

DVN Shanghai 2025 Workshop

02 December 2025



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ABOUT DRIVING VISION NEWS

DVN is the vehicle lighting: ADAS; lidar, and interior world's journal or record, dedicated to keeping the community informed and communicating about the latest progress and developments. DVN's three pillars are:

- **Technological watch** on new emerging technologies, with weekly electronic newsletters bringing news, analysis, and crucial information on innovation in lighting, ADAS, lidar, and car interior; there are also monthly technical reports with sharp focus on cutting edge technologies, company profiles, regulatory matters, and other relevant content available only from DVN.
- **Networking** of high-level decisionmakers, researchers, innovators, practitioners, academics, and regulators to make new business connections with two workshops per year in rotating locations throughout America; Europe; China; Japan; India, and Korea. DVN Workshops are very popular, and routinely fill to capacity with over 350 participants.
- **Promotion of innovations** - we facilitate the promulgation of knowledge of innovation, which in turn paves the way for commercialization, enabling to build new relationships through DVN Community to forge new business worldwide, The DVN Gold membership roster includes 260 companies including automakers; lighting and ADAS tier-1 and -2 suppliers, and a wide variety of universities; research outfits, and consultants. DVN Gold members receive all publications and attendance privileges at all DVN Workshops.

Executive Summary

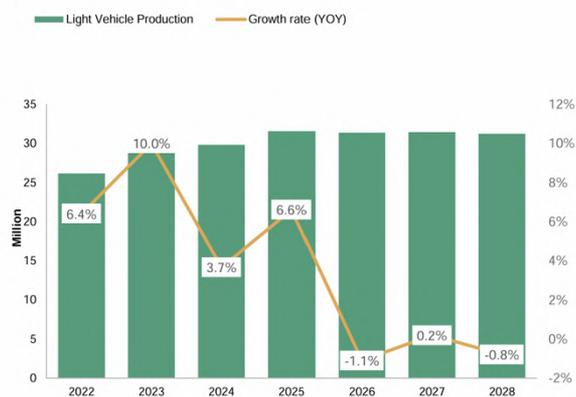


The 2025 DVN Shanghai workshop this past October attracted more than 520 participants from 150 companies, and more than 200 automakers – domestic Chinese ones like BYD, Xiaomi, Geely, Chery, BAIC, Great Wall, and Dongfeng, as well as international ones including Ford, GM, VW, Mercedes, BMW, Renault, and more.



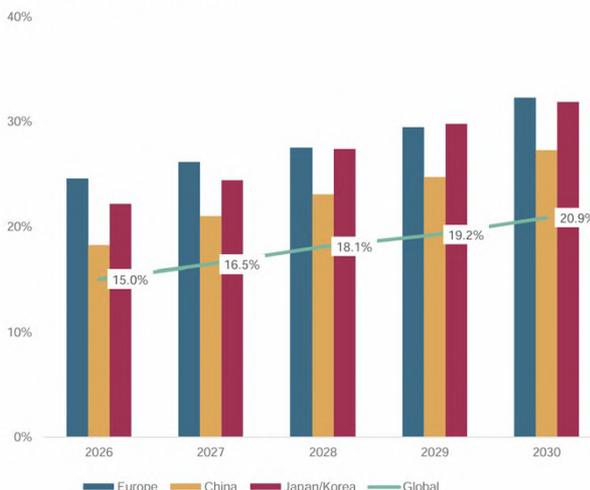
The Chinese automotive market is still growing in 2025 – S&P say it's up by 6.6 per cent – but should be stable in the coming years.

Mainland China light vehicle production forecast



As of Oct. 2025
Source: S&P Global Mobility

ADB penetration rate by regions



As of Oct. 2025
Source: S&P Global Mobility

Amidst that predicted automotive market level-off, though, the Chinese vehicle lighting market value will continue grow, with clear technical trends including ADB proliferation (estimated Chinese prevalence forecast to grow from 18 per cent in 2026 to 28 per cent in 2030) and lit grilles and logos (market forecast to triple from 2024 to 2031).

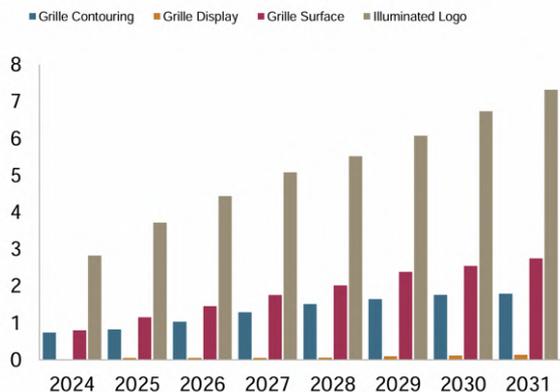
This year's event focused on five topics:

- Interior lighting: with increasingly dynamic activation, interior lighting is becoming a key part of the user experience. Vehicle usage patterns in China feed into this; when the vehicle is parked, for example in camping mode, new interactive lighting features shine – like starry-sky overhead lighting.

This is reflected in S&P figures about Chinese ambient lighting components forecast where evolution in China is growing faster compared to other regions

Front Lighting Enhancement

Million Vehicle

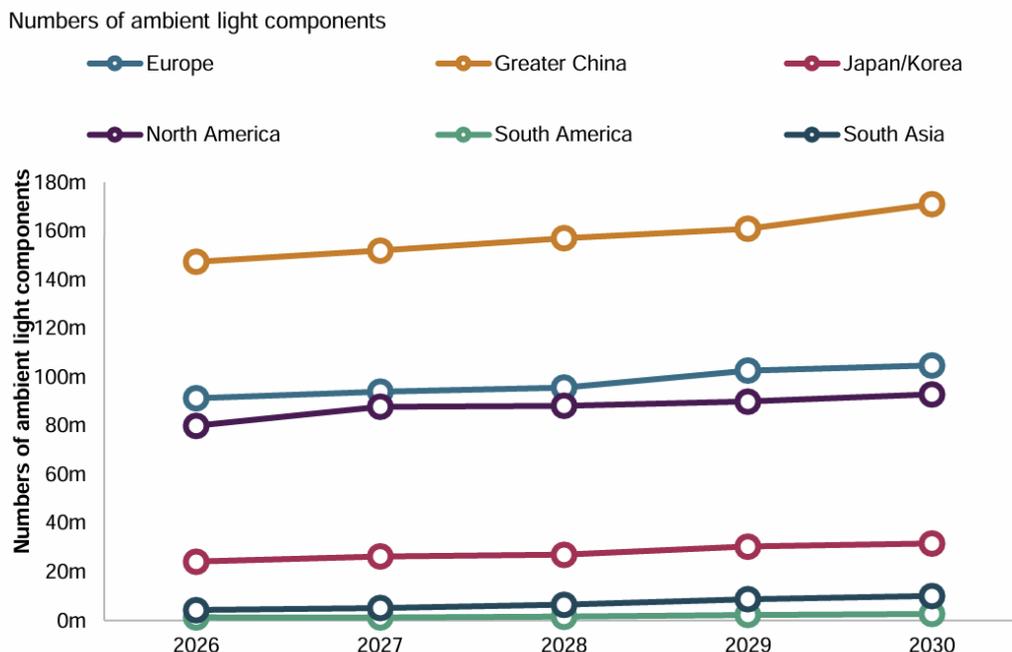


As of Oct. 2025
Source: S&P Global Mobility



Zeekr 001 Starlit Roof

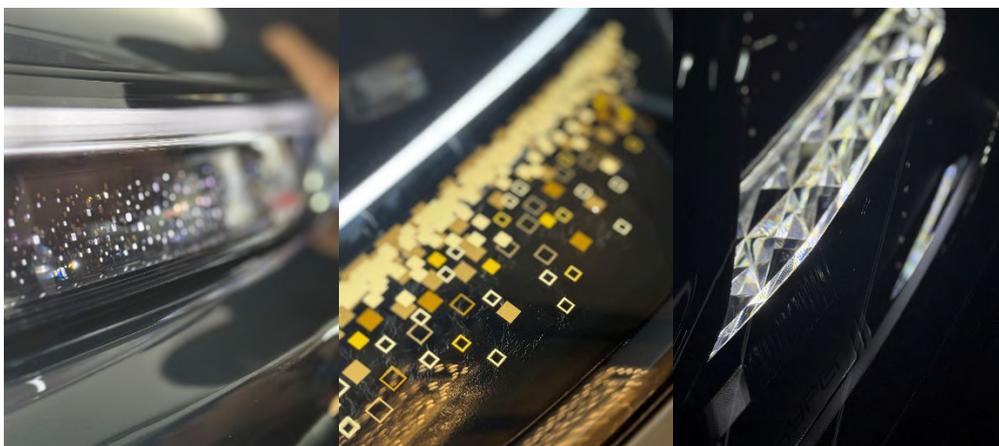
Global Ambient Lighting Components Forecast by Region



As of Oct, 2025
Source: S&P Global Mobility

- Electrical and electronic architecture
- Lighting design: interest in jewel-like design (crystal appearance – starry light, film integration, painting + laser etching) and turquoise light as a new differentiator for 'intelligent' vehicles with level-2 AD features. For this purpose, Chinese tier-1s are developing in-house simulation tools to speed the creation of optical systems including more than 1,000 LEDs (creating such a system one LED at a time would take too much time).





Mind mentioned the new Chinese GB 4785-2025 draft standard with additional requirement for ADS (installation, photometry, etc) expected to enter force soon. SMVIC reminded everybody that this ADS is not yet legal, except in some dedicated areas where local policy allows it.



• Lighting & safety performance: IM Motors mentioned the implementation of additional high beam to improve visibility, while CATARC presented their draft proposal for 2027 ratings, including a bonus for vehicles with signal road projections and/or driver assistance projections.



• Lighting & exterior HMI: ISD (interactive signal/social display) prevalence is continuing to grow, especially with 2- to 4-mm pitch with standard LED technology to keep cost down, as presented by Lynk & Co's 1- and 2-colour setups. RGB setups are coming soon, with multiple SOPs in 2026.



Liaowang ISD roadmap (L); Xingyu's Lynk & Co rear lamp with standard-LED ISD

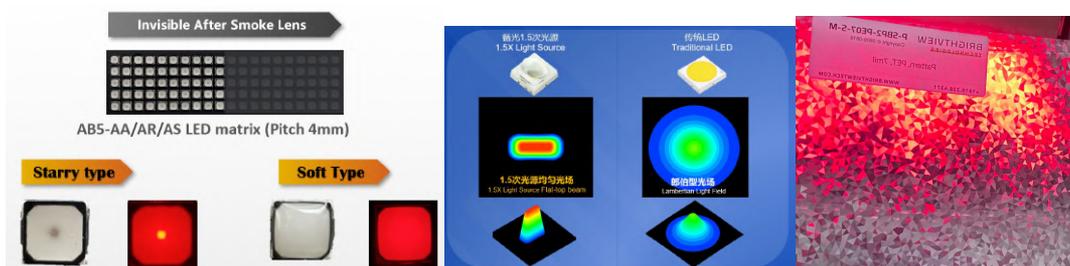
External HMI is not just for signaling functions with ISD; we are seeing more and more applications with RGB LED and laser projection systems.



Anrui DLP RGB

Appotronics DLP RGB

There was strong interest during the workshop in cost savings and faster development via design simplicity. The use of films instead of highly complex edge-lighted thickwall optics, and dome LEDs seem to be some good ways forward with a lot of attraction at tier-2 supplier booths.



APT smoke dome LED (L), Optiseen 1.5x light source with secondary lens (C), Brightviewtech film (R)

Keynote speeches



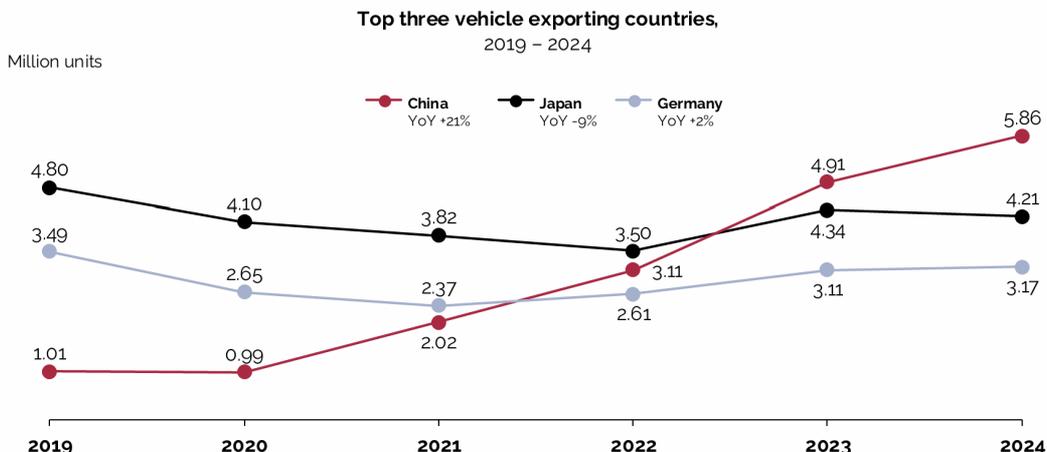
Automobility (Bill Russo, Founder & CEO):

How China's Digital Ecosystems are Re-Shaping Intelligent Connectivity



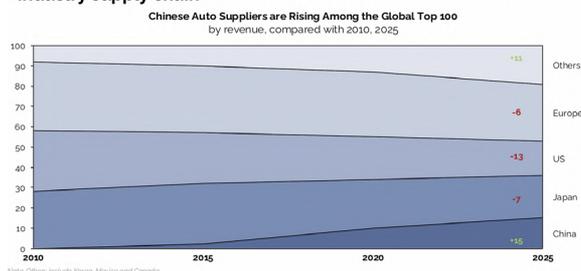
China now accounts for 33.8 per cent of the global vehicle production in 2024, followed by USA (11.4 per cent) and Japan (8.9 per cent). Long focused on the domestic market, China has greatly expanded their export market share in the last five years, going from 1 million vehicles in 2019 to 5.86 million in 2024, and is now the world's top automobile export nation.

China surpassed Japan in 2023 to become the leading automobile export nation



Tier-1s are following the same trend, with domestic ones growing faster. In the global top 100, there are now around 15 Chinese lamp set makers (up from zero 15 years ago).

China is a rising force in the 21st century global automotive industry supply chain



The Top 100 list of auto parts suppliers is comprised of an expanding number of Chinese companies

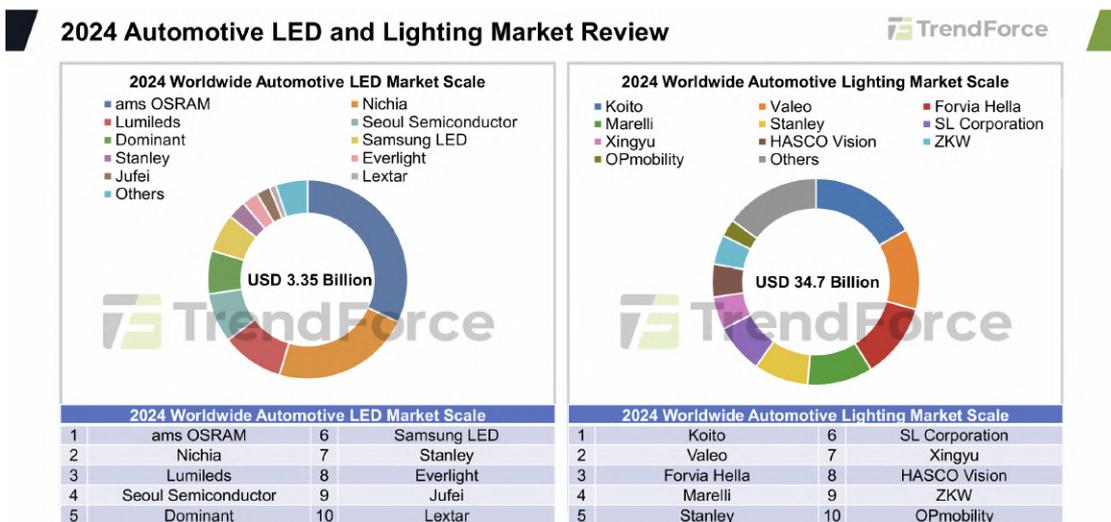


Trendforce (Joanne Wu, Assistant Vice President):

2025 Micro/MiniLED Automotive Lighting and Display Trends

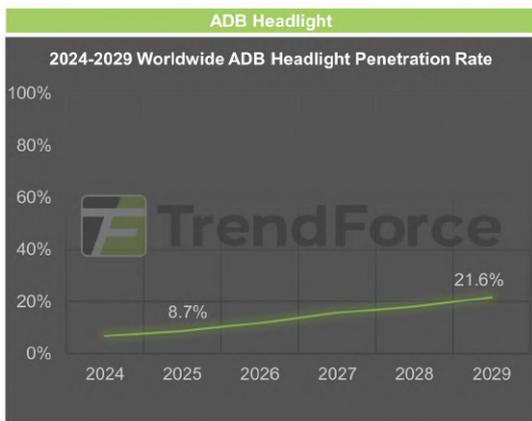


Trendforce predict the automotive LED and lighting market value will grow to USD \$48.2bn in 2029.



Headlamps

ADB helps expand drivers' nighttime field of view, giving them more time to react when seeing an obstacle and achieving better road lighting. ADB modules are mass-produced uniformly, saving development efforts and associated costs for regional markets. ADB market prevalence has the potential to reach 21.6 per cent by 2029.



Micro LED Headlights Introduced in European / Chinese OEMs

Year	Model	Price (USD)	Tier 1 Supplier	Headlight Technology
2023	Volkswagen Touareg	75,000-96,000	Marelli	h-Digi microLED, ams OSRAM- EVIYOS HD 25
	Porsche Cayenne (Coupe)	123,000-131,000	Forvia Hella	Digital Light SSL HD, Nichia- μPLS
2024	Volkswagen Tiguan L Pro	33,800-38,200	Marelli	h-Digi microLED, ams OSRAM- EVIYOS HD 25
	NIO ET9	115,000	Marelli	h-Digi microLED, ams OSRAM- EVIYOS HD 25
2025	Opel Grandland	40,000	Marelli	h-Digi microLED, ams OSRAM- EVIYOS HD 25
	SAIC Volkswagen Teramont Pro	38,557	HASCO Vision	ams OSRAM- EVIYOS HD 25
	Audi Q3 SUV	51,000-57,000	Xingyu	25,600-Pixel, ams OSRAM- EVIYOS HD 25

According to TrendForce, OEMs require an average pixel count of 20,000 for Micro LED ADB headlights. The future product trend of Micro LED pixel arrays will have the opportunity to develop towards two polarizations: one is low-pixel products, using 3,000-4,000-pixels; the other is premium products, using 70,000-100,000-pixels.

Automakers require an average of 20 kilopixels for microLED ADB headlamps. The product trends in microLED pixel arrays will bring the opportunity to develop along two lines: low-pixel products, around 3 to 4 kilopixels, and premium products with 70 to 100 kilopixels.

Taillights

MiniLED taillights and front communication displays have been installed in cars from IM Motors, GWM, Changan, Aito, and more. Designs currently incorporate P3 - P4 displays and a 100W specification due to cost and power consumption concerns, with advancements toward P1.5 to P2.8 displays and miniLED COB technology. AMS Osram's innovative Aliyos technology can display symbols, words, and images for styling, messaging, and warning.

Mini LED Taillights / ISDs in IM Motors, GWM, Changan, and AITO TrendForce

IM Motors LS6, GWM SAR Mecha Dragon, Changan NEVO E07, AITO M9

ALİYOS, using Mini LEDs on a flexible and transparent foil, displays symbols, words, and images for styling, messaging, and warning.

- Mini LED taillights (rear) and Mini LED communication displays (front) have been introduced in IM Motors, GWM, Changan, and AITO.
- Designs currently incorporate P3-P4 displays and a 100W specification due to cost and power consumption concerns, with advancements toward P1.5-P2.8 displays and Mini LED COB technology.

