Tue, 8 April 2025
Weekly Newsletter

DVN Lighting

NEWSLETTER #899

Editorial

DVN Visits Shenzhen

Shenzhen city centre light show (internet photo)

During the DVN event at Shanghai last year, I had the chance to have a long discussion with the BYD team about vehicle lighting technology and challenges, and they proposed a tour of their Shenzhen headquarters. Last month I arranged that visit.

Shenzhen is a hyperdynamic new city, with a population of about 18 million. It's quite near Hong Kong, with metro and ferry services connecting those cities. Shenzhen has developed quickly over the last four decades (and counting) to become the top-GDP city—higher than the long-leading Guangzhou—in Guangdong Province in the south of China. A prominent industry and technology hub, sometimes called China's Silicon Valley, Shenzhen's entrepreneurial, innovative, and competitive culture has resulted in the city being home to numerous small manufacturers and software companies. Big-name companies also are seated there, including Huawei, Tencent, BYD, DJI, and more.

Guangdong in general, and Shenzhen in particular, are strong bases for the LED industry, including light source manufacturing (APT Electronics, Refond, Nationstar…)

and for the vehicle lighting business as well. That was plenty of incentive for a trip to visit the lighting ecosystem and our DVN members.

First stop: BYD! We wanted to know more about its history and its unique vertical integration strategy for the company as a whole, and also for lighting. BYD design and make their own lamps—they also supply lighting for other car companies—and they also make their own LEDs and semiconductors.

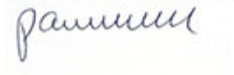
Recently, BYD's Yangwang U7 was released, equipped with DLP and other interesting lighting features. Now I've driven it at night, and it is primo!

We hope you will enjoy this deep dive into BYD and their lighting division.

Looking forward to meeting you this week for those who have chance to be in Koln for our DVN interior or in Detroit for our AEB Lighting/ADAS workshop.

Sincerely yours,

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



In Depth Lighting Technology

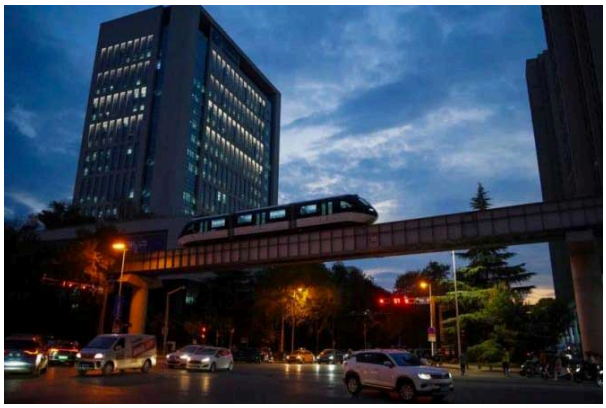
DVN Field Trip: BYD HQ in Shenzhen

BYD lamp plant director Zeng Rong (L), DVN CEO Paul-Henri Matha (R)

BYD's exhibition hall occupies two floors, and the staff gave us a detailed introduction (in fluent English) to BYD's 30-year development history and major technological breakthroughs, including blade batteries, the DM-i super hybrid system, their e-platform, Yi Sifang and Yun Nian, and so much more.

On 18 November 1994, Wang Chuanfu gathered a team of 20 people and founded BYD in Buji Town, Longgang District, Shenzhen. The formal founding date was 10 February 1995 as Shenzhen BYD Battery Company Limited, with a focus on rechargeable nickel–cadmium (NiCd) batteries.

BYD comprise four business units: Electronics, Auto, Renewable Energy, and Rail Transit. The rail transit is purely electric, including the BYD Cloud Rail; the BYD headquarters has also a cloud rail service, so that employees can take the shuttle between the buildings.

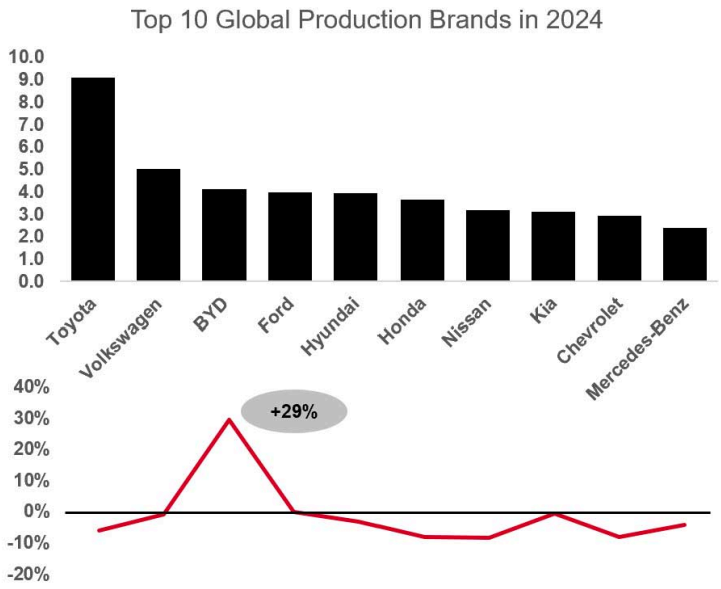


In 2024, BYD was the № 2 electric vehicle battery producer (after CATL), producing 17.2 per cent of the world's EV batteries. As of September 2024, BYD employs 900,608 people, of whom 104,003 work in R&D.

