

**REAL-WORLD VALIDATION TESTING:
CMD* OUTPERFORMED OEM SOLUTIONS**

CMD actively and sustainably protects headlamps from condensation.

* AML's Condensation Management Device (CMD), enabled by GORE Condensation Management Products



Editorial

High Content, Smooth Running At VISION E-Congress

The VISION congress was held last week—online because of the pandemic. We retain from this congress the high level of content. A great variety of speakers presented insightful lectures about technologies and techniques, automaker and supplier strategy, and safety and design analysis. We also were favourably impressed with the unusually fruitful Q&A periods after each session. Really, they were more like panel discussions with audience participation. What a pleasure to see experts led by the chairman, talking with colleagues and answering attendees' questions. The Q&A, prolonged though it was at 30 minutes per session, deserved to be still longer.

I want to thank the members of the Steering Committee who followed, month after month, the preparation of the congress, integrating endless changes.

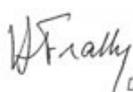
I want to thank the members of the Scientific Committee who selected the abstracts; it is to their great credit that the lectures were at such a high level.

Last but not least, I want to thank the speakers and the session chairs, who all did a wonderful job. All of us, we have done our best despite constraints imposed by the pandemic, and I think we succeeded. This week's DVNewsletter brings the main takeaways from the congress.

All that said, I do have a deep regret: While so many innovations and prototypes were presented, we were not able to have the night ride-and-drive demonstrations that have long been such an integral, characteristic part of the VISION congress. Here is hoping we can return to that practice soon.

Now, I am focused on the Shanghai DVN Workshop set to take place in less than a month. This workshop will be a hybrid event, held face to face for attendees in Shanghai, and also online with global attendees able to follow at a time convenient for them.

Sincerely yours


DVN CEO

In Depth Lighting Technology

VISION Congress: Main Takeaways

 International Conference and Exhibition
17 - 18 March 2021

 Digital edition

SIA VISION

Vehicle and Infrastructure Safety
Improvement in Adverse Conditions

 SOCIÉTÉ DES INGÉNIEURS DE L'AUTOMOBILE

 SIA 2021 VISION



The VISION Congress was held last week—online because of the pandemic. Herewith, our seven main takeaways in terms of lighting:

1 • Expansion of new functions in front and rear lighting and displays



NEW FUNCTIONS AND STYLING IN FRONT



NEW FRONT SIGNALING EVOLUTION



NEW REAR SIGNALING EVOLUTION

New functions are coming to improve safety and also to show the brand signature. Several lectures developed this item, some functions on light markings to improve safety, or brand logos for styling and marketing reasons.

2 • Thinner headlamps



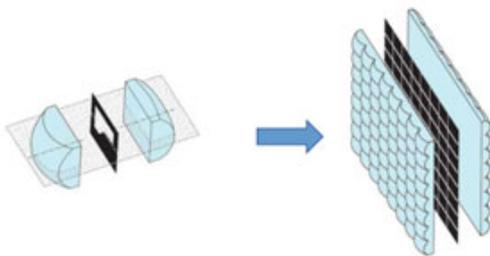
LATEST CAR MODELS

Several presentations developed ways to achieve 15-mm headlamp height. Think about that: 40 mm was considered unrealistically small just a few years ago, and not long before that, a 60-mm headlamp height was a big innovation.



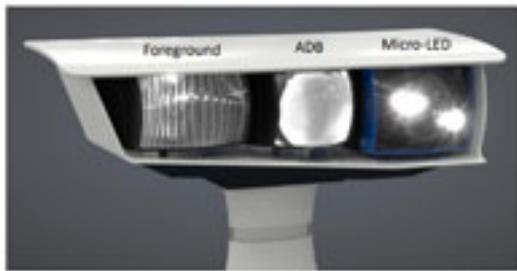
Headlamp module height and efficiency evolution
2010: 50mm. 2017: 30mm. 2021: 15mm

