



## Editorial

### Behind The Automaker Scenes

DVN produces a steady flow of information for community members—the popular DVN Workshops, weekly DVNewsletters, and monthly DVN Reports. And, there's a yearly DVN Study. This year's DVN Study provides extraordinary content from a new point of view versus the tier-1 and -2 perspective. With the title [Lighting Under Pressure? Leveraging Tensions Among Design, Marketing and Engineering](#), it is a tremendous piece of consulting work which would be very expensive if commissioned from a business consulting company.



The DVN Study provides a somewhat unusual view behind the scenes of the early stage of the car design process. DVN's experts worked closely together under my supervision to build the study; our intent is to describe and explain how and why

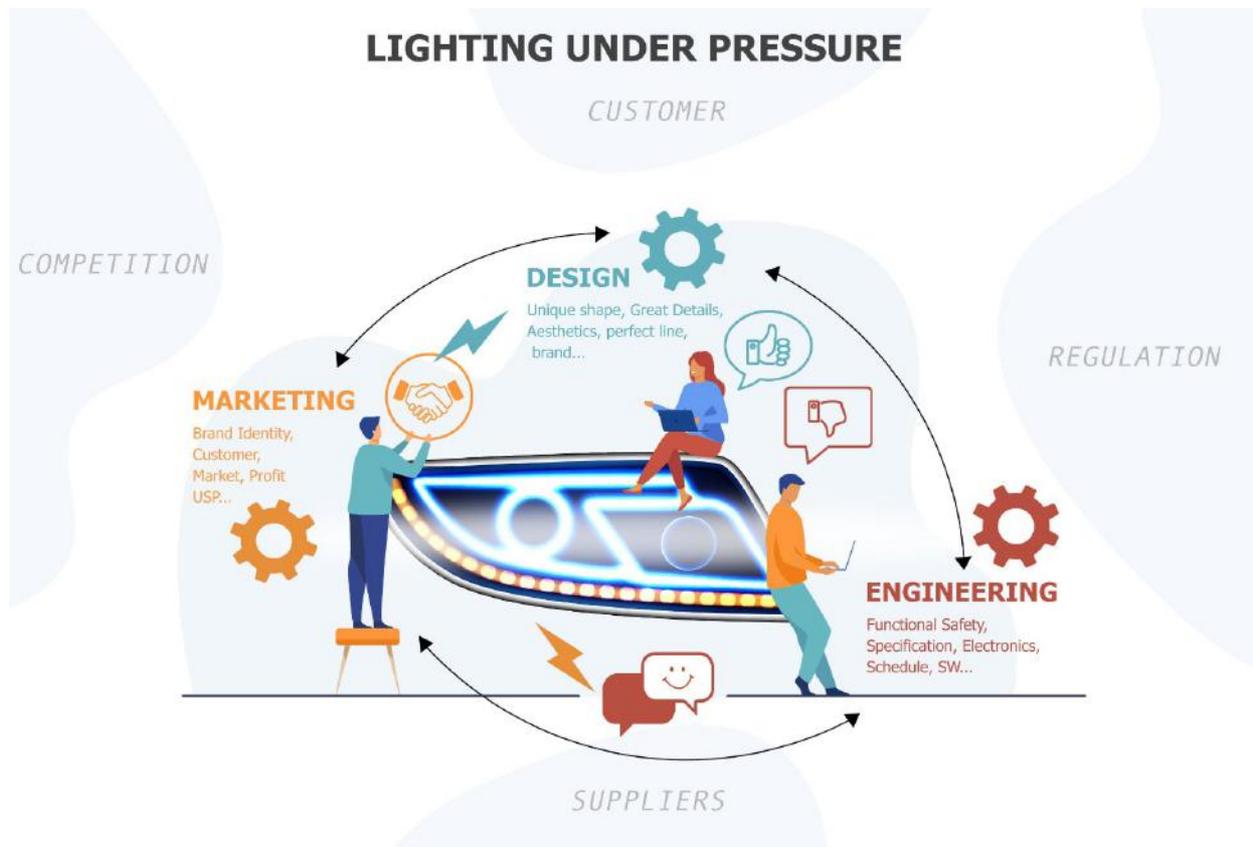
decisions are made. The roles of design, marketing, and engineering in the early phase of the car process are described and will give you valuable insight, if you are not an automaker manager working in this field. Then you will be able to adjust and optimise your activities to make them more efficient. You will learn how to support your partners inside a car company. You will understand their needs, their challenges, and their daily headaches. I am really proud to have coördinated the creation of this high-value study for engineers, marketers, and designers, and at its conclusion the role of DVN in this complicated field is discussed. I am very keen to have your comments and questions after you have read the DVN Study. You readers and we authors can virtually meet to discuss it at a date to be announced. More broadly, we asked recently for your opinion concerning quality and quantity of the DVN information, and based on your input we're bringing you innovations and changes starting next year.



