



Editorial

Important Tuesday For DVN

Two big events to announce today! You're about to read the first one here in this week's DVNewsletter: Marelli AL CEO Sylvain Dubois talks with us about his company's situation today and plans for the future; on the cornucopia of evolving technologies they're actively developing; on new lighting functions bringing growth opportunities outside traditional headlamps and taillights, and much more. He's certain lighting technology will advance further in the foreseeable future than in the last few decades, and his thoughts and forecasts are well worth your time.

And—also today—the DVN US Workshop opens in Novi, near Detroit. It's the 23rd DVN Workshop worldwide, and the sixth in America. I and the DVN team around the world have worked very hard to make this hybrid live + online conference a grand success. The theme, safety, is especially crucial at a time when lighting innovation on American roads is lagging behind similarly-developed countries and pedestrian deaths at night are increasing. The information and ideas shared at the Workshop stand to make real contributions to decreased traffic fatalities in America. Whether you're joining in person or via the internet...see you there!

Sincerely yours,



W. Frally
DVN CEO

In Depth Lighting Technology

Marelli AL CEO Sylvain Dubois • "The Next Generation Technology will be a Major Growth in the Lighting Business".



Since 2011, Sylvain Dubois has been holding management and directorial positions of growing importance; in 2019, he became CEO of Marelli Automotive Lighting, dedicated to exterior lighting and increasingly in ADAS sensing. In his 27 years (and counting!) in the automotive industry, he's lived and worked in France, the UK, the USA, Spain, Germany, Italy, and China. He courteously talked with us about his work, his company, and his outlook.



DVN: Nearly 3 years after your arrival at the head of Marelli AL, how's the company doing?

Sylvain Dubois: It has been and remains a difficult period between Covid, material shortages particularly in semiconductors, and raw material inflation; the whole automotive sector is hit including Marelli AL. Our numbers are basically in line with the market, and obviously this year the decrease is linked to the pandemic. We had a good Q1, but the situation of the market is still tough. When it comes to results, Marelli AL resists better than some of our competitors even in a market environment that remains difficult.

DVN: Will there be big changes at Marelli AL over the next year, do you think?

SD: In the first part of the year, we have launched our Ambition 2024 mid-term plan which is aimed at setting the pillars, the objectives, and the strategy for the next five years to make the company ready to compete in the future mobility scenario that will be seeing further important changes. Part of our mid-term strategy and ongoing transformation focuses on building market lead and competitive positions within businesses where we have a right to win. Like any responsible company, we must always be open to evolve our organisation in the direction of being effective, flexible and to create new value for our business and customers. This is part of building a strong and sustainable Marelli. Within this framework, I can say that Marelli Automotive Lighting will continue to play a crucial role.

DVN: What do you see as the company's strengths and challenges?

SD: Our strengths are innovation, a global footprint, and a well-balanced customer portfolio. We lead the pack on digitalisation of light distribution (we won an Automotive News PACE Award for our Hi Digi light) which is going to be the main

driver for growth in our sector. With Marelli we will continue to expand our customer base, in particular with Japanese OEMs, but also with American OEMs. Regionally, we will continue to expand in APAC, notably in China and India, and pursue our growth globally; we are targeting double digit CAGR in the coming years.

DVN: What do you think about Faurecia's buy-up of Hella?



SD: Hella is a very respectable competitor and Faurecia made a good move by acquiring them. I do not think it will fundamentally change the equilibrium. Changes are more likely to come from other players.

DVN: Coming back to technologies. After the DMD to Mercedes-Benz and the award you received, what products will be produced and delivered using this technology?

SD: Mercedes-Benz is not the only customer using this technology, we already sell it to Audi for the e-Tron. But this product will evolve to become more affordable and reach a larger segment. We already develop for other OEMs a next-generation technology (lower pixels, more affordable) and it will be a major growth in the lighting business.

DVN: A few years on from the introduction of DMD technology and the arrival of μ LEDs, do you think one will win out over the other?