3 • MLA technology coming along rapidly

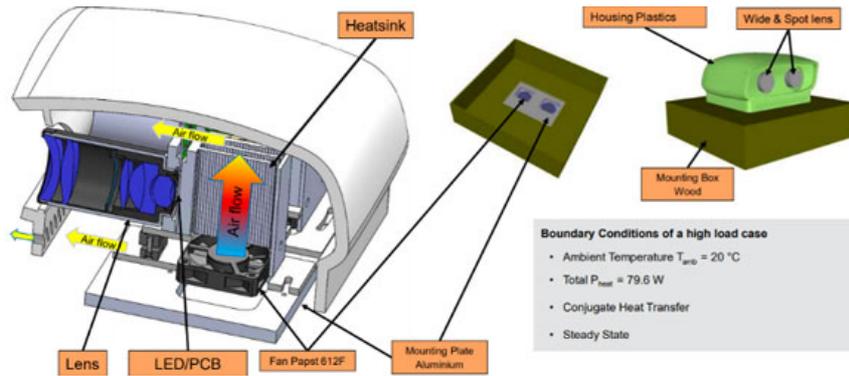


MLA was one of the surprises of the congress. It was shown the great possibilities to succeed with this technology for low beam, achieving thinner headlamps, styling differentiation, and even simple ADB function.

4 • ADB modules developed everywhere



The technology was in the centre of the presentation with DMD, MicroLEDs with high pixel count, and even dynamic laser beam added to a matrix beam.



EXAMPLE OF ADB MLED MODULE

5 • Power reduction

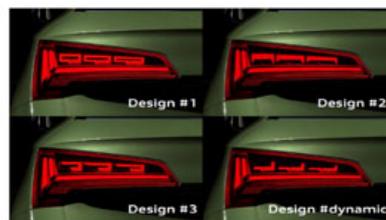
There is great pressure to reduce power consumption but this sometimes conflicts with styling demands.

6 • Automaker strategy

Priority of automakers is to put together innovative styling, to define a strategy concerning ADB, and to reduce cost in all new lighting and display technologies.

7 • Laser and OLED technologies

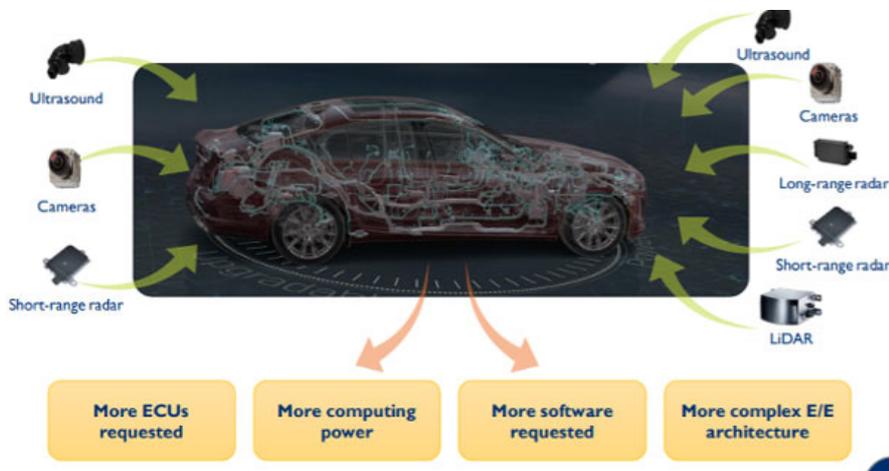
Lasers are increasingly being used, and OLEDs are gaining traction thanks to their dynamics.



There was a great deal of conversation about ADAS, as well; here are our four primary main takeaways:

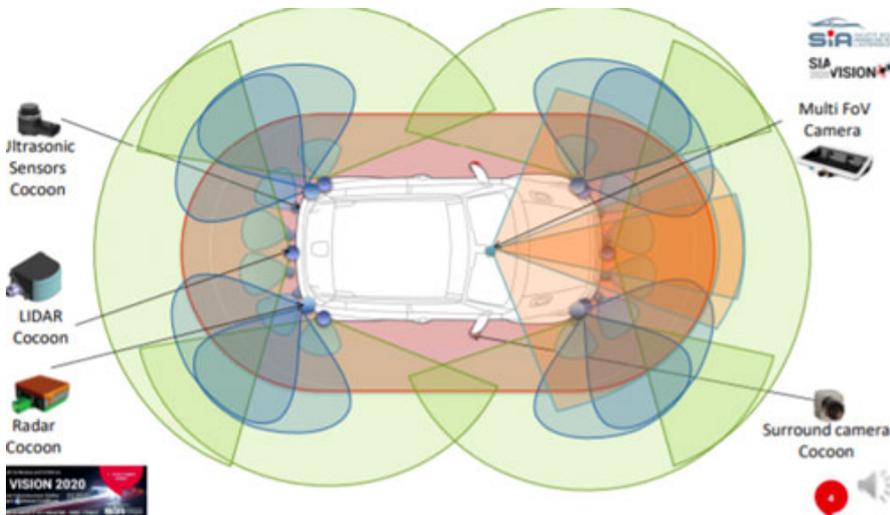
A • Proliferation of sensors in the vehicle

Vehicles are embedding more and more sensors, which raises the challenges of their integration in the vehicle, their fusion to perceive the environment, and also the management of an increasing quantity of data (local or cloud processing, data annotation and storage).



