a great big surface area for painting with light. The lighting elements are integrated into the guide rails of the roof system or roof element, while the panels remain transparent. Recently a panorama roof, featuring infrared absorption and integrated ambient lighting, has been launched on the BMW 7 series, for instance.

And Design Led Products, a Scottish company, proposes integration of functional light for seats, center consoles, and doors—with coupling to proximity sensors. They have profiled a new composite light guide technology that enables large-area uniformity for surface backlighting. The company's technical director Dr. James Gourlay says "Space constraints and complex curves make the backlighting of surfaces difficult. The joining or integration of surface materials, such as cloth, wood, decorative foils and metal, is challenging. This composite light guide technology allows LEDs and light intensity distribution optical features to be embedded inside and distributed throughout transparent films".

With modern car interiors full of bigger and bigger screens, reflection control becomes important to avoid distracting the driver. MacDermid Enthone Industrial Solutions showed a version if its XtraForm antiglare film well suited for displays. The films are specifically designed for deep-draw 3D film insert molding (FIM) applications and automatic processing, and are available in a range of different gloss levels from GU (Gloss Unit) 15 to 75. The film maintains full readability tactility despite adding an additional layer.

Screens project images from the environment, using cameras or radars positioned outside the cabin, and must maintain visibility whatever the weather conditions. Canatu, from Finland, developed its CNB system™ which provides an energy-efficient heater solution for lenses and sensors to keep them at their maximum performance in adverse conditions. These solutions, as well as Canatu's CNB films and touch sensors are based on Carbon NanoBud®, which offers deformability up to 200%

and enables design freedom for touch and heater interfaces with 3D formed shapes. Carbon does not reflect any light, thus enabling touch displays with deep black and high contrast. The optical properties and formability of the film enable sensors to be fully functional—even to a 360-degree or fisheye view.

The internal customization of the vehicle or the ability to change the appearance of a dashboard, for example, without investing in expensive tools is a longtime target of vehicle interior design; now comes Nakan offering a possibility to customize the vehicle interior with special Printsol™ vinyl inks for digital printing and the industrial means of affixing them to the chosen surfaces, with a suitable robotized pilot printer. A logo or pattern can be printed on the dashboard or a colored but imaginary seam can be superimposed on the real seam, with no modification of the part toolings. Thus, small runs of special editions and custom personalizations become feasible.

Materials and trim specialist TMG Automotive welcomed Portugal's Secretary of State for the Economy, who attended the show in recognition of a number of high-profile Portugese exhibitors. TMG's booth focused on translucent materials that allow seamless, functional surfaces with backlit controls; company R&D engineer Luis Filipe Silva said "When developing translucent materials, the challenge is to ensure they can resist the abrasion that results from constant touching and interaction with the driver or passengers".

Lightweighting Gains More Traction

Recent events covered by DVN-I confirm continuing efforts to reduce material usage and weight in cars, even though such efforts could arguably call futile compared to the very heavy batteries uniformly found in EVs.

We saw Recticel Automotive, the Belgian polyurethane skin supplier for automotive interior applications, and its new Colo-Sense X Lite high-performance material which offers 20% weight savings as well as other benefits such as higher formability, up to 50% VOC emission reduction,

and low temperature (< 65°C) operation allowing electronic and/or lighting integration. Recticel's proprietary PU (polyurethane) spray technology allows production in multi-tone and multi-grain designs and can apply for door panels, armrests, interior trims, convertible tops, load floors, rear shelves, and wheel arch paneling. It's worth noting that a European-funded project has recently started to improve PU thermoset's recycling process.

JSP gave a talk about their Arpro lightweight energy absorption material with structural strength and energy absorption capabilities. It has multi-chemical resistance, is recyclable, and has thermal, acoustic, and sound insulation capabilities. Manufactured worldwide, it can be used for safety components (e.g., anti-submarining ramps as in the Volvo XC 60, child seats, and suchlike), HVAC housings, and more.