MiniLED Automotive Displays

Sony Honda, BMW, HKMC, BAIC, and GWM are expected to release vehicles with miniLED displays between 2026 and 2029. Panoramic HUDs also use miniLED technology to enhance contrast ratio. Regarding microLED automotive display markets, automotive communication display, window transparent displays, head-up displays (HUDs), and morphing centre controls are receiving significant attention from automakers.

Smart Cockpit- From Today to the Future TrendForce

	AR-HUD	TFT-LCD	DLP (DMD)	LBS (MEMS)	LCOS	Micro/Mini LED Display
Resolution	★★	★★★	★★★	★★★	★★	★★★
Brightness	★	★★★	★★★	★★★	★★	★★★
Price	★★★	★	★	★★	★★	★★

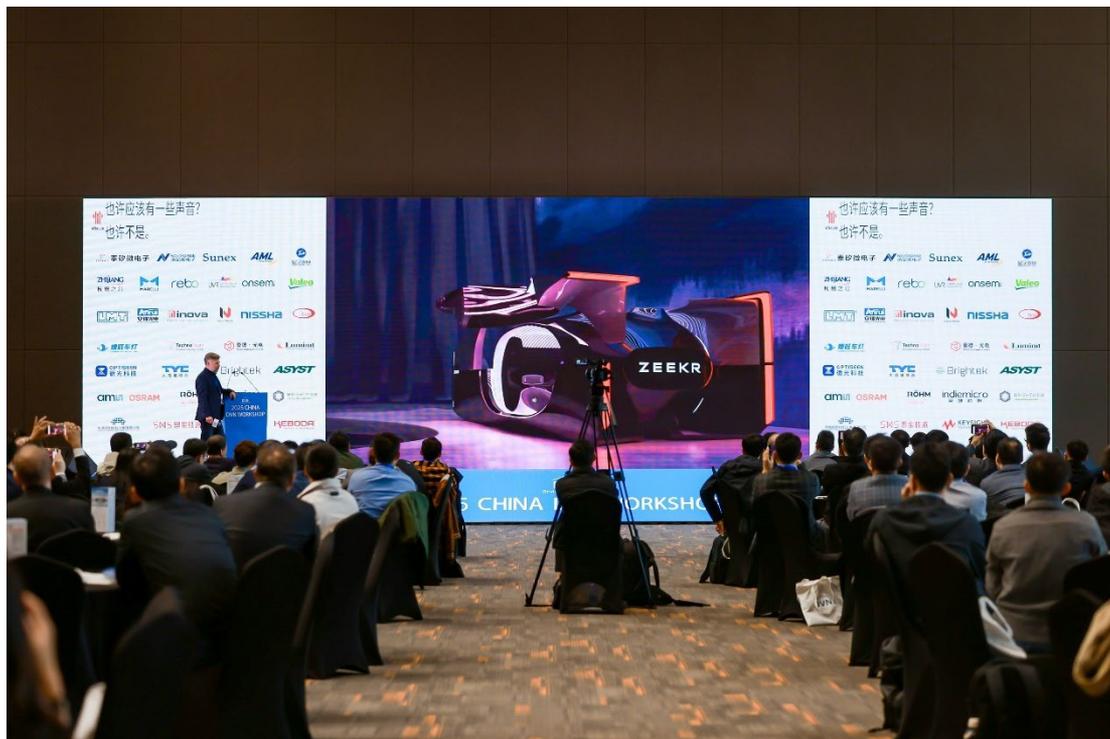
	Display	OLED	TFT-LCD	Mini LED TFT-LCD (HDR)
Brightness		★	★★	★★★
Contrast Ratio		★★★	★★	★★★
Reliability		★	★★★	★★★
Safety		★★	★	★★
Price		★	★★★	★★

Innovation Display	OLED	TFT-LCD	Micro LED Display
Reliability	★	★★	★★★
Safety	★★	★★	★★★
Price	★★	★★★	★
Note			Transparent Rollable

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China Academy of Art (James Hope, Automotive Designer - Professor):

Design Trends



Professor James Hope from China Academy of Art spoke about the evolution of vehicular lighting from its humble beginnings of rudimentary function through the milestones and breakthroughs which have led to today's innovative lighting concepts, shapes, branding attributes, and ambiance. The breakthrough of the blue LED in the early 1990s enabled the full colour spectrum and potential to be realized. Designers have more opportunities than ever to customize lighting designs and concepts into their work and to create new and exciting products.

Professor Hope shared some patented lighting concepts from his past work in the industry as example of innovations made possible by technological advancements. He considers lighting as a key frontier of possibilities for designers to explore. He also highlighted project work from transport design students at China Academy of Art, with their Zeekr-sponsored project work. They were tasked to explore the future of the luxury interior experience, highlighting how they used light in creative applications as integral elements in their design concepts. "If you want to see ideas for the future, who better to ask than young creative design students who will be creating that future?", Hope noted. To conclude, he suggested three trends: Firstly, considering lighting exterior with migration from functional elements to unique design elements and night signature.



Today we see this trend evolving into the illuminated grilles as lighting organically spreading from their original lamp function position to opportunities around the vehicle. Lighting can be functional, brand enhancement, and decoration in new and exciting ways.

The second trend is the interior space. Here, too, lighting is evolving from purely functional instrumentation and simple cabin lighting to ambient lighting as decoration, functional lighting with new opportunities such as shy tech, and welcome lighting. Maybe in the future as we understand more of how the brain perceives emotions and technology, there may be opportunities for lighting to go beyond the function and decoration to psychological and physiological wellbeing.

Thirdly: a related trend of new functions such as autonomous driving light indicators using light to communicate with other road users, and on some Chinese cars there are customizable screens that can communicate with banner script or emojis to create a more personal kind of communication. This could evolve into new and exciting ways to use a vehicle as a communication tool between the occupants and the outside environment.

MEMORY INTERSECTION

Fabric with interwoven fibre optics and light reflecting properties for memory motif

OP—The material of the interior

Woven fabric
Leather that can
feel like no
other.
Optical fiber
Sheep sensation

OP—Material in space

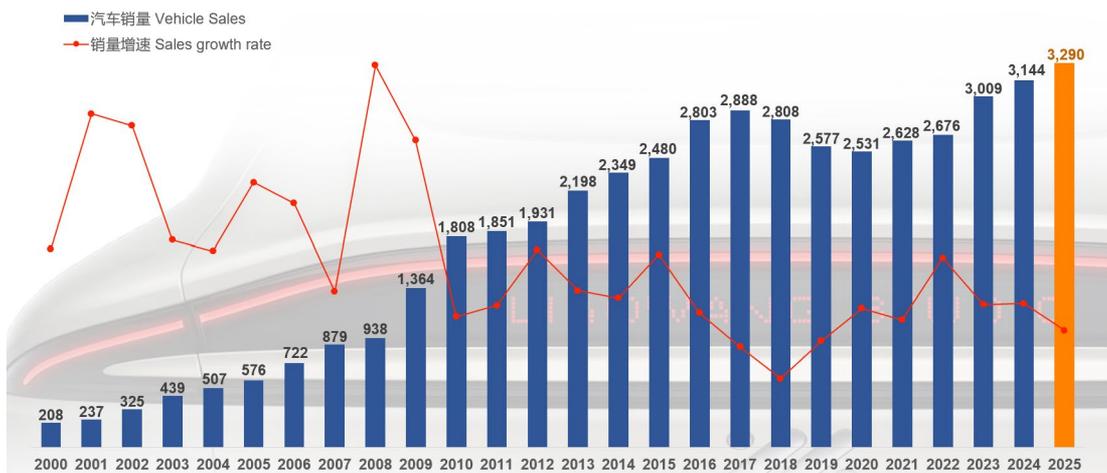
In the space, the flowing of
light fabric is reflected by
film, which makes the flow
of time and memory
yarn
Transmittance

OP—Materials for art installations

In the art space,
light is woven,
shining on new
multi-media art
materials that can
express memory.
An artistic
Molecular sculpture

Liaowang (Gu Dan, President): User-Centric Thinking and Product Innovation

Gu started this presentation with Chinese market information and AD Level 2 growth that will cover 70 per cent of the vehicle market in 2025, and 90 per cent in 2030.



With the new needs of V2X, Liaowang presented their roadmap with colourful MDL solution (from 2025 red/green/yellow light and in 2026 RGB ISD).

智慧交互? Intelligent Interaction?

燎旺MDL技术: LW MDL tech: Global debut Continuous iteration Leading products

ISC	MDL	MDL_RED	MDL 2.0
长安阿维塔11 尾灯灯 CHANGAN AVATR11 Halo Lamp SOP: 2022.10	长安阿维塔12 尾灯灯 CHANGAN AVATR12 Halo Lamp SOP: 2023.10	上汽智己L6 尾灯灯 SAIC IM L6 Tail Lamp SOP: 2024.5	吉利领克900 前位置灯 GEEELY LINK&CO 900 Front Position Lamp SOP: 2025.3

Colorful MDL 2025.4 ~ 2026

上汽智己全新L6 尾灯灯 SAIC IM New L6 Tail Lamp SOP: 2025.4	全新吉利交互车灯 All new RGB Interactive Lamp SOP: 2026
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Single color MDL 2022.10 ~ 2025.3

MDL 3.0 MDL RGB

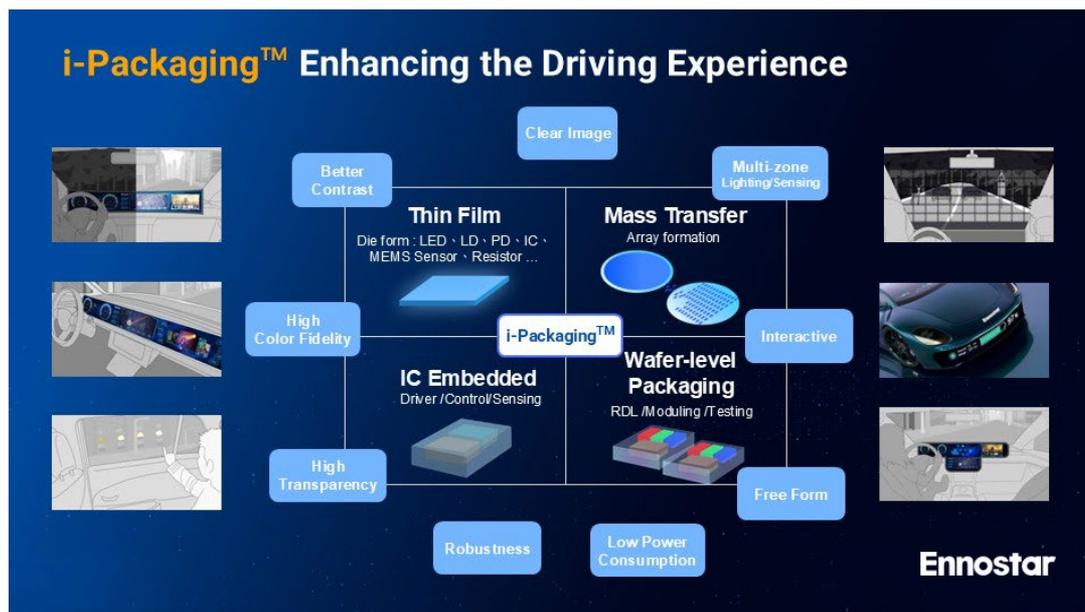
用户体验推动持续迭代
User experience drives continuous iteration

To support this development, Liaowang are using an intelligent system to communicate between ADAS, chassis and infotainment to lamps.

Ennostar (C.N. Huang, VP of Advanced Research Centre):

The Path to Compact and Integrated Automotive Lighting

Huang addressed a directional shift that is quietly rewriting vehicular lighting system design: semiconductor-grade integration for optical modules.



The presentation introduced i-Packaging, Ennostar's integration platform combining thin-film processes, precision mass transfer, IC embedding, and wafer-level packaging to achieve semiconductor-grade module integration. Built on chip-on-wafer (CoW) and chip-on-carrier (CoC) with substrate lift-off, i-Packaging supports diverse component combinations – LEDs, ICs, sensors, MEMS and more – consolidated at the wafer stage before singulation. Wafer-level packaging serves as the structural core, enabling compact T.E.M.O. (thermal-electrical-mechanical-optical) integrated modules. Precision mass transfer enables selective placement with fully array-level transfer, while IC embedding pushes miniaturization further by integrating drivers, logic, and sensing elements directly into the substrate.

All of this creates smarter, simpler, more space-efficient lighting architectures with compact and low latency control. For the first time, the vehicular lighting world adopts an architecture based on semiconductor integration philosophy that has already reshaped AI computing and advanced packaging.

i-Packaging: 9 Real-World Experience Gains

Better contrast: sharper visual separation for displays and surface light.

Clear image: cleaner optical rendering and symbol legibility.

Multi-zone lighting & sensing: each zone can detect, decide, react independently.

Interactive: light becomes a real-time feedback element in the cockpit.

Free form: industrial design shapes the light, not module geometry limits.

Low power consumption: efficiency per mm³ matters even more in EVs.

Robustness: semiconductor-grade stack improves thermal endurance.

DVN Report: DVN Shanghai Event 2025

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High transparency: display + light can merge invisibly into surfaces.

High color fidelity: automotive legibility requires colour precision generation.

This is where vehicular lighting moves next: not brighter pixels, but more intelligent ones. Ennostar describe themselves as holding strategic position as the world's № 1 rear lamp (red and amber) LED chip share, top-3 in backlight technology, ISD already commercialized, and turquoise LED chips in mass production. They are now channeling this capability toward transforming lighting into an information surface, not just illumination hardware. Ennostar are building this bridge from LED hardware toward semiconductor-integrated T.E.M.O. modules, and are opening collaboration with ecosystem partners.

S&P Mobility (Laura Dong, Senior Research Analyst):

Data Insight: China Automotive Lighting Market Forecast

S&P Global Mobility have determined that the global automotive industry is facing both challenges and opportunities. The global economy is expected to experience a downturn in the second half of 2025, but the long-term trend remains stable. Light vehicle production is projected to reach 91 million units in 2025, a 2-per-cent increase, with mainland China's production accounting for 32 million units.

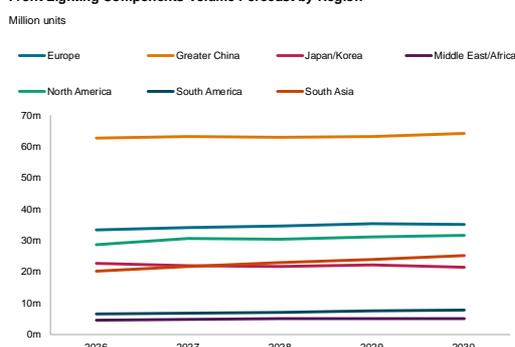
前灯：受到全球汽车生产增速放缓的影响，前灯市场将趋于平稳
中国市场仍为车灯需求最高，供应商最多以及竞争最激烈的市场。

Global Front Lighting Components Volume Forecast



As of Oct. 2025
Source: S&P Global Mobility

Front Lighting Components Volume Forecast by Region



As of Oct. 2025
Source: S&P Global Mobility

S&P Global
Mobility

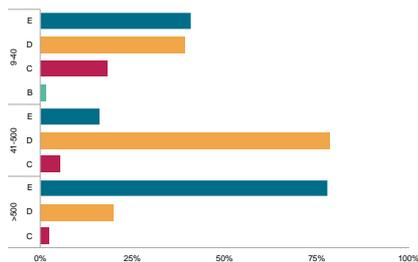
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The Chinese vehicular lighting market is highly competitive, leading the world in both demand and number of suppliers. The headlamp market is stabilizing, with greater China taking the lead in production volume. ADB technology is expected to grow at a compound annual growth rate (CAGR) of 9 per cent in China, achieving an estimated market prevalence of about 28 per cent by 2030. This figure may be lower than anticipated in the Chinese market, on account of complex traffic conditions and consumers' vague understanding of functional definitions. Therefore, compared to a standalone ADB function, high-pixel headlamps that combine both ADB and projection functions are expected to proliferate rapidly in the Chinese market. Against this backdrop, the demand for ADB in the Chinese market is more concentrated in mid-to-high-end vehicle models, primarily with a focus on high-pixel requirements. This contrasts with the European market, where demand is more evenly distributed across various vehicle models and different pixel counts.

ADB: 市场偏好对车型灯光定义的影响

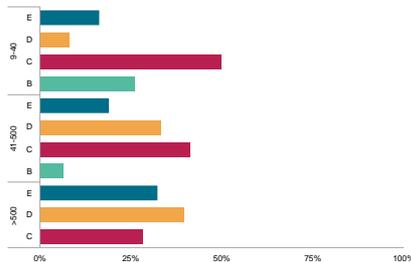
欧洲市场对于各像素ADB的功能配置需求较为平均，中国市场对于高像素ADB的需求更为集中。

ADB Pixel/ Segments (per Vehicle) in Vehicle Sales Segment China



As of Oct. 2025
Source: S&P Global Mobility

ADB Pixel/ Segments (per Vehicle) in Vehicle Sales Segment Europe



As of Oct. 2025
Source: S&P Global Mobility

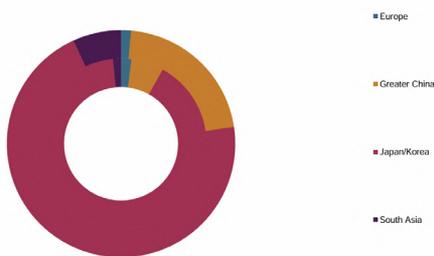
S&P Global
Mobility

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The application of projection headlamps shows divergence between the European and Chinese markets. Europe focuses on high-pixel ADB and road projection, while China places more emphasis on visible lighting, specifically road projection and entertainment projection during parking.

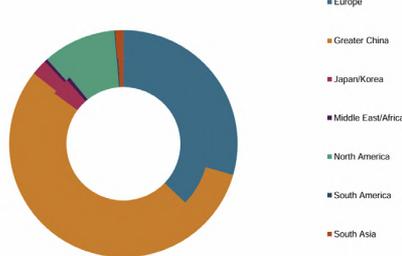
Signal projection modules are expected to grow in the Japanese and Korean markets, with the Chinese market gradually opening up due to the implementation of new regulations. Non-functional lighting is anticipated to achieve some growth, such as grille contour lighting, grille displays, and illuminated logos. However, due to the downward adjustment in global vehicle production and declining profitability, the market growth for non-functional vehicular lighting may be further suppressed by a reduction in overall vehicle budgets.

Signaling road projection forecast
Inner 2026/ Outer 2031



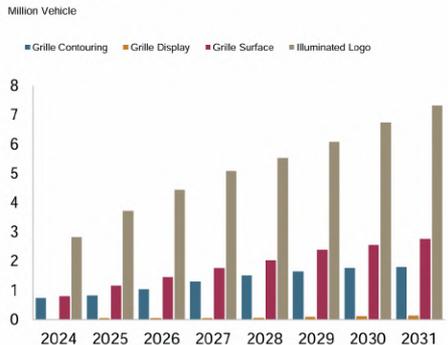
As of Oct. 2025
Source: S&P Global Mobility

Decoration road projection forecast
Inner 2026/ Outer 2031



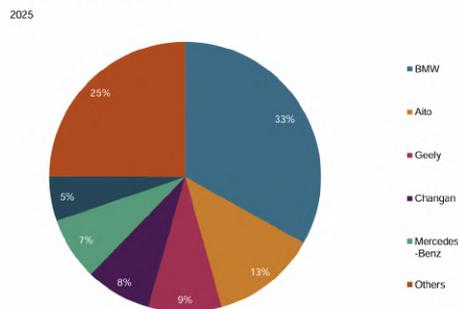
As of Oct. 2025
Source: S&P Global Mobility

Front Lighting Enhancement



As of Oct. 2025
Source: S&P Global Mobility

Top Brands Grille Illumination



As of Oct. 2025
Source: S&P Global Mobility

Session 1 - Interior lighting

Yanfeng (Christophe Pincemin, DGM Smart Interiors and Executive Director Smart Surfaces & Lighting):

Interior Lighting Next Trends and Innovations

With the evolution toward smart vehicles, the cabin is moving towards a 3rd living space with increasing use cases (different ADAS driving modes, living room, lounge, office, entertainment, camping mode...). This trend is currently mostly visible in China, but will extend to other regions with the rise of autonomous drive. These new use cases are generating new needs for cabin ambience, HMI, user communication, and interactions – which new lighting applications can support.



