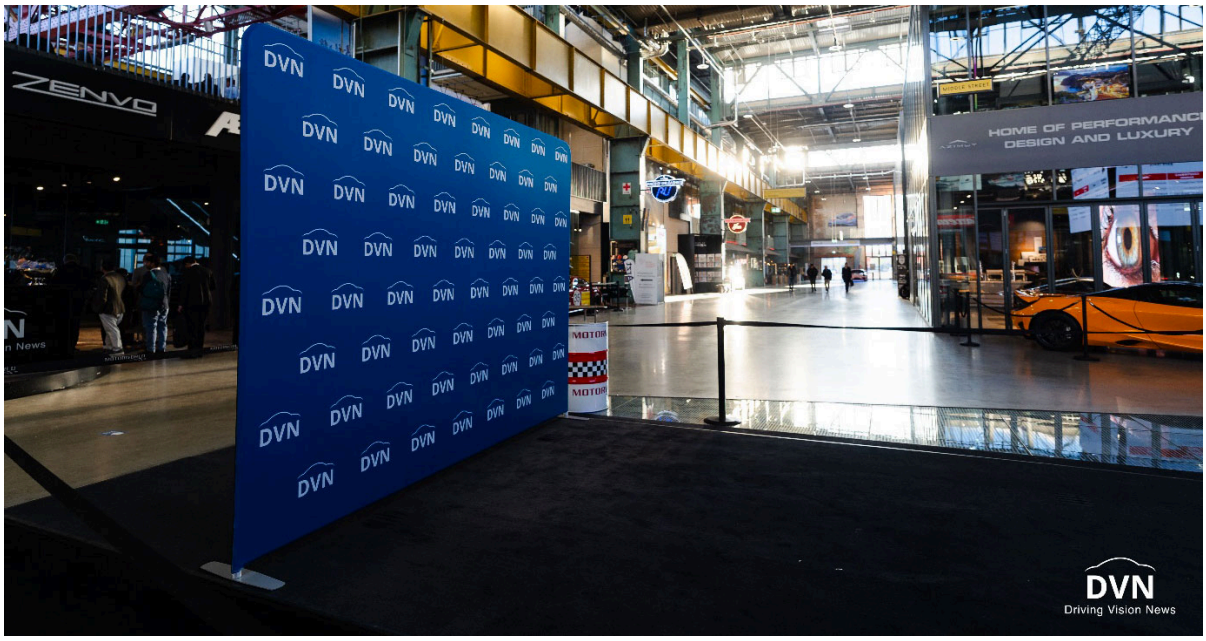
Tue, 4 March 2025
Weekly Newsletter

DVN Lighting

NEWSLETTER #894

Editorial

DVN Munich Report Goes Live



Just 10 days on from the DVN Munich event, we are pleased to publish our detailed report; download it **here**. In it, we bring you the challenges faced by the vehicle lighting world, as wrangled at the event in presentations and at expo booths. The list is long, and it includes the likes of:

- Transformation wrought by the shift to EVs and SDVs, pushed along by newcomers from California and China as well as migration from the tech industry—Rivian, Xiaomi, Huawei—and high-power computing—Qualcomm, Nvidia—and AI. What was not even dreamable before is becoming reality, much faster than we could have expected. No training period, no gradual learning curve; we've been thrown into the deep end of the swimming pool, and we'll have to learn to swim to survive.
- New technologies—MEMS, displays, computational optics, lasers—and new possibilities—projection and intelligent lighting—and new constraints like cybersecurity and software update management needed for V2X

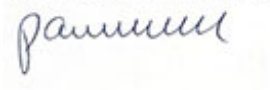
communications and L^{2++} and L^{3} features. Because cars are now interfacing with external clouds, legal frameworks are needed. Cars are being developed and certified in whole new ways. The CS and SUMS panel discussion was highly informative about these concerns and will be covered in a dedicated report next month.

- Increased pressure to drive down CO_2 in all phases of vehicle and component development, manufacture, use, and end-of-life handling. From ideas we see concrete things. The supply chain is starting to be organized with a lot of initiatives covered in the long sustainability session at the event. As pointed out by Valeo, 80 per cent of a vehicle's CO_2 footprint is defined during the design phase—three years' design work and seven years' production for a classical vehicle. That is to say, what we design now is valid for 10 years. If we want to change something in 2035, it is *now* in 2025 that we have to think about it!

Lots of food for lots of thought. Download the report and give it a read; there's much to discover.

