DVN-I
Automotive Interior

Thu, 26 March 2020 Weekly Newsletter **NEWSLETTER #24**

Editorial

Lessons Learned (So Far) From Coronavirus

We're living in a period perhaps more dramatic than any since World War II. The spread of the coronavirus has, is, and will be shutting down almost everything in this and almost every other industry, everywhere on the planet. We are all inundated with information—and laws, in some places—as vital measures to slow the spread of the virus and eventually defeat it.

Projecting forward in time to when the crisis is over, what would be the lessons we'd learned that would influence our daily life, and that we could apply in our car interiors? Most likely, we'll be paying more attention to IAQ (interior air quality), air circulation, water droplets, cleanliness of surfaces (and hands!) and hygiene in general, social distancing, and probably more will pop up as we progress. It has started already; several companies are marketing technology for automotive IAQ. We look at them this week, and naturally we'll be keeping an eye and reporting on developments along that line.

Continuity of equipment and behavior from home to office via transportation is what drives a lot of today's development requirements. Automotive Interiors are following the same logic; use cases, mostly influenced by home and office technology, are driving the next steps of automation, connectivity, and convenience within the vehicle.

This edition of DVN-I also includes a second wave of news and design perspective on the exhibits in the virtual Geneva auto show.

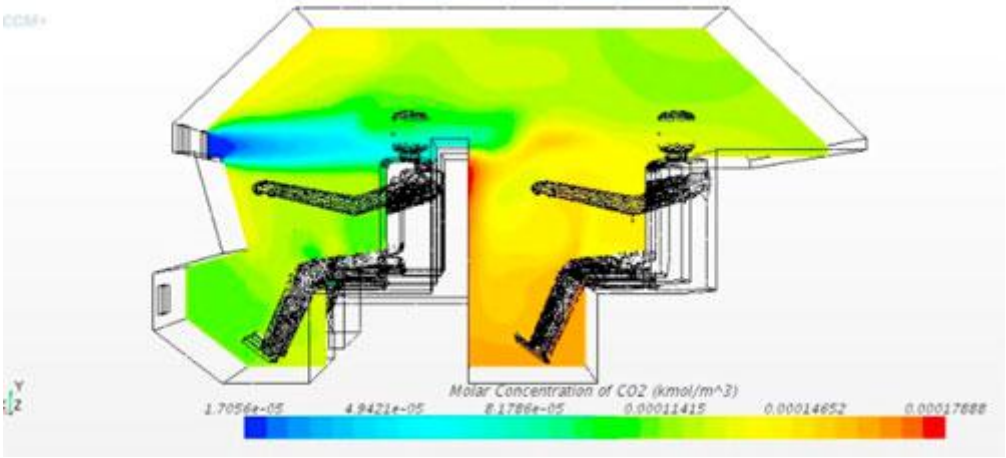
While working from home, take advantage of all the content in this week's DVN Interior Newsletter—and **subscribe** to keep yourself informed.

Sincerely yours,

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

A Fresh Look at Air Quality Inside the Vehicle



CFD model for simulating vehicle cabin indoor air quality

For most of automotive history there was no treatment of the air in and entering a vehicle's passenger compartment, other than to heat or maybe cool and dehumidify it. The engine's intake air was filtered, but the quality of the air motorists breathed was a function of whether the air was clean or dirty outside the car (vehicle and industrial exhaust, photochemical smog) and inside the car (tobacco smoke). Although the American-made 1940 Nash was first to offer a cabin air filter as part of its "Weather-Eye" climate control, they didn't gain traction as a universal item until around 2000. And now the market is moving beyond simple particle filtration to much more advanced and capable air quality management systems. The present pandemic brings air filtration into central focus; passengers and society are quickly becoming more demanding.

IAQ: Interior Air Quality

IAQ is now commonly used as an umbrella term for the science and technology defining, evaluating and managing the air quality inside any enclosure, be it a house, an office, a factory, or—newly—the interior of an automobile.

Among many environments, the vehicle cabin microenvironment has been lately of particular public concern. Although commuters typically spend only 5.5% of their time in vehicles, IAQ is generally evaluated as worse than the ambient outside air. Influencing factors include the usual stuff in outside air (bacteria, bad odors, auto and industrial exhaust, dust, tire and brake particles from other cars) as well as whatever contaminants might come from offgassing interior components (VOCs) and from occupants themselves (tobacco smoke or nicotine vapor, electronics, etc)—all concentrated by the enclosed confines of the cabin. Automotive IAQ thus affects comfort, safety and health of occupants.