SD: DMD is going to remain high-end and microLEDs will be democratised—as a matter of fact, this is already happening. I am still convinced that lighting technology will have more development in the next years than it had in the last 30 years. MicroLEDs will bring a new era of safety, not only providing the perfect light distribution, but also bringing active safety for the driver and traffic participants, with efficient warning messages projected on the road.

DVN: How about road projection; how's that coming along?

SD: It is keeping us very busy! High-resolution headlamps based on DMD technology are going project by project into series production. Recently another Mercedes, the C-class, started on the market with DMD. In addition, microLED technology from 2023 will spread road projection to a wider market for safety and driver comfort. The new field of road projections directly around the car is a function that our customers can use to generate new use cases. We have developed standard modules to support the rollout of road projections and we can offer it for front projection as well as for any other areas around the car. We partner with our customers to support the development of new use cases with our optical and hardware competence as well as software.

DVN: ADB is a wonderful technology able to greatly improve safety at night. What could the lighting suppliers do to convince drivers to buy it?

SD: As a tier-1 we are not able to have a wide access to final consumers and therefore be able to significantly influence their habits. However, we are promoting events at the dealerships and giving our support to the OEMs in order to educate consumers: explaining the lighting options in the car catalogue, for example. Sometimes things can be explained very easily and a simple sentence like "Imagine you can always drive with high beams at night" can reach a wider audience of non-technical experts. Unfortunately, we do not see these messages in the typical car advertisements in the media. This is something our OEMs should reflect on; we are here to support. Advertisement of ADB functionality is a key to spread this safety function on the market.

DVN: What can you tell us about Marelli's work on communications –V2driver, V2pedestrian—and the integration of sensors in lamps?

SD: Car communication is in fact just at the beginning as we discussed with DMD and μ LED. It will continue to evolve with additional technologies, for example, displays (TFT, etc) integrated in headlamps and rear lamps or other vehicle surfaces. Vehicle to driver and pedestrian communication requires the use of symbols and a logic understandable to humans and this is where regulators will play a key role. Technology is already there, but the regulators are not fast enough to catch up with it. Integration of sensors in headlamps, rear lamps and other future lighting devices is a path we are following for many years and we have valuable partners in the sensor area like Xenomatix for lidar and WHST for radar.

DVN: Lasers are used for long seeing range, and now for ADB scanning and communication. Do you see a future for it in comparison with DMD, LCD, and LCoS?

Sylvain Dubois: Laser is an interesting technology for reducing the size of the optical system thanks to the high luminance. The cost of the light source and the safety aspects to be taken into account have made the application of this technology not as easy as with LED. When you mention DMD, LCD, and LCoS (and I would add microLED) you are referring to high resolution systems where, in my opinion, laser will have a tough time competing.

DVN: Are you working on expanding beyond Marelli AL's core lighting technology business?

SD: We have defined our growth initiatives outside traditional head and rear lighting around two areas: Illumination at 360°, and for several years now we have been working on sensing for ADAS. For lidar we have invested in Leddartech and developed a partnership with Xenomatix. Today we are in a good position to offer to our customers a lidar solution for upcoming Traffic Jam Chauffeur, where concrete businesses are in discussion. In addition, we have developed a partnership with WHTS in China, with whom we are looking at expanding business in new generation radar. This sensor is already integrated in lighting components and we believe the market is going in this direction.

On the illumination side, we recently signed a partnership with Motherson for an illuminated front grille, and also for other illuminated body parts such as bumpers and rocker panels. Marelli Automotive Lighting and Motherson combine a complete range of systems, product competences, innovations and technologies from our global industrial footprint that is of great value for our customers. Motherson is a well-known partner with whom we have been working successfully for many years in India with a joint venture that supplies lighting to the Indian market.

DVN: We're looking forward to learning of your latest innovations at the DVN Workshop. What might we see there?

