

2018 North American International Auto Show • Detroit

Published 30 January, 2018




DrivingVisionNews.com

Automotive lighting and driver assistance technologies

Published by **Driving Vision News**

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About the author



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Executive Summary

The Detroit auto show has been morphing over the years, adapting to new realities of the auto industry. Despite heavy promotion of the show as roundly international and all-inclusive, makers who did not display at the show included Bentley, Lamborghini, Maserati, Land Rover, Jaguar, Porsche, MINI, Ferrari, Rolls-Royce, and America's own Tesla. These makers, amongst others, increasingly see the Detroit show as less relevant in a current-day automotive world where the North American innovation hot spots are in Silicon Valley and the internet has taken a big bite out of the public's need to go see car shows.

But the trend is not one of doom and gloom. Again, it is one of adaptation, and this is reflected in the evolution of show cars themselves. There were far fewer concept, prototype, and dream cars, but even the pre-production prototypes and newly-unveiled production cars are essentially dream cars in and of themselves, bristling with levels of technology and capability well outside yesterday's bounds of practicality. And there was absolutely no shortage of interesting lighting; the 2018 NAIAS was a showcase of the general trend toward higher lighting content on most vehicles offered in the world's second-largest vehicle market. One crucial piece of the context that separates the Detroit show from others round the world is that the US is one of the two countries on the North American regulatory island: the United States has its own lighting regulations, significantly different to the UN (or UN-approximate) regulations recognised by most of the rest of the world. So most vehicles on offer in America—and therefore most vehicles on display at the show—have different lighting system specifications and particulars than their equivalents elsewhere in the world. Red rear turn signals are allowed in America, for example—though this year there were interesting signs of how makers are adapting to a planned NCAP preference for the yellow ones the rest of the world requires—and front and rear sidemarker lights and reflectors are required, but side turn signal repeaters and rear fog lamps and DRLs are not. And ADB is still not yet legal in America, so models that come equipped in Europe are stripped of that feature for the American market. And it's not just lighting regulations that are different; most all North American vehicle regulations differ substantially from their international UN counterparts, as do North American vehicle buyers' habits and preferences, so it's really quite a different mix of vehicles than might be found at Paris or Frankfurt or Shanghai, for example.

Overall, last year's news is also this year's news: increasing lighting content on the front, sides, and rear of vehicles, but this is not a one-way trend. LED daytime running lights, though not required, are present on a lot more vehicles. The car-lights-as-art revolution, though it got its start in Europe, has well and truly spread to American shores. The whole industry, worldwide, is striving at an unprecedented rate to add glitz and fascination to what used to be purely functional, minimally-styled equipment. It is surely safe to say the old philosophy of vehicle lights as commodity items is now a distant memory. Another trend on the obvious increase is the use of lighting for brand and model-range identity advertisement.

Introduction

This, DVN's 123rd report, is a close and focused look at the new and notable lights on the vehicles at the 2018 Detroit auto show, to the near-total exclusion of other parts and views of the vehicle. Every model covered here can readily be viewed in its entirety elsewhere, but this is the only comprehensive report on the lights. This year we present an unprecedented 200 clear, colourful, sharp images at the perfect size whether you're viewing on a computer screen, a tablet, or you choose to print it out and carry it with you. Where warranted, we provide multiple views of the same lamp from different angles—annotated and described with text. Chapters are arranged by automakers; all of an automaker's marques are grouped together. There are about 50 words per photo, and we hope you find this as enjoyable and informative to peruse and read as we did to create.

Over each of the last several years it has become apparent that NAIAS is no longer the king-of-the-hill, cream-of-the-crop auto show it was years ago. Some major worldwide brands elected not to show at all, and the number of concept and dream cars is smaller than ever. More technology-orientated shows, like the Los Angeles one, have siphoned off many of the new-model introductions and much of the communication on driver assistance and other high-tech aspects of modern cars. But the definition and nature of a dream car or concept car is shifting and drifting, and the once-sharp boundary between a real car and a "dream" car has softened considerably. Today's pure concept car is much less likely to represent a flight of technical fancy—production cars and prototypes have taken on that job, and the fantasies come true, now—and more likely to represent an idea for a new size, shape, or kind of car. An unprecedented proportion of production and pre-production cars showed an immense amount of thought, skill, talent, whimsey, and love in design, style, and technical sophistication of the lighting systems. The LED lighting revolution really can't be described as a novel thing any more; LEDs are really now effectively the standard lighting technology. So much so that the few cars with all-filament lighting were notable as throwbacks!

North America is one of the world's only markets—and certainly the world's largest—that doesn't recognise the international UN (formerly "European") vehicle lighting regulations. That means there are differences in the American-spec lighting system configurations of models sold round the world, and it also means American homegrown lighting systems have evolved from a different set of genes. It's interesting to see how the international exchange of ideas is creating a truly international industry race for more and better lighting content and design. LED DRLs are fast on their way to becoming expected (if not quite yet standard) equipment, even though U.S. regulations don't require daytime running lights of any kind. Side marker lights and reflectors, unique as requirements in North America, are being integrated in new and clever ways. Rear turn signal colour is still a matter of style rather than a matter of basic safety specification in this market, but a proposal to award NCAP points for yellow rather than red rear signals has spurred novel turn signal designs on high-volume models. Inscrutable regulatory decisions, rather than being seen purely as barriers, are inspiring clever new ways of attaining compliance without crimping lighting innovation. More detail on all of this in the pages you're about to view.

And now...come join DVN as we walk the Detroit motor show!

Audi

Audi's light masters carry on striving to maintain their leadership role in an increasingly competitive field where other makers are aggressively ramping up their lighting R&D and budgets. Many of their cutting-edge technological achievements (matrix beams, etc) are still not allowed by American regulations, but Audi's US-spec lights still comprise appealing design with striking day and night appearance, strong technology-halo presentation, and imaginative functionality.



The new A7 headlamp is a complex multi-compartment building with fresh emphasis on longitudinal lines. Twelve of them show bright white light above, while below two of them divide inner, middle, and outer optic chambers.

The A8L headlamp has a similar multi-chamber architecture of squares, though here the longitudinal lines are confined to the outboard flank above the prominent horizontal LED-lit line.



The Q7 headlamp has its own version of the multi-chamber theme. Here it's an outboard oblong projector and two inboard reflectors, set overtop of two wide, slim chambers, and the inboard and outboard, upper and lower areas separated by flying-dart light guides for the DRL with 2-segment latitudinal light guides for the turn signal.

Audi, cont'd

The Q7 rear lamp expertly duplicates the front lamps' theme, with flying-dart separation of upper and lower, inner and outer segments giving a coherent, attractive appearance in both the lit and unlit states.



BMW

BMW showed some interesting new lights this year, and apparently they've managed to tame the laser so that it doesn't run afoul of North America's low intensity caps on high beam axial intensity. There are coherently iterative developments of the long-honed BMW familial front and rear lighting billboards, and an interesting new front turn signal.



The new i8 Roadster has compact, high-tech headlamps with a recursive basket-shaped theme to the divider bars separating the outboard projector from the inboard reflector. The projector has a blue-rimmed fish hook surround, and there's an intriguing warning label tucked into the inboard corner...

...which, on closer examination, is a laser light cautionary warning. It advises, in English and French, not to stare into the beam. Also present are operating frequency (500 Hz) and wavelength (400–459 nm) information, and other laser specs.



The i8 Roadster's rear lights carry on with BMW's i-range design theme while also tying in thematically with the double-basket appearance of the divider bars in the front lights. Edge-on taillights give an interesting stacked-plates, high-depth, high-tech look.

BMW, Cont'd

BMW's new M5 has quad-chamber LEDs, and the upper outboard chambers have projectors now rather than reflectors. The twin-ring effect of the DRLs has



evolved to a pair of fish hooks, and there's a **BMW ADAPTIVE LED** callout in the brushed-aluminium-effect sculping at the outboard edge of the lamp.