BYD Group's revenue has evolved like a skyrocket: from 0 in 1995 to $83bn in 2023:

BYD's largest subsidiary, BYD Auto, was founded in 2003. In 2022 they stopped ICE vehicle production to focus on PHEV and BEV cars.

BYD Auto are ranked the № 3 automaker in 2024 by S&P with 29-per-cent growth, while all the other top-10 OEM brands were stable or had decreasing revenues:



Data compiled Feb. 10, 2025
Source: S&P Global Mobility

BYD make five car marques: BYD Dynasty, BYD Ocean, Fangchengbao, Denza, and Yangwang.

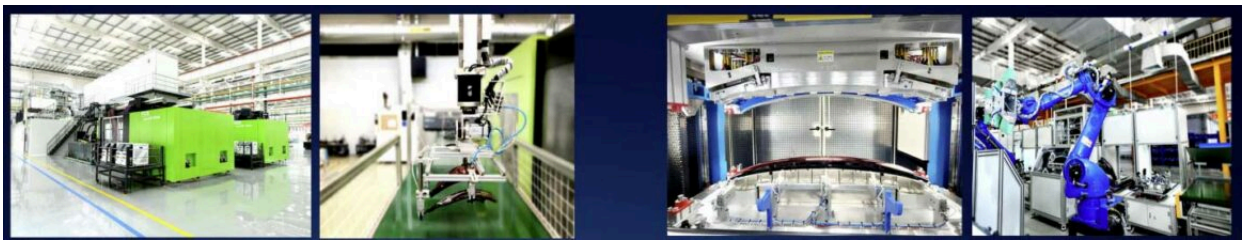
There are BYD Auto plants in China, Brazil, Thailand, and one is in the works for Hungary (for Europe in 2025). BYD's vertical integration is unique and quite striking, for the company as a whole and for vehicle lighting. Their 13th Division Lamp Factory is responsible for development and production of lamps, and BYD Semiconductor is responsible for the production of semiconductors, including LEDs.

In 2003 they started lamp design in Shanghai. The first lamp plant came onstream in 2005. There are now two R&D centres (at Shenzhen and Xi'an) and nine factories. The business scope of the 13th Division Lamp Factory includes interior and exterior lighting, HUDs, and rearview mirrors. From C¥5.81m revenue in 2012, revenue in 2024 reached C¥14bn (~€1.8bn), with 40-per-cent growth in 2024. The R&D team has 600 engineers with a plan this year to reach 700.

The 13th Division Lamp Factory also supplies outside customers like Changan, Toyota, Dongfeng, and Great wall. But BYD Auto are their main customer, generating 80 per cent of divisional revenue. BYD Auto also work with other suppliers like Koito, Xingyu, Hella, and Valeo for 10 to 20 per cent of their total lighting purchases.

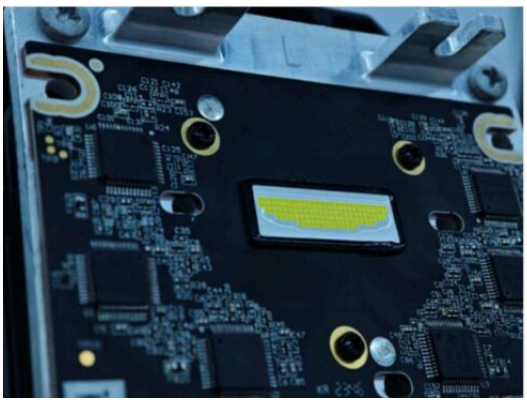
The 13th Division Lamp Factory started their first SMT line in 2018, and now have 100 SMT lines. The first xenon lamp was made there in 2013, followed by the first LED headlamp (2017), first CAN headlamp and LIN rear lamp (2020), and first DLP headlamp (2025).

They have all skills in-house for design and testing of hardware and software. For process, the main focus at BYD Group (and therefore at the 13th Division Lamp Factory) is automation, including injection, coating, metallization, and assembly line work; it's a zero-worker shop, as shown here:

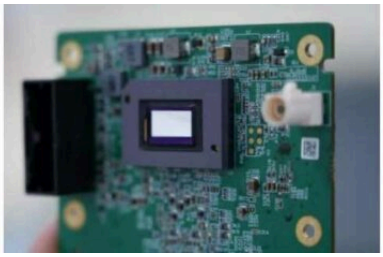


Recent developments include high tech lighting for vehicles from the maker's Denza and Yangwang brands.

As example, the BYD Denza Z9 and some Yangwang models have a five-row, 108-pixel ADB module developed and built all in-house—LEDs, module, and software.