Toyota Boshoku Displays Japanese craftmanship

Toyota Boshoku showed off a door trim for the Lexus LS, which highlights its Japanese craftsmanship with ornamental cut glass and hand-folded satin detailing. TB R&D General Manager Shinji Tominaga described it: "This fabric is not sewn, it is more origami-like in its style…and this is actual cut glass, like a whisky tumbler".

The door trim also features lightweight Kenaf natural-fiber base material. Kenaf (*hibiscus cannabinus*) is a common wild plant of tropical and subtropical Africa and Asia grown for thousands of years for food and fiber. It has superior CO_2-absorbing properties, and facilitates control of the whole product lifecycle, from production of raw materials through to the manufacture of the component, and eventually its disposal.

The company has also patented a unique method whereby heat-expandable microcapsules fill the gaps between the fibers during the molding of the material, which features a rigidity that corresponds to that of conventional materials, but offers up to a 20% reduction in weight. Tominaga says "We want to show new technology, but with traditional Japanese thinking, too".

Meanwhile at the Style & Technology Studio, TB's Prototype and Technology Center Advanced Development Manager Dr. Klaus Philipp presented a range of future innovations for automotive seating with excellent ride comfort. As part of his presentation, he revealed the company's latest seating concept, with a strong focus on the most important features of comfort: proper posture, appropriate support of the human body, efficient control of vibration transmission, and flexible fit considering the variety of human bodies and their individual differences.

Leather Sustainability: More Than Meets the Eye

Recent auto and supplier-industry shows have revealed—mainly on concept cars—the emergence of a willingness and desire to find an alternative to

leather in premium vehicles. In the last DVN-I newsletter, for example, we reported on apple- and pineapple-based vegan leathers.

Not to be shoved aside, Italian leather interests like the Dani Group, UNIC (the Italian Tanners' Association) and ICEC (Institute of Quality Certification for the leather sector) are ramping up efforts to defend their products against criticism on environmental and animal-welfare grounds. Firstly, they stress that upholstery leather exists only as a byproduct of the meat industry, using a part of the cow that would otherwise just go to waste. And they hasten to point out that even with a significant decline in meat consumption, there would still be enough slaughtered cows to meet the needs of the leather industry.

Their second point is that leather production is a modern industrial process fully compliant to regulations, confirmed by certifications like ISO 14001, with calculated and published carbon footprint, emissions, raw materials and chemical consumption figures.

And finally, they point out the use of authentic leather labelling, including environmental and animal species to help consumers and car buyers understand what is real versus synthetic or simulated leather. If the leather industry—Italy has 20% of the world value market share—can calculate and publish its CO_2 consumption per m^2 of leather seat material, it would be interesting to be able to compare the reckoning to that of seat upholstery coming from the oil industry. It would also be interesting to know which industry comes closer to meeting sustainability objectives and constraints.

New York Auto Show

Design, Texture, and Sound at NY Motor Show

Hyundai Santa Fe

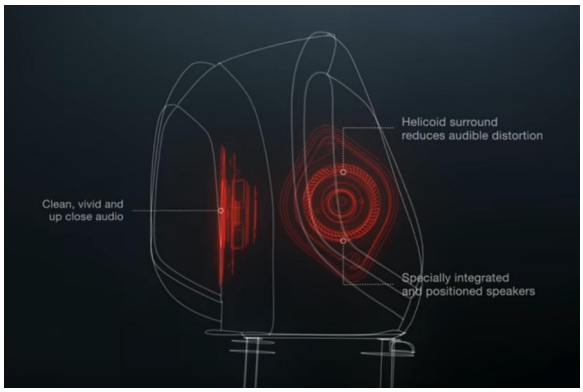
Among the top 10 vehicle interiors selected by WardsAuto at the New York auto show, we can identify the concern of car manufacturers not only for the quality of sound but also for the appearance of sound amplifiers and this even for the intermediate segments.