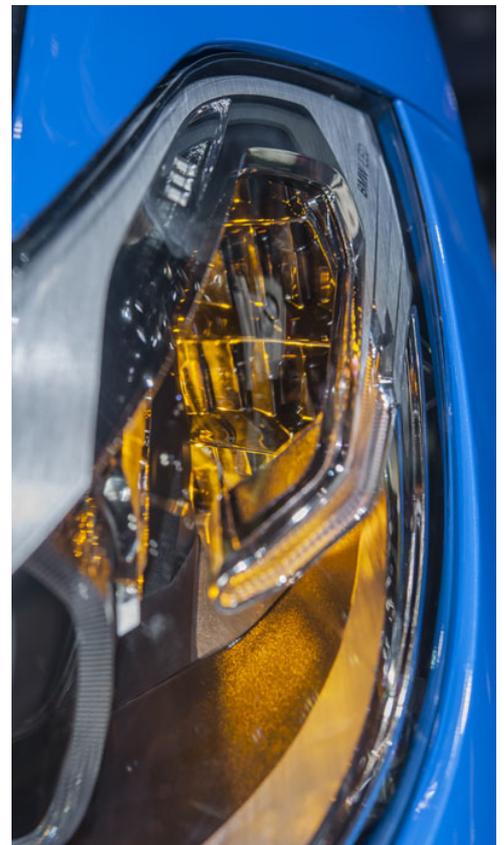
The M5's rear lighting package is familial, advancing design themes first seen in the 2-Series of some years ago. As with all American BMWs except the i-range, all rear lighting functions except the reversing lamp are done in red light.

BMW, Cont'd

BMW showed us an X2 prototype with mockup lights last year; now the real car is here. Its front combination lamp is of sturdily familial BMW design, with synecdochic partial hexagon shapes to the DRL rings. Of particular interest is the front turn signal; at first glance it looks incandescent...



...but it's actually a cleverly-designed reflector LED item, with the emitter partially shielded. Here's a detail view.



The X2's tail lamp has a 3-dimensional fish hook appearance, with horizontal striations in the (red) turn signal element.



The Jeep Wrangler's development is deliberately kept slow, so as not to alienate fiercely loyal devotees. This year's Wrangler is all new, replacing the previous model on sale for a decade. Extensive development and money went into the lighting package. High-spec Wranglers get a high-tech LED headlamp, a very large $\varnothing 23\text{cm}$ unit from AL with a perimeter-ring DRL, projector low beam, and reflector high beam optics. The lens is unheated. At the fender front is an all-LED lamp for position, turn, DRL, and sidemarker functions. →

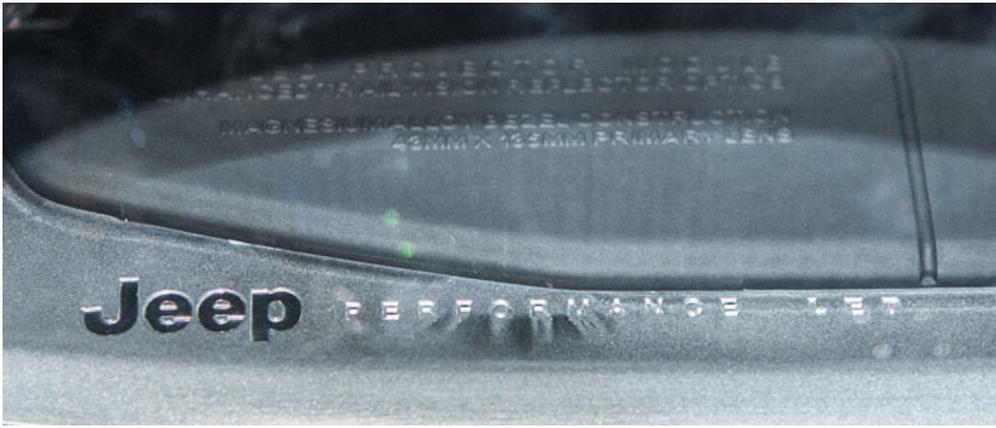


← Zooming in on the new signal lamp, we see the turn signal is below the DRL array.

A closer look at the new headlamp reveals highly intricate optics in the central low beam projector, multifaceted reflector optics above and below for the high beam, striations in the DRL ring, and the very large diameter of the lamp (note the inward bulge in the grill opening to accommodate the headlamp).



Jeep, cont'd



There's a prominent **JEEP PERFORMANCE LED** callout, backed up by detailed specifications: LED PROJECTOR MODULE; ENHANCED TRAIL VISION REFLECTOR OPTICS. MAGNESIUM ALLOY BEZEL CONSTRUCTION. 43MM X 135MM PRIMARY LENS

Down below, at bumper level, is a high-output reflector LED fog lamp by Myotek.



Lower-spec Wranglers get a basic H13 halogen headlamp, with bulb shield shaped like the front of the vehicle itself...

...and a bulb-type front turn signal.



Jeep, cont'd

A prominent "Try me!" display provided a hands-on demonstration of the difference in performance and appearance between basic halogen and high-spec LED headlamps and fog lamps on the Wrangler.



In back, there are two new variants of the traditional box-shaped taillamp. De luxe Wranglers get a tidy LED unit with wraparound sidemarker light and reflector outboard.



Basic equipment is this bulb-type unit.

Jeep, cont'd

The Cherokee's new lights include this trim, birdlike front combination lamp with bullnosed projector module, textural elements, a white LED zig line, and integral LED turn signal.



This detail view of the front turn signal shows the surface texture used to diffuse the dotted appearance of the emitters; this technique works around the effective ban on translucent materials.



Down below, there's Myotek's high-performance LED fog lamp.



The Cherokee's rear combination lamps are particularly interesting: the tail function is done by a wraparound, basket-shaped light guide. The red stop and yellow turn functions come from exactly the same lit area—not permitted by UN Regulations, but perfectly legal in America. When the turn signal is operating, the stop lamp is disabled on the signalling side; there is no alternation between yellow and bright red.



Auxiliary optics in the outer cover lens spread the stop and turn signal light to reach the required inboard angles.



Jeep, cont'd



Jeep's Compass has a high/low beam projector outboard, available in halogen or HID. Note the "disco ball" texture to smooth the cutoff. Inboard is a front position lamp masked off with a plate of hexagonal apertures also forming the projector bezel.

Down in the bumper fascia are a trio of conventional lamps: fog, turn signal, and DRL, all in incandescent technology.



Depending on the trim level and vehicle equipment, the Compass gets one of two rear lamp variants. Both incorporate auxiliary optics at the inboard edge of the outboard compartment, to spread light to the inboard angles.





Ram's main-event pickup truck is new for 2019, and a great deal of attention has been paid to the lights. There are two very different frontal styles for the '19 Ram, with differently-shaped lights, and there are three headlamp types on offer: halogen, reflector LED, and projector BiLED with AFS. Here are the tri-pocket reflector LEDs, also showing the prominent LEDs & light guides for turn signal and DRL. There's a proud RAM LED callout.



And here are the projector LEDs, with eyebrow and underline LED light guides for the turn signal and DRL functions, and another technology callout providing much more detail about the lights than anyone in America might reasonably have been expected to care about just a few short years ago: DYNAMIC AFS BI-LED; INBOARD ROTATION 7°, OUTBOARD ROTATION 15°.



In the bumper is a twin-pocket LED reflector fog lamp.

Ram, cont'd

Side turn signal repeaters still aren't required in America, but the Ram has them—at least on de luxe models—in the side mirrors, replete with style lines and a brand callout.



The rear lamps are available in an array of options: bulb-type on the basic trucks, LED with or without smoked lenses and with or without blind spot monitoring sensors on the high-spec models. As in FCA's Jeep Cherokee, the same area illuminates in red for the stop function, yellow for the turn signal.



