

PixCell LED

Ultimate precision in perfect alignment

100+ individual cells with just 25 µm spacing, perfectly matrixed onto a single LED chip for intelligent headlamps

SAMSUNG



Editorial

Looking At Small Enterprises To Get A Bigger View



At DVN, we work hard to do a good job of bringing you all the relevant news about the big names in lighting—automakers and their suppliers; the who's-who. Naturally, we mean to continue doing so. But those aren't the only ones in the world! That's why, starting this week, we're making a new special effort to explore the wide array of smaller players with a great deal of unique innovation to offer the lighting world. At first, we'll be describing some of these companies, doing some Q&A, and publishing provided pictures (not just internet downloads).

Our intent is to bring some interesting companies from the background to centre stage. We'd love for you to please send us a quick note to [share your suggestions](#) for companies you think could be interesting for other DVN readers to learn about, so please give us a hint. We are looking for innovative; surprising; unusual; lesser-known, or just plain interesting enterprises of any kind, especially newcomers and startups. We'll profile them regardless of their size; sphere of influence, or revenue, just because they could be interesting for more than a few members of our community.

We at DVN are convinced that we will get our reader's approval to such a new series. Please support with your contributions, suggestions and comments.

Wolfgang Huhn
DVN Senior Advisor

In Depth Lighting Technology



Elmos: Semiconductors, Software for New Lighting Systems



DVN was recently visiting the Dortmund based semiconductor maker Elmos. Surprisingly every DVN newsletter reader uses Elmos products! In average 7 Elmos chips are used in every car. The company has 1150 employees who are developing about 15 to 20 IC projects in parallel and reached a sale in 2021 of 322 M€.

The expectations for 2022 are more than 430 M€. The approximate worldwide distribution will be:

Asia: 45%

Europe: 45%

Rest: 10%

Major areas Elmos chips are used are Power Management, Airbag, Motor controls, Ranging, Sensors and, of course, Lighting. 80 million LIN RGB controllers are expected for 2022 for interior applications. For the rear lamps the hard wiring is more and more replaced by direct body computer driven solutions with integrated transceivers. Especially Asian OEMs use this widely like NIO, Great Wall, BYD and the Indian Tata group.

Elmos' Multichannel Driver solutions are fully embedded in the car's network. Software is the necessary enabler and adds value enough to justify Elmos' new software centre in the Dortmund High Tech Park. It has space for 70 software developers—25 are already on board working on embedded software to facilitate the likes of OTA; bootloading, and cybersecurity.

After our visit to Elmos, we have the distinct impression this is the right way to prepare for the new lighting elements approaching future cars and especially the EVs. Controlling hundreds of LEDs in the upcoming illuminated grilleboards is a new challenge for system suppliers and automakers. OTA updates of the grilleboard signatures will be the logical next step, enabled by semiconductors with embedded software.

A relatively new field for Elmos is lidar technology. They are preparing a 256 × 80-pixel lidar chip with 1 Mbit SRAM and histogramming on chip. A 50-metre range and a near field lidar, also for interior use, will be on sale soon. The chip is ultra-compact at 1.9 × 3.8 mm.

Another interesting area the company are working on: ultrasonic chips with world-leading technology. They are convinced ultrasonics still have a lot of potential and will not be replaced by near-field radar, contrary to others' predictions. A nice example is the Tesla Model X gullwing door protection; Tesla worked closely together with Elmos during the development phase to achieve the best result. Another new application example is delivery robots—a fast-growing segment and, by the way, a full L⁵ application.

Elmos' ultrasonic lab is equipped with absorbers; test objects, and a moving robot carrying a variety of targets for sensor tests.