Sincerely yours,

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

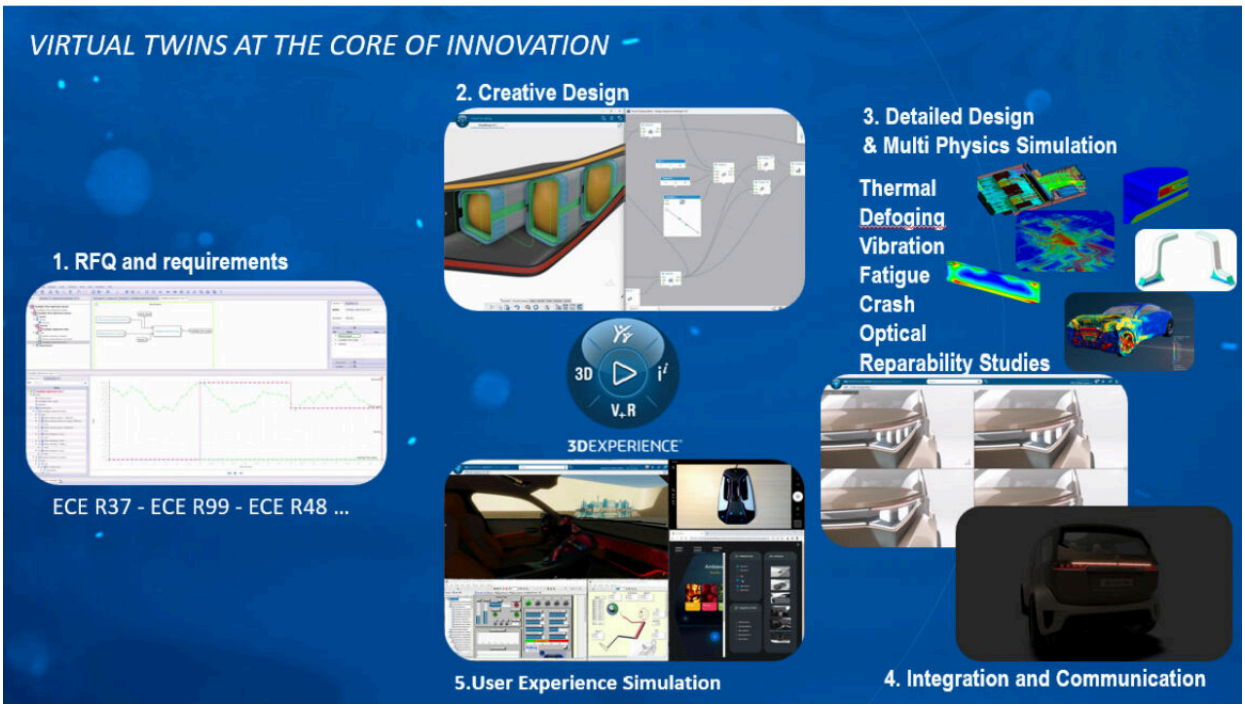


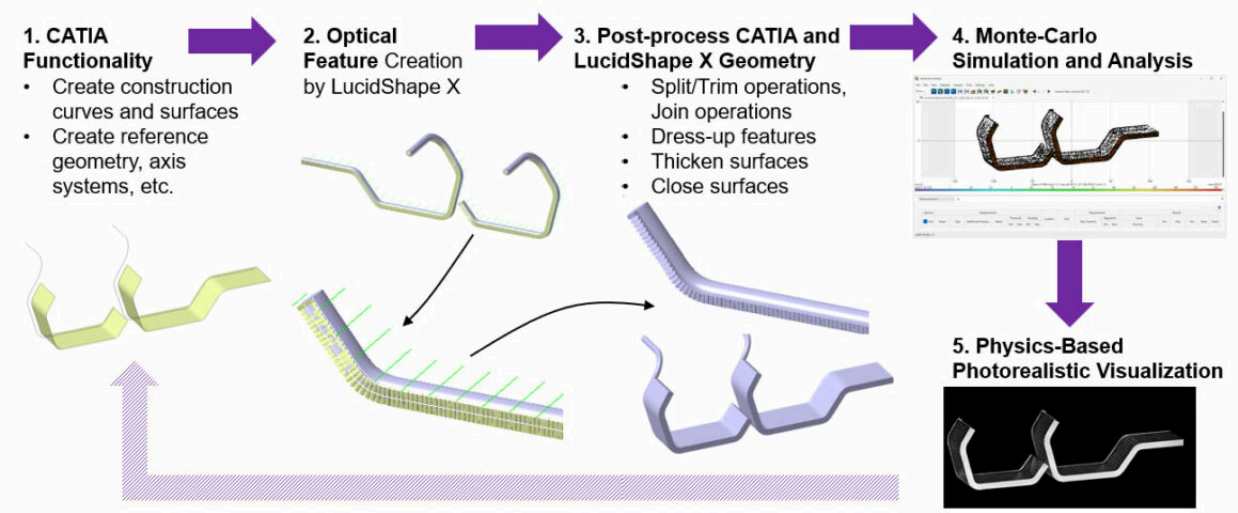
In Depth Lighting Technology

DVN Munich: Top Tech Takeaways

Numerous great presentations were made at the DVN Munich event. You can read all about them in the event report, which has just gone live today. Meanwhile, here are some of the main technologies which look to have a great future and possible applications to save time, cut cost, create new designs, and reduce CO_2:

- **Digital twin to develop faster**: how can our CAD be translated as fast as possible into optical concepts, including thermal simulation, optical rendering, pedestrian crash results, and performance ratings (NCAP, HSPR, IIHS, Consumer Reports…)? How can digital twins modify the original A-surface from design to give the correct performance and specification? how important is rendering simulation to shorten development loops?

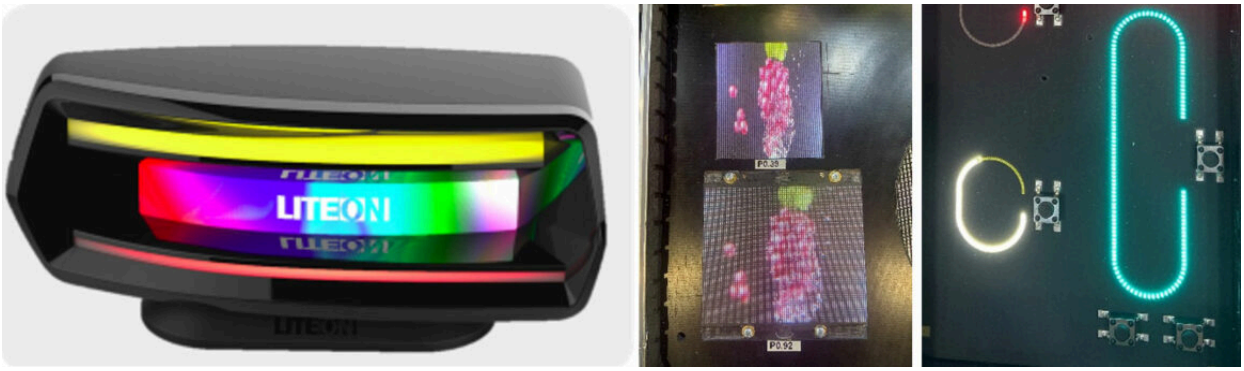




- **MiniLED and MicroLED displays**: light source innovation is continuing to push the design boundaries.

