DVN-I
Automotive Interior

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Editorial

Interiors Are Incredibly Diverse

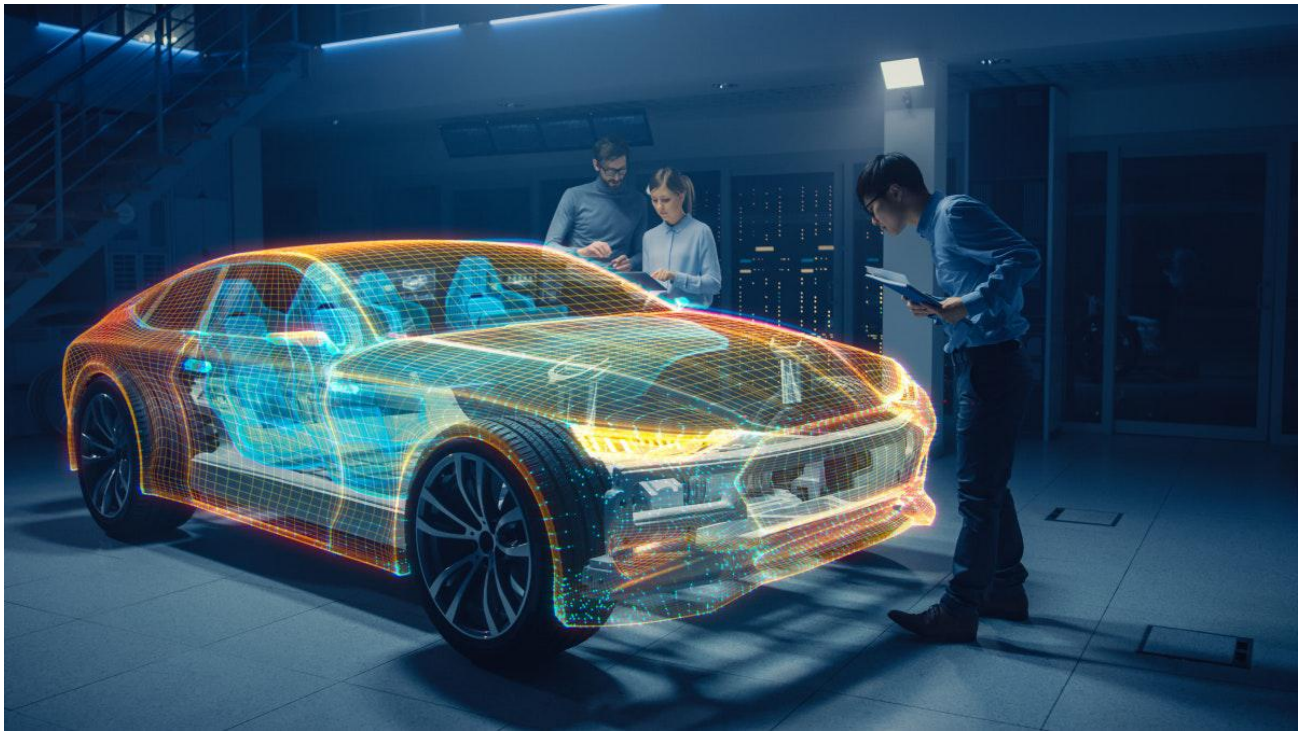


IMAGE: SHUTTERSTOCK

This week's edition of DVN Interior illustrates the extraordinary diversity of today's and tomorrow's automotive interiors. However it might be called—smart cabin, cockpit of the future, third living space—the overall system approach puts central focus on occupant experience, comfort, and safety for tomorrow’s mobility.

To make it happen takes a fast and accelerating stream of innovative technology and technique: Mercedes' new MBUX with its advanced HMI performance; the Healthy Back seat for VW's ID.4; Porsche's double-zone HUD; JLR's predictive touch controls with gesture tracking; Tesla's steering yoke and in-car gaming capabilities; ZF's in-roof airbag for new occupant positions; Faurecia's sustainable seat, the Geely/EcarX GKUI "Intelligent Cockpit", SAIC-GM's injection-molded soft skin, and so many more new concepts that need to be supported by polyvalent engineers.

Traditional engineering sciences like mechanics, thermics, chemistry, electronics, and so on now must be augmented by expertise and experience in software, artificial intelligence, human factors, design, and suchlike.