Ford

The Edge SUV has a new iteration of the attractive over/under shovel-optics taillamps, made by Flex-n-Gate. The upper clear section gives a yellow turn signal, the lower gives a red stop light, and the



swingline red section provides the tail function.

The Edge's new front combination lamp is trim and tidy, with an eyebrow DRL, an underslung turn signal, and LED headlamp modules with baskets underneath.



The bumper fascia contains an outboard unit carrying the vertical line from the DRL in the headlamp; at the bottom of that is what looks like a miniature projector LED fog lamp.

Ford, Cont'd

The Expedition Max now gets Ford's small oblong thick-optic LED headlamp modules, like those used in F-series pickup trucks. There's a wraparound DRL light guide, an LED turn signal, and an LED sidemarker light.



A detail view shows the LED low beam optics and the texture of the DRL light guide.

Lower-spec Expeditions get halogen headlamps with projector low beam, reflector high beam, and bulb-type turn signal.



Ford, Cont'd

The Expedition Max (at least) gets charmingly textured LED side turn signal repeaters built into the side mirrors. →



De Luxe Expeditions get this LED rear lamp assembly with an interesting structural-block effect outboard of the reversing lamp and a thick wraparound tail light guide...



...while lesser Expeditions get a bulb-type unit.



Ford, Cont'd



The new Ranger pickup truck, designed in Australia, has high-content LED taillamps made by Flex-n-Gate. There's a pair of slim red light guides providing the tail function just inside the wraparound retroreflector perimeter. A bold C-shaped element provides the stop function, surrounding a white-lens vertical oblong yellow turn signal. Below, there's a similarly-shaped reversing lamp flanked by a blind spot sensor.

The front lamp has a BiLED projector in a rounded-square bezel outboard of a bulb-type turn signal, both of these above a swoosh DRL array. Auxiliary optics in the front lens spread turn signal light inboard.



A lateral view shows the resolute forward-looking appearance of the FCL and the tidy packaging of the front sidemarker at the front of the wheel arch.

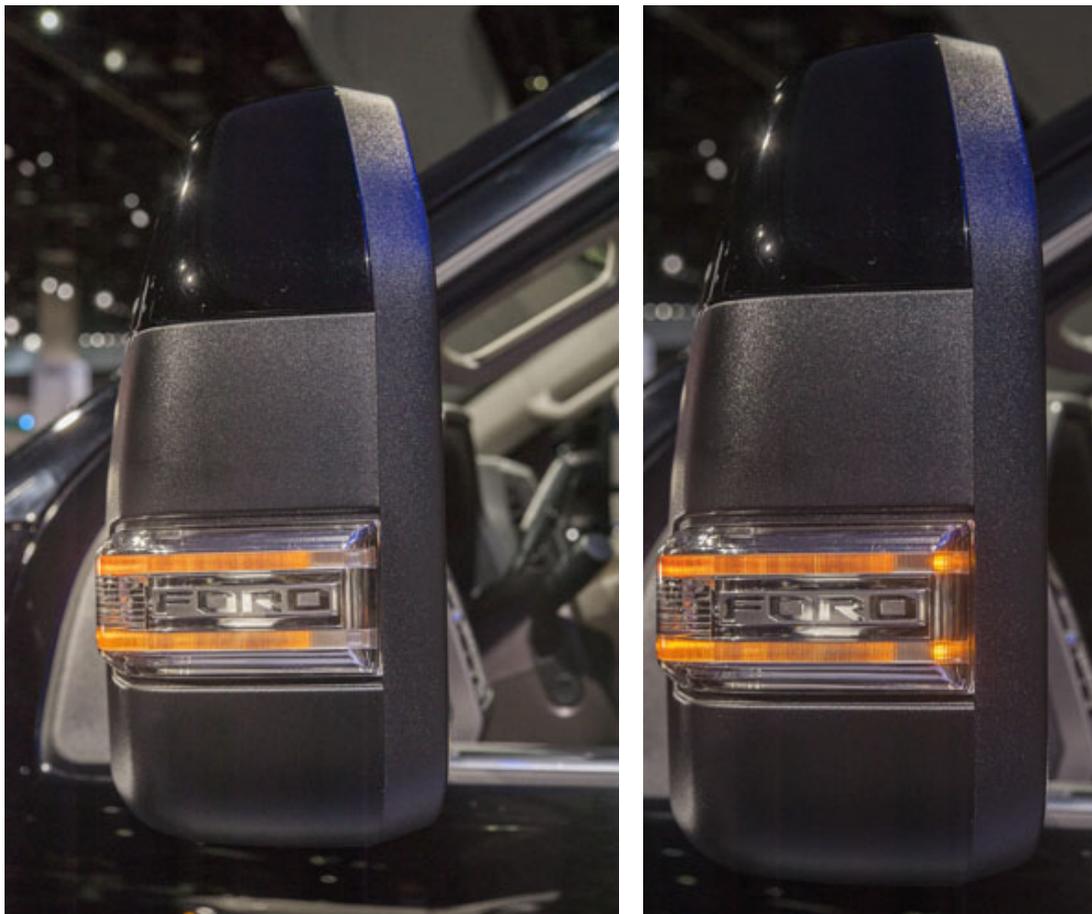


Here we see the LED fog/cornering lamp with its interesting horizontal-oval projector lens.



Ford, Cont'd

Ford's big F-Super Duty truck has the same front and rear lamps as last year, but the sideview mirror lights bear some attention. Longitudinal light guides running *almost* the entire length of the lamp provide an auxiliary side marker light function, while two additional emitters at the trailing edge of the lamp flash with the turn signals to serve as repeaters:



Ford: Lincoln



The Lincoln Continental, shown previously with a multi-icecube full-LED FCL, is now seen with a high/low beam projector and bulb-type turn signal.

The Navigator's got a fancy all-LED front lamp with two projectors above a 5-shovel array and a pair of dotted guides. The turn signal is a separate light guide below. →



Navigator rear lamp configuration: prominent red light guides for tail, sidemarker, and hatch sweep; triple-shovel yellow turn signal, and 10-shovel reversing lamp on the hatch.

Lincoln, Cont'd

The new Lincoln Nautilus has a familial 5-icecube LED headlamp with swoosh line LED array underneath: a tastefully elegant design. →



← The Nautilus rear lamp is likewise familial, with a slim red lateral band carried across the back of the vehicle, and a multi-shovel stop light ringed by a retroreflective surround.

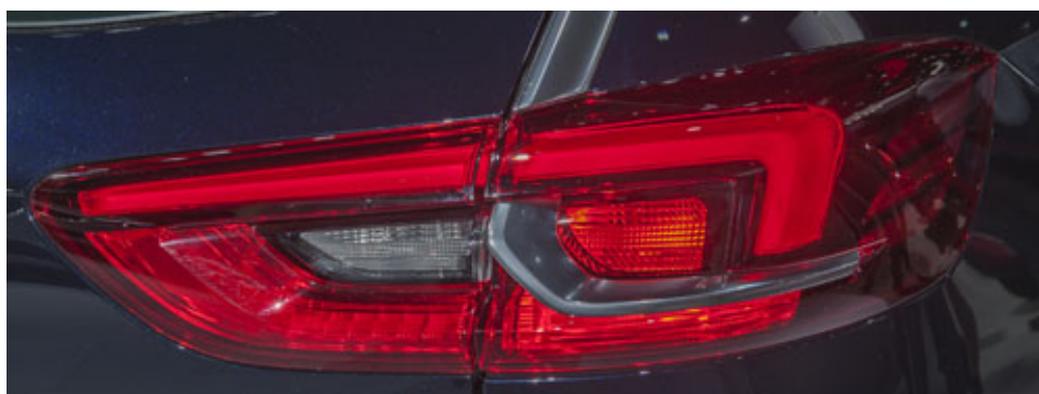
GM: Buick

For the time being, Buicks still have a lot of Opel in them. Here's the Regal front lamp with its extended-chevron light guides performing the turn signal function in the LED headlamps.