- 

Citroën 19_19 concept, VivaTech May 2019

Industry and regulators looked first at VOC concentrations inside cars, including what was long known as the "new-car smell"—popularly coveted in America and Europe and Japan, but rejected in China. Later, around 2000, the cabin came to be considered as a cocoon: a safe and protective environment shutting out bad kinds of noise, air, and light. More recently, a more holistic approach to vehicle occupants' health and wellbeing has gained steam. There's already been DVN-I coverage of related news, featuring the likes of Volvo, Jaguar, Yanfeng, Faurecia, and IQ Air.

Now, with a viral pandemic at hand, automakers, their suppliers, and aftermarket players are leveraging the opportunity to market products to provide and maintain better air within the interior of the car. This pandemic is a global tornadolike headwind that will have serious impact for a long time, and a lasting impact on many things like how we view health and wellness and the importance of personal hygiene in shared spaces—including, perhaps especially, automotive interiors.

Ultrafine particles, aromatic hydrocarbons, carbonyls, semi-volatile organic compounds and microbes have been identified as the primary air pollutants inside vehicle cabins, with concentrations and varieties of each depending on temperature, humidity, air circulation and suchlike.

- 

One study found that professional drivers are exposed to one kind of pollution at levels four times higher when driving than at home: 4.1 $\mu g/m^3$ of black carbon. While this amount may sound low, studies have found significant respiratory health effects, such as asthma and impaired lung function, with changes in carbon exposure for values as small as 1 $\mu g/m^3$.

Cabin air filters were originally designed to remove large particles like pollen and dust; they are not very good at filtering smaller, sub micrometer particles from vehicle emissions like CO_2 (exhaled by passengers), NO_x (from vehicle emissions), and viruses —which are very much smaller than bacteria; antibacterial filters don't stop viruses.

In-car pollution levels depend on the amount of traffic, the age of the car, driving speed, ventilation, traffic congestion, the types of vehicles ahead, weather, and other factors. Opening or closing a car's windows and vents can reduce some pollutants while increasing others. Using the air conditioner in recirculated-air mode, without bringing in outdoor air, can filter out most particulate matter, but keeps in and concentrates VOCs, and of course virus deposits on surfaces can be live/active for days.

Even though the electric-mobility revolution is well underway in many countries—China and Norway, for instance—driving in urban areas still often means driving in polluted air. Reducing CO_2 emissions and improving air quality remain major concerns in cities; now the coronavirus is creating an additional layer of necessity, which will probably end with better products and behaviors.

IAQ Technology

- 

Electrostatic and ionic/ionizer car air purifiers come in different shapes and sizes and all work using the same principle: charged electrical surfaces or needles generate electrically charged air or gas ions. These ions then attach to airborne particles which are then electrostatically attracted to a charged collector plate or simply fall and settle on surfaces around the car.

Car ozone generator air purifiers work by producing ozone (O_3), a strong cleaning agent that kills off odors and many different air contaminants including particulate matter and gases—but is irritating to the respiratory tract and eyes at higher concentration or with prolonged exposure.

HEPA (high-efficiency particulate air) filters remove airborne particulates safely with virtually no byproducts. The challenge with HEPA-based air purifiers for cars is that size constraints can drive a need for frequent filter replacement. Some HEPA purifiers also use activated carbon, well known for absorbing gases and odors.

PCO (photocatalytic oxidation) air purifiers work by reflecting an intense ultraviolet light on a metal surface which in turn oxidizes air pollutants. PCO purifiers convert harmful particulates and toxic gases into safer compounds such as carbon dioxide and water.

Let's have a look at recent built-in systems presented by automakers and suppliers

- 

Geely

As of this month, Geely is putting their "G-Clean" Intelligent Air Purification System (IAPS) in all their new cars to automatically filter out harmful particulates.

The IAPS was developed in just 20 days' time, uses antibacterial air filters, and Geely says it is N95 certified and eliminates bacteria and viruses. N95 means it blocks at least 95% of particles at least 0.3 microns in diameter, though, and the coronavirus is about 1/3 that size, so G-Clean's main beneficial effect may be on the marketability of equipped cars.

Geely used their latest compact SUV, the Icon, to show off the G-Clean system. The Icon stays true to the avant-garde minimalistic design of the Concept Icon shown at the 2018 Beijing Auto Show.

