DVN-I
Automotive Interior

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Editorial

HUDs Are Central In Tomorrow's Cockpit

BMW X3 FULL-COLOR HUD, US VERSION (IMAGE: BMW)

HUDs (head-up displays) are now playing a crucial role in automotive HMI (human-machine interfaces). A HUD relieves the driver of the need to take eyes off the road and refocus to look down at the instrument cluster or a secondary display. Instead, there's a virtual image that appears to float over the hood at an apparent distance of about 2 meters ahead of the car. This reduces dangerous distraction by displaying key information—speed, navigation directions, and alerts; that kind of thing—directly in the driver's line of sight. Information can be prioritized or displayed as necessary in context, so as to avoid having too much simultaneous data presented. With no need to focus back and forth, near and far, inside the car and out, a HUD can reduce visual fatigue during long journeys. So that is both a safety feature and a technological value-add. They are rapidly becoming a must as more and more information becomes available, so it can be presented to the driver in a non-distracting manner. And maybe, with additional projection technology and voice/gesture interaction, they'll practically become the cockpit of the future! Have a look at this week's in-depth.

The BMW i4 and iX were released last March, with interior details unveiled last week. These EV Interiors, using BMW's fifth-generation eDrive system, are presented in this week's Design Lounge.

We work hard to make the weekly DVN-I Newsletter worthy of the time you spend reading. We're glad you're in the DVN Interior community! (If you aren't yet, **come join in**).

Sincerely yours,

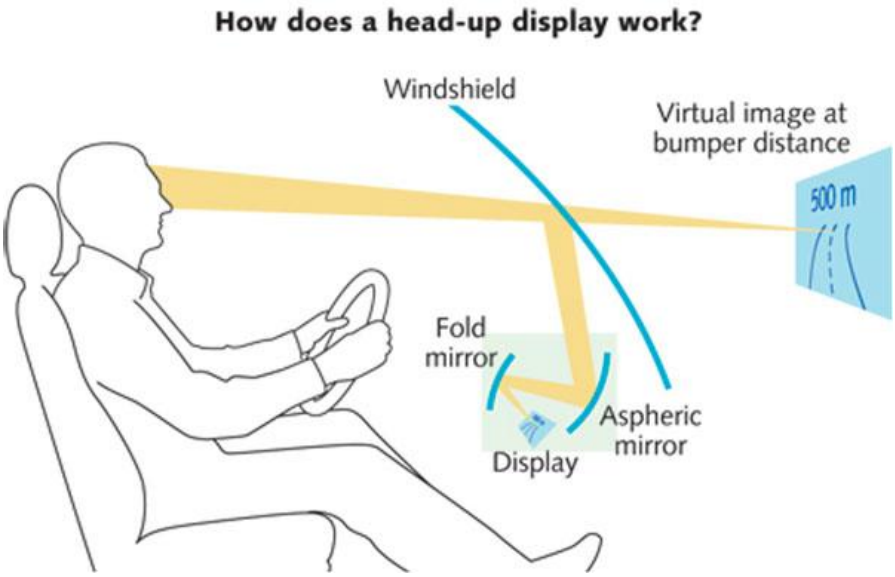
Philippe Aumont
General Editor, DVN-Interior

In Depth Interior Technology

HUD: a Must-Have For Today's, Tomorrow's Interior

BMW X3 FULL-COLOR HUD, EUROPEAN VERSION (IMAGE: BMW)

Head-up displays have been popular since the mid-20th century, and for years were primarily used in aircraft. During the 1950s, attempts were made to test this technology for cars—it really wasn't ready yet. But technology marches along, and now most premium cars have a HUD. As with most innovations, HUDs are now filtering down to the more affordable car classes, often as optional equipment.



(IMAGE: LASERFOCUSWORLD)

The head-up display projector is placed in the dashboard, under the windshield. It projects high-quality animations and information directly into the driver's field of vision. Its name refers to the operator being able to see the information without having to look down at displays in the instrument

panel. The main benefit is that the driver gets to keep their eyes on the road, and needn't constantly refocus between the instruments inside the car and the road outside.

A typical HUD has three main components: a projector unit, a combiner, and a video generation computer. The projection unit is an optical collimator setup: a convex lens or concave mirror with a cathode ray tube, LED display, or LCD display at its focus. This setup—a design that has been around since the invention of the reflector sight in 1900—produces an image where the light is collimated, i.e., the focal point is perceived to be at infinity.

Many HUDs are adjustable, as seen in this **BMW video**: they can be switched on or off, and adjustments can be made to the variety of displayed information, brightness, height, and position.

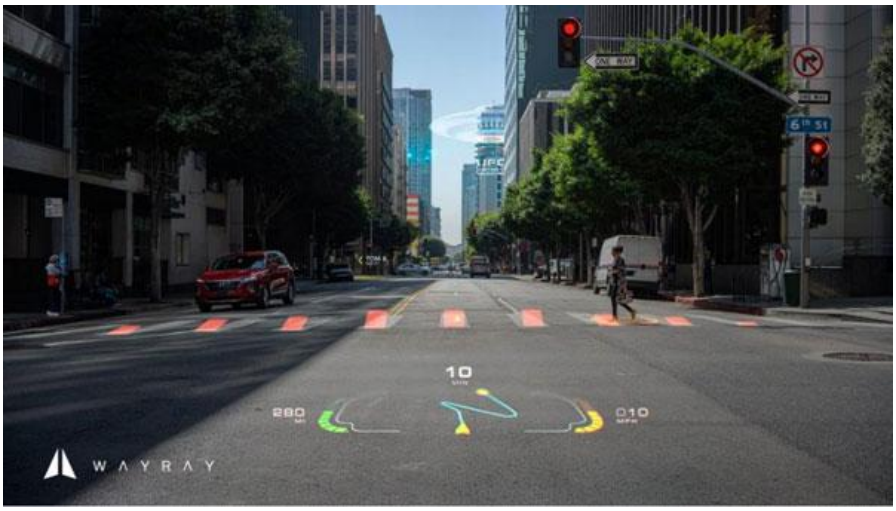
"ALFTEK" P10 AFTERMARKET HUD (IMAGE: AMAZON)

Aftermarket HUD systems are also available, where retailers propose product projecting the display onto a glass combiner mounted above or below the windshield, or using the windshield itself as the combiner.

