DrivingVisionNews.com

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Editorial

"Success" Is Spelled I-S-A-L In The Lighting Community

We are approaching the 14th ISAL conference in Darmstadt. As one of the few veterans from the very beginning, I take the opportunity to address you, dear readers from the DVN community and make some personal comments mixed with hard facts from the now 27-year history of ISAL conferences.

Looking to the bare numbers, this scientific conference is more than outstanding. In 2019 alone 1,000 visitors came to Darmstadt just for ISAL. Over these 27 years 1,246 lectures and papers from 25 nations have been presented.

Looking a little into the story of those more than 1,000 papers, it was—and is—a precise mirror of what the lighting community has been covering in that time window. We saw in those 27 years technologies come and go. It all started with Xenon; design improvements, and performance papers. In the course of the years many technologies started with the words “NEW” but silently they were buried by reality. Like in 1995 the ramp-up of Neon-tube technology for cars was reported. Well, it did not survive, but xenon kept us all going for a while. For more tops and flops see this week's in-depth article. And it's still ongoing; in 2022 we talk about performance ratings; design improvements, Xenon is replaced by digital projections. So there is something of a red line going through all those 14 conferences, and this is repeated on these two days in April. The lighting community meets live again and listens, discusses, and understands the challenges of improvements in all fields.

So please be a part of the community—just come. Yes, there are concerns about Covid, and no, it is not over; the ISAL team is depending on the respectful behavior of the participants. But besides that, all those coming are awaiting that event eagerly. They are eager to meet and eager to learn the next steps of technological success. And this success is spelled I-S-A-L.

Sincerely yours,

Michael Hamm
Head of Headlamp Development at Audi AG

Two information on DVN activity
- The DVN Interior workshop will be held in Köln on 26-27 April.
- *The DVN report “Laser Technology for Vehicle Lighting and Sensing”* is now available.

In Depth Lighting Technology

ISAL over the Years: What kept the lighting community busy?

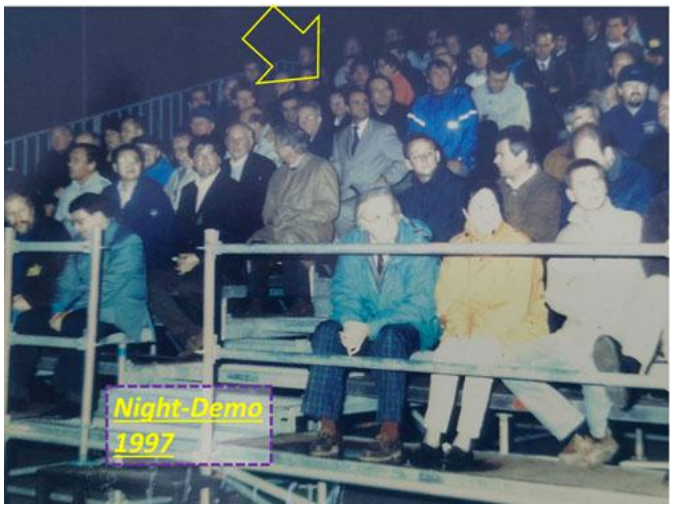
Even an “in-depth” article is too short to cover the 1551 abstracts resulting in 1246 lectures, papers and posters of those 14 conferences. The ISAL conference was and is the melting pot of scientific and engineering progress and serial application. But let’s look to the highlights and, consequently, lowlights of these events.
As there is no exact figure of merit, the ranking of a “Top” or “Flop” is just personal ranking of the author, and you may follow that also with a friendly twinkle in your eyes. And the author apologizes to all that are forgotten.

Let us start with the keynote speech. Well,13 conferences load a really heavy burden on the lecturers of #14. But in order to keep the challenge, let us concentrate on the good ones. A very good keynote was the contribution of Prof. Johann-Dietrich Wörner from the DLR, the German center for Air and Space Research. Besides the world of stars and space stations, he could captivate the audience with the research activities of DLR for energy and traffic, safety and digitalization. This was a 30-minute excursion in another fascinating world. And – ISAL conference can be proud to have a Nobel laureate keynote in its records. Prof. Shuji Nakamura explained the moments discovering the blue III/V LED story.

Quasi all conferences had contributions and sessions to Optics, Technology, Regulation, Photometry, Simulation, Rear Lighting and Front Lighting, Physiology and especially: Glare.
Some In-depth analysis:
Whereas 1995 already about 6 contributions covered High Intensity Discharge systems, only one (1) single lecture covered LED. In rear lamps. Xenon went out of interest slowly after 2011 with the last chapter of Xenon, the 25W 2000lm D5S bulb. There was a single, more or less historic reminder in 2015 with a D9S paper. The conference life span of Xenon was about 20 years.
At quasi every conference new simulation and evaluation systems have been presented. Each paper followed the idea to make a light distribution easier to evaluate and explain. In 2022 another rating will be presented by 6 lectures and a podium discussion: the HSPR Headlamp Safety Performance Rating. It seems that after 20 years of trials this is the first time a rating system is objective, understandable and covers current technology in a meaningful way and thus has a chance to be accepted.

