

Tue, 27 December 2022
Weekly Newsletter



NEWSLETTER #783

PixCell LED

Ultimate precision in perfect alignment

100+ individual cells with just 25 µm spacing, perfectly matrixed onto a single LED chip for intelligent headlamps

SAMSUNG



Editorial

Eyes And Lights On '23



The image shows the front view of a car with a glowing grille. The grille is illuminated with a grid of small lights, and the DVN logo is visible in the center. The car is dark, and the background is black.

DVN
Driving Vision News
2023
WORKSHOPS

LIGHTING
PARIS
TOKYO
SAN JOSE

INTERIOR
KOLN

LIDAR
FRANKFURT

All of us on the DVN team—and I personally—wish you a happy new year.

As you start to take a look at your 2023, save the date for the [DVN Paris Workshop](#) on 31 January-1 February at the famous Hyatt Regency Paris. The rubric of the event is **Software-Defined Lighting: New Possibilities for Optics; Electronics; Material, and Design**. Sessions will include four top-notch keynotes; 10 automaker lectures; 10 lectures from tier-1s and 15 from tier-2s and research outfits; a regulatory session, and a panel discussion titled *Light is the New Chrome—and What is the New Front End?* Quite a great docket. [Register now!](#)

This week, we bring you an article about Cesar Muntada, considered as one of the top lighting designers in the industry; and a piece about Porsche lighting. We're ever so glad you're with us, and we hope your holidays are warm, restful, festive, and otherwise going along exactly the way you like them.

Sincerely yours,


DVN CEO

In Depth Lighting Technology

Audi's Muntada: Lights to Interact Smoother and Safer.

Extract of a FastCompany article



Audi's designers have reinvented the front lamps on the new R8, with an array of 25 LEDs providing headlight beams; fog lamps; turn signals, and previously impossible decoration. Audi's head of lighting design, Cesar Muntada, was involved in transforming the vehicle lighting design alongside the likes of Wolfgang Huhn and Stephan Berlitz.

Herewith, his thoughts:

"We brought light design into the car industry. There's been a revolution in the technology. Headlights are taking radical new forms. In the latest concept cars as well as production vehicles designers are creating headlights and taillights that do far more than simply light up the road.

"There are adaptive driving beam headlights that can automatically shadow out and avoid shining in the eyes of oncoming drivers, and spotlights that can detect pedestrians and cyclists on the side of the road. There are animated displays that sparkle up when an owner approaches their car, and taillights using more finely controllable OLEDs that can boost their brightness when an approaching vehicle comes up close behind".



"Audi's A6 e-tron concept turns headlamps into a kind of entertainment, allowing parked cars to project videos or even playable video games onto the ground or a nearby wall. While some regulations won't allow us to do things while the car is in motion, there's a lot more freedom when the car is stationary.

Now, as the motor vehicle industry shifts its focus to electric vehicles, and eventually to autonomous vehicles, that's opening an abundance of opportunities for designers and leading to an industrywide rethinking of what lights can do, from upstart brands to the long-established leader in lighting design, Audi. "We created the first revolution," Audi's Muntada says. "I think we might now be in the second revolution."

The mainstream shift to EVs is an overarching theme:



HUMMER FRONT



HUMMER REAR

At the front of GM's new Hummer EV, in the space where the grille of a combustion-engine vehicle would be, hummer is spelt out in lights. The light band spans across this space, no longer needed for airflow and so now available for branding, messaging, and new designs. The LED taillights have a hummer callout as well.



"In the old days if you wanted something to sell for a higher price, you'd just slather chrome on it because that's what the customer can really see; lighting is the new chrome," says Raphael Zammit, chair of the graduate transportation design program at the College of Creative Studies in Detroit, one of the top schools for automotive design. Zammit spent years working on design and concept teams at automakers including Porsche; Hyundai, and General Motors, and he says lighting design is becoming one of the main differentiating factors among competitors. It's why companies like Audi have put such intense focus on

lighting design.