Creating a better lighting experience requires better electronic architecture: more centralized, less localized software; better data rates, and light orchestration. On the creative side, interior studio teams need to learn more about lighting and integrate it much earlier into the creation phase, incorporating technology in creative design. Early teamwork between studios and engineers is key!

Interior lighting design needs to be more use-case based and user-centric to create meaningful experiences combined with other modalities and functionalities of the car. To accelerate and curate lighting experience, Yanfeng have created a lighting tool chain to link lighting animation creative design with UI design and digital and physical prototypes.



Yanfeng Xim25 concept car

Yanfeng presented their latest concept car, the Xim25, designed for Chinese generation-Z users. It showcases 30 innovations and at least eight use cases. The lighting experience was created, designed and engineered by collaborating Yanfeng teams, and the vehicle won a Red Dot Concept Award in October 2025.

Forvia Hella (Wang Mengmeng, Interior Lighting Design Senior Supervisor):

Lighting the Cockpit of the Future: Forvia Hella Interior Lighting Innovative Solutions



This presentation showcased Hella's innovations in automotive interior lighting, as shown at the 2025 Auto Shanghai on a new Forvia demo vehicle called the Saphir. The demonstration comprised a comprehensive product portfolio including overhead consoles, ambient lighting, smart lights, and lighting electronics for interior lighting.

Six core innovative directions were highlighted, including the Cofi Leaf family, CoraLight, Incident Light, Premium by Light, and Sensing Roof Module. The Cofi surface backlighting system features lightweight design, homogeneous large-surface illumination, and reduced LED module count; an innovative optical system allows for richer dynamic effects and highly customizable lighting designs. Next-generation CoraLight, with a slim package under 15mm, supports parallel animations and integrates into vehicle warning systems. The Premium by Light series, offering tunable white light and a CRI better than 90, delivers immersive experiences through products like task lights and studio lights.

Emphasizing the shift from basic lighting functions to a 'life companion' role for car interiors, the presentation noted that lighting, when combined with sensing and HMI technologies, enhances safety warnings, personalization, and scenario adaptation. Forvia Hella aims to continue driving innovation to transform car cockpits into smarter, more comfortable, and user-centric mobile spaces.

Antolin (Sunny Mu, Interior Lighting & Electronics Engineering Manager): Antolin Intelligent Interior Lighting

Antolin presented their Lorem intelligent ambient light which goes behind fabrics, headliner, and the like. Their offer includes technologies visible by night and day, with luminance from 5 to 1,250 cd/m².



Thanks to smart RGB LED technology and additional sensors, UX is becoming more and more central with a lot of new possibilities.



Rebo (Pietro Postal, Director of Electronics):

Scalability of Interior Lighting Electronics

Rebo are a global tier-1 supplier renowned for their expertise in advanced interior lighting solutions. Increasingly, the line between interior and exterior lighting is increasingly blurred. Features and technologies once exclusive to the cabin are now shared across the entire vehicle, driven by evolving mobility trends and user expectations.



The first shared feature is safety. While autonomous driving is still in development, human drivers remain central. Interior lighting systems like head-up displays and warning indicators play a crucial role in communicating with drivers. Simultaneously, exterior lighting is evolving to interact with pedestrians and other road users through social displays and ground projections, enhancing overall safety.

Second, lighting is a powerful tool for brand identification. Inside the vehicle, illuminated emblems and ambient lighting reinforce brand presence. Outside, lighting extends beyond headlamps to define the vehicle's silhouette, turning the car body into a dynamic canvas of light.

Third, lighting contributes to customer experience and driving emotion. Interior ambient lighting offers customization in colour, animation, and music integration. Exterior lighting is following suit, becoming more automated and partially customizable.

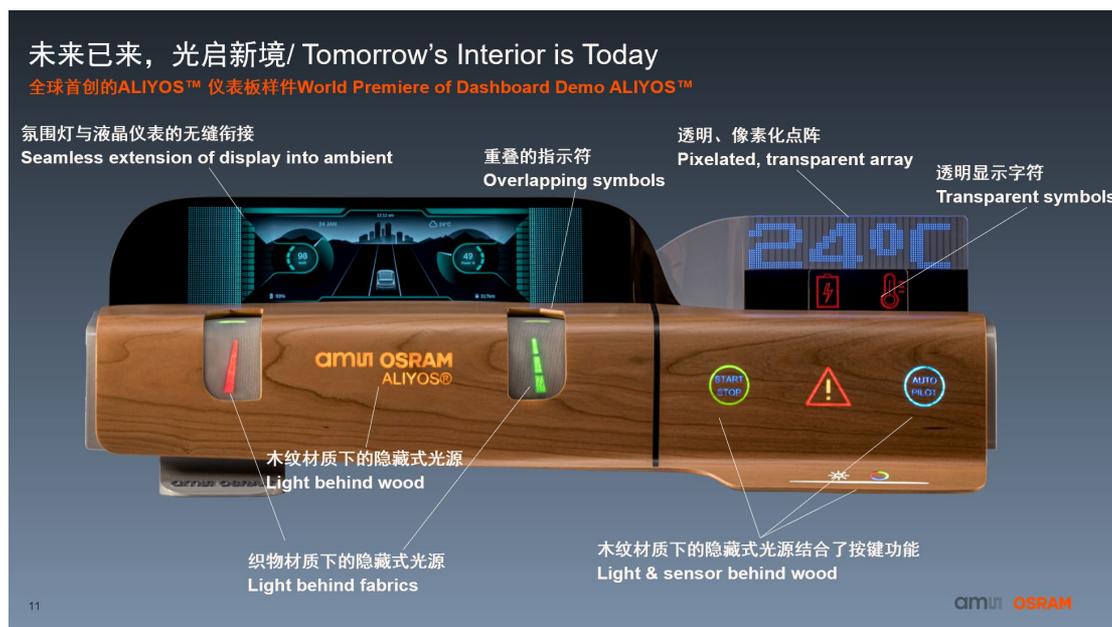
Technically, this convergence demands new electronic architectures. Traditional domain-centred systems are giving way to zonal architectures. Interior lighting benefits from scalable solutions like ISELED and Osram's OSP, while exterior systems adopt CAN-FD LED drivers and 10Base-T1S Ethernet, enabling seamless integration without microcontrollers.

The digital demands of exterior lighting, such as HD projections and interactive displays, now mirror those of interior systems. Both require expertise in pixellized LED driving, colour calibration, and functional safety, with ASIL-rated components increasingly present in both domains.

Overall, this convergence opens new opportunities for innovation, brand expression, and user-centric design.

AMS Osram (Kimi Chen, Director APAC Automotive Application Engineering): Tomorrow's Interior is Today - Solutions for the Next Level of Interior Lighting

With the acceleration of innovation and revolution of electric vehicles, automotive interior cabin design keeps reinventing itself. Next-generation cabins must fuse styling, functionality and system-level integration into a single, seamless experience. How to achieve those requirements and improve the user experience for interior design? AMS Osram answers with the open-source OSP protocol and latest film emitting technology, Aliyos.



The automotive cabin in the future is like a canvas. AMS Osram's new technology and product, OSP SmartRGB and Aliyos, provide unprecedented design option for Interior. OSP SmartRGB is already in series production. The open system protocol enables harmonized functions and unified architecture&protocol for customers. Aliyos technology can achieve super-thin and transparent applications.

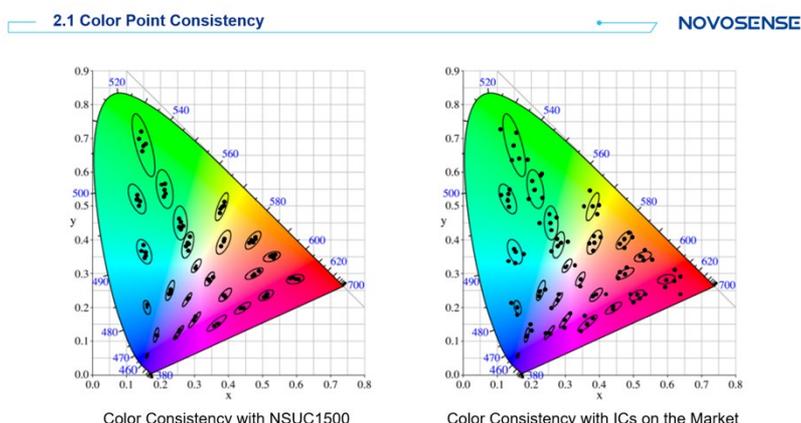


Novosense (Andreas Zhang, Marketing Director):

Novosense Empowers Automotive Lighting

This presentation focused on the evolution of automotive interior ambient lighting and the company's latest driver IC, the NSUC1500-Q1. As vehicles evolve from mechanical products to personalized digital spaces, ambient lighting has become an essential part of user experience and brand identity. The market for automotive interior lighting has expanded rapidly, with penetration expected to exceed 60 per cent by 2025, driven by trends toward smart, integrated, and customizable lighting systems.

From a technical standpoint, two critical aspects were highlighted: colour point consistency and luminous efficacy. Human eyes cannot detect differences within the MacAdam 3-step ellipse, and the NSUC1500 achieves this precision, ensuring smooth colour transitions and uniform lighting. Additionally, to address brightness imbalance among RGB channels, the NSUC1500 provides four LED driver channels, allowing extra red/blue compensation or white LED enhancement for improved light blending.



Key features include a 32-bit ARM Cortex-M3 core, 32KB Flash, four high-precision LED drivers up to 64mA, LIN communication support, and compliance with AEC-Q100 Grade 1 and CISPR-25 Class 5. The product reduces system cost with minimal external components while delivering superior EMC and algorithmic performance. In all, Novosense's NSUC1500-Q1 represents a step forward in intelligent, reliable, and efficient ambient lighting control, supporting automakers in creating more comfortable and personalized in-cabin experiences.

What does NSUC1500 Bring for Our Customers?

NOVOSENSE

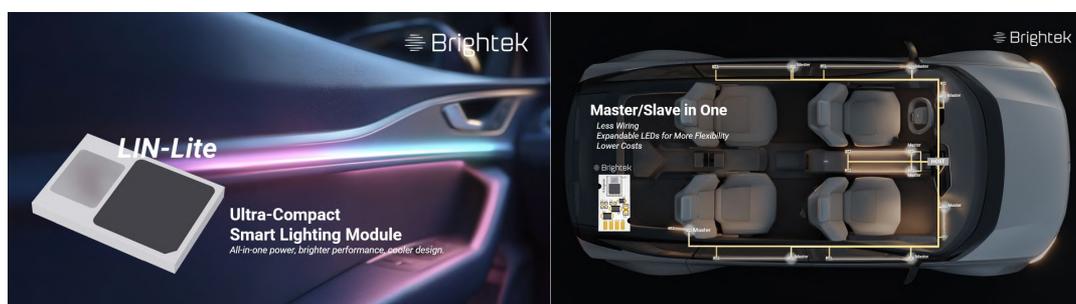
- 
Extreme BOM Solution for Ambient Lighting: Besides the ambient light IC, the peripheral circuit requires only 5 components on system level. The system cost savings are mainly associated to capacitors, LED driver, LIN transceiver, and LDO vs discrete solution.
- 
Chipset solutions optimize EMC performance. we offer a ambient lighting reference design which is optimized in terms of EMC and thermal behavior. The EMC measurements have been performed in an professional EMC chamber and are compliant with CISPR25 class 5. This application specific reference design shortens your design phase (e.g. chip selection).
- 
Market-proven Arm® Cortex® M3 core and family scalability: compared to the best System-on-Chip competitor solutions, we offer a scalable (memory, package) System-on-Chip family which is based on market-proven Arm® Cortex® M3 core and enables scalable platform designs and best price / performance ratio for ambient lighting.

Brightek (C.H. Tzeng, General Manager):

LIN-Lite Smart LED - Next-Gen Innovation for High-Efficiency Ambient Lighting

Brightek's LIN-Lite ICLED integrates intelligence, efficiency, and design flexibility into one compact solution. Unlike traditional multi-component setups, LIN-Lite combines a high-brightness RGB LED and a LIN driver IC within an ultra-compact 6.5 × 4.5 × 0.85 mm system-in-package (SiP). This integration minimizes PCB space and simplifies wiring, enabling sleeker, more efficient lighting architectures for modern vehicles.

With its ultra-bright output, LIN-Lite delivers up to 6 times the brightness of conventional single-LED solutions, bringing vibrant and immersive lighting experiences to the vehicle cabin. Its built-in RGB programming and tuning functions ensure precise colour control, meeting the D65 white light standard with excellent consistency (≤ 3 SDCM) and supporting 256 preset colours for dynamic customization.



Thermal efficiency is another key strength. The advanced package structure allows LIN-Lite to generate 50 per cent less heat while maintaining stable luminous performance. This makes it ideal for high-density lighting applications where reliability and long service life are critical.

On the communication side, LIN-Lite fully supports LIN 2.x and SAE J2602 protocols, enabling seamless integration with existing in-vehicle networks. Its master/slave functionality allows flexible control of multiple nodes on a single LIN bus, making it easy for automakers to scale out performance across diverse lighting zones.

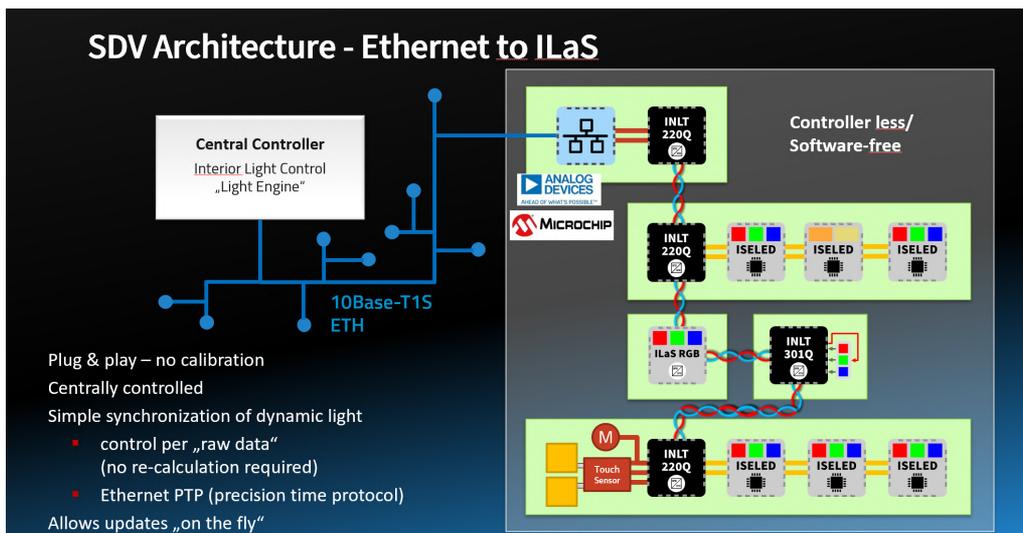
Each LIN-Lite ICLED is factory pre-calibrated with RGB data and fine-tuned through an integrated driver IC process. This pre-calibration shortens production time, reduces the cost of colour adjustment, and ensures long-term consistency and reliability.

All in all, LIN-Lite ICLED stands out for its unique features, competitive advantages, and its ability to simplify wiring and scale out performance while boosting manufacturing efficiency for automakers.

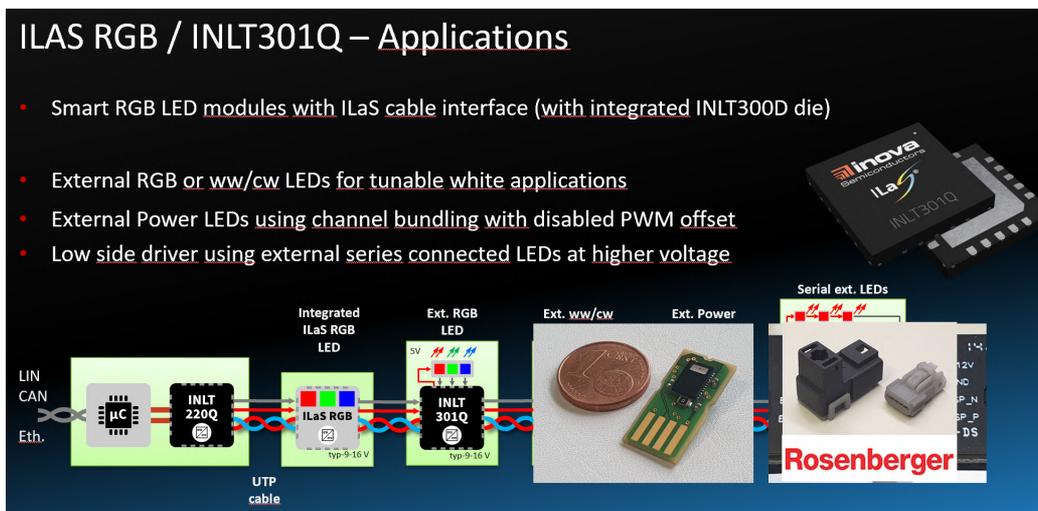
Inova (Bernhard Andretzky, Senior Technical Sales Manager):

ISELED: The Automotive Ambient Lighting Standard

Inova presented their Ethernet SDV-compatible backbone with microchip and analog-device solutions.



Interesting proposals were presented. with full LED modules including Rosenberger connector:



They also presented their new ISELED 2.0 LED driver family with 16 bit PWM, 3x12-bit colour control, and new licence with Lextar Ennostar.

Ennostar



Lumissil (Eben Qiu, Senior Application Manager):

Lumissil Dynamic Ambient Lighting Driver Chip

Eben presented their roadmap for Dynamic RGB application.

5V Multi-ch RGB Driver

5V Matrix RGB Driver

Smart RGB Controller

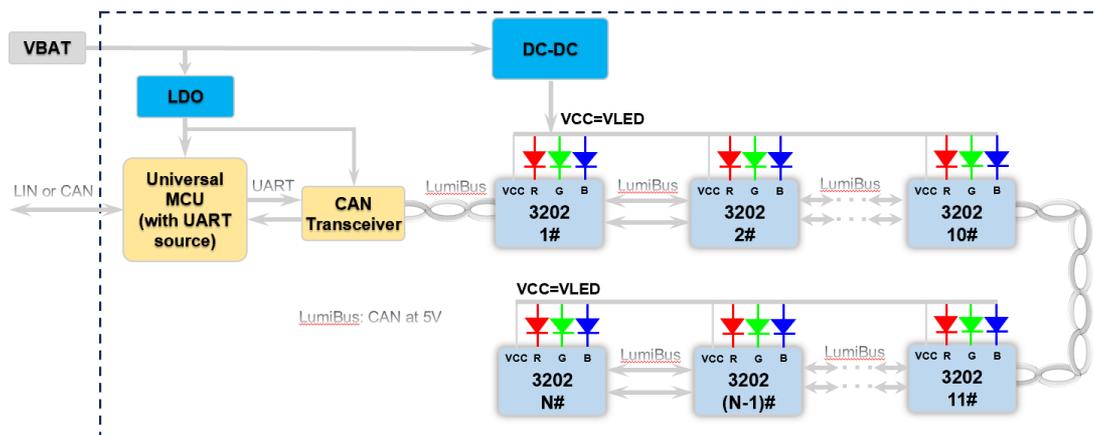
12V Matrix RGB Driver

LIN RGB Driver (4ch&18x2 Matrix)

To be able to simultaneously drive a lot of LEDs, they have implemented on different LEDs IC phase delay to reach 216 LEDs maximum with a unique LED IC (IIS32FL3776).

