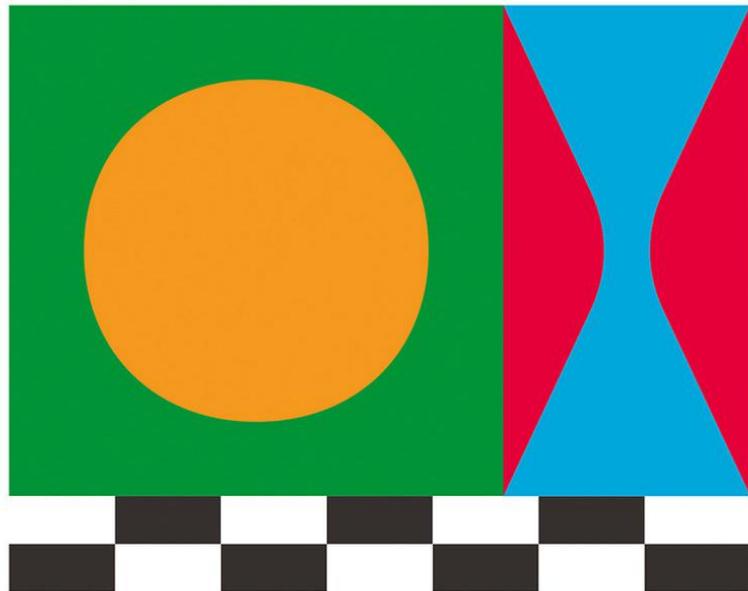


T O K Y O
INTERNATIONAL
M O T O R
S H O W

DVN Report

———— The 46th Tokyo Motor Show ————



OPEN FUTURE
TOKYO MOTOR SHOW 2019

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About the authors



Hector Fratty's entire career has been in vehicle lighting. From 1995 to 2006, he was Valeo Lighting's chief of R&D. His lighting expertise garnered recognition as one of Valeo's five Master Experts. In 2008 he launched Driving Vision News, which has become the automotive lighting and driver assistance industry's journal of record dedicated to keeping the community informed and communicating about the progress and innovation in the field.

Tokyo : The Future Through Japanese Eyes

The theme of this year's Tokyo Motor Show was «Open Future», and the show has been reinvented to provide visitors with a vision of a future mobility society; to this end, the show's scope has been expanded to encompass sub-themes like «The Excitement of Cars», «Future Homes,» and «Future Towns.»

Key takeaways

- The show was almost entirely Japanese. Daimler and Renault were there, but that's about it for non- Japanese automakers, and those two European companies didn't launch any world-firsts at the Tokyo show; it really is a regionally-focused event. As such...
- ...The cars shown catered for the needs and wants of a densely-populated country with few onshore energy resources. So there were lots of EVs, small and really small cars, and retro-styled car concepts.
- The auto usage development path is forking; splitting in two: city mobility with small cars, and driving pleasure with bigger ones. Lighting to meet new use cases have to be studied and understood.
- Japanese makers presented interesting cars and technologies with some very imaginative innovations.
- Clean mobility is presented and seen as a high priority. Cleaner engines, electrics, and hybrids dominated the show; most of the presentations and communications were focused on EVs. Automakers are facing tightening emissions restrictions in many markets—in Europe, for example, makers will have to pay huge penalties if they violate the 95 g/km CO2 threshold in 2020—and buyers increasingly prioritise a reduced climate footprint.
- Communication by lighting is gaining Traction. Ichikoh and Koito put forth strong presentations with a variety of concepts.
- interior lighting is going from strength to strength. There were a lot of concept cars with a great deal of interior lighting innovation on display. The Toyota-Lexus cars were one notable example.

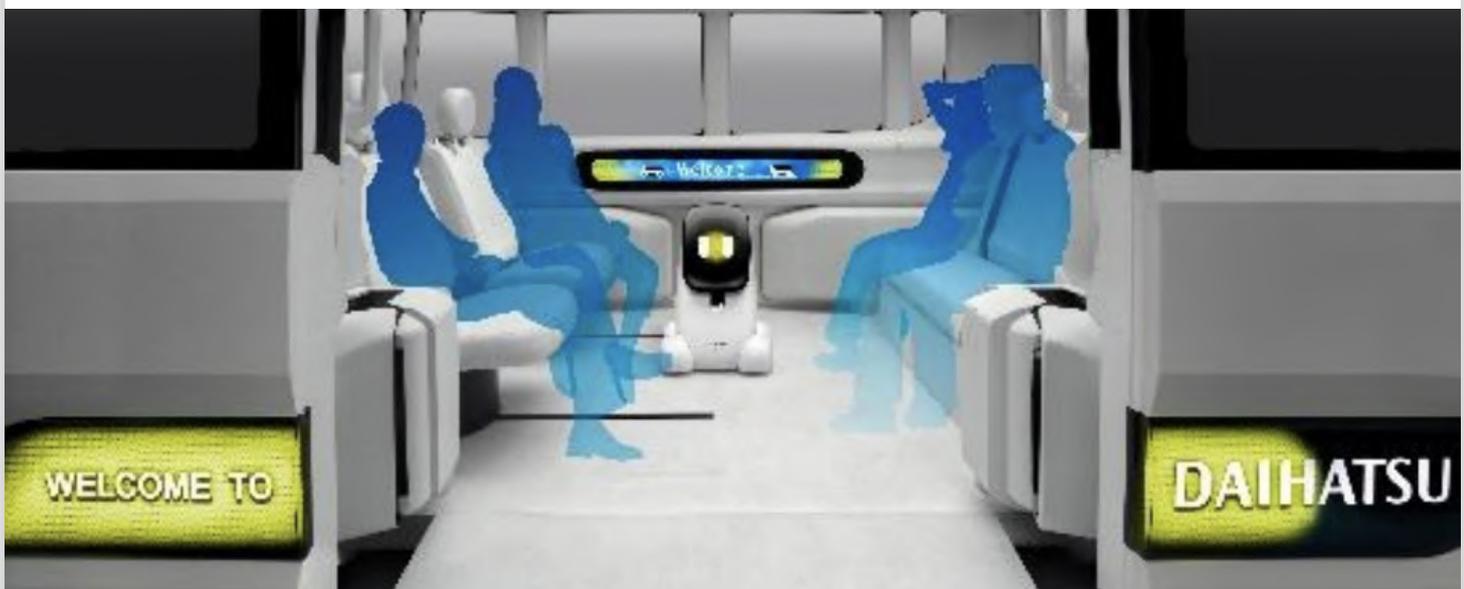
And now, here's a look at some of the particularly interesting cars we saw at Tokyo this year:



DAIHATSU

Ico Ico Concept

The Ico Ico is a one-box autonomous public transporter that aims to support free movement of people by providing first- and last-mile mobility. It's been designed for easy passenger ingress and egress, and is small enough to travel through narrow laneways, roads, and driveways.





DAIHATSU

Tsumu Tsumu Concept

Daihatsu's TsumuTsumu mini-truck idea caters for diverse usage situation. It has a large cabin with outstandingly easy ingress and egress, and a spacious, configurable cargo bed.





DAIHATSU

Wai Wai Concept

Here's a capacious yet compact mini-van, an easy-to-drive three-row six-seater with a sunroof to achieve a spacious interior with a sense of openness.





DAIHATSU

Waku Waku Concept

The Waku Waku is a miniature crossover with surprisingly large amounts of convenient cargo space and roof luggage capacity.





HONDA

Fit (Jazz)

Honda are working to move from multiple ADAS sensors to a single-lens camera. To that end, a Valeo wide-angle monocular camera is installed in the new Fit (also marketed as the Jazz) as a part of the «Honda Sensing» suite of driver assistants. Honda say the new camera achieves better performance at lower cost than previous systems with a camera plus millimetre-wave radar, and plan to install similar single-camera systems in more models.





HONDA

Accord

The new Accord is low and wide, with a spacious cabin. It's slated to go on sale in Japan early next year.





HONDA

e

Honda will begin sales in Japan of the «e», which was exhibited in preproduction form at the Frankfurt Motor Show this past September. Positioned as an urban commuter, the e features a motorised-rear-wheel drive system, which Honda say gives good power and easy handling. It has large dual touchscreens inside, and sideview cameras instead of mirrors. It's configured to seamlessly integrate mobility into daily life with the Honda Personal Assistant, a voice recognition function based on connected AI technologies.







HONDA

Freed

The Honda Freed is an easy-to-handle mini MPV based on the Fit/Jazz platform. Now there's a Crosstar trim level, which adds SUV styling (side cladding, bumper skid plates, LED fog lamps, etc).



D-Max

Isuzu are striving to appeal to diverse customers by offering a wide range of variations of this newly modernised truck. They're working to leverage their core business operations to increase sales and take a lead in the LCV market. In the headlamps, Bi-LED projectors combined with stylish signature lamps give the truck an eager, intense look. In the tail lamps, dual LED edge lights are employed. These new light designs generate a unique, stylish appearance both front and rear.