Zammit says lighting has become such a central part of the marketing of cars because, like the chrome of the past, it's readily leveraged to differentiate one brand from another: "A lot of car companies can show a car driving around really fast. But it's a lot clearer if you can compare this special effect against that special effect. It's more concrete".

When Audi moved into LEDs, lighting was no longer considered a discrete element of the car, or just a jewelry item that designers could tack on to grab the eye. Muntada says new and emerging technologies are making it possible for lighting to better blend into the shape of the car, or even be embedded in windshields. These advancements have meant a smoother overall form. Looking forward, Muntada says lights could be integrated in ways that blur the lines between the body and the lights. "We are part of the whole design," he says. "We are in the line, the message, the character, the personality of these cars. It's not true anymore that I have lights to see in the front and lights to be seen on the rear and that's it".

Emerging technologies make this blurring of body and light even more possible, according to Stephan Berlitz, head of Audi's lighting development. Digital micromirrors in Audi's matrix LED headlamps use 1.3 million tiny mirrors to precisely shape and project light, making it possible to sculpt the lighting enclosures without sacrificing lighting performance.



And the digital OLED rear lights on some new Audi models have a flexible substrate that allows them to wrap around three-dimensional surfaces. "That not only sharpens the form, but it also makes it possible to integrate digital light design within the exterior of the lights, enabling symbol displays for additional communication with the outside world," says Berlitz.

Lighting will still be needed on autonomous vehicles—not least so humans without the benefit of radar or lidar or night vision can see them.



It'll be part safety, part branding, according to Paul Snyder, a former car designer for Honda who now chairs the undergraduate transportation design program at the College of Creative Studies: "You're going to have lighting that still signifies here's the Zoox autonomous taxi bot, and you'll recognize it when it's coming down the road versus whatever the Waymo taxi bot or the Cruise taxi bot looks like," Snyder says. "Pedestrians on the street will definitely need to see these very quiet vehicles cruising around".

Audi's Muntada is already thinking about the role lighting can play in this future communication. Cars will need to have an entirely new 'light language', he says. There will need to be a systematic reimagining of car lights from merely lighting the road or indicating

turning and braking to communicating driving states; directional intentions; acceleration and deceleration; road hazards, and the service status of taxi cars operating autonomously. "It's something that doesn't exist at the moment. We started already but creating a designed light language needs to understand this language in a fraction in a second", he says. For lighting designers, the floodgates are opening. Whether it's animated light sequences in the conventional eyeball-like headlights or embedded LEDs turning entire vehicles into signs announcing your taxi has arrived, lighting technology is enabling bold new functions for light on cars.

If Muntada's right, lights are going to become a critical way for cars and humans to interact more smoothly and safely. Beyond just making it possible for people to drive at night or adding value to a luxury vehicle, lights may soon be vital mechanisms for the way we let robot cars coexist with humanity. "We believe this is the biggest challenge that we've had so far," Muntada says, "because it's trying to put the whole world together in a new way."

Lighting News

Porsche's Performance Leap in Light Technology

LIGHTING NEWS



Porsche have developed new high-resolution HD matrix headlamps. The core element is a chip that combines over 16,000 individually controllable microLEDs onto a surface area the size of a thumbnail. Two of these arrays are in each headlamp, for a high-resolution light distribution up to twice as bright on a surface four times larger than previous top-notch systems.

There are innovative functions such as lane illumination; construction and narrow-lane light, and adaptive motorway high beams. The high-performance high beam turns night into day at a distance of up to 600m. A new non-dazzling high beam function is used in traffic; large areas to the right and left of the anti-dazzling gap become significantly brighter.



In addition to four-point DRLs and static cornering lights, the new Porsche headlamp includes two of the new HD matrix modules and two bi-functional modules for courtesy lighting and the auxiliary high beam. These four main light sources are arranged in a four-point design characteristic of the brand. The previous top headlight from Porsche, by contrast, features four courtesy modules and a central Matrix module in 84-pixel technology.