	Part Number	LED	Current max.	PWM dimming	Key Features	PKG
Multi-CHs Driver	IS32FL3207	18	38mA	16bit	Phase delay, Spread Spectrum, 62KHz PWM	WFQFN-28
	IS32FL3209	18	78mA	8bit	29KHz PWM	WFQFN-28/ eTSSOP-28
	IS32FL3238	18	78mA	16bit	Phase delay, spread spectrum, 62KHz PWM	eTSSOP28
	IS32FL3240	30	38mA	16bit	Phase delay, spread spectrum, 62KHz PWM	WFQFN-40
	IS32FL3236A	36	38mA	8bit	22KHz PWM	eTQFP-48
	IS32FL3237	36	38mA	16bit	Phase delay, Spread Spectrum, 62KHz PWM	eTQFP-48
	IS32FL3265A/B	18	60mA	8bit	IIC/SPI, Phase delay, Spread Spectrum	eTSSOP28
	IS32FL3250	30	50mA	10+8bit	Phase delay, noise reduction	WFQFN-40
	IS32FL3246A	36	50mA	10+8bit	Phase delay, noise reduction	WFQFN-44

They have also developed solutions with Smart RGB controllers with Lumibus protocol (CAN physical layer on Uart protocol).



Indiemicro (Kris Li, Senior Product Director):

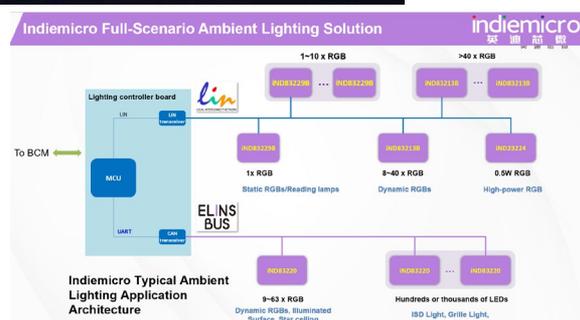
Chip Innovation Amid New Trends in Automotive Ambient Lighting

Indiemicro have shipped over 350 million automotive ICs, leading the global ambient lighting driver market in terms of market share.



In response to the three major new trends in automotive ambient lighting – OTA updates, complex display effects, and high brightness – Indiemicro have launched a series of chips: the iND83229B and iND83213BCS01 are equipped with 128KB Flash, with storage capacity 4 times that of traditional ambient lighting drivers, supporting secure OTA and firmware rollback; the former is a single RGB LED driver SoC, while the latter can drive 40 RGB LEDs with a single chip.

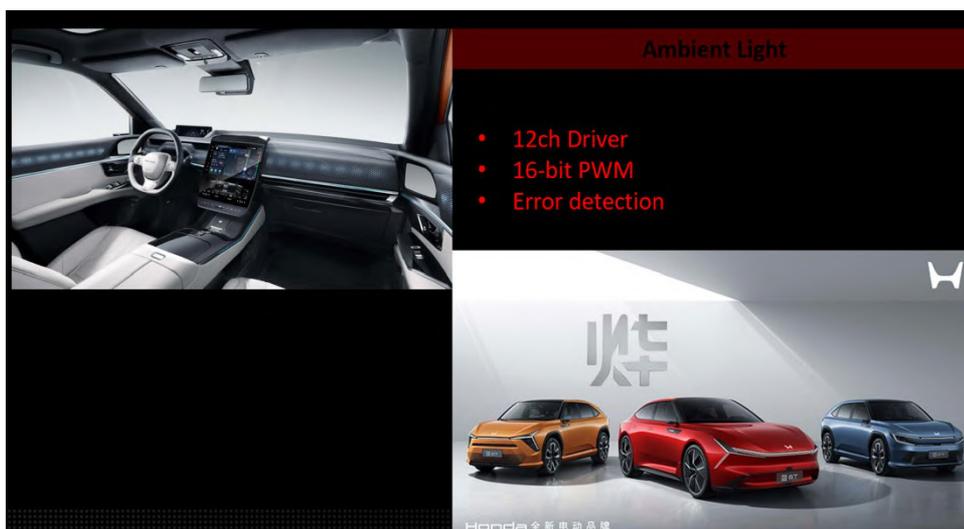
Indiemicro provide a full-scenario ambient lighting solution covering static RGB, dynamic RGB, and high-power RGB, which adapts to different LED applications through LIN/CAN buses, helping automakers quickly implement high-end ambient lighting functions and providing core support for the intelligent upgrading of vehicular lighting.



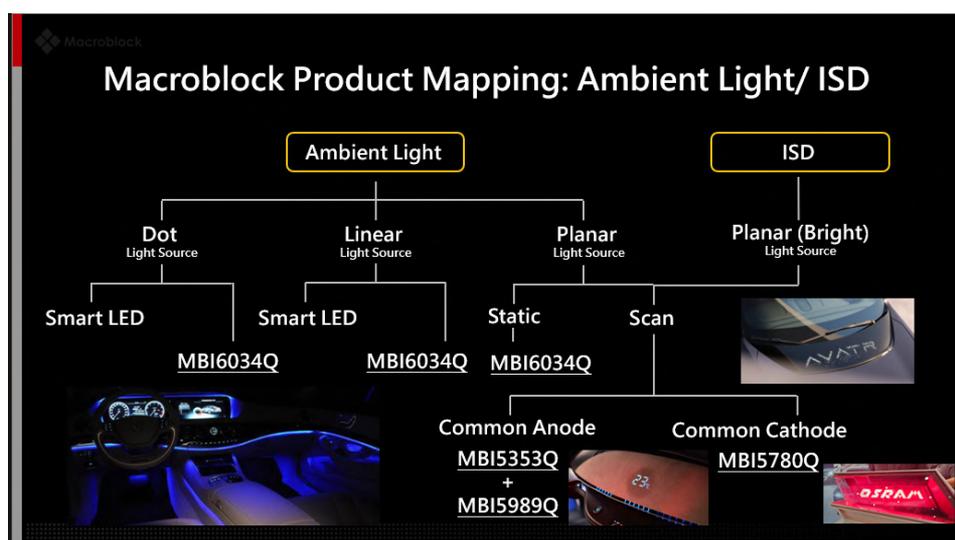
Macroblock (Steve Ho, Special Assistant to the General Manager):

Smart Cockpit Ambient Lighting: From Single Colour to Dynamic Multizone Dimming

Macroblock's ambient lighting LED driver ICs have successfully entered the supply chains of major international manufacturers. Ho explained that conventional ambient lighting conveys information through colour, but dynamic ambient lighting has more flexible application potential. Through intelligent control of dynamic effects, light colour, brightness, and response speed, dynamic ambient lighting can create an atmosphere for vehicles, convey messages, display warnings, and effectively showcase the car brand and whatever other information might be wished.



Ho emphasized that visualization is a key indicator for the development of ambient lighting. Besides meeting the personalized designs of car manufacturers, it also needs to possess human-machine interaction, diverse functions, and safety warning capabilities.



AMS Osram (Lufei Shen, Product Manager):

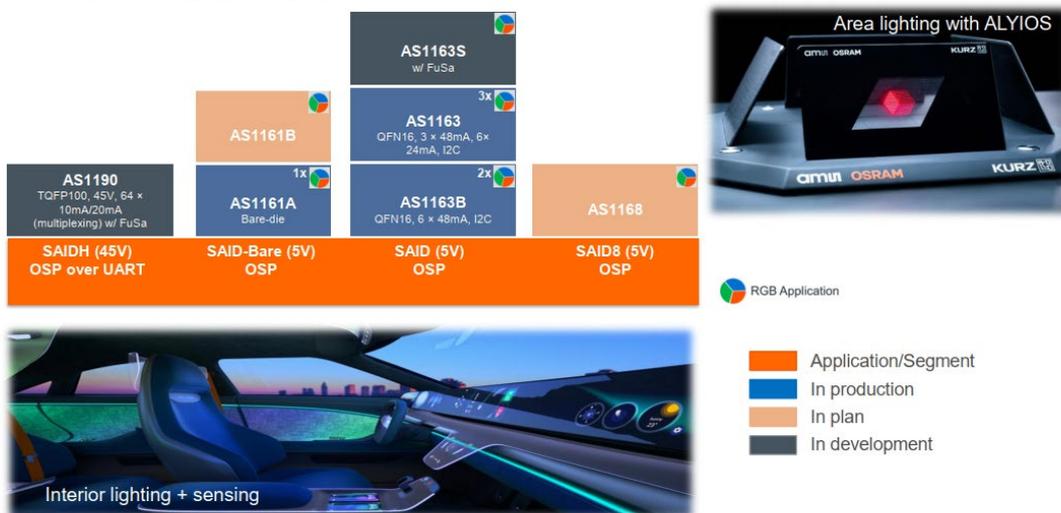
Emerging Trends in Automotive Electronics and Lighting Solutions

The motive of AMS Osram on innovative LED drivers is to help customers achieve beautiful designs. The new E/E achitecture in software-defined vehicles was summarized: Ethernet dominance, no local MCUs, more and more local intelligence. All of these trends request a standardized, low cost, performant local bus. The new light application trends in interior and exterior – new features like long light stripes, sensor integration – all request cost-effective solutions.

AMS Osram have provided an open and free system protocol to meet these demands. The OSP ecosystem is getting bigger and bigger. and the ISO standadization of OSP is being actively driven by AMS Osram, who are working on many new innovative LED drivers based on OSP such as AS1163 (optimized for narrow light stripes and sensor integration) and AS1190 (best solution for Aliyos or other segmented mini-LED arrays).

SAID Standalone Intelligent Driver Family

Product Portfolio & Roadmap (Automotive)



10 Copyright@ams OSRAM

Note: OSP based SBC (system base chip) is coming.

ams OSRAM

Session 2: Automotive Lighting EE and SDVs

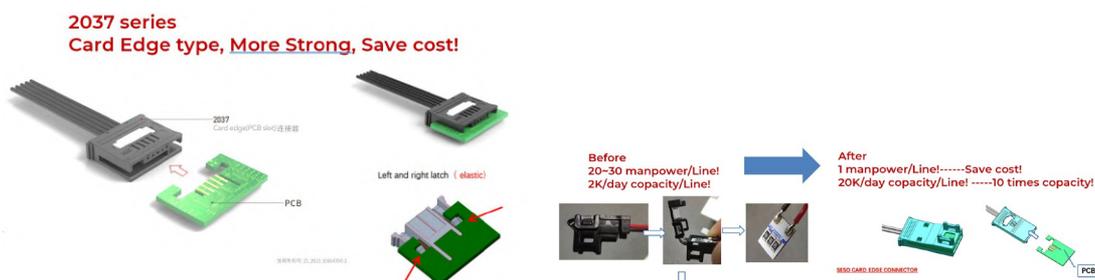
Seso (Brian Tai, CMO):

Innovative ideas for vehicle lighting connectivity solutions

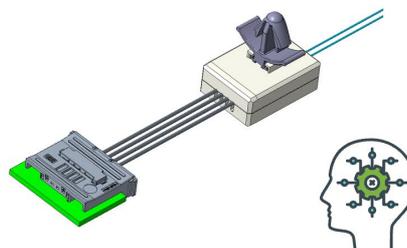
Seso are a connector company based in Dongguan, established in 2008, with 820 employees. They provide components for most Chinese lighting suppliers.



They have developed interesting solutions to reduce cost and simplify innovation, such as optical fibre integration.



Flexible electro-luminescent fiber connector solution



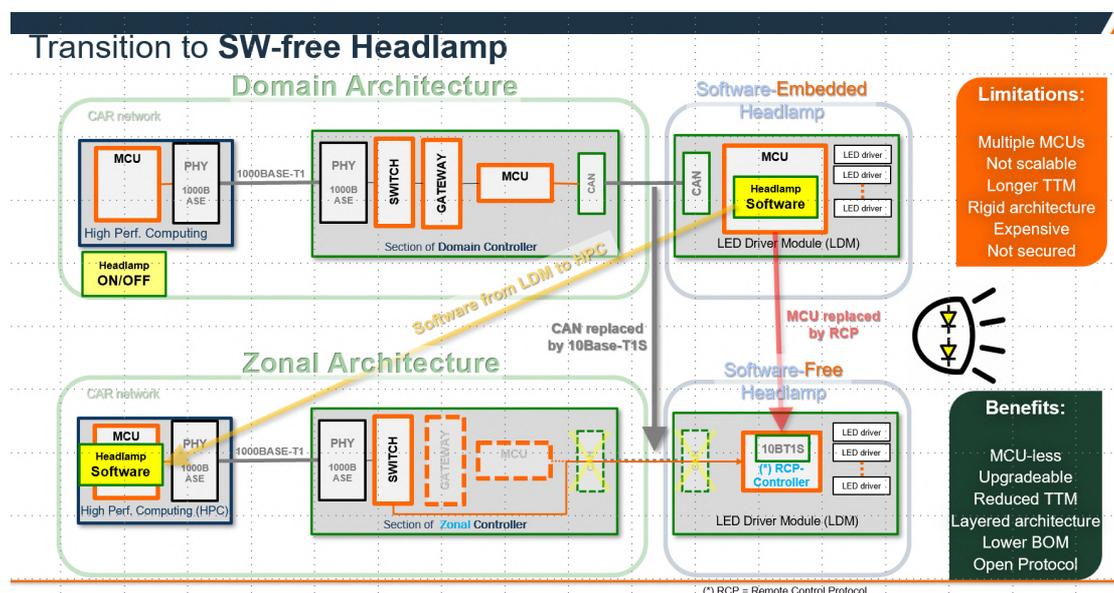
New idea for Automatic assembly connector solution!

Onsemi (Qing Zhang, System Architect, BD & Regional Marketing, AMG):

Preparing Automotive Headlamps for the Era of Software-Defined Vehicles

As the automotive industry embraces software-defined vehicles, headlamp systems – critical to both safety and user experience – must also evolve to align with next-generation E/E architectures, transitioning from traditional domain architectures to more flexible and efficient zonal architectures.

Traditional vehicular lighting relies on a distributed "ECU–CAN bus–MCU–LED driver" architecture, where each lamp node requires its own dedicated MCU and supporting circuitry. This approach suffers from multiple MCUs, limited scalability, long time-to-market (TTM), rigid architecture, high costs, and inadequate security.



To address these challenges, Onsemi have developed an MCU-less headlamp solution centred on 10BASE-T1S Ethernet communication. The key innovation lies in replacing the legacy CAN bus with Ethernet and substituting the traditional lamp-side MCU with an RCP (remote communication protocol) chip. This design significantly reduces system cost and complexity while accelerating time-to-market. Moreover, its centralized software architecture aligns with the principles of software-defined vehicles, creating ample room for future OTA updates and feature enhancements.

Onsemi's lighting solutions (HPC) are already deployed in the Volkswagen Tiguan headlamps and Golf rear lamps.

Novosense (Jack Deng, Product Application Manager)

Empowering the Future of Intelligent Automotive Lighting with Novosense Innovative Solutions

As vehicular lighting becomes increasingly intelligent and integrated, LED driver ICs are expected to deliver higher performance, smarter control, and greater design flexibility. Building on deep expertise, robust IP, and continuous innovation, Novosense offers a portfolio of automotive LED driver solutions for taillights, headlamps, and ISD applications.

With advanced technologies such as thermal-sharing, boost + constant-current + matrix solutions, and high-speed multi-channel digital control, Novosense help customers design lighting systems that are more efficient, adaptive, and competitive.



Novosense's linear LED drivers offer 1/3/12/16/24-channel options for conventional and dynamic taillights and illuminated grilles. Newly-launched high-integration ambient-lighting drivers enable more efficient and flexible illumination designs for smart cabins.

The company's switching LED driver range supports headlamp two-stage architectures, including pre-boost, constant-current, and matrix control solutions – a high-reliability, high-precision one-stop headlamping platform.

Infineon (Xing Su, Principle Field Application Engineer):

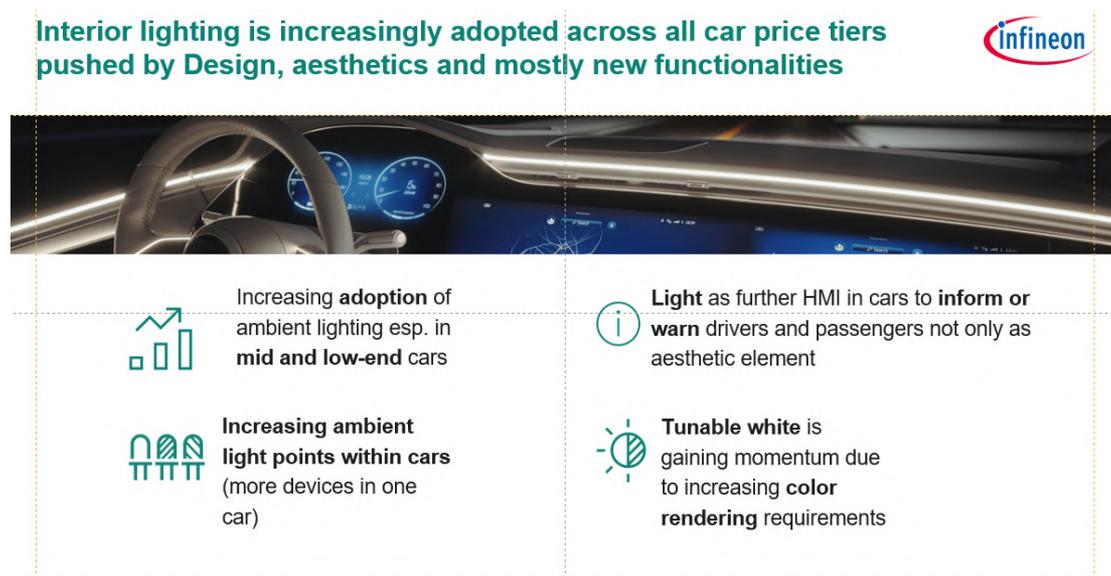
Lighting the Future: GaN Technology for Automotive Front Lighting, and the Emerging Role of Ambient Interior Lighting

GaN is a key enabler for next-generation automotive front lighting, delivering higher efficiency, tighter control, and more compact systems. In SEPIC LED drivers, GaN achieves a measured efficiency gain of 5 to 13 per cent over silicon, and reduces conversion losses by 27 to 56 per cent, with the greatest benefits at low battery voltages and higher LED counts.

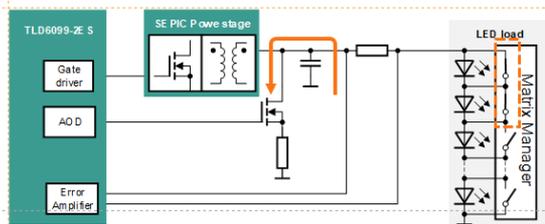
The TLD6099-2ES, a 2.2-MHz multi-topology DC-DC controller optimized for GaN, enables fast output discharge for ADB. It features dual independent channels, multiphase capability, spread spectrum modulation, and an output range of 1.5 to 70 V with 3.5 per cent accuracy in a compact PG-TSDSO-24 package. In matrix manager testing, the SEPIC solution suppressed current overshoot from 1.864 A to 1.144 A, enabling precise anti-glare ADB transitions. While dual-stage architectures dominate premium platforms, the TLD6099-2ES is positioned for volume cars, supporting up to six channels for DRL, high beam, low beam, matrix, and turn indicator functions.

For interior lighting, Infineon's LITIX Interior platform accelerates development by combining hardware with a production-oriented software stack. The TLD4020-3ET delivers high colour accuracy with an integrated MCU and LIN interface in a miniature leaded package, suited for dense, distributed nodes. The software solution includes ROM firmware, a peripheral driver library, middleware, a LIN stack with auto addressing, and a colour mixing library, with toolchain support for streamlined integration.

Together, these solutions enhance efficiency, stability, and scalability for both front and interior lighting, enabling safer and more functional automotive illumination.