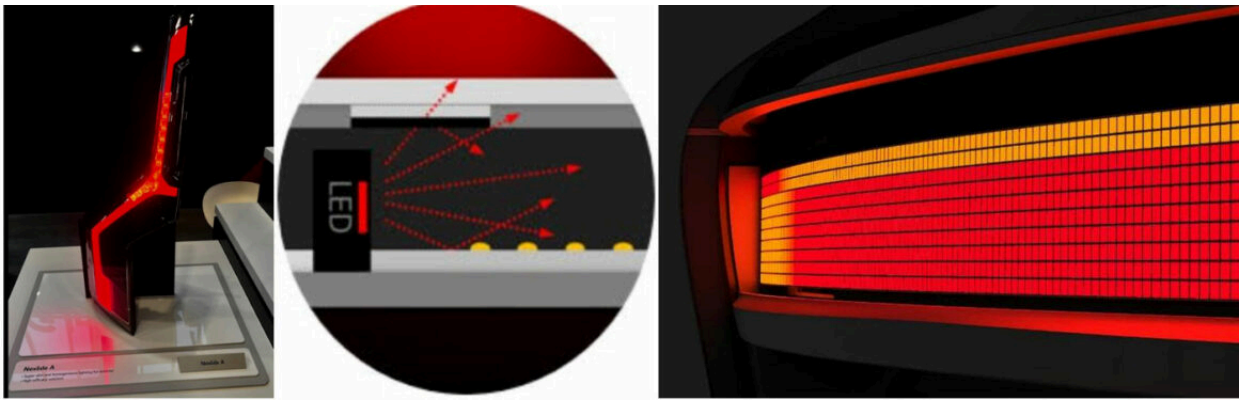
Liaowang presented their latest MDL Plus release on the Lynk & Co 900 with 10-kilopixel front ISD with 2mm pitch and 2,500 cd/m^2 luminance. Mind presented an interesting mock-up of a lamp including transparent display in front of low and high beam ('Hello').

Next steps were shown by tier-2 suppliers: Left to right, here are flexible RGB miniLEDs from LiteOn (1.25mm pitch, 4 kcd/m^2) · Refond's miniLED with 0.92mm pitch (Great Wall SAR) and demo with 0.39mm pitch ·
Everlight Vueral microLED demo with 0.1mm pitch · Vueral microLED with 0.2mm pitch and 6 kcd/m^2 luminance:



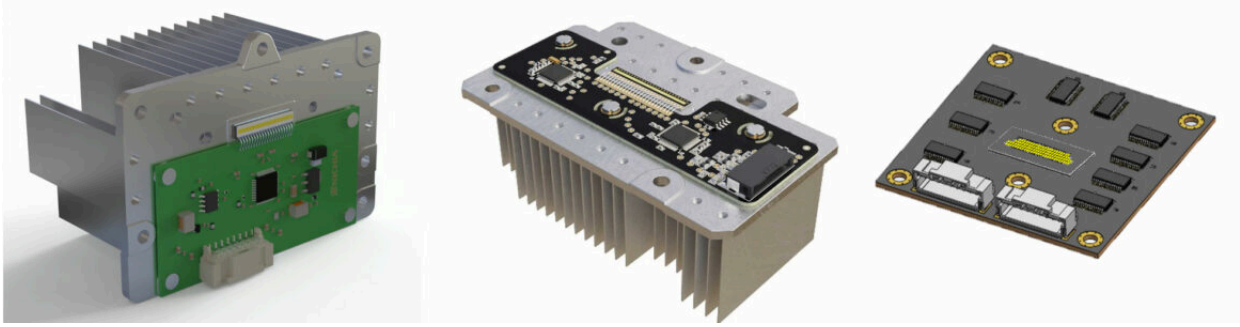
- **Diffusive solution**: designers strive for homogeneous light from all possible viewing angles, and R&D work seeks to minimize cost and power consumption. The Skytop BMW design is quite an interesting example with DRL height 12mm and rear position lamp height 4mm. New solutions are coming with efficient solutions:

Nexlide from LG Innotek (Nexlide A, 1.8W rear position lamp) and Nexlide Vision shown at CES '25 with 5×5mm pixel and 5W/m2 power consumption.

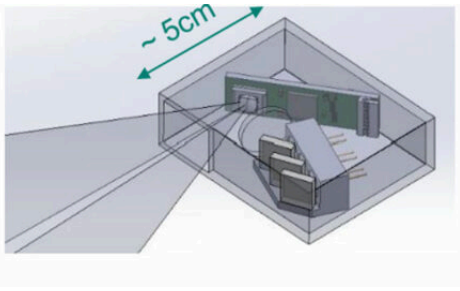


Laser texturing and films to scatter the light—L-R here Brightview technology, Reiche, Microrelleus:

- **ADB Design-to-cost solution**: proposals from Nichia (standard ADB engine with 16 or 24 pixels), Lumileds (Luxeon NeoExact with direct imaging system), and LiteOn (chip on board technology to improve thermal dissipation)

