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Weekly Newsletter

DVN
Lighting & ADAS

NEWSLETTER #846



DVN Detroit Workshop
Lighting

“Design & Safety:
lighting technology and EE architecture to
support new mobility”

11-12
JUNE 2024

Detroit

Editorial

DVN Goes To Porsche R&D



Wolfgang Huhn and I were invited to the Porsche R&D centre at Weissach, Germany, by Porsche's Body Lighting and Vision Development Director Robert Hähle. Accompanying Hähle were Dominik Walter (Functions), Heinz Redlich (Design), and Benjamin Hummel (Technology).

What a pleasure for us to be with an OEM lighting team—especially this particular OEM! In the past we were part of teams like this, and now we were visitors.

Driving a Porsche is not something I am used to doing, and driving a Porsche by night to test the lighting performance is something special for me. I tried with Wolfgang to put into this newsletter what we have experienced, but for the full you-are-there experience, please [watch the video](#) before you read our article.

We are also pleased to announce our detailed report of the Munich DVN Event is ready! Pick up [your copy](#) on the DVN website.

Sincerely yours,

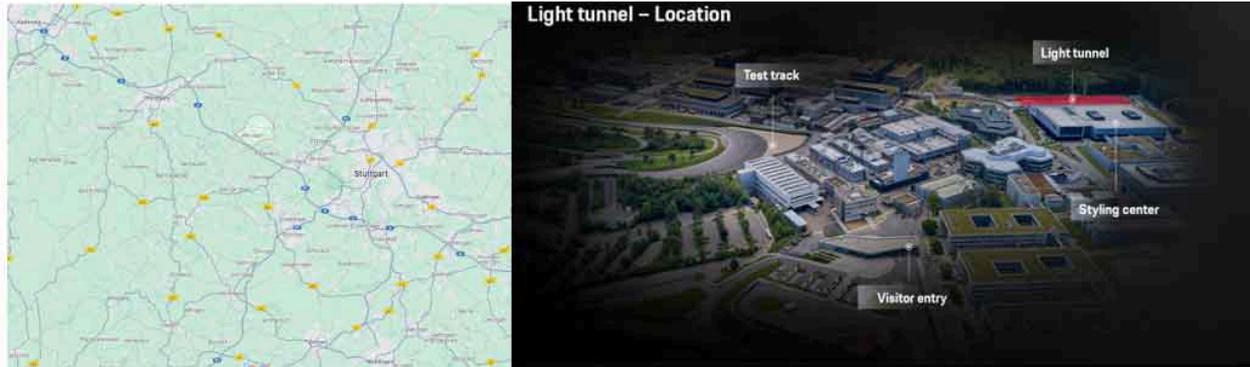
Paul-Henri Matha
DVN Chief Operating Officer and Lighting General Editor

In Depth Lighting Technology

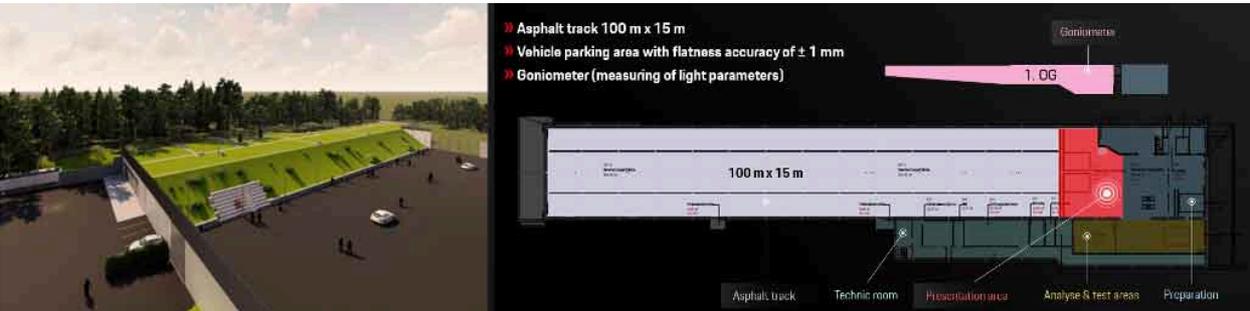
Porsche Cayenne by Night: Impressive MicroLED Tech!



More than 5,000 engineers are based at the Porsche R&D Centre in Weissach, including the lighting team. Most of our visit was in the *lichtkanal*, the 100- by 15-metre light tunnel.



Directly adjacent to the design studio, it's been in service for 15 months now. A photogoniometer is installed on the mezzanine to avoid disturbing vehicle analyses and lighting demonstrations.