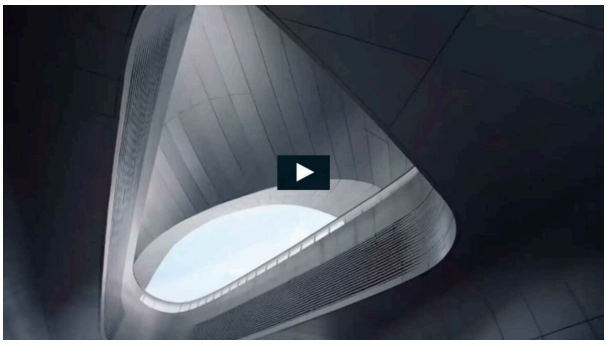


The Yangwang U7 has DLP technology from an external supplier, and this model was launched on 27 March.



More models will be equipped with DLP optical modules from external suppliers, as well as with self-developed products. Compared to external suppliers, the self-developed products will be improved in terms of lighting effects and cost.

After a nice dinner at the BYD restaurant, the lighting team arranged a night drive of a new model: the just-released Yangwang U7. This car integrates the brand's signature design, with the 'door of time and space' family design language. It has inverted-C-type matrix headlights, with recognition of the brand.



The headlight uses DLP technology and 108-pixel ADB. It supports intelligent interactive projection to achieve complex welcome scenes, personalized projections, and wall-projected movies. The full-width taillights and the high mounted stop lamp (CHMSL) are designed in continuity of the front position lamp with the lit logo between, and enhance the brand recognition:

BYD's lighting strategy is to dramatically expand their pre-development team and to develop and promote more innovation. We concluded our exchange with a discussion about mini- and microLED technology for display applications. BYD's lighting team also are responsible for HUDs and camera monitoring systems which are replacing side mirrors. MiniLED backlighting improves the contrast of the screen quite noticeably, and has a significant effect on PHUD (panoramic head-up displays), but the screen directly displayed by miniLED is limited to the size of LED pixel itself; it cannot provide very clear content or a good driving experience in the car yet. But it is a very good effect when used in the external lamps, even though cost and reliability challenges remain. When microLED technology matures, the relevant display technology will probably find application on high-end models, and it will provide very good customer experience.

Lighting News

ADAC Glare Symposium: Main Takeaways

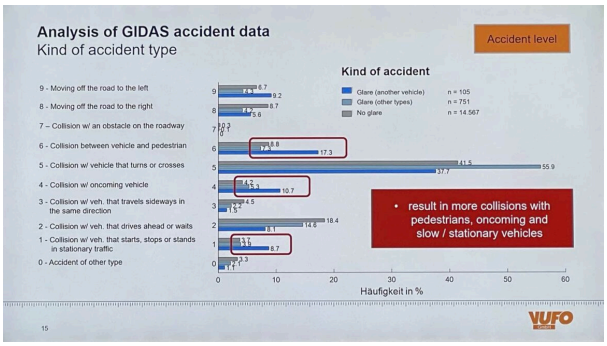
LIGHTING NEWS

By Michael Hamm, Senior Advisor DVN and TU Darmstadt lecturer

For two days about 60 participants attended the ADAC glare symposium in Landsberg/Lech, Germany. ADAC organized together with automobile clubs from UK, Netherlands, Austria, Switzerland and others a broad online survey on glare. The survey of motorists by questionnaire was conducted up to the end of 2023 to determine the extent to which they note they are affected by glare from light sources on vehicles and what restrictions they experience when driving. These results inspired ADAC to organize a symposium on glare with ophthalmologists, industry participants and researchers. The symposium could be considered as the extended version of the DVN Glare forum held in Munich the day before the DVN Munich workshop Feb. 2025 in Motorworld Munich.

The meeting started after welcome words from Prof. Khanh from Darmstadt University and Carsten Schulze, Technical President of ADAC. Burghard Böttcher reported from the ADAC survey. With 4.312 interviews extracted from a representative approach, 71 % of the respondents noted the glare unbearable or annoying. The Dutch automobile organization ANWB was presented by Herman Zeven. His organization did a member-based interview. More than 15.000 reactions were recorded. About 80% also mentioned glare as intolerable or annoying. Additional Bicycle lights and SUV were mentioned. Rod Dennis from the British RAC showed a more precise approach by asking when and how the glare was experienced. More drivers from limousine cars (e.g., lower driver's eye height) reacted on glare issues. Henrik Liers, Managing Director at VUFO Traffic Accident Research Institute at TU Dresden (a company run by TU Dresden, Accident Research FAT, Federal Highway Research Institute BAST) reported on a data analysis on accidents. From their GIDAS database of 14.567

accidents investigated, about 105 were related to glare from other vehicles. Generally, direct glare was



Mr. Liers from TU Dresden displayed Data out of the GIDAS database of investigated accidents. Only 105 accidents could be traced to glare impact.

In the ophthalmologic session, four ophthalmologists presented their findings. Dr. Dirk Werdermann explained the eye function and referred to the glare sensitivity of elderly drivers. Prof. Schiefer from Eye-Research in Aalen showed restrictions for the definition of visual acuity. Not all letters for visus determination are recommended. With Landolt rings about 8 - 15% of humans have problems on left-right discrimination. He showed that after the age of 48 years the ability of accommodation deteriorates. With age, the visual contrast sensitivity shrinks by a factor of six. Prof. Dr. Michael Bach from the Medical Center of University Freiburg showed the importance of contrast vision. Tom van den Berg from the Royal Netherlands Academy showed the investigations on straylight generated in the human eye. It is possible to measure the amount of straylight in a human eye individually and reliably. Many patients complain of night blindness. They see a “halo” around a light source or feel dazzled by the headlights of oncoming vehicles The effect of increased straylight in the human eye can be compared to looking through a dirty windshield.