HUD technology is still progressing, with automakers and suppliers proposing continually innovative solutions. These HUDs have evolved beyond the bulky navigation-only items available a few years ago. Systems are now capable of displaying much more information: compass direction, temperature, surrounding traffic, warning messages, speed, radio information, and more.

Factors expected to drive the growth of display systems are falling cost of display technology, and its rising performance in terms of readability, colors, contrast, and brightness. New projection technologies, including micromirror-based devices, are coming into the market, which will aid in creating brighter and more multicolored displays. The next step is for HUDs to be enhanced through augmented reality (AR-HUDs) and to use holographic technology.

HOE (holographic optical elements) allow for a wider field of view while reducing the size of the device and making the solution customizable for any car model.

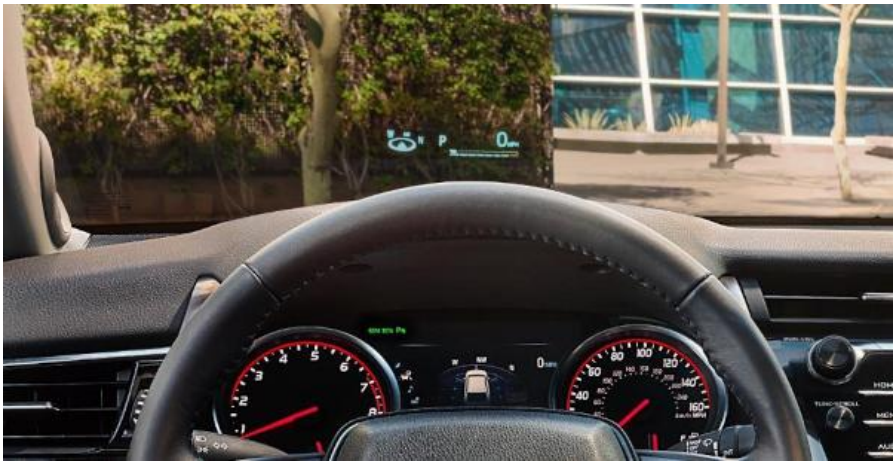


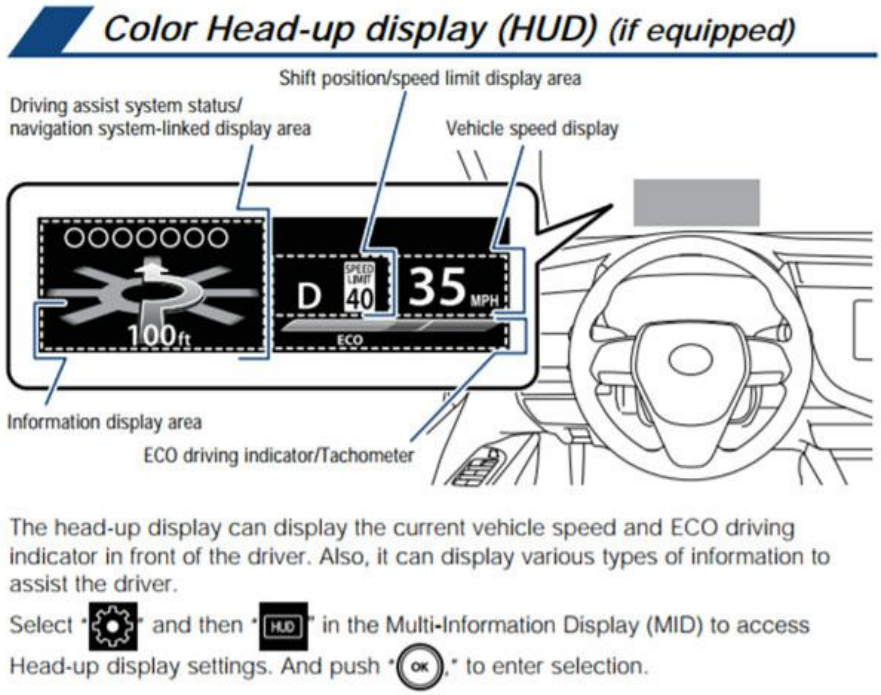
WAYRAY FULL-COLOR HOLOGRAPHIC AR DISPLAY (IMAGE: WAYRAY)

WayRay, based in Zurich, Switzerland, have developed a Holographic AR Display that creates a vivid 3D image seamlessly integrated into the real world at variable depth. It surpasses many conventional HUDs in projection system volume, FoV (field of view), and distance to the virtual image. The display's small package fits in virtually any car.

Consistent technological advancements and production volume increase have pushed the cost down, thanks to cheaper components and more efficient manufacturing.

The giant advancement in the state of the arts is apparent by comparing this Pioneer HUD navigation system from a decade ago. It replaced the driver-side sunvisor, and visually overlayed animations of conditions ahead—an early form of augmented reality. Now, Pioneer's AR-HUDs use a direct-to-eye laser beam scanning method, also known as virtual retinal display. The AR-HUD's core technology involves a miniature laser beam scanning display developed by MicroVision, with display technology using micro-electrical mechanical systems (MEMS) scanning mirrors with red, green, blue, and infrared lasers; optics, and electronics to project images.





HUD INFORMATION IN 2018 TOYOTA CAMRY OWNER'S MANUAL

In 2018, Toyota put an optional great big 10" color HUD in their Camry—much bigger than HUDs in most other cars. A HUD is standard equipment in the Toyota Prius, as well. DVN has reported a lot of information about HUDs; here are some examples just since the beginning of this year:

• VW's AR-HUD, first to offer augmented-reality head-up display system for the compact segment, in their ID.3 and ID.4 fully-electric models