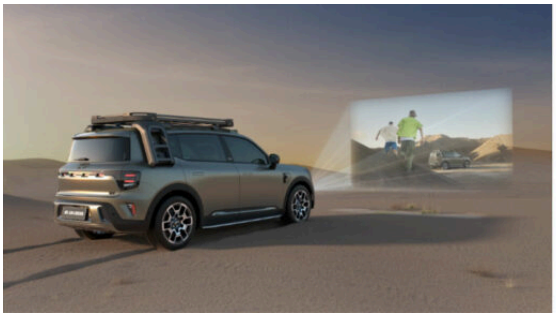
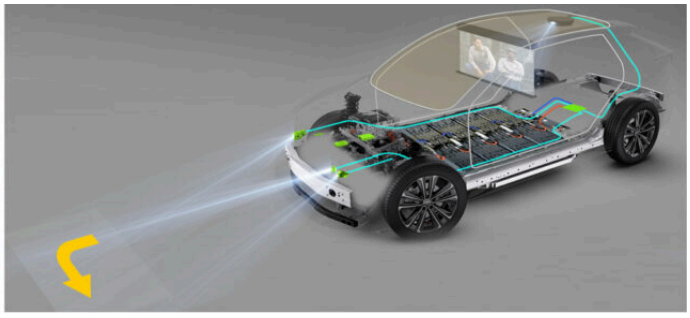


• **Miniaturization of projection systems** for welcome sequences or signalling road projection: 3-colour lasers and MEMS from Maradin and Infineon: FoV 45° × 30° and > 600 kilopixels, size < 60 cm^3), and simple solutions from Odelo—a Gobo system and sequential activation of 3 LEDs.

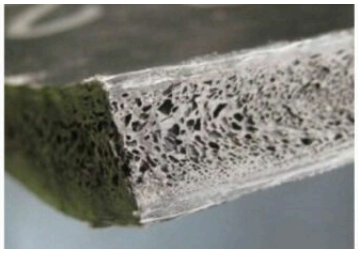
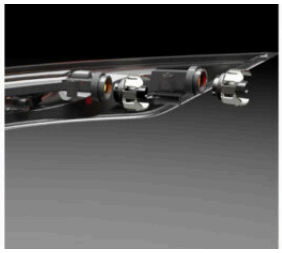
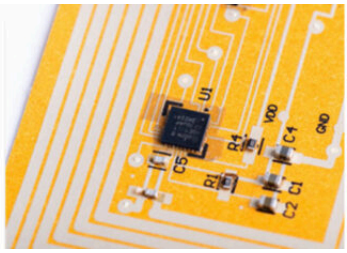


- **Lasers for lighting applications**: Appotronics, already delivering an RGB laser DLP on Smart № 5 for welcome / cinema application, showed an extravagant concept of distributed illumination from a central laser light engine, and cooled by the vehicle's battery cooling system. More will come soon with a demo at the Shanghai autoshow in April; DVN will cover that event.

This architecture, if dreams come true, could be a total gamechanger for vehicle architecture.

- **Sustainable solutions**: Big variety of initiatives and ideas to lower the CO_2. A few examples of many discussed during the event: 80 per cent of the possible CO_2 reduction is during the design phase. For example: reducing power consumption by using the likes of ams OSRAM's DRL proposal—7W with XLS, compared to an average 21W DRL power consumption analysis done by A2MAC1. Replaceable "LED bulb" architecture for easy repairability and recyclability (Volvo trucks and ams OSRAM's XLS solution). Mucell technology to reduce component weight (Renault). Usage of sustainable polymer (ZKW target 80 per cent in 2032), low carbon aluminium and sustainable PCB (Rise). Development of collecting waste, and compounding plants to develop circular solution (Sabic and Covestro). Development of PFAS-free solutions.

L-R: Volvo Trucks · Renault · AMS Osram · Rise

Lighting News

Kyocera Invest in TactoTek

LIGHTING NEWS

Kyocera have stepped up with €5m worth of investment for Finland-based in-mould structural electronics experts TactoTek. TactoTek's IMSE technology integrates electronic functions into 3D injection-moulded plastics, opening new possibilities in the design and manufacture of electronic devices.

Kyocera are developing their Haptivity® haptic feedback solution by integrating piezoceramic actuators into IMSE parts. TactoTek, for their part, will gain access to Kyocera's expertise and resources to accelerate the company's growth and market reach.

Kyocera's Haptivity platform is designed to combine force sensing and tactile feedback to create intuitive and user-friendly experiences. Force sensing activates capacitive touch interfaces with intent, while tactile feedback confirms actions by feel.

Kyocera's piezoceramic actuators reflect the company's expertise in developing fine ceramic materials for industrial and consumer applications. As a TactoTek licensee, Kyocera have integrated their components within IMSE human-machine interface surfaces. The result is uniquely thin, light, and tactile HMI solutions.

TaktoTek CEO Jussi Harvela says, "With Haptivity, Kyocera fulfils the intent of TactoTek's licensing model, enabling our partners to combine IMSE technology with their own strengths to secure and extend their market position. Kyocera's significant investment in TactoTek's current financing round reflects the market potential of IMSE technologies, including Kyocera's current customers and prospects."

TactoTek develop and validates IMSE technology, which they licence to partners including designers, manufacturers, integrators, and vehicle makers who design, manufacture, and integrate IMSE into their product offerings. User interfaces and lighting solutions are among the prominent IMSE applications.

Rivian to Recall Vehicles for Headlight Fault

LIGHTING NEWS

Rivian have issued a recall affecting 17,260 vehicles in the U.S. due to a headlamp issue. The recall affects some 2025-model R1S SUVs and R1T pickup trucks, according to Rivian's report filed with the National Highway Traffic Safety Administration.

The problem is the low beam may fail to illuminate when starting the vehicle in cold weather. To fix it, Rivian will replace the headlight control module in affected vehicles. The modules manage the operation of vehicle's headlights, including the activation of low and high beams.