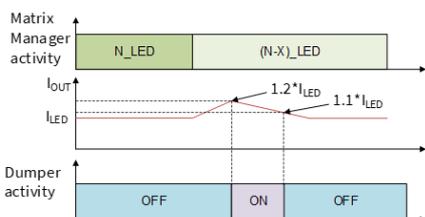


TLD6099-2ES controls a dedicated NMOS dumper to discharge the output capacitor avoiding current spikes at load side

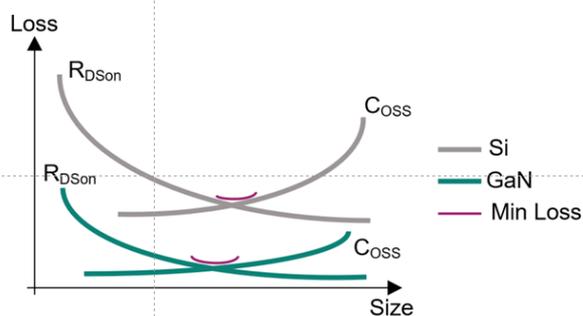
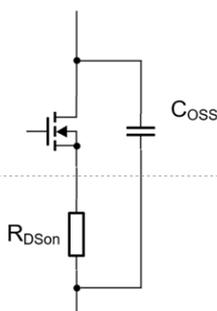


Behavior

- **SEPIC power stage** is designed to achieve the maximum output power (all the LED switched on at maximum output current)
- If the output current spike is higher than the internal threshold ($120\% \cdot I_{LED}$) the device triggers the **dumper network** to discharge the output capacitor
- The dumper discharges the output capacitor until the output current goes below an internal threshold ($110\% \cdot I_{LED}$)
- TLD6099-2ES also discharges the compensation network according the new output voltage (**no further uC assistance needed**)



The advantages in graphics

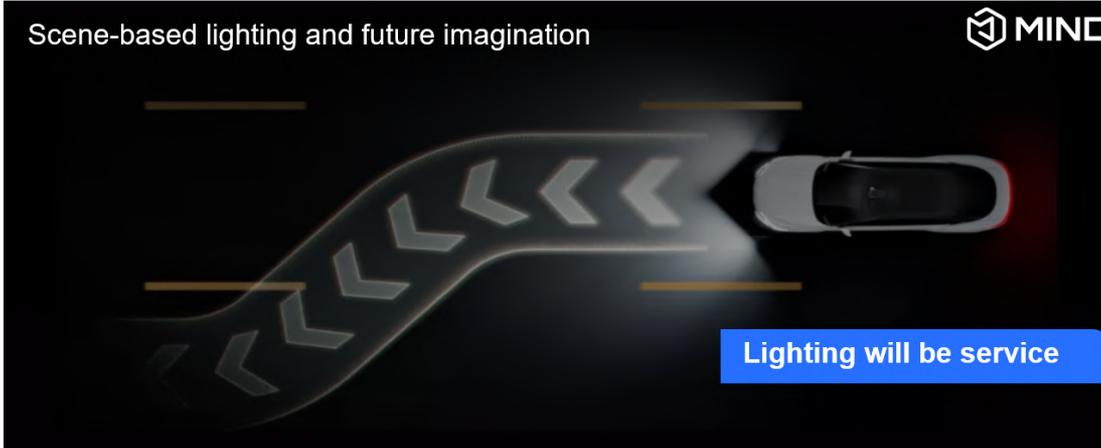


Mind (Yu Shijie, Director of Electronics):

Lighting Electronics Architecture Trends In The Era of SDV

MIND

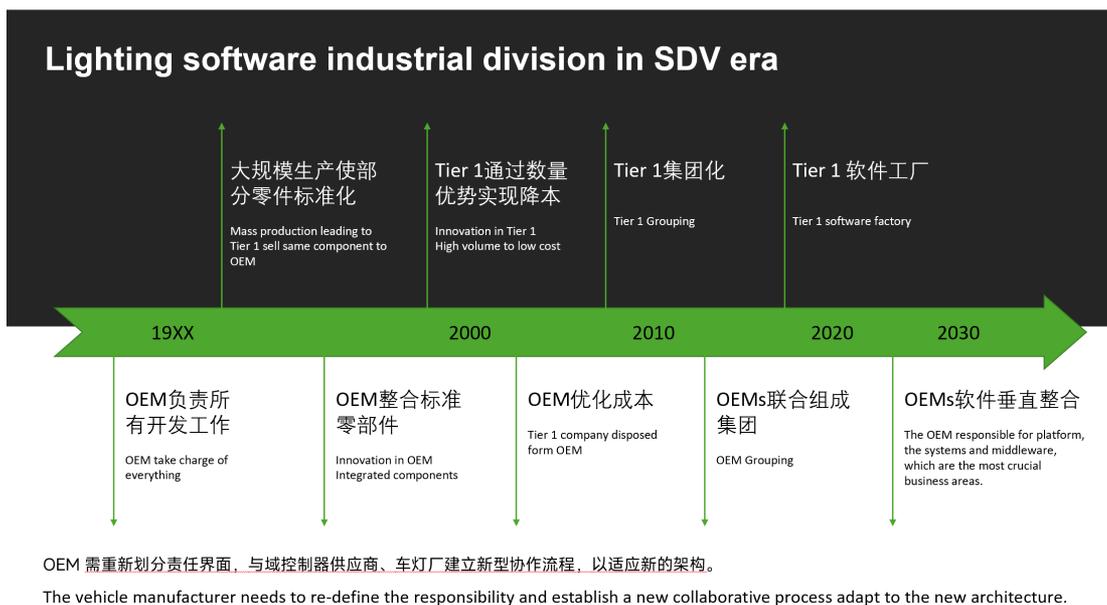
Scene-based lighting and future imagination



Lighting will be service

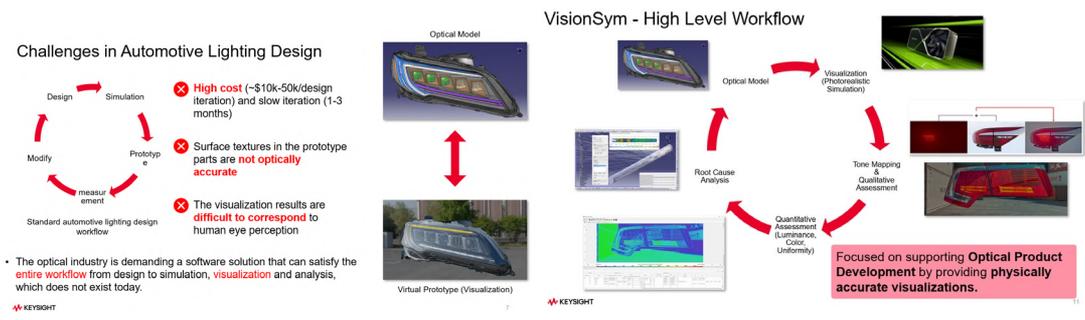
The business of "light as a service" has a vast potential. For instance, dynamic ground projection displays the remaining power percentage, advanced ADB precisely blocks oncoming vehicles, the brand signature enables users to pay to download festival light shows, and the interior ambient lights are linked with the audio system, air conditioning, and driving mode to create an immersive experience.

This presentation outlined an exciting evolution in lighting electronics architecture, shifting from traditional separate ECUs to a more integrated zonal ECU model. Mind are dedicated to advancing future LDC development, and are highlighting innovative concepts like scene-based lighting, viewing lighting as a service. This approach opens up new possibilities for enhancing user experiences.

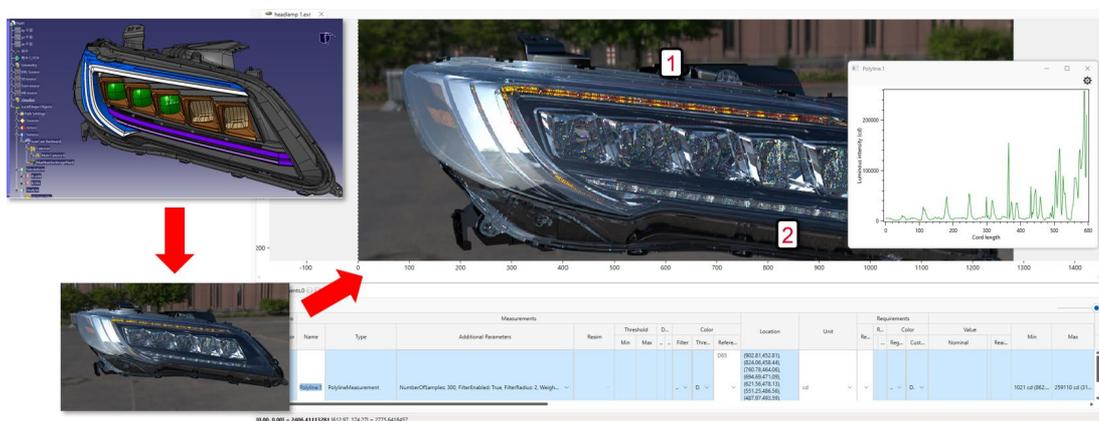


Keysight (Shen Hang, Senior Application Engineer): Reshape Automotive Lighting Visualization to Boost Simulation Design

This lecture mentioned the slow speed and high cost of iteration: 1 to 3 months and USD \$10K to \$50K for each loop.



Keysight's VisionSym can be integrated into optical development tools. It includes simulation based on light sources and materials, supported by Nvidia GPU, with quantitative assessment of luminance and colour. Examples were presented, of Honda's Acura ILX headlamp & rear lamp:



1. Rear lens
2. Position lens
3. Side lens
4. Trunk lens



Session 3 – Exterior lighting design

Chery QQ (Liu Yujie, Styling Engineering Manager):

QQ5 Concept Car Lamp Technology Sharing – Design & Engineering Integration From Concept to Mass Production



The Chery QQ family is a series of compact city cars. The lighting design of the Chery QQ5 concept car represents a successful journey from forward-looking concept to engineering reality. Its core, the Aurora Link Lighting System, deeply integrates the inspiration of the natural aurora with intelligent sensor technology, transforming car lights from mere functional components into 'light that tells a story'.

It has a minimalist, integrated front and rear lamp design. A black graphic element and geometric segmentation create a 'seamless and continuous' visual aesthetic. Technologically, it innovatively embeds sensors like autonomous driving cameras and lidar within the lamps, using a pixelated design. Dynamic light effects, such as blue-white breathing and amber pulses, visualize the operational status of these sensors, turning invisible data into a legible 'narrative of light'.

This was made possible by early collaboration between styling and engineering, realizing a symbiotic relationship between technology and aesthetics. Awarded the Red Dot Design Concept Award, the QQ5 enhances the vehicle's design quality and breaks the brand's conventional image. It signals Chery's evolution from pragmatism towards a 'poetic expression of technology', showcasing the boundary-breaking innovation of Chinese design to the world.



Geely (Jiacai Xu, Head of Exterior):

Geely's Innovation in Automotive Lighting



As the function of vehicle lighting evolves beyond basic utility and aesthetic appeal toward a synthesis of intelligence, elegance, and emotional resonance, serving simultaneously as a 'dialogue medium within the human/vehicle/environment ecosystem' and an 'emotional expression interface' for the vehicle, Geely have redefined their lighting development framework. This redefinition is anchored in the core principles of customer-centricity, strategy-oriented guidance, and fundamental innovation as the driving force.

The innovation methodology is structured around three core dimensions. First, a user-centric approach that transforms customer insights into Geely's benchmarks of innovative foresight, aesthetics, functionality, and quality. Second, the integration of a design philosophy described as 'distinctly Chinese, yet non-traditional and inherently joyful', which translates cultural motifs such as the 'ripple of light' into engineering reality through a systematic process of cultural inspiration, technological realization, and design refinement. Third, positioning lighting as both the vanguard of exterior styling technology and a pivotal platform for the brand's intelligent technology integration.

Geely are advancing intelligent lighting through a tiered deployment strategy, focusing on four key application domains: basic safety, practical enhancement, smart interaction, and full-scenario intelligence. This progress is driven

by a combination of in-house R&D and strategic partnerships, underpinned by emerging technologies such as large language models that enable personalization and interactive experiences. Internally, Geely have upgraded their development framework with advanced tools and specialized talent. Externally, they have established a triangular collaborative model in which Geely define demand, lighting manufacturers concentrate on hardware, and technology companies empower software. This model is progressively dismantling traditional collaboration boundaries, fostering the emergence of a multi-party symbiotic ecosystem. Case studies, including the Galaxy M9's "Starry Ripple" front lighting, pixel-style rear lamps, and the Galaxy A7's front light development, exemplify the seamless integration of user insights, light-language aesthetics, and technological innovation in real-world applications.

Hasco Vision (Yang Fan, Creative Styling Designer):

Freely Combined Micro-Lens Headlamps - Innovative Integration of Styling and Full-Scenario Application

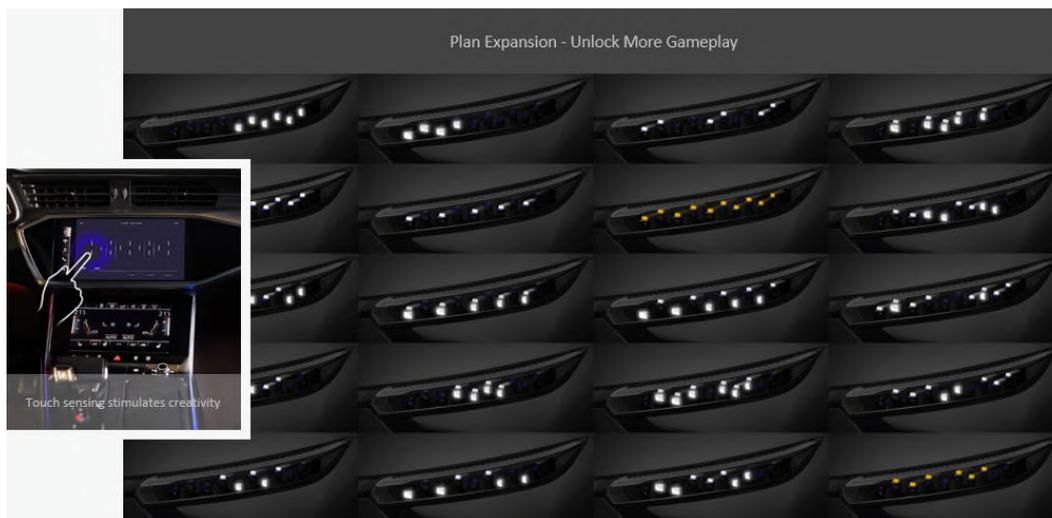
This presentation described Hasco's freeform microlens headlamps as an innovative integration of technological aesthetics and diverse scenarios. Yang Fan said for styling, they discarded the split headlamp design with narrow eyes and returned to an integrated design. By combining four intelligent high-beam units and six adaptive low-beam units, they achieved precise intelligent adaptive lighting distribution. They innovatively integrated three functional modules – daytime running lights, position lights, and dynamic turn signals – creating a visually more cohesive and harmonious appearance. Beyond the main-light-free creative design, the modules were miniaturized in detail, with each module protruding 10 mm. Blue metallic strips were added between the modules and the signal lights, enhancing the overall sense of layering and the detail quality of the design.



Yang described Hasco's proposed solutions for users' driving pain points. For example, the car-finding mode: activating this function makes the vehicle's lights flash and the horn sound, which can help the user locate the car. When the battery is low, the lights can also provide an intuitive indication of power consumption and charging status. There are also reminders for children and pets left behind; if the vehicle is locked and the interior cameras detect a child or pet inside, the lights immediately trigger an alert to notify the user. During nighttime camping trips, users can adjust the lights to different intensities to assist with pitching a tent, preparing dinner, or engaging in recreational activities.

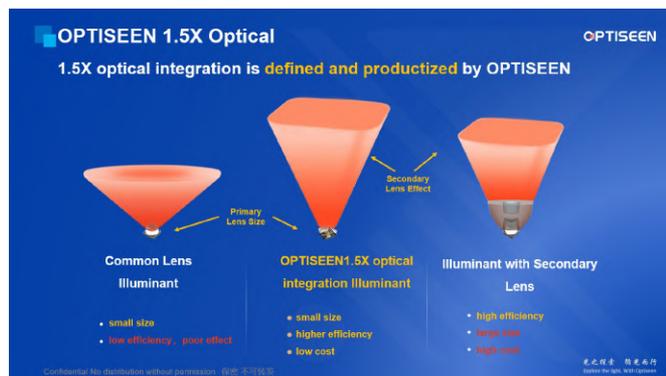
scene category	diagram	lighting effect
car-finding mode		
Charging Feedback/Power Consumption Prompt		
Child and pet reminder		
Camping Nighttime Auxiliary Lighting		

Building on the design of this freely combinable micro-lens headlamp, Hasco have carried out deeper innovations and expansions, evolving the car lights into a creative interactive platform that gives users the initiative in designing the lighting. By sliding their fingers, users can design and display the lighting patterns they want in real time, and this interaction greatly enhances their sense of engagement.



Optiseen:

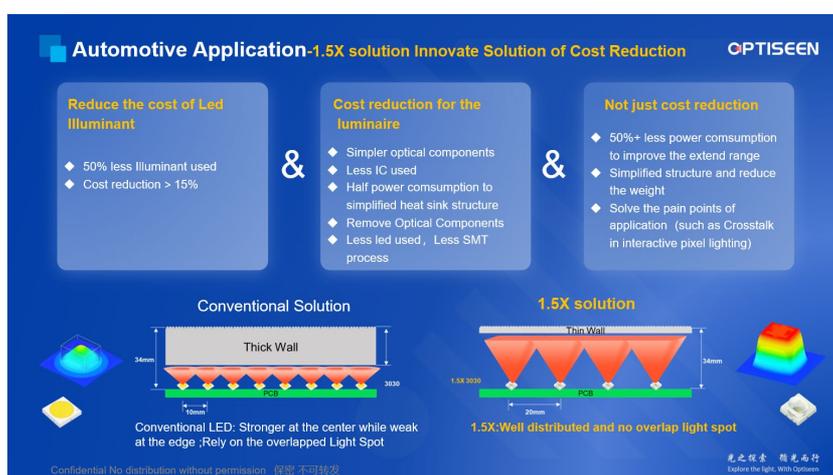
1.5X Optical Integrated Light Source: Innovative & Cost-Effective Approach for Automotive Lighting

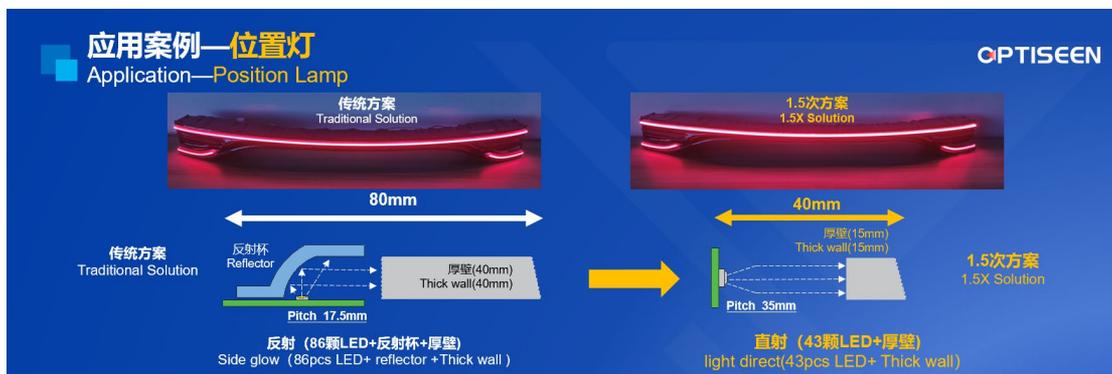


Optiseen's 1.5X optical integration technology integrates the optical system onto the light source, realizing a component-level optical solution for the first time in the industry. It features small size, high optical efficiency, and low cost, while combining the advantages of both common lens and secondary optical lens.