SD: Doctor Rosenhahn, our head of headlighting innovation, will present an interesting lecture to show how new Headlamp Safety Performance Ratings (HSPR) will support traffic safety.

In GTB's Working Group SVP, all set makers, OEMs, and experts from the Technical University of Darmstadt are working on this new headlamp rating system, the world's first that includes ADB functionality. With the help of this rating system, ADB headlamps can be rated in an objective way to show the large advantage of this lighting function in terms of comfort and safety for the end customer. We will also have a dedicated space to showcase our products and innovation where the participants will be able to see some interesting samples of our high-resolution modules and interact with our experts.

At the DVN US Workshop 2021, Marelli AL is presenting its portfolio of optical concepts which offer many possible solutions to combine its sophisticated electronics with style concepts in lighting products.

Lighting News

Innovative Hella Lights on the Mercedes EQA

LIGHTING NEWS



No engine, therefore no cooling system, therefore no radiator, therefore no radiator grille! In an electric vehicle, the grille space can be redesigned and repurposed with illuminated displays and logos and LED light strips. Hella have now demonstrated their distinctive lighting and electronics expertise front-and-centre on the new Mercedes EQA.

The main light strip, a metre wide, provides an unmistakable appearance on the road and visually connects the headlamps. One LED is integrated on each side of the light strip; an innovative optical concept developed at the Hella competence centre for car body lighting in Ljubljana, Slovenia, ensures homogeneous lighting throughout. The light strip is produced at the Hella plant in Lippstadt.

Auto Motor und Sport Magazine: Great Communication on Lighting

LIGHTING NEWS



THE WORDPLAY TITLE MEANS "CREATING LIGHT" AND ALSO "VERY BRIGHT PERSON"



MICHAEL KRUPPA AND MICHAEL HAMM IN THE AUDI LIGHT TUNNEL INGOLSTADT

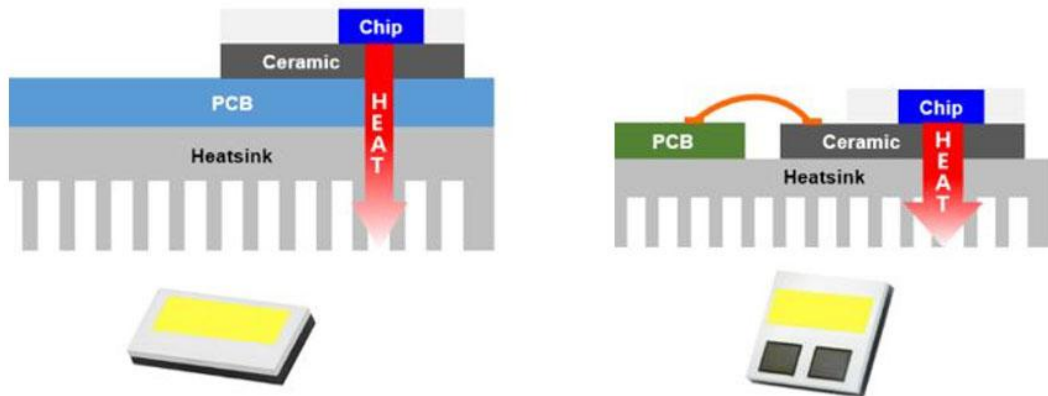
Auto Motor und Sport, Germany's foremost car magazine, published last week a long article on lighting. Consulted and quoted were Audi's Head of Lighting Development Michael Kruppa, and Head of Headlamp and Front Lighting Development Michael Hamm. The article presents the history of lighting and the arrival of LEDs in rear lamps and then years later in headlamps. Innovations are highlighted like digital matrix headlamps with their 1.3 million micromirrors; OLEDs for rear lights, and now the new functions for communication; Kruppa says a lot will happen in the next few years.

It's a very interesting article and should convince readers of the lighting's worthiness concerning—yes—the design of the car, but more significantly, the safety aspects.