Research Institutes gave an overview on research about glare. Dr. Klaus Trampert from KIT Karlsruhe showed an experimental setup to determine the readaptation without the errors that might occur by pressing a button or verbally announcing Landolt ring orientation. Readaptation after a 500 ms glare pulse of 24 lux was measured. Christian Schwanengel from Techno Team showed his company’s ability to make luminance measurements with extreme small resolution. From the derived luminance values, he showed how the resulting illuminance at the eye could simply calculated.

ADAC Outdoor demonstration of different light sources in different situations to demonstrate discomfort glare and disability glare.

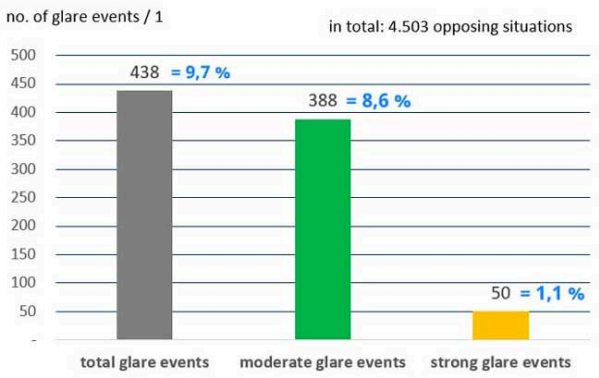
Mr. Böttcher from ADAC organized a lighting demo indoor and outdoor.

In an indoor demonstration ADAC had lined up cars with several types of illumination. Halogen, Xenon. LED and LED ADB cars were illuminating a wall. Later those cars were driven in an outdoor circuit. The idea was to show the different contributions to disability glare and discomfort glare.

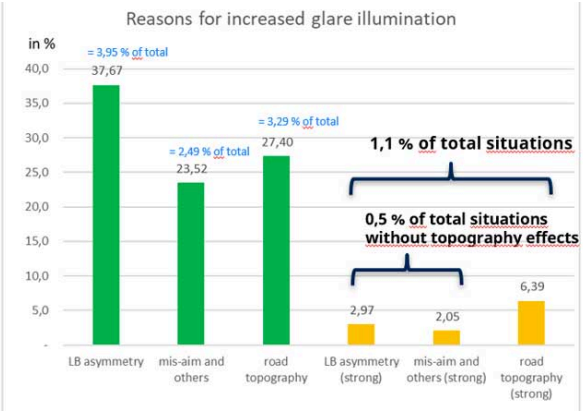
The second day of the ADAC glare symposium was dedicated to research and regulation.

Prof. Stephan Völker from TU Berlin showed research findings about glare source luminance and spectrum. With proper aiming there were only small effects on glare source luminance or spectrum found. Nevertheless, they exist and could be quantified. Prof. Völker showed that the dominating parameter for glare is the illumination (measured in lux) at the driver's eye.

Dr. Ernst-Olaf Rosenhahn from Marelli Lighting shared new glare analysis by measurements and new statistical evaluations. In morning and evening driving situations, the amount and type of glare in opposing situations was recorded. Dr. Rosenhahn shared the bitter results.



Glare analysis from 4,503 opposing situations. About 8.6% of total were moderate glare and 1.1% were strong glare events.



Deep Dive 8.6% moderate glare events: 3.95% LB asymmetry, 2.49% misaim and about 3.29% road topography. Strong glare: about 0.5% asymmetry/misaim and 0.6% topography

About 10% of the opposing situations were related to glare. In a deeper analysis he could split the glare impressions to the root causes low beam asymmetry, misaim, and road topography.

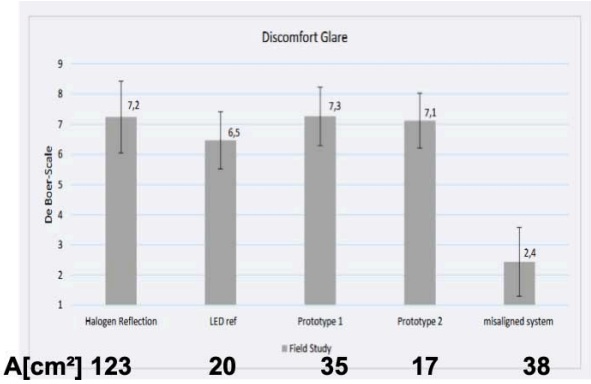
Dr. Rosenhahn additionally gave an example of strong glare due to road topography. An oncoming car on a hill/bridge produces with 60 km/h about 1.5 seconds glare below cutoff for oncoming traffic. The glare peak is not rectangular, but more triangle shaped. Assuming 4.5 lux maximum at driver's eye the result is 3.4 lx·s glare. From literature, it is known that such amount leads to strong glare.