Some manufacturers choose to highlight the speakers while others choose to hide them. The chosen materials are getting fancier, sometimes with aluminum. Texture is also leveraged to reinforce design motifs. The Bentley Continental GT, for example, has drilled brushed aluminum speaker grates, while the Hyundai Santa Fe finesses their design with very textural, mocha-brown door speaker grilles. For the Kicks, Nissan has chosen a complex audio system that wants to get closer to the quality and auditory perception of portable audio headsets that are incompatible with driving. With the Bose Personal Plus System, two speakers are invisibly integrated in the driver's head restraint, near the ears. The

helicoid surround makes for less distortion of the sound. Six other speakers are positioned in the cockpit and the touch screen allows adjustment and customization.

In New York, incremental efforts on sound design and quality are being made, still using existing audio technologies as breakthroughs remain pending, such as those introduced by Yanfeng through its alliance with Noveto to market audio systems featuring "dynamic focused sound" based on sound sensors, transducers, and software that can locate and track the passenger's position and deliver high-quality sound straight to their ears, without disturbing others.

Nissan Kicks



Genesis' Mint 2-Seater EV Concept

Hyundai's premium Genesis brand fielded an electric concept car with a strong and aesthetic style. It's called the Mint. Inside it, designers chose to use traditional materials such as leather but the floor shows a key original design element: a diamond shape pattern called "G-Matrix". It's on the pedals, the dashboard, and elsewhere in and around the car—even on the wheels.
The front seat is a bench in which the retractable central armrest houses a spherical control knob. When the car is turned on, the sphere rotates to become the control for the driving modes. That way the driver always knows when the car is on, something that isn't always apparent with electric cars.

In addition to six GUI (graphical user interface) information screens that call attention when needed, the instrumentation consists of a screen located at the center of the steering wheel, which Genesis says permits the driver to focus on the road. Will it do that? Maybe, but how is the driver to seek and use the information on a small, turning screen located outside their axis of vision?
Unusually, access to cargo space is not possible from the back of the Mint. In consideration of access to the trunk of any vehicle parked in a big city is just about always problematic, the Mint proposes a new solution: a lateral opening which pivots upwards like wings so passengers can reach their bags or suitcases from the parcel shelf.
Like most concept cars, this one is unlikely to see production in its displayed form, but the design is really neat.

DVN-I Design Lounge

Industrial Design—specifically automotive industrial design—is a discipline whose practitioners wear many hats in executing their daily jobs. Whether aesthetically integrating visual and textural elements, expressing brand language, or translating consumers needs into tangible product solutions, their end goal of creating desire is critical to the success of today's automotive interiors.

So welcome to the Design Lounge, where will be exploring the design movements, trends, and explorations of automotive interiors.

The Autonomous Lounge

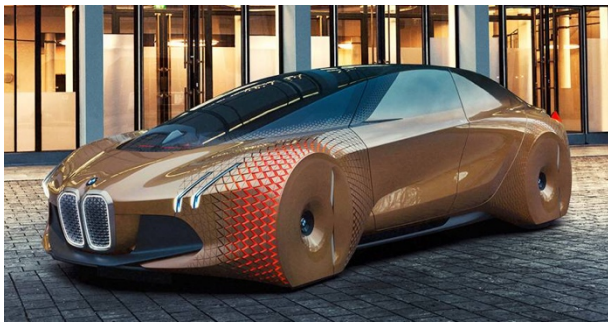
Rear compartment seating concepts have incorporated numerous variations based on the overall vehicle function. With the potential of autonomous driving much of the function is on a loungelike seating configuration that also integrates the pillar, doors and windows. Harking back to stagecoaches and the birth of the car, this compartment was defined by the need for privacy. Blocking out the identity of the passenger from onlookers was critical. Using large wide pillars or curtains was a defining design characteristic used for luxury vehicle from the ‘30s until today.