Rivian say they've had no reports of collisions resulting from the fault, caused by some vehicles having been equipped with parts incorrectly configured by the supplier. The issue affects vehicles manufactured between 29 April 2024 and 3 February 2025. As of press time, there is no word on whether a similar recall is being undertaken in Canada, or elsewhere in the world.

Epistar, Lextar to Merge

LIGHTING NEWS

Ennostar, established in 2021 as a joint venture between Epistar and Lextar, have decided to restructure and merge Epistar and Lextar into a single company called Ennostar. The merger will formally happen in October 2025.

Ennostar hope this will accelerate the company's growth in the high-value-added optoelectronics market, which includes microLED displays, as the company wish to increase their product range beyond LED devices into high level systems and solutions.

Ennostar are the world's № 5 LED producer by revenue—$760m in 2024, a growth of 9.3 per cent from 2023.

New Cars, New Light styles

LIGHTING NEWS

A good lot of interesting vehicle and lighting designs have been launched recently. Here are three of them:

Li Auto's i8 has a front end similar to their Mega, including the unique trailing-edge-of-hood location for the DRL, front position lamps, and side marker lights (themselves unusual on a passenger car outside North America):

The Volvo ES90 has a unique rear lighting signature. The nifty taillights at the left and right edges of the backglass remind of Germany's experiment in the 1980s with dual high-mount brake lights—shown here as a Hella retrofit kit installed in an early-1970s BMW 2002—before the US-type CHMSL became the type accepted round the world:

And the China-market Audi A5L has classy front and rear lit logos:

Industry Bucks for US AEB Rule Rollback—Could ADB Be Next?

LIGHTING NEWS

DVN Analysis by Daniel Stern

As we **reported** shortly ago, AEB—automatic emergency braking—hasn't been much of a big topic for the lighting community. It's tangentially related to driver vision (more like vehicle vision), but the AEB requirements in Euro NCAP are such that the connection isn't all that strong. The tests for an equipped car to avert or mitigate a collision include nighttime tests done with street lights and low beams (or with no street lights but high beam headlamps lit), so camera detection isn't a big issue; the street lights help a lot, and low beam performance is not so crucial.

Then came NHTSA's new PAEB (pedestrian automatic emergency braking) requirements, promulgated as FMVSS 127. Speeds are similar, but the night tests are done with no street lights, on high beam but also on low beam—and also in pedestrian-crossing-the-road scenarios, not just longitudinal pedestrian movement along the road.The low-beam scenario is hard, but maybe feasible with low beam if more light is put to the left of centre, close to the horizontal. But that's going to aggravate already-pitched complaints of intolerable glare from oncoming and following vehicles.

If ADB were allowed in the test scenario, it could be easier to detect the pedestrian from the side for sure, maybe without the extra glare that will result from changing low beams to help a vehicle pass these tests. But there is no mention of ADB in FMVSS 127; it's all upper (high) and lower (low) beams.

As it stands now, the requirements of FMVSS 127 present a need and opportunity for close collaboration between lighting and ADAS teams.

But what if it comes to stand differently? A very interesting thing—an unprecedented one—happened shortly ago which could shake all this up. The Alliance for Automotive Innovation is a U.S. lobbying group who describe themselves as the 'unified voice of the automotive industry'. Formed by the 2020 merger of the Alliance of Automobile Manufacturers and the Association of Global Automakers, they describe their mission as 'working with policymakers to support cleaner, safer and smarter

personal transportation that helps transform the U.S. economy and sustain American ingenuity and freedom of movement'.

Automaker members of the Alliance include the BMW Group, Ford, GM, Honda, Hyundai-Kia, Isuzu, JLR, Mazda, Mercedes-Benz, Mitsubishi, Nissan, Porsche, Stellantis, Subaru, Toyota, Vinfast, the Volkswagen Group, and Volvo. Tier-1 members include Aisin, Aptiv, Autoliv, Bosch, Denso, Infineon, Luminar, Magna, Qualcomm, and Texas Instruments, amongst others. That's quite a who's-who chunk of the automotive industry.

Just after the inauguration of the Trump Administration, the Alliance filed a lawsuit in the U.S. Court of Appeals against what they've framed as "the [previous] Biden Administration's Department of Transportation". The lawsuit, which can be read here, seeks a repeal of FMVSS 127 as issued by NHTSA last year. The Alliance says the lawsuit "*should not* be interpreted as opposite to AEB, a lack of confidence in the technology, or an objection to AEB's widest possible deployment across the U.S. vehicle fleet. Rather, this litigation is about ensuring a rule that maximizes driver and pedestrian safety and is technologically feasible".

The lawsuit isn't sudden or capricious; it comes after a great deal of less-litigious effort by the Alliance. Their June 2024 petition for reconsideration called the FMVSS 127 requirements impracticable and likely to have grave unintended consequences, such as falsely-triggered urgent braking, causing high-speed rear-end crashes.

Just after Donald Trump won the Presidential election, the Alliance wrote him a letter pointing out that FMVSS 127 is out of accord with AEB regulations and guidelines elsewhere in the world, and urged the inbound administration to revisit the rule. In late November, 2024, NHTSA substantially denied the Alliance's petition for reconsideration, along with four others from individual automakers. Alliance President and CEO John Bozzella called that denial "a disastrous decision (…) that will endlessly —and unnecessarily—frustrate drivers; will make vehicles more expensive; and (…) won't really improve driver or pedestrian safety".

So is this futile, or could it gain traction? Maybe it could; as the Alliance points out, it is the prerogative of the Trump Administration to repeal or revise the previous administration's regulations. We will just have to wait and see. But there might be an interesting parallel here, relevant to the vehicle lighting community

The Alliance also wrote a letter to Congress in June 2024—around the same time as they filed their (doomed) petition for reconsideration—recommending that NHTSA should adopt an AEB standard similar to the European one.

