DrivingVisionNews.com
Automotive lighting and driver assistance technologies

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Editorial

Lighting, Photonics: 2 Great Industries That Go Great Together

The vehicle lighting industry is a strong community with strong relationship between its members, but is something of an island, more or less alone when organisations in other fields could help. I think, for example, of photonics organisations around the world like Photonics Europe which gathers more than 550 companies, Ecomotion with its thousands of members, and all the startups involved in optics, electronics, software, and materials.

For this reason, we at DVN are working for the next workshops to organise a startup corner. We will invite eager startups seeking to present their innovative products and services; we're confident it will be fruitful for the lighting community as well as for the startups in their efforts to attract customers and investors. In a time when investments are decreasing, it is important to find innovative companies whose new thinking can help decrease the costs of R&D and commercialisation.

Amidst this week's news, we've got a double shot of can't-miss content for you: our DVN Report on Marelli Automotive Lighting brings comprehensive information on Marelli's history, organisation, and key data; and on the supplier's Automotive Lighting division's R&D, products, technologies, strategy, strengths and challenges.
And we've got information on the new headlight rating system which we think will be of great benefit to consumers and producers alike. It's based on laboratory measurements, and leads to representative results that enable a direct and objective comparison of different headlighting systems; read all about it.

Sincerely yours

DVN PRESIDENT

In Depth Lighting Technology

Marelli AL: Leveraging Strengths Versus Challenges

Automotive Lighting was founded in 1999 as a 50:50 joint venture between the vehicle lighting operations of Magneti Marelli and those of Robert Bosch. In 2001, Magneti Marelli increased their stake from 50% to 75%, and in 2004 bought out Bosch entire, so AL became fully a Magneti Marelli operation.

Magneti Marelli was acquired by Calsonic Kansei, and in May 2019 the two companies united to create one of the world’s largest independent automotive suppliers under the Marelli marque. With a strong track record in innovation and manufacturing excellence, Marelli's mission is to transform the future of mobility by working with customers and partners to create a safer, greener, and better-connected world.

With around 62,000 employees worldwide, the Marelli footprint includes 170 facilities and R&D centres across Asia, the Americas, Europe, and Africa, generating revenues of €14.6bn in 2018.

Marelli Automotive Lighting's headquarters is in Reutlingen, Germany; AL's business is divided into three units—headlamps, rear lamps and ECU—with dedicated production units reflecting the different technologies use. Marelli-AL supply all the world's major automakers including Volkswagen, Daimler, BMW, FCA, Ford, GM, PSA, and Renault. The company also supply Honda and Mazda in Japan, and their transplants worldwide. This makes Marelli a global player in vehicle lighting, one of the largest worldwide suppliers in front and rear lighting, up there with the likes of Koito, Valeo, and Hella.

In DVN's previous report on the Automotive Lighting company in 2008, their sales—mainly centred in Europe—were at €1.6bn with 11,700 employees. Now the figures are €3.9bn and 20,500 employees with a much more global distribution. That's a huge growth rate, more than 11 per cent per year.

CEO Silvain Dubois considers the company a well-established lighting supplier, with the critical size, global footprint, and a well-balanced customer portfolio. The company's challenges are to adapt continuously to new technologies such as mass-market full LED headlighting solutions, democratisation of ADB, and development of DLP and laser for high-end applications. To meet these challenges, AL have built a clear strategy of standardisation and modularisation. Their library includes e-Light, s-Light, k-Light, m-Light, adn d-Light modules which can be configured to meet most automaker specifications and requirements for volume, mass, functions, and cost.
For high end systems, AL offer all the relevant technologies: laser, sensors, OLEDs, new lighting functions, matrix, ADB with all technologies of digitalisation for front and rear lights.

