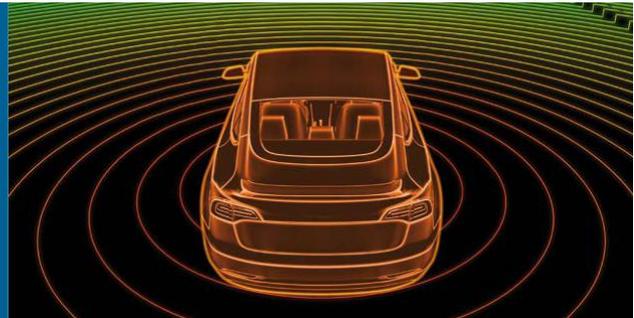


DVN Automotive LiDAR Study has just been published. Price: 8000 Euros.

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Editorial

CES Dazzles With Today's Take On Tomorrow's Tech

We spent most of last week walking the mindbogglingly expansive CES in Las Vegas. Even with our tight focus on vehicle- and driving-related technology, the event was huge. We retain some key points from our visit:

- There were *some* concept and prototype cars, but not very many of them; fewer than last year, as it seemed. Still, we were quite amazed at the progress made by Byton, Rivian, and Fisker out of the work-in-progress realm—this year they showed vehicles looking very nearly ready for production. High-quality prototype/concept cars were shown by Nissan and Mercedes.
- In contrast to that, there was an enormous amount of vehicle and driving technology on display. We got the sense that showing these kinds of technology was easier this year: last year, companies had to put a lot of effort into explaining what the various parts of the transport ecosystem might look like and how they might fit and work together. With those lessons having percolated in the public mind, this year providers could more readily show their innovations without having to explain every basic aspect of what they are and how they fit in the world.
- Integration and interaction are basic bedrock in the transport revolution. In the way vehicles use infrastructure, in the way humans use vehicles, in the way vehicles use data, and in the way technology is configured and deployed, integration and interaction will be found all up and down the scale.
- Not a whole lot of lighting innovation on display this year, but there was some. SLD Laser working on laser-based lighting, have made some big strides in the last year. Stanley are aggressively pushing into the UV-C LED.
- The push to integrate ADAS/AD sensors into car lights continues, as does the pushback from those worried about cost and feasibility of car repairs. Last year's

notable lighting innovation powerhouses were dramatically scaled back or not present this year, though interesting new technology was shown by Osram.

- What used to be considered "high resolution" for variable-message/variable-image pixellated display screens on the outside of vehicles, is now considered low resolution. The improvement in just a single year's time is remarkable.

In this week's newsletter you'll find a good assortment of spot focuses on innovations and agreements announced at CES. Watch for thorough coverage in the forthcoming DVN Report on the show.

We're putting finishing touches on the DVN Workshop to be held the 28th-29thW of this month in Munich, at the marvellous and convenient Hilton Munich Airport hotel. On Driving Vision News website you'll find the program. **Last registrations for the DVN Munich workshop can still take place online [following this link](#) but the Hilton Munich Airport Hotel has no more rooms available for Monday 28th night.**