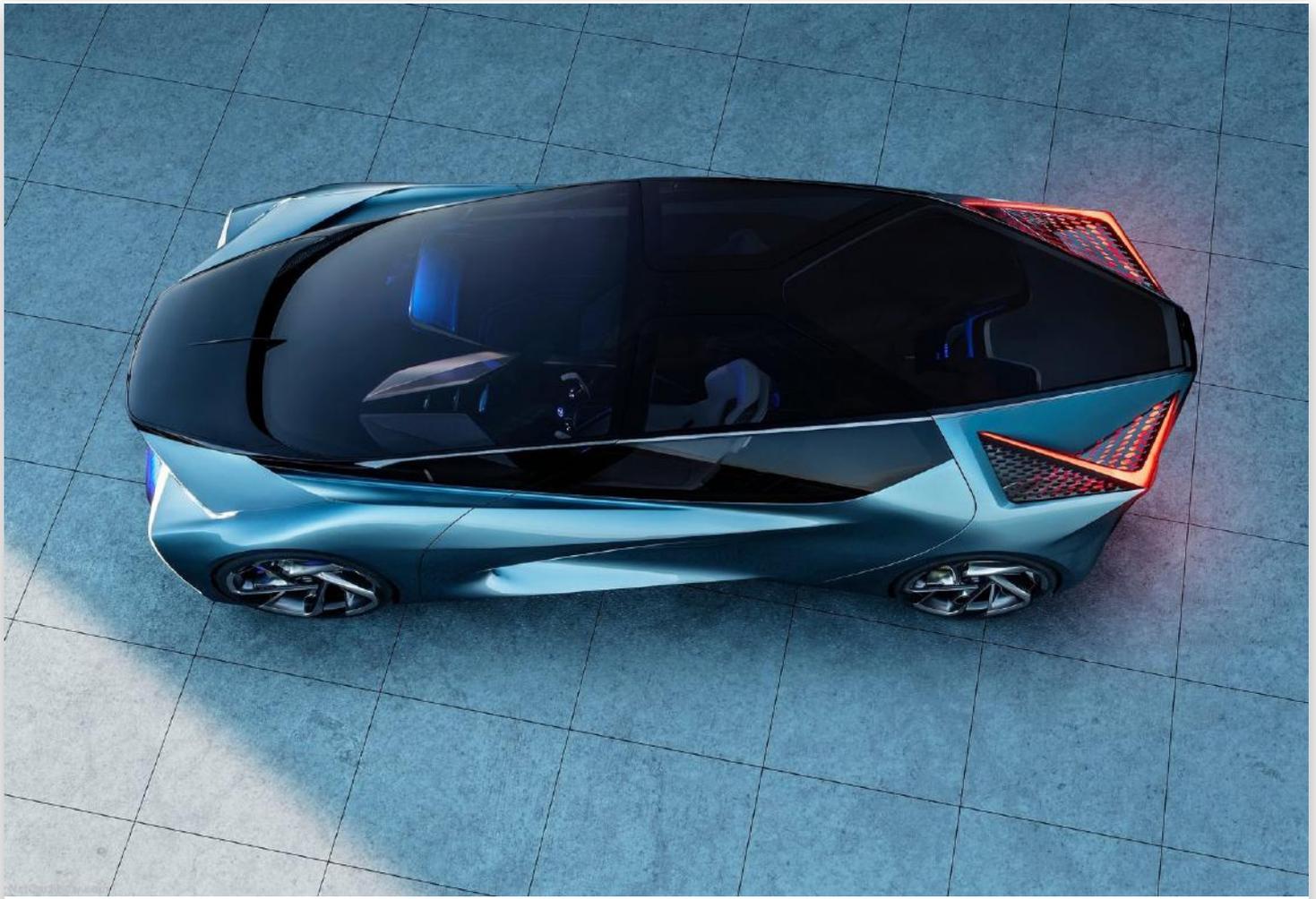




LF-30 Concept

The LF-30 embodies the «Lexus Electrified» vision put forth by the company. It was presented as a look ahead to the cars of 2030 with features such as a new-concept cockpit based on a human-centred design philosophy and a steer-by-wire system. The exterior design, too, is said to suggest what a Lexus EV of the 2030s might look like. The window glass, which contiguously runs from the front to rear, and the wing-shaped headlamps form the contours of the car.