And here's the halogen version, with its trapezoidal reflectors and the extended-chevron light guides showing the DRL function.

And round the back, there's a red iteration of the same extended-chevron light design. Except for reversing, all rear light functions on the Regal are in red light.



The Regal wagon gets a different taillamp, but the chevron theme is still prominently visible.

Buick, cont'd

An old-fashioned repeater is found on the Regal's front fender, behind the front wheel.



Here's the internal sculpturing of the repeater, revealed on light-up.



The LaCrosse front combination lamp has a steering BiXenon projector, a cornering lamp, an LED DRL/position lamp, sidemarker light, and side retro-reflector all built in.



A similar theme is presented in the LaCrosse taillamp. Single chevrons here, rather than double.

Buick, cont'd

Buick's Enclave has a curtain optic describing chevrons front and rear, wrapped around a single multifunction projector optic.



This detail view shows the Buick crest in the side of the shiny, chromelike curtain.

Down below is a bulb-type turn signal and wraparound light guide, completing the front-end "frame" effect of the white DRLs.



The Enclave's rear lamp has a complex depth effect and fairs seamlessly into the chrome transverse band. Shovel optics for the stop/turn function, single thick chevron eyelid above.



The Cadillac XTS has a reflector LED headlamp package in a flying-dart shape pointed aft, with outboard longitudinal textured light guide providing the DRL and position light functions. As seen here, the lower portion of the light guide also lights up in amber for the turn signal function. Below, there's a continuation of the vertical DRL/position lamp light guide as well as a cornering lamp.



A front-on view of the main front lamp shows the elegant jewel-like appearance to the reflector headlamp optics and the textural, dotted look of the DRL and turn signal.



Cadillac, cont'd



The XTS rear light has a high-loop light guide for the tail function, surrounding emitter heads for the combination stop/turn light. The lower edge of the rear lamp swoops inward, carrying the "tail" of the looped light guide. A $\frac{3}{4}$ view shows how the rear lamp tastefully evokes the famous Cadillac tailfins of years past, and shows the chrome reveal strip at the outer perimeter of the lamp.



The rear sidemarker light is elegantly done as a dimensionally-lit Cadillac crest.

GM: Chevrolet

Like Jeep, Chevrolet made a point of communicating about lighting upgrades. Here we see a set of LED taillamps with smoked (dark) lenses on display as a Camaro accessory.



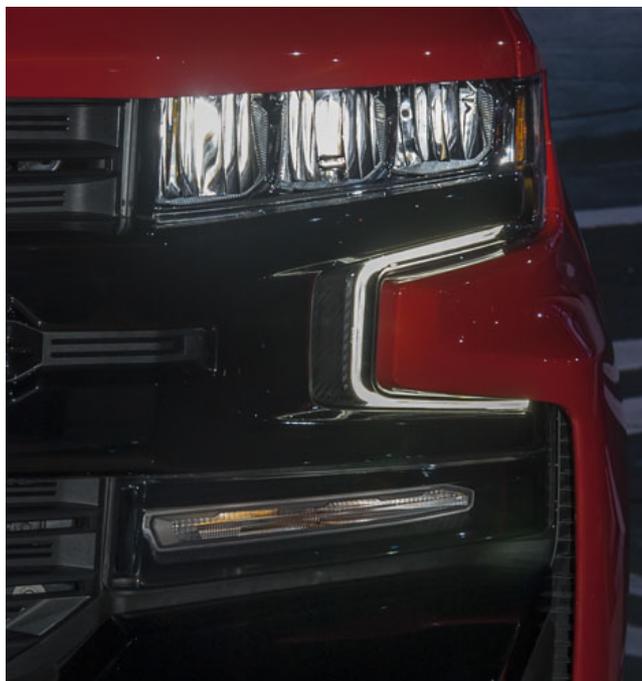
...as opposed to the unsmoked standard-equipment taillamps.



The Camaro's new front lighting package includes a high/low beam projector with disco-ball condenser lens, a basket-shaped white dotted LED array, a bulb-type turn signal, and a horizontal LED array in the bumper fascia.

Chevrolet, con'td

The new Chevrolet Silverado pickup truck has (top to bottom) a trio of reflector LED headlamp optics with sidemarker at the outboard edge, a bracket-shaped white LED array, and a slim horizontal linear LED turn signal. More basic models like the red truck below have a less fancy DRL and a bulb-type turn signal, but keep the LED reflector headlamps.



Down below, there's a projector LED fog lamp.



The Silverado taillamp is an architectural hourglass-shaped tower of thick and thin light guides and textured lenses, all in red.

Chevrolet, con'td

The Chevrolet Equinox front combination lamp has a BiXenon projector in a basket-shaped sling with the sidemarker at its outermost edge. There's a curvilinear DRL inboard.



The turn signal is incandescent, and located down in the traditional fog lamp position in the bumper fascia.

The rear combination lamp is a simple reduplicative-shapes design, and the empty colourless chamber appears to be a package-protection for easy inclusion of a yellow turn signal if that becomes desired in the future—perhaps it is used as such in export markets.



Chevrolet, con'td



The Equinox has a small three-emitter LED repeater built into the wing mirror on each side, and it is E-marked, another hint at export-market sales intent for this vehicle.



Chevrolet's Virtual Dynamics Lab was a "4D experience" for showgoers to don goggles, have a seat, and immerse themselves in a virtual reality adventure.



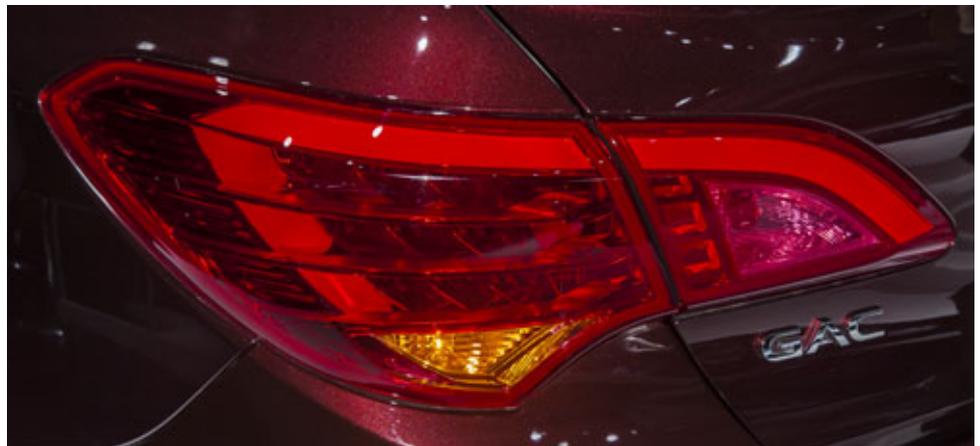
GAC • Trumpchi

Guangzhou Automobile want to market their vehicles in North America starting next year. They have a technology lab in California, and are planning a development centre near Detroit and a design studio in Los Angeles. The cars are sold in the Chinese domestic market under the **Trumpchi** brand; the company say the "P" is silent, but GAC executives watching showgoers point and laugh at the name are considering changing it to avoid unwanted association with the current US presidency. None of the Trumpchi models on display appeared to have American-spec lights; comments here apply to the Chinese- or UN-spec lights shown.