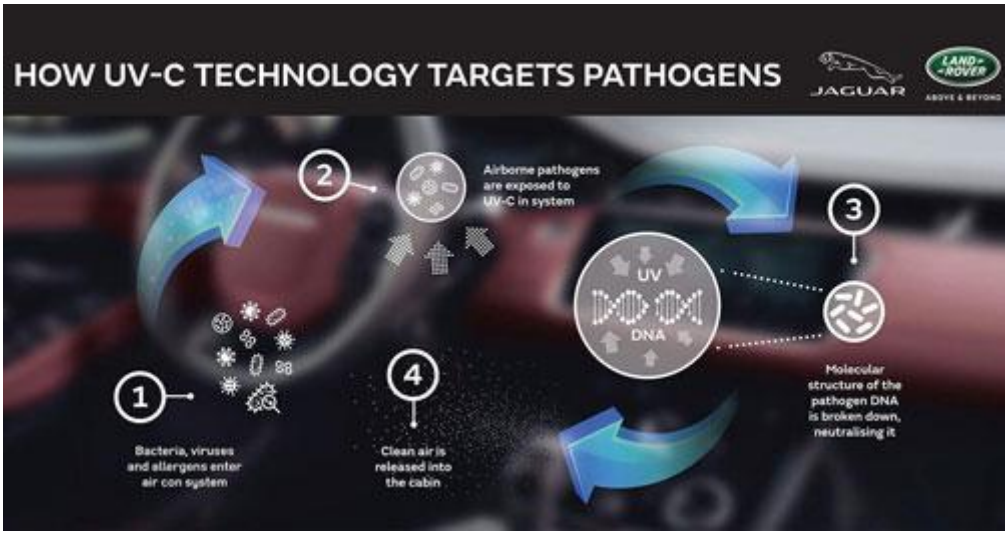
Tesla

- 

Tesla made headlines after introducing the "Bioweapon Defense Mode" on their cars. The theatrically named mode might stoke anxiety, but Tesla claims it removes at least 99.97% of fine particular matter and gaseous pollutants, as well as bacteria, viruses, pollen and mold spores. Tesla's website says "Bioweapon Defense Mode is not a

marketing statement, it is real. You can literally survive a military grade bio attack by sitting in your car". They used the 2018 California wildfires as a trigger to market the new mode, and some Tesla customers posted information stating a dramatic improvement in air quality with the windows up and Bioweapon Defense Mode enabled.

Jaguar Land Rover

- 

In the 2020 Range Rover Evoque, the optional cabin air ionization system ionizes particles in the air, making them attract to surfaces and helping cleanse the air. This feature can be turned on or off as desired. JLR currently equips the Jaguar I-Pace and the Range Rover Sport with a four-zone climate control system that uses cabin air ionization to remove pathogens with negatively charged particles.

Audi AI:ME concept

- 

- 

Natural elements were especially important, and the (real) green plants contained deep in the IP and entwined over the pergola-style wooden slats in the roof send a key visual message. "The idea of detoxing, purification, is very important in the mega-city context," says Audi designer James Nissen. "The cabin is a filter from the city, a cocoon, very clean and pure."