[CLICK ON THE IMAGE TO START THE VIDEO](#)

The new HD matrix technology also stands apart in terms of design: for the first time, the characteristic Porsche four-point signature of the DRL can also be seen at night when the new system is used – with both low and high beams. The HD matrix headlights will be introduced successively in different model lines with identical module technology but adapted designs. In the development process, Porsche submitted over 25 patents for the innovative technology.

The design of the headlamp is clearly structured: four almost squarely-arranged light modules, each complemented by a narrow daytime running light strip above the module, trace the brand's characteristic four-point design by day and by night. The two upper bi-functional modules are identical and provide the courtesy lighting and auxiliary high beam with three LEDs each.



The heart of the new HD matrix technology is the two lower light units. Each features an identical LED array with integrated ASIC LED driver which generates an unprecedented high-resolution luminous flux in an area of just 12.8 × 3.2 mm. The system controller, comparable to a powerful graphics card, activates and controls the brightness of each of the 16,384 individual LEDs per array, in 1,024 steps.

Lenses with specifically ground optical glass complete the two HD modules; the lenses produce different illumination angles. The wide-angle lens of the outer HD matrix module's illumination covers 40° of width and 10° of height. The inner module with 'telephoto' lens has a 20° wide by 5° tall beam—half as high and half as wide, with significantly higher intensity. The light distributed by the two HD modules overlap in the centre.

The performance leap in light technology can be attributed to this efficient generation of light and the combination of the two HD matrix modules with the two bi-functional modules. With a total of 32,768 individually-controllable pixels per headlamp, the HD matrix modules generate direct high-resolution light. Only the light that is actually required is generated; this is why it is known as active-matrix light.

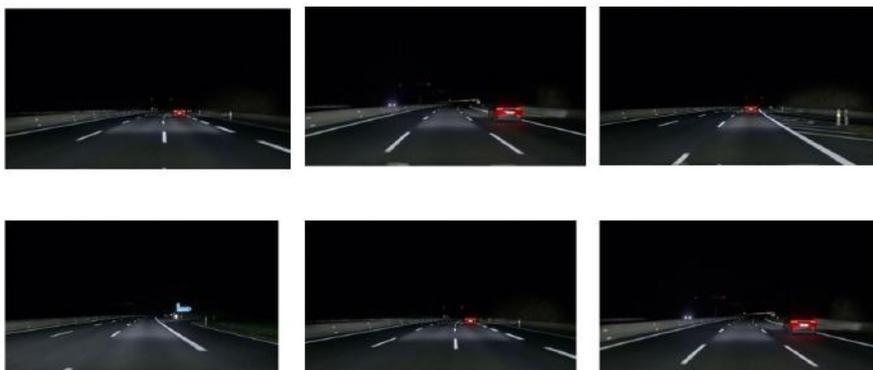


The HD matrix light illuminates the entire $40^\circ \times 10^\circ$ field with over 1,400 lumens. It covers the entire high beam range and begins just in front of the vehicle. The light can be distributed in any way within this area and this flexibility makes it possible to improve existing functions and introduce new ones—always with the aim of offering the driver the best possible seeing in any situation.

If the system does not detect any vehicles ahead, and the automatic high beam is active, the HD matrix modules switch from low to high beam, and the auxiliary high beam of the upper bi-functional modules is automatically switched on. This ensures an increase in the beam length and increases the performance of the high beam, which reaches out more than 600 metres! If the camera detects a vehicle ahead or an oncoming vehicle, the auxiliary high beam is deactivated, and the vehicle is selectively masked out by switching off the corresponding pixels of the HD matrix modules. The energy that this frees up is converted into additional, functional HD light. The full width of the available HD light is used to optimise the illumination of the non-dazzling high beam and to improve the driver's ability to see, without dazzling other drivers. When anti-dazzling is activated, the amount of light from the HD matrix module to the right and left of the anti-dazzling gap is doubled, resulting in significant brightening of the remaining high beam range.