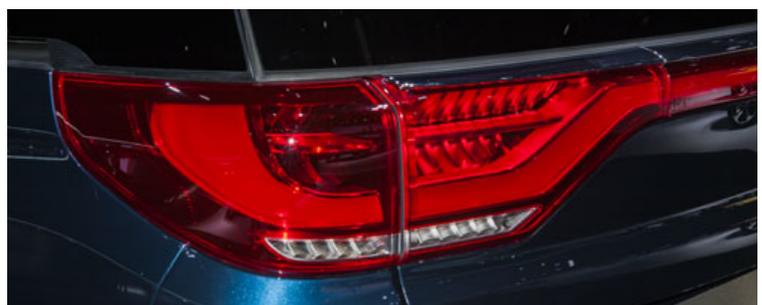
The GA8 front lamp has a bifunctional projector outboard of a bulb-type turn signal, and an array of 12 individual dots for the position and DRL functions.

The GA8 rear lamp's shape reminds of some Mercedes models, and creates a depth effect with its inner structures. The turn signal is surely too small to meet American regulations.



The GM8 headlamp has a pair of small square LED projectors above a pair of LED reflectors, all with decorative frames that remind of a fabulous vintage barber chair footrest. The outboard sides of these frames have TRUMPCHI and FULL LED TECHNOLOGY callouts. There's a flowing curve to the DRL light guide, and a small bulb-type turn signal below.

And here's the GM8's rear lamp, with arrays of shovel optics and a basket-shaped thick diffused light emitting surface for the tail function. Here again, the turn signal is too small for American regulations.





The GS3 has a rather straightforward front lamp design: projector low beam and halogen reflector high beam, bulb-type turn signal outboard, and a slim white linear DRL underlining the lights.

The rear lamp has an attractive figure-infinity shape to the taillight guide, which rings the turn signal (outboard) and reversing lamp (inboard).



The GS4's front lights are also technically basic—reflector high beam, projector low beam, bulb-type turn signal with a dual-chevron design that reminds us of another vehicle brand, and a five-dot LED DRL tucked in below the low beam.

GAC-Trumpchi, cont'd

Here's the GS4 rear light, with a nice appearance softly diffusing the shovel compartments inside to create a depth effect.



This unidentified Trumpchi vehicle has a front light with crisply-defined rectangular lamp modules and a prominent multi-shovel LED turn signal.

The Trumpchi GS7 and GS8 models share front and rear lights. Here's the front light, with a quartet of rectangular LED projectors in streamline-sculpted frames, a 5-dot LED turn signal, J-hook DRL, and GAC FULL LED TECHNOLOGY callout at the bottom and on the side in the large rearward-pointing arrow portion of the housing, faired into the vehicle's front fender.



GAC-Trumpchi, cont'd



The GS7/GS8 rear lamp is interesting. It uses the partial-mirror trick to create a tunnel effect when the taillamps are lit. The four-dot turn signal is surely too small for America, but take a look at the lit versus unlit appearance of the lamp.



GAC-Trumpchi, cont'd

GAC-Trumpchi's Concept Enverge has mockup lights, which nevertheless appear akin to the rectangular modules found in production Trumpchi cars. Note the vertical light (DRLs?) in the bumper fascia.



The Enverge rear lights also have vertical modules in cone-shaped nacelles in the bumper, above which are silvery linear light ideas.

Honda

Here's an interesting variant on the all-LED headlamp we saw on the Accord last year: it's still got a multi-shovel LED array, but there's a halogen reflector lamp (high beam, we reckon) inboard.



And here's the Accord's rear lamp: a sideways-A with pinstriped thick red guide for the tail function, dotted array for the stop light, and bulb-type reversing lamp and yellow turn signal.

The Honda Clarity's front lighting package has a J-shaped DRL (dotted by the sidemarker), a shovel-array headlamp, a very slim and long LED turn signal, and a blue fascination plate serving as the headlamp's "eyelid".

The Clarity's taillamp is Honda-familial.



Honda, cont'd



The Insight's front lights serve up a different flavour of the Honda family pie: shovel-optic headlamps, curvilinear DRL, shiny fascination plate, and long slim turn signal.

In the bumper: a 5-projector LED fog lamp.



The Insight tail lamp has a bold, vivid red bathtub shaped guide for the tail function. Red stop, yellow turn, and white reversing light functions are done with bulbs.

Honda: Acura

Here's the Acura RDX Prototype's headlamp, with a seven-squares headlamp optic array, a prominently curved checkmark DRL, and a tidily-integrated sidemarker light.



Like the headlamp, the RDX Prototype's rear lamp looks production-ready. There's probably the purest version of a fish-hook shape we've seen in the wraparound light guide, and dark optics to hide the bulb-type yellow turn signal. Note the sculptural carving on the side.

The ILX headlamp bears its version of the Acura family design, with five trimmed ice cubes for optics and a slim underlining DRL light guide.



The ILX rear lamp is tastefully understated, clearly intended to accent the overall style rather than draw strong attention to itself. Turn signal is yellow, but incandescent.

Acura, cont'd

Most readers will remember the technical papers written and presented about the folded-lightpath optics seen here in the Acura RLX headlamp. We see a streamline



effect to the side ornamentation in the bezel. Note the neatly-integrated sidemarker light.



The RLX rear lamp presents a terraced appearance with five parallel flow lines and a foremost thick red border. There's a dart-shaped colourless area that might provide the turn signal function.

Hyundai

Hyundai's Veloster, new this year, has an interestingly-shaped projector low beam outboard of a reflector halogen high beam, next to a bulb-type turn signal. Twin 7-dot slings provide the position and DRL functions under the low and high beam headlamp optics.



The Veloster rear lamp has a triple-trident design reminiscent of a Lamborghini design, with a stars-in-the-sky appearance to the red fields above and below the trident wings. Turn signal and reversing lamp are incandescent.

We notice a theme here!
This is the rear lamp on the
new Hyundai Sonata.



And here's the Sonata's front lighting package: Bulb-type turn signal inboard, BiLED projector outboard, and linear arrays in a trident-shaped bezel providing turn signal and DRL functions down below.

Kia

The Kia Forte has an LED DRL in the form of four flags surrounding the low beam projector; the front lighting package is otherwise conventional.



The rear lighting package is interesting. It's got a wide W-shaped light guide capped by a horizontal one for the tail function (the horizontal guide wraps round for the side marker function), tidily hidden retroreflectors, and a rear turn signal very similar to the front one in position and framing—but the rear turn signal lens is designed to make this bulb-type lamp look a bit like a light guide. Note the small reversing lamp hiding beneath the turn signal.

The yellow Kia Rio shown here demonstrates there's still room—though it's shrinking—for utterly basic technology: H4 headlamps and filaments for every signal function.





The Kia Niro front light has an attractive twin-projector design with a boomerang-shaped LED array following the outer perimeter of the lamp. Sidemarker is integral. The white LED DRL is above the halogen fog lamp in the bumper fascia.



The Niro rear light has a trio of C-shaped dotted arrays all ringed by a homogeneously-lit light guide. The outermost C-array swaddles the bulb-type yellow turn signal.

Triplets are the order of the day at Kia, as it seems; here's the Sorento's front combination lamp, with LED projector low beam, twin LED reflectors for the high beam, all underlined by a textured LED array.



The Sorento rear lamp has twelve upright red stripes with a fish-hook red light guide wrapped around; yellow turn signal and white reversing lamp are bulb type.