ADDING SENSORS IMPACTS THE COMPLEXITY OF ELECTRONIC ARCHITECTURE

Tesla's Model S, for example, has eight surround cameras, 12 ultrasonic sensors, and forward radar (but no lidar, because CEO Elon Musk says lidar is useless and thinks all the other car companies are stupid for using it). The Mercedes S Class has a stereo camera, 360° surround cameras, four multi-mode radars, a long range radar, ultrasonic sensors, and a front lidar. And the Audi A8 has a front camera, 360° surround cameras, long- and midrange radars, ultrasonic sensors, and front lidar (Valeo Scala).



B • Sensor integration

A part of the congress was also dedicated to integration of sensors at the front, sides, and rear of the vehicle and in the front and rear lamps. There's quite a steep set of challenges for sensor fusion and for the management of data quantity, local or cloud processing, data annotation and storage.

In favour of integrating sensors into lighting: Great synergy; lighting makers have the skills, resources, facilities, and expertise (light sources, optics, thermics, lens protection and lens washing) needed to develop the integration of sensors in the vehicle. Robustness of sensors. Shared cleaning, cables, and connectors. Similar needs (lighting/sensors) for resistance to water, dirt, abrasion, etc.



Against integrating sensors into lighting: difficult or impossible maintenance and drives up the cost of lamp assemblies; more complicated automaker management of multiple suppliers and confidentiality/IP issues; decreased standardisation.

C • Validation

The scenario-based validation of ADAS and Autonomous Driving systems was also interesting topic that has been addressed in different presentations

D • Connectivity

Trends are definitely toward increased connectivity, cloud processing, and artificial intelligence. The connectivity plays a role for coöperatively extending the effective range of sensors. Deep learning algorithms coming into production in the automotive industry will improve safety from not only the vehicle point of view but also the infrastructure point of view.

Lighting News

Condensation Manager Banishes Lens Fog

LIGHTING NEWS



Interview with W.L. Gore's Ronald Szewczyk

Ronald Szewczyk ("SHOO-chik") is an application engineer in automotive venting at W.L. Gore. He started his career as a design engineer in the pharmaceutical industry, then transitioned into an application engineering role supporting the designs he had created. In his position at Gore, he supports automotive venting for exterior lighting and powertrain applications. His primary focus is on lighting and the CMD, that is AML's Condensation Management Device, enabled by Gore products. Szewczyk works with automakers and suppliers, and tests products on cars in real-world conditions, as well as in controlled lab environments.

DVN: Tell us about W.L. Gore, won't you please?

Ronald Szewczyk: We are a global materials science company dedicated to transforming industries and improving life. For the automotive industry, we work in close collaboration with industry leaders to enable their applications exterior lighting, electronics and powertrains, and data transmission cables and fuel cells—all to be safer, cleaner, more productive, reliable, durable, and efficient. Gore employs approximately 9,500 associates, and generates annual revenues that exceed \$3bn.

DVN: The pandemic has affected the whole automotive industry. What has been its effects on your sales?

RS: Our sales were certainly impacted earlier in the pandemic, as has been true for many in the automotive industry, but we are seeing a robust recovery in both our venting and fuel cell portfolios. For venting, we think that is because our portfolio continues to offer up new solutions based on our advanced membrane technology and other proprietary developments that are welcomed by the market.

DVN: Gore make vents which manage internal pressure and humidity in headlamps. Could you describe this activity?



RS: For headlamps, Gore technology has led to two excellent solutions, both of which provide life-of-vehicle performance and protection: One of course is our innovative portfolio of adhesive vents. The other is a truly unique device that actively removes—not just reduces, but *removes* condensation from headlamps. It's an industry first.

Our adhesive vent portfolio is based on diffusive venting technology, which incorporates our proprietary Gore membrane to provide continuous moisture diffusion and pressure venting whether the vehicle is moving or parked. This enables ongoing condensation reduction, and equalises pressure differentials that could stress seals or threaten the integrity of the sealed enclosure. At the same time, this membrane protects against ingress of fine dust, dirt, water, splashes or sprays, and common automotive fluids.

A truly unprecedented innovation for headlamps, jointly developed with AML, leverages their actuator expertise with our diffusive technologies and unique regenerable desiccant material. This CMD (Condensation Management Device) actively removes humidity from inside the headlamp, to significantly reduce the risk of condensation forming.