Car Accident and Safety Research played an important role all over the conferences. It started 1995 with the characteristics of nighttime accidents. 1999 the mortality in Rieti and Frascati county was analyzed. Later Safety and Visibility Improvements from Xenon Projectors, Dynamic Bend Light and Adaptive Cutoffs were investigated. Especially safety aspects became more and more important from about 2013 onwards. New technologies created also conservative reactions, what the real benefits of such new technologies could be and what the drawbacks were. So, a bunch of studies and investigations covered ADB, Digital Construction Zone Light, Lane keeping, reaction times of dynamic signal functions as well as conspicuity, eye mark investigations, distraction potential and glare on wet roads.

One of the most cited Accident and Safety research highlights was an accident analysis already published in 2009. In a TÜV study the first big proof could be given, that good lighting (at that time it was Xenon) avoids accidents. The study was based on the German DESTATIS accident data base. Different road types and ambient illumination could be addressed. Two datasets were created, one with high Xenon equipment and one with low or zero Xenon equipment. As expected, on city roads there was no significant difference in reported accidents. On rural roads and highways however, the ´Night-to-Day-Ratio´ of reported accidents was significant lower for the group of cars with high Xenon take rate. So the conclusion was: For the group of cars with high Xenon take rate the risk of having a night time accident was clearly lower: -25% on rural roads and -17% on highways!!



We need more of such good news…..
What were the Tops, the most successful topics introduced at ISAL?
Obviously, LED, but this would be too easy.
Looking to the history, it is interesting to see when the first paper an innovative idea was announced and how many years later this idea became series reality.
One of the champions of innovative lead was the paper of BMW's Martin Enders in 2001. His paper on Pixel light based on the DLP chips was at that time not more than a smile. This idea just needed about 18 years before the first digital projections in Audi and Mercedes cars arrived on the market. We should congratulate him for that nearly 2-decade prevision capability.
Other prevision capability was shown in 2007 by the authors Mojrzisch and Strauss from Hella's L-Lab where they described a segmented Xenon shutter, most likely the begin of ADB and Matrix systems, at that time a dream. But, in 2013 the first Matrix headlamp reached the market with the Audi A8. Rearlamp Technology also needed a long ramp-up. Again 2007, OLED was first mentioned by the authors Kraus, Benter and Börner from Philips Lighting. 2016, 9 years later the OLED story became true. But, unlike others, this technology changed into the digital world and still makes part of the Audi story today…..

What were the Flops that popped up, excited the community for a while and disappeared again?
First to name: Night Vision Infrared. First mentioned in 2001, the peak of papers was about 7 in 2005. 2009 the last paper investigated some IR diode improvement. Then the story was over. 8 years lifetime for that technology from invention to oblivion.
Second: Marking Light, mentioned in 2009 was overrun by Matrix. After the Matrix stripes were existing, there was just no need for a separate module to make a striped light that was activated perhaps once or twice a year.

Third: LCD. A nice idea 2015 with a bulky solution, but Pixel Light, MicroLED and DMD made the story after 2019.
Other technology innovations that were named with “New…..” just didn’t make it. NEO, New Vertical Shape elliptics, New Crystal lens, New Opti-LED, New Omni-Blade, New 1024 LED pixels,…. Good ideas, no breakthrough. And some technologies were just too strange: Water cooling in headlamps, Heat pipes, Diffractive Optics etc.

What’s still to come? As of today, we do not know whether they either evolve as Flop or Top:
C2C, C2H, Car2X Communication, Digital Driver Assistance, Symbol Projections, Animations, Function-on-Demand, MEMS, LCOS, Laser scanners and many more…..
We are all keen to be part of the ongoing development.

And among the 1200+ papers some were exceptional in research, structure and results. The author’s subjective Top 5:
“Pedestrian Behaviour in different Encounter Scenarios” from TU Darmstadt’s Timo Singer, “Success of Driver Assistance through Digital Light Projections on the Road” by BMW’s Marina Budanow, “Analysis of Safety Aspects for LED Matrix Hight Beam Functions” by AL’s Armin Austerschulte and Ernst-Olaf Rosenhahn, “High Beam Optimization for Low Resolution Glare Free High Beam” by TU Darmstadt’s Jonas Kobbert and “Frontiers in LED and Micro-LED Technology” by Lumiled’s Oleg Shchekin.
(Sorry for the other excellent papers that were not mentioned)

And – last but not least – what would ISAL be without the constant flow of legendary photon videos of Visteon’s Rainer Neumann…..

Three questions to Pr.Khanh about ISAL

DVN: Will Covid Influence ISAL this Year?

Prof Khanh: Covid-19 has dominated the world stage for the last two years and continues to influence our personal and working environments, so it is no surprise that it also influences the planning of ISAL. Due to government restrictions, ISAL will be held with fewer visitors than in the past few years. A few exhibitors have cancelled due to travel restrictions, but this, in return, has offered a few new exhibitors the chance to participate. All visitors must wear a mouth and nose covering and will need to be vaccinated or recovered from the virus. The current mandates make the planning of the event difficult, but the organizing team is relieved to be able to hold ISAL at all. After two full years of online meetings, it is time to transition back into pre-pandemic life.

DVN: Which innovations and research results, we will hear about @ISAL, do you personally favorize?