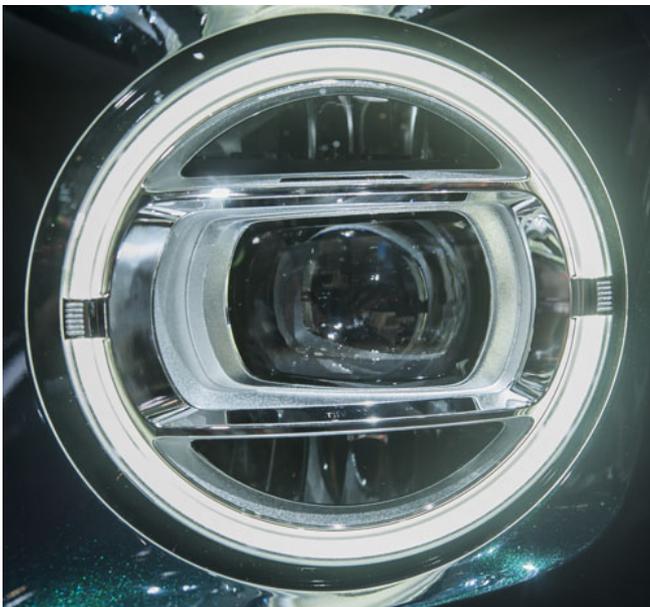


Mercedes

Right up front, outside the entrance to the NAIAS venue, Mercedes displayed a vintage 1979 Geländewagen entombed in a 44.4-ton block of resin tinted to resemble the amber in which prehistoric insects are sometimes found perfectly preserved. The sculpture, measuring 5.5 metres long, 2.5 metres wide, and 3.1 metres



tall, took 90 days to pour and must have cost a fortune to transport. Visible through the amber resin is a full complement of incandescent lamps; the newest lighting technology on the whole vehicle is its H4 headlamps—a ten-year-old innovation when the '79 G-wagen was built.



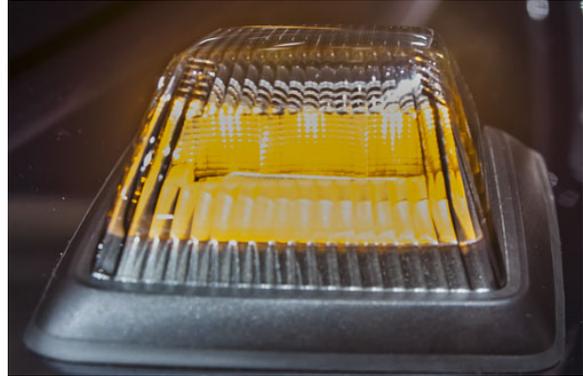
The impetus for the encased old G-wagen: the announcement of an all-new G-wagen, finally after all these years. The design is iterative, but the technology is up to date. Here we see the new headlamp: still a large round design, but now a full-LED design: a DRL perimeter ring surrounds an oblong projector with upper and lower reflector optics for high beam. It's an elegant, appropriate-to-vehicle that appears to share thematic similarity with the new Jeep Wrangler headlamp shown elsewhere in this report.

And—also similar to the Wrangler—there's a technology callout on the headlamp bezel.



Mercedes, cont'd

The classic-look/modern-tech approach to the new G-wagen's design is apparent in the front turn signals. They're still perched on rubber plinths atop the front fenders, just like the previous model. But now they're triple-inverted-shovel LED units:



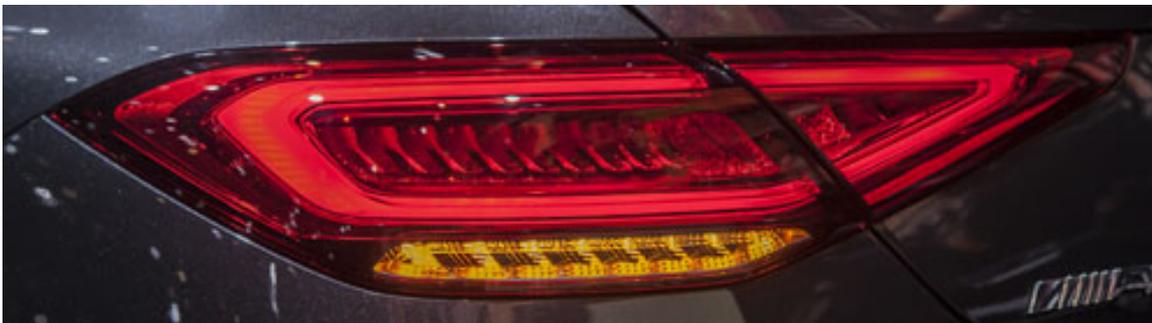
And the rear lamps, too, get the retro-modern treatment: same shape as before, but nicely done in full LED technology and better integrated into the body. This is a rest-of-world model; it remains to be seen if the US model will have this taillamp or one with a red turn signal.



The Mercedes CLS LED headlamp has trapezoidal projector lenses under an inverted-checkmark DRL.

Mercedes, cont'd

The inverted-checkmark also lights in amber for the turn signal function; here we see its texture and thickness, and the headlamp technology callout. →



The CLS rear light has a trim, attractive design with a pinstriped effect to the tail light guide wrapped around the stop light shovels; this ECE

version has a yellow turn signal which may not survive the trip to America.

The Mercedes Concept EQA had interesting coiled-lines front and rear light mockups suggesting high-function intelligent lighting. Here's the front mockup...



...and here's the rear. Note the prominent depth effect, and see a video of the light's animation on the [DVN YouTube channel](#).

Mercedes: Smart

Here we see a bit of an apparent contradiction: up-to-the-minute technology in the form of an electric vehicle, with 5-decade-old headlamp technology in the form of H4s.



Nissan

Compared to the previous model, the new Leaf EV has lights more in line with the Nissan familial look. Headlamps are LED projectors with attractive squared projectors and an inverted-checkmark DRL light guide, with a bulb-type turn signal inboard.



This frontal view shows the homogeneity of the DRL, and the prominent rectangularity of the headlamp modules—so much so that they almost bring to mind the twin-rectangular sealed beam setups of the '70s and '80s! Below there's a small reflector fog lamp with what appears to be an H8 bulb.



The Leaf's rear lamp bears similarity to that of the Juke and Rogue. It's got a bookend-shaped upper section for the tail function, and a three-shovel stop light array in red above incandescent yellow turn and white reverse lamps.

Nissan, cont'd

Nissan's Rogue Sport (the rest-of-world "Qashqai" name is apparently too weird for Americans) has front combination lamps with round outboard LED low beam projectors, shovel-optic reflector LED high beams, and interesting inward-arrowhead bulb-type turn signals just inboard of upright-checkmark LED DRLs.



In back there's an inverted-checkmark theme to the tail lamps, which do all functions with red light (except the innermost reversing lamp section).

The new Nissan Kicks has a squared-lens LED low beam projector like the one Nissan put on the Sentra shortly ago. High beam and turn signal are bulb types, but there's a sideways-vee shaped LED DRL.



The Kicks taillamp is quite conventional—bulbs everywhere—but nicely designed in accord with familial Nissan styling cues.

Nissan, cont'd

Nissan's X-Motion concept takes an architectural look at what tomorrow's cars might look like inside. There's still a driver's seat, but clearly the overall intent of the interior design is to provide for the living-space-on-wheels goal of AVs. Note the flat floor and what look like rotatable seat mounts, and the clamshell front/rear door configuration opening wide.



The X-Motion's front light mockups might hint at future Nissan design directions; this one's an inward-pointing flying dart.

The rear lamps are much closer to actual functionality. They use Flex-n-Gate's patented optical techniques to achieve pseudo-holographic, high-depth effects at affordable cost and without deep packaging requirements.





Infiniti's Concept Q-Inspiration has mockup lights with a striking design. Front and rear, they bear numerous parallel longitudinal lines of light, looking almost biological—like

the intricate gills on the underside of a mushroom.



The Infiniti QX50 headlamp features four squares' worth of LED projector lighting, ringed by light guide eyelids for the DRL and position lamp functions.

Here's the QX50 fog lamp, an LED item somewhat bafflingly certified as SAE F (not F3) but ECE F3 (not B). Its internal structures are uniquely sculptural and attractive.



Infiniti, cont'd



The QX50 rear light is self-contained; all functions are performed by the one lamp on each side, and in red light for the American market. Attractive vertical LED elements in a row provide the stop light function. A wingtip-shaped retroreflector is below.