It's altogether too wide a field for a single person to master, so engineers of the future need to be trained for all these new topics, and their ability to work as a team is more crucial than ever before—reflecting the electronic "teamwork" they're building into whole new kinds of vehicle interiors. That’s the key challenge of today and tomorrow, and that's why DVN-I is here: to help you keep efficient, clear track of the fast-moving state of all these new arts. If you're not yet a DVN-I member, **Join us!**

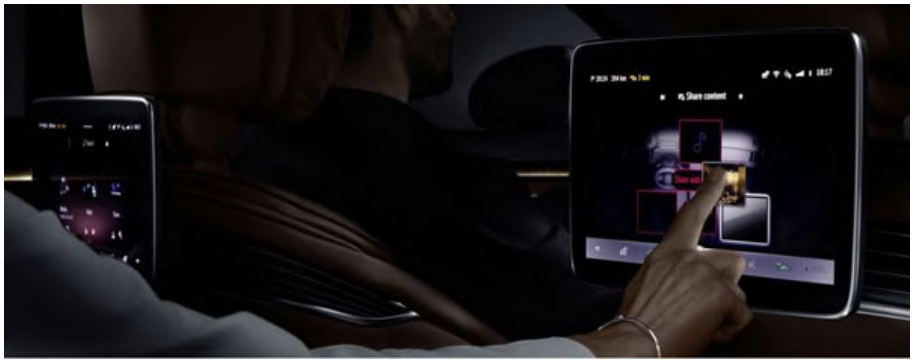
Sincerely yours,

Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

Cabin of the Future Pulls Innovation

Personalized offerings in the vehicle are in vogue. The interior must appeal to all the senses, be safe and comfortable, and vehicle operation must keep pace with the always-connected reality of today's users.



ADAPTIVE MBUX NETWORKS A WIDE RANGE OF SYSTEMS AND SENSOR DATA. (IMAGE: DAIMLER)

Superlatives are a dime a dozen at vehicle presentations. This was no different at the beginning of September, when **Mercedes-Benz** presented their new S-Class at the equally new Factory 56 in Sindelfingen. Mercedes CEO Ola Källenius spoke of the "most digital car in the most digital factory". Nevertheless, there seems to be a return to inner values. Sheer performance data is taking a back seat to digital cockpit offerings. Topics such as operating logic, infotainment, and haptics are taking center stage. In the new S-Class, the interior has fully developed into a third living space—a refuge between home and the workplace, as Mercedes sees it.

The basis for new experiences and further digitalization of driving and traveling is provided by a new architecture with calm lines and surfaces and large, dominant screens. Highlights include multimodal seats with up to 19 actuators providing services for their optimum position, and active ambient lighting integrated into the driver assistance systems and able provide visual support for warnings. The controls have been reduced to provide a minimalist appearance, and an instrument panel has been developed with the central display leaning free.

To improve the infotainment, the "Hey Mercedes" voice assistant is networked with the corresponding systems so, for example, a seat position can be animated when a voice input is expected. In addition to details such as an interior air package with ionizer and active scenting, the intuitive MBUX display and operating concept is likely to attract particular attention. Up to five large screens, partly with OLED technology, facilitate the control of vehicle and comfort functions. A new 3D driver display enables spatial scene perception via eye tracking without the need for special 3D glasses. A personal profile can be created directly in the vehicle and synchronized with existing Mercedes-me account data.

Volkswagen also wants to appeal to all the senses with an interior of what they call a "novel character". The compact electric drivetrain of their **ID.4** model offers space for generosity—the separation of the instrument panel and center console is intended to contribute to the airiness. A light band under the windshield serves as a safety and comfort feature, intended to support the driver with intuitively detectable colored-light effects. For example, it highlights information from assistance and navigation systems and announces braking prompts and incoming phone calls. The seats bear the seal of the "Healthy Back" campaign; they can be electrically adjusted in a variety of ways, and their pneumatic lumbar supports integrate a massage function.

The Volkswagen Group is currently offering electromobility on a higher level in the form of the **Porsche Taycan.** New this year, buyers can now order a color head-up display that projects important information directly into the driver's field of vision. The display is divided into a main display area, a status area, and an area for displaying temporary content. Taycan drivers can purchase various comfort and assistance functions as needed, which also works downstream for subsequent owners.