Prof Khanh*:* After many years with LED, Laser and OLED since about 2006, the current innovations are not only developed on the fields of light source system (thermal management, dimming, modulation) and optics. The further innovations in the next future are related with the light aspects (lighting distribution on the road, rating and evaluation of the front lighting system with all the aspects like visibility, uniformity, brightness on the foreground field and adaptive rear light).
Also, after some years with lighting technologies like ADB and AFS as technological platform with pixel light (DMD, LCD and LED-arrays), the next questions are related to the whole loop from human drivers (or cameras and other sensors) over the decision making process with AI-based data processing to the pixel light headlamps in order to regulate and adapt the whole lighting distribution on the road in dependence on the currently monitored traffic situation. Also, innovations for rear lamp systems are not only the design-related tasks, the adaptation of rear lamp's luminous intensity is dependent on the weather (daytime, nighttime, wet or dry road surfaces) and traffic conditions (distance between the cars, road infrastructure) and will be operated by means of the future sensor systems.

Until now, the indoor lighting for a modern vehicle has been developed for manually driven cars and the current development stays on the level, that the interior lighting systems are configured with light guides (fiber optics) with RGB-LEDs generating decoration and mood atmosphere. The tendency of the next steps of indoor lighting systems are oriented for the autonomous vehicles in which the people shall use the indoor room as living and working room, so that we shall go from a signaling to an illuminating task and the working and living people are in the focus of totally new lighting concepts (human-centric-lighting).

How important is Automotive Lighting and the ISAL Symposium for the Technical University of Darmstadt?

Prof Khanh*:* The Technical University Darmstadt and its new Management Board have developed in the recent time a transfer strategy and are searching for cooperation with academic, industrial, social and political partners. We think that the future of Germany and Europe is closely related with the Automotive Industry generally and the Automotive Lighting specifically. ISAL Symposium is one of the most important conferences organized by a research institute of the TU Darmstadt since many years and stays a highlight in the process of science and innovations of the TU Darmstadt.

Lighting News

Monthly DVN Report on Laser applications in automotive

LIGHTING NEWS

BMW M8 2016 | MB S- Class 2017 | Range Rover 2018 | Audi A8 2020 | BMW 3

EXAMPLES OF HEADLAMPS WITH HIGH BEAM BOOSTER

DVN publishes this week, its monthly report which is dedicated to laser applications in vehicle.

The high luminance of laser sources attracted the attention of automotive lighting engineers for visible applications as lighting field and for infrared applications as lidar field.

Laser High Beam Booster
The application of laser sources in combination with remote phosphors to generate an ultra-powerful high beam was the first use case in vehicle lighting. Started in 2014 by BMW and Audi, in the meantime several other brands have also adopted this technology for their premium car models. The function is still mainly available as an option, not as standard equipment.

Ultra-Thin Cavities
The effective visual impression of ultra-thin cavities has a practical lower limit at about 10-15 mm height. Several companies started production of headlamps with frontal height as little as 15 mm based on HB LED technology. Since HB LED systems are well known technology; easier and less costly to develop without need of the safety systems required by lasers, in this application, too, the use of lasers will be limited.

Scanning ADB systems
Scanning MEMS laser systems to implement ADB and road projection functionality are under heavy development by key lighting suppliers. Although the application advantages of this concept are obvious, a number of challenges still have to solved: electrical and mechanical stability of the system as well as reliability of components.

Road Projections
Presently, road projections from headlamps are mainly implemented by a separate DLP unit. A DMD mirror array is illuminated by a sophisticated optical system to generate close to homogenous illumination pattern. Light sources for this application can be HB LEDs or laser sources. In automotive applications, mainly HB LEDs are used, here again because of their advanced state of development, low cost, and simple system architecture relative to laser setups.

Exterior lidar sensors
Exterior lidar sensors are strongly coupled with driving automation. In addition to cameras and radars, a third independent source of information is needed to safeguard reliable vehicle surrounding data even under adverse conditions. It is the opinion of a broad majority of automakers; tier-1 suppliers; research institutes, and industry experts that driving automation from L^3 upwards needs lidar sensors for reliable functioning. Additionally, the lidar sensor information will enable advanced ADAS functions.

In-cabin sensing
Driver- and occupant monitoring systems are key technologies to observe and keep track of driver attention and occupant behaviour. Monitoring of driver attention is becoming a key element to proceed to (partial) L^3 automation. Safety organisations already require in their roadmaps DMS and OMS as a feature for the best vehicle ratings, and regulators are considering especially DMS as a requirement for L^{3+} vehicles. Additionally, OMS are being phased in to prevent death of children and pets left behind by distracted parents.

In the future

- In lighting segment, Laser systems will have a difficult position. The creation of HB LEDs has significantly cut into lasers' brightness advantage and the related improved benefits in the application. Under these assumptions, we expect that laser-based systems in automotive headlighting will remain a niche.

- For sensing applications, the situation is quite different. It is broadly common opinion that lidar sensors are an important support for advanced ADAS functionality and are necessary for L^{3+} driving automation. Such laser sensors will augment cameras and radars as a redundancy safely measure. The market development of these systems is strongly linked to the expected progressive growth of driving automation. Lidar sensors need IR laser sources, and a replacement by other sources is not on the horizon. Consequently, the extension of this IR laser segment will follow the growth of ADAS and driving automation.