A noteworthy part of that letter reads, "*Automakers and suppliers provided NHTSA a series of technical adjustments during the comment period to correct the deficiencies and achieve our shared safety goals. Despite partnering with automakers on AEB in 2016, this time the agency rejected the industry's feedback (…) after a decade of shared and substantive work on AEB and bn dollars invested, NHTSA inexplicably changed course and issued a rule that automakers indicated was not feasible*". That seems an apt description of the development path of the US ADB regulation, too. If the U.S. AEB rule can be framed as a misstep by the previous administration, and the current administration can be enticed or induced to change it so it's more like the EU protocol, **could the same thing maybe happen with the U.S. ADB rule?** Maybe it's not so far-fetched as it might seem, even if a group like the Alliance hasn't (yet?) militated for such a move.

To review: J3069, the SAE technical standard for adaptive driving beam systems, was the product of NHTSA asking SAE to translate the U.N. ADB standard into terms compatible with the U.S. legal and regulatory system. As we described in our **DVN analysis** shortly after NHTSA's ADB rule was published, Congress ordered NHTSA to

adopt SAE J3069, but instead NHTSA rejected SAE J3069 and substituted their own standard, significantly divergent from the SAE standard in ways that necessarily reduce the performance potential and increase the cost of a U.S.-compliant ADB system, compared to the ECE and SAE systems allowed everywhere else in the world.

But there are recent voices right within the U.S. Department of Transportation calling for NHTSA to revisit their decision and adopt SAE J3069. In 2024, the U.S. Transportation Secretary convened TTAC, the Transforming Transportation Advisory Committee, to advise the DOT on innovation. At the end of 2024, TTAC's 99-page report was published. On page 83, Section 7.4 starts out with boldface type reading, "**NHTSA should revise the Adaptive Driving Beams (ADB) rule and align itself with the European and Canadian approach to ADB.**" The text goes on to say doing so would permit wider and faster adoption of ADB systems, and to criticize the existing NHTSA ADB standard as "*reducing flexibility for automakers to install [ADB] at a reasonable cost (...) this rule made the perfect the enemy of the good by forcing a choice between forgoing an ADB system altogether and pursuing a system that meets requirements far more demanding than those in Canada and Europe. In addition, aspects of the rule are inconsistent with other NHTSA regulations. If not adjusted, parts of this rule stand as an obstacle to the deployment of this important safety technology in the U.S. market. With increases in pedestrian fatalities coming primarily at night, [ADB] could help to protect vulnerable road users. But under current NHTSA regulations, ADB systems allowed in Europe and Canada are not allowed in the United States*".

Pete Buttigieg, The Biden Administration's Transportation Secretary who convened the TTAC, has been swept from office along with the rest of the Biden Administration. And the Department of Transportation as a whole is likely under significant threat of substantial "deletion" by the Trump Administration. Perhaps there will be nobody left at NHTSA or the DOT to change the ADB and AEB rules.

Driver Assistance News

Mercedes L2++ Coming on New CLA

DRIVER ASSISTANCE NEWS

Mercedes-Benz will be the first international automaker to offer L^{2++} starting in China this year. A few days ago, Mercedes announced they are bringing fantastic new L^{2++} driving features, the most advanced form of partially automated driving.

Mercedes' point-to-point assisted driving will enable mature handling of complex urban traffic, while the driver keeps their hands on the wheel and monitors the traffic. The car handles the steering, braking and accelerating. It helps the driver navigate busy streets in the world's biggest cities.

Coöperative steering is unique to Mercedes-Benz: the driver can always intuitively adjust the position of the vehicle without disengaging the system.

The system will make its debut in the upcoming new CLA.

General News

Hella Publish Preliminary '24 Results, '25 Outlook

GENERAL NEWS

Forvia Hella have presented preliminary results for the fiscal year running 1 January to 31 December 2024. In a challenging market environment, currency-adjusted sales improved by 1.3 per cent to €8.1bn; reported sales are at €8.0bn—on par with 2023. Operating income declined to €446m (versus 2023's €486m); the operating income margin fell to 5.6 per cent (versus 6.1 per cent). At the end of 2024, net cash flow was 2.4 per cent of reported sales (the 2023 figure was 2.6 per cent). Group-wide sales development was largely driven by the Lighting Business Group. Primarily a result of the full consolidation of Chinese joint venture Beijing Hella BHAP Lighting, sales increased by 2.8 per cent to €4.0bn (versus €3.9bn in 2023). The lighting business was supported by slight growth in the American region, driven by launches for headlamp and rear lamp projects. The operating income of the Lighting BG decreased slightly to €126m (down from €132m in 2023), reducing the 2024 operating income margin to 3.2 per cent from 3.4 per cent the year before.

In the Electronics Business Group, sales fell by 2.3 per cent, from €3.4bn to €3.3bn. The radar business has gained traction, partly due to new series launches in the Americas. However, in addition to the declining industry environment, postponements of series projects, effects from the customer and product mix in China, and the electrification slowdown in Europe all dragged down business development in the electronics sector. Operating income declined slightly, from $232m in 2023 to €226m in 2024, with the operating income margin holding steady at 6.9 per cent.

In the Lifecycle Solutions Business Group, sales fell by 3.6 per cent, from €1.1bn to €1.0bn. On account of expansion of the electric/electronics portfolio, the independent spare parts business grew in key European markets. But due to an overall weaker

market, major makers of agricultural and construction machinery, trucks, and trailers invested significantly less in new vehicles. So the operating income of the Lifecycle Solutions BG fell from 2023's €128m to €99m, reducing the operating income margin from 11.9 to 9.6 per cent.