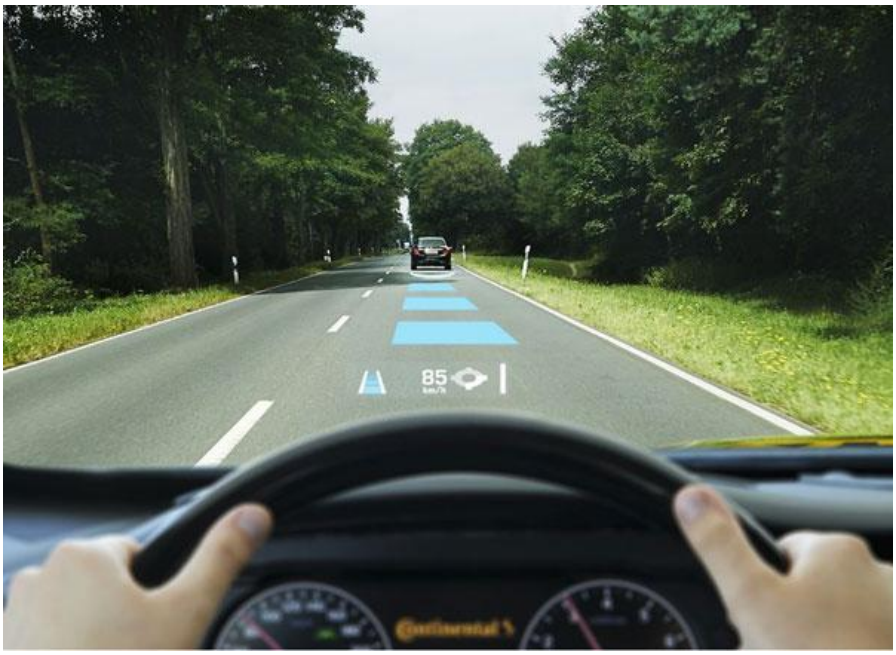
• GM's Cadillac Lyriq with AR HUD employing two planes: a near plane indicating speed, direction and more, and a far plane displaying transparent navigation signals and other important alerts

• BMW's Mixed Reality HUD with Futurus, involving whole-windshield augmented reality displays

• Envisics HUD with Panasonic, already on 150,000 JLR cars, with information displayed in 3D and arrows indicating the way to the driver or information on cultural places or shops

• Hyundai Mobis' newest 12″ HUD, built with GL Studio HMI software tools, leveraging GPS data to provide information like driving routes, driving assistance, and traffic signs, as well as traffic data about cars sharing road space

• The Porsche Taycan HUD Developed Using EB Guide Tools: Nippon Seiki selected EB Guide from Elektrobit (EB) as a suitable tool for the HUD's software and graphical framework development



(**IMAGE: CONTINENTAL)**

Continental offers Adaptive Cruise Control, which uses an AR-based HUD to display and monitor the speed and distance ahead of the cars. A crescent-shaped icon on the display changes its color to provide uninterrupted feedback when the vehicle ahead gets too close. The display panel plays a critical role in the augmented usage of the driver assistant systems in the vehicle. With that as background, let's take a deeper look at the latest news:

Himax Unveils LCoS Platforms for AR HUD

Himax

Drive for better vision

Himax Technologies, headquartered in Tainan, Taiwan, is a fabless semiconductor solution provider dedicated to display imaging processing technologies. Himax is a worldwide market leader in display driver ICs and timing controllers used in automotive, digital cameras, car navigation, virtual reality (VR) devices and many other consumer electronics devices.

The Company also offers CMOS image sensors, wafer level optics for AR devices. They recently unveiled its latest liquid crystal on silicon (LCoS) technology, phase modulation LCoS, for AR-HUDs used as holographic displays. Himax demonstrated an AR-HUD platform using their phase modulation LCoS as holographic display that offers more compelling visual experience than conventional HUD solution. The AR-HUD provides brighter and higher contrast images, and displays multi-focal plane images with less power consumption, lower cost, and smaller form factor. For automotive applications of duo-focal AR-HUDs, the information displayed on the dashboard is projected directly onto the windshield in the driver's line of sight with focus at 50 cm.

Another long-range plane focused around 10 meters fuses augmented reality information, such as navigation map and driving instructions, with far-field real world images for the driver to see intuitively on windshield. The AR HUD also features a proprietary computer-generated holographic engine for real-time augmented reality information fusion as well as image distortion adjustment to fit for different windshield curvatures.

Panasonic's Big HUD in the Mitsubishi Outlander

The large-screen HUD developed by Panasonic's automotive division is installed in the Mitsubishi Outlander released in the American, Canadian, and Puerto Rican markets this past April. This is the first Mitsubishi to feature a Panasonic (or any other brand) windshield HUD.

Outlander (Photo courtesy of Mitsubishi Motors Corporation)

Appearance of HUD

HUD screen image projected onto a windshield (Photo courtesy of Mitsubishi Motors Corporation)

IMAGES: PANASONIC

The HUD presents a variety of information such as vehicle speed, navigation instructions, and driver assist information in the driver's line of sight.

With their expertise in optical technologies acquired through development of digital cameras, Panasonic has applied the high precision free-form mirror and the high-intensity PGU (Picture Generation Unit) technologies to the HUD, successfully providing a large, bright, sharp screen with minimal distortion (field of view: 7° × 3°).

Overview of the developed technologies:

High-precision freeform mirror

Panasonic's HUD uses a high-precision freeform mirror to which the company applied its lens design and molding technologies originally developed for digital cameras. This minimizes the HUD unit's bulk while allowing projection of a low-distortion image on the large screen in the limited space in the vehicle.

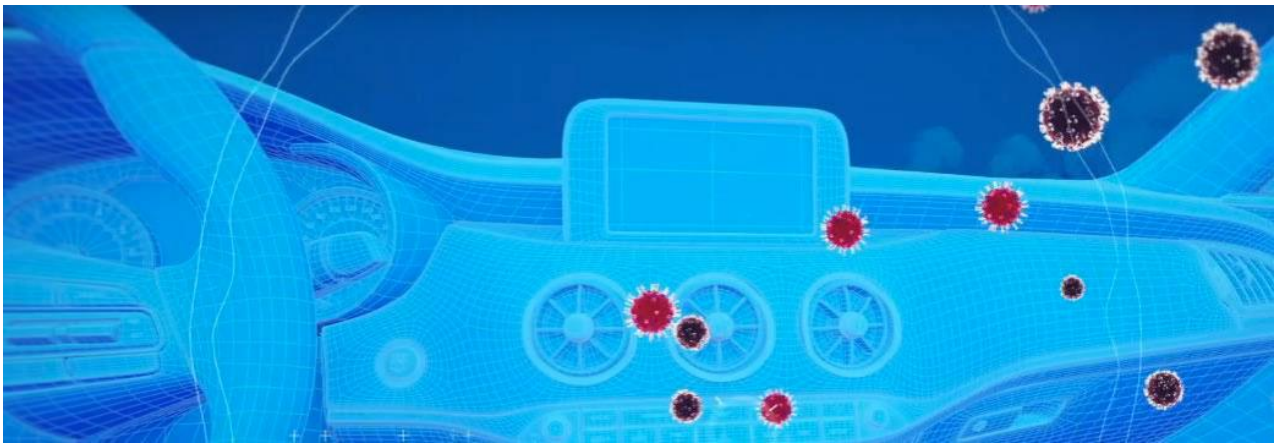
High-intensity PGU

Panasonic's proprietary backlight design for the HUD, which was developed based on the lighting technology for LCDs, provides the driver with a clear image even under conditions that might have made it difficult to see the display, such as under direct sunlight or while wearing sunglasses.