He also calculated glare situations of an oncoming car in a curve. Trees and bushes aside the curve could obscure the headlights and only the luminance on embankments and trees would be visible. This situation was described by ADAC as dangerous because the high beam assist only reacts on direct headlight visibility and potentially high beam glare would exist. Looking to the naked data, Dr. Rosenhahn calculated in various curve radii about 0.6 - 1.1 lx which is equivalent to moderate glare. This is due to the fact that a high beam has its maximum roughly in the optical axis, while a car in a curve (bend radius 100 - 400m) does not hit the eyes of a driver with its optical axis. But in internet this was demonstrated as a big topic. There might be potentially a higher sensibility by the drivers because they might feel that the oncoming car could do something to avoid a potentially heavy glare situation.

Elisabeth Kemmler from the Lighting Lab of Darmstadt University showed findings of a laboratory experiment on light source size and luminance.

Markus Peier from the Lighting Lab of Darmstadt University showed findings of outdoor results on glare reduction by adaptively controlling the rear lights. Especially when standing behind a braking car there is potential to reduce the luminance of the front car's rear lights.

Dr. Aniella Marie Johannsen from LLAB Lippstadt showed an indoor and outdoor test on the influence of small light emitting areas on headlamp glare. This experiment was organized together with Dr. Niedling from Forvia Hella. Looking into the results, there was no evidence found that on a real road discomfort glare increases by aperture or LED as new light source. All ratings are above admissible. But a misaligned system that thus produces higher illuminance at the driver's eye is rated (2.4) in the DeBoer category between (3) disturbing and (1) unbearable.



Results of the LLab / Hella investigation on discomfort glare produced by different light sources and luminous aperture of the headlights.

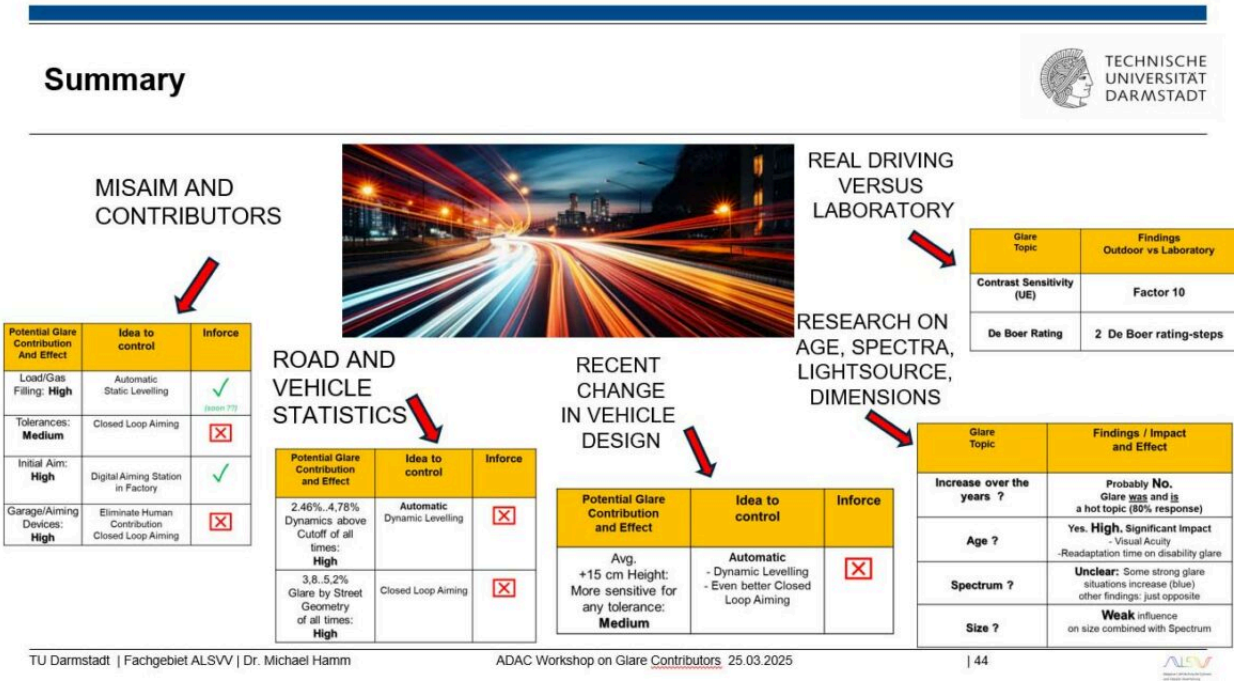
Prof. Lamontain from Magdeburg Research showed the power of virtual assessment of wet road and glare.

Prof. Khanh from Lighting Lab of Darmstadt University presented findings on soiling of headlight outer lenses. He explained an experiment where salt and dirt were used as real dirt contributors on outer lenses. With increasing soiling, the glare contribution increased up to a factor six where the headlights range decreased for lower visibility and detection.

Dr. Michael Hamm from Lighting Lab of Darmstadt University collected the impact of various glare contributors in vehicle lighting systems. Especially the non-existing precision of headlight aim due to tolerances and load conditions, dynamic effects and topography was investigated and quantified.