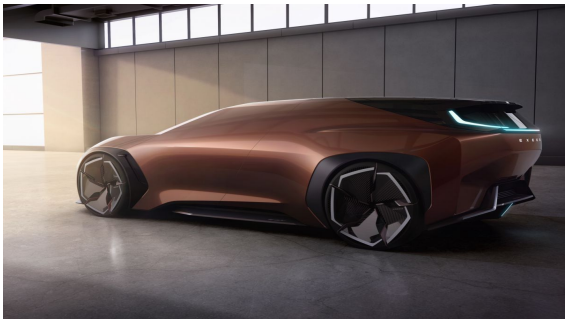
With today's mono volume designs this has become difficult to achieve, especially as the need for a clear and unobstructed view for the driver directly conflicts with this traditional solution.

New and innovative solutions are being explored today that can be broken down into three categories:

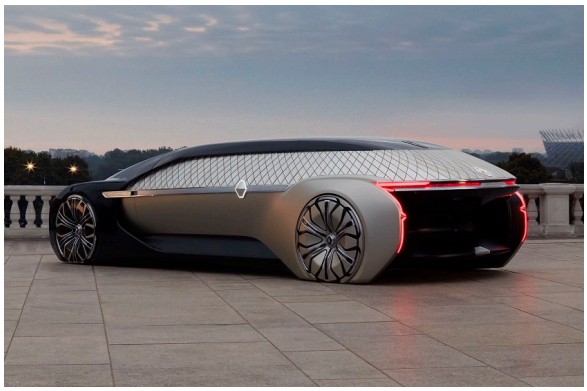
Virtual Solutions. As seen within the Yang Fang Interiors XiM20 study, Daimlers F 105 Luxury in Motion Vehicle and Volvos 360 concept that use virtual information like OLED screens and DLP projectors (similar to HUD technology) that enhance the environment for the rear occupant while blocking the view from the wandering eyes of passerby and other vehicles' occupants.

Exterior Solutions. Mirrored/body colored exterior glass seen in both the Daimler F 015 Luxury in Motion vehicle, BMW Vision Next and the Cherry Exceed E-IUV. Dispensing of the traditional exterior glass to body proportion to hide and blend the exterior body with the glass that blur the separation of metal and glass and better enclose the rear occupants.





Lattice Solutions. A more traditional solution used within architecture by Renault in their EZ-ULTIMO study and Nissan. Directionally, these are being explored to allow both the privacy required for the rear occupants by the use of controlling light and shadow like traditional window blinds, allowing for a more 3 dimensional solution that retains the ability to keep a clear line of sight for the driver and passengers.






A binding element within all of these directions is the use of a rear lounge type seating arrangement, whether individual seats or more flowing bench type solutions are used, the ability to recline or introduce a relaxed/sleep mode defines the rear occupant environment and interaction with the outside world.

DVN-I Newsletters & Reports are designed & configured for maximum value to:

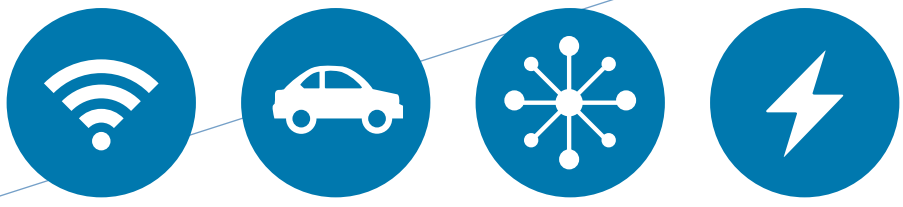
- Automakers
- Tier-1 and -2 suppliers
- Technology suppliers & service providers
- Startups
- Researchers, practitioners, engineers & designers

DVN-I Content includes:

- Cockpit, seats, doors, trim, floors, overheads, steering wheels, centre stacks

- Within these areas, coverage includes the likes of seat frames, foam, fabrics & textiles, leather, airbags & seat belts, plastic parts, carpet, headliner, infotainment, ECUs, sensors, software, and component parts.

- Topics range into the performance these systems and components contribute toward, such as mobility, interior design, perceived quality, safety, health, wellbeing, comfort, HMI, thermics, NVH, acoustics, audio, haptics and the whole constellation of the vehicle-occupant interface.



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