Wolfgang Huhn  
DVN Senior Advisor

# In Depth Lighting Technology

## DVN Study: Don't Miss It!



DVN adds another dimension to its repertoire by studying the process of creating a new vehicle and understanding the role of lighting within this process. The result is an informative, exciting-to-read, 100-page [DVN Study: \*Lighting under Pressure? Leveraging Tensions Among Design, Marketing, and Engineering\*](#)

This DVN Study focuses on the automaker perspective on the vehicle creation process, and brings readers the opportunity to better understand the roles and responsibilities of the automaker's design, marketing, and lighting engineering activities that often seem to be opaque to observers from the outside. The inside information in this DVN Study makes it more transparent, giving an insight where the doors are normally totally closed, to facilitate mutual understanding among car makers and suppliers. You'll gain insight into how best to educate new managers, engineers, account managers, and project leaders to raise motivation and avoid frustration. You'll find strategic tips to prepare for the stormy times of a vehicle launch. There's great information on how to anticipate the complexity created by new influences and changed priorities in automaker processes. And you'll learn how to grow from a reactive observer into a proactive participant in the early car creation phase.

Senior car lighting experts—Carsten Befelein, Geoff Draper, Hector Fratty, Wolfgang Huhn, Leo Metzemaekers, Jean Paul Ravier, and Ralf Schäfer—have analysed how a new vehicle model is created and the roles of the different functions, especially with respect to creating the lighting system.

As with previous DVN Studies, one element of information gathering was through interviews with a number of key automaker stakeholders. Not unexpectedly, during our research for this study it was apparent that there are tensions among the targets of the three key functions of design, marketing, and lighting engineering.

The study starts by describing the main demands of the three key functions, including the influence of the homologation process. The study concludes by outlining the tensions and inevitable target conflicts—such as the role of lighting engineering relative to marketing, design, and regulation—during the development of a vehicle, and describing how to deal with them constructively.

## **Main chapters**

### **Business opportunities**

#### **Design demands and trends**

- Mission of design expressed by designers
- Megatrends influencing design and styling
- Design and styling demands for lighting
- Design trends and demands as expressed by designers
- Future styling trends and demands
- Takeaways from design demands

#### **Marketing demands and trends**

- On the importance of marketing
- The roles of marketing during the vehicle creation and life cycle
- Brand value and signature
- Marketing trends and demands as expressed by designers
- Takeaways from marketing demands

#### **Lighting engineering demands and trends**

- Introduction on the role of engineering and its main relationships
- Relation, tension, conflicts with design
- Relation, tension, conflicts with marketing
- Value drivers for lighting engineering
- Takeaways from engineering demands

#### **Regulatory and Safety Demands**

- Homologation and regulation
- Tensions in the programme for the launch of a new vehicle model range
- The UNECE or EU exemption procedures
- Fundamental requirements to enable a new lighting function to be regulated
- How to avoid delays to the introduction of new functions
- Conclusion

#### **Leveraging Tensions**

- Some aspects of the vehicle design process
- Reasons for the pressures on designers
- Reasons for the pressures on marketing

- Reasons for the pressures on engineering
- The role of the program director
- The others are not enemies
- The right organisation
- The role of DVN

# Lighting News

## ZKW's $\mu$ Mirror Modules for Dynamic Light Functions

### LIGHTING NEWS



Together with research partners Silicon Austrian Labs, Evatec, EV Group and TDK Electronics, ZKW are working on what they call micromirror technology for integration into MEMS in which the micromirror can be pivoted around two axes by means of piezoelectricity, enabling a laser beam to be directed specifically and precisely. In the future, this will enable smart lighting functions for vehicles, such as the projection of symbols and warnings onto the road, or flexible, adaptive vehicle lighting. This technology can be used in front lights, rear lights or as side projection, as well as in lidar systems for optical distance measurement.

