DrivingVisionNews.com
Automotive lighting and driver assistance technologies

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Editorial

150 DVN Reports—And Counting!

Last week, we published our 150th DVN Report! Many of them, going back years now, are still apposite today. Of course, some of the earlier ones contain information that no longer pertains to the current realities of the field, but those, too, remain interesting and useful as an archive of where we've been.

And every DVN Gold member has ready access to all 150 of them. The DVN Report library contains a big variety of titles. There are automaker profiles, lighting supplier profiles, regulatory analyses, detailed descriptions of vehicle lighting in important regions around the world. There are thorough assessments of technologies and techniques in interior and exterior lighting, in simulations, in machine vision. There's detailed coverage of every DVN Workshop and of important congresses like VISION and ISAL, and photographic records of the world's auto shows.

Judging by the feedback you send us, DVN Reports are very useful for the lighting community—especially for newcomers and for training. The DVN Report we published last week is a fine entrée to discover lighting and its history through the lens of styling, a crucial lever in the neverending drive to sell cars. We're proud to bring you ongoing, high-quality coverage on topics that matter in your professional life, and we intend to carry on doing it.

See below a very interesting In-depth made by the American Daniel Stern about the great challenge of the new lighting functions which will represent a “central wave of the future of vehicle lighting”. For this reason the DVN team, with the greatest worldwide experts, is working very hard on a study named "**New lighting functions - 2020-2030**" to improve Safety, Communication, Comfort and Styling. More information soon.

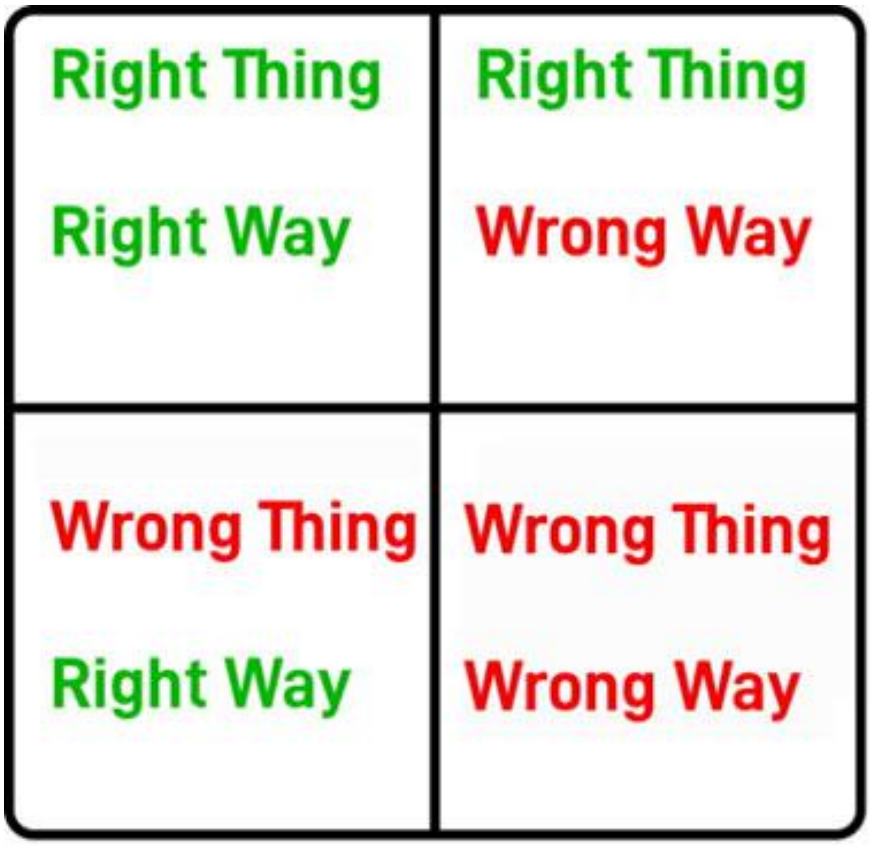
Keep well and be safe,

DVN PRESIDENT

In Depth Lighting Technology

Doing the Right New Lights the Right Way

Welcome/Farewell displays…dynamic turn signals…road-projected turn signals…road-projected reversing lamps…road-projected lane guidance lines…autonomous-mode indicator lights…variable-message displays that can show a vehicle's state of charge, warn following drivers of emergencies up ahead, and provide any number of other message content…numerous new interior lights…and that's not even to mention perhaps the crown jewel of them all: ADB in its many, increasingly capable forms. It's no secret that whole new kinds of vehicle lights are proliferating in the minds of engineers, designers, stylists, and safety practitioners. We give them heavy coverage here in DVN, because they represent a central wave of the future of vehicle lighting.