Valeo

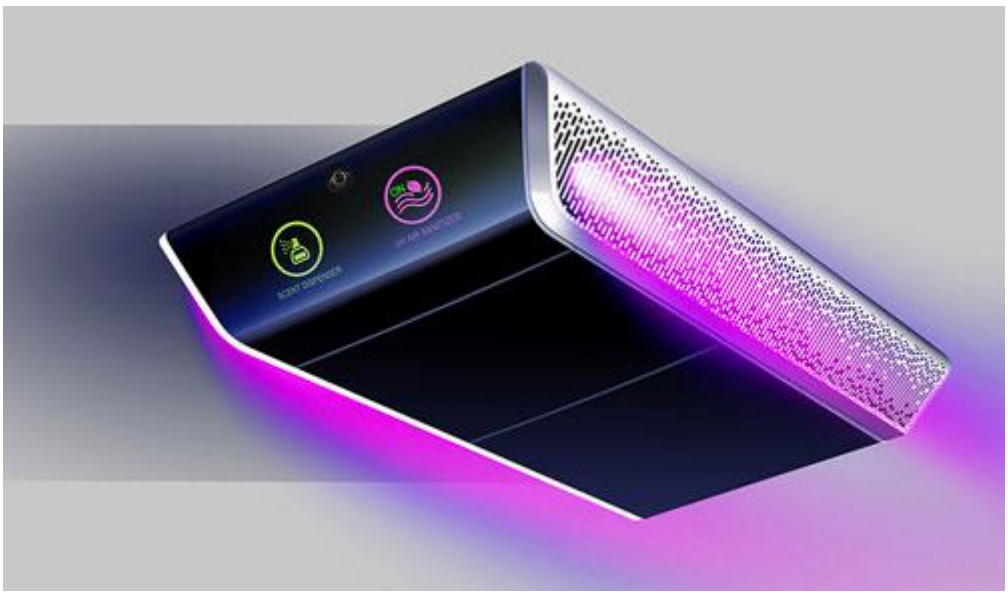
- 

A year ago at the Shanghai Auto Show, Valeo showed a smart cabin air quality solution based on a high-efficiency cabin air filter system, featuring a VOC and PM2.5 (particulate matter ≤ 2.5 microns in diameter) filter which eliminates 98% of fine particles and absorbs almost 100% of harmful gases.

It included dynamic digital monitoring of cabin air quality consisting of measuring pollution levels, taking preventive measures and anticipating maintenance. Their PM2.5 sensor automatically activates the recycling mode when particle concentration levels are too high, for instance. For additional protection, Valeo also offers a

purification system with an ionizer diffusing negative ions to clean the cabin, as well as cabin fragrances customized to the passengers' tastes.

Yanfeng

- 
- 

Yanfeng presents their expertise in integrated interior technology and smart cabin design with an advanced technology concept called the "Wellness Pod": an antimicrobial device that sanitizes vehicle interior air and surfaces with UV light while perfuming the car with a variety of scents stored in non-liquid form. It's contained in an overhead console, and Yangfeng sees increasing use cases for owned, shared, and hailed cars.

Interior News

Capacitive Driver Vigilance Monitor in MB E-Class

The new Mercedes E-Class was unveiled online through Geneva digital streaming. Like other cars in this premium segment, it comes equipped with a whole bunch of driver-assistance features. New on the list: a steering wheel with capacitive sensing to check whether the driver is paying enough attention.

Capacitance sensing may be a more direct and accurate method than measuring steering wheel angle or torque inputs. It works whether the wheel is the all-leather or the leather/wood version. Other driver assistance features on this vehicle are active steering assist (to remain lane centered), adaptive cruise control, active brake assist and more.

Cadillac's Super Cruise already uses a touch-sensitive steering wheel, as well as eye-tracking cameras to ensure that drivers are paying attention. Audi's E-Tron also has a touch-sensitive capacitive steering wheel. Which driver monitoring system is the best? It's still difficult to say; all of these technologies are still relatively new.

The new problem is that as cars become filled with technology, there's a greater risk that humans will become overconfident. Robert Sumwalt, Chairman of the U.S. National Transportation Safety Board, recently warned that drivers should keep in mind: "If you own a partially automated car, you won't own a self-driving car. Don't pretend you do."

BMW i4 EV Sound Design

Also introduced within the virtual Geneva auto show (see more details in the Design Lounge section of this week's newsletter): the BMW Concept i4 is not only new for its design, but also its sound profile. Hans Zimmer, German film score composer and record producer, composed the sound of the BMW Concept i4 together with BMW sound designer Renzo Vitale under the brand name BMW IconicSounds Electric.

BMW IconicSounds Electric will help personalize BMW's electric models with extra emotional depth by connecting the driver with the vehicle's character on another level

through individual tones and sounds.

The car's sound is designed to be classic, but surprising with a feeling of lightness with a repertoire going from a core brand environment to more intense tones of "sport". Acoustic accompaniments to a door opening, when starting the car, with start/stop are likewise part of its soundscape.

Interior silence of electric vehicles is often cited as a major benefit of electric mobility. As the choice of electrified models increases, however, it also means some drivers are missing out on the emotional appeal of sound, and automakers are keen to differentiate their offerings.

The Concept i4 is the second BMW with drive sound developed with Hans Zimmer, following the presentation of the electric sound for the BMW Vision M NEXT at the #NEXTGen event in Munich last June.

Renault Dacia Spring

Renault Dacia presented the Dacia Spring in parallel with the Geneva auto show. The Spring is Dacia's first fully electric city car. Consistent with Dacia positioning, this show car is conceived as an affordable EV offer.