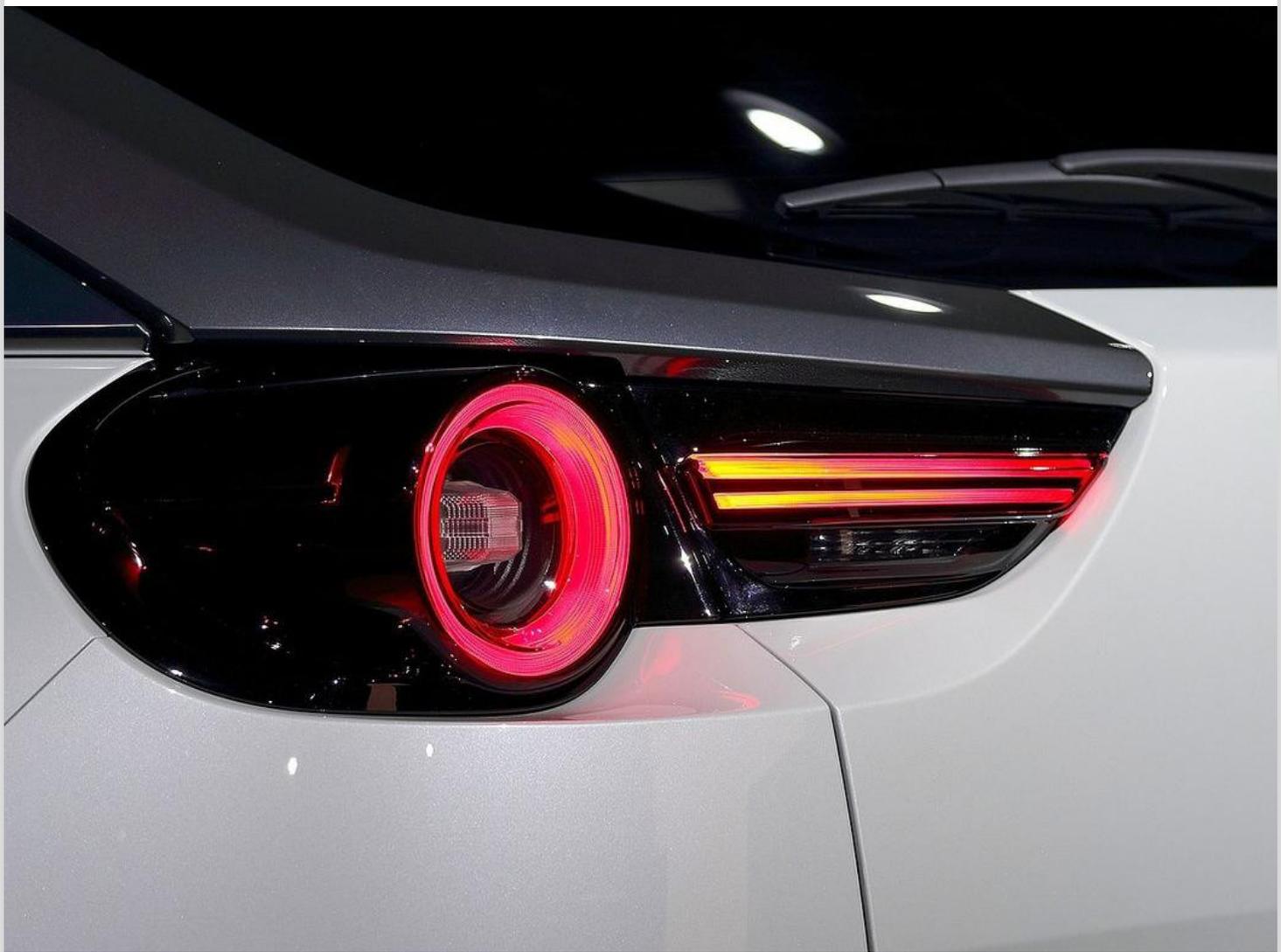




MX-30 Prototype

Mazda's first series-production EV is slated to go on sale early in 2021. Mazda say they set out to create a car that would «become a partner to its owner...every time a customer gets behind the wheel, their affection for it should grow».







CX-8

The updated CX-8 is Mazda's three-row CUV, which provides a refined driving experience and enhanced utility with comfortable seating for six or seven adults.





Mi-Tech Concept

This small electric SUV concept bears MMC's new Dynamic Shield front design concept, which has a satin metal look to the central «grille», and copper accents to subtly hint at the car's electric powertrain. T-shaped headlamps are embedded in the front end to emphasize a distinguishing outward appearance. The rear styling evinces a big, bold hexagon carved from a metal ingot. It's got T-shaped tail lamps that echo the front light design.



The Mi-Tech's HMI displays information detected by a comprehensive technology network, including advanced optical sensors, on an augmented-reality windshield. With vehicle, road, and surrounding traffic conditions shown on the AR windshield, drivers can make accurate, heads-up decisions even in poor visibility conditions.





Super Height K-Wagon Concept

Here's Mitsubishi's newest small, tall kei-class wagon. It has a high-performance engine and CVT, over-and-under grouping of the front lighting package, and slim vertical tail lights flanking the upright back-glass. The interior is configured and arranged for the feeling of an airy, spacious flight deck feeling.





Engelberg Tourer Concept

The Engelberg Tourer, named after a ski resort town in Switzerland, is a three-row SUV with the latest iteration of MMC's twin-motor PHEV drivetrain with four-wheel control and solar charging capability. The front lighting package has bolt triple-stripe headlamps ringed with blue accent stripes, and a sextet of LED off-road lights above the windshield. At the rear there's an attractively swoopy full-width linear CHMSL above the backglass, and wide, bold tail lights.





Ariya Concept

Nissan's Ariya Concept shows off the latest evolution in the automaker's ideas for how vehicles can, could, and should be powered, driven, and integrated into society. It's a crossover EV with twin electric motors, comprehensive driver assistance technology, and a look that heralds Nissan's new design direction, called «Timeless Japanese Futurism». There's a bold electrified V-motion signature shield up front and a striking rear light blade, short overhangs, and an interior that feels more like a lounge than a conventional vehicle.





IMk Concept

The IMk concept offers advanced Nissan Intelligent Mobility technology and a powerful EV drivetrain in a compact, agile body. It's 3,434 mm long; 1,512 mm wide, and 1,644 mm tall. The headlamps comprise three ultra-slim ice cubes on each side, atop upper and lower «grilles» whose striped theme is picked up in the wheels and in the taillights. The only actual pushbutton in the whole of the interior is atop the shifter; everything else is touchscreens and virtual buttons, and there's a front bench seat.







Skyline

The Skyline bristles with advanced driver assistants, presenting as version 2.028 of the maker's ProPILOT suite. The highly advanced capabilities of the system are available only on specific parts of specific highways in Japan, for now—ones that meet design, feature, and density criteria and have been mapped out in high definition. When on such a stretch of road, the driver can take hands off the wheel, but an interior IR camera keeps an eye on them to make sure their eyes are still on the road.





Serena

Nissan's most popular minivan now comes with the maker's award-winning e-POWER EV system. The all-LED front lighting plays an integral role in the swoopy, deep-vee styling, while the rear lights cap off what can credibly be seen as...tailfins!





Levorg Prototype

Subaru showed their new second-generation Levorg for the first time at Tokyo. Subaru say they envision «a future that everyone can enjoy driving at the full, at their will», and the Levorg prototype is definitely firmly in an era where autonomous driving technology is widely spreading. The lighting (and the overall design) are fresh and new, while remaining readily recognisable as belonging to the Subaru family. Light styling is evolutionary rather than revolutionary.





WRX STI EJ20 Final Edition

A special commemorative edition of the WRX bids farewell to the EJ20 engine. 555 of them will be made, not more, and purchase opportunities will be offered by lottery, only in Japan.