At your service,



Daniel Stern
DVN Editor-in-Chief

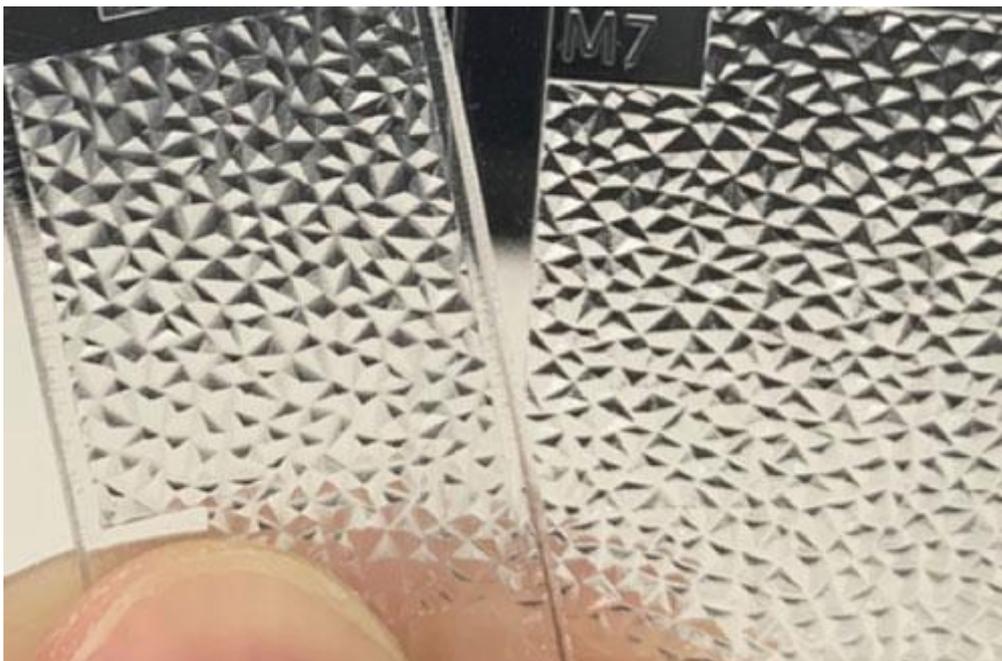
In Depth Lighting Technology

Microrelleus' Femtosecond Laser: Hi-Fi Micro-Engraving

Microrelleus are a family-owned company based in Barcelona since 1983, offering high-quality industrial engraving—with a particular speciality in micro-engraving for moulds and tools.

In 2013 they acquired a five-axis nanosecond laser machine to expand and complement their services, then in 2016 they became world pioneers offering a femtosecond five-axis laser service called cold laser ablation. It involves ultra-short laser pulses—a femtosecond is 10^{-15} second, that is one quadrillionth of a second, or 0.000,000,000,000,001 second. The characteristics of this cold laser ablation unlock new possibilities in prototyping: microstructuring, texturing and engraving on almost any material. With conventional technology it is not possible to obtain very high quality, performance, and detail in prototypes, but Microrelleus' femtosecond laser ablation provides absolutely burr-free microstructuring with very sharp edges and high-quality surface finish.

So, Microrelleus are microstructuring and texturing PMMA and PC prototypes, both for functional and design purposes.

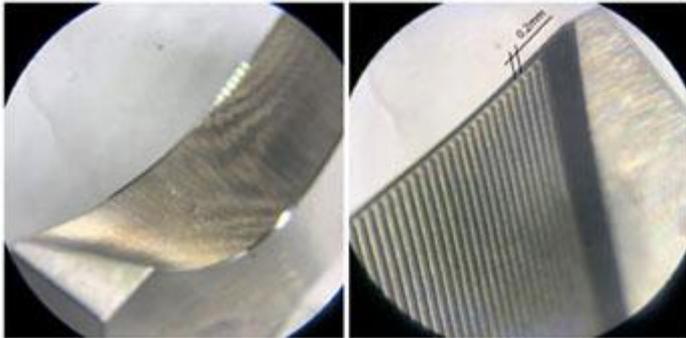
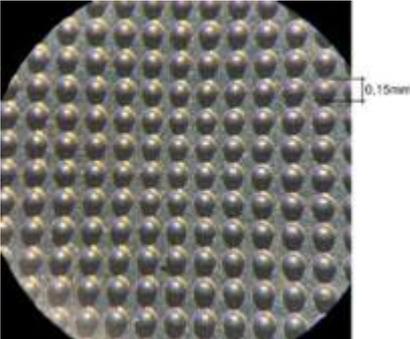


Texture comparison between prototype and injected part

In addition, they offer innovative mold and tool microstructuring. Before the advent of their technology there was a big gap in the level and fidelity of engraving detail and micro shapes between conventional technologies—milling machines, die-sinking EDM, etc—and lithography and other nanotechnology processes; there was no real solution with micron-scale resolution.