This technology can control the light beam distribution through its built-in optical system, achieving a more uniform and accurate illumination effect. To achieve the same effect, the 1.5X optically integrated light source can significantly reduce the number of light sources used by approximately 30 per cent, and cut the light source cost by more than 15 per cent. By simplifying the lamp structure and reducing optical parts, it helps customers achieve substantial system-level cost reduction. The optically-integrated light source also offers innovative values such as reducing the weight of automotive lamps, lowering power consumption, and providing more design space for the lamps.

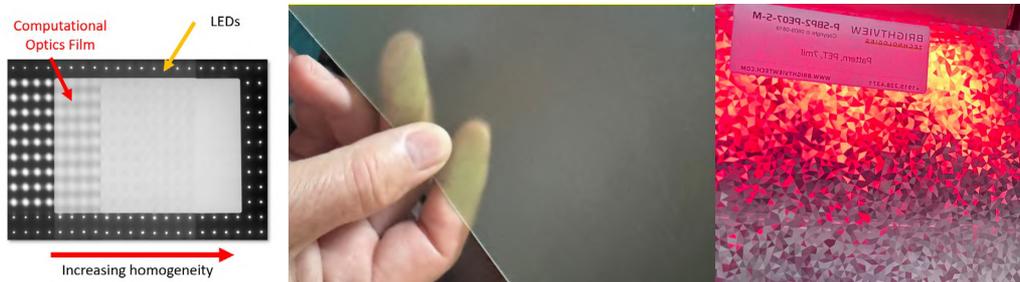
In automotive interior and exterior lighting as well as optical sensors, Optiseen products are compatible with a wide range of scenarios and possess significant advantages. This provides customers with new ideas and options for application innovation and technical cost reduction.





BrightView Technologies (Michael Murphy, Chief Commercial Officer):
Advanced Automotive Lighting Through Computational Optics

BrightView Technologies presented their computational optics films technology, which can easily create multiple designs. They can define the design pattern stylists want to have. This technology is applied in Forvia Hella's Flat light product range.



Market Launch of FlatLight Technology as Daytime Running Light

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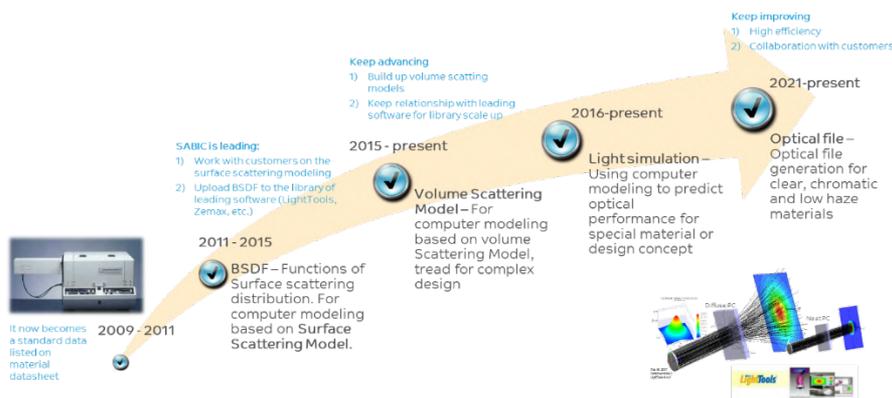
07th October 2025



- Innovative concept from FORVIA HELLA takes signal lighting for vehicle fronts to a new level in a cost-efficient manner
- Reduction of installation space to a total depth of just five millimeters and multi-color combinations offer maximum design freedom
- 40 percent more energy-efficient and 80 percent lighter than conventional systems on the market
- Technology was initially developed for rear applications and has been successfully in series production since 2024

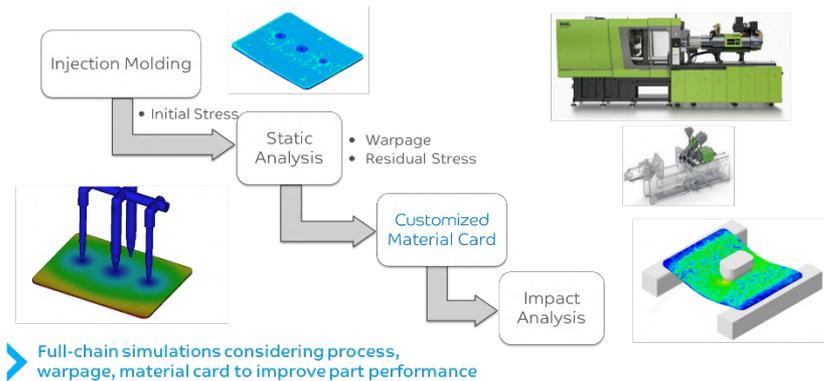
**Sabic (Dongli Hu, Lead Analytical Scientist & Alex Wang, Lead PE&D Scientist):
Mobility & Energy Simulation Capabilities Excellence Empower Lighting Innovation**

The presentation highlighted Sabic's internal simulation capabilities in optical file generation and predictive engineering, empowering lighting innovation through excellence simulation capabilities.



Sabic optical competency roadmap

As the result of over a decade of continuous investment and evolution, Sabic's optical competency roadmap covers basic optical performance evaluation, key parameter D.L.D, functions of surface scattering distribution, volume scattering model, as well as optical file generation in various formats. This specialized expertise helps customers achieve more innovative and aesthetically compelling optical designs and lighting solutions within shorter development cycles.



For better support of design for manufacturing and performance, Sabic's PE&D team developed the Full-Chain Simulation process. By considering upstream processing effects such as residual stress and warpage, they achieve good correlation results during the mechanical performance simulation and tests. Sabic's Simulation Portal is developed to maintain high-quality material engineering data, which is free for Sabic customers.

Sabic Full-Chain Simulation

Huaju (Jia Zhenqing, Vice President & Project Director):

The Application and Case of Artificial Crystal Materials in Automobiles



Volvo XC90

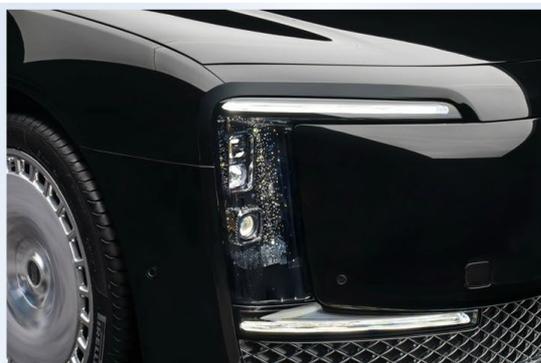


BMW 7 Series



MAEXTRO S800

Huaju estimates the synthetic glass crystal market for automotive interiors at around USD \$500m to \$700m in 2024, with a forecast in 2030 around \$1.2bn. Prevalence rate for mainstream luxury brand will evolve from 30-40 per cent to 70-80 per cent in 2030, and in China Specifically it will evolve from 40-45 per cent to 50 per cent (China being the first market for such crystal).



Nissha (Zou Mengjia):

Lumistyle by Nissha · Innovative Lighting Pattern Design

Films are coming in the automotive industries for various applications in exterior and interior body and lighting.

Exterior

2020 TOYOTA MIRAI(Heater film)



2023 Polestar 3(Printed body color + Heater film)



2024 GMC Yukon Denali(Decorative inner lens)



Smart Interior

2024 TOYOTA Camry(Hidden graphic)



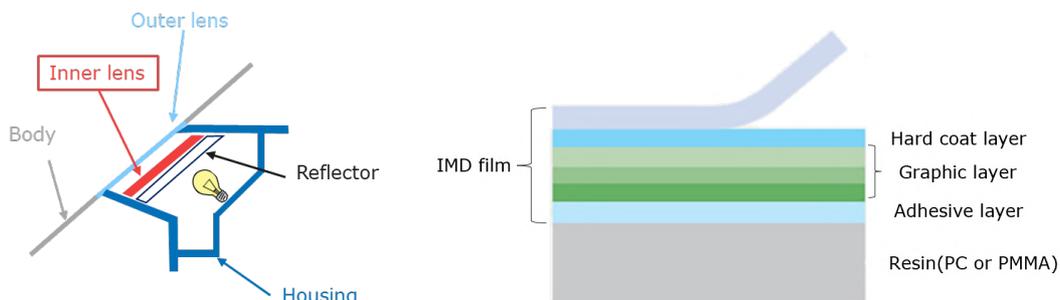
2024 BMW X5/X6/X7(lightning trim)



2025 GWM Gao Shan (lighting trim)



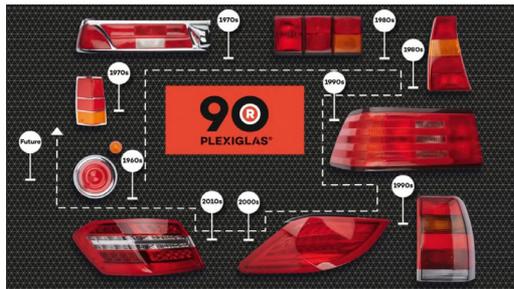
Nissha presented their Lumistyle with IMD technology:



Röhm (Zhong Shen, Head of Technology):

Lighting the Future: How Plexiglas PMMA Transforms Automotive Design with Style and Performance

PLEXIGLAS® Originalby Röhm: an inspirational brand for 90 years.



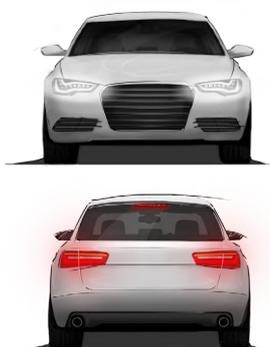
Plexiglas, the brand of polymethyl methacrylate (PMMA) from Röhm, has been an inspiration since its very first application, and is the material of choice for creative designs and innovative projects thanks to its versatile properties and intelligent functions.

The automotive industry has been using Plexiglas molding compounds since the 1950s, when they replaced glass for small round taillight covers. Today, Plexiglas molding compounds enable the manufacture of large taillights and striking light guides for unique signature lights that make it easy to recognize a vehicle brand even from a large distance.

Röhm offer a complete portfolio of PMMA molding compounds under the Plexiglas brand, with properties tailored to the highly specialized technical requirements and design trends of the automotive industry: highly transparent compounds for dashboard covers, varieties with special light-guiding and light-scattering properties, glossy-black compounds for class-A surfaces, as well as special molding compounds with an increased heat deflection temperature or impact resistance.

Because PMMA is initially completely colourless, it can be coloured accurately in all standardized signal colours. Röhm offer a variety of special colours. These include further colours for signal applications and lighting engineering, as well as variants with a good covering power for coextrusion.

The colourings listed by AMECA (the Automotive Manufacturers Equipment Compliance Agency in the USA) are available for signal equipment in vehicles. These meet the requirements of SAE J576.



Seeing and being seen

- PLEXIGLAS® is the ideal material for displaying light. Not only the light source is important, but also the signal effect produced by light guides, lenses and light covers.
- Rear, brake and indicator lights– UV and weather resistant covers and light guides for taillights and turn signal indicators.
- Headlamps: Modern LED and advancing MatrixLED technology combined with intelligent sensors and sophisticated optical lens systems set standards in the field of headlamps with PLEXIGLAS® and PLEXIMID®

Advantages:

- Excellent UV and weather resistant
- High color fastness and design freedom
- Outstanding optical clarity, transparency and light guide ability
- Chemical-resistance and higher heat deflection temperature

Mind (Dai Jie, Styling Director):

Research On The Styling Trends In The Era of Intelligent Driving – From Regulation to Design

2025年04月上海车展
Shanghai Auto Show 2025



GAC M8
LI auto MEGA

ADS灯提升了车的科技感，成为重要的营销卖点。
The ADS light enhances the vehicle's technological sophistication, serving as a key marketing selling point

比亚迪新车标配后视镜ADS灯
BYD's new cars come standard with ADS lights on the OSRAM mirrors.



2025年08月成都车展
Chengdu Auto Show 2025



SAIC
HYPTEC

Mind user research indicates that consumers exhibit a strong preference for ADS lamps, demonstrating a willingness to pay a premium for these elements, which underscores their significant added value in marketing. Mind have investigated various styling strategies, such as integrating the grille, fusing taillights, highlighting the A-pillar, and reinforcing wheel wraps. Their findings suggest that the front grille captures high attention, while the A-pillar and the connection between the front windshield and the interactive screen evoke a strong futuristic feel. The future of ADS lights is expected to focus on integration, interactivity, and customization, leveraging new materials and processes to enhance brand differentiation and improve user experience.





Dongfeng (Henning Knoepfle, Design Director):

"Revisit, Revise, Revitalize": Using Light Signature to Signal Brand Transformation



Dongfeng design presented their lighting strategy for two brands.

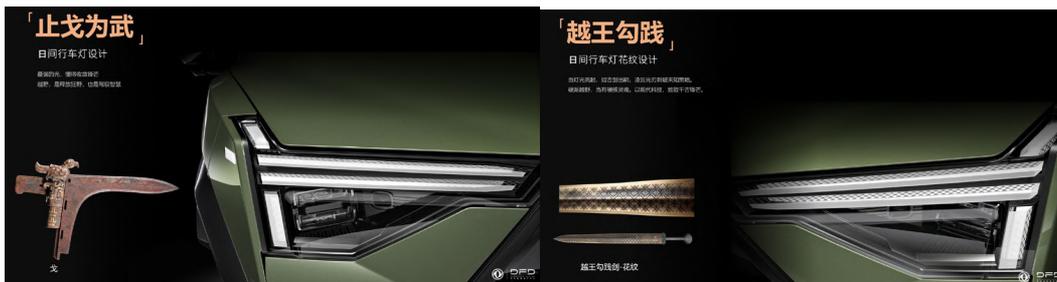


For the Aeolus brand (mainstream passenger cars): pixels, front and rear:





And for the M-Hero brand, a 'lighting weapon' strategy (reminding of Volvo's Thor's-Hammer look):



Session 4 – Lighting & Safety

Xingyu (Tongyang Zhao, Product Design Department Leader):

Regulation-Driven, Digital Lighting: From Passive Compliance to Active Guardianship

技术融合：数字孪生与AI赋能

Technology Convergence: Digital Twins and AI Empowerment

车灯代际趋势

Vehicle Lighting Generation Trends

1st 基础照明 Basic Lighting
光效提升 光学效能提升 高动态范围
物理性能增强 体积缩小 寿命延长 亮度稳定

2nd 功能照明 Functional Lighting
传感集成 功能融合
车身集成 域控架构 中央平台
车灯集成 功能集成 光源一体化

3rd 自适应照明 Adaptive Lighting
生理适配 色温调节 识别联动
交互维度 用户编程 情感化设计
安全维度 协同安全 主动安全 基础安全

4th 智能照明 Intelligent Lighting
车路协同 主动优化照明 信号反馈响应 路况识别
车车协同 同步光轴 灯光指引 灯光预警
品牌延伸 共创灯语 品牌标识

舱内外智能发展，多模式、多场景交融

Intelligent Development Across In-Vehicle and Out-Vehicle Scenarios

智能驾驶

Intelligent Driving

全场景贯穿的自动驾驶
Omni-scenario Autonomous Driving

智能座舱

Intelligent Cabin

多场景交融的座舱体验
Multi-Scenario In-vehicle Experience

硬件 IOT AI 5G 大数据

智能车灯

Intelligent Car Lighting

多场景交互的照明革新
Lighting Innovation for Multi-Scenario Interaction

Vehicular lighting is evolving toward multimodal interaction and multi-scenario adaptation. End-user expectations have shifted from passive acceptance to active demand for more service-orientated and intelligent lighting capabilities. This trend is now catalyzing corresponding transformations in vehicle design.

智能车灯标准化体系逐渐完善、产业升级加速

The standardization system for intelligent Vehicle Lighting is gradually maturing, and industrial upgrading is accelerating.

法规驱动，引领产业升级新纪元

Driven by regulation, ushering in a new era of industrial upgrading.

GB 4599-2024《汽车道路照明装置及系统》和GB 5920-2024《汽车和挂车光信号装置及系统》已于2024-09-29正式发布，并将于2025-07-01正式实施。

针对投影灯，法规分别新增了两个全新的功能，**驾驶员辅助投影功能**和**光信号投射功能**。

星宇参与行业标准制定
投影新法规2024年已释放，投影部分可纳入常规近/远光部分认证

智能前大灯

智能大灯

智能尾灯

内外饰灯具

强标规划 智能场景

测评引导 照明增强

显示化

显示化

符号规范

智慧光毯

交互化

情绪化

合作伙伴：[星宇] 中汽中心、红旗、比亚迪等

功能破局，拓展车灯交互新边界

Redefining vehicle lighting Interaction: Expanding Functional Frontiers.

高像素ADB测评体系发展近况

Development Status of the High-Resolution ADB Evaluation System

- 将ADB纳入道路性能测试方法，ADB功能权重逐渐提高
- 建立整灯系统感-控-算-照综合能力门槛，推动动态性能测试

测评框架	光学+动态试验/评分/权重	试验验证/数据库更新	公示/发布
2023Q1			
2024Q1			
2024			

车辆处于静止状态时，允许显示动态信息
Dynamic information display is allowed when the vehicle is stationary.

4.31 在车辆静止且满足下列一项或多项条件时，非标准定义的外部照明和光信号装置可开启，但不待危害本标准定义的外部照明和光信号装置有效性：

- 发动机(推进系统)停止工作；
- 驾驶员或乘客的车门已经打开；
- 行李舱门已经打开。

光信号投射功能被赋予多种可能性
The projection feature enables diverse functional possibilities.

- 由简单几何图形和/或单个字母组成，内容简单，不会产生歧义
- 只能改变图案的长短、大小比例、投影方向和位置

Meanwhile, the regulatory landscape has been undergoing transformation. Xingyu have strategically evolved from merely following standards to actively participating in their establishment. This shift demonstrates Xingyu's commitment to expanding the technological boundaries of vehicular lighting, and highlights the company's pioneering

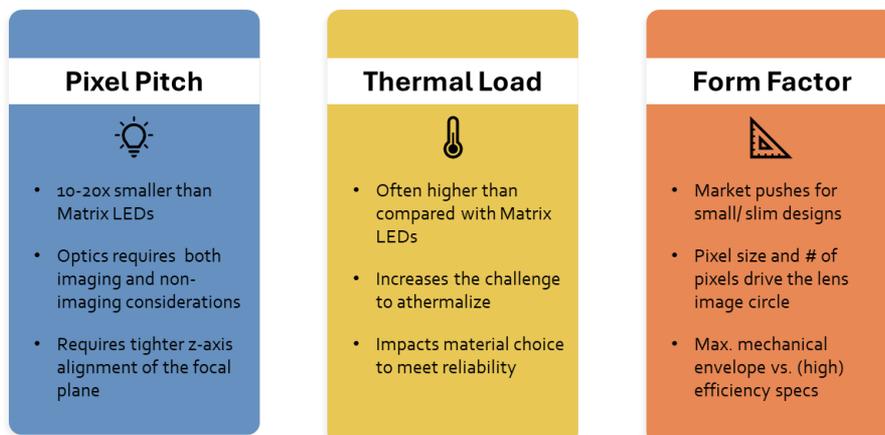
trajectory in innovation. Xingyu employ a dual-engine strategy, leveraging both foundational and key technologies. This approach is transforming their traditional vehicle lighting products into safety-enhanced 'interactive media'.

Xingyu are dedicated to creating smart and holistic vehicle lighting solutions across four dimensions: sensing, lighting, display, and projection. The sharing of new technological achievements in three main product areas underscores the company's solid accumulation in technology integration and development path exploration.

Regarding future trends in intelligent headlamps, the presentation emphasized a focus on "restructuring the emotional interaction model". Specifically, the system will achieve true intelligence through deep learning of end-user preferences, intelligent recognition of driver emotions, and advanced algorithms, enabling natural and thoughtful human-vehicle interaction.