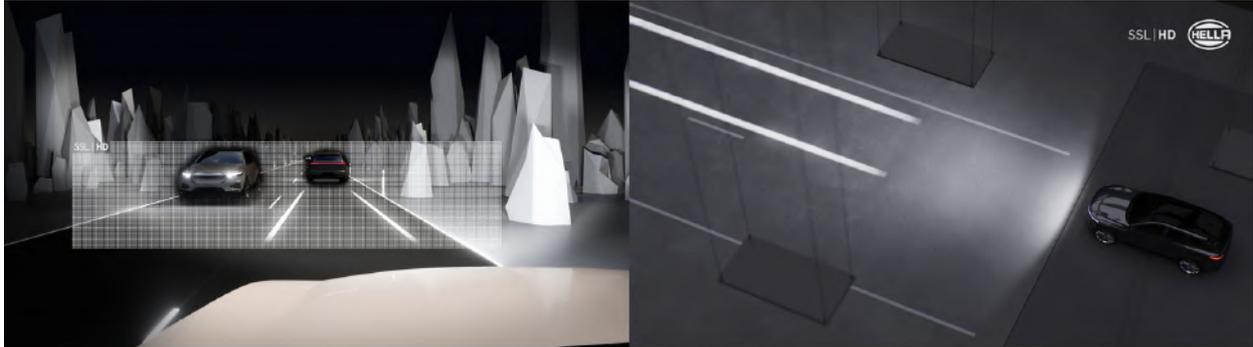
ZKW CEO Oliver Schubert says the micromirrors "could be a strategically important key technology enabling new automated lighting functions for autonomous driving (...) to make vehicles smarter, safer and more interactive".

Within the framework of the research coöperation, launched at the beginning of this year, the partners contribute their respective core competencies. Silicon Austrian Labs (SAL) contributes research expertise and offers microelectronics manufacturing capabilities; TDK are responsible for development of piezo-enabled materials and expertise; Evatec provide technical equipment and machinery; EV Group are a leading supplier of nanoimprint equipment with process expertise, and ZKW are concerned with the possible applications of the technology.

The aim is to achieve the highest possible resolution of projected light functions in order to increase road safety. ZKW currently are working on two prototypes that combine the micromirror chip and the necessary electronics in a single lighting system. With their partners' combined expertise, the micromirror project is a model for cross-disciplinary research and collaboration.

# HELLA: Further Series Orders for Innovative HD ADB

## LIGHTING NEWS



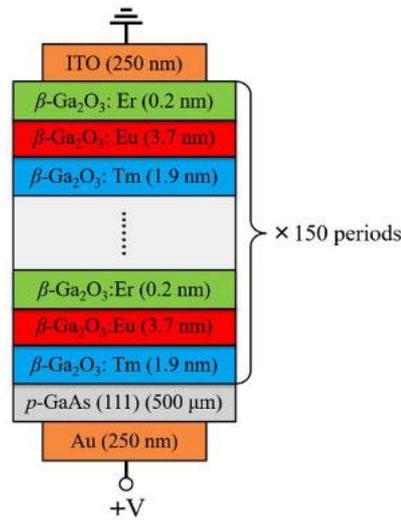
ADB HELLA has further developed its innovative chip-based headlamp matrix system "Solid State Lighting | High Definition" (SSL | HD) and received additional orders. The technology is now also being used in EV SUV from an international automobile manufacturer and in a premium vehicle from a German automobile manufacturer. The vehicles are expected to go into series production in mid-2024. The total order volume amounts to up to €200 million over the term of the contract. Development and production of the headlamps take place in the global HELLA network, including in Germany, the Czech Republic and China.