Now, Microrelleus can create microstructuring for lighting purposes such as diffracting, spreading, or diffusing light with attractive surface patterns, concentrating light for greater intensity, and creating micro-optics. The five-axis capability of their machinery allows all these new possibilities to be applied over any 3D shape.

Their technology was presented in an exhibition booth at ISAL this past September. These next images are photomicrographs of microstructures on a 3D mould insert, and micro-optics on steel (at 90x magnification):



SEAT's Cupra Tavascan concept has Microrelleus' microstructures in the tail light lenses to promote homogeneity of the lit appearance. We asked four questions of SEAT Lighting Manager Carlos Elvira:



DVN : What is the feedback on the wonderful rear lamps of the Cupra Tavascan unveiled at the 2019 Frankfurt auto show ?

Carlos Elvira: The general comment was about an innovative design that takes advantage of the technological opportunity offered by the femtosecond laser to create 3D forms very difficult to present with other technologies.

DVN: What does this technology bring in the styling of rear lamps, compared with your already nice rear lamp?

C.E.: It allows us to evolve from uniform lines that characterise our current designs to uniform surfaces that provide our designs the opportunity to work in three dimensions.

DVN : Do you think this technology is mature to be used production ?

C.E.: It is a mature technology to make prototypes on plastics of all kinds. For production it is a mature technology within the dimension of microstructures. If for optical reasons we need to make moulds with nanostructures, then it is necessary to do more durability tests. But for today's needs it is a very reliable technology

DVN: Do you expect using the technology in the next rear lamps you are

developing at SEAT? C.E.: As I said before it is a possibility in the hands of our designers to work in another dimension with the light of our models and I am sure they will take advantage of as we have always done in our models previously with the technologies at our disposal.

Lighting News

Stanley Buy HexaTech in UV-C LED Push



Stanley Electric will acquire shares of U.S. company HexaTech and make it a Stanley subsidiary. HexaTech develop, make, and sell aluminum nitride semiconductor substrates, a key component for deep-ultraviolet (UV-C) LEDs. With a dominant wavelength of 265 nm—deadly to

bacteria, but harmless to humans—such LEDs are being developed with an eye toward replacing bulky, power-hungry fluorescent and HID sterilisation-lighting technology. HexaTech's technology has achieved defect-free, large-diameter growth of the aluminum nitride crystals that are used for the substrates of these LEDs.

The increase in population and economic activity is currently worsening the problems of water shortage and contamination and atmospheric pollution on a global scale. The global scale for deep ultraviolet mercury lamps alone is expected to reach around ¥160bn (\$1.46bn, €1.31bn) this year. Furthermore, the Minamata Convention on Mercury that took effect in 2017 prohibits the manufacture and import-export of products containing mercury starting this year. Mercury lamps for sterilisation are temporarily exempt as there is no practical alternative light source—but Stanley have already achieved a UV-C LED output power of 50 mW, and see the HexaTech acquisition as a key stepping stone toward their goal of 200 mW soon, which would position Stanley well to commercialise UV-C LEDs.

Stanley are hoping to launch new products into the sterilisation market as quickly as possible and to reach sales exceeding ¥50bn in the sector by 2025. At CES last week, they showed application concepts for continuous cleaning of water, refrigerator contents, automobile interior air, food production areas, and more. Too, Stanley expect that aluminum nitride substrates will be used for communication and power transistors in the future, leading to further growth in demand for the HexaTech technology.

Gentex Dimmable Windows for Airbus Planes—Cars Next?

Airbus are now offering Gentex's latest electrochromic windows. These EDWs (electronically dimmable windows) will allow passengers to selectively darken their window without shutting out the scenery outside. This eliminates the bulk and wear of traditional window shades, and the windows also block infrared energy, thus reducing



passive heating of the cabin and lessening dependence on power-hungry air conditioners.

