Tue, 11 October 2022
Weekly Newsletter

DVN
Lighting & ADAS

NEWSLETTER #772

Editorial

Optics: Still A Crucial Field For Driver Vision Tools

I recently went back to my longtime professional home and visited Valeo's facilities in Bobigny, discovering their latest achievements in ultra-slim lamps. It put me in mind of the decade between 1990 and 2000, when I was at Valeo myself, proud to show rectangular lights of 'only' 70 mm height and round projectors of 'only 60 mm diameter.

After the arrival of LEDs in large production in 2010-2015, that's when headlamps really began to shrink in height and power consumption while growing in performance, down to 50 or even 40 mm high with a flux of 900 lm from 40 W power. The quest continued, with lighting suppliers competing, and we now see cars with headlamps just 15mm high with that same flux and consumption, like the module in the new Great Wall.

And still the quest continues! During my visit at the Valeo lab, I saw a lighting mockup with a height of—wait for it—only 5 mm! It is increasingly easy to achieve today a lighting module of 5 mm height with 900 lm from less than 30W. You'll read about it in this week's in-depth report. Moreover, I was impressed in driving at night by such a light, with perfect illumination on the right kerb; a very large spread on the left, and good homogeneity.

We will have to improve the aiming—static and dynamic alike—to avoid glare of such brightness, but this ever-shorter headlamp height goes in the direction of the automaker designers who want to hide the headlamps.

While optics might be growing less important with the arrival of new materials and techniques in thermics; electronics, and software, there is still a great need for great optics. Optics experts, I say congratulations on your successes! As during my job in the past, still today many things remain to be done in your field. Continue dreaming!

To watch the VODs from the DVN China Workshop, please follow this link.

Sincerely yours,

In Depth Lighting Technology

Valeo LineLens for 5-mm Headlamp Height

Headlamp height is decreasing year after year. After the more than 120 mm height up to the 1980s, then 100 mm in the '90s and the 80 mm in the '00s, we are seeing a second great evolution with height shrinking through 40 down to 15 mm, last year. Following the desires of automaker designers, we will see in the future the headlamps almost hidden with height of less than 10 mm.

The figures below show the evolution of Valeo modules these last years

Valeo have developed a 'thinnest possible solution' headlamp setup: the LineLens, with 5 mm for low and high beam and 10mm for the matrix beam. The LineLens is the latest in Valeo's breakthroughs to revolutionise vehicle lighting design. Other benefits include lens curvature to follow the outer lens contour with up to 35° of horizontal rake and 5° of vertical tilt; a cutoff free from colour fringe, and good IIHS test results.

After two years' research and development, Valeo are showing automakers a real "dream" lighting module. And because it is a module, Valeo can offer standard design but also customized style. The headlamp can become thinner and fit with any aerodynamic car body shape for a perfectly seamless integration.

The thin signature of the module invites also to position an appliqué between the headlamps, to display an endless thin continuous light line, coordinating with vertical DRLs for full light contouring of the front fascia. Height reduction is also an opportunity for additional space to add new features such as light projection, or pixelated signaling to bring end users with new welcoming/goodbye experience, customisation choices, and V2x communication.

The challenge on this module was to drastically reduce the height while maintaining optical efficiency. The result is here, and customers' successful night drives validate the choices made.

LineLens is Valeo's best-yet have-it-all offering of design and performance. Style and height reduction are important challenges, but not the only ones; Valeo also are creating the future of the illuminated grilleboard and fascia extension; electronic architecture; digitalization, CO_2 reduction, and more.

Our night drive with the LineLens 5mm module shows a perfect illumination on the right kerb, a very large spread on the left, and a good homogeneity on low and high beam alike. When meeting or overtaking a car, the ADB shows very well the light about the cut-off on the left and right part of the car, showing a very good comfort, but it was difficult to see what it brings on the visibility on the road at 100 m, as with most of the several lights I drove at night with during this round of tests. The main reason is the chain of tolerances; having light on the road at 100 m close to the oncoming vehicle means less than 1°.

The night drive showed that it is possible to have a very good low beam with 5mm height, and a very good high beam with 10mm height. An improvement in the tolerance chain, including performance of the camera, surely could lead to a best-in-class ADB!