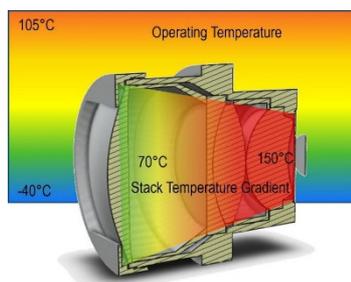
Sunex (Ingo Foldvari, Business Development Director):

Insights and Future Perspectives for Hybrid Lens Designs in High-Resolution μ LED Headlamps



MicroLED projector systems designs require precision imaging optics to support advanced driver-assistance functionality and strengthen automaker brand identity. With that leap in capability comes tougher demands for optical, thermal, and durability.

MicroLEDs generate extremely high luminance in very small sources, creating steep internal temperature gradients across the optics. At the same time, tier-1 and OEM specifications push for more compact designs and components to withstand harsh operating and storage environments while maintaining performance over 15-plus years. Meeting those requirements calls for high-precision optics, tight mechanical tolerances, and robust materials that deliver stability across a wide temperature range, all in compact footprints suited for modern vehicle styling. Hybrid lens architectures, which combine glass and plastic elements, have emerged as an effective path to balance performance, manufacturability, and cost. Glass provides thermal stability and chromatic control, while advanced plastics support complex shapes and enable scalable production. When engineered correctly, hybrid systems minimize aberrations, preserve modulation transfer function, and control distortion while standing up to heat cycling and mechanical stress.



However, plastics bring specific risks: focal shift from thermal expansion, deformation near Vicat softening temperatures, refractive-index drift under cycling, moisture-driven transmissivity changes, yellowing from UV, and coating crazing during expansion and contraction. These physics constraints cannot be ignored; they must be accounted for through careful material placement along the optical axis, athermalization design strategies, and rigorous simulation tied to real-world validation.

ZKW (Xin Di):

Vertical Designs for Main Beam Solutions: Challenges of Legal Requirements and Consumer Ratings

Vertical styling of main light functions is becoming more popular. One big challenge for vertical design is that the headlamp setups are usually built using multiple modules to generate one main light function. These modules must be aligned to each other, especially for vertical and horizontal low beam aiming, which is relevant for legal regulations and measurement points and also the gradient position and sharpness.

From analysis we can see that if we aim parallel, but measure at shorter distance than infinity we will get parallax error and so we might not fit the intensity requirements. Therefore, 25m is best for aiming, since homologation is done at that distance.

Another important topic is to decide the aiming reference. Depending on centre point and aiming reference, the light distributions are aimed up or down in the headlamp setting. It will impact the range and glare, which are the main topics for current rating systems worldwide, like C-NCAP in China, IIHS in America, and HSPR in Europe.

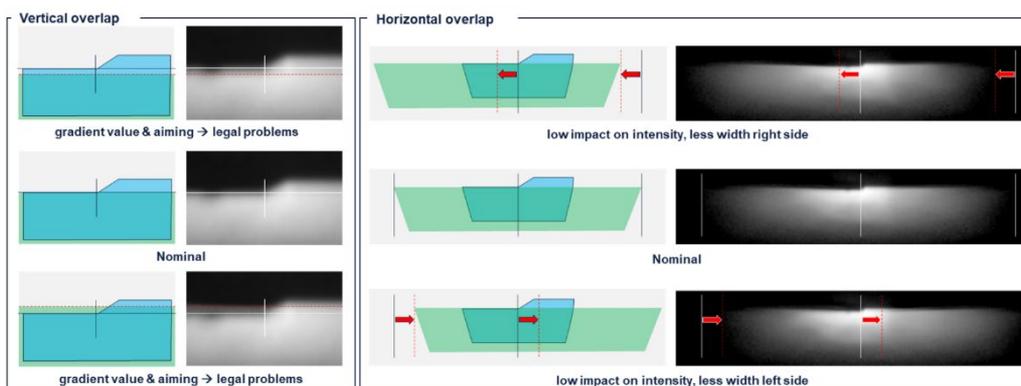


[A member of LG]

Sets of modules: Alignment problems?

Horizontal and vertical aiming is relevant for various legal regulations & measurement points

- > Intensity for certain points may be too high/low with bad alignment
- > Gradient position and value is strongly impacted by any vertical mis-alignment



Here is an example showing the difference with different aiming reference. If the upper module is defined as the reference, the range is good, but you will get high glare demerits if the aim is adjusted too far up. If the lower module is defined as the reference, the range is bad due to aiming down upper modules, but there's almost no glare.

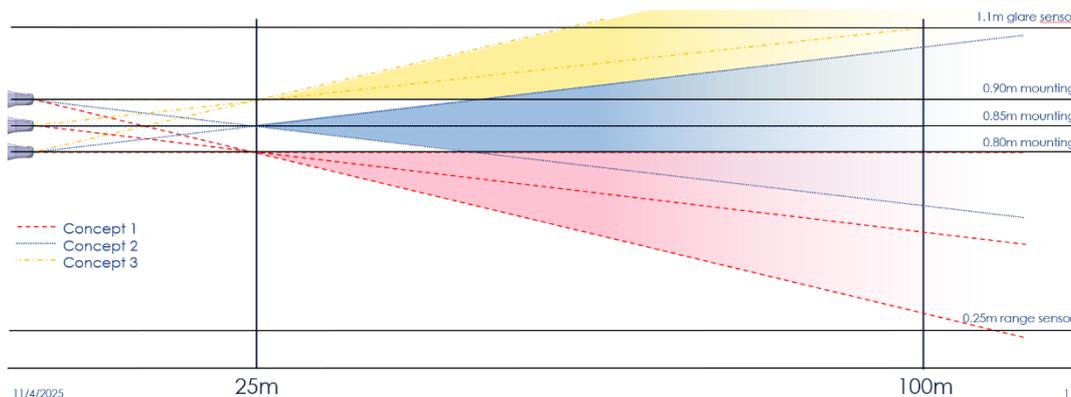


Challenges in driving conditions: example IHS rating

Example setup: 3 modules, 50mm offset

Impact on driving tests

- > Depending on aiming, aiming causes glare or reduces range
- > Any Driving test results are strongly depending on mounting height



Challenges in driving conditions: example IHS rating

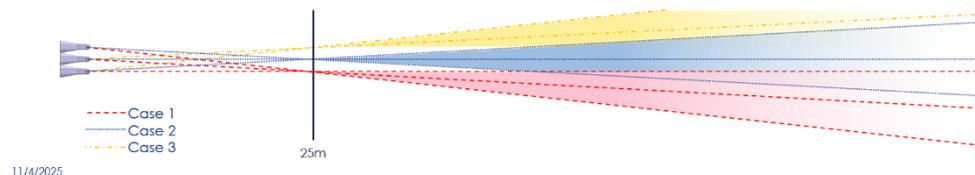
Example setup: 3 modules, 50mm offset

General HDL aiming

Degree		-0.4	-0.3	-0.2	-0.1	0	+0.1	+0.2	+0.3	+0.4
Bottom sensor	Case 1	23.5	17.3	12.5	9.2	7.1	6.1	6.2	6.2	20.9
	Case 2	17.9	13.5	9.8	7.5	5.9	5.9	6.1	17.3	69.9
	Case 3	10.7	8.1	6.3	6.1	6.2	6.6	42.1	100.6	165.0

Case 1: Glare unlikely, due to aiming down upper modules. Range is bad, i.e., HDL downward adjustment shows significant range demerits

Glare present due to aiming up lower modules. I.e., High glare demerits if HDL is adjustment too far up, but good range if HDL is adjusted too low



Evaluation of design impact on legal and rating values needs to happen as early as possible, with aiming concepts selected on a design-specific basis, depending on mounting height and targeted requirements.

Zhijiang (Li Yunlong, Senior Research Fellow):

Adhesive System Solutions for Headlamp Bonding

Zhijiang are dedicated to developing high-performance adhesive and sealant solutions for the global automotive industry. they showcased advanced bonding for automotive headlamps and critical electronic systems, ensuring reliability, durability, and superior performance.

For headlamps, they offer a comprehensive portfolio to meet diverse manufacturing needs. PUR hot-melt adhesives provide fast setting and excellent airtightness through a unique combination of physical and chemical bonding. For applications requiring extreme strength and ageing resistance, two-component polyurethane systems deliver robust performance without emitting CO₂. They also provide versatile silicone-based sealants (JS-8100) for superior heat and weather resistance, and removable hot-melt butyl sealants that enable eco-friendly lamp disassembly and repair.

PUR Hot-Melt Headlamp adhesive

One-component moisture-curing polyurethane hot-melt sealant. The NCO-terminated prepolymer reacts with moisture in the air after melting application, forming a stable solid with strong adhesion.

Process Features:

- Application temperature: 110–140°C
- Fast positioning after cooling
- Excellent airtightness
- Ready for packaging within 10 minutes
- Black & Grey available

Typical Advantages:

- Stable dispensing
- Low fogging value
- Widely accepted by the market

PPT30-PC substrate fracture

	JS-PUR700	JS-PUR700-1	JS-PUR702	JS-PUR700HD
Open Time (min)	3±1	3±1	3±1	10±5
Test the airtightness time (min)	8-10	8-10	8-10	8-10
Viscosity (120°C, Pa·s)	12±3	15±3	17±3	180@95°C
Key Performance	Compatible with older equipment	Higher initial strength	Almost no stringing	Excellent thermal stability

For parts with larger slant angles, model 702 is more suitable

Beyond illumination, Zhijiang provide complete adhesive solutions for IGBT modules, high-clarity OCT resins for display screens, and solutions for PCB protection.

Ford (Henry Shi, Senior Automotive Lighting Engineer):

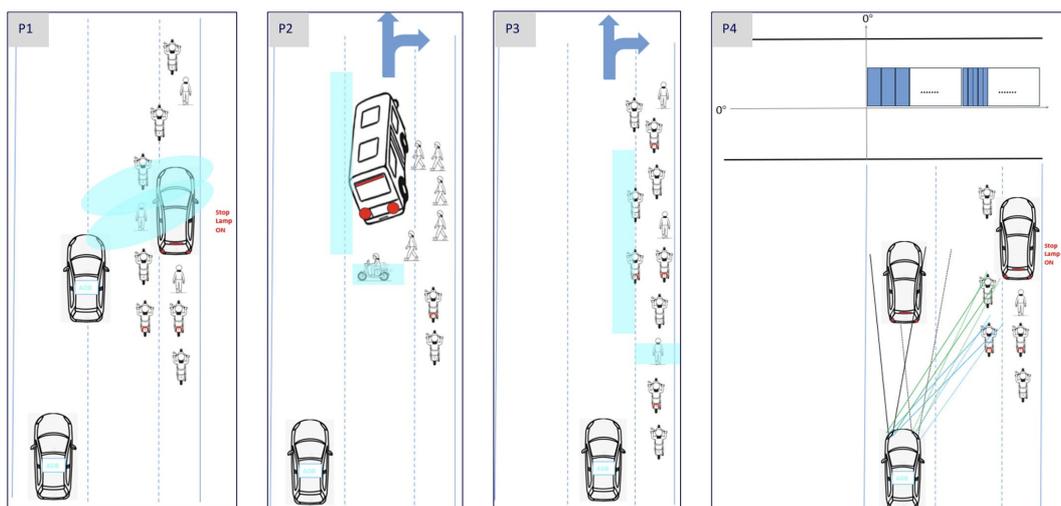
ADB Systems: Deglare and Lighting Strategies Discussion



Ford China is in their 30-year anniversary under Ford Global leadership, with local innovation for Chinese customers. ADB technology can be enhanced to deliver measurable safety benefits for China's unique road environments. This lecture emphasized practical priorities: advanced deglare strategy to protect oncoming and leading road users, enhanced detection of static roadside objects and hazards, and more reliable identification of vulnerable road users such as pedestrians, cyclists, and e-bikers across diverse urban, suburban and low-visibility, high-traffic conditions.

Shi proposed use-case dependent enable/disable logic, segment angular mapping, and camera-pixel polygon alignment with beam maps under time-synchronized control.

5.2 ADB Active/Disable Strategy

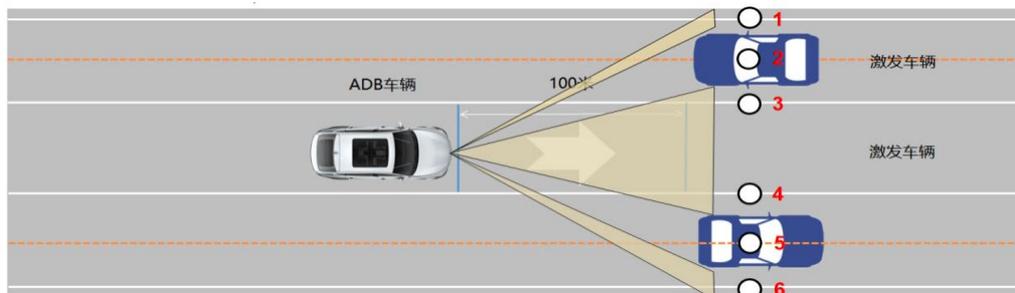


He described how integrating ADB into the ADAS domain and the broader vehicle/roadside IoT ecosystem could transform lighting from passive illumination into an active safety system.

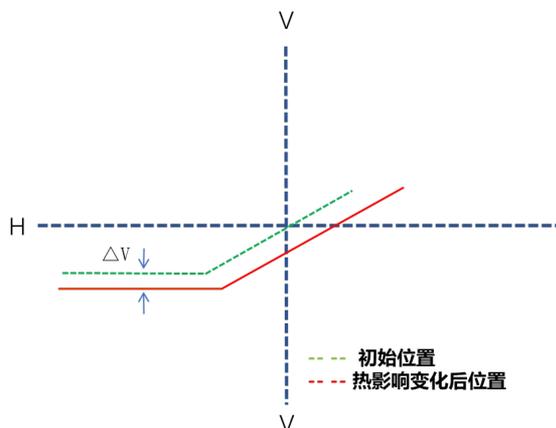
China Automobile Intelligent Technology Tianjin (Zhao Zhun):

Introduction to the Draft of C-NCAP 2027 Lighting Safety Test Regulations

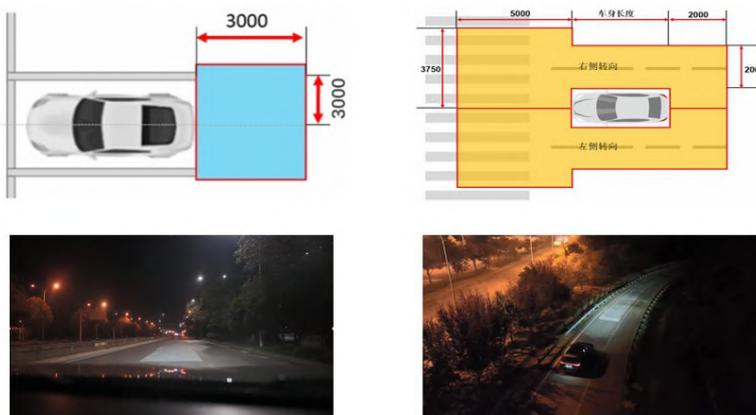
Zhao Zhun presented the main evolution of the draft 2027 C-NCAP lighting protocol, including the glare-measurement method, uniformity of beam pattern, and ADB evaluation for multiple vehicle detection and multiple degraded zones...



...low beam cutoff evolution after heat load (15 minutes)...



...and the addition of signal and ADAS projections into the rating with a possible points bonus.



The new protocol was started in mid-november this year, with a draft scheduled to be released at the end of December and a final release slated for May 2026.

LMT/TechnoTeam (Claire Yang, LMT Asia-Pacific Regional Manager & Bob Liu, Light-All Managing Director):

Current Challenges in Automotive Lighting Testing: Goniophotometry of XXL Lighting and Signalling Components; High Speed LID Generation of Front Lighting for EOL and R&D



LMT presented their LMT GO-A Velas hybrid robotic A-type goniometer that can handle full-vehicle-width front and rear lamps.

The machine's table is free in space; test samples may be up to 3 m wide, with no sample realignment necessary.

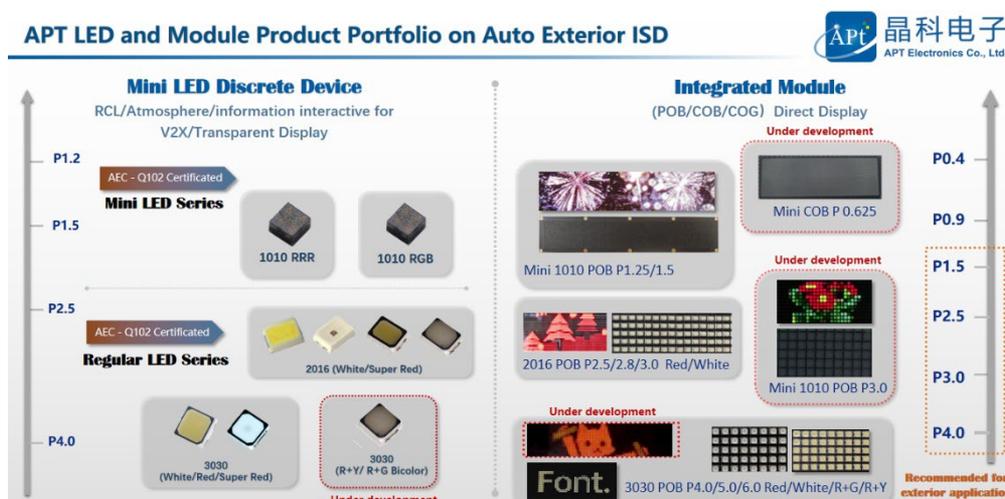
The new gonio handles heavy sample/jig assemblies up to 230 kg. It offers angular accuracy of 0.01° for horizontal and vertical coordinates, as well as LMT's patented Velas Coordinate Transformation: light sources under test need not be aligned to the goniometer origin.

Session 5 – Lighting HMI

APT Electronics (Esther Law, Senior Auto LED R&D Engineer):

Automotive LED and Module on Exterior Interactive Signal Display

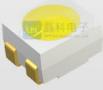
As vehicle exteriors evolve into dynamic communication interfaces, APT outlined how LEDs are enabling new forms of visual communication between vehicles, drivers, and the traffic environment. APT showcased a comprehensive product portfolio covering conventional LEDs to miniLEDs, supporting pixel pitches from 1.5 up to 4.0. Key offerings include SMD 3030, 2016, and 1010 LEDs, which feature 'static invisibility' when off and uniform, high-consistency light emission when activated. The ultra-compact 1010 series, in particular, enables higher pixel density and finer optical control, making it ideal for high definition and high resolution seamless modules, and giving a cinematic level of detail on the exterior display of the vehicle.



A significant focus was placed on APT's miniLED POB (package-on-board) solutions, such as the P1.5 RGB module with nearly 38,000 LEDs, capable of displaying smooth, full-colour animations. APT emphasized that POB technology delivers excellent optical performance, enhanced design flexibility, and cost efficiency for exterior lighting applications, especially for pitch above P0.8. APT also introduced a modular system framework supporting real-time video input control systems.

Several mass-production examples, including projects with Changan Avatr, Lynk & Co, and Aito, demonstrated APT's capability to deliver reliable, high-performance ISD solutions. Looking ahead, APT highlighted three key trends: further miniaturization of LEDs, more customized shapes and arrangements, and deeper integration of displays with vehicle exterior components.