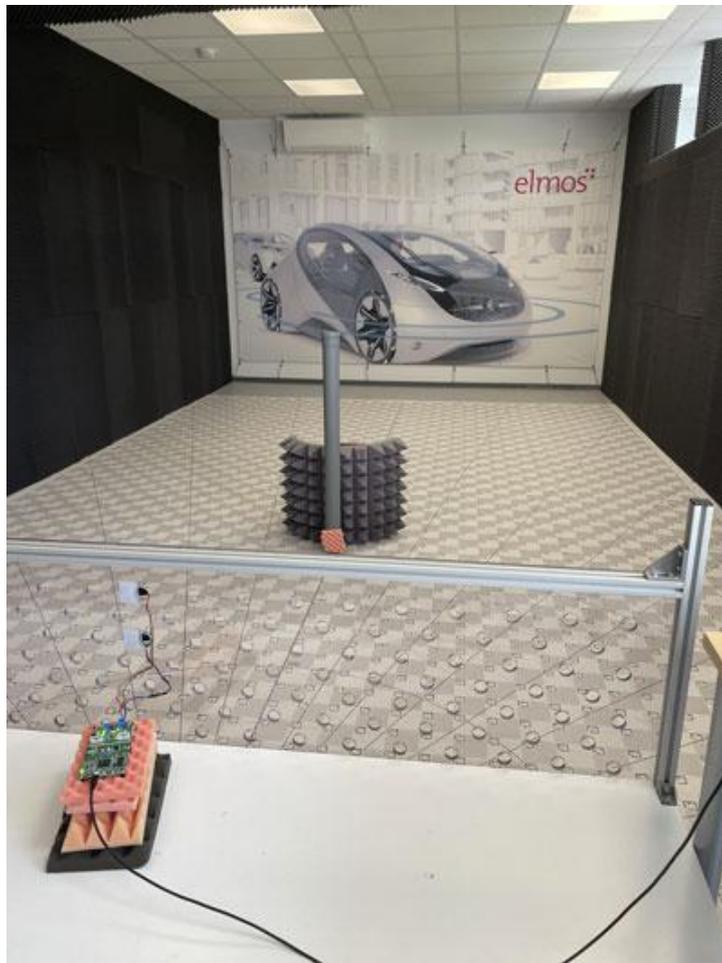
DVN Capsule-Interview: Elmos CEO Arne Schneider



L-R: JÖRN CONZE · DR. ARNE SCHNEIDER · THOMAS REUL ·
DR. WOLFGANG HUHN · DR. ANTON MINDL · JATIN THAKER · OLAF HUG

DVN: The automotive semiconductor crisis has severely crimped car production. How many cars were cancelled because of missing Elmos ICs?

Arne Schneider: We are quite pleased to say that we have been a very reliable supplier to our customers even in the global chip supply crisis. Together with our strong partners, wafer foundries and assembly partners, until today, we always found a way to make sure that sufficiently many Elmos ICs were supplied to our customer and finally reached the OEM production lines. We were not responsible for a single line down. That took enormous effort, and the Elmos team worked day and night for our customers—but given what we have achieved we are very proud. Supply Security will get even more crucial in the future automotive market and we attach great importance to this dedicated Elmos property.



ELMOS ULTRASONIC LAB

DVN: Our DVN Study, Forecast on New Lighting Systems, predicts that nearly all new premium EVs will have illuminated front ends and logos using hundreds of LEDs for animation and communication. Does an Elmos IC fit here?

AS: Elmos LED driver solutions are ideally suited for BEV and NEV exterior lighting illumination including front lighting grill, logos and end-to-end rear lighting solutions.

Supported by a high-speed communication enabled by the 'Elmos Light Bus', these LED driver solutions deliver high pixel count precision control to display and transmit useful information to the vulnerable road user using hundreds of LEDs and animation sequences. These BCM controlled multichannel LED drivers come with advanced thermal management, low power saving modes and reduced harness weight systems resulting directly into increased range for the EVs. Elmos solutions today are already in advanced development with premium OEMs for such applications.

DVN: Lidar sensors are a new business field for you. Why will the Elmos approach be successful in all the dozens of different lidar sensor offers?