Three Questions to Arnaud Perrotin

Arnaud Perrotin, a 28-year veteran of the lighting community, has been with Valeo Lighting Systems since 1994. In 2003, he became R&D Director for Europe; for the last four years he's been in charge of lighting module platform activities—from their development to their industrialisation, with worldwide remit. He's got great passion for this field of activities, driven by strong technical breakthroughs especially over these last two decades. He will make a lecture on the LineLens at the VISION congress to be held 19-20 October at Cité des Sciences in Paris.

DVN: Lighting modules have become a great lever to standardise and to improve quality and cost. What can you tell us about your activity?

Arnaud Perrotin: Standardisation is clearly one of the main goals on product side but also on process items like assembly lines. My organisation is split in five teams, with a location on every continent, in order to be close to the operations and customers. Our goal is to develop product and process technology 'bricks' that can be reused from one customer project to another, covering all the lighting modules scope from LED reflector to matrix; pixel; HD solutions…it's not so easy to make it happen, as style is also fully part of lighting modules' attractiveness and customers expectations, especially in the last five years.

DVN: You presented a wonderful range of lighting modules. Very high tech… excluding the volume and the weight of the heat sink. What can be done about that?

A.P.: I guess this will be even more a must in the coming years, especially through EV cars market size increase as the packaging and depth is a more challenging criteria and also in order to move to zero-CO_2 solutions. For sure we are working to improve our thermal dissipation solutions in relation with our suppliers panel. In the meantime, I must say that customers optical performance expectations trend is to increase them; in addition, the increase of worldwide ratings complexify the overall picture (IIHS, CIASI, C-NCAP…in addition to all regulation text); This leads to increase the level of design challenges to be addressed, and sometime with design consequences on the heat sink side. This said, we are working on every component of the modules in order to improve the cradle-to-grave CO_2 picture, and the heat sink is a major part of it. Our ambitions in CO_2 reduction are as important as other specifications.

DVN: You have done a great job on the lighting module with 5mm height. Where were your challenges to achieve this?

A.P.: The main challenge was to allow this 5-mm module height without jeopardising drastically the optical efficiency. We did succeed thanks to a new patented design which allows us as well to follow the headlamp lens curvature with a tilted angle above 30°. Thanks to this, this solution is able to address either modular standard design, or customised styling solutions in order to decrease the headlamp height, appearance or even to give an invisible effect of the main lighting functions! Last but not least, we've got the ability to provide the same signature day and night, between DRL and low beam, thanks to this lens height reduction. The designer's dreams will become reality!

Lighting News

Fruitful Round Table at VISION Congress

LIGHTING NEWS

Volvo's Paul-Henri Matha will chair a round table session, in VISION congress about UNECE regulation for lighting and ADAS, Status, future and stakes.

Four main stakeholders will be present :
* United Nations Economic Commission for Europe
GRE chairman Timo Kärkkäinen
* United Nations Economic Commission for Europe
GRVA secretary François Guichard ,
* UTAC CERAM
Type approval managing director Antoine Pamart,
* TU Darmstadt
Professor Khanh.

This round table will be for sure one of the great moments of the Congress. You will be able to address all the questions you may have about lighting road projection, autonomous driving signal lamp, illuminated logo, software update, ALKS, etc.