It's an electromechanical device, installed on the headlamp housing. Equipped with a breathable membrane and a radial seal, it allows the headlamp to remain completely sealed while providing pressure equalisation and ingress protection. The CMD incorporates proprietary Gore technology including a unique regenerable desiccant material. This desiccant adsorbs moisture from the inner headlamp. Then, as the desiccant is regenerated, it desorbs (releases) that moisture to the external environment. These adsorb/desorb cycles lower the lamp's internal dew point (DP). As the internal lamp DP drops, the difference between the internal lamp DP and the lens temperature increases, reducing the risk of condensation occurring inside the lamp. Active moisture removal is what makes CMD such an innovative solution to condensation challenges!

DVN: Could you give some details of the CMD technology to convince customers?

RS: At the core of CMD is the Gore microporous desiccant tape. It was specifically designed for the robust performance the auto industry requires: It has a high absorptive capacity and is engineered for repeated cycling over the life of the vehicle. During a short active cycle, the CMD quickly and reliably desorbs and expels the moisture it absorbed from the internal headlamp environment, including surface moisture and moisture within the plastics, into the external atmosphere. This active moisture removal technology functions effectively, even in extremely humid weather conditions. We credit the CMD's functionality in varied environments to our collaboration with AML. By combining our respective areas of expertise—AML's in actuating

devices and Gore's in condensation and ePTFE (expanded Teflon) membranes—we were able to tackle the source of the problem, which was: just remove the moisture from the enclosure before condensation can form. It sounds simple, but it was a two-year collaborative effort to implement it in a way that would provide life-of-vehicle performance and reliability.

DVN: Have you already started delivering CMD to customers?

RS: AML is the supplier of CMD to the market, but yes, the CMD is commercialised, and since July of 2020 BMW has incorporated CMD as standard equipment on their 5 Series, with initial roll-out in China, where headlamp condensation an issue that is top-of-mind for many car owners. That's because China offers some of the most challenging environmental conditions a headlamp can experience, in terms of levels of heat and humidity that consistently generate condensation.

DVN: How do you see the future of this technology?

RS: We see great promise for the future. The unique technology behind Gore condensation-management products has potential in a wide variety of applications. Automotive exterior lighting was our primary focus, because this technology is so well-aligned with some of the megatrends we see. Beyond the cosmetic and bottom-line benefits of clear lenses, we're also exploring how this technology might support emerging applications where sensors are integrated into headlamps. Because of course those sensors would require clear lenses to function properly. This is an exciting area, and one we are eager explore further in discussion with our customers.

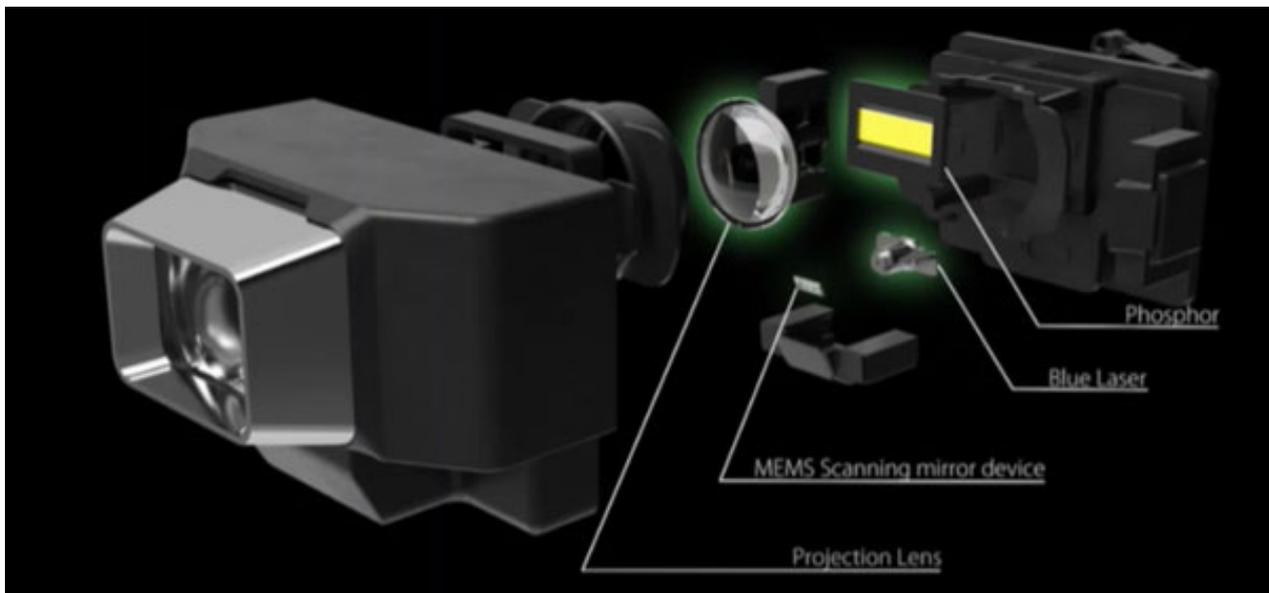
DVN: Do you foresee fogging in the lens disappearing in all headlamps?