EDWs use a proprietary electrochromic gel encapsulated between two thin glass panels that darkens or lightens in response to electricity. A low-voltage electric current is passed through

conductive coatings and across the glass panels to induce an electrochemical reaction in the gel that causes it to darken. Removing the voltage allows the gel to return to its natural, transparent state.

Compared to previous designs, the latest EDWs darken twice as fast and become 100 times darker, effectively eliminating more than 99.999% of visible light. The ones Airbus went for are designed as integral replaceable units to make installation and maintenance easier, and have a long-lasting, scratch-resistant dust cover. Could EDW technology make today's tinted car windows obsolete? Probably someday soon; at CES, Gentex showed an electrochromic sunroof.

Gentex, founded in 1974, are a supplier of automatic-dimming mirrors and electronics for the automotive industry, and dimmable windows.

Bosch's ADB-Like Virtual Sunvisor



Drivers block large parts of their visual field when they swing down a visor to keep bright sunlight out of their eyes. Along with sunlight, a traditional visor can block out traffic lights and other important things the driver ought to be able to see. Bosch's new Virtual Visor aims to fix that. It's a transparent LCD panel with integral camera, designed and positioned like a regular visor, but it shades only the

sunlight from the driver's eyes.

The Virtual Visor uses a single, transparent panel, a driver-monitoring camera, and facial detection to track the driver's eyes and block the sun accordingly. It's conceptually similar to ADB: the bright light is dynamically shadowed out from the driver's line of sight; everything else remains clear. Artificial intelligence determines specific features on the driver's face, such as the eyes, nose and mouth, and identifies where shadows from the sun are cast on the face.

Transparent hexagonal pixels on the screen allow for digital movement of the shaded areas of the visor to adjust to where the driver's eyes go.

Antolin, Eyesight Team on Driver Solutions



Grupo Antolin and Eyesight Technologies have entered into a partnership to provide driver and occupancy monitoring technology. The collaboration will provide car manufacturers with in-cabin solutions

tailored to the needs of future electric, connected, autonomous vehicles, leveraging the technological capabilities of driver and occupancy/interior monitoring.

Eyesight's Driver Sense driver monitoring system tracks the driver's eyes, eyelids, pupils, head, and gaze to determine alertness, wakefulness and attentiveness of the driver. Their Cabin Sense occupancy monitoring system keeps track of the car's interior and passengers, powering adaptive safety features and personalised cabin environments. Driver identification and action detection such as smoking, seatbelt use, and phone-holding are also available. Last week at CES in Las Vegas, Antolin were presenting in Eyesight's booth; they showed how Driver Sense can be integrated into a drive deck design. Eyesight's sensing solutions encompass a variety of applications related to driver and passenger safety and experience inside the vehicle.

The partnership with Eyesight allows Antolin to move forward with their Smart Integrator strategy, anchored in developing more complex systems, offering new features by incorporating more technology, electronics, and lighting solutions. Smart Integrator will be the cornerstone of Grupo Antolin's new plan to be launched this year. One of the mainstays of the plan is the search for alliances with startups and tech companies—such as Eyesight.

Driver Assistance News

Automakers Spend for EVs, AVs Despite Soft Interest



Automakers are investing enormous money in electrification and autonomy—two areas in which consumers aren't showing strong real interest.

A new study from Deloitte, released at CES last week, finds car buyers are ambivalent toward autonomous and electric cars, and shows that the amount they are willing to pay for these features may be less than what automakers think.

58% of U.S. consumers told the global consulting firm they are not willing to pay more than \$500 for AV technology. Perhaps worse for companies developing AVs, which often use the promise of safer roads as a compelling marketing tool, 48% of consumers believe self-driving vehicles will be unsafe.