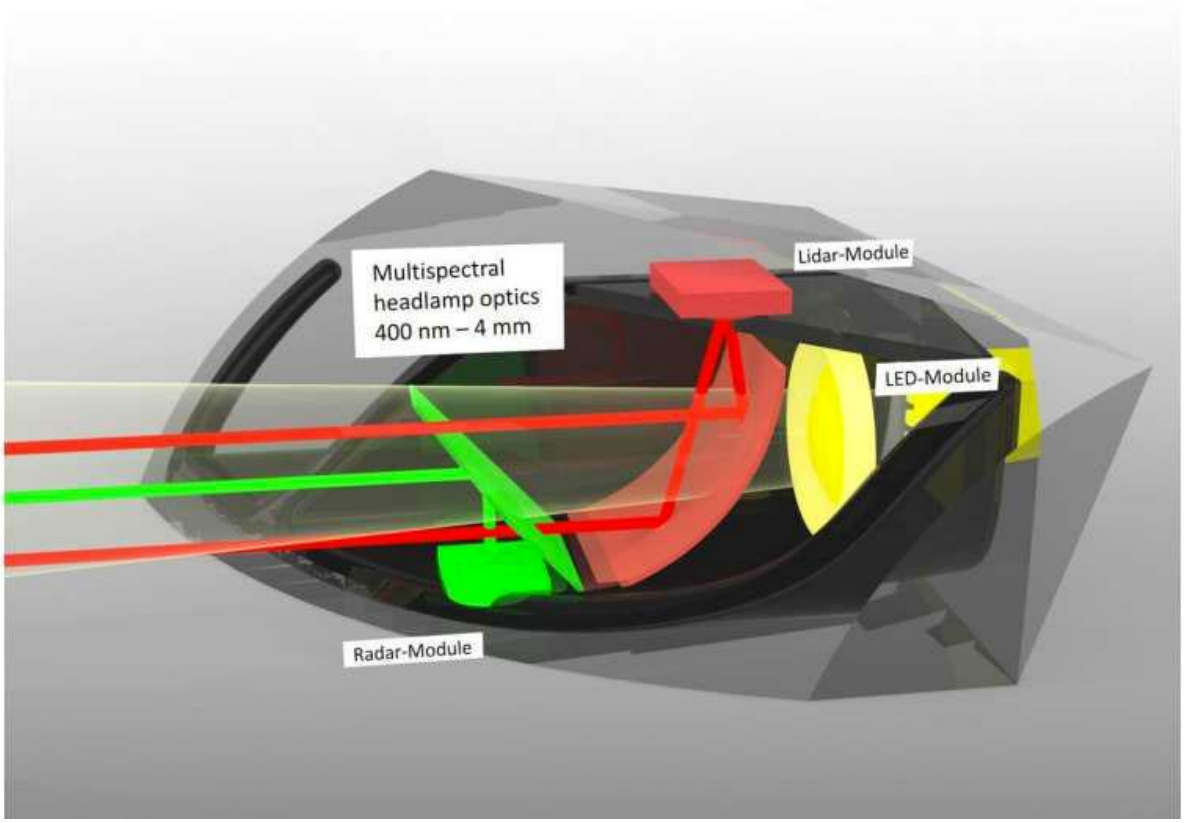
The two expectations of the chairman Paul-Henri Matha:

1/ one for the legal expert in car makers and set makers. It will be the first time that in a lighting Congress or a ADAS Congress both GRE and GRVA members will be at the same table, whereas there are a lot of ongoing discussions where requirement is mixed like Autonomous driving signaling lamp.

2/ for most of the attendees, they will be able to understand the last release about lighting, ADAS, software management and AD.
It will be interesting to understand how test house like UTAC are able to handle homologation and how university can support the new crazy lighting innovation to bring them on the road with objective studies.
"I also expect a lot of questions from the attendees to have a fruitful discussion".

Researchers Combine Lidar, Radar in Headlamp

LIGHTING NEWS



Researchers at the Fraunhofer Gesellschaft have found a clever way to integrate radar and lidar into vehicle headlamps.

Five Fraunhofer institutes have joined forces in the 'Smart Headlamp' project to install the sensors in a space-saving way, without compromising function and performance. The aim of the project is to develop a sensor-integrated headlamp for ADAS in which different sensory elements are combined with adaptive lighting systems. In this way, objects on the road—especially other road users such as pedestrians—will be better and sooner recognised. "We integrate radar and lidar sensors into the headlights, which are there anyway, and which guarantee optimum transmission for optical sensors and light sources", says Tim Freialdenhoven, a scientist at Fraunhofer FHR.

The light that falls from the headlamps onto the road should not be influenced by the two additional sensors. Nevertheless, the beams of both sensor systems should take the identical path as the LED light. This is further complicated by the fact that all beams have different wavelengths: visible light is in the range of 400 to 750 nanometres; the infrared lidar beams are 860 to 1,550 nm, and the radar beams have a wavelength of four millimetres. "These three wavelengths are to be coaxially combined, so we speak of a multispectral combiner", Freialdenhoven explains. In addition, arranging the sensors side-by-side would take up considerably more space than the coaxial arrangement. The researchers solve this problem using what they call 'bi-combiners': a specially coated dichroic mirror is used for the combination of LED light and lidar light, with which both beams are brought onto one axis via a wavelength-specific reflection. The same is done at the second combiner, where LED light, lidar light and radar are combined, although this is not as complex because of the very different wavelengths.