For the first time, HELLA has implemented the SUV headlamp with an asymmetrical arrangement by integrating the SSL | HD module on only one side of the headlamp. The module also makes it easy to switch from left-hand to right-hand traffic and vice versa. High-precision digital pixel switching also provides further customization options such as coming-home and leaving-home animations and other communication functionalities. For example, symbols can be projected onto the road to interact with the driver. To ensure optimum illumination of the road, the SSL|HD functionalities are supplemented by additional components such as BiLED and matrix modules.

HELLA's SSL | HD technology represents the evolutionary further development of LED matrix systems. This is associated with the requirement to achieve both a very high light output and a very high range of functions with a minimized size of the light modules. The SSL Micro-LED Clusters are electronic components in which currently between 100 and 25,000 LED pixels are arranged in a very small space. These LED clusters are combined as a light source in the headlamp and offer new application possibilities due to the higher number of pixels. For example, they enable partial masking of oncoming vehicles and the illumination of traffic signs. In the long term, projections of the safety distance could also be realized or pedestrians or cyclists could be highlighted by means of light.

# Gallium Oxide White LED Prospects

## LIGHTING NEWS



SCHEMATIC STRUCTURE OF LED BASED ON GA<sub>2</sub>O<sub>3</sub>

Saga University in Japan has reported work towards white LED (WLEDs) based on rare-earth -doped gallium oxide (Ga<sub>2</sub>O<sub>3</sub>). The researchers adopted a vertical integration strategy with Ga<sub>2</sub>O<sub>3</sub> layers doped with thulium, europium, and erbium grown on top of one another. This vertical strategy leads to more compact devices without compromising crystal quality; the team say "films grown by lateral integration are deposited side-by-side, while the co-doping of multiple rare earth elements into the same host will unavoidably degrade the crystal quality and, thus, induce undesirable threshold voltage and luminous efficiency...compared with phosphor-assisted WLEDs, direct white light emissions are achieved from single-material-based LEDs in this work without using additional red, blue or green phosphors, which can greatly reduce the energy re-absorption effect between different phosphors". Such energy re-absorption would negatively affect power efficiency.

The researchers also see the phosphor-free approach based on single-material-based WLEDs with direct primary colour mixing as more conducive to displays based on smaller-pixel  $\mu$ LEDs.

The Saga team see  $\beta$ -Ga<sub>2</sub>O<sub>3</sub> as "an ideal host for rare-earth ions benefiting from its ultrawide bandgap (4.9 eV), which is advantageous to improve the thermal stability and luminous ability of rare-earth dopants at room temperature". According to the researchers, at present "there are no reports available related to full-colour (white) LEDs based on rare-earth-doped Ga<sub>2</sub>O<sub>3</sub>".

The samples consisted of 150 periods of the sequence of the three types of Ga<sub>2</sub>O<sub>3</sub> doping.

# Genesis GV60 Shows Stylish New Lights

## LIGHTING NEWS



Genesis officially revealed a few official exterior images of the GV60, the brand's first electric vehicle based on a dedicated EV platform.

The front features a design optimised exclusively for the electric vehicle. The duolinear quad lamps add character to a refined and voluminous body.



At the rear, matching duolinear combination lamps take on a dynamic shape and flow seamlessly with the body. The rear also features a fixed rear wing spoiler to accent a coupe-shaped roof, adding to the image of dynamic high-performance and is used to integrate technical functions such as taillights, with the rear turn signals way down below.

# Audi Grand Sphere Concept to be Unveiled in Just Days

LIGHTING NEWS



IMAGE: AUTOCAR

The Grand Sphere, to be revealed on 2 September at IAA, will be one of three show cars that Audi will produce in the next year to showcase their approach to L<sup>4</sup> vehicles. The production version will succeed the A8 as Audi's top-of-the-range luxury offering, and is due to be revealed in 2024, before going on sale early the following year. Audi's design chief Marc Lichte says the Grand Sphere will be "a very concrete teaser of the Artemis project" that will show a new revolution in design with a focus on interior space. The Artemis project he mentions is tasked with developing new platforms and software to underpin a new generation of EV-AV Audi models.