Interior News

Asahi Kasei Europe's Work on Auto Interior Hygiene

INTERIOR NEWS

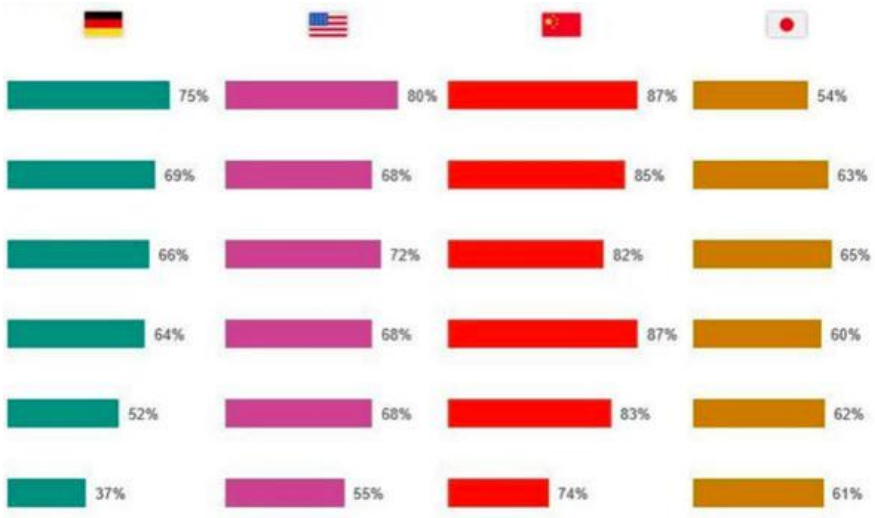


(IMAGE: ASAHI KASEI)

Covid-19 is changing our understanding of cleanliness and safety in vehicle interiors. A recent study shows vehicle users worldwide are willing to pay a premium for cars that actively zap pathogens on surfaces and in the air.

The Covid 19 pandemic has had a strong impact on our mobility behavior. Surveys show that the use of public transport and car sharing has declined sharply. In contrast, private vehicles are becoming more popular as a safe space with a low risk of infection. The pandemic will have a lasting impact on existing and future mobility concepts—and on the materials and technologies used in vehicle interiors.

Surface materials significantly determine how the driver and passengers perceive the interior. In the past, they had to be attractive to the eye and pleasant to the skin, meet American fire-resistance regulations, and that's about all. The current situation significantly increases the requirements for general cleanliness and safety against viruses and bacteria in vehicles. A survey by Asahi Kasei Europe and the Cologne-based market research institute Skopos in December 2020, confirms this development. 500 vehicle users in each of the core markets of Germany, USA, China, and Japan were surveyed regarding their preferences for the vehicle interior.



EUROPEAN RESEARCH INSTITUTE SKOPOS ANALYZED THE STRONG DEMAND FOR CLEAN-SURFACE, CLEAN-AIR SOLUTIONS IN THE VEHICLE INTERIOR. (IMAGE: ASAHI KASEI)

Results:
In Germany, 64 per cent of users attach great importance to this topic in their current vehicle and rate it even higher than connectivity, intuitive operation, or personalization of the car. The same results can also be observed in other markets, for example in China: 4 out of 5 vehicle users attach great importance to cleanliness. 75 per cent of users in Germany rate easy-to-wash surface and seat materials as advantageous for their next new car purchase, 66 per cent water- and dirt-repellent surfaces. Vehicle users in China and the USA also see a great benefit here.

Every second vehicle user in Germany sees an advantage in antiviral and antibacterial materials for surfaces that are touched most often. In China (83 per cent), the USA (68 per cent), and Japan (62 per cent), the proportion is even higher. 69 per cent of users in Germany see a clear benefit in an advanced air filtration system that filters the outside air entering the vehicle. 87 per cent of vehicle users in China are in favor of an advanced air filtration system that filters the air inside the vehicle.

Every third user in Germany who is planning to buy a new car would be willing to purchase an optional surface-protect package for an extra €1,000. In the USA, every second user is willing to pay $1,000; every fourth even $1,500. In China, the willingness is even greater: 70 per cent are willing to pay a surcharge of around €900. One of three new car buyers in Germany would be inclined to pay €1,000 for an optional cabin-protect package that ensures safe air in the interior. Every second American is willing to pay $1,000; every fifth even $2,000. In China, the demand is even more pronounced: 71 per cent are willing to pay €600; 40 per cent even €900.

The results of the study show that concepts against invisible threats in the interior are highly popular among vehicle users. Asahi Kasei offers a "Healthy Car Portfolio", which in addition to antimicrobial membranes, seat covers and plastics also includes innovative UVC LED solutions for air filtration in cars.

Rolls-Royce's Boat Tail Nautical Design

INTERIOR NEWS

(IMAGE: ROLLS-ROYCE)

The Rolls-Royce Boat Tail is the result of four years' work—nearly 2,000 all-new parts create a unique design inspired by a yacht. When it comes to customization, there really are no limits at Rolls-Royce. Customization is nothing unusual for luxury brands, but with the Boat Tail, the British brand takes it to the extreme. The Rolls-Royce coachwork team designed a completely new body for the convertible, which is modelled on a yacht in its nautical design.

The bespoke luxury convertible, 5.9 meters long, shines in pearly azure blue. The hood is hand-painted. A lighter blue is on the polished wheels and the leather seats, which are also set off with darker piping and stitching. Inside, a special weaving technique creates a wavy look. The instrument panel bears a unique braided texture known as *guilloche*, used in the manufacture of fine jewelry and watches, a bright blue color finish weaves into the technical fiber trim of the dashboard.

At the touch of a button, the rear deck opens to reveal the integrated hosting suite under the two flaps. One side is dedicated to aperitifs; the other to the kitchen. To this end, a double champagne fridge was designed to store the client's favorite vintages at a specific temperature. The silver cutlery comes from Christofle in Paris and the porcelain plates have fine platinum rims. In addition, the owners of the convertible yacht can take a seat under a parasol.