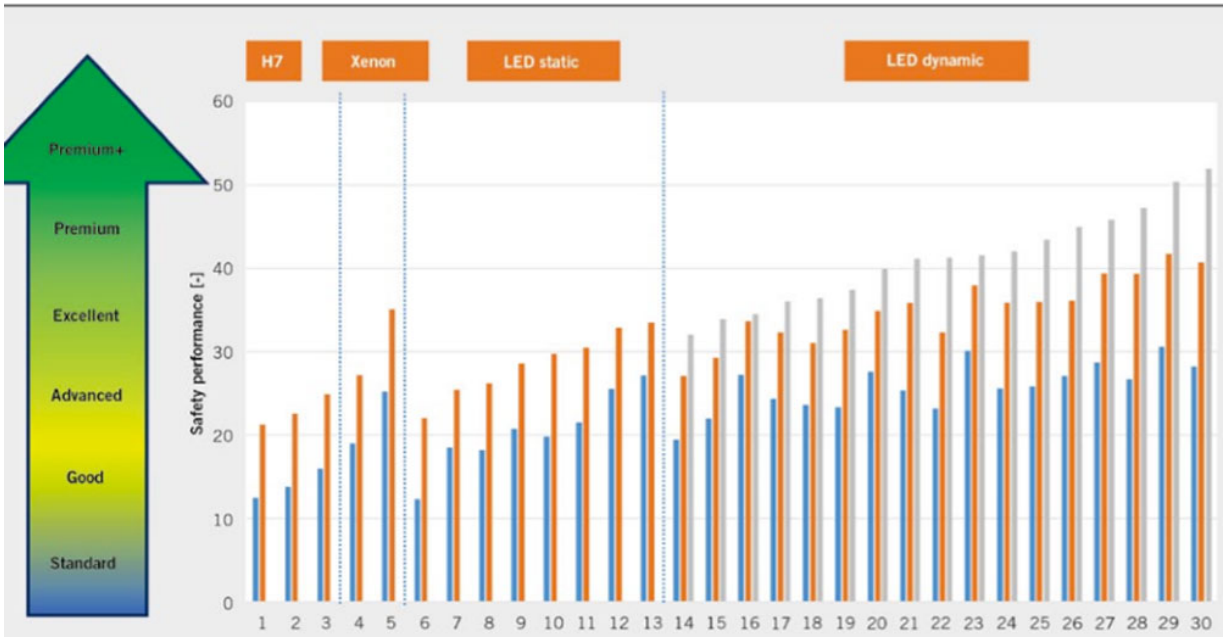
Marelli AL have been winning awards lately, too: in 2015 they won a Red Dot Design Award for the matrix headlamp on the Audi TT, in 2019 the CES

Innovation Award for Smart Corner, and this year the Pace Award for their h-Digi lighting module.

AL were first to market a DMD-based ADB with Mercedes-Benz, and then on the Audi e-Tron.
The supplier's main strengths are lighting technology leadership, a great portfolio with innovative projects and high-volume projects, a good structure in terms of production and location, and a good image in technology. Read much more in the DVN Report on Marelli Automotive Lighting.

Lighting News

New Headlight Rating System, New Challenges

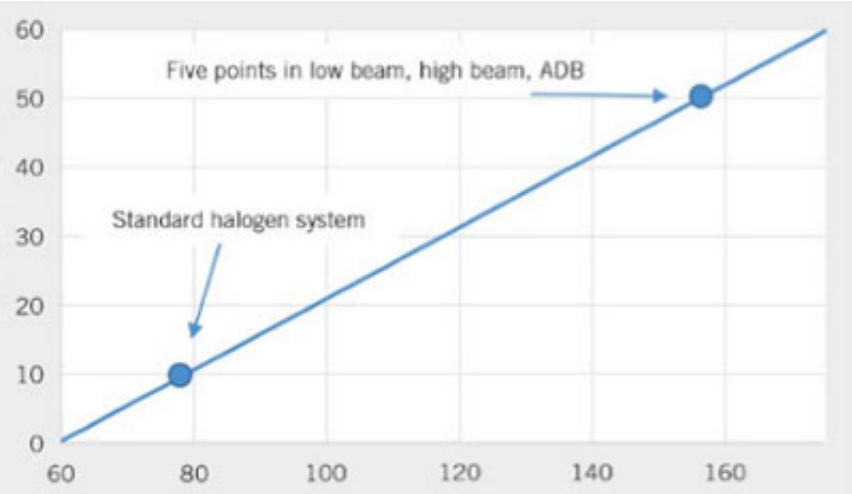


SAFETY PERFORMANCE OF HALOGEN, HID, LED, ADB HEADLAMPS (SOURCE: TUD)