For the current fiscal year 2025, the company expect currency-adjusted sales of between €7.6bn and €8.0bn, approximately, and an operating income margin of between 5.3 and 6.0 per cent. Net cashflow is expected to be at least €200m.

Valeo's FY24 Results

GENERAL NEWS

Income statement		2024	2023	Change
Sales	*(in €m)*	**21,492**	**22,044**	**-3%**
R&D expenditure	*(in €m)*	(2,127)	(2,029)	+5%
	(as a % of sales)	*(9.9) %*	*(9.2) %*	*-0.7 pts*
Administrative and selling expenses	*(in €m)*	(1,035)	(1,084)	-5%
	(as a % of sales)	*(4.8) %*	*(4.9) %*	*+0.1 pts*
Operating margin*	***(in €m)***	**919**	**838**	**+10%**
	(as a % of sales)	***4.3%***	***3.8%***	***+0.5 pts***
Other income and expenses	*(in €m)*	(313)	(111)	N/A
Cost of debt	*(in €m)*	(251)	(243)	+3%
Net attributable income	***(in €m)***	**162**	**221**	**-27 %**
	(as a % of sales)	***0.8%***	***1.0%***	***-0.2 pts***
Basic earnings per share	*(in €)*	0.67	0.91	N/A

In 2024, Valeo achieved their profitability and cash generation objectives, recording sales of €21,492m, down 0.5 per cent like-for-like, and operating margin up 9.7 per cent to €919m, representing 4.3 per cent of sales (up 0.5 percentage points year-on-year), in line with guidance.

48 per cent of the global business is done in Europe & Africa (+1 point), followed by Asia (31 per cent, -2 points) and North America (19 per cent, -1 point).

Original equipment sales*** (in millions of euros)	As a % of sales	2024	2023	Change	LFL* change	Perf. **
Europe & Africa	**48%**	**8,596**	**8,840**	-3%	-3%	**+1 pt**
Asia, Middle East & Oceania	**31%**	**5,559**	**5,911**	-6%	-2%	**-2 pts**
o/w Asia (excluding China)	*16%*	*2,907*	*3,026*	*-4%*	*+2%*	*+7 pts*
o/w China	*15%*	*2,652*	*2,885*	*-8%*	*-6%*	*-10 pts*
North America	**19%**	**3,454**	**3,572**	-3%	-3%	**-1 pt**
South America	**2%**	**341**	**378**	-10%	+5%	**+3 pts**
Total	**100%**	**17,950**	**18,701**	**-4%**	-2%	**-1 pt**

** Like for like.*
*** Based on S&P Global Mobility automotive production estimates released on February 18, 2025.*
**** Original equipment sales by destination region.*

The lighting division outperformed automotive production by 1 percentage point, driven by numerous production launches in Europe for European automakers. In China, the division's performance was fuelled by recent production starts in electrification for a North American automaker (with starts for the same customer also boosting business in North America) and several Chinese automakers.

The lighting division's EBITDA margin for the year remained robust at 13.2 per cent, with resilient cash generation in a context of high costs required to prepare for numerous production launches and the postponement of a large number of production starts.

Original equipment sales*** (in millions of euros)	As a % of sales	2024	2023	Change	LFL* change	Perf. **
Europe & Africa	**48%**	**8,596**	**8,840**	-3%	-3%	**+1 pt**
Asia, Middle East & Oceania	**31%**	**5,559**	**5,911**	-6%	-2%	**-2 pts**
o/w Asia (excluding China)	*16%*	*2,907*	*3,026*	*-4%*	*+2%*	*+7 pts*
o/w China	*15%*	*2,652*	*2,885*	*-8%*	*-6%*	*-10 pts*
North America	**19%**	**3,454**	**3,572**	-3%	-3%	**-1 pt**
South America	**2%**	**341**	**378**	-10%	+5%	**+3 pts**
Total	**100%**	**17,950**	**18,701**	**-4%**	-2%	**-1 pt**

** Like for like.*
*** Based on S&P Global Mobility automotive production estimates released on February 18, 2025.*
**** Original equipment sales by destination region.*

For 2025, in a still-uncertain environment, Valeo are aiming for another year of improved financial performance, with the following objectives:

- Sales of between €21.5bn and €22.5bn
- An increase in operating margin to between 4.5 and 5.5 per cent

Promoting Circularity via Public-Private Partnership

GENERAL NEWS

Deloitte Tohmatsu LLC
Hideo Matsue

TOYOTA MOTOR CORPORATION
Chief Sustainability Officer
Yumi Otsuka

Ministry of Economy, Trade and Industry
Shogo Tanaka

During Circular economy Expo in Japan, the Japanese Government strongly promoted resource circularity policies. Because Japan is a resource-poor country, circularity really matters. Shogo Tanaka, from the Ministry of Economy, Trade, and Industry, made points including:

- The movement towards commercialization is becoming very active, and we are working on policies to turn this into an opportunity for growth
- We also want to submit a bill to amend the Law for Promoting Effective Utilization of Resources.
- In order to expand the use of recycled materials, we will first designate strategic materials by government ordinance.
- In order to use these recycled materials, we will create a product top runner certification system for products that are themselves suitable for supplying recycled materials.
- We will amend the law so that collection will be possible if ministerial certification is received.
- We will establish a framework for providing guidance and recommendations to promote the healthy growth of the aftermarket industry.
- We are creating a framework for sufficient financial support that covers not only the introduction of equipment but also the running costs.
- We are creating rules for investment support and subsidy support

Toyota Motor's Chief Sustainability Officer Yumi Otsuka said his company aims to create a social system that can circulate resources: "In terms of the coexistence of humanity and the earth, we are working on the circular economy as an important issue. Based on the culture of the spirit of the Toyota Production System, the key is to eliminate waste. We are focusing on developing technology, building partnerships, and shifting business models to use fewer resources, produce less waste, and use them for a longer period of time. We are also considering designs that are easy to disassemble and disassemble.