IMAGES: ROLLS-ROYCE

The Rolls-Royce Boat Tail is said to be the most expensive model the brand has ever created, costs are more than 12 million euros. The "Coach build" department is a very lucrative business, because interest and enquiries for a custom creation exceeded all expectations. Therefore, Rolls-Royce Coach build is now an integral part of the Bespoke line portfolio, catering exclusively to special requests. More of these completely customized boat-tail variants are also said to be in the works.

Continental's Pillar-to-Pillar Display

INTERIOR NEWS

(IMAGE: CONTINENTAL)

Continental's integrated display spanning from one A-pillar to the other provides space for a growing number of vehicle functions, digital services, and communication and infotainment applications.

Continental received their first order from a major automaker for a display solution extending across the entire width of the cockpit in a high-volume production vehicle. Volume production is to begin in 2024.

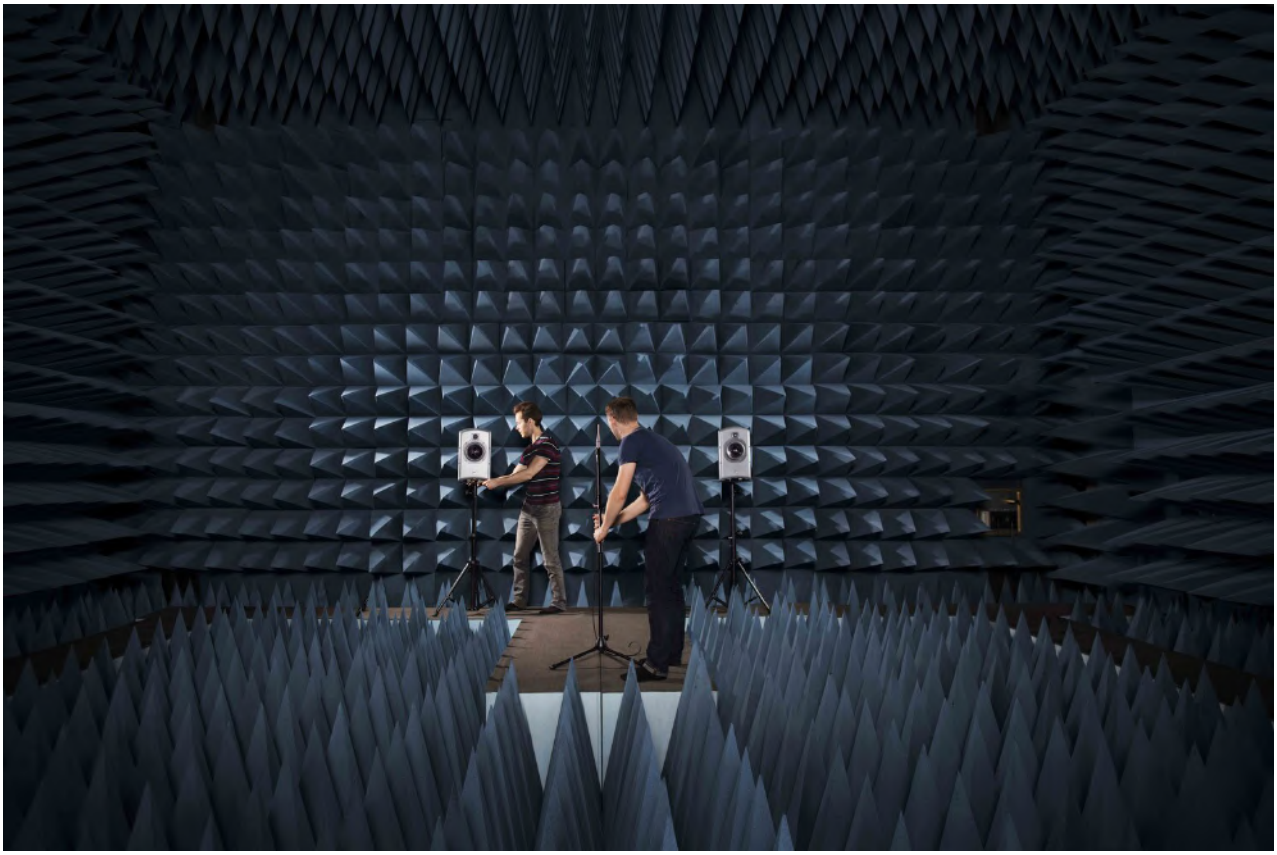
This integrated solution turns this suite of displays as a central visual interface between the driver, co-driver and digital driving experience and marks another step in the evolution of the car into a smart device as part of the internet of things, according to Continental.

Navigation, warning signs, movies, news, social networks, office applications, and booking apps to plan the route are amongst the fully immersive content displayed across the entire width of the cockpit. "A driving experience that is digital and safe is becoming the most distinctive feature of modern cars. The size of the displays and their intuitive operation play a central role here," says Jens Brandt, Continental North America's Head of Human-Machine Interface. "In short, while horsepower used to be the gold standard for vehicle differentiation, now it is screen diagonals and user experience."

Considering all the multiple new vehicle functions and digital services going into cars with increasing connectivity, traditional instrument panels and center consoles have become a dialoguing tool between occupants, the car, and even the external world. An exclusive focus on the driver also is no longer appropriate for the wide range of communication and infotainment services now available to all vehicle occupants. Therefore, displays have been getting bigger and bigger for years. With a few high-performance computing capabilities expected to replace the previous large number of dedicated control units in the future, Continental thinks their pillar-to-pillar display is the next evolutionary step and an expression of the increasing transition of the car into a mobile data center.