This function is used for better illumination of the vehicle's own lane in the form of a light carpet. The lane between the road markings becomes significantly brighter. And this regardless of the vehicle's position in the lane. Whether the vehicle is further to the right, further to the left or in the middle, the light carpet adheres to the road markings as if it were a magnet. The function is activated exclusively on motorways or comparable roads. It enables early detection of hazardous objects and reduces lane changes by other, less attentive drivers into the vehicle's own lane. In the case of deliberate lane changes, the light carpet is briefly widened to cover both lanes when the marking is crossed, before subsequently illuminating only the new lane more brightly once the lane change is complete.



When construction zones or narrow areas are detected, the light carpet is automatically reduced to the same width as the vehicle, including mirrors, to brighten the lane and thus

make it visible to the driver. This visual support enables drivers to better assess their position in the narrow lane as well as overtaking manoeuvres. Steering and speed corrections are demonstrably reduced, with lane keeping and road safety being enhanced as a result.



On motorways and comparable high-speed roads, the control system ensures the best possible illumination of the driver's lane while also optimally adapting the light distribution to the conditions on the motorway. The illumination is cut off with a soft transition towards the median strip, which prevents drivers in the oncoming lane being dazzled.

Mobis at CES: Premium Illuminated 3D grille design

LIGHTING NEWS



Visitors will be able to see Mobis' celebrated lenticular grille lighting in person. Featuring Mobis' patented lenticular lens, this premium grille design solution creates a 3-dimensional look that appears to change depending on the viewing angle.

Mobis will also unveil a new product called prism module. Thanks to new achievements in prism optics, this lighting product combines the low beam and the DRL into a single module that's just 12 mm thick. Prism module's significantly reduced size also gives headlamp designers a much greater degree of freedom.

DVN will publish in January, a report on the CES event, and an interview of Mobis.

Valeo, Ningbo Swell Agree Strategic Alliance

LIGHTING NEWS



Valeo and Ningbo Swell Industry have signed a strategic alliance agreement for the development; production, and marketing of illuminated front grilleboards for the Chinese automotive market. By combining their expertise, Valeo and Swell intend to offer carmakers in China value-added grilleboards with inbuilt lighting.

Grilleboards like these are an essential element in the identification of car brands and style, particularly on EVs which don't need a radiator grille in this location. So, more front-and-centre space is available for signature lighting, which opens up new creative fields for car designers.

Maurizio Martinelli, Valeo's president of visibility systems, says "The value of lighting will grow further thanks to the electrification of vehicles. I am therefore delighted with our alliance with Ningbo Swell Industry. This move completes Valeo's strategy to capture worldwide business opportunities represented by the new front central area integrating additional lighting. Valeo and Swell together represent a major player in the front central area in the Chinese market".

Ningbo Swell Industry design and make automotive interior and exterior parts.

"Sense the Next": AMS Osram at CES

LIGHTING NEWS



AMS Osram will demonstrate how their latest sensing and lighting is enriching people's lives. CES visitors to the supplier's booth, themed "Sensing the Next" (...trends in consumer and industrial applications), will experience how the supplier combine sensors and emitters to create advanced optical systems for the industrial, automotive and mobility markets to make life better for everyone.