"Currently, Toyota's design recyclability rate is over 85 per cent, and we are working to achieve a recycled materials adoption rate of over 30 per cent by 2030. Considering the entire lifecycle of a car and the number of parts it has, it is very difficult to create

an ecosystem, but we need to be able to steadily collect parts when the customer reaches the end of their use, and we design our cars with the assumption that both the software and hardware will be updated so that the cars can be used for a long time.

"From now on, we will transform into a mobility company, and as we provide mobility in all forms, we feel that it is necessary to create international rules for used cars that are also being sold overseas. After-sales is where we truly interact with our customers. We believe that increasing value as Toyota is very important and makes our customers happy. We are reviewing our designs, such as by removing adhesives and using other materials to make things easier to disassemble".

To go further ...

Light on wheel

TO GO FURTHER ...

By Paul-Henri Matha

A lot of people have been asking me if a lighted-wheel design is legally possible. That's not easy to answer, because I am no longer part of a carmaker, nor do I work at a test house for component or vehicle approval. But here are my personal thoughts on the matter:

In China, this is clearly acceptable according to GB4785-2019, in parking condition, according to ¶ 4.31

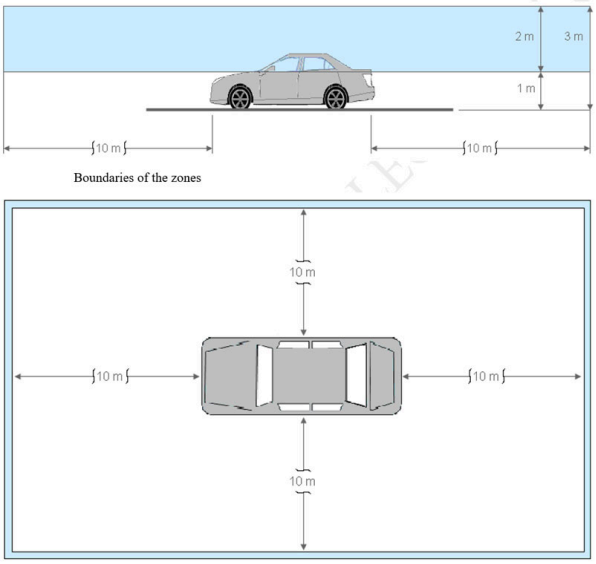
In China, this is clearly acceptable when the vehicle is parked, according to GB 4785 2019 ¶ 4.31, which says lighting and signalling devices not defined by the standard may be activated if the vehicle is stationary, subject to conditions—one of which is that the validity of devices which are defined by the standard must not be prejudiced.

In Europe, parking conditions are now strictly defined in the new R48-09, and unapproved lamps 'may be' or 'are' prohibited—the exact degree and nature of prohibition isn't final; there is an ongoing task force for lamp activation under parked conditions (TF LUQC, as we've previously reported). Consensus is not finalized yet and there are different views, so the best way for an automaker to navigate this uncertainty is to be close to their authorities to have their feedback.

Anyhow, in R48-09, this kind of light from the wheel might be considered as a courtesy light, defined as a lamp used to provide supplementary illumination to assist the vehicle user to approach or depart, enter or exit, load or unload the vehicle. But it's

not a free-for-all; there are constraints, one of which is that it should not be possible to see the apparent surface of the courtesy light from 10 metres away and a height of 1 to 3 metres, and lighted wheels as proposed in these photos would seem to run afoul of that requirement, presented in ¶ 6.24.9.3:

(…)the technical service shall perform a visual test to verify that there is no direct visibility of the apparent surface of the exterior courtesy lamps, if viewed by an observer moving on the boundary of a zone on a transverse plane 10 m from the front of the vehicle, a transverse plane 10 m from the rear of the vehicle , and two longitudinal planes 10 m from each side of the vehicle; these four planes to extend from 1 m to 3 m above and perpendicular to the ground as shown (…).



However, ¶ 6.24.9.4 suggests a possibility to disregard that requirement if the light intensity is less than 0.5 cd:

At the request of the applicant and with the consent of the Technical Service, the requirements of paragraph 6.24.9.3. may be verified by a drawing or simulation or deemed be satisfactory if the applicant can prove that the luminous intensity of light emitted directly during the observation test described in Annex 14 is not more than 0.5 cd per lamp.

Now, what about other-than-parked conditions, when the vehicle is actually driving? Then a lamp like this could maybe be considered a manœuvring lamp, which is allowed to be white, but then its apparent surface must not be visible—a requirement similar to 6.24.9.3.On top of that, the lamp would be in this case installed on a movable component.

On top of that, the lamp would be in this case installed on a movable component. ¶ 5.17 says any kind of lamp may be mounted on a movable component of the vehicle, as long as the conditions of ¶ 5.18 through 5.20 are met.

“Rear position lamps, rear direction-indicators and rear retro-reflectors, triangular as well as non-triangular, may be installed on movable components only:”

Would it be acceptable to have another lighting function on a movable part (the wheel) if the component fulfils the photometrical requirement of 5.18.1?

“If at all fixed positions of the movable components the lamps on the movable components meet all the position, geometric visibility, colorimetric and photometric requirements for those lamps”

The only lights intended for dedicated installation on the side of the car—side marker lights—must be amber, not white.

In a nutshell, is it feasible? My personal opinion is perhaps yes, in parking condition and in combination to light intensity below 0.5 cd. We will see when BMW will release the car. Looking forward to discovering it soon!