Dacia strives to make simple, robust, reliable, and affordable vehicles mainly through selection of already-validated components. The Spring should help the brand achieve European CO_2 targets—today that's not the case, showing a downside of using "old" components.

The car is a 100% all-electric 5-door 4-seater (five, in a pinch) with a range over 200km, for urban and suburban usage. It is based on Renault EV technology, a city car with a price estimated between €15,000 to €20,000. It will be available next year. The exterior design expresses modern SUV style with pastel mouse grey body, enhanced with matte splashes of fluorescent orange, with trim along the wings, roof bars, and lower door panel; extra high clearance, and skid plates built into the front and rear bumpers.

While images of the interior are not available yet, it's reasonable to suppose it will be inspired by the Renault City K-ZE all-electric city car (interior shown here) manufactured and sold in China since last year. There's a straightforward dashboard design with a large center screen and digital instrument cluster, refreshed to be consistent with the modern exterior.

DS Ultraleap Mid-Air Haptics

In the previous DVN-I Newsletter, we looked at PSA's DS Aero Sport Lounge in Geneva.

The futuristic car's central armrest contains a revolutionary human-machine interface using gesture controls and haptic feedback which uses ultrasound focused on the user's hands to create the sense of touch in mid-air. The technology interprets hand gestures enabling the driver, or passengers, to control a range of systems—managing the car's entertainment systems, for example, or the navigation system.

This technology has been developed with Silicon Valley-based Ultraleap, formed when Leap Motion and Ultrahaptics came together last year

Through several mini ultrasound speakers, triggered at different time, creating ultrasound waves arriving at the same point in space, called focal point, at the same

time. Where the focal point is positioned in 3D space is programmable in real time, and a Leap Motion Controller tracks the exact position of the hand and positions the focal point at a spot on it. These waves have enough force to create a tiny dent in the skin. This pressure point is used to create a vibration that can give a wide range of tactile effects, effectively forming 3D controls in the air.

According to research by the University of Nottingham, this combination not only reduces driver distraction, but also increases driver preference and experience.

The DS Concept targets to remove the barrier separating real and virtual interactions, supporting simplification and elegance of the cockpit, mixing avant-garde and high tech.

VW ID4 First Insights

The ID. CROZZ show car, presented at IAA 2017, evolves into its series production version, the ID.4. Volkswagen pressed on with their electric mobility strategy by providing a detailed insight into the brand's first all-electric CUV during a webcast following the cancellation of the Geneva Motor Show.

Built on the new modular electric drive matrix (MEB), the new ID.4 (ID for Intelligent Design) will be launched this year with production and sales in Europe, China and North America. The high-voltage battery, giving up to 500km range, is positioned near the center of the underbody to create a low center of gravity and an optimum in terms of driving dynamics, along with a well-balanced axle load distribution. This architecture, just like all other MEB models, offers plenty of interior space thanks to its compact, electric drive technology.

The fully digital cockpit of the zero-emission CUV has been clearly structured. It is operated primarily using touch surfaces and intelligent, intuitive voice control. The ID.4 is set to get the same augmented-reality heads-up display as seen in the ID.3. This

system projects information such as the satnav display and speed directly onto the windshield.

The traditional CUV version of the ID.4 will easily be able to accommodate four fully-grown adults in its cabin, while the boot should have enough space for a couple of large suitcases. Plus, the lack of a central tunnel means more foot room for the passenger sitting in the middle of the back seats. The lower roofline of the ID.4 coupe-SUV will most likely eat into headroom and storage space somewhat.

Koenigsegg Gemera Cocooning Interior

Koenigsegg Automotive is a Swedish manufacturer of high-performance sports cars, founded in 1994 and based in Ängelholm, Skåne County, Sweden.

Koenigsegg presented at time of Geneva show, its new Mega Car, the Gemera, a combination of the two Swedish words "ge" (give) and "mera" (more) signifying "to give more".

All four adult-comfortable seats have the same shape and are optimized for comfort with integrated memory foam for ideal support, a technology pioneered in the original Koenigsegg CC carbon bucket seat and the Koenigsegg One:1 seat. Ingress and egress are easy through user-oriented architecture, and giant full-length Koenigsegg Automated Twisted Synchrohelix Actuation Doors (KATSAD) that open wide. The doors are cleared by the absence of B-pillars, thanks to a strong carbon monocoque shell. The audio system is built around 11 speakers, and each occupant has 2 cup holders, one hot and one cold.