Exterior Lighting Style Manager Heinz Redlich reviewed with us Porsche's lighting design heritage: two round lamps, with a simple race-inspired design, starting with the 911 and maintained for quite a few years, reinforcing the light signature of a Porsche. On the street, it has long been important to clearly recognize a Porsche in the rearview mirror.

Eventually, Porsche started a new design tradition: a strong four-point light signature first on the Turbo, then eventually on all models.



The next logical step was to realize this four-point signature image also by night. How Porsche engineers achieved this on the new Cayenne is quite ingenious; Front Lighting and Light Modules Manager Benjamin Hummel explained the technical strategy with HD-Matrix and four-point concept. Specifications were clear for engineers: 600 metres' range on high beam; wide illumination on low beam, and top-class safety and functionality.



To meet those goals, total luminous flux is around 2,500 lm with I_{max} of more than 187,500 cd. Without a high beam booster, the I_{max} from the two HD modules greater than 100 kcd; their illuminated field is 40° wide and 10° high.



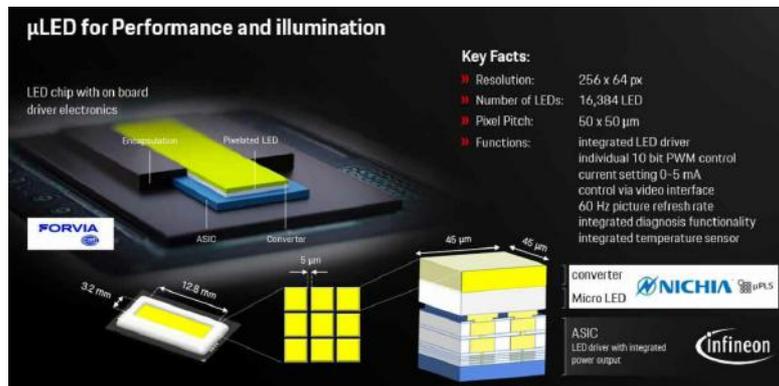
To obtain this level of performance and functionality, Porsche developed the technology and the light distribution with Matlab and a high-end projector (beamer), even before microLED chips were available.



Notable here is that Porsche uses the full freedom to design and optimize the digital light distribution on their own. The HD system with both modules is able to obtain the designed beam pattern. This is clearly a new direction; the supplier and the automaker are working closely together to optimize the performance of the headlamp.

The HD system offers 15 different beam patterns: AFS C; V; E, and W; swivelling, right/left-hand traffic adaptation, static bending light, fog-optimized low beam + ADB + road projection markings (lane light, construction zone light, marking light...) and more.

Light Electronics and Functions Manager Dominik Walter explained the HD concepts developed by Forvia, Nichia, and Infineon:



To create the different beam patterns, more than five different sensors feed information to the central lighting ECU, which calculates the optimal beam pattern every 16 ms (60-Hz frequency). The target light distribution will be sent to the μLEDs, which can be controlled with a 10-bit PWM resolution and current settings of 0 to 5 mA.



For example, producing the light carpet or construction zone lighting involves input from camera, navigation system, and online traffic information feed.



Porsche have also developed a range mode function that reduces energy consumption on the electric Taycan. By selecting the Range drive mode, exterior light is reduced for low and high beam, and lane and construction zone light are deactivated.

We topped off our visit with a night drive of the Cayenne. Its fantastic lighting, especially on high beam, gives the driver excellent perception. I really liked the high beam height, a generous 10 degrees. It reminds me the trouncing improvement when bixenon modules made HID high beams feasible, not just low beam: then, as now, you really appreciated the new lighting technology when you drive in a forest (especially in a Porsche).

I was impressed by the homogeneity of the beam pattern; the superposition of the four modules on each side cannot be detected on the road. Porsche says this is thanks to the split algorithm inside the headlamp in combination with a big effort in the headlamp production line, due fine-tuning the LED modules with mechanical and PWM adjustments for each LED to be compliant with the light picture specified by Porsche.

I was also impressed by the visibility of the carpet light while driving; it is the best one I have ever seen. The idea to have two HD modules, one of which with a $\pm 10^\circ$ field, is clearly an advantage to increase the contrast of the road projection.

Porsche shows a welcome scenario road projection too (see [video](#)), which is short with an easy graphic, unlike other brands using road projection techniques.

Also in the entry version Porsche takes care of safety: The Cayenne's basic equipment involves a bi-matrix system with 11 segments.

Light performance is first; everything else second—that is Porsche's philosophy. The Cayenne HD Matrix LED headlamp is clearly one of the very best in the world, maybe *the* best.