Highlights include:

- Dynamic forward lighting: with more than 25,000 individually-controllable pixels, Eviyos will bring HD-quality projections onto the road without glare while enabling the projection of approved warning signs;
- In-cabin 3D driver monitoring systems based on advanced infrared emitters and image sensors, and incorporating Smart Eye software for detecting driver distraction or drowsiness;
- Interior lighting: the new Osire[®] E5515 side-looking automotive RGB LEDs in thin, smart structures using an innovative in-mold process and validated for use in TactoTek's IMSE[®] technology;
- Lidar: Discover AMS Osram's broad portfolio of emitters.
- Hands-on detection: experience the industry's first completely reliable solution, enabling car manufacturers to comply with safety needs and rules;
- Exterior lighting: a full-width rear lamp system just 5 mm deep, based on Synios[®] P1515 side-looker LEDs

Driver Assistance News

Automakers Should Simplify ADAS: Consumer Reports

DRIVER ASSISTANCE NEWS



Driver-assist systems that lack user-friendliness not only cause frustration, but may diminish the system's safety benefits, according to Consumer Reports. People confused by their driver-assist features might disregard them altogether.

"If they are not enjoyable to use in the car, if they're beeping at you incessantly, if they're doing things that are unexpected or confusing and you don't know why it's doing that, or how it's doing that, then not only is it confusing, but it can be annoying and frustrating," says Kelly Funkhouser, manager of vehicle technology at Consumer Reports' Auto Test Center.

In 2021, CR surveyed 35,250 owners of vehicles made in the 2015-22 model years. The survey focused on adaptive cruise control; blind-spot warning; forward-collision warning; automatic emergency braking; and lane-departure warning; lane-keeping, and lane-centring assistance systems.

Rear crashes decrease by half in vehicles equipped with automatic emergency braking and forward collision warnings, according to a recent study by the U.S. Department of Transportation and automakers. But CR's Funkhouser says difficult-to-use safety systems may hinder safe driving; unexpected beeping or unfamiliar symbols may distract a driver. A bad experience may cause the driver to disable the system.

Automakers should simplify and personalize the ADAS experience, according to Consumer Reports' guidelines. The system's name should be consistent throughout the vehicle, including the window sticker; manual, and vehicle display, as well as online and in marketing tools. The variety in system names comes down to branding and marketing, Funkhouser says, adding that automakers want their systems to stand out among their competitors.

The report said anywhere between eight and forty unique terms may exist for a given type of system. In many instances, many drivers aren't confident in how their systems work, the report said. For example, Consumer Reports found only 48 per cent of owners with vehicles equipped with forward-collision warning say they understand how it works, and just 42 per cent of owners of vehicles understand their vehicle's automatic emergency braking. That is why Consumer Reports and other safety advocates have created the "Clearing the Confusion initiative", which recommends a list of standard names designed to help consumers understand safety systems.

Volkswagen's Cariad Opens U.S. Tech Hub

DRIVER ASSISTANCE NEWS



Cariad continue their growth, and plan to strengthen their global development force by up to 1,700 new software and hardware developers and engineers globally in 2023.

Next month, Cariad will establish a new tech hub in the United States. As a kickoff and introduction, Cariad will be present at CES 2023 with a booth; presentations, and vehicle exhibits like the new Volkswagen ID.Buzz, which runs on software developed by Cariad.