AS: Elmos focused on the short-range lidar applications we see this as most promising field of application for us. In these areas we want to offer products that convince even lidar skeptics by an attractive price-performance ratio. Our first customers confirm our belief and mass production will start in 2024.

DVN: Ultrasonic sensors are used for two decades in parking assistance systems. What is the future of such a mature system?

AS: We clearly see ultrasound as a core technology enabling any kind of safe low speed maneuvering, for example in urban areas, and not only parking. Increasing levels of autonomy in the upcoming years require maximum safety. Therefore, vehicles need to have the highest possible confidence to make driving decisions. Next generation ultrasound systems will be playing an important role in surveilling the immediate vicinity of the car, supporting highly integrated ADAS and AD architectures and allowing for data fusion with other sensor modalities.



JÖRN CONZE, DR. ARNE SCHNEIDER,
JATIN THAKER, OLAF HUG

Lighting News

Hyundai Mobis to Showcase Innovation at NAIAS

LIGHTING NEWS



Korean automotive supplier Hyundai Mobis will exhibit for the first time at NAIAS (the North American International Auto Show) in Detroit. The world's № 6 auto supplier plan to exhibit more than 30 technologies including their EV platform; an illumination grilleboard; an integrated cockpit, and an AR HUD.

HM executive VP and head of global OE sales Axel Maschka says "We are discovering many new opportunities in the North American market, where competition for future mobility is fierce".

At the show, Hyundai Mobis will display numerous new mobility technologies in electrification; ADAS, and infotainment that are available for mass production. Their illuminated grilleboard technology allows automakers to use the entire grille area as a lighting element or to communicate with vehicles or pedestrians.

It is interesting to note that this trend is exactly what DVN presents in **DVN Market Forecast on New Lighting Systems—Technologies and Skills to Succeed**, released this past July.

This study presents the market perspective of new lighting elements like illuminated grilles and logos; signal projections; road projections; ADB; laser light sources; OLEDs; communication displays, and more.

Lynred-Umicore Sensor to Cut Traffic Violence

LIGHTING NEWS



Lynred, a developer of infrared detectors, and Umicore, a “circular materials technology company”, are to co-develop novel thermal sensing technology which, they say, “will significantly improve the performance of Pedestrian Autonomous Emergency Braking (PAEB) systems in adverse lighting conditions at an affordable cost”.

Recent AAA and IIHS scrutiny have found that current PAEB systems perform inconsistently, and poorly at night. Increasingly, insurers and rating agencies are advocating for rulemaking to equip passenger vehicles with PAEB systems that work well in the dark. Lynred global market leader Sebastien Tinnes says “Protecting pedestrians in poor visibility conditions makes a strong case for thermal imaging, which is well-established for being efficient in the majority of degraded visibility scenarios, as it can detect and identify objects at greater distances and with more accuracy”.

While a visible camera, along with a low-beam headlight, can detect at a distance of only 20 to 30 metres, thermal sensing can detect objects as far away as 300 m. Thermal sensing can also classify a person or animal from a distance of 100 to 200 m, depending on the sensor resolution (QVGA or VGA, respectively).

The co-development of the thermal sensing technology for improving next-generation PAEB systems, which consists of a new 8.5- μm pixel pitch microbolometer designed by Lynred and Umicore’s wafer-level lens technologies, funded under the European HELIAUS project.

Lynred and Umicore, which have previously collaborated on projects to promote and develop infrared technologies, began working on the HELIAUS project in 2018, along with 11 partners from four countries.