Aside from their functionalities, most all these new lights have significant styling punch and power. But at base, most car lights are safety items; even those not intended to directly provide a safety function have considerable power to improve or degrade traffic safety. Lights can inform or misinform. They can warn or distract. They can clarify or confuse. They can work in harmony with the other lights around them on the same car and others, or they can clash—overwhelm—drown out—contradict.

Most of a century ago when cars were getting their first serious lights, the questions of what to do and how to do it were, in many ways, quite a lot simpler. There was no established practice to worry about violating, what regulations existed were being written in time with the development of the lamps themselves, and the state of technology and technique constrained the possible implementations. The automotive world looked to broad conventions already in place for the likes of railways, to arrive at general guidelines. White light to the front and red light to the rear, for example, is a deeply ingrained, foundational plank. So much so that even though rigourously scientific research in the 1960s and '70s found green is probably a better colour than red for the rear position (tail) light function, and found no problems caused by mixing red-taillight and green-taillight vehicles in traffic, there was practically no possibility to swerve from the red-taillight convention. It had simply been baked into the cake much too long ago, and so established practice won out over scientific rectitude.

Less seismic squabbles cropped up over the years, and they still haven't been fully resolved—what colour should the rear turn signal be? The front position lamp? The rear side marker light?—but these kinds of questions are rapidly being dwarfed by the intricate questions of how to add new lights beneficially, without spoiling existing lights or making new problems. Theoretically, of course, the answer is "do the science!". But what level of science is appropriate? American regulators want extensive, rigourous study demonstrating that a new kind of light doesn't negatively affect safety. That's a rational, reasonable approach, but it brings its own practical limitations: if a new kind of light doesn't meet existing regulations, it can't be deployed beyond a small scale, making it very difficult to gather realistic data about the new light's safety effects.

But it's easy to go too far the other direction, too, and argue for a new kind of light based on guesses, assumptions, hopes, wishes, dreams, commercial intents, and inadequate or improper kinds of science. Take sequential turn signals, for example: as long as there have

been sweeping turn signals, there has been commercial promotion of the idea as a big safety improvement, and there has been grumbling in regulatory and technical-standards boards that the claims for better safety aren't based on any real or apposite data. Which side is right? Maybe both, to some extent; almost every question raises at least one more question. If *one* car has turn signals that illuminate sequentially in a more-or-less horizontal line in the direction of intended movement, and the intensity and dwell time are appropriate, maybe that turn signal is at least as effective as a conventional on/off blinker. If one car out every ten has such signals, maybe that's still okeh. But thorough scrutiny of real crash data has revealed that when most cars have a CHMSL, vehicles without one are at elevated crash risk. The same is true of DRLs. So at what point—if any—does the mix of dynamic and static turn signals begin to make problems? Does the overall safety benefit go negative for some vehicles? For all vehicles? We don't know, and yet sequential turn signals are on the roads. And if turn signals that *illuminate* sequentially are at least as good as on/off blinkers, does that necessarily mean turn signals that *extinguish* sequentially are equally beneficial, or at least no worse? This very debate has just taken place in the SAE Lighting Systems Group, with decisions **made** but no new data presented or assessed—which means the decision was made based on conjecture, speculation, rationalisation, and opinion. Is it correct? Maybe or not, but these kinds of decisions can be very difficult to reverse once they've been made.

Naturally, any inventor wants the validation and remuneration of seeing their new light on every car. Likewise, a company proposing a new kind of car light stands to gain quite a bit if their new light is allowed or required: a product-differentiation lever, a revenue stream, other kinds of fame and fortune. The point of this article isn't to accuse or judge any car company or expert group for the decisions and claims they've made, but to encourage discussion: just what kind and amount of science is necessary to really justify a new kind of car light?
For an exercise in point, let's look at one particular proposal for front stop lights: one or two green forward-facing lights that illuminate together with the equipped vehicle's conventional red rear stop lights. The photo here shows an equipped vehicle with its green front stop light lit as it slows to give way to a pedestrian.