The QX80 rear lighting package, by contrast, puts amber bulb-type turn signals down in the bumper fascia with the retroreflectors; only the stop/tail and reverse functions are done by the main clusters.



The QX80's front lamp has an LED projector outboard, an LED reflector inboard, and Nissan's eyelid DRL. Down below there's a twin-pocket LED fog lamp.



This detail view shows the homogeneously red appearance of the main rear lamp cluster's perimeter band, and the shovel optics for the stop and reverse lamp functions.



Subaru

Subaru's new Ascent SUV has front combination lamps in accord with the brand's family styling: a round projector boxed in on three sides with a light guide DRL.

There's a bulb-type turn signal inboard, with a striated strip of clear polycarbonate in front to approximate the look of an LED light guide. Note auxiliary front lens optics for angular compliance of the turn signal.



The Ascent's rear lamp is also familial, looking like the big sister of the lamp on the Outback: a prominent C-shaped dotted red LED array bracketing bulb-type turn signal and reversing lamp.

In lateral view we see the very large fair-in of the tail lamp to the body panel, punctuated by the sidemarker.



The Outback lights haven't changed in design or style, but now LED headlamps are available. In this detail view of the projector, we see the horizontal striations on the condenser lens that are becoming something of a hallmark of LED projectors.

Toyota

The Toyota 86 has new lights this year. There are prominent individual dots; five for the DRL and six for the turn signal, inboard of a round BiLED projector. There's a stylised "86" callout on the outboard side of the projector's teardrop-shaped bezel. Fog lamps are also in LED technology.



The new 86 rear lamp is an all-LED item, as well: six big round dots for the yellow turn signal, a red eyebrow for the taillight, and a round array for the stop light with underslung multi-segment retroreflector give an aggressive bird's-eye look to the lamp.

The new 2019 Avalon, the Toyota brand's biggest and highest-specification sedan, has interesting lights all around. The headlamps use slim, small oblong LED modules for the low and high beam headlamps.



Toyota, cont'd



The Avalon's LED front turn signals are in two segments for a very deliberate reason discussed below. Note the very

short height of the headlamp as a whole.

And here's the Avalon's rear lamp. Like the headlamp, its overall height is quite short. There's a terraced series of three retroreflector lines.



The rear turn signals are divided into two segments: one on the body and one on the trunk lid. Both segments light up simultaneously—regrettably in red—then the trunklid section sequentially extinguishes before both sections go dark together. In live speed, the sequential effect is pleasingly smooth;

see our DVN movie [here](#). We've also got a slow-motion video [here](#), clearly showing the stages of the sequence. How is this legal when Audi's rest-of-world swiping signal is not? It's because the outer, body-mounted lamp is the compliance light. It's a conventional on/off turn signal Toyota say has at least 50 cm² of lit area as required by MVSS 108. The inner, trunklid-mounted lamp with its sequential extinguishment is an auxiliary light that does not interfere with the function of the compliance light; as far as American law is concerned, it doesn't really exist.

Up front, a similar but opposite approach is taken: the inner compliance segment switches on, providing at least the required 22 cm² of lit area all at once, then the outer auxiliary segment sequentially switches on, then everything goes dark together. Here, too, the sequential appearance is smooth (though not as smooth as a UN-spec Audi); see our [live-speed](#) and [slow-motion](#) videos.



The Camry's new design came last year, but this year we were able to get closer to the lights. Here's a detail view of the LED rear combination lamp.

The Camry headlamp has a frontmost LED turn signal array shaped something like a beaching ocean wave; inboard of it are three curved linear elements, and outboard of it is the rather small round Bifunctional projector eye.



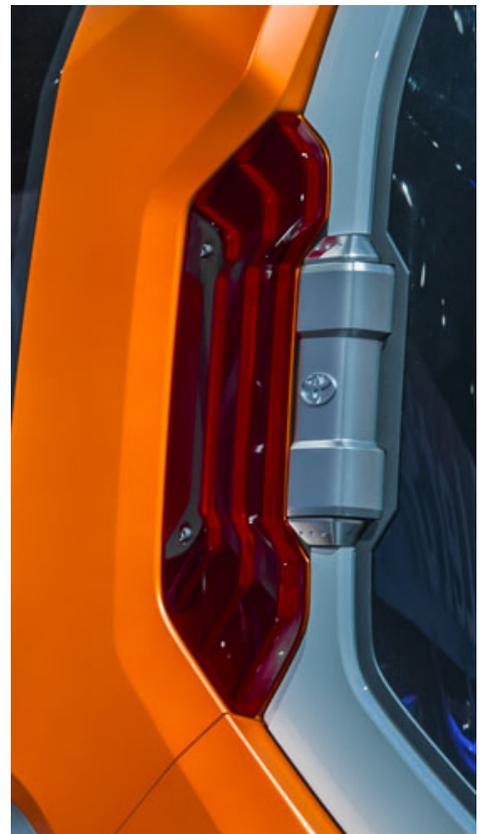
The Toyota Tundra pickup truck makes a great leap forward in headlamp technology: the lamp is the same size and shape as last year's H4, but now it's got an over/under reflector LED setup with the emitters on top and bottom of a central horizontal bar, much like the LED headlamps made in America by Peterson and Truck-Lite. The turn signal is still incandescent, but there's a great big wraparound white LED DRL at all but the inboard edge of the lamp's perimeter.

Toyota, Cont'd

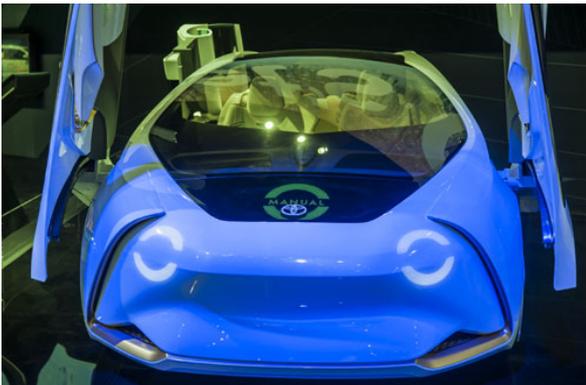
Toyota's FT-4X Concept has complex-looking headlamp mockups with an intriguing LASER TRACKING callout. Interesting that details like the side marker light are present in this mockup lighting package.



Compared to the front, the FT-4X rear light mockups are rather less suggestive of fascinating new technology. Nevertheless, they have an interesting terraced design.



Here's the front face of Toyota's Concept-i, with its "eyes" in asleep (top) and awake (bottom) mode. In both images, the variable-message sign says manual, meaning the vehicle is not in autonomous mode.



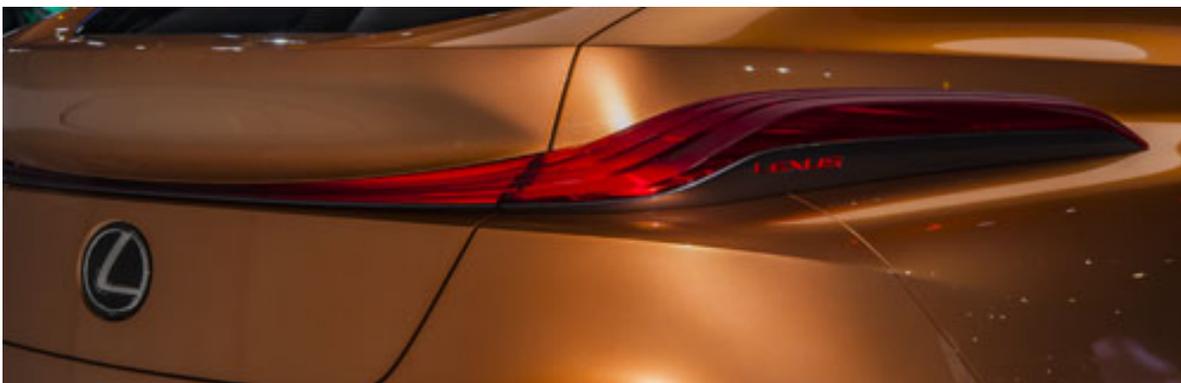
Toyota: Lexus

The Lexus LF1 Concept has highly 3-dimensional front lamps, which in the past might have been dismissable as unfeasibly slim, but lamps like those on Toyota's own Avalon make these barbed-star mockups look much closer to reality now.