Micro Cones from DBM Reflex

LIGHTING NEWS

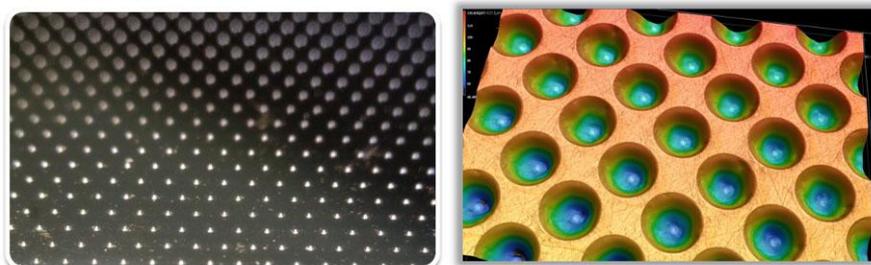


RENAULT AUSTRAL REAR LAMP MADE BY MARELLI AL

Canada-based DBM Reflex produce optical inserts; moulds for optical components, and moulded optics for vehicle lighting: light guides; thick lenses; collimators, and more. Over the last year the company have introduced new technologies such as silicon moulding for pixel lighting applications. For silicone applications DBM also provide moulds; optical inserts, and mouldings.



The first commercial application of DBM Reflex's new micro cone technology is in the rear lamps of the Renault Austral. Micro cones are optical features which let a surface, or a part of a surface appear almost transparent when not illuminated, yet homogeneously lit when illuminated. The transparency and luminance effects can be tuned over a wide range by the detailed layout of the optical features.



EXAMPLE SPACING OF MICRO CONES (L); MICRO CONES SEEN UNDER CONFOCAL MICROSCOPE.

Micro cones are cone-shaped structures on one surface of a lens, that enable a controlled light reflection in the direction of the opposite surface. The illumination originates from the edges of the surface. This illumination concept is sometimes called a 'light curtain'. The geometry of the

structures is not strictly limited to cone shapes; others such as capsule-shaped geometries are sometimes used to guide the light reflections to specific areas.

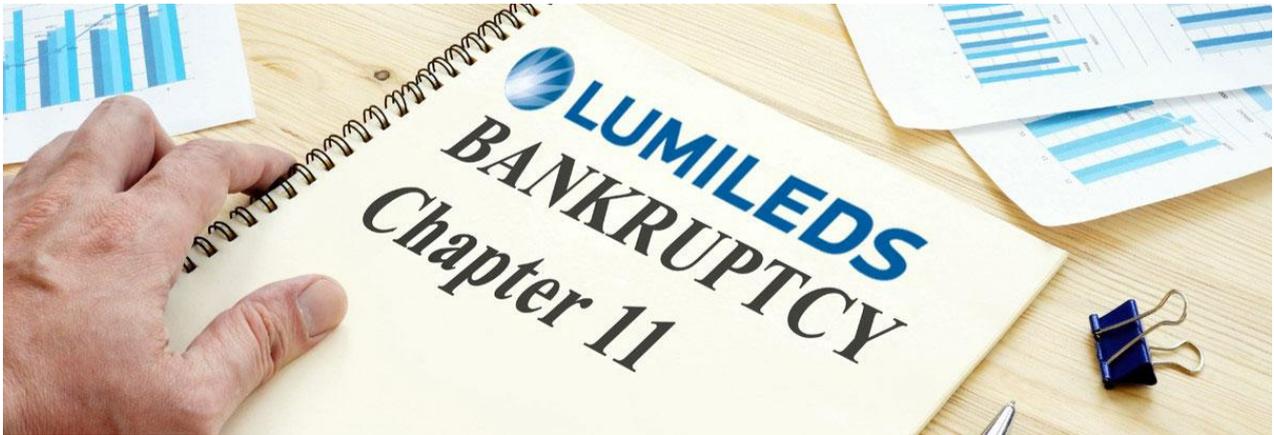
The density; opening angle, and depth of the structure influences the intensity of the scattered light. An excellent surface quality of the carrier surface is necessary to avoid premature light scatter, so the designed pattern illuminates crisply and with high contrast.

DBM use diamond machining for precise control of the cone parameters. Surface radii in the range of several tens of μm and cone densities of more than 70 cones per mm^2 have been realised with this technology. Moreover, diamond machining provides excellent surface quality of the cone surface finish as well as of the carrier surface, which is of special importance for the appearance in the unlit state.