- Driver- and occupant monitoring systems are high on the agenda of vehicle safety organisations and automakers. DMS is an important element to support driving automation to detect inattentive drivers. OMS is brought to the attention of authorities in combination with safety features with respect to use (and correct use) of seat belts, and to prevent children and pets being left behind in parked cars.

ams OSRAM Will Sell AMLS to Plastic Omnium

LIGHTING NEWS

ams Osram have agreed to sell the independent and dedicated AMLS business to Plastic Omnium for €65m. The company will continue to be a key supplier of automotive LED and optical components to Plastic Omnium.

AMS Osram Automotive Lighting Systems was established in October 2021 following the dissolution of the Osram Continental JV. Headquartered in Munich, AMLS combines lighting technology with electronics and software to develop smart and innovative full lighting systems for the automotive industry.

As an industry leader in automotive optical solutions, AMS Osram will continue to provide high-tech innovation in components for automotive, including automotive lighting, covering the entire light spectrum and sensing applications for the car industry. This includes key automotive technology to support optical applications such as driver and interior monitoring; dynamic and static exterior lighting; RGB interior lighting; lidar for ADAS; head-up displays, and gesture sensing to name just a few areas of innovation.

The AMLS business generated €148m in revenues in 2021, and has around 770 employees at nine locations worldwide, including 120 engineers working in five dedicated R&D facilities. With Plastic Omnium, AMLS will join a world-renowned and strongly growing automotive tier-1 supplier group with 30,000 employees serving a global customer base. Headquartered in France, the company posted an annual revenue of €8bn for 2021.

Morgan: Auto lighting, Ext. and Int., has a Great Future

LIGHTING NEWS

SASCHA KLAPPER

TODD MORGAN

Last week, Sascha Klapper, Lighting Senior Analyst at IHS Markit discussed with Todd Morgan, Chief Technology and Innovation Officer at Lumax Industries, how vehicle lighting is influencing the automotive design in the coming years.

Todd first made a great summary of the main steps of automotive lighting, clear lenses, then HID, DRL, AFS functionalities, LED, and now ADB, all these technologies oriented to safety but also to styling differentiation.

Then he talked on the future of lighting. There were not breaking news but an interesting status of the lighting technologies and functions arriving very fast in the Premium cars before extension few years later in the medium size cars and also in the emerging countries.
In the new functions, Todd mentions lighting communications as Welcome/Farewell, signs to the drivers, to the pedestrians, to the environment, displays and new lights in logos and grills in front of the car.

With the DRL, the dynamic lights, the personalization, the ADB, the OLEDs, “Lighting is becoming more than the new chrome for designers. Lighting is the intelligent chrome” while is improving safety.
Automotive lighting, exterior and interior has a great future and the arrival of EV and AV combined with subscription service are opportunity to grow the market.

Follow all the interview in the link below

https://autotechinsight.ihsmarkit.com/podcasts/42/lighting-ahead-staging-the-future-vehicle-design

To continue the interview, DVN asked 4 missed questions to Todd Morgan, one of the greatest experts in automotive lighting.

DVN: 2 years after your arrival at Lumax, what is your feedback on Lumax and on the Indian market?

Todd Morgan: Lumax, as well as the entire Indian market, is packed full of opportunity. We see the Indian market craving new innovative technologies, and although there are definitely cost barriers, that doesn’t prevent us from developing and delivering cost-effective and high value solutions. Electric vehicles (EV) are appearing at most major OEM’s and there are some exciting startups coming into the market as well. We also can’t neglect the 2-wheeler market in India, and you will see some very interesting technologies appearing there as well. Bringing new innovation to the interior of vehicles is an interesting opportunity too.
To make this happen, we already have a very strong technology partner with Stanley, and their connection to the JOEM’s is invaluable. Our development center in Taiwan also brings an excellent connection in Asia (customers, prototyping and tooling). We are now opening our European office in the Czech Republic, where we will develop and adapt innovations for the Indian market, act as a window to our European based customers, and aggressively develop our technical competency across the organization, particularly in our two engineering centers in India (Delhi and Pune). I’m truly excited about the plans we have in place with Lumax, and the response from our customers have been nothing but positive.

DVN: You presented the bright future of ADB. which technologies will be dominating in the next five years and with which penetration? (Matrix, HD, scanning, LCD with which type ?

Todd Morgan: It goes without saying that ADB brings an unparalleled improvement in performance and safety, and our goal is clearly to provide this technology on all levels of vehicles. To drive down the cost, we need to look at efficiency, and I believe the micro-LED technologies that several Tier2’s are developing is the path forward. Competition in the market is always good for cost but will also drive efficiency improvements. This will allow the premium segments to bring even more amazing functionality and it open the doors to the mainstream market. I think the fact that the USA will FINALLY allow ADB will also help drive down cost and bring focus to cost-effect ADB technologies. We are already developing ADB

systems for Indian OEM's, so that speed of technology migration continues to accelerate. I don't think we are going to see 20k pixel solutions in the emerging markets very soon, but I'm confident you will quickly see cost-effective ADB designs on the road.

DVN: in front lighting, which main trends for style or marketing do you see in the premium cars, Generalist cars and in emerging countries. How the technology need to evolve to prepare that?

Todd Morgan: As we all know, the studio are using lighting to define the signature of the vehicle, and as a lighting guy, I always enjoy the vehicle unveilings, because what do you see first? The lighting! We will continue to see the lighting being dispersed on the front of the vehicle as opposed to being 2 "simple" headlamps, for example into the facia. Lit grille is a great canvas to play now, particularly for EV's. The animation and personalization effects seem to be without limits, and clearly, we will see more and more effort in that direction. These effects can also be combined to act as a communication tool, for example using it to communicate charging status.