# Oakland University's Certification on Vehicle Lighting

LIGHTING NEWS

# OAKLAND UNIVERSITY™

The logo graphic consists of a central gold-colored swoosh that curves upwards and to the right, flanked by two horizontal black bars of equal length.

Oakland University's School of Engineering and Computer Science and Professional and Continuing Education have worked with vehicle lighting companies to develop a vehicle lighting certification program to introduce students, particularly those new to the industry, with a solid foundation in vehicle lighting technology and the opportunity to interact with those already in the field. The 12-week, 72-hour online program covers fundamental topics like optics and LED lighting; electrics and electronics; design and testing; manufacturing processes, and marketing. The program is ideal for recent graduates and working engineers new to the lighting industry.

**The program** is organised into three modules. Module 1 focuses on the history of the industry and where it is going. It will also cover terminology, components, and units that are specific to the industry. Topics include styling, light generation sources, physical optics, optical design and mechanical interface to the vehicle. Module 2 delves into the importance of safety in terms of electronics and electrical design, sensor interfaces, and thermal design as well as EMI, testing and validation, moisture management, and autonomous drive. And module 3 is centred on manufacturing and marketing, regulations, safety, intellectual property, and branding. Topics include project life cycle management, injection molding and tooling, materials and coating, and electronic manufacturing. Advances in lighting such as smart lights and LED innovations are fueling the rapid pace of technology changes and the need for courses like this to bring those in the industry up to date. Each module will be offered twice per year. The total cost for the program is USD \$3,600, and a Certificate of Achievement is awarded upon successful completion. Students also can visit relevant companies to get a look at their processes firsthand.

# Hella Product Innovations at Caravan Show

## LIGHTING NEWS



At the 2021 Caravan Salon trade show, Hella's universal LEDayFlex III combination lamp will be unveiled. It has three LED light functions—DRL, position light, and turn signal—and boasts Hella's innovative EdgeLight technology. Their clear design means the modules can be harmoniously integrated into any front lighting setup, whether that's done horizontally, vertically, or diagonally.

Franco Ricchiuto, Global Sales Manager for the caravan sector at Hella, says "The Caravan Salon, which will take place in Düsseldorf from 28th August to 5th September, is one of the sector's most important drivers as it offers us the chance to talk directly to our customers and present technical innovations and new products from the lighting and electronics sectors. With that in mind, we are pleased to be there again this year with a HELLA stand".



Also on display will be the new third-generation L4565 Performance and Essential BiLED low beam and high beam headlamps, which are part of Hella's massively popular 90-mm modular headlamp family. Their high light output eclipses the lower performance of the previous first- and second-generation BiLED modules. The Performance version uses what Hella call zero-tolerance integration: the front part of the headlamp module is firmly embedded into the vehicle apron and is not moved afterwards. Instead, both the basic aim setting and the headlamp levelling are adjusted

exclusively via the rear part of the module, which is not visible from the outside. This enables the required gap dimensions to be made much smaller and the modules to be integrated more harmoniously into the vehicle body.



Other new Hella lights to be put on show-and-tell include a new full-LED caravan rear lamp, which offers the five obligatory signal functions—tail, stop, turn signal, reversing lamp, and rear fog—and produces two eye-catching light strips in the tail light with what Hella call "glowing body" technology. There's also a central LED licence plate module with integrated rear fog light, and innovations in the Shapeline modular lamp series. Show stand visitors will also get to see more custom rear lamp designs with glowing body and EdgeLight technology.