The next logical step in the modern cockpit would be for cars to anticipate their driver's operating preferences. A joint development by **Jaguar Land Rover** and **Cambridge University** is working to improve touch controls with "Predictive Touch" technology: artificial intelligence and sensors anticipate the user's intended target on the touchscreen, and execute the operating step without contact. To do this, a gesture tracker uses optical or radio-based sensors to combine contextual information such as the user profile, interface design, and environmental conditions with data from an eye tracker to analyze eye movements. According to JLR, lab tests and on-road trials have shown that driver interaction with the user interface is reduced by up to 50 percent.

XIM21 SMART CABIN CONCEPT (IMAGE: YANFENG AUTOMOTIVE)

With their latest smart cabin concept XiM21, the interior specialists at **Yangfeng Automotive Interiors** are now predominantly targeting user experiences and intuitively controllable functions. Competitor **Faurecia** also is focusing on a seamless, anticipatory user experience with the cockpit of the future, bristling with features and functions like automatic recognition of occupants, personalized seating and lighting preferences, and individual sound zones. Interaction with the vehicle takes place intuitively through speech, gestures, and touch.

WITH THE COCKPIT OF THEFUTURE, FAURECIA STRIVES TO PROVIDE A SEAMLESS, PREDICTIVE USER EXPERIENCE. (IMAGE: FAURECIA)

For the supplier, this includes multisensory wellness programs on board, which are intended to contribute to the relaxation and revitalization of the occupants. Together with Faurecia, **ZF** already went public months ago with the Safe Human Interaction (SHI) cockpit. With this concept, the suppliers are demonstrating ways in which a change of driving task between person and vehicle can be designed comfortably and safely in automated driving. To achieve this, the engineers rely on a special hands-on detection system in the steering wheel, which moves up and away to the front during possible automated driving scenes, but remains within reach. Thanks to steer-by-wire, the steering wheel can remain stationary in this driving mode instead of continuing to turn as the wheel turns. At the same time, the seat moves back and down, and tilts more to extend the adjustment range. The SHI cockpit communicates the change in driving responsibility not only by automatically changing the seat position, but also via other channels such as situation-related haptics, visual, and acoustic information.

Gaming and 4D cinema experiences are further topics on the agenda of interior designers. In the future, thanks to central high-performance computers with new electronic architectures, it will be possible to control climate and audio zones as well as screens individually for each passenger. That's according to Ralf Drauz, an accounts director at Faurecia Clarion Electronics. One child riding in the back seat, for example, can watch a movie while the other plays a guessing game on the rear seat monitor, which is operated by smartphone. With the switch to 5G, that will improve even more. And it will even be possible to play directly in the cloud. Meanwhile the adults' nerves remain ungrated, thanks to the advanced noise cancellation—a technology already known from headphones.

Interior News

Tesla's Plaid Interior With New Touchscreens and More

INTERIOR NEWS

Tesla's Model S has been refreshed for 2021 with a giant horizontal center screen, an updated center console, a new wood grain trim, and a rear passenger touchscreen. It also features a new steering yoke, covered in more detail in this week's Design Lounge.

The upgraded interior includes a horizontal dash screen with a wireless charging device below it, like that in Tesla's own 3 and Y models. Earlier, the S and X both featured a vertical touchscreen stretching from the center console to the top of the dash.

Tesla describes the new center display, tiltable left to right, as having 2200 × 1300 resolution and 10 teraflops of processing power to make it "an ideal touchscreen for entertainment and gaming anywhere". Another screen, located in front of the driver, shows crucial driving information. A third display at the trailing end of the center console provides entertainment and controls for rear passengers.

The new center console, is a slick, one-piece addition. The center console and storage area also received updates, with a sliding-door design replacing the conventional swinging action. Additional storage is available in the new door panels.

This updated system will come with tri-zone environmental controls, enabling customized airflow options to achieve optimal comfort. Airflow and temperature are controlled through the displays without any physical vents, according to Tesla, whose website claims "On hot days,

Cabin Overheat Protection ensures interiors always stay cool. In cold weather, pre-conditioning automatically warms the cabin and prepares the battery for maximum range".

ZF's Roof Airbag Saves Room in Interior

INTERIOR NEWS

Last week we looked at headliners, without mentioning airbags which are not yet common roof components. However, a roof-mounted airbag (ZF calls it a Bag-in-Roof or BiR) was launched in 2014, and the second generation is already in production. ZF is one of the few roof bag suppliers, and they are regarded as a pioneer of the technology; they've put up an **online video** about roof bags.