One of the big topics seem to be the incorrect aim of the lamps. Several tolerances contribute to variations in aim. Additionally, a live experiment with 15 of the participants showed that nobody of the 15 participants was able to aim the test lamp identical to anybody else in the test group. A standard deviation of ±0.25° with a maximum of 0.6° was recorded. Dr. Hamm could show from literature that this is not surprising. Aiming with the eye is always loaded with additional tolerances. Additionally, he showed data from scientific reports that a test with 10 garages showed that not a single garage was able to aim correctly. Some did just nothing or made things worse. His recommendation was to put priority in technical equipment (e.g. digital aimers) via PTI to have at least one point in car life where aiming was done with minimal tolerances.

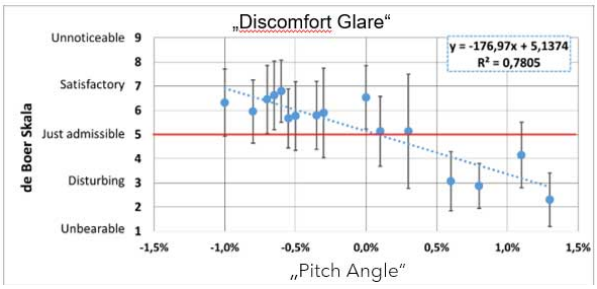
Dr. Hamm showed that due to dynamics about 2.5 - 5% of all times the vehicle's cutoff is above the horizon and thus potentially creating glare. Due to topography, about 3 - 5% of all times the vehicle‘s cutoff is above the horizon and thus potentially creating glare. Only few countermeasures are already in force. Especially the coming static automatic load correction could be a positive glare reducing contributor.



Another effect was that outdoor investigations are creating different results, because the test persons must fulfil driving tasks. A difference of 2 DeBoer rating steps was recorded if the results of indoor and outdoor findings were compared.

In the last session glare and reduction in the field of regulation was covered. Tomasz Targosinski explained the process of interaction in the way a new regulation is created.

Dr. Rainer Neumann gave an overview of regulation activities on glare. Dr. Rainer Neumann chairs the research WG SVP in GTB, is Co-chair of the WG Strategy and belongs to the international Automotive Lighting and light– Signalling Expert Group (GTB). He reported on the VEDILIS Research project in 1995 that was initiated before the introduction of Xenon Light. The study for this research on spectrum and aperture influence by the Dutch research team of TNO did reveal only small influence of about 0.1 DeBoer Points. In a big outdoor study in the year 2014, GTB made experiments demonstrating the influence of load in the vehicle's trunk. 25 different vehicles with 3 different load conditions were used to investigate the impact on discomfort glare.



Results of the investigation on discomfort glare induced by trunk load in the outdoor event conducted 2014 by GTB in Klettwitz/Germany

The introduction of static automatic levelling that corrects the vehicle's headlight aim on the load in the trunk will possibly reduce glare events in the future. The GTB has passed that proposal, but as Rainer Neumann showed, there is some additional contribution by GRE and UNECE necessary to bring such proposal in the status of "in force".

Ravi Mehra is New Uno Minda Managing Director

LIGHTING NEWS

Uno Minda have announced that Mr. Ravi Mehra, formerly Deputy Managing Director of the Uno Minda Group, has been elevated and appointed as the Managing Director of Uno Minda.

Mr. Nirmal K Minda, who has led the group for nearly five decades, passes the baton to Mr. Mehra to lead Uno Minda into a sustainable and future-ready era. Mr. Minda will continue to provide strategic guidance in his role as Executive Chairman.

With his experience, leadership, and deep industry expertise, Mr. Mehra has been instrumental in driving innovation and growth at Uno Minda. Uno Minda are confident that his leadership will accelerate their journey toward a more sustainable, responsible, and technology-driven future, further solidifying Uno Minda's position in innovation and production.

Ichikoh Tooling Centre Comes Onstream

LIGHTING NEWS

Ichikoh Industries, part of the Valeo Group, have opened the Ichikoh Tooling Centre, a mould factory that serves as the core base for moulding technology, on the premises of their Isehara Manufacturing Plant in Kanagawa Prefecture. This plant will produce very difficult moulds, and will be responsible for prototyping, analysis, and estimating, handing over moulds to each manufacturing base, and supporting mass production.

Ichikoh are leaders in moulding subfields including microfabrication, laser texturing, and metal moulding. To meet ever-increasing quality demands, the company are actively developing new manufacturing methods. To improve production efficiency, they've adopted an efficient layout conscious of preventing a single product from stagnating or going back between processes.

The old factory's problems were solved by optimizing the layout of the equipment and installing a precision machining room to deal with vibrations that affect fine processing. The company also aim to more than double the current number of moulds they produce. Moulds are important parts that determine the quality and performance of a product, so perfection is required; therefore training the next generation of engineers is an urgent task.

The company's mission is to develop workers to inherit the skills of existing 'master craftsmen'. Training mouldmasters takes many years, and securing the necessary personnel is an issue, so Ichikoh are promoting data conversion, mechanization, digitalization, and automation of operations while creating an environment that supports the improvement of mouldmaster skills.

A Glimpse of the VW ID.Every1's Exterior Lamps

LIGHTING NEWS

Information about VW's ID.Every1 model has been trickling out, and now it's time for lighting details from VW partner Hote Studio fur Produktdesign.