Our special thanks from DVN go to Benjamin Hummel and Dominik Walter, whose personal initiative made this visit possible.

Paul-Henri Matha & Wolfgang Huhn

Lighting News

WP.29 192nd Session: Short Report from GTB

LIGHTING NEWS



By Valter Genone, GTB President

WP.29 held its 192nd session in Geneva from 5 to 8 March, and important lighting issues were on the docket.

The most interesting item for DVN is the final approval of the 09 Series of amendments to UN Regulation N° 48 (Installation of Lighting and Light Signalling Devices on Vehicles). This series of amendments includes:

- requirements for mandatory automatic headlamps levelling and a narrowed initial-aim range;
- a first set of requirements allowing the answer-back signal;
- updated requirements on functionality of exterior courtesy lamps, introducing variability of the light intensity and of the apparent surface shape/dimensions;
- possibility to increase the number of manoeuvring lamps on trailers;
- introduction of transitional provisions for devices, phasing out the use of outmoded lamps type-approved to older versions of the regulations, by referring only to the most recent requirements in UN Regulation N° 148, 149, and 150.

The entry into force is foreseen for October-November 2024 and—subject to national-level decisions (or at European Union level for the EU member states), the mandatory application dates are confirmed as follows:

- M-, N1-, O1-, and O2-category vehicles: from 1 September 2027 for new type approvals; from 1 September 2030 for new registrations;
- N2-, N3-, O3-, and O4-category vehicles: from 1 September 2028 for new type approvals; from 1 September 2031 for new registrations.

All the other documents presented by GRE and dealing with other lighting regulations (Nº 45, 53, 74, 86, 148, 149, and 150) were approved; their entry into force is foreseen for October-November 2024.

Not directly connected with lighting but surely of interest of the lighting community is also an in-depth discussion on the environmental impact of vehicles during their entire life cycle, from the supply of materials for their production to their disposal, including reuse and recycling possibilities. Not forgetting, of course, their period of use. The WP29 showed particular attention to this matter, confirming the need for industry to take this issue into account.

A couple of specific points in this discussion are worth noting:

- the intention to develop globally harmonized methodology to determine the carbon footprint of vehicles from cradle to grave. The development of such a methodology, dedicated to the lighting systems, could be a good subject for GTB in the future.
- a document ([WP.29-192-10](#)), prepared by The Netherlands, described how the negative impact is underestimated of vehicle automation on sustainability, and potentially on deaths. Such impact depends on how vehicle automation will be developed, from a regulatory, commercial, and technological perspective. The common claim that vehicle automation will contribute to sustainability will require actions from WP.29 in order to make it happen.

New Dodge Charger

LIGHTING NEWS



The frontal design of the new Dodge Charger is a modern version of the original 1966 Charger also shown here: a full-width grille area with hidden headlamps. This time, though, there's no actual grille, for there's no engine to cool; the new car is electric. Also, the 1966 Charger had a pair of round sealed-beam headlamps on each side, hidden behind motorised doors which looked like an extension of the grille when closed and flipped up out the way when the lamps were switched on. The new car has hidden headlamps, alright, but they're LEDs hidden in plain sight, with a distinctive white LED full-width front light band. Here's a perfect example of light as the new chrome.



This wraparound light band spanning the 'grille' opening couldn't have been done in '66. Neither could the illuminated emblem, though the design itself, called the Fratzog, was Dodge's logo from 1962 to 1976. Dodge have gone all-in with its reintroduction on electric Dodges; the natively-silent electric Charger has an artificial engine-noise system called 'Fratzonic', to appeal to those who just cannot survive without rattling other people's eardrums...vroom, vroom!

The rear lighting, too, is firmly based on the original 1966 charger, which also had a red light band spanning the full width of the car. But the '66 car did it with six incandescent bulbs—48 watts for the tail light function; 108 watts when the driver stepped on the brake —while the new car does it with LEDs illuminating a stylish "ring of fire" wraparound with a small fraction of the power consumption, including a red-lit Fratzog in the centre.



Flex-N-Gate is contributing to this exterior design, by delivering the front and rear facias, the frunk, the mirror bracket covers, and the litgate.

Lynk 07 EM-P Launches in China

LIGHTING NEWS



Lynk & Co launched their 07 EM-P sedan. It's about the size of a Toyota Camry: 4,827L × 1,900W × 1,480H mm, with a 2,843-mm wheelbase.

The new model uses a 1.5T EM-P plug-in hybrid system, and is built on the CMA Evo platform—a development of the Compact Modular Architecture (CMA) platform developed by CEVT of Sweden.