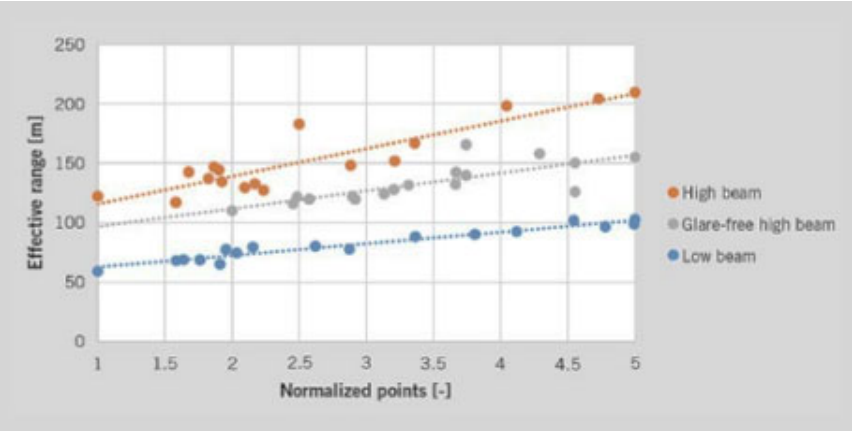
Last month we **presented** a new rating system which—for the first time—facilitates qualitative evaluation of glare-free high beam (ADB) systems. Now we bring you more information. TU-Darmstadt's Professor Khanh, leader of the project to develop the rating system, says "The main point of this new rating system is to keep the principle of CIE TC 4-45 and to expand the evaluation to the ADB context based on weighting the use frequency of ADB. This new rating system has been validated with 17 different headlamps types. Before the VISION congress where the rating system will be presented, a number of automakers and setmakers will hold task force meetings in Darmstadt to optimise the evaluation by collecting headlamp luminous intensity curves, and to validate this evaluation by real test drives in August-September."

And team member Rainer Neumann says "The new rating system takes into account the safety-relevant photometric data to be able to detect objects [so drivers can] react accordingly in time and avoid accidents in nighttime driving. It takes into account for the first time the important adaptive driving beam system (ADB), which works automatically and results in an optimised illumination of the road ahead without glaring other road users. The first publication by TUD was just published in ATZ, a German auto R&D online magazine. Additionally, we also need to communicate and involve

automotive journals in the public our new rating system to get support and to create awareness and acceptance."



SAFETY PERFORMANCE IN TERMS OF MEAN EFFECTIVE RANGE



STANDARDISED POINTS OF THE LIGHT FUNCTIONS AND CORRESPONDING ASSIGNMENT TO AN EFFECTIVE RANGE

The evaluation points of all eight ADB criteria are summed up to determine the total score. It is possible to grade the safety-relevance of the individual criteria by weighting the criteria with different factors before summing them up. Due to the different areas of application for low beam, high beam, and ADB and the resulting different criteria, a standardisation of the evaluation points of the individual functions is necessary for an overall evaluation of the headlamp functions.

The method based on laboratory measurements thus leads to representative results that enable a direct and objective comparison of different headlamp systems. The method presented is based on the recognised evaluation principles from the CIE standard TC 4-45 and the legal requirements according to UN R123.

Furthermore, the evaluation is based on a comprehensive database of a wide range of headlamp systems and test series, so that in conjunction with the extensive ADB database developed, reliable results are achieved for all systems. In order to present the individual safety performance of a headlamp system in an easily understandable way, it is classified in performance: Standard, Good, Advanced, Excellent, Premium, or Premium+.

The authors of the study, led by Prof. Khanh from TU Darmstadt, are Audi's Dr. Michael Hamm; Marelli Automotive Lighting's Dr. Ernst-Olaf Rosenhahn, Felix Freytag, and Gerd Langhammer; and Varroc Lighting Systems' Dr. Rainer Neumann.