The vehicle that was presented is a concept car, not a production model. As these pictures show, there is no gap between lenses and bezels. Outer lenses are polished, rather than injected and UV-coated. This is the big difference with lamps on production vehicles.

It will surely be interesting to see if the final concept will keep this front fascia, which reminds of the Renault 4 with its lit logo and 2-metre-wide outer lens.

ADAC Buy EBW Electronics

LIGHTING NEWS

On 1 April 2025, ADAC Automotive bought Holland, Michigan-based EBW Electronics. This acquisition provides ADAC vertical integration, as well as production and distribution of printed circuit board assemblies and electronic assemblies, adds a fifth West Michigan manufacturing location, and grows the team in West Michigan to 1,000+.

ADAC say the addition of electronics manufacturing will be a catalyst for growth in other automotive categories, strengthen their tier-2 automotive supply for electronic products produced in North America, and propel growth in industries including commercial vehicles, agriculture, furniture, and home products.

ADAC are known for their lighted door handles.

EBW Electronics President Cory Steeby (L), ADAC Automotive CEO Jon Husby (R) at EBW's Holland Township plant

Creat Join TactoTek Ecosystem

LIGHTING NEWS

Creat GmbH have signed a licence agreement with TactoTek, the pioneer of In-Mold Structural Electronics (IMSE®). This partnership allows Creat to strengthen their position as an innovator in vehicle lighting by incorporating TactoTek's IMSE technology into design and engineering solutions.

Creat have extensive experience in developing advanced interior and exterior lighting systems for major automakers and suppliers. By using TactoTek's IMSE technology, Creat will be able to deliver lightweight, highly integrated lighting solutions that align with the evolving demands of future mobility. This partnership further strengthens the IMSE ecosystem by bringing in another skilled engineering partner with strong expertise in the automotive industry.

Creat CEO Matthias Abeln says his company are "committed to pioneering technologies that seamlessly blend innovation, efficiency, and design freedom. With TactoTek, we have gained a strong partner whose IMSE technology is redefining standards in automotive lighting. Our partnership with TactoTek is driving the evolution of automotive lighting—innovative, efficient, and visionary. Together, we are shaping intelligent, aesthetic, and sustainable lighting solutions that meet the demands of future mobility".

TactoTek's IMSE technology integrates printed electronics and electronic components within ultrathin, lightweight, and functionally integrated smart surface structures. It supports the automotive industry's push for greater design flexibility, enhanced energy efficiency, and sustainability. TactoTek SVP of Consulting and Services Marko Suo-Anttila says Creat bring "deep expertise in automotive lighting and a strong track record of delivering innovative, production-ready solutions to the industry; their engineering capabilities and commitment to excellent lighting design make them a perfect partner for IMSE technology".

Breaking News

Stellantis and Valeo strengthen their cooperation with the launch of the first Remanufactured LED Headlamp in Europe

BREAKING NEWS

On the occasion of the Rematec trade fair in Amsterdam, Stellantis N.V. and Valeo mark their partnership and commitment to Circular Economy business model with the launch of two new remanufactured products: the first remanufactured LED headlamp in Europe and the remanufactured infotainment display screen.

Stellantis and Valeo are long time partners, committed to extending the products' lifespan without compromising quality, reducing waste, resources use and carbon footprint, while generating financial value.

Stellantis targets to lead the industry to Carbon Net Zero by 2038. Through its CAP 50 decarbonization program, Valeo is committed to achieving carbon neutrality by 2050. Circular economy plays a key role to reach this goal in both companies and remanufacturing is one of the main drivers.

Collaborating with Stellantis, Valeo successfully launches a remanufactured headlamp, the first of its kind from Valeo. This cooperation highlights the commitment to sustainability.

Remanufacturing the headlamp enables the reuse of up to 50% of the raw materials recovered from an end-of-life LED headlamp, mostly the most valuable parts such as