There's a well-polished **website** to promote the idea. The site has photos and videos, quotes from European Commission white papers, and what purports to be science and research. The site owners, through the tone and content of the website, make arguments that front stop lights are necessary, effective, and cost-effective; theirs is the right way to implement them, and they should be green.

Do the arguments have merit? Well…maybe. Some of them might, sort of. Certainly there are kernels of truth and reasonable propositions present: drivers have an easier time telling what pedestrians are doing than pedestrians have telling what an oncoming car intends to do. AVs will mean something has to replace the longstanding pedestrian/driver right-of-way negotiation via eye contact and hand gestures, and a light signal of some kind seems logical. The European Parliament are in favour of emergency braking display, and they base that favour on a position that "the deceleration of vehicles should be rendered easier for other road users to perceive by means of clear signal lights on vehicles". A front stop light could give drivers more opportunity to take evasive manœuvres to avoid a rear-end collision. Those all sound like reasonable propositions.

But it is a long leap of faith to go from those general premises to an assertion that this outfit's green front stop lights should be on all vehicles. Throughout the site and its documents, guesses and opinions and survey responses are overinflated into—and presented as—scientific findings. Phrases like "longitudinal field test" are used to make a loose collection of a few subjectively-reported anecdotes sound like a solid set of data. The argument for the front stop light's cost-effectiveness amounts to "It costs only about €30 to equip a vehicle, so there's no reason for the purchase price of the vehicle to increase"—anyone who has ever had even the remotest brush with a car company's cost-control department knows that every cent is consequential; a €30 increase in build cost is certainly not accepted with a shrug, nor is it ever assumed the automaker will simply eat this cost and not raise the price of the car.

And then there is the matter of colour: why green? Well, because all the other possible colours are unavailable or unsuitable: white would get lost in the existing white DRLs and headlamps. Amber is for turn signals. Blue is for emergency vehicles. Red is for the rear of the car. And therefore: green, support for which takes the form of a paper musing on the psychological effects of red and green, which is then overtorqued into an argument that because green is associated with forward motion and words like 'go', it's the appropriate colour for a front stop light.

Oops, but autonomous-mode indicator lights are turquoise (i.e., blue-green), a colour closely adjacent to green; how easy would it be to confuse the two? And green is already used in the traffic system to mean "go"—now this proposal wants to use it to mean "stopping"; what will be the effects on traffic signal clarity? On the speed and accuracy with which drivers react to green traffic lights? How many drivers will make a mistake when a green light comes on in their field of view? How many of those mistakes will result in crashes? And it seems likely, perhaps inevitably so, that some number of people would rely too heavily on the front stop light and enter the path of a vehicle that isn't actually slowing or stopping enough to avoid a collision. Will any of these effects degrade, negate, or reverse any safety benefit that might come from the front stop lights as proposed? Anybody can guess, hope, wish, and opine, but we cannot *know* without rigourous, realistic science.

And the same probably goes for the other new kinds of light being proposed from all corners of the autosphere. Lovely ideas, most of them, but that's not sufficient; their merit must be proven by reference to what actually happens in the real world as it actually exists. Scientists, start your engines!

Lighting News

Unclear future for light JV between Osram and Continental

LIGHTING NEWS

Osram and Continental confirmed discussions about the future of their cooperation. The joint headlight company of the automotive supplier Continental and the lighting group Osram could possibly soon be dissolved.

The Dax group from Hanover said last week that both sides are holding talks about the JV. Nothing has been decided yet. However, the company did not want to comment on the question of whether a sale or a reintegration of the activities was conceivable, as did the further schedule. Also from Osram it was said only that one was in talks, but there was still no decision. The "Wirtschaftswoche" had previously reported about it.

There are around 1,500 employees in Munich who deal with automotive lighting technology. However, industry circles heard last week that the future for the JV could look dark. Neither Continental nor the future Osram majority owner AMS would be very interested in it.

Continental - the world's second largest automotive supplier after Bosch - is currently converting its structures in the direction of electronics, sensors, electromobility and software. Light and LED technology are also considered future technologies in the industry, but the Hanoverians' focus in the future will be primarily on IT systems and networking. The classic drive division will also soon be spun off into an independent company.
Osram, a German multinational lighting manufacturer headquartered in Munich, Germany. is currently being taken over by the Austrian sensor specialist AMS. Its portfolio ranges from LEDs, sensors, and modules to light management systems

OLEDs Grace New Audi Q5

LIGHTING NEWS

Next-generation OLED lighting technology is available for the first time in the updated Q5. The optional OLED rear light is split into three tiles of six segments each, which enables Audi designers and developers to create different light designs and signatures from a single item of hardware.