Impreza Sport 2.0i-S EyeSight

Three years after its launch, the fifth-generation Impreza gets major updates including a new front bumper and headlamps, and a «Touring Assist» version of Subaru's acclaimed EyeSight ADAS package as standard equipment.

XV Advance







XV Advance

The XV Advance CUV is Subaru's first hybrid model. It's powered by what the maker are calling e-Boxer, combining the Subaru's signature boxer (horizontally opposed) engine with electric-drive capability. Here again, EyeSight Touring Assist is standard. The car's traction battery can charge from 0 to full in five hours from a 120v plug-in, or two hours from a 240v outlet. There are LED projector headlamps up front, and LED stop/tail lamps as well.





Viziv Adrenaline Concept

Here's the first concept vehicle designed under Subaru's new design philosophy—»Bolder«—which emphasises key elements of the Subaru design language. This concept was first unveiled at the Geneva Motor Show this year; Viziv is a coined word originating from the phrase «Vision for Innovation». The light styling is highly congruent front-to-rear, with curvilinear shapes up top and hexagonally-arranged dots below.





Waku SPO Concept

Here's a plug-in hybrid small coupé with old-style wing mirrors (for many years, Japanese regulations required the driver's sideview mirror sightline to be swept by wipers). It is a personal compact PHEV. The lighting is full-LED, and there's a screenlike «grille» that might resemble a robot's face.





Hanare Concept

The Hanare is a box on wheels, an autonomously-driving mobile room where everyone can use transportation time and comfortable space effectively. The styling is an attractive mix of retro boxy shapes with tomorrow's touches. The top-hinged side panel opens up whole.





Hustler Concept

Here's another playful blend of boxy retro style cues with new-fashioned technology. It's a mini crossover wagon with round headlamps, box tail lights, and other Jeep-like cues.





Granace

The large radiator grille embellished with metallic accents flows seamlessly into the twin-lens LED headlamps, which project in vertical and horizontal directions, providing the van with expressive, sophisticated eyes. Woodgrain decorations flow from the back of the front seats toward the side trim. The LED side colour illumination is gently lit.



The Granace comes standard with the latest version of Toyota Safety Sense, featuring improved sensing functions that make use of the pre-collision safety system that detects pedestrians during the day and at night, as well as cyclists during the day.





e-Palette (2020 Version)

The e-Palette is Toyota's first vehicle developed specifically for autonomous MaaS applications. It reflects Toyota's ongoing transition to a mobility company and combines electrification, connected networks, and advanced driving technologies to support new shared mobility businesses and business models.

The e-Palette is equipped with a specially-designed automated driving system that includes control hardware, software, and advanced sensors such as cameras and lidar. Combined with high-accuracy 3D mapping and an operation management system, e-Palette will achieve low-speed automated driving at SAE level 4. Both front and rear lamps mimic eye contact to inform pedestrians of vehicle actions—we're not sure these particular configurations are necessarily intuitive, understandable, or optimal, but they do demonstrate the concept.







e-Trans

Toyota showed their ideas for a highly polyvalent taxi/delivery vehicle for people and packages.





e-Chargeair concept

In the Mobility Theme Park at the Tokyo Motor Show, Toyota showed their imaginative idea for a multi-functional mobile charging station. The e-Chargeair is a public charging station for a range of devices from phones to BEVs can be charged wirelessly, even while in motion. It can also supply power to infrastructure, and has wifi and an air purifier.





e-care

Toyota invited showgoers to imagine a medical exam of the future using a facial version of the well-known game «rock-paper-scissors». This mobility service allows a passenger to talk with a doctor while en route and also undergo a medical exam on their way to the hospital. The e-Care goes where it is needed—to a private residence, to a business, or wherever.





LQ concept

Toyota say their LQ leverages advanced technology to build an emotional bond between car and driver. It uses the roof and floor mat areas as an intuitive communications platform to share information between the vehicle and passengers. Embedded lighting displays different colours to indicate automated or manual driving mode, and lights up different foot wells to indicate which passenger the car is addressing. It can also communicate information such as road surface conditions to people inside and outside of the vehicle using the DMD in the headlamps. The system can activate one million tiny embedded mirrors to project complex figures on the road ahead. The dashboard displays use OLEDs. The advanced instrument panel design wraps around the driver.