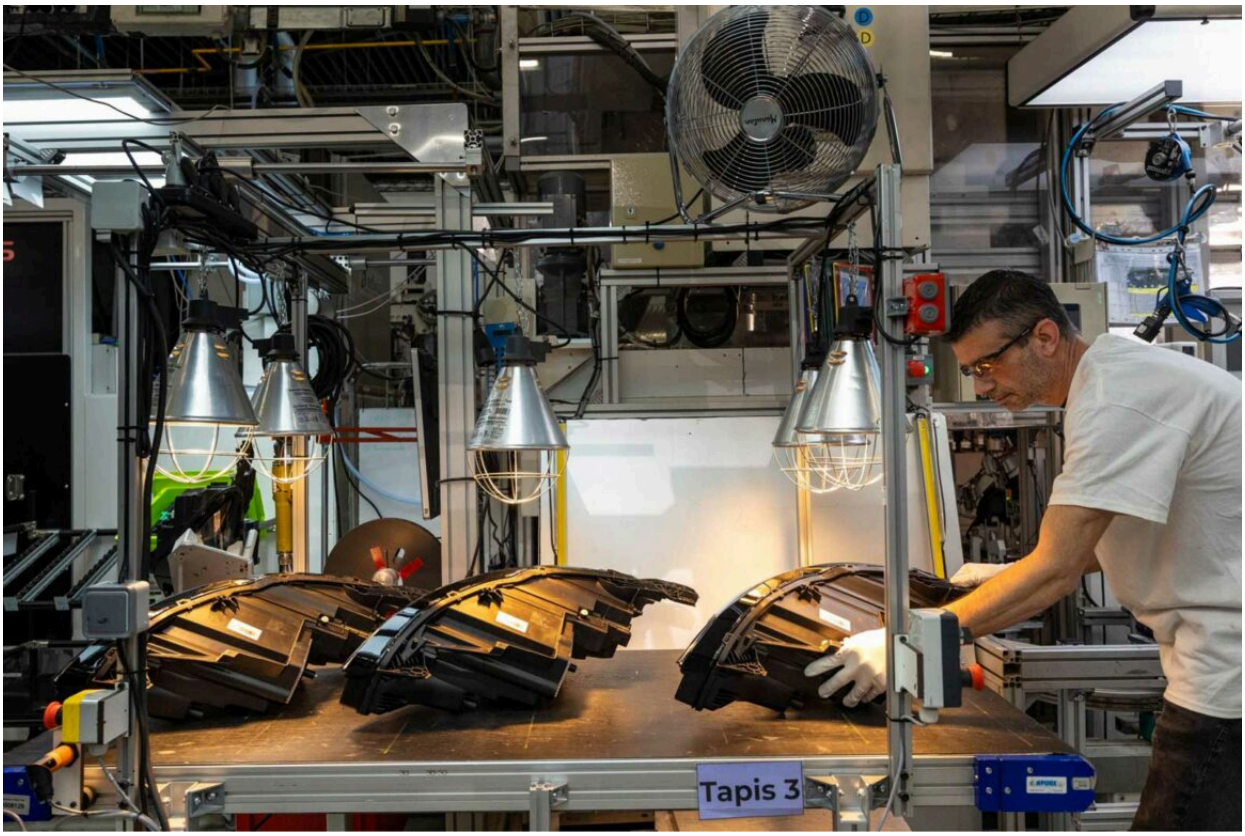
the LED module itself, reducing CO2 emissions by up to 70% compared to producing a new one.

It also offers new opportunities for Valeo's industrial activities, reinforcing its operations in the plants of Chrzanow (Pol) and Angers (FR).

Stellantis is the first carmaker to integrate this product in its aftersales offer in Europe, available in the SUSTAINera REMAN range starting from the end of first half 2025. The first application will start on the Peugeot models 3008 and 5008; second application on P 508 model.

"After the success of our collaboration with Valeo to launch the first remanufactured front camera for ADAS systems, we are expanding our range of remanufactured products to include electronics and launching the first remanufactured LED headlamp. This shows our commitment to innovate in automotive remanufacturing and meet the strong demand for headlamps and display spare parts in an affordable and sustainable way," said Laurence Hansen, SVP Global Circular Economy at Stellantis.

Christophe Le Ligné, Valeo Group R&D VP and Light CTO said: "At Valeo, sustainability is not just a word, it's a commitment to action. At Valeo sustainability means action through teamwork. We are proud to extend our remanufactured portfolio thanks to our cooperation with Stellantis, while reinventing our industrial activities. After the successful launch of our worldwide premiere two years ago, we are launching a European premiere with the remanufactured headlamp. We are bringing an "as good as new" offer at a lower cost to the end user".



To go further ...

How Rivian Came In First with US ADB

TO GO FURTHER ...

Interesting discussion between Chris Perkins, Senior editor at Motor1 and Carlos Montes Relanzon, Rivian's senior manager for lighting systems, to talk about the first vehicle equipped with US-spec ADB, compliant with FMVSS 108.

It is not often that the general media talks in detail about ADB, especially in North America, which is why we're publishing this link to the Motor1 article.

Carlos explained how they were able to quickly develop specific hardware and software in less than two years. Some of the latest systems from Audi and Mercedes use over a million LED pixels that can effectively project monochromatic images, but Rivian's system is comparatively simple from a hardware perspective. Each headlight has 35 LEDs.

Relanzon says, "FMVSS requests for transition zones, and you need to design the PCB for those transition areas. Otherwise, if you bring a European matrix, it isn't going to happen, it's not going to work. You need to design it for this".

Carlos comments, "The fact that Rivian was able to create and launch an ADB system in two years is remarkable. Typically, the auto industry moves slowly, but Rivian, being a smaller, newer and less bureaucratic company than mainstream automakers, can get things done more quickly. There're fewer layers involved in the decision-making process (…) Rivian's approach to hardware and software also offers a key advantage. The new R1T and R1S debuted a new 'zonal architecture', with fewer and more powerful ECUs grouped together in three geographical 'zones' handling all vehicle functions (…) Rivian software team allows the lighting team full access to all the vehicle's sensors, and zonal architecture allows for very quick iterative updates throughout the development process. At a traditional automaker, making such changes often involves an external supplier, which stretches out the process over months. Rivian can instead do it in minutes."

Let's meet Carlos at our DVN Detroit event in September to continue the discussion (and I hope to test the car). We've already confirmed an OPmobility lecture to give their views about the lamp itself, and the challenges they tackled to develop it in just two years.