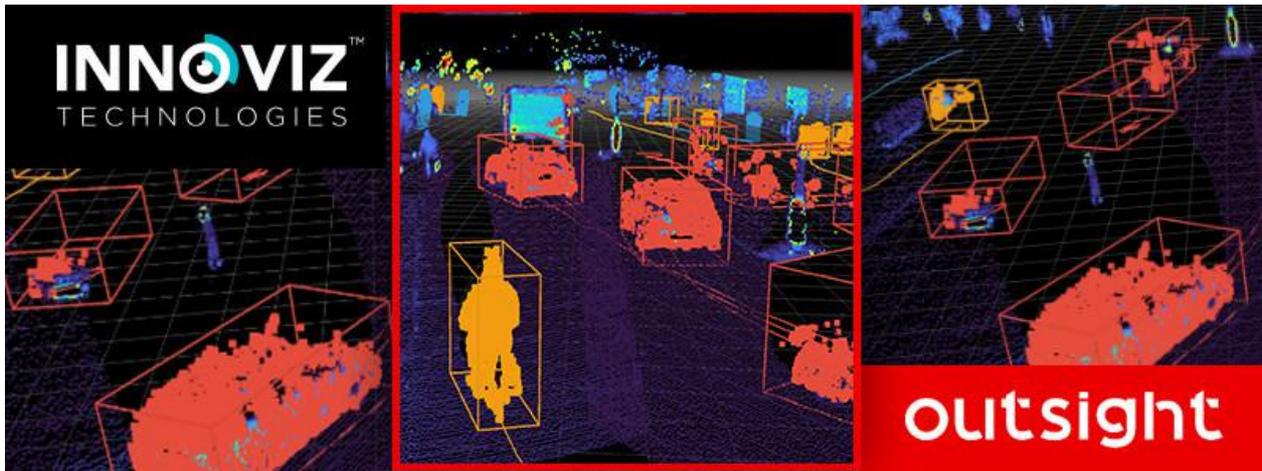
As the core of the new tech hub, Cariad will start with a team of about 300 software engineers and developers who previously worked for VW of America, focused on cloud technologies and infotainment. Based in the heart of two major technology ecosystems, the greater Seattle area and Silicon Valley, Cariad are developing automotive technology solutions in the areas of automotive cloud, the digital vehicle experience and automated driving.

One of the major solutions developed by the American team is the Volkswagen Automotive Cloud: In close partnership with Microsoft, the team are creating a unified backend for all Volkswagen Group brands—an important backbone for continuous over-the-air updates for software-defined vehicles. The first customer vehicles will be connected to the Volkswagen Automotive Cloud in 2024.

After recruiting about 1,500 new employees in 2022, Cariad plan to add another 1,700 new tech innovators around the world.

In & Out: Innoviz, Outsight in Lidar Push Pact

DRIVER ASSISTANCE NEWS



Innoviz and Outsight have announced a partnership, saying Outsight's software and Innoviz's lidar products "facilitate and accelerate the adoption of 3D lidar technology beyond the ADAS market".

Innoviz lidar sensors meet the automotive industry's requirements for performance and safety, while Outsight's Spatial Intelligence real-time edge processing and cloud capability platform offers a ready solution for effectively integrating 3D lidar data into any infrastructure; industrial, or vehicle application.

Outsight say their products "make technology easier to use in any project, both in real-time and the cloud, including essential features like lidar SLAM; object detection and tracking; classification, and segmentation. Both companies are founding members of the Lidar Coalition.

Magna to Buy Veoneer's Active-Safety Biz

DRIVER ASSISTANCE NEWS



Magna will buy Veoneer's active-safety business from the current owners, New York-based investment group SSW Partners, for USD \$1.525bn in cash. Combining Veoneer's active safety competence and product portfolio with Magna's ADAS business is expected to strengthen the combined business and provide customers in more geographical locations with a full suite of ADAS solutions.

Magna CEO Swamy Kotagiri says the acquisition comports "with our Go-Forward strategy to accelerate investment in high-growth areas, strengthens our ability to deliver systems solutions to meet customer needs, and positions Magna as a leading full-service ADAS provider".

And Veoneer CEO Jacob Svanberg says "Magna is the right long-term home for Veoneer's active-safety business. The combination of both businesses creates durable value and accelerates an already exciting growth trajectory for Veoneer's employees, products and customers".

The transaction with Magna is expected to close near mid-year 2023, subject to approval of applicable regulatory authorities and other customary closing conditions. This past April, SSW Partners bought Veoneer in an all-cash transaction for \$4.6bn. With the announcement to sell the active-safety business to Magna, Veoneer continue their process of finding a suitable buyer for their restraint control systems business.