Since micro cone surfaces provide a better light extraction efficiency when the structure is pointing inside the plastic material of the lens, DBM machines a master and generates a high precision electroform that will be used as a tool insert for injection moulding.

Lumileds' Big Borrow OK'd Despite Judicial Doubt

LIGHTING NEWS



Lumileds won U.S. bankruptcy court approval to borrow USD \$175m, overcoming skepticism from a federal judge who said a fee tied to the loan seemed excessive. US Bankruptcy Judge Lisa Beckerman approved the financing package.

Existing lenders who opt to advance fresh credit to the bankrupt company will share a fee totaling nearly 37 per cent of their equity once Lumileds exits Chapter 11 bankruptcy protection. The fee is large because the structure of the loan, which may grow to as much as \$275m, requires lenders to take on more risk than in most bankruptcy financing packages, according to an attorney for a group of existing lenders. The loan will not be repaid once the company exits bankruptcy, but instead will turn into an 'exit facility'.

Lumileds filed for bankruptcy under a debt load of \$1.7bn. Their proposed restructuring plan would cut that debt by \$1.3bn and force Apollo Global Management to relinquish control of the company.

Lumileds, headquartered in San Jose, California, have filed for Chapter 11 bankruptcy protection. In a statement, Lumileds communicated a business-as-usual message explaining their filing of 'first-day' motions to obtain the requisite court authority for the company to continue operating their businesses and facilities in the ordinary course without disruption to customers; vendors; suppliers, or employees.

EOI (Excellence Opto Inc.), Tamkang University in Cooperation Pact

LIGHTING NEWS



To bring Taiwan's young professionals to the world of electric vehicles and smart cities, Tamkang University President Huan-Chao Keh and R&D Director Li-Ren Yang invited EOI President Fanny Huang and her team to join the 2022 International Business Seminar and Industry-University Conference; Announcement of R&D Results, and Joint Signing Ceremony of Five Plus Two Industry-University Alliance.

With the rapid development of electric vehicles, the market has expanded, and the development has become more optimistic. The research and development achievements of EOI in recent years are closely related to green energy saving and sustainable environmental protection. In addition to the automotive field, the six core technical capabilities of optics, mechanism, electronics, thermals, LED packaging technology and software and firmware have been continuously improved.

Through this industry-university matchmaking exchange with Tamkang University, bilateral cooperation and development will be closer: EOI will bring the students an international employment stage, while Tamkang University will provide EOI with a ready talent pool.

Aspöck EcoLED III Unveiled at IAA Fair

LIGHTING NEWS

ECOLED III
Standlicht Kreuzschaltung | Tail light cross wiring



45 YEARS ANNIVERSARY
ASPÖCK
SYSTEMS

auto mechanika FFM	13.9 17.9
HALLE 3 STAND G61	
IAA TRANSPORTATION	20.9 25.9
HALLE 26 STAND D24	
bauma	24.10 30.10
HALLE A5 STAND 418	

Aspöck's latest full-LED commercial-vehicle multifunction rear light with tail; stop; reverse; rear fog; triangular reflector, and dynamic direction- indicator has been unveiled at the IAA Transportation trade show in Hanover. The EcoLED III is unusually light and slim; equipped with striking features and made in Europe.

It's a fully in-house effort; the design and engineering of the energy-efficient full-LED Ecoled III rear lamp is done at Aspöck headquarters in Austria, handled in the Aspöck Group, and produced at the company's largest production site, Aspöck Portugal.

Going far beyond the typical installation regulations, the taillight of the Ecoled III features a large homogeneous lit area with Glowing Body technology. The retroreflector triangle is moved outward to the left and right rear lamps to give the taillight area even more space.