"We are working on fusing the data from radar and lidar, to offer extreme added value, especially in terms of reliability", says Freialdenhoven. A patent has already been filed, and the team currently are working on building a prototype. The technology will significantly expand the possibilities of sensor integration for ADAS. Smaller light modules, more compact lidar sensors and integrated radar sensors allow the implementation of multisensor concepts, especially for autonomous driving with increasing design requirements and limited installation space.

Hella's Multifunctional Phygital Front Shields

LIGHTING NEWS

Hella have received major orders for their highly integrated front phygital shields from German premium manufacturers. These large-area, complex modules for the front of the vehicle—grilleboards, in a word—are used as a style-defining, brand-differentiating design element of electric vehicles by means of lighting and multicolouring. With additional functionalities such as integrated sensor technology, radar permeability and heating, they also play a central role in automated driving.

The customer projects comprise a total of eight different electric vehicle series and have a total volume of over €1bn. The start of series production is planned for mid-2025.

Front phygital shields are available in various levels of integration, for example with different lighting functionalities. Based on the respective customer requirements, headlamp and signal light functions can be integrated. LEDs can also be used to illuminate the front of the vehicle; highlight brand-typical design elements, or generate coming home/leaving home animations. Taking into account different colours as well as illuminated and non-illuminated versions among other things, a total of over 140 different designs are realized within the scope of the customer projects.

At the same time, these grilleboards facilitate the implementation of automated driving functions. For this purpose, the grilleboard acts as a radar-transparent cover for the sensors integrated in the front of the vehicle, which thusly are protected from the weather and dirt. At the same time, the integral heating function makes the radar sensors even more impervious to the weather.

Front Phygital Shields are composed of up to eight different foil and plastic layers. 'Phygital' is a neologism intended to convey a blend of the physical and digital.

Plastic Omnium Acquires Varroc Lighting Systems

LIGHTING NEWS

Plastic Omnium finalizes the acquisition of Varroc Lighting Systems which activities are integrated into the Group's new lighting division, representing pro forma sales of around €1 billion in 2021, 7,000 employees and 11 plants worldwide.

For Laurent Favre, CEO: "With this acquisition, Plastic Omnium positions itself as a leading player across the entire lighting value chain with a broad range of products, from components to full headlamps. We are now able to provide unique differentiated solutions thanks to synergies between lighting and our front-end module and bumper activities"
"We are excited to finally welcome our colleagues from Varroc Lighting Systems to the family! With this strategic next step of Plastic Omnium, we can now fully launch Plastic Omnium Lighting: A comprehensive player with around 7,000 employees worldwide and a 360° product portfolio covering all the needs of the automotive lighting market."

DVN will publish, next week, an interview of Laurent Favre who will talk on his thoughts concerning lighting activity for Plastic Omnium. Don't miss this interview.

Audi Win AM+S Award for Digital Matrix Light

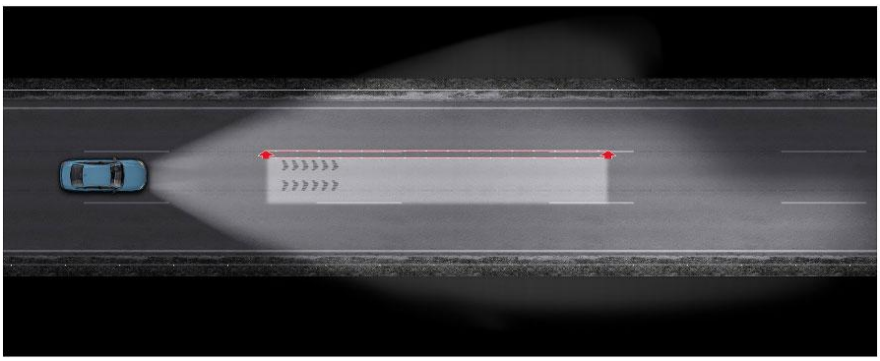
LIGHTING NEWS

STEPHAN BERLITZ WITH 2 AM+S JOURNALISTS (AUDI PHOTO)

Audi have won an award from prestigious German car magazine Auto Motor und Sport. Specifically, they won in Category F, Safety Assistant Systems, with their Digital Matrix LED headlamps produced by Marelli Automotive Lighting.