We in the lighting community must work to have more articles like this, all over the world, so consumers know the innovations and their benefits (and can get to work lobbying their governments in places like the United States where most of these innovations are still not allowed).

Seoul Semiconductor's New Headlamp LEDs Boost Efficiency

LIGHTING NEWS



SCHEMATIC COMPARISON OF STANDARD LED (LEFT) AND WICOP TE (RIGHT)

Seoul Semiconductor have announced the launch of their new Wicop TE LEDs, which stand to significantly improve thermal efficiency of LED headlamps. With increasing prevalence of electric vehicles, Seoul Semiconductor expect accelerated expansion of their market share in the global vehicle LED market of approximately USD \$2.7bn.

The Wicop TE departs from previous methods of attaching the LED package to the printed circuit board: it attaches the package directly on the heatsink, to better carry away the emitter's heat.

Seoul Semiconductor will be introducing these new LEDs as well as the latest developments in their natural-spectrum SunLike LEDs, and their VioLED UV emitters for disinfection in automotive air conditioning systems at the DVN US Workshop today and tomorrow.

New CEO is Bullish on Myotek's Future

LIGHTING NEWS



Stephane Védie, newly installed as CEO of Myotek, says "We do have a great engineering team in Irvine [California]. We bring innovation and technology to our customers thanks to our creativity, speed and flexibility. I was impressed by our electronic design, simulation tools, state of the art optic, rapid prototyping and validation capabilities".

Myotek have an engineering centre there in Irvine, with manufacturing plants in Asia and in Manistee, Michigan.

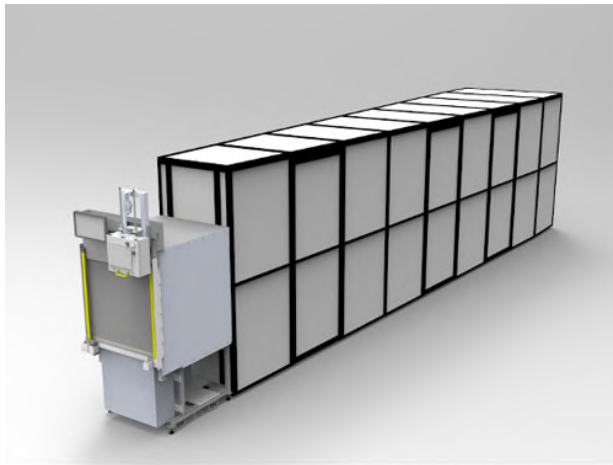
Védie comes to head up Myotek after serving as President and CEO of Varroc Lighting Systems since 2016. Earlier, he was North America CEO of Magneti Marelli, after serving as President and CEO of Magneti Marelli's Automotive Lighting division in North America and France.

Dajac Osprey HS10: Fast, Accurate IIHS Headlamp Ratings

LIGHTING NEWS



The headlamp aim and validation wizards at Dajac have brought forth their new Osprey HS10 validation machine. It's a 10-metre tunnel containing a high resolution, low noise, lab grade photometric camera, along with the Expert I/O to interface with external devices and a wireless keyboard and mouse. Based on Dajac's IntelliAim software, the HS10 brings new features including greater accuracy and IIHS scoring for every lamp tested, making it perfect for meeting the fast cycle times of manufacturing.



IntelliAim validation software is the control center of the Osprey HS10. It runs on a PC, and the main window clearly shows the status of the script along with a large image that provides maximum clarity to the operator. IntelliAim also controls the cycle and has numerous configurations and testing options such as cut-off sharpness, photo area thresholds, IIHS ratings and scores, screwdriver controls for alignment, and more.

Dajac, an Indiana company founded in 2000, design, manufacture, and market equipment to align and validate lighting. as part of the process of lamp manufacturing, vehicle assembly, quality assurance, and for use in lighting laboratories.

AR Supplier Pact to Bring New AR Wearables

LIGHTING NEWS



WaveOptics, specialist designers of diffractive waveguides for AR (augmented reality) wearables, have announced a strategic supplier relationship with Jade Bird Display (JBD) for microLED microdisplays.