The first generation of roof airbags was applicable to SUVs, because of their relatively large headroom. The first application was in the Citroën Cactus. A roof bag helps protect drivers and passengers of differing body sizes in various seating positions—the latter now more crucial than ever, with occupants taking a wide range of new positions as driving becomes more automated. The folded airbag is mounted above the windshield, inside the headliner. In a head-on frontal crash, it deploys from top to bottom of the windshield in front of the driver and passenger.

Both packaging and mass have been improved over ZF's first-generation roof bag; the new bag has a single- or dual-stage gas inflator, gas diffusion channel, and airbag with enhanced

vehicle assembly features. With this new revised package, roof bags can now be installed in all kinds of vehicles, not just SUVs.

Putting the bag in the roof frees up space to open instrument panel options: roomier glove box, more knee room, passenger mounted screens, and otherwise like that.

Notably, the roof bag reduces loads and stresses on the windshield, as it deploys in parallel with the windshield rather than in opposition to it, reducing the risk of stress to the glass.

Perhaps the next step will be a roof bag for rear passengers…!

Faurecia's Sustainable Seat

INTERIOR NEWS

In line with overall company CO_2-neutral goals, Faurecia has launched their "Seat for the Planet" as a company-wide initiative to develop sustainable materials and circular economies in the automotive industry. The French supplier's approach goes beyond automaker specifications and targets to improve industrial processes, materials used and the seats' design to reduce the CO_2 footprint of seating systems throughout their lifespan.

The Faurecia teams have identified five "golden rules" to guide their innovation: use sustainable materials (natural, with lower CO_2 footprints, recycled or recyclable); use less (and

reduce waste in manufacturing); avoid mixed materials; center consumer experiences and needs, and design for easy assembly and disassembly.

Steel and plastics used in seating, together represent almost 50% of the Group's CO_2 emissions. Engineers are working on improving how to process steel and are developing new manufacturing processes to reduce waste and the amount of energy required—and using decarbonized energy when possible.

The seat's foams and covers are also new, with the development of seat foams that use recycled, recyclable, easier to separate, and biosourced materials such as hemp stems or PET fibers from recycled water and soda bottles. Faurecia is also considering low-carbon textiles and alternatives to leather for seat covers.

Frugal design is evident, with pared-down designs for specific vehicle lines, with minimized material usage, visible structural parts, and reduced steel structure because of semi-structural foam.

The first loop of these solutions offers an average reduction of 30 per cent in CO_2 emissions, and 10% lower mass compared with conventional seats, with no compromise on comfort and safety.

Ecarx, Visteon to Develop Intelligent Cockpits

INTERIOR NEWS

IMAGE: ECARX

Ecarx is a technology company in Hangzhou, China. Their idea of an intelligent cockpit includes HMI, infotainment systems, intelligent voice interaction, navigation system and app store. They're being supported by a strategic investment from Geely Holding Group, with core products such as vehicle chipsets, intelligent cockpits, intelligent driving, and HD maps with big data and IoV cloud.

At present, GKUI, the intelligent ecosystem designed for Geely by Ecarx, has surpassed 2.3 million online 4G users. With a million more users yearly, GKUI—for Geely Key User Interface—has become the system with fastest user growth in the industry.

Now Ecarx will develop intelligent cockpit solutions with Visteon and Qualcomm. The 3rd-generation Qualcomm Snapdragon automotive cockpit platforms into the next-generation of Visteon's SmartCore cockpit domain control platform, creating an infotainment ecosystem that safely delivers integrity-level information to drivers and ADAS.

Kraton's Injection-Molded Soft Skin for SAIC-GM

INTERIOR NEWS

Kraton, a US-based producer of specialty polymers and bio-based products derived from pine wood pulping co-products, has announced the first use of their IMSS (Injection Molded Soft Skin) technology in an automotive application. The interior of the Buick GL6, a joint project between Chinese firm SAIC and GM, developed by their common development arm PATAC (Pan Asia Technical Automotive Center).

IMSS uses Kraton's ultra-high-flow thermoplastic elastomers, belonging to the hydrogenated styrenic block copolymers (HSBC) family. Unlike traditional PVC soft skins, HSBC-based soft skins allow injection molding of large, thin-wall parts, such as instrument panel skins. They contain no added plasticizers, phthalates, or cross-linking agents, and provide lower odor (crucial in the Chinese market where "new car smell" is regarded as an IAQ pollutant), less outgas fogging, and lower VOCs coupled with better aging, improved safety performance, and lower specific gravity.