Dirac Self-Driving Cars To Reimagine Sound Systems

INTERIOR NEWS



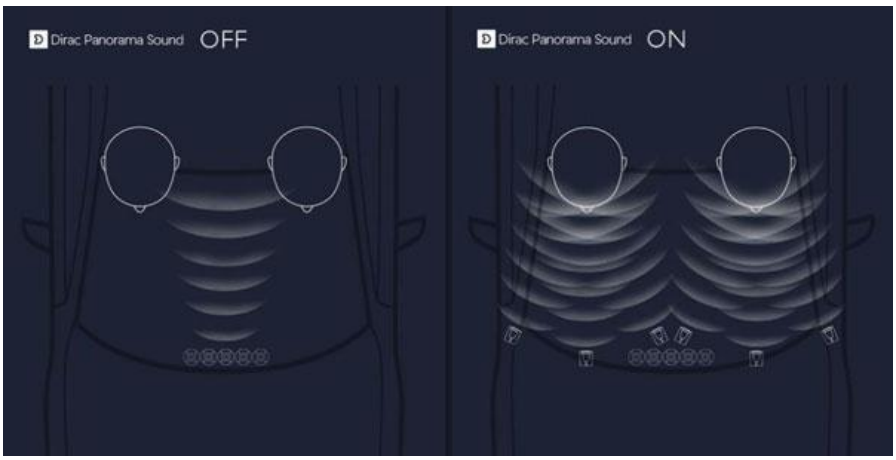
Dirac specializes in digital sound optimization solutions. It all started 15 years ago, when some of the founders were still PhD students at the Signals and Systems Group at Uppsala University in Sweden. They started Dirac, named in honor of the British physicist Paul Dirac, whose name is centrally linked with a mathematical function used in their algorithms.

Dirac Live® is a complete software-based working methodology tailored for acoustic tuning of automotive sound systems, and is a real time-saver and a quality assurance boon for sound engineers. The technology is implemented in the amplifier or the head unit, where a proprietary high-resolution structure minimizes MIPS and memory usage. Typically, the power ratio between the direct wave and the tail is improved by 6 dB or more. It also targets to optimize the impulse responses and magnitude frequency responses for an almost perfect natural sound. It addresses time-domain problems, Dirac software treat the room's spectral coloration, with a focus on variations across different measurement positions as to never overcompensate.

The less-than-ideal positioning of loudspeakers leads to a poor performance from each speaker and dissimilar impulse responses from different speakers. All these contribute to imprecise and unstable stereo imaging, lack of distinctness, boomy and uneven bass, varying performance across seats and problems with frequency response.

In more automated vehicles, occupant position may vary, thanks to seating new flexibility (swiveling, relax position,). Fix positioning of the speakers, even if directional, becomes an issue, and digital algorithm software correction is the solution. It allows more design freedom in speaker size, characteristics and location. It helps creating sound zones where occupant will enjoy a full immersive and personalized sound experience, whatever their position, and the position and program (music, news, movie). It brings also conference calling capabilities, creating a virtual meeting experience inside the vehicle, where the voices of conference participants come from specific directions, offering audible cues that improve communication.

Dirac Live also includes intelligent noise-canceling algorithms, which can help getting rid of unwanted noise, whatever the external and road situation.



Overall, the audio experience is strongly part of the overall experience, as it comes from a complex perception from all occupant senses.

Huawei OS in New BAIC SUV

INTERIOR NEWS

(IMAGE: LUCIA SI)

BAIC has become the first automaker to adopt vehicle cockpits with an OS (Operating System) developed by controversial Chinese technology giant Huawei.

The operating system, named HarmonyOS, will be installed in the new Arcfox αS ICE SUV. Huawei developed the HarmonyOS operating system after being barred from accessing U.S. technology, including Google's Android operating system, in 2019.

Arcfox αS is offered with Huawei Inside (HI) version, featuring Huawei's claimed L^4 autonomous driving solution and Harmony OS intelligent cockpit. It can be connected to smart homes and other intelligent devices, "which can transform the car into a movie theater, game hall, and karaoke room in seconds," Huawei said.

The cooperation between BAIC Group and Huawei started last year when BAIC Group launched the first Arcfox model αT, the first mass-produced local EV equipped with Huawei's technology.

The high-end brand Arcfox, first introduced in 2016, was built by a joint venture between BAIC Bluepark—the EV-focused subsidiary of BAIC Group—and Magna, under a 51/49 per cent JV structure. BAIC positions Arcfox as a high-end brand to differentiate the product from its own "Beijing" brand, and develops the EV through cooperation with local technology companies such as Huawei, as well as auto-part suppliers including Magna and Contemporary Amperex. Arcfox uses Huawei's advanced chip and software as well as Magna's chassis technology.

Based on Kirin chipsets, Harmony OS smart cockpit solution features a cockpit-oriented software platform, a display platform, and a complete hardware and software ecosystem. It provides capabilities such as one-chip multi-screen, multi-concurrency, and runtime deterministic assurance to meet the requirements of mobility scenarios. Through HarmonyOS, a vehicle's head unit can connect with other intelligent terminals, using various hardware and share information. Within the cockpit Huawei provides its signature Huawei Mobile Services (Automotive) core capabilities, such as voice, vision, sound partitioning, sound effects, and touch control, and fully opens these capabilities through APIs, which allow automotive manufacturers, tier#1 suppliers, and application ecosystem partners to develop functions, services, features and applications.

Fisker Partners With Sharp On Screen Development

INTERIOR NEWS

FISKER OCEAN (IMAGE: FISKER)

California-based EV manufacturer Fisker has nominated Sharp Corporation, majority owned by Taiwan-based Foxconn, to develop technologies to support the next generation of in-vehicle screens and interfaces for Fisker cars. The agreement includes the co-creation of technologies and the subsequent manufacture of screens and components to support the Ocean SUV, Project 'PEAR' (Personal Electric Automotive Revolution), and potentially two additional Fisker vehicles.

"The nomination of Sharp brings another world-class partner into our product development and technology ecosystem," said Fisker chairman and CEO Henrik Fisker. "Our product development process enables us to design and develop products with high quality partners like Sharp much closer to the time of launch, which in turn enables us to deliver the latest technologies to our customers. Our collaboration with Sharp is set to create exciting new automotive display systems, featuring innovative backlight solutions to improve illumination without increasing power consumption—in addition to class-leading resolution, bezels, and design."

Fisker and Sharp say they will work to optimize the global production strategy for all screens. Screens became more and more strategic into vehicles, and even more for EV where it is probably as important as battery, in term of technology, strategic sourcing and customer appeal.

FISKER OCEAN (IMAGE: FISKER)

The Design Lounge

BMW's Newest BEVs: iX and i4

THE DESIGN LOUNGE

BMW has just introduced their latest battery electric vehicles based on the CLAR platform (covering the D, E, F -segment ICE cars, sports cars and SUVs). The i4 sedan, and iX SUV are entirely new, completely removed (although utilizing some advanced aluminum and carbon composite construction) from the previous i3 and now discontinued i8 vehicles.

Oddly, BMW has chosen to not incorporate a front trunk, or 'frunk' into either of these vehicles.