BMW took the № 2 slot for their driving assistance, and Porsche came in 3rd for their innoDrive.

The Audi Digital Matrix LED headlights projects lane and orientation light on motorways and construction sites, and present animated light projections when opening and locking the car.



DIGITAL MATRIX LED HEADLAMPS: LANE LIGHT INCLUDING ORIENTATION LIGHT FOR MOTORWAYS AND WORK ZONES (AUDI PHOTO)

In the competition amongst car brands, Mercedes-Benz continues to hold a dominant position. While Audi and, for the first time, Škoda, can each win one of the eight awards. The S-Class won the Connected Car category and the Mercedes EQS won the Connected E-Car category.

"The topic of electromobility is becoming more and more important for our readers, which we have also noticed through additional questions about the actual election," said Dirk Gulde, AM+S' testing and technology editor.

Driver Assistance News

Intel Mobileye Files for IPO

DRIVER ASSISTANCE NEWS

Intel have filed for an initial public offering of their Mobileye unit. Terms haven't been disclosed in the filing, put in last Friday with the U.S. Securities and Exchange Commission, but the filing does say Mobileye will continue to be controlled by Intel after the IPO.

Intel expect the stock float to value Mobileye at as much as USD $30bn, which is less than originally hoped, according to Bloomberg News.

Intel CEO Pat Gelsinger is trying to capitalise on Jerusalem-based Mobileye, acquired in 2017 for $15bn, with a partial spinoff of shares. Mobileye make chips for cameras and drive-assistance features.

Now with about 3,100 employees, Mobileye have collected data from nearly 14 billion vehicle-kilometres' worth of on-road driving across eight testing sites globally. the company say their technology leads in the race to shift the driving task from the human to the machine. They've shipped 117 million units of their EyeQ product.

Qualcomm's First Auto Investor Day

DRIVER ASSISTANCE NEWS

The first-ever Qualcomm Automotive Investor Day took place with many investors and analysts in New York. President and CEO Cristiano Amon spoke first about Qualcomm's vision and strategy. The company's 'One Technology Roadmap' has three pillars:

- Everything wireless;
- High performance with minimal power usage, and
- Artificial intelligence at the edge.

According to Mr. Amon, Qualcomm will "be able to use AI in every single element of our SoC, from modem to RF to CPU to GPU to computer vision and camera as well as applications in a revolutionary software application for AI at the edge, which we talk about as AI stack."

Qualcomm are benefiting from the rapid transformational shift in the automotive industry of building computers-on-wheels; centralised computing platforms; digitalisation; more ADAS/AD, and cars that are always connected to the cloud.

Velodyne Buy AI Software Maker

DRIVER ASSISTANCE NEWS

Velodyne Lidar have acquired Bluecity, a Montreal-based artificial intelligence software company whose lidar-based solutions target safety, traffic, and infrastructure issues. Velodyne say the all-stock acquisition reinforces their commitment to enabling customer success by delivering industry-leading, AI-powered autonomous vision solutions.

Velodyne and Bluecity have been partnering for years to deliver lidar-based solutions for smart city applications. Velodyne's Intelligent Infrastructure Solution combines the company's lidar sensors and Bluecity's AI software. IIS delivers traffic monitoring and analytics to improve road safety and efficiency, and helps cities plan for smarter, greener transportation systems. The solution is deployed across four continents with 74 installations, including systems rolled out domestically in California, Colorado, Florida, New Jersey, Maryland, Texas, Nevada, and Michigan and internationally in Canada, China, UAE, India, Finland, Germany, and Australia.

Velodyne say they will continue to expand their Intelligent Infrastructure Solution's capabilities, including monitoring flows of people and vehicles to create a range of new full-stack infrastructure solutions for applications such as parking, retail, casinos, and stadiums. To serve these growing markets, Velodyne will integrate Bluecity's robust AI and analytics software, delivered in a Software as a Service model, with Velodyne's Vella lidar perception software. This integration will facilitate the creation of new Velodyne lidar-based software solutions for industrial, robotics and intelligent infrastructure, enabling the acceleration of customers' time to market with autonomous vision systems for these markets.

Vella software translates lidar data into actionable information so that autonomous systems can observe and understand the environments they are operating in. Vella's real-time data enables autonomous systems to make decisions and take action, such as a robot or vehicle moving safely, and provide analytics.