Kraton says an injection-molded IP soft skin can save energy, labor and manufacturing time compared to traditional slush molding processes.

The IMSS compound was developed by Dawn New Material in China, working in cooperation with Kraton as a technology transfer licensee of Kraton's IMSS technology. Kraton has also established technology licenses with several other premier compounders worldwide to make this technology available to all automobile manufacturers.

The Design Lounge

Steering Yokes Are Finally Here • Part 4

THE DESIGN LOUNGE

After highlighting how Ferrari evolved their steering wheel controls form their Formula 1 cars to their current street car line-up, let see how the steering yoke is being implemented into the market with Lotus and Tesla.

Lotus Evija

The limitations of a steering yoke design when used to maneuver a vehicle in tight turns/parking situations is seen here. The wide horizontal shape of the yoke limits the degree

to which the wheel can be spun, and means the rim of the steering control is not in a uniform location to be grabbed without looking. This can be leveraged as an advantage if the vehicle is designed for a yoke rather than a wheel, though: limiting the ‘spinning’ of the wheel can become a very useful method in controlling the vehicle.

With the top and bottom of the steering wheel ‘cut off’, the driver's view of the road and cluster becomes unobstructed.

It can be clearly seen in a profile view here that the steering yoke does not break into the side window plane as traditional round wheels do. Lotus also chose to float the center console capacitive-switch stack that also separates the driver and passenger compartments:

For the steering yoke, Lotus chose to use traditional type switches, including miniature stalks that are now integrated onto the yoke itself instead of sprouting from the steering column.

The turn signal switches are implemented as a left and a right pushbutton, as is the headlamp beam selector switch. The main lights switch is a rotary knob. The horn switch is the traditional type; the driver swats or mashes the center pad.

Dominating the yoke controls is a large, red rotary switch that selects the driving modes of the all-electric hypercar.

The driver's view creates a very race-oriented experience for the Lotus owner. Critically, Lotus’ design of the yoke allows the driver to grip the wheel in the same manner as a traditional round wheel, especially the top of the wheel for multi turn and parking situations.

Tesla 2021 Models S and X Refresh

Although similar on initial view, Tesla's design of their yoke is fundamentally opposite to the approach Lotus used. Nevertheless, as with Lotus, we see how its use creates an airy environment in the front cockpit area.

Tesla's use of the yoke is also a key interaction point for both the drivers instrument cluster and the larger center UX/HMI screen.

The primary difference between the Tesla and Lotus execution is the elimination of a grippable top portion of the steering control. This does not allow the driver to grip the yoke from above or when executing parking maneuvers.

Further contrasting Tesla's approach is the use of capacitive switching integrated into the steering yoke in addition to their multi-function scroll wheel design.

Interestingly, the horn activation uses a capacitive switch instead of the traditional center pad placement.

The interaction between these switches, the scroll functionality and the cluster and center display creates a very user-oriented UX/HMI approach the contrasts the racecar-type

approach used by Lotus.

Seen holistically, the Tesla yoke and interior design place the driving function of the yoke as a secondary priority to its UX/HMI usability and interaction.

Its implementation into Tesla's newest vehicles sends a clear signal that the autonomous driving future is closer than it appears. This is in stark contrast to the race-oriented beginning of the yoke used by Lotus.

News Mobility

_Car interiors Unplugged

NEWS MOBILITY

IMAGE: WALLPAPERSAFARI

7. In search of an epic _

(this story is part of an ongoing series introducing automotive interiors as an evolution of our habitat)

Driverless vehicles express a new form of urbanism, a practice of laying down new tracks reterritorializing public spaces. Coded paths of motion are like invisible rails. Back in time, the railway related to a semiautonomous type of approach to mobility, by detaching and assigning the steering function to the rail and only leasing the choice of speed to the operator. Channeling all cognitive engagements in a single dimension, it fostered all unpredictable factors to faultlessness thus allowing the displacement of enormous masses straight ahead. There is a truth of geometry that shows that every time we detach a component from the equation of mobility, another one grows disproportionally. Mobility is enabled only when we find a balance between all measurements. Trains are fast or slow but definitely heavy, not at all agile or reactive and this is their limitation and eccentricity. The suspense moment in just about every movie that involves trains, is how to stop when emergency occurs and this seventh-art depiction is the most powerful narrative of the mechanical nature of the beast.