# Driver Assistance News

## Yole's Lidar Interview with Xenomatix, Marelli AL

DRIVER ASSISTANCE NEWS



Yole Développement forecast that the lidar market for automotive is expected to grow from USD \$85m in 2021 to \$2.3bn in 2026, representing almost half of the 2026 lidar market. Yole had the opportunity to talk about lidar with Xenomatix CEO Filip Geuens and Marelli AL's ADAS Sensors Product Management and Business Development director Frédéric Chave, who offered these thoughts:

"The push from the automotive industry for lidar solutions is increasing. Due to safety and reputation concerns, a growing number of [automakers] will be taking the direction of full AD in specific operation domains and certainly call for lidar to deliver autonomy. We focus on offering robust sensing solutions from ADAS for L<sup>2+</sup>, up to enabling full autonomy.

"Our teams are constantly being built up to support our expanding technical developments. As a result of our constant optimization, we've made our lidar [one-third the size]. It consumes only half as much energy as before, and we tripled the number of laser beams.

"Lidar is expected to solve many corner cases, especially when fused with radar and camera. At the same time, they are expected to see nearby, far away, and in all directions simultaneously, with human precision. Moreover, lidar is expected to deal with all weather and road conditions where camera and radar struggle. Marelli Automotive Lighting, the initiator of the Smart Corner<sup>®</sup> solution, offers the integration of

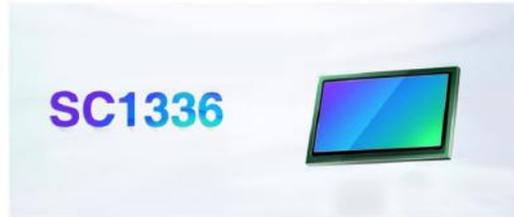
sensors into lighting elements and clusters, taking advantage of existing production knowledge and footprint for exterior parts located in strategic locations offering an unobstructed view for sensing elements.

"Currently, lidar can be placed in the grille and in exterior front and rear lighting. These options respond optimally to styling requirements as well as to demands of cost, space, and weight.

There is also a growing trend in grille illumination and animation or extended illuminations bars. All these surfaces give more opportunities for smart-sensor integration, aided with the help of innovative base material suppliers."

# SmartSens' New Car Camera CMOS Sensor

DRIVER ASSISTANCE NEWS



SmartSens have launched their SC1336, a 1/3-inch, one-megapixel CMOS image sensor for automotive applications such as front-view cameras and surround view systems. The new product uses SmartSens' DSI-2 imaging technology, which delivers sensitivity of 12,448 mV/lux·s, resulting in full-colour night vision. It also features PixGain technology.

The SC1336 has a pixel size of  $3.75 \times 3.75 \mu\text{m}$ , and is available in a 35-Pin CSP package. Thanks to Sitewell's innovative DSI-2 technology, it gives excellent full-colour imaging performance in the dark driving environment at night. Currently available for sampling, it is expected to enter mass production in the third quarter of this year.

# Scantinel Add Adelsberg to Advisory Board

DRIVER ASSISTANCE NEWS



Scantinel, a startup developing and making FMCW automotive lidar sensors, have appointed Mikael Adelsberg to their advisory board. Adelsberg is SVP of Connected, Autonomous, and Embedded Systems at Scania. Since 2003, he has held various management positions at Scania, including Head of Powertrain Control Strategy.

The lidar technology Scantinel are currently developing for the mass market will help autonomous driving achieve a breakthrough and, it is hoped, displace the currently used time-of-flight (TOF) systems. Scantinel's sensors can be used for obstacle detection and avoidance, object recognition and tracking, as well as simultaneous localisation and mapping.

Scantinel cofounder and Managing Technical Director Andy Zott says "With Mikael on board, Scantinel will benefit from proven technical expertise. He also knows OEM requirements and processes. This will allow us to be even more responsive to the expectations and technical needs of major global brands in the automotive industry".

*Founded in 2019 and based in Ulm, Germany, Scantinel Photonics specialise in FMCW lidar technology for autonomous vehicles. Scantinel are backed by Zeiss Ventures and Scania Growth Capital.*

# General News

## Audi sees China luxury market reaching 4.5M in 2030

### GENERAL NEWS



Audi predicts luxury vehicle sales in China will hit 4.5 million annually by 2030, a jump of 48% from 2020. Electric vehicles will generate 40% of annual luxury sales in 2030, up from 10% now, the luxury brand of Volkswagen Group estimates in a strategy report released this week.