RS: CMD shows it's achievable. We know that consumers already feel lens condensation is a significant problem: many perceive it as a "failure of quality" on the part of the automaker, and this can certainly affect brand reputation. As headlamp styling and design are increasingly important to brand image, solutions to sustainably protect headlamps from condensation are more urgently needed.

More information is available as an [online resource](#) from Gore.

VISION: 3 Interesting Lectures at ADB Session

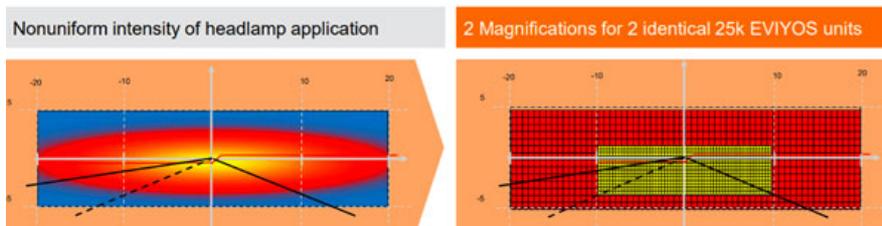
LIGHTING NEWS



1) Osram ADB HR Mockup: 2 Eviyos Make 100k Pixel Performance

The target of the prototype was to demonstrate that two micro-LEDs Eviyos from Osram having 25k each can deliver a performance equivalent to a unique 100k micro-LED system.

The main principle is to use these two Eviyos with two different magnification, one illuminating a large field from -20° to $+20^{\circ}$, and the other more central from -10° to $+10^{\circ}$. This distribution is like the one necessary for headlamp with more intensity in the center. Similarly, for HD application such as road projection, it is mainly the center part of the beam that is used, so where the highest definition is useful.



The MicroLED used for this prototype is the next generation of Osram Eviyos with 25600 pixels, with a reduced pitch of $40\mu\text{m}$.

To allow these two magnifications, two different optical systems are used: one with a field of view of $\pm 12^{\circ}$ and the other with $\pm 20^{\circ}$. Six lenses are used for each, 5 spherical in glass and one aspherical in Zeonex, the last one having a diameter of 50mm. The system length is 100mm, and the numerical aperture 0,6.

2) Stellantis Strategy for the integration of ADB headlamps and HD headlamps

Whilk Goncaves presented the PSA strategy (defined before the merge with FCA) for the integration of ADB headlamps oriented to the needs of the many brands of the company. In this strategy, every kind of ADB, single row with 10-20 px, two rows with 50 px, three rows with 84 px, HD high definition with 10kpx and very high definition with 1 Mpx could have some applications in the company, each brand having specific needs.

For instance currently, Opel is looking at HD systems, Peugeot and DS are using two rows systems and Citroen one row system.

However, the trend is to progressively increase the number of pixels for each brand.

Stellantis has different requests on the style:

- Very thin modules for lit signatures till 5mm for ADB and LB that could be linear or curved

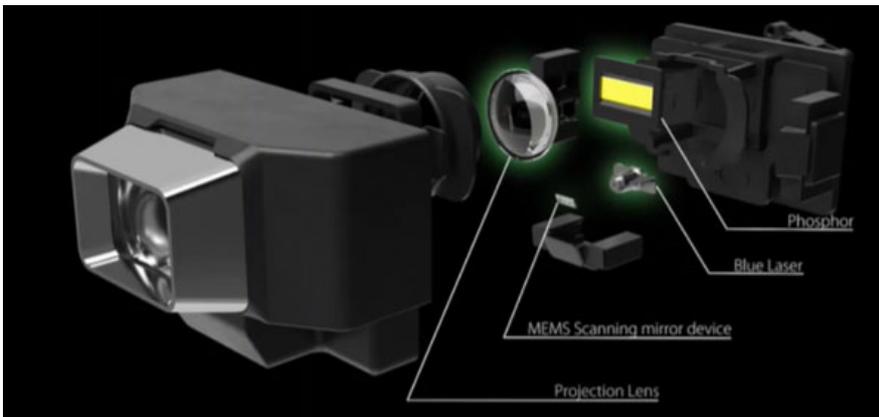
- Reduced depth particularly for EE cars with reduced energy consumption
- Towards Multifunction systems, meaning in a first step the integration of LB and ADB in the same module, and later the HD, boost, bending light in the same module
- Optimized power consumption necessary for all types