The Leopard, WaveOptics' latest development kit, demonstrates an advanced level of readily deployable and customisable AR technology. It is the closest form-factor akin to traditional consumer eyewear available from the UK based company.

Leopard uses the Katana waveguide platform launched at CES 2020. It is the thinnest and lightest waveguide available: only 1.15mm thick, weighing just 7g. It combines with Loki, the WaveOptics designed projector (incorporating JBD's μ LED panel) weighing just 0.6 grams and with volume 760mm^3 , which fits into the housing of the glasses for ease of assembly and style. The 0.13" VGA μ LED display from JBD has an active area of only $2.64 \times 2.02 \text{ mm}$, capable of achieving brightness of over 4 million nits. This enables the ultra-efficient, super bright and small form factor design of the Loki.

This unique combination allows user experience testing of green only, monocular smart glasses, suitable for notification-based use cases.

μLED Headlamps from Sunex

LIGHTING NEWS



Modern high-definition headlamps are designed for two main applications: advanced lighting functions—ADB, AFS, traffic spot marking lights—and road projections to assist or warn the driver.

There are different technical solutions to highly pixelated advanced lighting and road projection headlamps, each with its own benefits and drawbacks. DMD-based solutions will have difficulties penetrating the mass market because they're expensive, have moving parts, and their reflective imaging mode wastes energy. Laser and LCD systems will possibly stay as niche solutions. μLED technology, on the other hand, shows all the promising signs to emerge as an ideal bridge between ultrahigh-resolution DMD systems and the well-established Matrix LEDs.

Sunex are a high-volume supplier of high-quality optics, and now they are successfully addressing this emerging market of μLED-based automotive headlamps from their two manufacturing sites near Shanghai, in China. The Songjiang facility was opened in 2001 and has 2,000 m² dedicated to management, assembly, quality control, and engineering. The Kunshan factory was opened in 2012 and has 11,000 m² currently dedicated to test, assembly, quality control, and R&D.

Driver Assistance News

Luminar Buy OptoGration for Lidar Scale-Up

DRIVER ASSISTANCE NEWS



The Luminar Technologies company are acquiring their InGaAs chip design partner and manufacturer, OptoGration, for that company's core IP and supply chain capacity. The buy comes as Luminar scale their latest lidar sensors into series production and will enable deeper integration with their existing chip design subsidiary Black Forest Engineering (BFE), bought by Luminar in 2017.

OptoGration have capacity to produce about a million InGaAs chips with Luminar's design each year at their specialised fabrication facility in Massachusetts, with the opportunity to expand to 10 million units per year capacity.

Luminar combine their InGaAs photodetector chips from Optogration with silicon ASICs produced by BFE to create their lidar receiver and processing chip, which can acquire and process gigabits of precise data per second to produce optimal lidar data.

Sung-Ho Kim is New AEye Korea Manager

DRIVER ASSISTANCE NEWS



Aeye have appointed Sung-Ho Kim as the national manager of their new Korean office, opened recently to support and grow AEye's business in the automotive, mobility and industrial markets in East Asia. Mr. Kim is an experienced automotive and defense industry executive; he most recently served as president of Valeo Korea.

AEye use a single product platform and single supply chain across markets to drive cost efficiencies and accelerate adoption in automotive, mobility and industrial markets. The company are engaged with an ecosystem of more than 75 partners globally across industries. In each case, AEye's adaptive, affordable, performant lidar can be configured by software to meet the needs of specific applications per market. AEye Korea will provide the company's innovative, adaptive lidar products and support services to Korean automakers, as well as to customers in other vertical industries including trucking and ITS.

AEye are a premier provider of intelligent, next generation, adaptive lidar for vehicle autonomy, ADAS, and robotic vision applications. AEye's iDAR™ (Intelligent Detection and Ranging) system leverages biomimicry and principles from automated targeting applications