The survey was conducted for Deloitte's 2020 Global Automotive Consumer Study. 51% of the respondents are concerned by the idea of AV being tested in areas near where they live.

"Underlying these massive R&D investments is the assumption that consumers will actually pay for advanced vehicle technologies when they appear on the market," said Joe Vitale, global automotive sector leader for Deloitte. "As consumer skepticism gains momentum, automakers should rationalize returns on invested capital to remain profitable as consumers' desires to purchase new technologies continue to wane."

The results are more encouraging for electric vehicles. 41% of U.S. consumers say they are actively considering a hybrid-electric or battery-electric vehicle for their next purchase. That's up from 29% only last year.

But there's a disconnect. Even though the average vehicle owner travels only about 27 miles per day, according to the Deloitte study, 41% also believe that full battery-electric vehicles should have a range of at least 300 miles. In the meantime, there are still concerns over charging infrastructure and how the widespread rollout of chargers will be funded.

Marelli, Xenomatix to Form Lidar JV



Marelli and solid-state lidar supplier Xenomatrix announced last week at CES that they will enter into a technical and commercial development agreement in the autonomous driving field.

Xenomatrix will provide Marelli's AL lighting division with lidar modules. The solid-state, multi-beam lidar, together with AL's lighting expertise, will provide dependable long range coverage, crucial to enable a variety of ADAS and AD functions.

Xenomatrix's products use non-scanning lidar. Their XenoTrack and XenoLidar product ranges already have found favour with tier-1 suppliers and automakers. AL CEO Sylvain Dubois says Marelli are "glad to start this collaboration with a high-tech added value partner like Xenomatrix; our objective is to support our customers in enabling a crucial set of functions in the ADAS and AD field".

AL and Xenomatrix will combine competencies and technologies to offer modular lidar system solutions to meet future global automotive needs, also leveraging the AI perception technology derived from Smart Me Up, the French startup Marelli bought in 2018. Marelli have progressively strengthened their competence in the ADAS/AD domain with iterative improvement of their Smart Corner, which integrates sensors for autonomous driving within vehicle headlamps and tail lamps while maintaining attractive styling and world-class lighting performance. Last year the Smart Corner was named a CES Innovation Awards Honoree.

Lidar Companies: Latest Developments at CES 2020



At CES, automotive applications covering autonomous driving technologies are one major field targeted by worldwide technology builders.

- **Velodyne lidar** introduced Velabit™, the company's smallest sensor which brings new levels of versatility and affordability to 3D lidar perception, at CES 2020. The Velabit leverages Velodyne's innovative

LiDAR technology and manufacturing partnerships for cost optimization and high-volume production.

- **Ouster** revealed two new digital lidar sensors, one, OS0-128, features ultra-wide field of view and the other, OS2-128, addresses the long-range detection

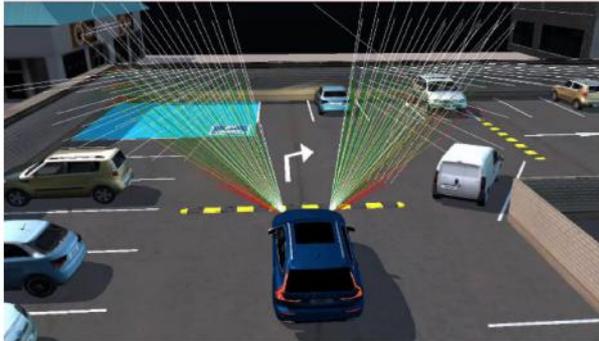
The OS0 marks a new category of ultra-wide field-of-view lidar optimized for autonomous vehicle and robotics applications.

- Combining **Intvo's** smart software with **AEye's** 2D/3D adaptive sensing iDAR™ platform, the two companies are demonstrating advanced pedestrian intent capabilities at CES 2020 that captures, processes and optimizes both 2D and 3D data in real-time, to achieve human-like perception that aims to improve safety for all road users.