At the present moment that pre-coded digital rails can incorporate both speed and direction, physically detaching from the vehicle just about any function, we find ourselves looking for a point break, an edge, an expression of some short of a limit of the fresh autonomous vehicle plot, just so, we can compare and identify with it. How much of it is quantitative and how much is cognitive? If we could pre-code an entire trajectory with all its constituents through automata, what would be its boundaries, or in other words ‘its character’, and equally how these parameters would morph the object/vehicle that carries through such attempt? Visualizing the tool that generates and reconstructs our territory is a lot more than just another vehicle silhouette; it is an emblem, the expression of a new era. If train is the symbol of the imperial world and automobile, as more individualist, the symbol of the republic, that gives a flair of what is following.

With tens of thousands of mechanic, electric and electronic components and billions of lines of code, the most complex object ever made incorporates its surroundings and expresses the ambition of a constant and flawless relationship between the two, like never before in our mobile history.

_To be continued…

*INDUSTRIOUS*_____

86% of Chinese Car Shoppers Consider EVs: Continental

NEWS MOBILITY

Continental;s Mobility Study 2020 reveals growing demand for privately-owned cars in China. Use of cars has increased against the background of the pandemic, and almost 60 per cent of respondents say they have already bought a car or are considering doing so.

This rising demand, coupled with an openness to electric vehicles, could lend the technology a significant boost. High prices for EVs are not an obstacle to purchase in China, though respondents cited a lack of available charging stations as inhibiting factors.

This is one of the key findings of the Continental Mobility Study 2020, in which representative groups of people in France, the USA, Japan, China, and Germany were surveyed about their mobility habits in cooperation with a social research institute. Against the background of the coronavirus pandemic, 46 per cent of respondents in China say that they use their cars more often than before. In Germany, this figure is half as high at 23 per cent.

Up to 86 per cent of car buyers surveyed in China said they would consider buying an EV, the study found. By contrast, the proportion of respondents with a similar propensity was 28 per cent in France and 35 per cent in Germany.

Only 20 per cent of respondents in China see high EV prices as a barrier to purchase, as opposed to 46 per cent in France and 55 per cent in Germany.

In parallel, about 60 per cent of Chinese consumers surveyed stopped using public transportation and are using carpools less, amidst the pandemic.

General News

Lectra to Buy Gerber Technology

GENERAL NEWS

France-based Lectra plans to acquire the entire capital of US-based Gerber Technology**.** Founded in 1973, Lectra has 34 subsidiaries around the world, serving customers in over 100 countries, with close to 1,800 employees and 2019 revenues of €280m. For car interiors, Lectra is the № 1 provider of soft material cutting, like textile, leather, vinyl. They also serve the fashion, furniture, and other industries.

Gerber, in the same business, invented the first automated cutting system more than 40 years ago. The first Gerber cutter, used by General Motors for over 20 years to cut seating materials, has been on display in Washington D.C. at the Smithsonian Institute's National Museum of American History.

Automated cutting machines and spreading systems are key to maximize material utilization, especially when it's very expensive like leather, to generate a precisely-made cut part to be later assembled most often by sewing to get seat, door, instrument panel upholstery.

The acquisition would allow Lectra to complement its market position and continue to enhance its offerings based on Industry 4.0 technology with product lifecycle management (PLM), product data management (PDM) and computer-aided design (CAD) solutions

VW Trinity to "Revolutionize Volkswagen": CEO Diess

GENERAL NEWS

In a recent tweet, VW Group CEO Herbert Diess said the Trinity project "will revolutionize Volkswagen - and especially Wolfsburg". After focusing on mass market EVs—their ID family—Volkswagen is shifting its attention to a high-end EV. "Project Trinity", as it's being called, is expected to offer more sophisticated technology as a sort of VW brand equivalent of Audi's Artemis program to strengthen Audi's reputation as a technological leader.

Trinity will be composed of three elements, as the name suggests: a new EV platform, an advanced driver-assist technology along the lines of Autopilot, and a new production approach. The EV will have L^{2+} autonomous driving capability and will be ready for L^{4}. The level of self-driving that the production Trinity car will offer will depend in part on regulators in various markets.

Meanwhile, VW is continuing to roll out their mass-market ID models, starting with the ID.3 hatchback in Europe and the ID.4 crossover in America. Additional ID models are also planned: an ID.6 SUV in China,f for example, and a modern version of the classic VW Microbus, called the ID.Buzz.