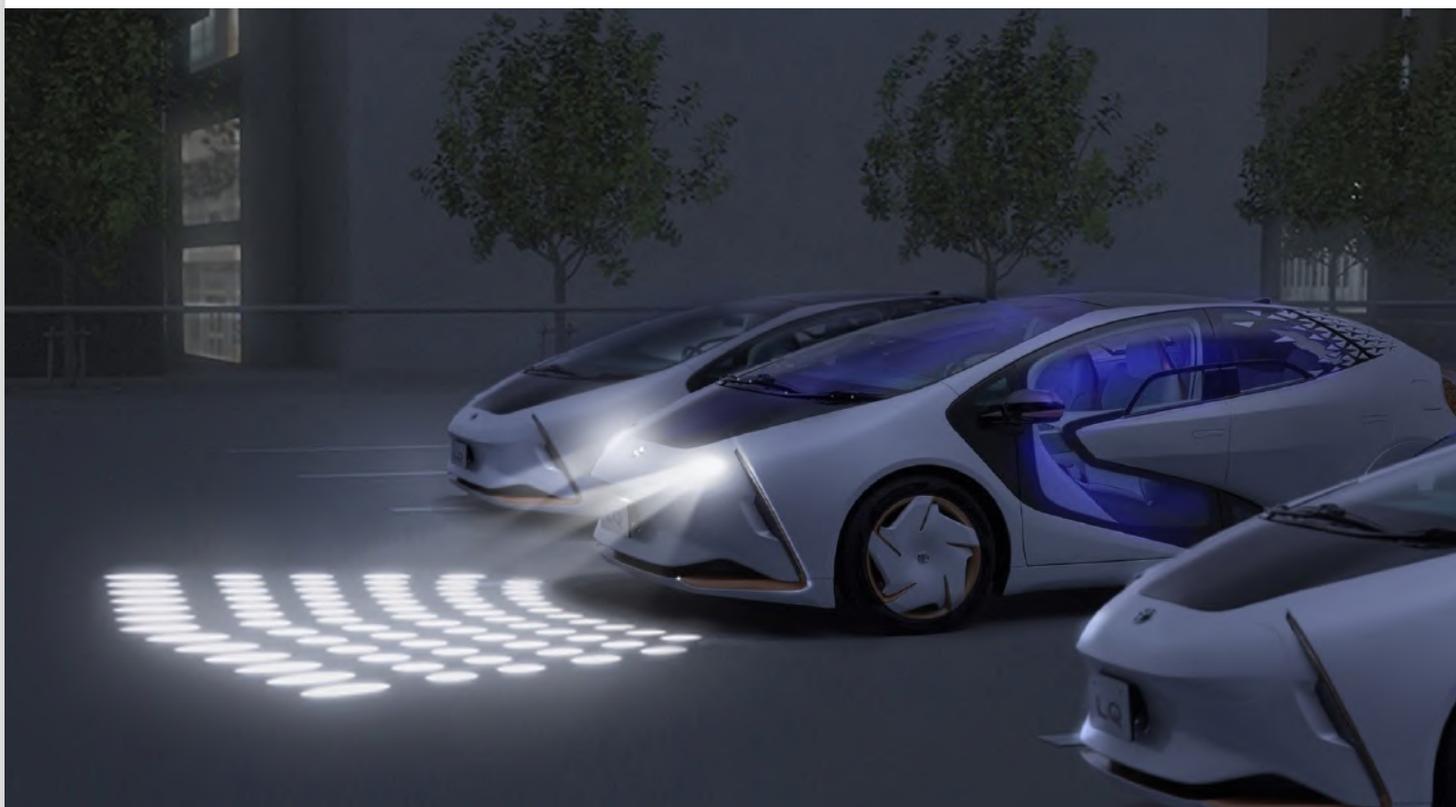


Toyota's «Yui Project Tours 2020» is a public test-drive event scheduled to run from June to September 2020. The public will have the opportunity to register for a chance to be selected to experience the LQ and the «Yui» AI. By using a smartphone app in advance to provide their interests and preferences, selected participants will join a test drive of the «LQ» with «Yui». The LQ is equipped with an L4-equivalent automated driving function, and an augmented reality head-up display (AR-HUD) expands the information display area, supporting safe driving by reducing driver eye movement.

Driving information such as lane warnings, road signs, and route guidance can be displayed in a three-dimensional and easy-to-understand manner over the scenery seen through the windshield.



The system helps keep the driver's eyes on the road thanks to a large screen display (equivalent to 230 inches) that has a depth of 7 to 41 m ahead of the vehicle. The roof and floor mat areas are used as an intuitive communications platform to share information between the vehicle and passengers.





Mirai Concept

The totally redesigned Mirai concept portends a major step forward for FCEVs and the potential of a hydrogen-based energy stream. It's got significantly greater range and improved driving performance compared to the first Mirai, and an elegant, sporty design that offers increased passenger room.





The interior, equipped with a 12.3-inch wide screen on the centre console and instrument panel that embraces the driver, provides a simple, modern space to create a feeling of warmth and comfort.





Yaris

The new Yaris is scheduled to go on sale in Japan early next year, after already going on display in showrooms throughout Japan. New headlamps feature LED technology, including turn unitary turn signal/DRL units. There will be four different powertrains to deliver agility, superior comfort, and smooth and direct acceleration.