- **Luminar** introduced its lidar perception technology that enables safe driver-out-of-the-loop autonomy and demonstrated the technology's capabilities in real-time of

detecting and classifying objects out to 250m. Paired with Luminars sensors, its new Perception Compute Unit (PCU) reference design is powered by the NVIDIA Xavier SoC, which is already being embedded into production vehicles.

Aeye Collaborates with Ansys in AV



Ensuring safe autonomous driving requires new kinds of sensors to quickly and correctly interpret dangerous road scenarios which cannot be reliably detected by traditional perception platforms. To validate the effectiveness of these sensors, engineers must carry out numerous road tests which require a great deal of time and expense.

Ansys enables Aeye to produce virtual prototypes to accelerate the design, testing and validation of automotive perception technologies in real environments and demanding conditions. Automakers can virtually simulate driving situations and travel millions of kilometres in just a few days, while minimising the need for physical prototyping.

Next generation AD systems will be able to imitate human vision and the way the eye visualizes and assesses road conditions thanks to technologies from Aeye, a pioneer in intelligent perception, and from Ansys, a leading digital simulation software provider. Aeye integrates Ansys technology into their intelligent detection and telemetry platform, reduce the need for their customers to make costly, time-consuming physical prototypes and improving the security and reliability of autonomous systems.

Specifically, Aeye use Ansys' Speos and VRXperience, an advanced driving simulation tool with physics-based sensor models, in the IDAR platform, on which customers can quickly test and certify their designs in a realistic virtual driving environment. IDAR—Aeye's Intelligent Detection and Ranging system—is an advanced vision technology for autonomous cars that combines deterministic perception with AI-driven perception. This makes it possible to detect and estimate very long distances very quickly, which is impossible with lidar sensors or conventional cameras. With this integration, companies developing AVs and ADAS will be able to easily design virtual lidar prototypes and simulate exactly how they should perceive the environment.

L4 May Be as Good as It Gets: VW Exec

Volkswagen Autonomy CEO Alex Hitzinger thinks his subsidiary's first product to get Level-4 autonomy could be a version of the I.D. Buzz three-row electric minivan, possibly as a light-duty commercial vehicle starting around 2025.

At CES last week, Hitzinger said the goal is to generate enough demand for L4 autonomy, at least potentially to take advantage of some economies of scale, and explore “scalability”, not just offer a token fleet of test prototypes.



As for L5—fully autonomous driving, anywhere and in any conditions—Hitzinger said "This is one of the hardest problems we have. This is like we are going to Mars...maybe it will never happen". So L4 might be as good as it gets, he said, adding that Level 4 abilities could potentially attract commercial-vehicle users.

Full AVs At Least 10 Years Off: BlackBerry CEO



BlackBerry CEO John Chen spoke last week at CES about the race for fully autonomous vehicle technology, privacy and security, and BlackBerry competitors.

"I don't think I'm going to buy a Level 5 car for at least 10 years," he said, but he expects to see autonomous commercial vehicles and taxis soon.

His company have a major stake in facilitating AV technology through their software solutions and made six major auto-related announcements at CES, including a partnership with Renovo for a data management platform with QNX, BlackBerry's automotive operating system, and a partnership with Amazon Web Services.

"Level 3 will be mainstream for a long time," Chen said, speaking about the levels of autonomy. "The design wins in Level 4 and Level 5, but the revenue is still in Level 3."

Chen also spoke about the company's automotive market share and potential competitors, such as software provider Green Hills Software and Google. Chen estimated BlackBerry holds more than 50 percent of the market, with 150 million vehicles on the road using QNX.

Hella and Oculii in Radar Pact



Hella and Oculii have established a strategic partnership to deliver high performance radar sensing and perception solutions for Level 2–3 ADAS and AD, based on Oculii's Virtual Aperture imaging software, which significantly increases the angular resolution of a radar phased array. This, it is claimed, dramatically improves safety, reliability and efficiency of ADAS.