Stanley: HL Combining Laser and MEMS Scanner

Advanced LED technology enables innovative automotive lighting including ADB by which each single LED pixel can be control independently for a wider range of applications.

Based on similar concept, Japanese LED maker Stanley proposed an innovative way to combine laser and MEMS mirror, which allows high precision light and sensing function.
Stanley uses blue laser light which can be reflected with MEMS mirror and converted into white light with phosphor to build a headlight system. Via reflection with controlled angle of the mirror, light distribution can be formed in different shapes. The segments of brightness control reached 64,000 segments in a 400 x 160 grid.

In addition, laser beam scans in high speed creates “planes” of light for driver to ensure visibility in short and long distances. By providing appropriate light distribution to match driving speed with a combination of lasers and the MEMS scanning mirror device,
For realizing such light distribution of high precision, it is critical to integrate laser beams with advanced optical technologies including lenses and reflectors, plus the supports from mechanical technology.

Koito has also proposed a new ADB technology named BladeScan which uses a laser with scaning and end February DVN assessed the technology in a night drive.

L-Lab to Look at Glare Risk From Small Lights

The L-Lab was founded in 2000 as a research platform for public private partnership together with university of Paderborn and Hella.

Christian Schmidt, Hella's Head of Lighting Innovation, is a member of the L-Lab board. Dr.-Ing. Mathias Niedling is the Head of the L-Lab since 2018. The L-Lab has around 20 students, and research centres on five areas of Lighting:

• New light sources, e.g., laser and scanning laser, for future vehicle lighting applications
• Material suitable for lighting applications—silicone and holography, for example

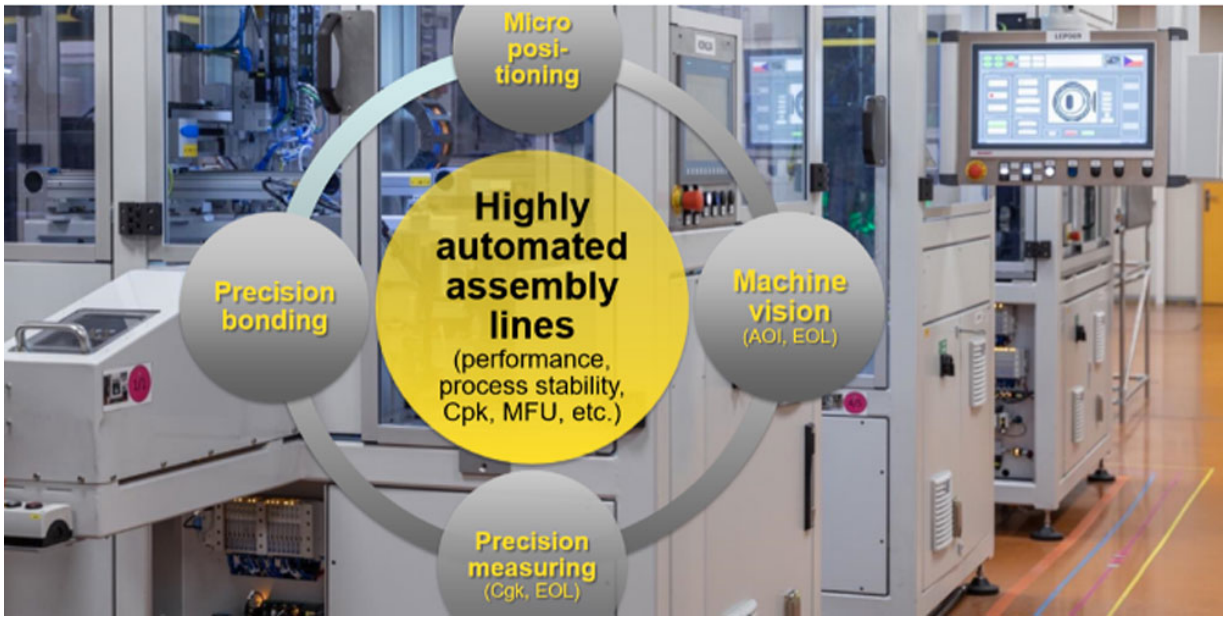
• Interior lighting, such as limits of illuminance to not disturb drivers