It is a plug-in hybrid, it has all the safest protection and assistance technologies, and it is designed for worldwide homologation.

The Gemera is limited to an edition of 300 mega cars, at a price we can only imagine will also be "mega".

- 

- 

News Mobility

Delivery Shuttle to Compensate Virus Curfew

Neolix Technologies, based in Beijing, is one of the many startups developing L^4 autonomous delivery vehicles. The company is targeting food delivery, mobile retail, and security, with a 136,000-m^2 factory in Changzhou with an annual production capacity of 10,000 vehicles. Autonomous deliveries are getting a huge boost with today's coronavirus crisis, and the opportunity for driverless delivery at any time (e.g. during curfew)

Neolix's shuttle-like cars comprise 2.4 × 2.4 × 2.4-meter containers. They detect and avoid obstacles using a combination of sensors and HD maps captured with what the maker calls "centimeter-level" accuracy, and they travel up to 100 km on a single battery charge on roads with inclines up to 20 degrees at speeds of up to 50 km/h.

On the service side, Neolix provides a cloud platform that manages vehicle dispatching, condition monitoring and visualization, error warning management, and driving data analysis. In the event something goes wrong, remote operators can disengage the shuttles' autonomous systems.

Neolix says they have sold 225 vehicles to customers like Huawei, Alibaba, and others over the past two years, deployed in 10 cities throughout China.

According to a McKinsey report, self-driving vehicles and mobility services in the region are expected to be worth more than €500 billion by 2030, when the number of autonomous cars on public roads is expected to reach 8 million. In Beijing alone, the city's Innovation Center for Mobility Intelligent (BICMI) reported that autonomous vehicles from 13 China-based companies, covering more than 1 million km, compared. That's up from 2018, with 153,600 km, with 8 companies.

Uber, Lyft Stop Pooled Rides to Limit Viral Spread

The carpooling option that offers cheaper ride facility to the users has been suspended in the wake of the coronavirus outbreak and its social distancing requirement.

Regular rides and company's food delivery platform, Uber Eats, remain available, with possible adaptation as situation evolves. Regular rides are protected by "gestures that save", such as driver with mask, washing hands after any trip, cleaning of interior trim at the same time, available tissues and alcohol-based sanitizer. Riders are also asked to wash their hands before and after a ride, sit in the back seat, and roll down the window to improve ventilation.

Shared rides represent between 15 to 30% of revenue of ride hailing companies.

Overall Americans spent 21% less on Uber rides in the week ending March 16 compared with the previous week

The Design Lounge

Polestar Precept: Sustainable Elegance

In the previous issue of DVN-I, the Design Lounge covered (virtual) Geneva directional concepts. Now, here is a review of most exciting production previews.

These vehicles are created to give the public a preview of what will be coming to market by each automaker soon. Developed not as pure concept or production vehicles, these vehicles show the final intent.

Showing a more radical departure from the Volvo æsthetic, the Precept shows Polestar moving their EV drivetrains in a more sporting direction. This can be seen by the elimination of the Volvo grill on the exterior and an overall aggressive proportion.

The car has a pure 4-seater in layout, with bolstered individual seating for both front and rear passengers, along with a traditional sedan layout.

Strongly dominant seating forms are highlighted with high contrast color & material choices (black and white with orange accents) allows the seats, center consoles/armrest and door panel insert to visually 'float' from the interior space.

In keeping with the floating theme, the cluster and UX/HMI display are thin gloss black surfaces, without shrouds, that contrast elegantly with the thin aluminum horizontal decorative insert in the middle of the instrument panel.

As seen from above, simplicity in form and colors allows the Precept to have a very elegant, simple yet strong design theme without any clutter of vent and buttons which then further differentiate it from the Volvo parentage.

Typically, heavily bolstered seating has a strong 'stitched or trimmed' aesthetic, with leather or Alcantara used as a traditional upholstery.

By using a one-piece woven material and recycled PET fibers (both covered in previous editions of DVN-I), Polestar has created a rich luxury aesthetic without relying on ordinary luxury materials.

BMW i4: Premium EV

BMW, with this vehicle and the cancellation of the i8, has now officially moved away from the EV aesthetic used until to date. They seem to follow the rest of the BMW line-up with only details (blue line/lighting) separating the EVs from the ICE cars.