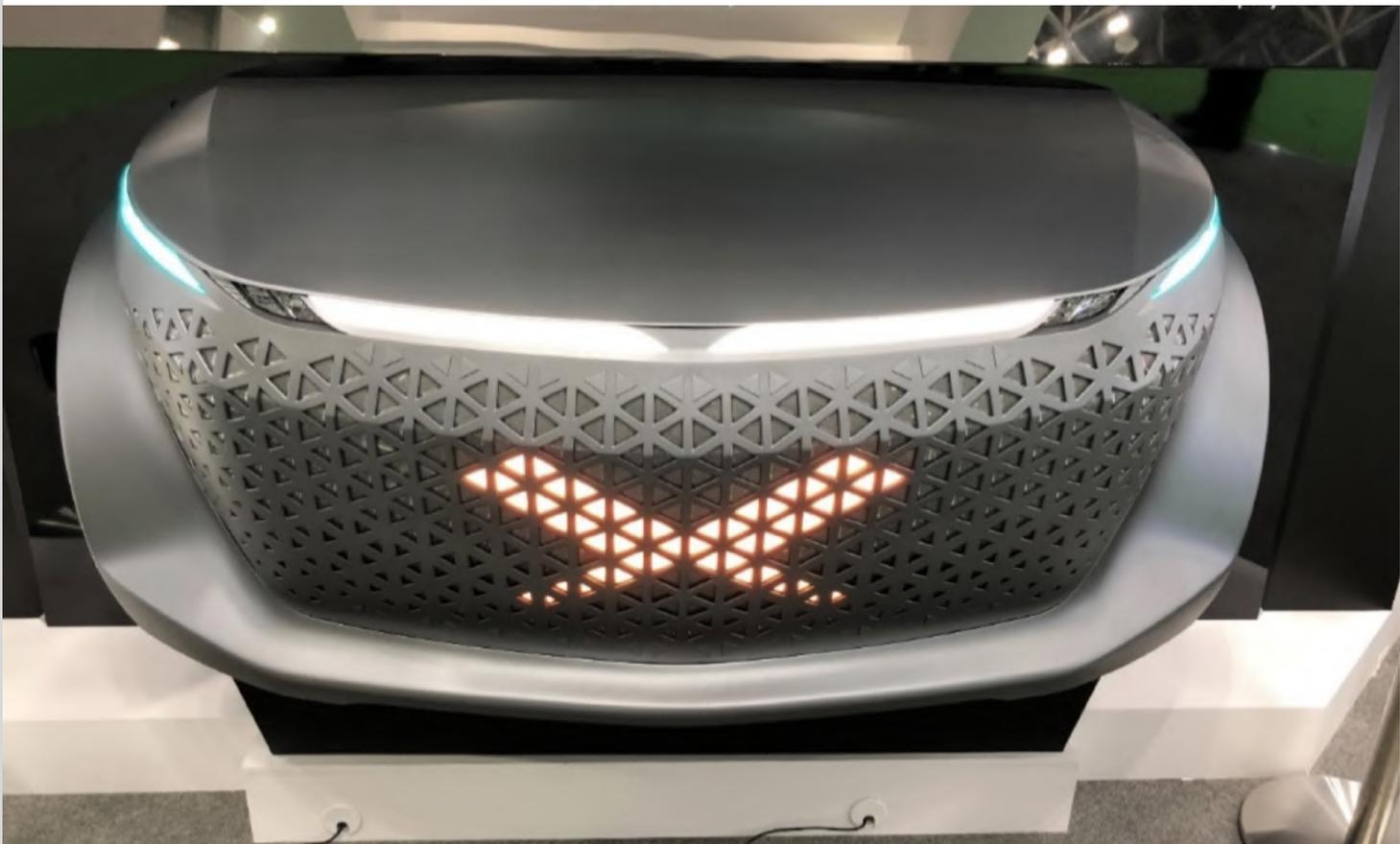
Ichikoh

Ichikoh unveiled a virtual-reality system using high-definition lighting and computer graphics. In the low beam area, it informs a driver of the width of a vehicle by drawing guidelines, and gives navigation information by projecting symbols and numbers on the road. In the high beam area, it prevents the oncoming and preceding vehicles from being dazzled while maintaining driver's visibility at an equivalent level, by enhancing the resolution of illumination pattern and by minimising the shading range.



Another Ichikoh exhibition was a full-scale mock-up of «Communication Lighting», a system that indicates the intention of the car by using lights instead of the driver's hands and face. It will be the lighting as HMI (Human Machine Interface), employed to exchange information between human and vehicles in the automated driving society. Using about 400 LEDs, Communication Lighting indicates the movement (intention) of the car to surrounding drivers and pedestrians by using light sign during automated driving instead of the driver's eye contact and gestures.

Ichikoh also displayed about 10 types of scenarios such as «Thank you» for oncoming vehicles and «You can go across» for pedestrians and verify whether the intention of the vehicle is conveyed to visitors.





Greeting to owner



Pedestrian alert on slipping through bike

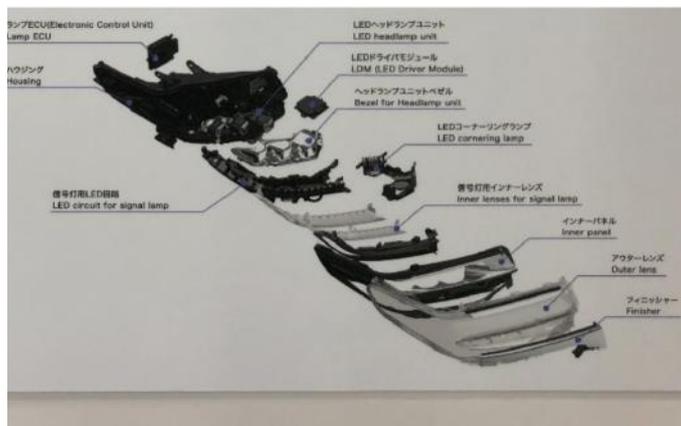


Thank you signal



Auto parking signal

ABD Headlamp System displayed
Toyota Alphard-Luxury Minivan with Glare Free High Beam





Marelli

The company's slogan, «Powering Progress Together», is emblematic of a focus on helping their customers confidently navigate and succeed in an unprecedentedly changing industry. Marelli is introducing products and services in the areas for Autonomous Driving, Connected Systems, Electrification, and Green Technology.