CHANGAN-AVATR E11
Greeting Lamp (1860pcs)
PLCC-4 White (0.2W)






LYNK&CO - 900 (L946)
Tail ISD Lamp (2065pcs)
PCT2016 super red






AITO M8
Tail ISD Lamp (2065pcs)
PCT2016 super red
(0.2W)



Front Face ISD



Mini 1010 LED and
P1.5mm ISD module



Rear Face ISD



2016 Red color LED
Pitch 2.5mm

[...More New Project](#)

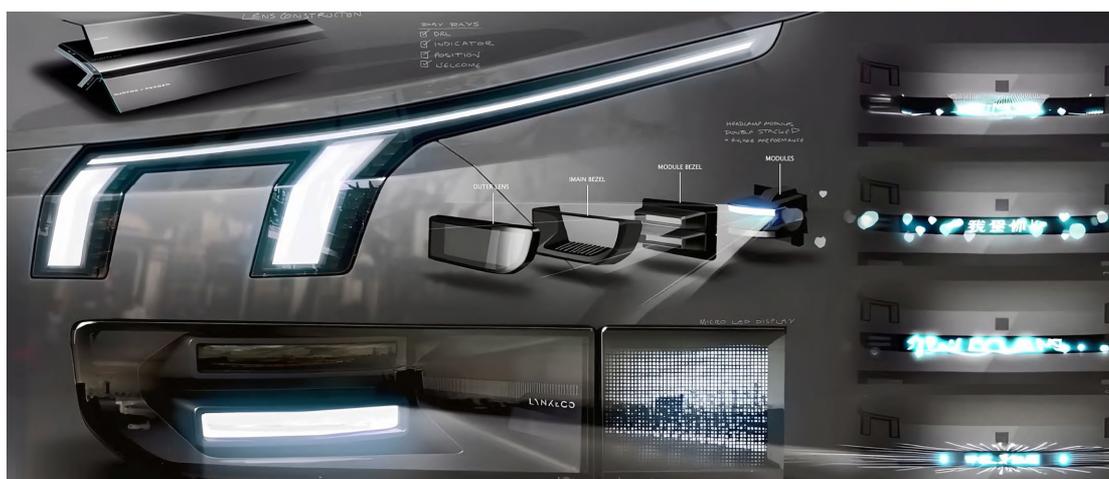
In closing, APT stressed the importance of collaboration across the LED supply chain and deeper integration with integrated circuits (ICs), electronic control, software, sensors, optics ect. to shape the future of automotive interactive displays.

Lynk & Co (Alsed Briscoe, Exterior Chief Designer & Joel Hake, Senior Exterior Conceptualist):

Designing With Light: The Lynk & Co 900 Story



Lynk & Co's design team shared technical info and how they work in advanced phase with optical simulation tools, CAD, and quick prototyping to find the right optical concept fast.



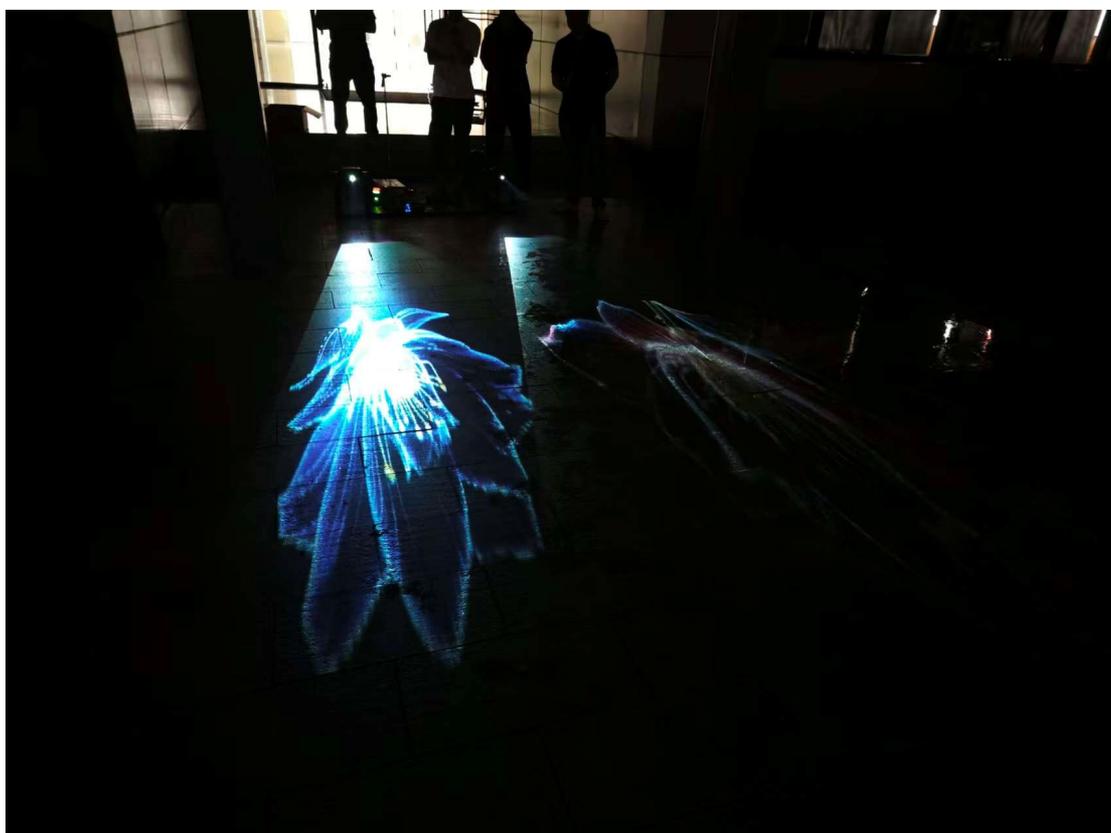
Front ISD details were provided (Liaowang make it): 6FR4 pcb, 10,192 LEDs, 32-grey scale. 2.5mm pitch, brightness of 2,500 cd/m², multiple animations via CAN-FD protocol, and OTA updateable.



For the rear lamp, they have a mix of FR4 (trunk) and flexi-board (body) due to curvature. The rear ISD has more than 2,400 LEDs, possibility to select different signatures, including a white/red lit logo.

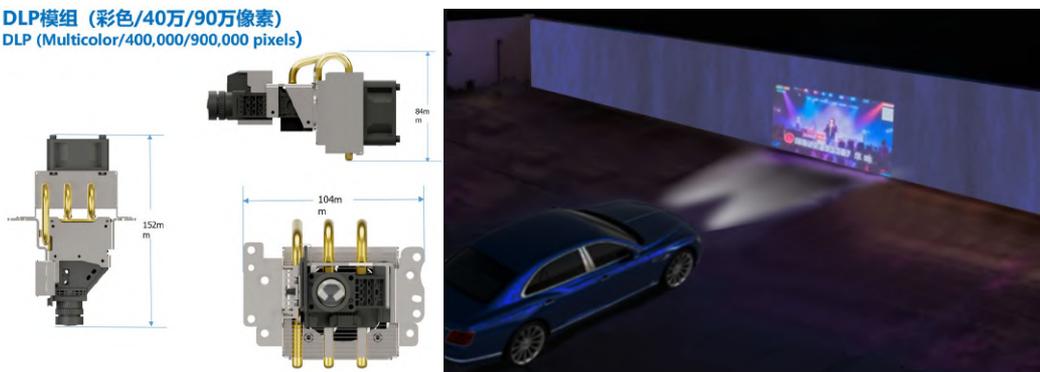
Anrui (Zhang Yunfei, R&D Deputy Director):

RGB DLP Redefines the Interaction Between Human, Vehicle, and Road



Anrui presented their RGB LED DLP development, with SOP this year – it's installed on vehicle which has not yet become available on the market. They can display 400 kilopixels (DLP3021-Q1) with FOV 28° × 15.6° and 150-200 lm.

DLP模组 (彩色/40万/90万像素)
DLP (Multicolor/400,000/900,000 pixels)

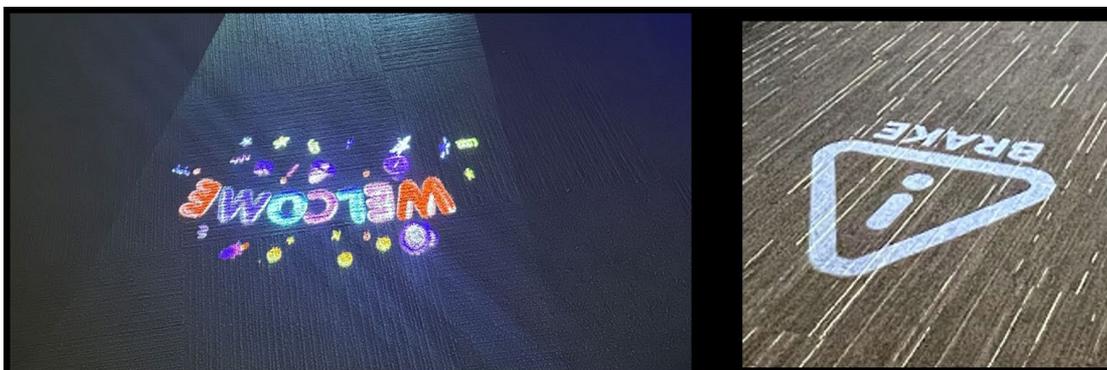


Appotronics (Dr Han Meng, Senior Marketing Director):

All-in-One Laser Digital Color Projection Headlamp



Appotronics launched their first RGB DLP in September 2024, with 800 lm flux. Now they've got a laser-based one, with a $\varnothing 28\text{mm}$ lens, with contrast increased from 80:1 to 200:1.



	LED source	Laser ALPD® source
F number	1.6	2.4
MTF	<50%	>50%
Contrast	1:80	1:200

IM Motor (Ma Mudi, Senior Automotive Interior-Exterior Lighting Market Expert): IM Motor Smart Lighting Approach of Product Matrix

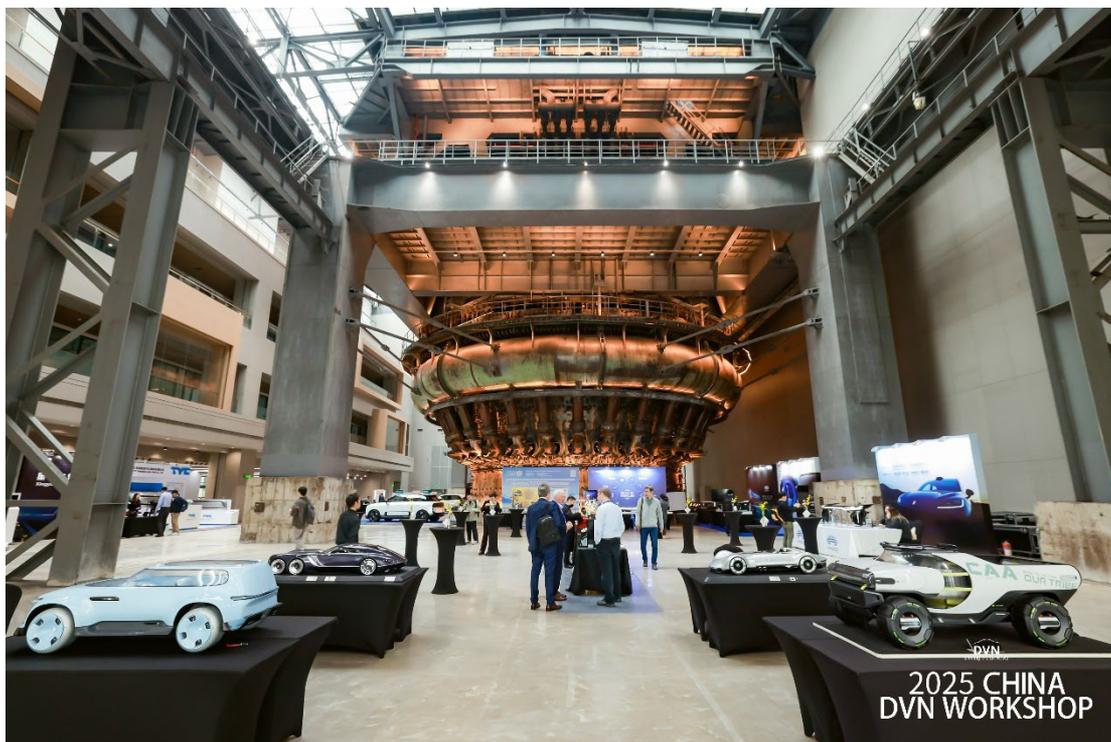


Ma Mudi presented the new IM LS9 with its impressive roof lamp (additional high beam from Yishan) to be able to detect pedestrians at 400 metres, when vehicle speed is above 80 kmh for at least two seconds. Activation is done manually via the light stalk.

She also talked about ISD with OTA capability upgrade of the ISC system, they can remotely deploy lighting animation templates and enabling user-defined light programming. For example, with OTA, they recorded 89.8K accesses in the last 30 days. User-created custom lighting animations exceeded 54.1K entries, and single thematic video achieved 400K+ organic views.



Photos & Networking





LIST OF MAIN DVN MONTHLY REPORTS

Main reports launched in 2008-2020

Koito company profile
China lighting market
The Wonderful World of Passenger Car lighting
Tier 2 and 3 contribution on automotive lighting
ZKW company profile
Simulations in automotive lighting
Mercedes-Benz profile
LED technologies in automotive lighting
LEDs Thermo-Electrics
Interior Lighting
BMW and lighting
Lighting and ADAS
Materials in lighting
Laser Head lighting
Automotive lighting Regulations worldwide
Israeli Startups
Jaguar Land Rover and lighting
Engineering companies involved in lighting
Japanese lighting market
Status of w/w Regulations
Korea Lighting Market
SL Corp profile
ADB/Matrix Beam
India Car Industry and Lighting Market
Vision of lighting 2025-2030
Automotive lighting Regulations worldwide
Vehicle Lighting in USA
New ADB technologies
Interior Lighting
Camera technologies
Varroc profile
Volkswagen profile
US automotive lighting industry
Materials in Vehicle Lighting
The Future of Exterior Lighting
IAA Frankfurt Autoshow
DVN Munich WS
GENEVA Autoshow
US Lighting
Marelli AL Profile
50 years Light Styling
ADAS and Lighting

Main reports launched in 2021

Evolution of LEDs
New Models July-October
2020 Audi Lighting & ADAS
Lighting in development countries
ADB Update
DVN Shanghai WS
Innovations in Rear Lighting
Global Landscape of Automotive LED Suppliers

Reports launched in 2022

Technologies presented in CES 2022
Laser light automotive lighting
ISAL report
DVN US workshop
Worldwide Demographic Development
Models launched May to August
DVN Shanghai report
VISION congress
Paris Autoshow + last Vehicle models
L.A. Autoshow

Reports launched in 2023

CES Report
TU Darmstadt Lighting Institute
DVN Paris Workshop
Universities and Lighting
MLA Technology
Models launched in H1-2023
DVN Tokyo Workshop ISAL Report
DVN US Workshop
Osram Company Profile
DVN Shanghai Workshop

Reports launched in 2024

CES
New cars of the semester
DVN Munich Workshop
OLED Technology
Beijing Autoshow
Display Week
2024 DVN Detroit Workshop
ALE, June 2024
Indian vehicle lighting market
DVN Pune Workshop summary
New cars 2024
Nichia company profile
Test houses
Shanghai DVN event summary

Reports launched in 2025

CES and Bharat Mobility Global Expo
DVN Munich event summary
Dekra testhouse
SPE Plastics in Electric & Autonomous Vehicles (EAV)
Auto Show Shanghai
IAA
DVN Detroit Report
The Czech Automotive Ecosystem
DVN Shanghai Report

DVN ecosystem and scientific community

DVN is a reference in the world of Lighting, Interior comfort and Lidar

Car Makers

Audi
Avatr Technology
Bentley
BMW
Ferrari
Ford
Ford Otosan
General Motors
Genesis
Hero MotoCorp
Honda
Hyundai
Jaguar-Land Rover
Kia
Lotus cars
Lucid Motors
Mazda
Mercedes-Benz
Mitsubishi Motors
Nio
Nissan
Renault
Rivian
Seat
Stellantis
Subaru
Toyota
TVS
SAIC Volkswagen
Volvo Cars
Zoox

System Suppliers and Tier 1s

Adient
Anruì
Appotronics
Aspöck Systems
Braslux
Cepton
Ceres Holographics
Chongqing Rebo
Continental
Creat
Diode Dynamics
Elba
F2J Industry
Feka
Fiem Industry
Flex-N-gate
FORVIA designLED
FORVIA HELLA
GHSP
Grupo Antolin
Hascovision
Hitachi
Ichikoh
J.W. Speaker
Keboda
Koito
Lightworks
Lumax
Luxit
Maier

Magna
Marelli
Marquardt
Mind
Mobileye
Mobis
Muth Mirror Systems
Nordic Lights
Odelo Farba
OPmobility
Panasonic
Polycontact
Prettl group
Rehau
SL Corporation
SMR Automotive
Stanley
The Lighting Consultants
Toyota Boshoku
Uno Minda
Valeo
Varroc
Weidplas CH
Xingyu
Zanini
ZKW
Zodiac

Light Source Suppliers

ams OSRAM
APT Electronics
Brightek
Dominant Opto Tech.
Everlight Electr.
HC Semitek
Kyocera SLD Laser
LG Innotek
Liteon Technology
Lumileds
Nichia
OLEDWorks
Refond
Samsung LED
Seoul Semiconductor

Tier 2s and service providers

A2Mac1
Ascorium
AML Systems
Ansys
ASAP
ASYST Technologies
Auer Lighting
BASF
Bluebinaries
Brightview Technologies
Capgemini
CLM Search
Coindu
Covestro
Dajac
DBM Reflex
Delo

Die haptiker GmbH
Docter Optics
Dow
Edag
Elmos
Endego
Ennostar
Euro Moulders
EV Group
Flow Dry Technology
Focuslight
Fusaware
Grewus
HJ Optics
Huawei
Idemitsu
Infineon
Inova Semiconductors
Instrument Systems
Integrity
Joysonquin
Leonhard Kurz
L.E.S.S.
LMT
Luminus
Mektec
Microvision
Maxell Frontier
MD Group
Melexis
Microchip
Microrelleus
Mitsui Chemicals
Mocom
Nalux
NBHX Trim
Oerlikon
ON Semiconductor
Pininfarina
Polyrise
Preh
Ray Group
S&P Global Mobility
Sabic
Schott
Seaborough
Seoyoneh-Ewha
Shihu
SP3
Sunny Automotive Optech
Suzhou Senbo
Synopsys
TechnoTeam
Toshiba lighting
TQ Technology
Uni Tooling
Ventura
W Research Company LLC
W.L. Gore & Associates
WLOPT
X2F
Xunchi

Universities, NGO and labs

Alliance for Automotive Innovation
ARAI
Automotive Research Association of India
BMDV
Bundesministerium für Digitales und Verkehr
CATARC
China Automotive Technology and Research Center
CEA Leti
Darmstadt university
DEKRA
Department for transport, UK
DTI
Danish Technological Institute
DVR
Deutscher Verkehrssicherheitsrat - German Road Safety Council
Estaca
École supérieure des techniques aéronautiques et de construction automobile
Fraunhofer (FEP, IAP, ILT, IMS)
Fudan university
GTB
Hannover Leibniz
Hochschule Aalen
Hochschule Magdeburg-Stendal
Icahn School of Medicine at Mount Sinai
Light and Health Research Center
ICAT
International Centre for Automotive Technology
Idiada
Institut d'Optique
JASIC
Japan Automobile Standards Internationalization Center
KBA
(Kraftfahrt-Bundesamt)
KATRI
Korea Apparel Testing & Research Institute
KIT
Karlsruhe Institute of Technology
Kotsa
Korea Transportation Safety Authority
LCOE
Laboratorio Central Oficial de Electrotecnia
L-LAB
MLIT
Ministry of Land, Infrastructure, Transport and Tourism
NHTSA
National Highway Traffic Safety Administration
OICA
International Organization of Motor Vehicle Manufacturers
Pacific Northwest National Laboratory
Phabulous
RDW
RISE Research Institutes of Sweden
Sapphire STS
SMMT
Society of Motor Manufacturers And Traders
SMVIC
Shanghai Motor Vehicle Inspection Certification
TNO
Traficom
Transport Canada
UMTRI
Université Gustave Eiffel
UTAC
VDA
Verband der Automobilindustrie
VEDECOM
Vrije Universiteit Brussel
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