Driver Assistance News

Oliver Blume Steps Up as Cariad Chair

DRIVER ASSISTANCE NEWS



The Supervisory Board of Cariad have elected as their chair Oliver Blume, the new Chairman of the Board of Management of Volkswagen Group.

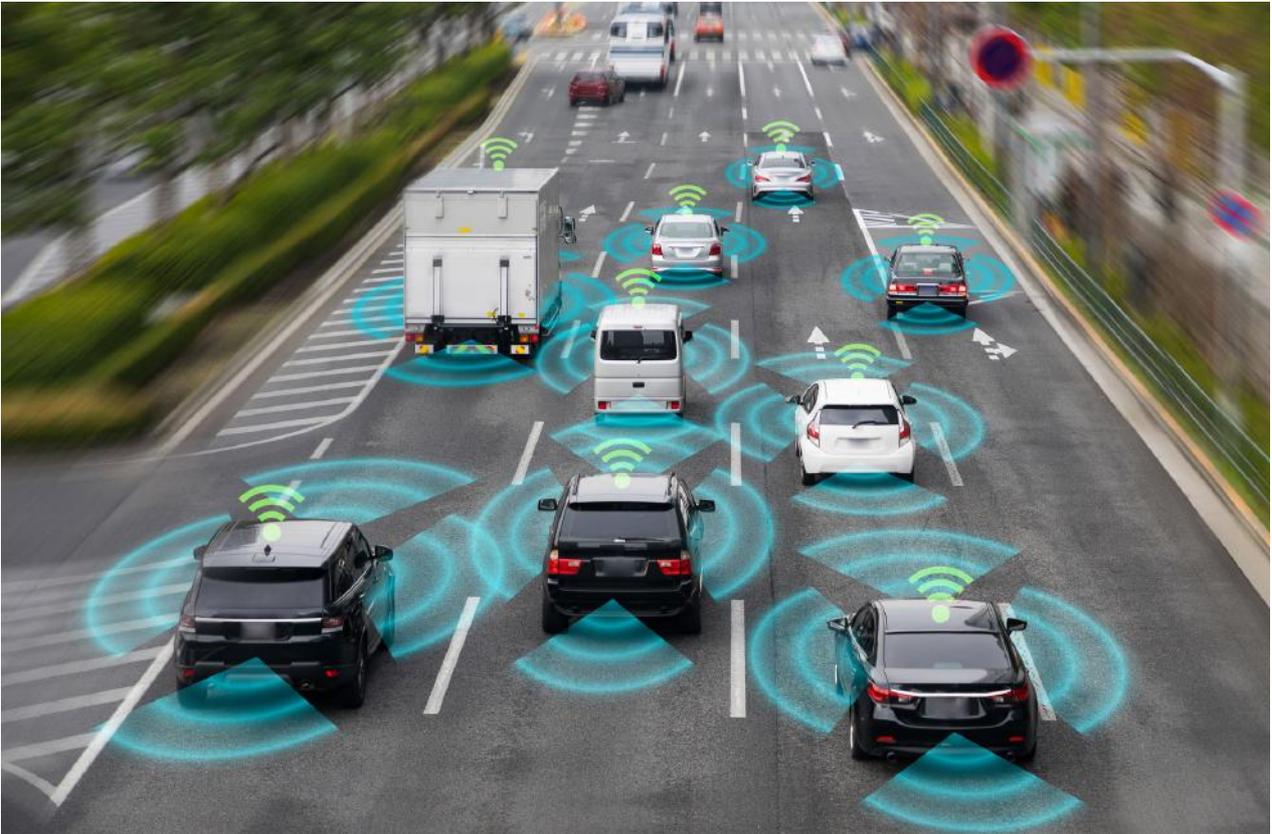
In addition, Michael Steiner (management board member of Porsche AG for R&D) and Thomas Ulbrich (management board member for technical development of the Volkswagen brand) have been appointed as new members of the Supervisory Board of Cariad.