The new car can be seen as a sedan version of the Lynk 08 EM-P, an SUV launched last year with most of the same design elements like the new staple-shaped LED running lights. Headlamps are in the black panel integrated in the bumper.

At the back of the Lynk & Co 07 EM-P there is a black spoiler and taillights that run the width of the car, punctuated by four vertical rectangles.

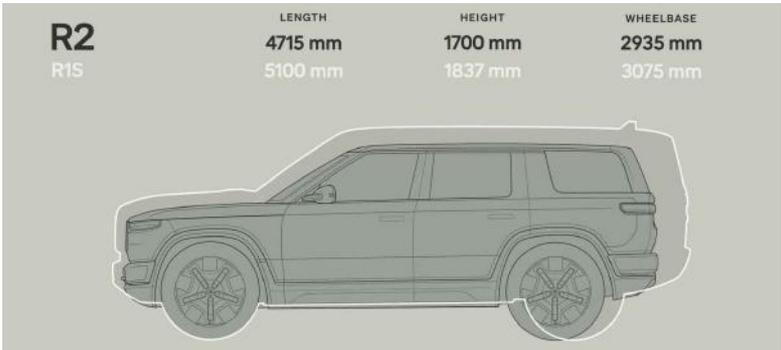
Rivian R2, R3 Revealed

LIGHTING NEWS



By Paul-Henri Matha

Everybody was waiting for the reveal of the R2 on 7March, but Rivian decided to reveal also their new baby, the R3. The R2 is similar to the R1, but smaller; it is 4.71 m long compared to the R1's 5.1m.



The design is really similar, you need to be a specialist to see the differences. Like the small orange component in the wheel arch (is this a side turn indicator for Europe?), or the new CHMSL in the spoiler; does it fulfil the minimum 29 cm² required in USA? perhaps what was presented is a European car. More information for sure will be provided in the next months. SOP is scheduled in 2026 in USA.



The R3, on the other hand, is a totally different shape. It is really fresh, but at the same time some people compare it to the 1983 Golf—a matter of opinion, I think



We can see a similar orange side turn indicator in the wheel arch, a sort of front orange reflex(?), and a really nice rear full-width lamp. The high-mounted stop lamp is also similar to R2, up in the spoiler.



With this rear lamp design, you have a drawback: you need additional lamps to fulfil regulations worldwide when the hatch is open. We can see a black / translucent part in the bumper; maybe it is for the additional lamps—but does it fulfil the 50-cm² minimum size for USA? Or do we have an additional lamp when we open the tailgate? we will know more about this, too, in a few months. Reflex seems yet to be added for the final vehicle.

SOP is scheduled in 2027.

Driver Assistance News

Hesai Lidar for Li Mega

DRIVER ASSISTANCE NEWS



Li Auto recently launched the Mega, their first high-voltage BEV. The multipurpose vehicle is equipped with Hesai Technology's ultra-high-definition long-range AT128 lidar, which allows for a full suite of intelligent driving capabilities.

Li Auto's L8 and L7 Pro models will also feature Hesai lidar as a standard configuration with an urban navigation on autopilot (NOA) function that allows drivers to enjoy the comfort and convenience of safe, intelligent driving. This technology greatly improves intelligent driving systems' obstacle detection, enabling vehicles to quickly respond to unpredictable road conditions.

"When it comes to safety, only the best is good enough," a Li Auto spokesperson commented. "Hesai played a major role in bringing our autonomous driving suite to life and Li Mega will bring a new standard of technological advancements to the MPV market."

"At its core, Hesai is a safety company, and we are thrilled to partner with Li Auto to bring a best-in-class EV autonomous experience to driving enthusiasts of all kinds," a Hesai executive shared. "We look forward to continuing to advance vehicle innovation and safety together".

General News

Valeo's '23 Sales Goals Met

GENERAL NEWS



Valeo's turnover grew at the same rate as global automotive production, reaching €22bn. The Visibility Systems Business Group, at €5.54bn, performed in line with automotive production.

Operating margin improved; after falling to 1.7 per cent in 2021, it continues its recovery to 3.8 per cent.

The objective by 2025 is to increase operating profit and cash generation by more than 60 per cent. This requires new cost reduction measures, linked in particular to the merger of the Propulsion Systems and Thermal Systems business branches, which CEO Christophe Perillat calls two sides of the electrification coin.

Outlook

With €35bn in orders recorded last year, in addition to €32bn for 2022, Valeo say they are confident for the future. Order Intake show a “significant improvement” in on-board margins, in particular in centralized software architectures (SDV) with in particular very good contracts with Renault and BMW.