Unsurprisingly the premium segment will lead the way in bringing new functionality on the road, and also push for any regulatory revisions that are necessary. But I see the generalists and even the emerging markets putting more budget into lighting. Also as EV continues to grow, studios want their vehicle to look like an EV.

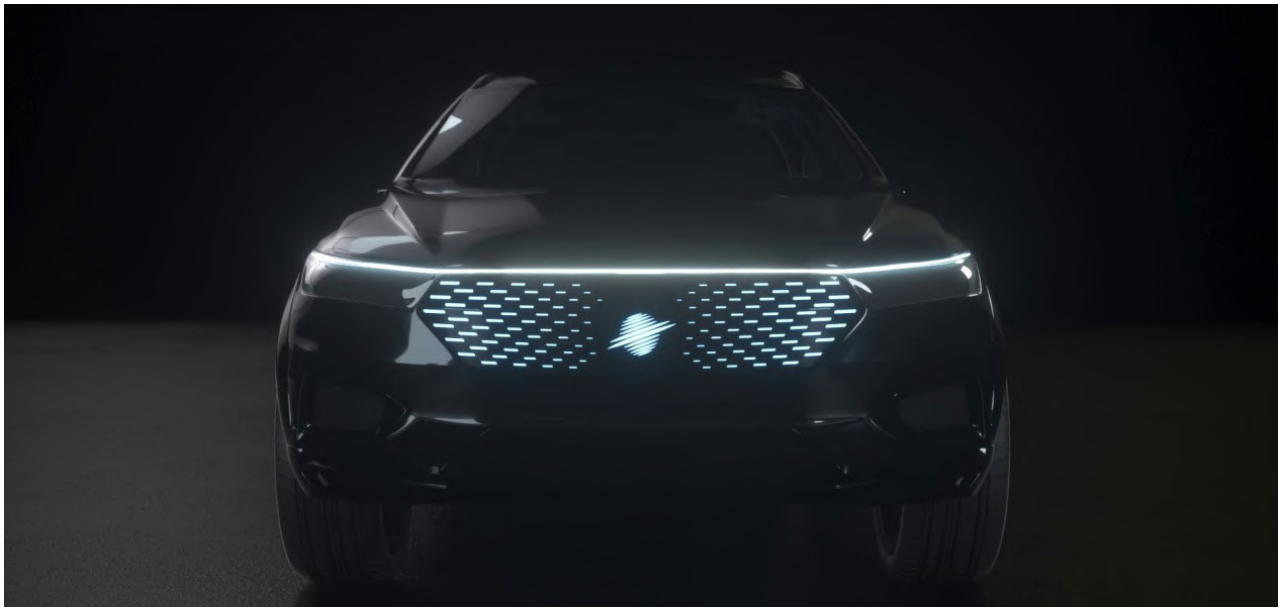
As a lighting community we need to continue to look for ways to develop compact modules, to make room for all of the styling elements. We also need to find the sweet spot between standardization and customization. Lastly, I can only repeat that the focus needs to stay fixed on efficiency and maximize the Lumens/watt KPI. This will also drive improvements in cost, weight and package space.

DVN: After two troubled years due to the pandemic, how do you see the future of lighting What could be the most important challenges for the Lighting industry during the next five years?

Todd Morgan: Between the pandemic and the semiconductor shortage, it's been a tough couple years for the entire automotive industry, but I remain optimistic that we will come out of both stronger than ever. I think the announcement of several OEM's moving to become purely EV is significant, so the challenge to provide more and more functionality and features, and at the same time lower power consumption will be interesting. I think also the ability of the regulations to keep pace with the evolution of what is technically possible (and affordable) will be something we need to take very seriously. Image projections is a great example of this and finding the balance over what is a safety enhancement, but not a distraction to other drivers is a subject of debate. ADAS is another area of great interest to all of us, and not only how we can better integrate sensors and cameras around the vehicle, but also how we can enhance our beam patterns (visibly and invisibly) to improve the performance of these sensors. All of this will continue to accelerate the need for us to develop our capacity and competency in electronic hardware and software. Definitely exciting times ahead!

Hella's New Front End Design Concepts

LIGHTING NEWS



Unlike a conventional car with an internal combustion engine, an electric vehicle does not require active engine cooling. Hella Lighting managing director Dr. Frank Huber says " This opens up completely new design possibilities for designers of e-vehicles; the entire area can therefore be freely designed. Hella is developing large-area panels for this purpose. Special attention is paid not only to the design, but above all to the integration of further functionalities".

Based on the company's distinctive lighting and electronics expertise, Hella integrate front radar covers ("radomes"); radar sensors, lidar sensors, and cameras for driver assistance systems, and headlamps into the front face panels. "We act as an innovative system integrator. Vehicle manufacturers benefit from this because they have to coordinate fewer sub-suppliers," says Dr. Huber.