The cockpit has been also simplified by only focusing on a cluster/UX/HMI display slightly angled towards the driver with a minimal use of auxiliary buttons on the center console.

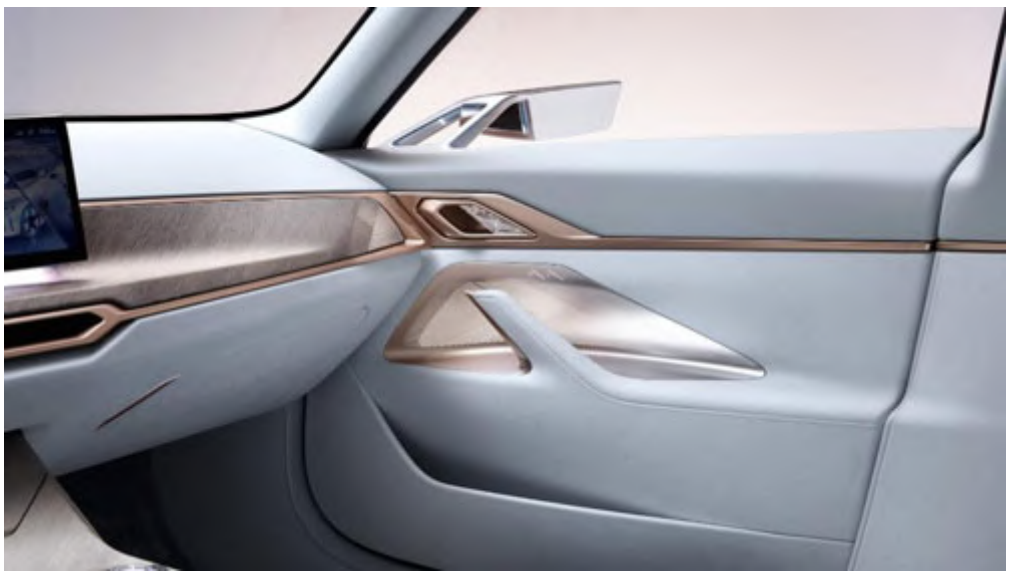
- 

- 
- 

Ambient lighting to help define specific driving modes are used throughout the IP and door-panels.

As with Polestar, the seating material is also of a one piece knit construction giving the seating surfaces a molded æsthetic.

A very light colorway is used along with copper detail elements for touch points and a large swath of natural finished (non-glossy) wood trim for the IP and center console.



The door-panel to IP intersection shows off the fit and finish along with attention for fine details like the handles, speaker grills and switchgear.

Aiways U6: Lifestyle on the Go

Aiways' third model is the U6. It's a CUV in its proportions, this EV is more 'lifestyle' oriented rather than luxury/premium in its positioning with its bright orange and black contrasting paintwork.

For the IP and cockpit, a black and white high-contrast colorway is also used but with more robust forms and a stronger use of orange throughout the interior.

A glossy black floating element cluster and UX/HMI displays contrast a strong horizontal ‘vent' crossing the entire width of the IP. Of note is the robust 'shifter' element along with a ¾ steering wheel that gives an uncluttered view of the instrument cluster.

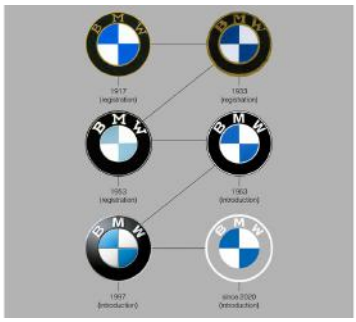
The rear seats are also heavily bolstered with a substantial center console that integrates upper and lower storage solutions.

Orange highlights the fabric pull straps for the doors along with complimentary stripes on the seat bolsters.

Straps are provided to secure items in the door pockets, too.

General News

OK, Bimmer! BMW's New Logo



BMW is showing off a new iteration of their traditional round logo. The automaker says it will not be used on production vehicles and is only intended for the website, social media and other communications. However, the logo is on the hood of the Concept i4 vehicle, an electric car that made its debut during the online conference in parallel to the cancelled Geneva show.

The new logo still includes the blue and white colors of the Bavarian state in the middle, but the **bmw** callout appears in a new font.

"The new logo radiates more openness and clarity," according to the automaker.

With visual restraint, graphic flexibility, less black the new logo is more adapted to digital communication and smart phones (and their pocket screens). It could anticipate a next step where the letters BMW don't even appear.