BMW i8

BMW i3

BMW i4

BMW iX

BMW I4

BMW IX

Looking at both interiors, there is one element that ties them together: the large, curved horizontal display unit along with the associated HUD.

With the rest of the i4 interior, it's based as a 4-door sedan version of the recently introduced i4 coupé. The lower instrument panel, tunnel console, seats, and doors panels have not been further developed thematically.

Interestingly, BMW has chosen to not evolve the exposed 'natural-fiber' materials that showcased its sustainable material usage in the i3 and i8; instead they're highlighting the use of animal-free (vegan) material with discreet logos on the surfaces.

These displays allow the elimination of the traditional cluster binnacle or cowl, and open the upper instrument panel area for a more modern, airy feeling.

The ICE i4 coupe and new BEV i4 sedan share the same seating and trim themes…

… while the iX uses a new design first was seen in their concept vehicle bearing the same name.

This quilted look is reminiscent of recent Citroën DS 'wristwatch' designs.

The rear seating trim covers expand this quilted look to the entire width of the interior. Notice how this is incorporated into the lower pillar trim panels, which wrap into the doors.

Another feature in the iX is the use of an electronic sunshade integrated into the roof glass. By eliminating the traditional fabric covered panel, an air of high-tech ambiance is created.

BMW I4

BMW IX

Finally, looking at how the rear cargo is executed, the iX has a very simple hatch opening and cargo bay. Notice how they have integrated auxiliary rear lights behind the hatch opening, in accord with legal requirements that the lights either be on a fixed body component or be duplicated so as to remain visible even with the hatch open.

Next week, we'll look at how design detailing and craftsmanship (perceived quality) have evolved, and what makes these factors succeed or fail.

News Mobility

_Car interiors Unplugged

NEWS MOBILITY

NAPIER-RAILTON COCKPIT – 1933 – IMAGE: ENGLISH WIKIPEDIA

22. UX, a Universal eXperience _

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

"*A person's perceptions and responses that result from the use or anticipated use of a product, system or service*" is the ISO definition of human-system interaction *(ISO 9241-210)*

Speed, is the factor that changes perception of space in early 1900. Automobile introduces a completely new setting of cognitive rules redefining far and close. Signs, symbols, letters and all sorts of graphics become the ever-evolving aesthetic mood that frames mobility. Automobile evolves along with its surroundings, introducing a new optical language as an immaterial possession of progress. Our mobile lives, intertwined with graphic codes, reformed into a new era of visual communication.

Somewhere in today's France (Lascaux), 17,000 years ago, humans have drawn on cave walls to communicate. History however begins much later with the first inscriptions; the moment drawings become a system of symbols/letters to express meaning. Today's visual universe, mostly digital, introduces new aspects of expression were graphics and language merge. From Lascaux to our computer screen, all we try to do is control the outside world, get familiar with hazards and other outer powers, anticipating the outside dangers to come.

Mechanical precision in automotive interiors related always to symbols and letters, from speedometer dials to H-pattern gearboxes. Engine rev, oil pressure, battery voltage, water temperature gauges, in 50s racecars, constitute the man-versus-machine visual interface. Pilots had to know how to make sense of all watchmaking-type digits in order to take critical decisions during the race. 'Hazard bulbs' added light and color to the overall layout while in late 60s the big red and round kill-(engine)-button gives a special visual accent to race cockpits for almost a decade. The 80s are about speed, and toggle switches appear to regulate aerodynamics and suspensions. Carbon fiber makes everything more compact, cockpits as well and, warning-lights gradually replace gauges on the notion that driver needs to know only critical values. The more the warning lights the more the symbols; lights become symbols/letters. Soon, radio communication buttons appear and early computer screens follow with fuel-consumption calculations. The 1989 paddle-shift brings 'everything' into the cockpit and while it is all about space, the 90s bring the cosmic explosion of electronic technology. Real-time data allow driver to adjust accordingly the entire engine cartography and suspension. Ever grown numbers of buttons, dials and symbols are fighting for space in an ever-shrinking cockpit.

Adding yet another layer of complexity, screens come to transfer our visual memory from the toggle switch to its icon, by the virtual nature of the 'symbol', an active drawing, a utilitarian magic to increase chances of success. A toggle switch is used by a pilot but its digital twin by every pilot: the one (design) for all. Icons of motion become icons to activate motion hence, portraying a kind of universal semantic.

Design, a discipline that combines both rational and artistic skills, is called to resolve the conundrum on mainstream vehicles. The assignment is to make sense out of a vast set of parameters that cognitively developed over very long time. Designing an experience into the digital world, as a way to create meaning in a vast universe of new parameters, is difficult to comprehend with analog means. Languages, symbols, cultures merge into one and only sign that has to be significant and convey the exact same meaning for everyone.

Unlike physical objects, designs of digital experiences scale as big as inconceivable, from a low-key graphic telltale to the violation of a community's standards. Design process itself diverts between designing for a specific market, segment or region and designing for the entire human race. After all, it is about 'Lascaux' but mostly the last two letters.

_to be continued…

_____*INDUSTRIOUS*__

Edag Reinventing Mobility With Citybot

NEWS MOBILITY

(IMAGE: EDAG GROUP)

There are already 36 megacities worldwide with 10 million inhabitants and more. This rapid growth could lead to the necessary infrastructure lagging behind and the cities being threatened with collapse due to the overload of local traffic and public transport.

"Anyone who wants to develop mobility in a new way needs a clear vision, the necessary competences, innovative strength as well as the courage to break new ground" says Cosimo De Carlo, CEO of the Edag Group, in his essay from the series "Makers of Mobility".

The transformation process of the automotive industry is in full swing. Software and digitalization are inexorably making their way into the industry as a megatrend. Digitalization means more than the electrification of the vehicle. It is the basis for turning the automobile into a fully integrated component of the mobility ecosystem "Mobility Environments". It is about networking the vehicle with the rest of the world. The question of mobility of the future is much more multi-faceted. Thanks to technical developments, new mobility scenarios such as autonomous driving or large cities without traffic jams and parking problems are becoming increasingly important. However, today's transport system does not exploit all the possibilities for increasing efficiency because it lacks a holistic and networked approach.

The mobility of the future is automated and networked. Based on this motivation, Edag has developed a holistic mobility concept with the Edag CityBot. The CityBot is a networked, autonomous, multifunctional and emission-free robot vehicle. One that can be used both as a passenger car and as a commercial vehicle in the logistics and service sector. The CityBot is a complete ecosystem for public transport or closed areas such as industrial plants.