The software technology scales angular resolution without requiring multiple active transceivers or expensive antenna technologies, creating an affordable, high performance solution that dramatically enhances existing radar architectures. Leveraging this software technology, Hella will bring their competence in the field of automotive radar hardware design experience and industrialisation capabilities along the entire supply chain to leverage and extend their existing radar product platform. It is claimed the joint development effort will bring high resolution best-in-class L2-L3 ADAS imaging radar solutions to global automakers.

"This collaboration with Oculii will enable us to leverage advanced software technology to significantly enhance the performance of our leading automotive radar platform," said Frank Petznick, Hella's EVP of Automated Driving and Member of the Electronics Executive Board. "Oculii's Virtual Aperture Imaging technology will enable us to develop radar solutions that catalyse new functionality for ADAS and promote the trend towards AD".

Meanwhile, Oculii CEO Dr. Steven Hong called Hella "an ideal strategic partner for Oculii as we look to deploy our Virtual Aperture imaging radar software technology (...). Oculii and Hella have demonstrated that our combined expertise can deliver a radar perception platform that can meet the needs of both ADAS solutions today, as well as AD in the future".

In December, Hella Ventures also became a shareholder of Oculii. The first joint development projects will start immediately, with the objective of a SOP in 2023.

Oculii sensors extract unprecedented resolution, accuracy, and range from commercial, mass manufactured, automotive grade low cost radar silicon - bringing high performance perception to the masses

General News

Supplier innovations at CES



As traditional suppliers seek a stake in the future of mobility, many are using their expertise in interior technologies to bring changes to the cockpit.

Bosch won a 2020 CES Innovation Award for their new 3D display, which uses passive 3D technology to generate a 3D effect for images and warning signals

inside the cockpit. The goal is to allow drivers to process visual information faster and easier than when it's displayed on conventional screens.

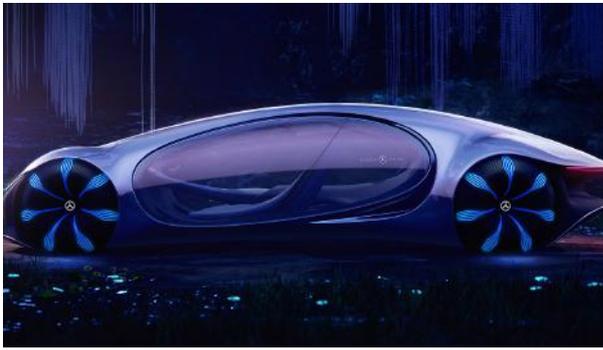
Visteon unveiled their MicroZone high-contrast, low-power display, which allows for easy over-the-air updates and good security.

Aisin Seiki unveiled their I-mobility Type C20 concept vehicle: an automated, buslike ride-sharing vehicle intended for short destinations. It has an electric ramp for accessible boarding, and an in-cabin monitoring system to detect a passenger's facial direction and eye movement. It incorporates Aisin electric vehicle components such as the eAxle electric four-wheel-drive unit, rail-free power sliding doors, and thermal management products.

Continental showed their "holistic" HMI, which combines auditory and visual cues for human-machine communication inside and outside an autonomous vehicle. The HMI will provide a number of cues, such as when pedestrians are detected in the path of the CUBE, the supplier's development shuttle for autonomous technologies. Waiting passengers can track a shuttle's location, and the vehicle will display a welcome message when it arrives. The system also provides sounds that let pedestrians know they are in the vehicle's path and caution them to move. Once it stops, the shuttle will notify pedestrians when they can safely cross.

Mercedes' New Vision Concept

Daimler's newest Mercedes concept, the Vision AVTR (Advanced Vehicle Transformation), showcases new organic design, active aerodynamic, hologram-based human-machine interface, new interior materials and electric drive ideas on an advanced new concept car.