• Headlamp technology and sensor interaction

• Human machine interface

As stylists demand slimmer and smaller headlamps, the L-Lab developed a super small headlamp with a height of around 15 mm and study is now under way to investigate the potential risk of additional glare from such small lights. Research began with static conditions, not moving vehicles. The plan is to extend this study to the dynamic realm with series production cars to evaluate real traffic conditions. There has been recently an article and movie from ADAC (German Automobile Club), stating that very small headlamps could be dangerous for other road users. One important factor is the distance of observation between the road users and the headlamps. A central target is coöperation between GTB and L-Lab for the dynamic tests in order to get scientific results representing the real nighttime driving environment. Results are expected to be published by the end of this year.

Robooptic: Experts in Laser, OLED, and LED DMD Process



Robooptic Systems, formerly well-known as M-Tech Systems, remain deeply involved in highly automated production processes which require functionality such as high-resolution machine vision, micropositioning, active alignment, highly accurate precision bonding, and reliable measuring and testing.

The company develop technologies in-house to realise production, measurement, and test methods for products that would not be achievable using conventional methods.

Drawing on over two decades' experience, Robooptic are considered a technology leader in the areas of high-precision machining, systems, and automation solutions. Worldwide, they enable their customers to set new standards in their production processes and support them to gain and keep a leading position in their markets.

The company are a leading partner to companies from the automotive lighting industry working together on laser light modules, OLED technology and LED-DMD projectors.
Robooptic's principle of work is coöperation in customers' development processes from the very beginning. They find this approach allows them to find the best possible solution and achieve all the requirements within the planned timeline. Since the entire process is done internally—from research and development to prototyping and testing and finally in-line implementation—high agility and adaptability is achieved.

Founded in 1951, Robooptic Systems are a part of the GAW Group present in 19 countries. There are more than 600 employees, and an annual turnover of €130m. The portfolio of the GAW Group includes industrial plant construction, mechanical engineering, industry related services as well as automation, and serves essential markets as automotive, optoelectronics, plastics, medical engineering in almost every region of the world.

New Bimmer 4's Fine Lines in Lighting

The new BMW 4 bristles with advanced lighting technology—and advanced style.

LED headlamps are standard equipment with particularly fine contours; laser high beam boost is available as an option. The DRLs take a fish hook shape accented by a central light dot suggestive of focused eyes.

At the rear are elegantly dark LED tail lights, with brand-typical light guides now in a swooping fish hook design—a neat and tidy tie-in to the front lightstyle.

Driver Assistance News

VW Pour $2.6bn Into Argo AI

Volkswagen have completed their $2.6bn investment in Argo AI, a self-driving startup based in Pittsburgh, Pennsylvania, USA.

Argo, founded in 2016 by Bryan Salesky and Peter Rander, are now jointly controlled by Volkswagen and Ford (who made an initial investment early in Argo's life). Volkswagen's agreement includes the transfer to Argo of the automaker's Munich-based Autonomous Intelligent Driving unit, which boosts Argo's employment to more than 1,000, according to Salesky.

Volkswagen's supervisory board has approved several projects in a multibillion-dollar alliance with Ford announced last July. Ford, for their part, created Ford Autonomous Vehicles LLC in 2018, pledging to invest $4bn until 2023 and have sought outside investors to help share the spiraling cost of developing autonomous vehicles.

China's NIO, launch level 4 trials in Israel with Mobileye

NIO, the Chinese electric vehicle maker and a major rival of Tesla is installing Mobileye kits for driverless cars.