About new functionalities with guiding lines and pictograms, they will have to achieve Security and Comfort, Augmented reality, and Danger Alert targets.

3) Stanley ADB from MEMS Laser

Stanley has defined the main specifications of his system for each of these conditions of use:

- On straight road: a minimum light distribution angle of 1° to avoid glaring the other users
- At high speed, a high-luminosity narrow distribution with a visibility distance two times higher than traditional LED HL
- At low speed, a spread of light of $\pm 45^\circ$ to see pedestrians more quickly
- On curves, a high intensity area following the curve with no brightness change and with no mechanical system.



To achieve these targets with a laser scanning system, Stanley has developed a prototype including a blue laser, a MEMS Scanning mirror, a phosphor layer in reflective mode, and a projection lens.

Features of MEMS

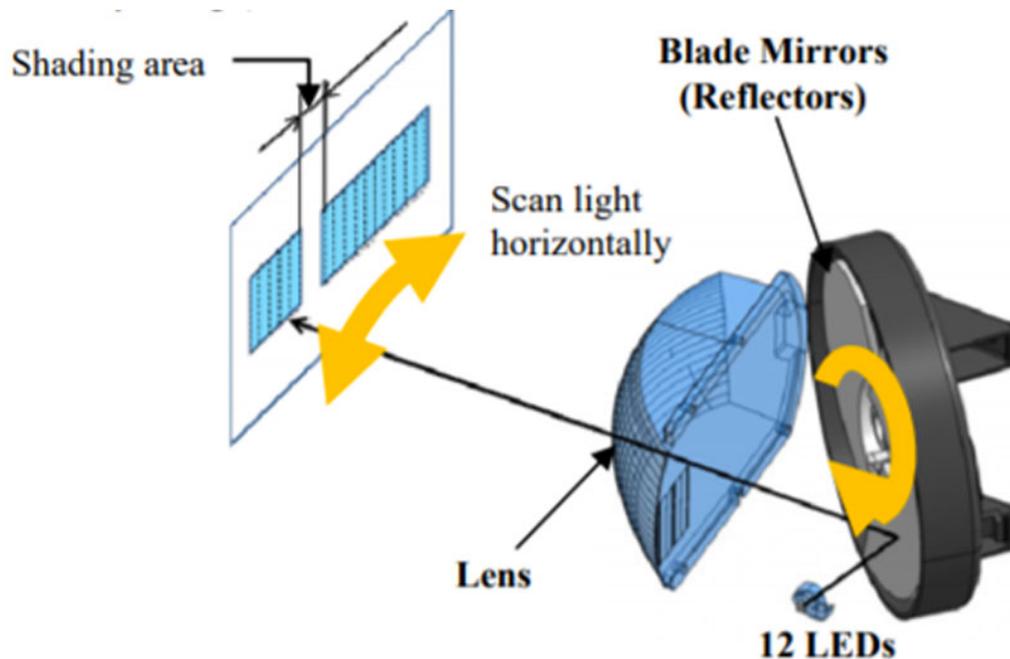
- at high speed
 - High-luminosity narrow distribution simply by narrowing the scanning angle of the mirror.
 - Recognition an obstacle with a reflectance of 10% that has fallen 185 m away
 - Approximately two times visible distance of conventional LED headlamps
- at low speed
 - Light distribution up to 45° right and left when driving at low speed
 - Flushing the pedestrian to recognize the pedestrian more quickly.
- at curve

High-intensity area is swiveled without changing the brightness

- It is possible to swivel without mechanically moving the optical unit

JSME Award for Koito BladeScan ADB

LIGHTING NEWS



PRINCIPLE OF BLADESCAN

Koito have won a Medal for New Technology for their achievement in development and mass production of their BladeScan[®] ADB system.

This award is bestowed by JSME, the Japanese Society of Mechanical Engineers, for technologies that have contributed to the Japanese economy by developing breakthrough new products and improving quality and productivity. JSME is Japan's largest academic organisation for the purpose of encouraging the development of mechanical engineering in Japan.