At VW Group's JV with China FAW, Audi builds A3, A4 and A6 gasoline sedans, Q2, Q3 and Q5 gasoline crossovers; and two electric crossovers, e-tron and Q2 EV.

Audi will increase the number of models assembled at FAW-VW to 12 by the end of 2021, also plans to launch sales next year, of its first product built at VW Group's JV with SAIC, the elongated Audi A7 sedan.

In 2020, the brand's China sales rose 5% to 726,000 vehicles, despite the pandemic. Audi's first-half China deliveries jumped 39% to 418,000, according to FAW-VW.

# Changan to Shoot for 3 Million Units by '25

## GENERAL NEWS



China's Changan want to sell three million vehicles a year in 2025, and 4.5 million annually in 2030, their Chairman Zhu Huarong says, adding 35 per cent of their sales in 2025 will be new energy vehicles including full-electric, plug-in hybrid, and hydrogen fuel cell vehicles.

Changan, who operate a joint venture with Ford, sold two million vehicles last year. The Chongqing-based company, who are developing electric vehicles with Huawei Technologies and battery maker CATL, plan to invest C¥150bn (USD \$23bn) in the smart EV industry in the next five years.

Changan's local rival Geely aim to sell 3.65 million cars a year in 2025, and Great Wall are targeting 4 million.

# Audi Post-Sale Upgrades to Supplement Future Revenues

GENERAL NEWS



Audi are testing temporary software upgrades with consumers, and promising to share revenues with dealers.

Executives at Audi explained a business strategy that includes eliminating internal combustion vehicles by 2033 and diversifying revenue streams to include a new focus on post-sale temporary software upgrades to be shared with dealers. The strategy for the coming decade would see the last new combustion-powered vehicle in its lineup introduced in 2025, and transitioning between then and 2033 to an all-BEV product range.

Audi's head of digitalisation, John Newman, says his company have been doing field-tests with consumers on a variety of digital offerings Audi hope will supplement revenues in future decades as EV sales grow. He says "We're really focused on introducing solutions that we can introduce across multiple platforms, and so this gives us access to millions and ultimately 10 million vehicles at once, [which] really causes us to focus very clearly on business that happens after we sell the vehicles, so this is a bit of a change".

Audi are testing different ideas right now with customers operating under nondisclosure agreements to "figure out the right value proposition" for customers paying additional funds to upgrade their vehicles, Newman said. "We found that there are opportunities for us to do new things in terms of products and services for customers", he added, saying Audi are experimenting with how long such upgrades would last before needing to be "bought" again.

# Dacia Sandero becomes Europe's best-selling car

## GENERAL NEWS



The Dacia Sandero small hatchback was Europe's top-selling car in July as overall registrations in the region fell 24%, ending four months of growth. New-car sales fell to 968,000 last month from 1.27 million in July 2020, according to data from 26 European markets collected by JATO Dynamics.

The Sandero had the No. 1 spot for the first time since its launch in 2008. The Volkswagen Golf, which usually tops the rankings, was in second place, followed by the Toyota Yaris.

Registrations fell in most European markets in July, as the pandemic continued to weigh on consumer confidence and the global shortage of microchips hit the availability of many models.

Hyundai and Suzuki were among brands that gained volume in July, with Hyundai's and Suzuki's registrations up 5%.

All other major brands saw sales decline, with Renault down 54%, Ford down 46%, Nissan down 37%, Peugeot down 34%. VW, Europe's top-selling brand, saw registrations drop 19%.

Helped by the Sandero's popularity, Dacia's 16% decline was less than the overall market.

Registrations of battery-powered and plug-in hybrid cars had their best July results to date, and the second-highest monthly market share this year after June, JATO Dynamics said. A total of 160,000 battery-powered and plug-in hybrid cars vehicles were registered in July, accounting for almost 17% of total registrations. The monthly market share for diesel cars declined to 22 percent from 30 percent in July 2020 and 32 percent in July 2019. The share for gasoline cars was 59 percent, down from 60 percent in July 2020.