Michael Steiner studied mechanical engineering at the Technical University of Munich and held various responsible positions at Daimler from 1995 onwards. In 2002, he moved to Porsche and subsequently held various leading positions at the Porsche Development Centre in Weissach, most recently as head of complete vehicle engineering and quality Management. Steiner has been a Porsche management board member for research and development since 2016.

Thomas Ulbrich completed an apprenticeship as a car fitter and studied automotive engineering at the University of Applied Sciences in Hamburg. He began his professional career in the Volkswagen Group in 1992, and since 1995 has held various management positions at Volkswagen; FAW-Volkswagen; AUTO 5000; Volkswagen Commercial Vehicles, and Shanghai-Volkswagen. From 2014 he was the VW brand management board member for production and logistics; from 2018 for E-Mobility, and since 2021 for technical development.

Shanghai Foresee Automobiles as Big Biz

DRIVER ASSISTANCE NEWS



Shanghai is betting big on AVs as the kernel of a high-growth industry that can produce USD \$72bn in economic value by 2025. More than 70 per cent of vehicles produced by 2025 should have L^2 and L^3 capabilities, while L^4 systems should be realised in “specific areas and scenarios”, according to the plan. At present, most equipped vehicles have only L^2 or L^{2+} .

The plan calls on relevant companies and research institutes in the city to increase research and development of a number of key technologies, including automotive chips; artificial intelligence algorithms; laser and radar components; in-vehicle operating systems; intelligent computing platforms, and steer-by-wire systems.

The 70-per-cent goal for locally-built vehicles with autonomous driving systems translates to nearly 2 million vehicles a year in 2025.

Navya Field Self-Drive Shuttle Order

DRIVER ASSISTANCE NEWS



Navya, an autonomous mobility systems maker, will sell an EVO shuttle to Landkreis Kronach. The district of Kronach is in the German federal state of Bavaria. It is the third shuttle to be ordered by the Landkreis Kronach, and comes as an addition to the two ARMA shuttles which were acquired within the framework of the SMO.

The SMO project brings together twelve partners, including the equipment supplier Valeo and the operator Omnibusverkehr Franken (a subsidiary of Deutsche Bahn), and is the impetus behind the deployment of six Navya self-driving shuttles over the three north Bavarian towns of Hof, Kronach and Bad Steben, as well as Rehau.

The two ARMA shuttles that were acquired within the framework of the project by Kronach are still operating on the town's roads, creating a new public transportation service that links the town's main places of interest. The three kilometers of open road that make up its route starts at the station, takes in the car parks situated in the town center, and then travels across the upper part of the town to the fortress, Festung Rosenberg.

The acquisition of the new EVO self-driving shuttle will enable the current route to be extended as far as Kronach castle, which is the town's main attraction. This new extension is designed to enable tourists to travel around the town with ease, but it will also be of benefit to all the residents of Kronach, who will see the possibilities offered by shared mobility multiply within their town.

The new order also demonstrates German's market dynamism in terms of autonomous passenger transportation. To date twenty Navya shuttles have been sold in Germany, including two EVOs at the end of 2021, which will be put into operation in October 2022 to serve the thermal spa of Bad Staffelstein within the MILAS project.

General News

Marelli, 1st to Bring a 35" Single Wide Display to Market

GENERAL NEWS



Marelli is the first supplier to bring a 35" single wide display to market, launching in early 2023.

The single wide display delivers high-tech safety and energy-saving features.

These include a Normally Black in-plane-switching Thin Film Transistor (TFT), in-cell touch for brighter and more saturated colors, a local dimming and integrated backlight to optimize screen display performance and save energy, an optically-bonded cover lens, slim bezel design, and Automotive Safety Integrity Level support for safety.

Marelli's range of large area displays provides a unique, coherent interface, delivering entertainment and a personalized experience thanks to seamless integration and advanced human-machine interaction (HMI). The wide display area also allows a dynamic configuration of the HMI, depending on the type of applications running.