To give the panel an attractive day and night appearance, Hella use various manufacturing processes. For example, structures such as hexagons can be introduced into the surface with a laser. Manufacturers can individually choose whether panels are implemented in the vehicle's colour, or in a homogeneous black or chrome look. Hella master new technologies such as injection stamping; film back injection, and others to produce highly decorative components according to customer requirements. At night or when switched on, the light exits are illuminated and structures and animations become visible. "Within the framework of the respective legislation, many things are possible in terms of design," explains Dr. Huber. Another advantage is that the panels can be quickly customised, for example for different model variants, by simply adjusting the design or styling of the surface. "This eliminates the need for costly mold adjustments, resulting in a faster return on investment for automobile manufacturers".

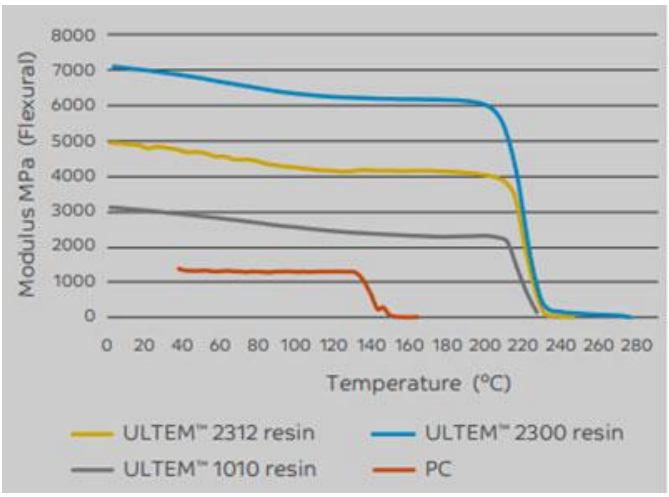
Ultem Resin for Digital Matrix LED Headlamps

LIGHTING NEWS

DIGITAL MATRIX HEADLAMP PROJECTS WARNING IMAGES IN FRONT OF THE CAR

Sabic's Ultem polyetherimide resin addresses high temperature requirements, up to 230 °C. Additionally, the material's dimensional stability and low outgassing performance are comparable to metal and glass. Potential digital matrix LED headlamp applications include lens barrels; spacers; brackets; reflector mirrors, and DMD sockets.

Ultem resin benefits also include low mass compared to metal and glass; direct metallisation, and a high degree of design freedom.



MODULUS VS TEMPERATURE: ULTEM MAINTAINS HIGH MODULUS UP 217 °C

ZKW's Climate-Neutral Polestar Electronics

LIGHTING NEWS

The aim of the Polestar 0 project is to develop and bring to market a completely climate-neutral automobile by 2030. ZKW will develop electronic and electrical components for Polestar. In addition, the company will switch to CO_2-neutral production worldwide by 2025. This goal is to be achieved with energy savings, waste avoidance, and conversion to green electricity. CEO Oliver Schubert says: "As part of the joint project, we are investigating the potential of the circular economy in order to reduce the ecological footprint of our products to zero in the future". The Polestar 0 project aims to completely eliminate emissions from the supply chain and change the processes of automobile production in the long term instead of offsetting CO_2 emissions.

Modern headlamps comprise many different components, including various plastics and electronic components. For sustainable production, the proportion of plastics must be reduced, for example through the use of bio-based or recycled materials. An analysis by ZKW has shown that electronics are a key driver for climate-neutral headlamps. Harmful emissions can be avoided here with printed circuit boards—for example through new materials and optimisation of process technology—and by switching to CO_2-neutral electronic components and assembly.

Making electronic and electrical components climate-neutral requires more than new materials and process technologies; carbon capture in the manufacturing process; the avoidance of waste, and recycling also enable CO_2-neutral production. Even the reusability of repaired headlamps is conceivable. “Where emissions cannot be avoided, alternatives must be found. For example, a connector housing could be made from biogenic raw materials, or it could be dispensed with by using other connection methods, such as direct plug-in connections or PCB edge connectors," says Schubert.
With the "SusMat4CarLight" project funded by the Austrian Research Promotion Agency FFG, ZKW are researching sustainable, recyclable composite materials for future car headlamps.

Driver Assistance News

Valeo's Lidar in Mercedes Drive Pilot L3 System

DRIVER ASSISTANCE NEWS

Valeo Scala 2, the supplier's second generation lidar, plays an important role in the Mercedes Drive Pilot system for conditionally automated driving (SAE L^3), allowing the driver to delegate under certain conditions the driving task to the car in complete safety.

In December 2021, Mercedes received the world's first internationally valid system approval for L^3 automated driving, meeting the demanding legal requirements of UN R157 for such systems. If the particular national legislation allows it, Drive Pilot can operate in conditionally automated driving mode at speeds of up to 60 km/h, in heavy traffic or congested situations and on suitable stretches of motorway.

Drive Pilot will be available in Germany in the first half of this year. It measures the distance to surrounding objects to the nearest centimetre, by calculating the time it takes its laser beam to travel to an obstacle and back again. This enables it to build a complete 3D image of the vehicle's surroundings. The point-cloud image is analysed by algorithms to identify all the objects, allowing the device to distinguish between moving and static objects. It classifies them into different categories such as cars; trucks; buses; bicycles; motorcycles; pedestrians, and infrastructure, and captures their shape and position. If the objects are moving, it measures their speed and keeps tracking them, even when they are no longer in the driver's line of sight. It predicts the objects' behaviour and trajectory.