Audi lighting wizard Stephan Berlitz—his formal title is Head of Lighting Innovation Development—says "In addition to perfect contrast, the benefits of digital OLED are a high level of homogeneity and minimal gap between the segments. Looking to the future, digital OLED is therefore the perfect technology for executing personalised light design with a high degree of precision and extensive variability. This technology offers all sorts of opportunities for further development".

When ordering their Q5, customers can choose from three rear light signatures, each with its own Welcome and Farewell display. On switching the Audi drive select mode to "dynamic", the lights change to yet another signature. The OLED rear light cluster also has proximity detection: If another car approaches a stopped Q5 from the rear to within less than two metres, all the OLED segments light up—solid red. Then when the Q5 starts to move, it returns to the original light signature.

LED headlamps are standard equipment, with matrix LED headlamps available as an option.

New Lights On Nissan's New Rogue

LIGHTING NEWS

The 2021 version of Nissan's Rogue CUV has an all-new lighting package. Up front, horizontal bar-shaped reflector LED headlamps placed halfway up the bumper fascia have four complex shovel optics for low beam, and what looks like a fifth, innermost chamber for high beam. In accord with current trends, the DRLs and front turn signals are in separate eyebrowlike lamp units where the hood meets the fenders:

The side marker lights are neatly tucked into the outboard trailing edges of the eyebrow lights, while the sideview mirrors hold slimline LED repeaters

The taillights have an attractive double-line fish hook design for the red functions, with

bulb-type amber turn signals below and the CHMSL neatly integrated above the hatchgate glass. Rear retro-reflectors are at the bottom of the bumper fascia.

Valeo Are № 2 Patent Filer in France

LIGHTING NEWS

With more than 1,000 patents published in 2019, Valeo ranked second in the INPI (the French National Institute of Industrial Property) rankings.

Valeo feel that innovation is aided and abetted by a strong intellectual property portfolio. During periods of crisis, leaders confirm their position by preserving a major effort in R&D and industrialisation technologies for differentiated products and services. Surely it will remain fascinating to see how the Valeo Group carry on with their innovative drive!

CAPA: Parking Sensors, Lamp Mount Repair Kits…Truth?

LIGHTING NEWS

CAPA (the Certified Automotive Parts Association) is an advocacy group for non-OEM aftermarket parts makers.

CAPA say their goal is "to provide the auto repair industry with a reliable, trusted means for identifying replacement parts comparable to parts from the original equipment manufacturer". They promote "CAPA-certified" aftermarket parts as being equivalent to OE components. But numerous rigourous tests have found aftermarket headlamps, including "CAPA-certified" ones, are significantly inferior to OE lamps in performance, durability, and construction, however—not to mention **other problems** with aftermarket lamps—and the organisation's requirements for headlamps amount to "must look like the original part, and must meet the applicable regulations"—without regard to the difference between meeting the regulation and matching the OE part. And a **CAPA video** purporting to show the superiority of "CAPA-certified" parts actually compares only an OE component and a non-"CAPA-certified" aftermarket replacement.

CAPA have also "verified" the range of headlamp mount tab repair kits we **reported on** last Autumn, for 11 Jeep Grand Cherokee headlamps and six GMC Sierra headlamps. The organisation say "CAPA Verification differs from its Certification Program in that there is not a car company service part available for comparison to the aftermarket part (…) parts that have been CAPA Verified have been proven to meet Verification Program requirements".

CRS CEO Maurice Paperi says the mount-repair parts are fabricated by additive manufacturing, and Vice President Steve Arnone says they use a nylon substance able to perform physically and chemically like the OEM mount, in a nonstandard 3D printing process—he wouldn't explain in detail, but said the process can simulate the same grain structure of the original injection-moulded mount.

CAPA say the headlight kits "were verified following a testing process which included material testing, vibration testing, and vehicle test fit".

Driver Assistance News

Audi Win Award For Virtual Side Mirror

DRIVER ASSISTANCE NEWS

For their virtual sideview mirror, Audi have received the Society for Information Display's Display Application of the Year award.
The Audi system comprises a small exterior camera and a door-mounted 7" OLED interior display, OLED being the best technology for clear vision no matter what the weather and sunlight are doing.