In the medium term, Valeo are revising downwards the 2025 objectives of their Move Up strategic plan, to take into account a global automobile market which will reach only 91.5 million vehicles rather than the 98.5 million estimate upon which the plan was based.

Valeo now are targeting, in two years, a turnover of between €24.5bn and €25.5bn, and an operating margin of around 6 per cent. They carry out 47 per cent of their activity in the Africa-Europe zone, and 16 per cent in China. More than half of the orders taken in China last year were with Chinese brands, which will have an impact on activity from the second half of 2024.

According to Périllat, Valeo are fully able to compete with local equipment manufacturers. “We are Chinese in China, and that is not a slogan!”, he says. “Our costs are Chinese, as are our suppliers. And management has fewer than 10 expatriates, compared to 200 ten years ago, out of a total of 20,000 employees”—all of which adds up to China being Valeo’s leading country.

Apple Cancel EV, Abandon μ LED Development

GENERAL NEWS



Apple are cancelling their decade-long effort to build an electric car, according to sources with knowledge of the matter (who asked not to be identified because the announcement wasn't public). COO Jeff Williams and EV VP Kevin Lynch made the disclosure internally last week, surprising the nearly 2,000 employees working on the project.

The two executives told staffers that the project will begin winding down and that many employees on the team working on the car will be shifted to the artificial intelligence division under executive John Giannandrea. Those employees will focus on generative AI projects. The Apple car team also has several hundred hardware engineers and car designers. They may be able to apply for jobs on other Apple teams. There will be layoffs, but it's unclear how many.

The decision to ultimately wind down the project ends a multibillion-dollar effort that would have vaulted Apple into a whole new industry. The tech giant started working on a car around 2014, setting their sights on a full AV with a limousine-like interior and voice-guided navigation. Most recently, Apple had imagined the car being priced at around \$100,000. But executives were concerned about the vehicle being able to provide the profit margins that Apple typically haul in on their products. The company's board were also concerned about continuing to spend hundreds of millions of dollars a year on a project that may never go live.

It wasn't the only unexpected news from Apple, who also have cancelled their microLED effort for the future smartwatch that was anticipated to be released by 2026. Hundreds of people working at the company's secret facility in California were let go, and manufacturing partner ams OSRAM were informed of the cancellation.

ADI, BMW in Car Ethernet Pact

GENERAL NEWS



Analog Devices and the BMW Group have announced an early adoption of E²B, ADI's 10base-T1S Ethernet to the Edge bus technology within the automotive industry. Automotive Ethernet connectivity is a key enabler of new, zonal architectures in automotive design, and supports automotive megatrends such as software-defined vehicles. BMW plan to leverage E²B for their ambient lighting system design in forthcoming vehicles.

Since 2018, ADI have been working closely with the BMW Group on a new concept to simplify bringing Ethernet to the Edge. At the same time, the IEEE 802.3cg group were defining a new 10-Mbps Ethernet standard called 10base-T1S, with ADI and the BMW Group among other companies both actively involved. Using E²B to remove microcontrollers and move software from edge nodes to central processing units enables an all-hardware edge node while reducing software development and qualification tasks.

In a statement, the BMW Group said, "While working alongside ADI on 10base-T1S E²B, we joined efforts on a number of key considerations, from simplifying implementation, to cost analysis and design support. The relationship with ADI has enabled us to move more quickly to market with a solution of a zonal architecture for software-defined vehicles".

ADI Automotive Cabin Experience VP Yasmine King said, "We continue to deeply engage with the BMW Group to understand their next-generation needs and bring further optimized products to aid next-generation architectures, as well as bring continued cooperation on standardization. 10base-T1S E²B is a great new addition to our automotive connectivity and networking portfolio, innovated to drive success across different use cases, with the flexibility and scalability to support zonal, domain and hybrid architectures".

In-cabin experience continues to be a critical focus for automakers, with driver and passenger expectations becoming more refined. This is especially true of the ambient lighting within the vehicle.

However, many of today's lighting solutions are complex to implement, use legacy technologies, and are difficult to scale and update as the number of supported LEDs increases. 10base-T1S with E²B will allow automakers to provide a rich customer experience and synchronize lighting with other applications in the vehicle. Fully enabling a software-defined lighting system provides improved flexibility, ease of upgrade, and ease of use.

ADI's King noted, "This approach to edge connectivity is so sought-after that the automotive industry inside the Open Alliance is now aiming to standardize a similar solution. ADI, along with the BMW Group and other companies, are actively working with the industry to create an open standard implementation".