The CityBots are part of a complete smart city operating system. In combination with the platform technology for the Internet of Things, Edag is not only launching new autonomous transport and work vehicles, but also possible new business models at the same time. For example, when the vehicles are automatically paid for their work assignments. Or when traffic flow software takes over route planning and coordinates the CityBot fleet. The entire traffic would then be in a permanent state of flux, maximally efficient and without traffic jams. The goal is to use the CityBot at airports from 2025 and in urban areas from 2030 and to generate new business areas and market volumes.

General News

Will Hella Be Sold?

GENERAL NEWS

(IMAGE: HELLA)

The Manager Magazine reports that the industrialist family Hueck are considering selling their majority shareholding in automotive supplier Hella. The owner family surprised even the company's own CEO notion. Hella could be on the verge of leaving the stock market if the family would decide to exit. However, the shares of the shareholder family are still bound by a pool agreement until at least 2024. This means that all 60 members of the partnership must agree.

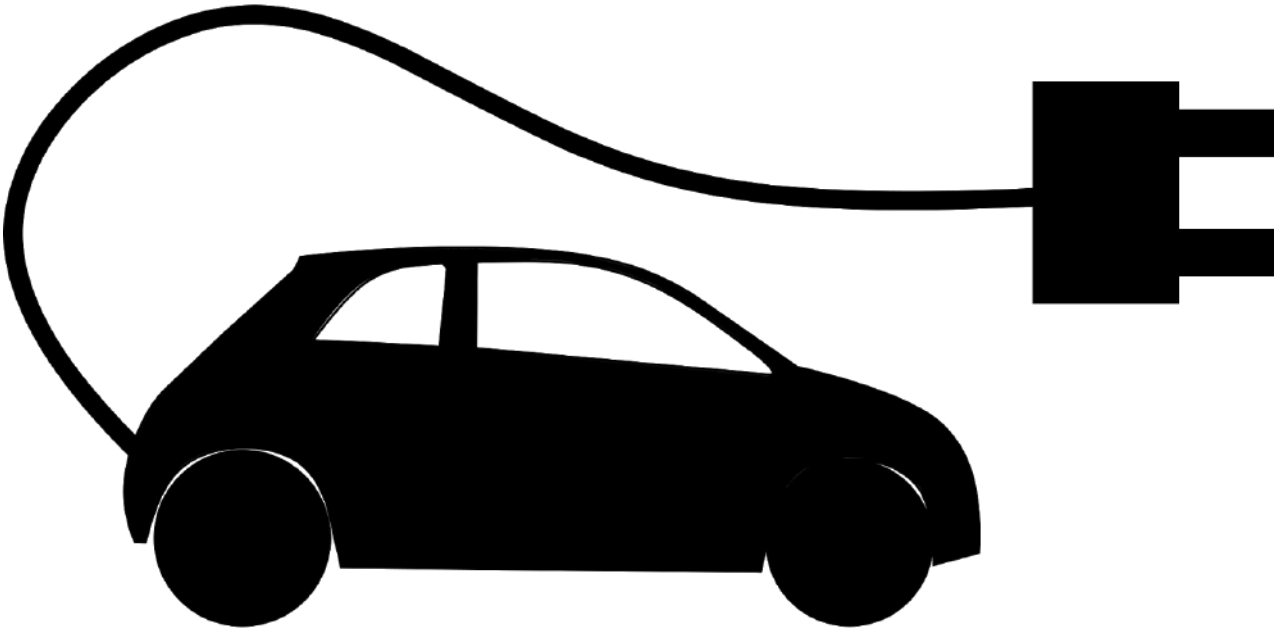
Hella is present in some of the fastest-growing niches of the automotive business and achieved an EBIT margin of 8 per cent even between June 2020 and February 2021 in the midst of the Corona pandemic. Traditionally, the family business generates solid cash flows. Hella's product focus is on lighting systems and automotive electronics, and the group employs 36,000 people. In the most recently completed financial year 2019/20, the company achieved sales of €5.8bn. The equity ratio of 39 per cent is above the average for the industry. In addition, the supplier has liquid funds of almost €1bn at their disposal.

More important for Hella than entering lucrative businesses is to advance into lucrative niches where the competitive pressure is not that important. For example, Hella is one of the leading manufacturers of 24-gigahertz radars, which carmakers need for their driver assistance systems. Another core of Hella's strategy: high spending on research and development. For years, Hella has spent over 9 per cent of its turnover on research and development—a top value in the industry.

Getting access to this company should be tempting for many potential buyers. All large-cap private equity funds are likely to be interested. Hella would also be an attractive addition to the portfolios of numerous large automotive suppliers, but many interested parties are still suffering from the financial consequences of the pandemic, and are struggling with their own restructurings.

Within A Decade, We Will All Be Driving EVs

GENERAL NEWS



(IMAGE: MEDIUM.COM)

A Bloomberg NEF report commissioned by Transport & Environment forecasts 2027 as the turning year when EVs will start to become cheaper to manufacture than their ICE equivalents across all segments, mainly due to a sharp drop in battery prices, and increased manufacturing productivity from additional volumes across more new models by more manufacturers.

Batteries, which have fallen in price by 88 per cent over the past decade and are expected to plunge by a further 58 per cent over the next ten, make up between 25 and 40 per cent of the total price of a vehicle. The average pre-tax price of a mid-range electric vehicle is around €33,300, compared to €18,600 for its diesel or gasoline equivalent. In 2026, both are expected to cost around €19,000, while in 2030, the same electric car will cost €16,300 before tax, while its internal combustion equivalent will cost €19,900, and that's without factoring in government incentives. And when considering total cost of ownership, the difference is even more spectacular because of EVs' low maintenance costs.

Other reports, such as a recent one by UBS, put the date of parity a few years earlier, by 2024, after which they say there will be little reason left to buy a non-electric vehicle.

In Europe, regulation is pushing the market, as EV is the only technology known to stave off huge fines for exceeding emissions limits. Brands such as Bentley, Jaguar Land Rover, and Volvo have already announced they'll go full electric by 2030.

In the US, new ambitious infrastructure plan put in place by the Biden administration promises to accelerate this transition. In China, the transition is well under way, with a large number of new EV-only automakers.

One way or another, the future of the automotive industry is electric, and it's increasingly clear the transition will take place during the remainder of this decade.