The car is the result of collaboration between Mercedes' global design operations and the team behind Hollywood film producer James Cameron's movie Avatar, the 2009 science-fiction blockbuster featuring an alternative humanoid species set in the mid 22nd century.

Rather than previewing any specific upcoming production model, the Vision AVTR is intended to combine the ideas designers, engineers, and trend researchers suggest could improve interactions between humans, machines and nature in the distant future.

Described by Mercedes head of advanced design Stefan Köhl as a "play garden of new shapes and ideas within a human-centered design idiom", the concept is intended to portray what an S-Class might look like a hundred years from now. Among the more flamboyant elements on the car are 33 individual bionic flaps, evincing reptile scales, that lift from the rear bodywork to alter the aerodynamics.

The new concept has been conceived to move sideways at approximately 30 degrees by driving the front and rear axles in the same or opposite directions. This "crab movement" is designed to provide the car with maximum agility. Inside, the Vision AVTR sets out to integrate its occupants on a deeper level than today's cars, with a new hologram-based interface system which, in combination with autonomous driving technology, does away with the need for a steering wheel and traditional controls.

Production Byton M-Byte Sees Light of Day



Two years after showing an initial concept at CES, Byton last week showed off the production version of their M-Byte electric crossover and announced a first major partnership as an auto manufacturer.

Byton are a Chinese company founded in 2016. They've been ambitious with production plans for their first vehicle; they plan to launch the M-Byte in China this year, and recently tapped veteran engineers from Ford and Renault to

prepare for its upcoming production.

The company say they've received licences to sell the vehicle in California, which they hope will pave the way for sales throughout North America next year. European deliveries are planned for next year as well.

The M-Byte incorporates Byton's "Your Platform for Life" user experience, the company's vision of making the vehicle the "central device in your ecosystem of digital devices," CEO Daniel Kirchert says.

SEAT Brand Boss Steps Down



The head of Volkswagen Group's SEAT brand, Luca de Meo, is stepping down.

He'll be replaced by the brand's finance chief, Carsten Isensee. De Meo will remain with VW Group for the time being. VW Group said de Meo has had his duties as Chief Executive of Seat revoked at his own request and by mutual agreement. His resignation comes amid media reports that de Meo has been offered the CEO job

at Renault.

Renault have said they are drawing up a list of candidates, probably including de Meo, to replace Thierry Bolloré, who was shown the door last Autumn; Renault are currently led by finance chief Clotilde Delbos on an interim basis.

Plastic Omnium Ready for Future: New CEO



Laurent Favre has just taken charge of Plastic Omnium. Before, he was CEO of the automotive division at Benteler, which makes structural parts. He has also held management posts at ThyssenKrupp and ZF in his 23-year automotive career.

Plastic Omnium had revenue of around €9bn in 2019, up from €1.5bn in 2011, with more than 130 factories and more than 20 R&D centres round the world. They expect a 2019 operating margin of 6%.

Some of Favre's comments:

"Plastic is the only material that is 100% transparent to radar waves. The autonomous car, full of radar, lidar and sensors, will be made of plastic parts with connectivity integrated. That indicates that plastic has a bright future. In front-end modules, we're the leader with our HBPO JV with Hella, and we're developing new modules to increase the content per car, for example to add cockpits.

"Today Plastic Omnium is producing products; tomorrow we want to produce functions. That means integrating radar, lidar or lighting, for example, into our exterior systems. We are doing that in our coöperation with Hella for bumpers and with Brose for doors. That's really the transformation we are working on, from a product supplier to a function supplier.

"We continue to grow in China, and in 2019 it was the country where we outperformed the market the most. In the first nine months of 2019, the market was down 13%, but we grew by 4%. We don't see a recovery in 2020 but our growth will still be solid. We have 26 factories in China and we've launched a R&D centre in Wuhan; we are covering all the main clusters; and we have a balanced portfolio between global and domestic automakers.