The display provides a much better image than a conventional mirror can in certain situations, such as driving in direct sunlight. The mirrors also adjust automatically to three driving situations: On the highway, the field of vision is reduced so the driver can better estimate speeds when driving fast. When turning, the indicator view extends the relevant side's image detail to reduce the blind spot. When parking, the field of vision is extended downward so the driver can manœuvre accurately.

The camera is integrated into the hexagonal end of the virtual mirror's flat supports, and its images are digitally processed and displayed on a high-contrast, 1,280 × 800-pixel OLED display.

The Society for Information Display (SID) is a global professional organization that focuses on the further development of electronic display and visual information technologies and offers a platform for cooperation, communication and further development of the display industry and its technologies. The members are specialists from a wide range of business areas in the display industry, such as research, design, manufacture, application, marketing and sales.

UN Regulations For No-Look Self-Drive Tech

DRIVER ASSISTANCE NEWS

The first regulations for L^3 autonomous driving are going to hit the books soon. The first function to formally defined and regulated: ALKS (Automated Lane Keeping Systems), which enables a car to steer itself at speeds of up to 60 km/h within a lane without any human supervision. It allows drivers frustrated by congestion on highways the chance to take their eyes off the road and let the car navigate tedious stop-and-go traffic.

The new regulatory framework means BMW can offer "eyes-off" automated driving in their iNEXT electric SUV set to arrive next year. Daimler have their eyes on eyes-off autonomy for their new-generation Mercedes S-Class, which will launch later this year. Audi developed the world's first eyes-off system in the 2017 A8, but the technology wasn't activated because of regulatory hurdles.

The Regulation will take effect on 1 January 2021 in the European Union, Japan, and other countries that use UN Regulations and choose to apply this one. Other countries that participated in the regulatory development include China, Canada, and the U.S., though none of those countries formally applies UN Regulations (and the U.S., practically alone in the world, does not recognise them at all).

Velodyne Expand Lidar Partnerships, Applications

DRIVER ASSISTANCE NEWS

Velodyne Lidar have agreed a multi-year partnership with Outsight, who specialise in smart city monitoring. Outsight's 3D 'Semantic Camera' system uses Velodyne Lidar's sensing technology to help industry and government improve their analysis and management of people-flow and assets in large, crowded environments.

Lidar sensors enable 3D capture and tracking of people and objects while maintaining anonymity. The Outsight camera uses an embedded AI processor to merge lidar data with RGB colour data into a detailed situational understanding of facilities such as airports, shopping malls, and railway stations.
The system is being deployed at Paris' Charles de Gaulle airport to optimise passengers' journeys, improve queue flow and asset management, and support compliance and safety. The system can also be deployed to support social distancing and public health.

At the same time, Velodyne's Puck 3D lidar sensor is now used by autonomous vehicle specialists DGWorld in their fleet of autonomous internal terminal vehicles at the United Arab Emirates' Jebel Ali seaport.

General News

Tesla Overtake Toyota on Wall Street

GENERAL NEWS

Tesla last week became the highest-valued automaker as their shares boiled up to record highs, carrying their market capitalisation higher than that of former front runner Toyota.

The surge boosted Tesla's market capitalisation to USD $209bn—over three times the combined value of GM and Ford, and about $6bn more than Toyota's current investor value. This rise in Tesla's value of over 163% since the start of 2020 probably reflects growing confidence among investors about the future of electric vehicles and Tesla's shift from a niche carmaker into a global leader in cleaner cars.

After several years of losses, Tesla have delivered three straight profitable quarters since Q3-2019, and surprised investors with solid Q1 deliveries despite the pandemic.

Toyota, one of the world's most profitable automakers, sold 10.46 million vehicles during their 2019 financial year ended this past 31 March 31, over which they reported net revenues of $280bn. Tesla, for their part, ended 2019 with $25bn in revenues, having delivered 367,200 vehicles last year.

Notoriously brash CEO Elon Musk has said Tesla will deliver at least 500,000 vehicles in 2020, a forecast the company haven't revised despite the coronavirus pandemic, though the fiery corporate performance comes at a human cost: despite coronavirus lockdown laws, Musk has kept Tesla factories running and ordered workers to choose between reporting for work (and risking infection) or losing their jobs.