As part of the project, NIO will manufacture and install in each of its electric vehicles 'kits' for level 4 autonomous driving (driverless cars in pre-defined lanes and under restrictions) that have been developed by Mobileye.
These level 4 vehicles will ultimately be used as robo-taxis to provide mobility-as-a-service (driverless ride-hailing services) although they will also be sold to private individuals. Under the terms of the agreement, NIO will mass-produce the kits in for other projects being carried out by Mobileye.
Mobileye will also develop for NIO a system enabling driverless electric cars to navigate directly and on the shortest route to the nearest charging point, when the battery is nearly empty and implement the charging process without any human intervention.
NIO has sent its ES38 model to Israel for R&D purposes only. The car came onto the market in China in March and has two cross-over engines with more than 500 horsepower and a 100 kilowatt per hour battery that gives the car a range of 580 kilometers between charges (by the NEDC standard).

NIO is one of China's leading electric car manufacturers. Between January 2019 and May 2020 the company sold 39,000 cars including 6,990 cars this year, up 38% in 2020 despite the coronavirus crisis.

Omnivision: wafer-level camera module for driver monitor

From Optics.org

Omnivision Technologies, a developer of advanced digital imaging solutions, last week, announced the OVM9284 CameraCubeChip module, described as “the world’s first automotive-grade, wafer-level camera.”

The 1MP module measures 6.5 x 6.5 mm to provide driver monitoring system designers with flexibility on placement within the vehicle cabin. Additionally, says OVT, “it has the lowest power consumption among automotive camera modules, which enables it to run continuously at the lowest possible temperatures for maximum image quality.”

The OVM9284 is based on OmniVision’s OmniPixel®3-GS global-shutter pixel architecture, which OVT claims provides “best-in-class” quantum efficiency at the 940 nm wavelength for high quality driver images in darkness. The integrated OmniVision image sensor has a 3µm pixel and a 6.35mm (1/4in) optical format, along with 1280 x 800 resolution.

“Most existing DMS cameras use glass lenses, which are large and difficult to hide from drivers to avoid distraction, and are too expensive for most car models,” commented Aaron Chiang, marketing director at OmniVision. “Our OVM9284 chip module is the world’s first to provide automotive designers with the small size, low power consumption and reflowable form factor of wafer-level optics.”

LeddarTech and STMicroelectronics Collaborate on Lidar

LeddarTech announced that it is working with STMicroelectronics to create a lidar evaluation kit. Which will demonstrate technical concepts and offer development capabilities in a functional lidar for automotive Tier 1-2 suppliers and industrial system integrators to develop a lidar solution based on LeddarEngine technology.

LeddarTech's kit will include ST's MEMS mirror-based laser-beam scanning solutions along with technologies, products, and services from other LeddarTech ecosystem partners. The evaluation kit is being developed to target automotive front lidar applications for high-speed highway driving such as highway pilot and traffic-jam assist, as well as industrial and robotics lidar applications. To facilitate this cooperation, LeddarTech has welcomed ST in its ecosystem team of technology leaders.
The Canadian lidar company has been strengthening its partnership with different industry experts to push development in lidar technology, expanding application opportunities in different fields. LeddarTech announced the result of its collaboration with Osram in May 2020, a lidar platform based on Osram's laser emitter and LeddarTech's processing software.
Teaming up with ST, LeddarTech aims to offer innovative lidar automotive and industrial solutions to the market.

General News

Porsche CEO to Head VW Brand: Report

OLIVER BLUME

Volkswagen Group CEO Herbert Diess will promote Porsche CEO Oliver Blume (photo) to become head of the VW brand, if *Auto Motor und Sport's* report is accurate.

Blume will be moved to the VW brand to help the company get a grip on production issues with the VW ID3 electric car and the new 8th-generation Golf compact hatchback, according to the report. Bernhard Maier, currently head of VW's Škoda brand, will become Porsche CEO, the magazine said. Maier was sales and marketing boss at Porsche before becoming Škoda CEO in 2015. Diess is currently head of multi-brand Volkswagen Group as well as head of the VW brand.

The changes follow a reshuffle last week in which VW's chief technology officer, Matthias Rabe, moved to Bentley to become that brand's engineering boss. He replaced Werner Tietz, who moved to VW’s SEAT brand to head R&D.