This is the first time for Koit to win this prize. The BladeScan system uses a scanning method that puts LED light onto two spinning blade-mirrors to provide a morphing headlight beam by using persistence of vision (the residual image effect) for the first time in the world.

With this method, by turning 12 LEDs on and off in line with the rotation of blade mirrors, a high-resolution light distribution is produced—it's equivalent to 300 LEDs in a system without spinning mirrors—and the deglare zone is minimised for optimal precision and maximum driver visibility. The system enables to illuminate vicinity of oncoming vehicles and preceding vehicles or an area between them, and helps driver to early detect crossing pedestrians, thus contributing to nighttime traffic safety.

Koito are committed to further pursue cutting-edge technologies and to develop customer-first products to enhance the safety and comfort of motoring society. The winners by specific name are Naoki Takii, Satoshi Yamamura, Hidetada Tanaka, Yasuyuki Kato, and Kazutoshi Sakurai.

Hamamatsu's Rapid MicroLED Inspection Tool

LIGHTING NEWS



MINY PL TOOL DETECTS ABNORMALITIES

There's an all-new system from Hamamatsu Photonics for high-speed inspection of microLEDs on wafers. Called the MiNY PL, the tool is designed to detect abnormalities in the LEDs' external appearance, intensity, and wavelength of their light emissions. The MiNY PL system uses a photoluminescence (PL) measurement technique based on the company's image processing technology and a newly developed imaging module.

According to Hamamatsu, the MiNY PL makes fast pass/fail decisions when inspecting microLEDs, which will contribute to an increased product yield for use in display applications and will also help to increase the R&D and production efficiency of microLEDs. Furthermore, the MiNY PL will also streamline the 100 percent inspection process of microLEDs in future mass production lines.

Marelli AL ADB in New VW Tiguan

LIGHTING NEWS



Smart, adaptive headlamps can help to give the driver a visible added value, while they promote the vision of intelligent adaptive driving beam functionalities for volume segments. Marelli AL's standard modules generate both the base light and the 2-row-matrix with all intelligent functionalities of the new VW Tiguan headlights.

Whether it's glare-free high beam, dynamic curve light, or tourist mode with options for right- and left-hand traffic, by means of individual LED control the intelligent headlights adapt to driving conditions seamlessly. AL have put up a [video](#) describing the capabilities of the VW IQ.Light headlamps they supply for the Tiguan.

Driver Assistance News

Luminar Lidar for SAIC's New EVs

DRIVER ASSISTANCE NEWS



Luminar have announced a strategic partnership with SAIC, China's largest auto maker. Luminar's Iris lidar and components from their Sentinel software system will underpin the autonomous capabilities and advanced safety features in SAIC's new R-brand EVs, expected to begin series production with Luminar starting in 2022, with the parties' longer-term goal being widespread standardisation across all vehicle ranges.

As part of the close collaboration, Luminar say they will also be establishing an office in Shanghai alongside SAIC.

The companies say the partnership will deliver the first autonomous production vehicles in China, establishing SAIC's technology leadership and Luminar's production launch in the region. Luminar say their Iris lidar will be seamlessly integrated into the roofline of the vehicles at the optimal vantage point, while acting symbolically as a crown of the vehicle for safety and autonomy. Certain software components in Luminar's Sentinel solution, including object detection, classification and tracking, will also be integrated into R brand, helping to enable planned highway autonomy and proactive safety capabilities on the vehicles.

SAIC VP Yang Xiaodong says "Our new R brand line of vehicles will combine the best technology with luxury and comfort, and autonomous capabilities are central to that vision. The only autonomous vehicle company we seriously considered was Luminar—they are in a league of their own in lidar technology and software, uniquely enabling us to achieve our vision in series production".

Siemens, Bosch to Link Roadside Cameras With Vehicles

DRIVER ASSISTANCE NEWS



Siemens Mobility and Bosch have announced a new, fully integrated connected vehicle collective perception system. It enables a direct connection between roadside camera onboard intelligence and dual-mode roadside unit (RSU), which can in turn pass information to connected vehicles. Detections and geocoordinates captured by roadside cameras can now be processed more efficiently, bypassing additional interface devices, making it easier and cheaper to install, and easier to maintain and keep updated.

The new integrated system has been developed through testing at the American Center for Mobility and in the USDOT Connected Vehicle Pilot at Tampa Hillsborough Expressway Authority (THEA). Two initial use cases, Pedestrian Collision and Wrong Way Vehicle Detection, are currently being piloted and now are ready for installation.