'Full Self Driving' Tesla Causes Highway Pileup

DRIVER ASSISTANCE NEWS



VVNG IMAGE

The driver of a 2021 Tesla Model S has told the police his vehicle was in so-called 'full self-driving' mode when it took it upon itself to cause an eight-vehicle pileup on the San Francisco Bay bridge last month, which sent two young people to hospital and caused a severe traffic jam. The police report says the vehicle was going 55 mph when it abruptly changed lanes and suddenly braked to about 20 mph. That caused another vehicle to strike the Tesla, and then a chain reaction of crashes.

The crash happened just hours after Musk said Tesla would make FSD software available to anyone in North America who requested it, after having previously offered the system only to drivers with safety scores considered acceptable by Tesla, and who would not post negative comments on the internet.

Tesla publicly insist their cars aren't autonomous and require active driver supervision, but notoriously cocksure CEO Elon Musk and some of his more sycophantic fans have also filled the internet with tweets and videos suggesting there's a strong element of nudging and winking about those warnings.

Musk has heavily promoted 'Full Self-Driving' (FSD), sold as a \$15,000 software update to Tesla vehicles, but the system is facing increasing legal; regulatory, and public scrutiny. The 'Autopilot' and 'Full Self-Driving' are L2 driver-assist systems, which is part of the reason why Jennifer Homendy, chair of the U.S. National Transportation Safety Board, is among the chorus of safety experts denouncing misleading names for the systems; she has said Tesla must do more to prevent misuse.

NHTSA are among the auto and traffic safety regulatory agencies around the world investigating Tesla after reports of braking "without warning, at random, and often repeatedly in a single drive". This past summer, the agency published a [report](#) finding Tesla vehicles often self-disengage their 'Autopilot' mode less than a second before a collision, leaving the driver no time to resume control; around the same time, the agency upgraded their investigation to a more serious engineering analysis.

See [DVN's Tesla ADAS white paper](#) for more detail about differences between claimed and actual performances of Tesla's 'Autopilot' and 'Full Self Driving' systems.

General News

2022 Light Vehicle Market Underperforms 2021 *Data from LMC Automotive*

GENERAL NEWS



	2022	2021
US + Canada	15.3	16.5
West + East Europe	14.7	16.4
China	27.4	25.5
Japan	4.2	4.4
Korea	1.8	1.8
Brazil + Argentina	2.3	2.3
Total	82.1	81.4

DATA FROM LMC AUTOMOTIVE

2022 has been a downturn year for the global light vehicle market—projected to wrap up with 82.1 million units sold, about the same as 2021 and 10% lower than 2019's level of just over 90 million.

U.S. sales grew by 11% to 1.14 million units in November 2022 compared to November 2021. The gain was largely a result of weak sales a year ago, while the selling rate fell from 15.2m units/year in October to 14.2m units/year in November.

Western Europe rose to 13.8 million units/year in November, the second-strongest performance of the year behind August. In raw monthly registration terms, November increased 15%, with 1.1m cars registered.

Eastern Europe grew slightly from the previous month to 3 million units. Despite the increase in sales for November, the market is still down 28% due to the war on Ukraine restricting supplies and sanctions crimping Russia's sales.

China decelerated sharply in November, amid sporadic lockdowns across the country and an increasingly uncertain economic outlook. Preliminary data indicates that the November selling rate was 24.9 million units/year, down 12 per cent from October. But EVs continued to perform relatively well in China, with sales expanding 58 per cent YoY in November, led by BYD and Tesla. EVs accounted for almost 29% of passenger vehicle sales in the world's largest auto market.

In **Japan**, the rate grew to 4.8 million units/year, the highest rate since April 2021. Continuing improvements in component supplies helped boost production and thus sales, especially for miniature vehicles which account for about 40% of total sales.

Korea, too, saw sales hotting up as the year-end expiry nears of the temporary excise tax cut. The November selling rate reached 1.8 million units/year, the highest rate since early 2021, boosted by strong sales of imported vehicles. In contrast, sales growth of domestically built vehicles was modest, despite production having expanded by 25%.