Valeo Scala 2 transforms the raw data from the sensor into useful data. It eliminates any data that could alter its calculations, as if it were filtering the information to validate only relevant data. This enables it to cancel out any echoes caused by raindrops on its light pulse, so it can see through the rain and measure the density of a rain shower. Its software even allows it to troubleshoot itself. Its exclusive cleaning and heating system is triggered whenever its field of vision is blocked, by dust or ice for example.

Luminar Integrate Further With Freedom Photonics Buy

DRIVER ASSISTANCE NEWS

US-based automotive lidar leader Luminar Technologies will buy Freedom Photonics to get greater control over the supply of key system components including lasers. Luminar say the buy "follows a multi-year collaboration and brings fundamental next-generation chip-scale laser technology, intellectual property, and production expertise in-house". Cofounder and CTO Jason Eichenholz said the addition of Freedom Photonics would benefit both system performance and cost, thanks to greater economy of scale and a strengthened technology roadmap: "They have proven to be the best in the world for breakthrough semiconductor laser chip technology, where both power and beam quality are needed simultaneously for true high resolution at long range".

Earlier this year, Freedom Photonics claimed a new world record by demonstrating more than 5 W of continuous-wave optical power from a 1,550-nm laser diode amplifier—that's the same wavelength used in Luminar's lidar systems—with nearly diffraction-limited beam quality. Freedom Photonics CEO Milan Mashanovitch, for his part, says "Joining Luminar is the perfect opportunity for Freedom Photonics, providing us an accelerated path to at-scale commercialization of our world-class diode laser technologies".

Founded in Santa Barbara, California in 2005, Freedom Photonics have expertise across indium phosphide (InP), gallium arsenide (GaAs) and silicon photonics material platforms, and have actively been collaborating with Luminar for several years. Cofounded by CEO Milan Mashanovitch and CTO Leif Johansson, Freedom sell a range of high-performance laser diodes as well as high-speed photodetectors and customised private-label components.

Beep Secure Additional Funding

DRIVER ASSISTANCE NEWS

Autonomous Mobility Solutions

Beep, a provider of multi-passenger, electric, autonomous mobility solutions, announced USD $25m worth of Series A-1 funding led by ABS Capital, with supporting participation from Intel Capital, Blue Lagoon Capital, TDF Ventures and Hidden Creek Management.
The funding will enable Beep to further develop their autonomous software platform while also advancing their flagship public transit autonomous mobility service focused on first- and last-mile transportation networks.

This latest funding round follows a strategic collaboration announcement in February 2022 with Intel's Mobileye and Bentelerto develop and deploy automotive-grade; fully electric, autonomous people movers for public and private communities by 2024 across North America, aimed at first- and last-mile use cases. The purpose-built autonomous mover from Benteler EV Systems will be underpinned by Mobileye's industry-leading self-driving system, and supported by Beep's proven deployment and operations systems, technology and services.

Beep deliver mobility services utilising driverless, electric, multi-passenger vehicles. By specialising in planning, deploying, and managing advanced autonomous shuttles for both private and public communities, Beep safely connect people, places, and services in first-mile, last-mile mobility networks. Beep also leverage the data and learnings from their public road deployments to produce vehicle agnostic, edge solutions meant to enhance safety, access, artificial-intelligence and driverless operating capabilities of autonomous platforms. Beep deliver on a primary goal of enabling mobility-for-all with the services and software they provide.

New Eyes, New Perspectives on AV Crashes

DRIVER ASSISTANCE NEWS

Dr. Carl Macrae is an applied psychologist and professor with a PhD in risk management, conducted in collaboration with a large airline. Currently he is researching the risk analysis and safety governance of artificial intelligence in complex sociotechnical systems—how risk events and other disruptive incidents are analysed and learnt from, and how organisational and regulatory systems can be designed to support adaptation and improvement.

Now Dr. Macrae has a new paper out—it's **available online**—looking through important new lenses at the 2018 crash of a self-driving Volvo modified by Uber into a pedestrian crossing a road in Arizona. The abstract says, inter alia, that AIS (autonomous and intelligent systems) are rapidly proliferating, including in self-driving cars. These AIS have the potential to bring enormous benefits to society, but also to introduce new risks and aggravate existing ones. One of the most critical risk management challenges is to ensure that AIS failures can be rigourously analysed and understood, so the safety of these systems can be effectively governed and improved. AIS are necessarily developed and deployed within complex human, social, and organisational systems, but to date there has been little systematic examination of the sociotechnical sources of AIS risk and failure.

Accordingly, Dr. Macrae's article develops a conceptual framework that characterises key sociotechnical sources of risk in AIS by reanalysing one of the most publicly-reported failures to date: the 2018 fatal crash of Uber's self-driving car. Publicly available investigative reports were systematically analysed using constant comparative analysis to identify key sources and patterns of sociotechnical risk. Five fundamental domains of sociotechnical risk were conceptualised—structural; organisational; technological; epistemic, and cultural—each indicated by particular patterns of sociotechnical failure. The resulting framework of sociotechnical risk in AIS extends existing theories of risk in complex systems and highlights important practical and theoretical implications for managing risk and developing infrastructures of learning in AIS.

Meanwhile, Wired magazine has published a first-ever **in-depth article** centred round Rafaela Vasquez, the safety driver popularly—but maybe not correctly—considered to have been at fault for fiddling with her phone instead of watching the road. The article goes into extensive technical detail on the modifications Uber made to the self-driving Volvo, including disabling its automatic emergency braking system.