This solution takes advantage of smart video-as-a-sensor capabilities enabled by Bosch IP cameras with on-board intelligent video analytics (IVA). When applied to important use cases, the Bosch IP cameras detect vehicles and pedestrians to stream intelligent metadata and prompt the roadside units to communicate safety messaging to vehicles. The solution provides improved situational awareness for drivers and enables them to take more immediate action when pedestrians are entering into a crosswalk.

This complete V2X solution uses camera intelligence to process at the edge, with no central server required. Safety messages transmitted to the vehicle through the RSU are displayed, if equipped, on the onboard unit (OBU), along with aggregated information on traffic signal state and phase timing.

The combined Bosch and Siemens solution enables mobility operators to make cities, vehicles and infrastructure intelligent. These solutions enable city planners and senior traffic engineers to create smarter, safer, and more sustainable transportation ecosystems.

General News

China Sales Surged in February

GENERAL NEWS



China sales reached 1.503 million in February, soaring 365% from a year earlier, according to CAAM (the China Association of Automobile Manufacturers).

China's vehicle outputs and sales in Feb., 2021 (thousand units)					
	Feb., 2021	YoY change	MoM change	YTD, 2021	YoY change
Outputs	1,503	418.9%	-37.1%	3,890	88.9%
PV	1,162	480.6%	-39.1%	3,072	87.0%
CV	340	280.8%	-28.8%	818	96.3%
Sales	1,455	364.8%	-41.9%	3,958	76.2%
PV	1,156	409.9%	-43.5%	3,201	74.0%
CV	299	246.2%	-34.8%	757	86.2%

Data source: China Association of Automobile Manufacturers (CAAM)

This past February was the eleventh month in a row during which China's monthly outputs and sales rose year over year. The surge reflects the low sales for the same period last year. Auto sales slumped 79.1% in February 2020, as many cities in the country were in lockdown and factories and dealerships were shuttered. Rising market demand this year is another contributing factor to the jump.

Compared to January, China's auto outputs and sales fell 37.1% and 41.9% on account of fewer workdays in February due to the Spring Festival holiday. For the first two months of 2021, China auto sales amounted to 3.958 million units, leaping 76.2% year on year. The sales edged up 2.7% compared to Feb. 2019, but shrank 12.6% over the same period in 2018.

Europe Sales Plummet in Worst February Since 2013

GENERAL NEWS



European new-car sales fell 20% in February, as coronavirus lockdowns and accompanying uncertainty across Europe took a toll on sales. Registrations in the EU, EFTA and UK markets were 850,000. The result was the worst February for car sales in eight years.

Volvo and Smart were the only brands with volume gains, with Volvo sales up 1% and Smart's registrations up 64%.

Volkswagen -19%,

Stellantis – 22%.

Renault – 29% and Nissan - 35%

Ford - 23%

Hyundai's - 23% and Kia - 15%

Toyota - 11%.

Mercedes-Benz - 23%,

BMW - 14%,

Lexus - 31%.



Passenger car registrations: -21.7% first two months of 2021; -19.3% in February

NEW PASSENGER CAR REGISTRATION (EU)

Through February, overall European sales fell 23% to 1.69 million.

Spain - 38%

UK - 36%

France -21%

Germany -19%

Italy – 12%

Gore Membrane Feted by Toyota

GENERAL NEWS



SHINICHI NISHIMURA AND TOYOHIRO MATSUURA WITH TOYOTA'S PROJECT AWARD.

W. L. Gore & Associates' Gore-Select® membrane has received Toyota's prestigious Project Award in the Technology Section. Gore-Select was awarded for its innovative technology, which contributes to the performance and value of Toyota's new Mirai premium fuel-cell electric vehicle introduced last December.

Toyota's first-generation Mirai revolutionized FCEVs when it launched in 2014. It incorporated Gore-Select membrane as its PEM (proton exchange membrane), the core material of its fuel cell stack. Now, an improved Gore-Select membrane helps the second-generation Mirai exceed the capabilities of the previous model.

At the heart of this performance improvement are recent advancements to the Gore-Select membrane, which now is 30 per cent thinner for improved gas permeability and fuel efficiency, along with a unique reinforcement layer that significantly improves the membrane's mechanical durability.

W. L. Gore & Associates are a global materials science company dedicated to transforming industries and improving lives.. With more than 11,000 associates and a strong, team-oriented culture, Gore generate annual revenues of \$3.8bn.