A lateral view presents a flying-dart aspect to the front lamps, which make the car look as though it is in motion even while it's parked.

The LF1 rear lights aren't just shaped like a racetrack, they *are* a 3-D racetrack!



Lexus, cont'd

A lateral view of the LF1 rear light mockups shows how their curvaceous tridimensionality contributes to the overall styling of the car. From this angle, they seem to suggest wings or fins. The LEXUS callout in the side could be a hint of how side markers might be done on future Lexus models.



The Lexus NX gets new rear lamps this year. The previous model had three small, very-high-intensity emitters providing photometric compliance of the stop lamp

(the larger tail area lit up as well, meeting the letter of the EPLLA requirement, though circumventing its spirit)—with US intensity requirements, they were extremely bright to be stuck in traffic behind. The new NX lamp has a new diffusion-textured red checkmark-shaped area where the super-bright emitters previously were. No word yet on whether they're less glaring; Toyota's show vehicles had disabled stop lights. There's a yellow six-shovel LED turn signal below the red area, and a 4-emitter reversing lamp neatly tucked above the swoosh line on the hatch lid.

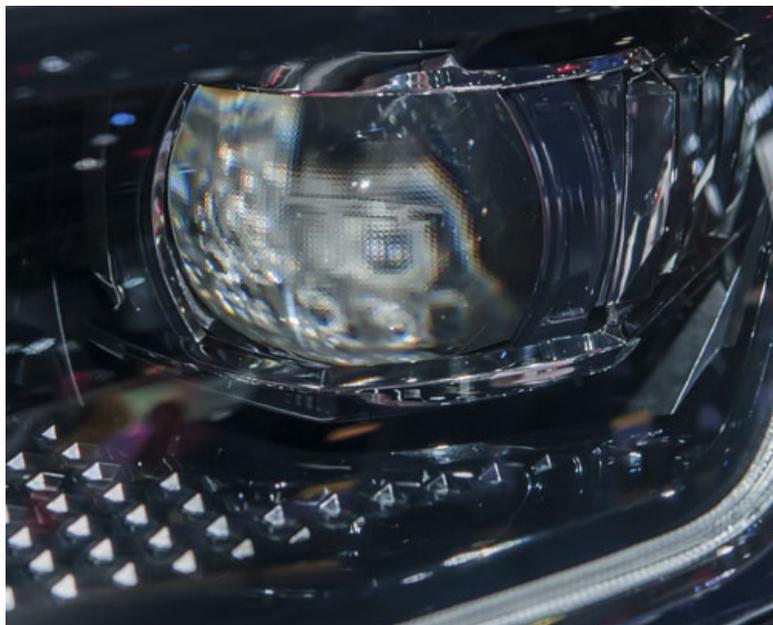
This year's NX headlamps have a trio of miniature LED projector balls in a trim, fashion-forward headlamp perched above a two-colour checkmark for DRL, position, and turn signal functions.





The completely new Jetta was first to greet us at the VW stand. There are two kinds of headlamp, depending on vehicle trim and equipment. Here's the triple-reflector LED version. Turn signal is incandescent; LED DRL is outboard.

And here's the BiLED projector version. Incandescent turn signal here, too, and a wraparound light guide for the DRL.



This detail view shows intricate surface texturing on the oblong condenser lens of the BiLED projector. We also see the interesting series of pyramids on the floor of the headlamp.

Volkswagen, Cont'd

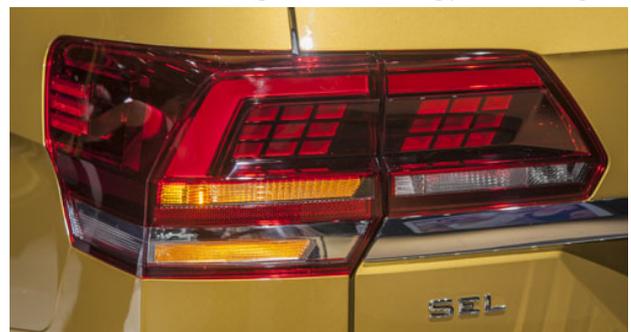
The angular rear lamps contain shovel optics for the stop light, a long eyebrow light guide for the tail light, and—glory be!—a yellow LED turn signal.



Driving home VW's boasts of high technology content in the new Jetta was a first-year 1984 model. In front: twin rectangular sealed beams. In back: four incandescent bulbs inside a multicoloured plastic box.



VW's Atlas SUV has side-by-side LED reflector headlamps with snazzy double-hammock LED arrays for the turn signal (amber) and DRL (white) functions. Additional lighting functions are below the chrome divider bar. The Atlas rear lamp has a high-tech iteration of the VW design language, with a double-line yellow bulb-type turn signal.



Volkswagen, Cont'd

Like the Atlas, the VW Golf Alltrack has twin LED light guides built into the headlamp for the turn signal and DRL functions. Here we see LED projector low beam and scoop-optic reflector high beam.



The Golf Alltrack rear lamp emphasises horizontal lines, and the Jetta's yellow turn signal does not rub off on the Golf.



These two photos show the difference between the Passat's rear lamp appearance with and without the stop/turn segments illuminated.

Volkswagen, Cont'd

This Passat's headlamp has side-by-side LED reflectors, a racy red accent stripe, a prominent horizontal LED array at the bottom for the turn signal, and a slim, striated white light guide at the top for the DRL.



The redesigned Tiguan can't be had with OLED front lights, but (except the DRL) it can be had with no-LED ones. Here's the standard equipment: halogen reflectors, bulb-type turn signals.

Higher-spec Tiguans get full-LED front lamps thematically similar to those on the Passat.



Volkswagen, contd



Here's the new Tiguan tail lamp: a hockey-stick cradles a square puck.

The VW ID Crozz concept has intricate, elegantly-designed headlamp mockups. A ring of inward lines give a sense of great depth.



The rear lights on the ID Crozz concept are stylistically much simpler than present VW designs. Is this a preview of coming VW taillamps, or more of a "watch this space" placeholder? We shall have to wait and see.

Lighting and ADAS Suppliers at NAIAS

Hella and Bosch invited DVN to tour their showrooms at NAIAS. No photography was permitted, but these suppliers graciously toured us around their expo spaces, showing and telling about their latest production and forthcoming components and systems. **Hella** are hard at work refining their micro-lens LED matrices which can be used to create footpaths made out of light to guide the driver and passengers safely into and out of the car; alert them to water, mud, or tripping hazards near where the car is parked, warn approaching bicyclists that a car door is about to open, project all manner of messages and symbols on the road for a surprising distance from the car, and more. They've also been developing their hologram-based car lights, and can do magic tricks with multiple very different lights occupying the same apparent space, highly effective illusions of great depth despite very shallow packaging, and more. They've got a highly-performant infinite-colour interior light that can be played with and adjusted by touch (like a touch screen on a smart phone), as well as new developmental breakthroughs in their ever-more-intelligent headlighting systems. Aside from all of that, Hella have a large and growing range of ADAS sensors and systems.

So too have **Bosch**, whose display space focused on powertrain and braking systems, but nevertheless contained autonomous-driving technology and technique.

Valeo refused us entry into their expo space—a bit ironic, given DVN President Hector Fratty's multiple-decade career as their chief of lighting R&D.

Magneti Marelli were present at NAIAS, but they had a much larger presence at CES in Las Vegas; see the DVN Report on that show for more detail.

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