PreAct, Espros Collaborate on Flash Lidar

DRIVER ASSISTANCE NEWS

PreAct Technologies, an Oregon-based developer of near-field flash lidar technology, and Espros Photonics, a Swiss leader in the design and production of time-of flight chips and 3D cameras, have agreed to co-develop new flash lidar technologies for specific automotive; trucking; industrial automation, and robotics use cases. The collaboration combines the dynamic abilities of PreAct's software-definable flash lidar and the versatile and ultra-ambient-light-robust time-of-flight technology from Espros, to create next-generation near-field sensing solutions.

The automotive and trucking industries continue to rapidly integrate ADAS and self-driving capabilities into vehicles, and the need for ultra-precise, high-performance sensors is paramount to ensure safe autonomous driving. The sensor solutions created by PreAct and Espros will address top ADAS and self-driving features such as traffic sign recognition; curb detection; night vision, and pedestrian detection with the highest frame rates and resolution of any sensor on the market.

PreAct Technologies created the world's fastest flash lidar that powers near-field sensing and object tracking solutions for automotive; trucking; robotic, and industrial markets. Their patent-pending suite of sensor technologies is also the only software-definable lidar on the market designed specifically to support the extended life of software-defined vehicles.

Espros Photonics were founded in 2006 and are a highly specialised IC design and production company built around a unique CMOS/CCD process developed and owned by Espros. The company also develop and produce 3D camera modules based on their own 3D imagers.

General News

German Automakers: What Crisis?

GENERAL NEWS

German luxury cars have never sold as well as in 2021:
• Porsche recorded the most successful year in their history, according to their president Oliver Blume, posting a rate of return on turnover of 16 per cent.
• Lamborghini, a Volkswagen Group brand, did even better with more than 20 per cent.
• Mercedes announced a return of 12.7 per cent on their sales, a figure never equaled in their history of more than a century.
• And BMW turned in a return of over 10 per cent, the best result since 2017.

These results contrast with the uncertainties linked to Russia's war on Ukraine. The shortage of wiring harnesses produced there has already forced several manufacturers, including BMW and Porsche, to temporarily halt production. Despite this “very volatile” situation, BMW boss Oliver Zipse assures that the company will remain “profitable”. Shortages remain "manageable" for his teams, he says. He nevertheless had to reduce his profit growth forecast for 2022 by one point, estimated at between 7 and 9 per cent.
Luxury was in full recovery in 2021. In a sluggish automotive market, sales increased by 8 per cent for BMW, with more than 2.5 million vehicles delivered in 2021; by more than 11 per cent for Porsche with 301,915 vehicles sold; and by 13 per cent for Lamborghini. The Volkswagen group have thus directed the available semiconductors to their Porsche subsidiary, to the chagrin of the VW factory unions.
Mercedes have also focused on the top of their range, which grew by 30 per cent in 2021, while Class A sales have stagnated.

At the same time, manufacturers have reduced their fixed costs. Faced with a demand that cannot be fully met, they have also abandoned the discounts. So:
• Porsche now collect a net profit of €16,500 on average per vehicle;
• Mercedes: €5,800;
• BMW: €3,900.

Hon Hai Aim for Share of Global EV Market by '25

GENERAL NEWS

This month, Hon Hai Precision Industry published their 2021 annual report, according to which Hon Hai's operating income in 2021 will reach a record high of approximately €200m, a year-on-year increase of 12 per cent; the net profit attributable to the parent company is approximately €4.5bn, a year-on-year increase of 37 per cent.

In terms of electric vehicles, "Hon Hai's EV cooperation has been in progress according to schedule. Accelerating commercial transfer and mass production, and developing higher-value components and software will be the focus of Hon Hai's EV development in 2022. By 2025, Hon Hai's target is 5% market share. The vehicle production target will be 500,000 to 750,000 units, of which the revenue contribution from vehicle OEMs is expected to exceed half", said Liu Yangwei, Chairman of Hon Hai Precision.

Regarding the specific mass production progress, "Hon Hai expects to start producing the electric pickup truck of the American electric company Lordstown in the second half of this year, and the Model C electric vehicle will start production in Taiwan in 2023".

The Epidemic is Not Fatal: VW

GENERAL NEWS

At VW's annual media conference, VW Group China CEO Stephan Wollenstein said that although the pandemic has dented many places in China, impact is not fatal: "The suspension of individual factories for a few days is completely controllable. A similar situation occurred in Ningbo in December last year, which lasted about 2 weeks. Several factories in China have strong flexibility and can work overtime through overtime. Add a little bit of catching up, so it won't be a structural issue".

On March 13, affected by the epidemic, FAW Group announced that all five vehicle factories in Changchun City will suspend production. The restart time of the production line will depend on the overall situation of epidemic prevention and control.

FAW Group has five major automakers in Changchun: namely FAW Hongqi; FAW Jiefang; FAW Car; FAW-Volkswagen, and FAW Toyota. Changchun Fengyue Company have an annual production capacity of about three million vehicles.

In 2021, Volkswagen sold more than 119,000 EVs in the Chinese market, a year-on-year surge of 128 per cent, setting a record for the highest growth in history. Among them, about 70,000 ID-series models were delivered.