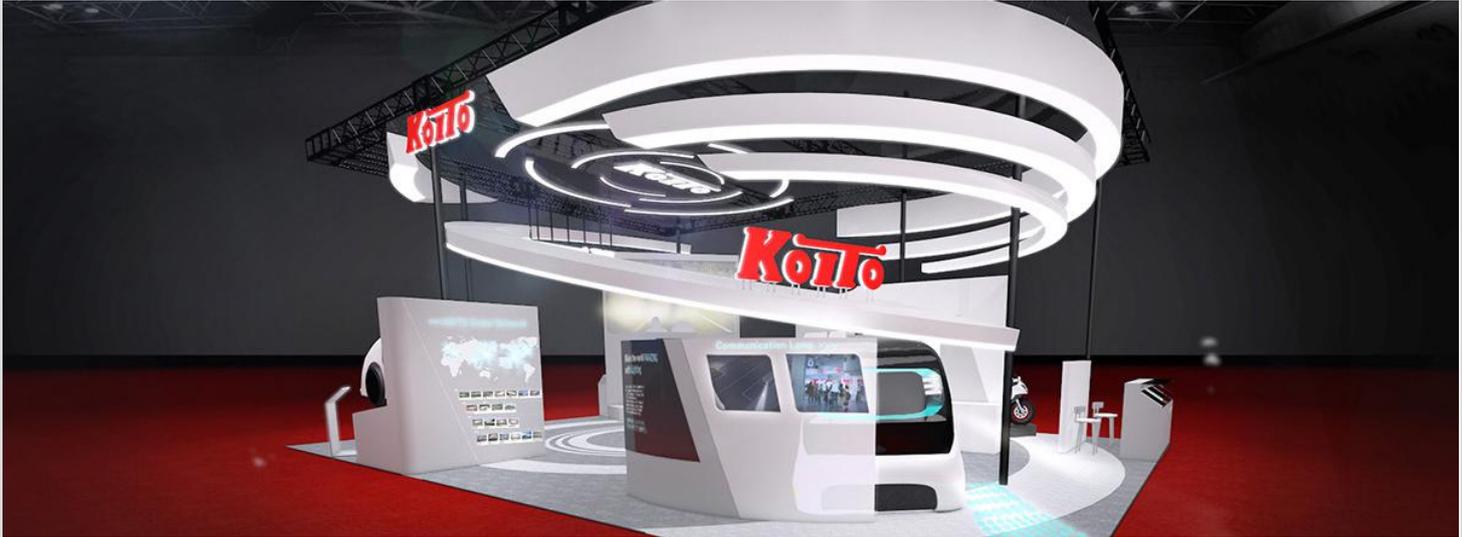


Marelli presented the latest iteration of their Smart Corner™, wherein sensors for autonomous driving are integrated in the headlamp: light-detecting devices using infrared cameras, lidars, and short and long-distance radars) into headlight and rear light units, which are used to create maps of the surrounding environment to support autonomous driving.



In the Interior Experience area, Marelli presented integrated cabin system solutions such as their «Human-Max Cabin» concept model, which maximises the value of the individual transport experience.

Koito



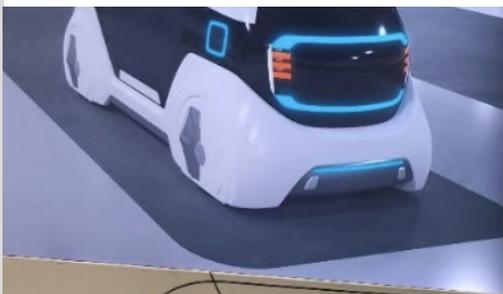
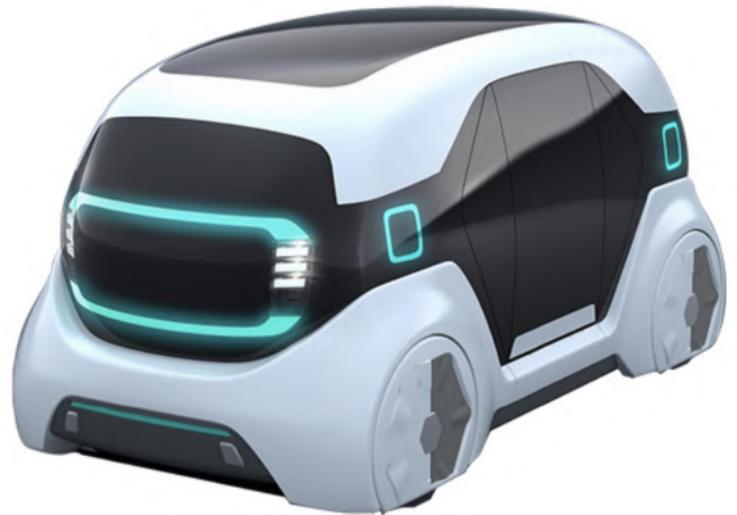
By installing sensors—lidar, cameras, millimetre-wave radars—into headlamps and rear combination lamps in the four corners of the vehicle, next-generation lamps detect objects 360° around the vehicle at an early stage. Koito also provides pedestrian-to-vehicle communications by promptly informing drivers or pedestrians by using lights in new ways.

Signal Lamps for AV

AV marker to indicate that the vehicle is running in autonomous mode.

AV signal to indicate signs to inform that the vehicle will shortly move, or giving way to pedestrians.

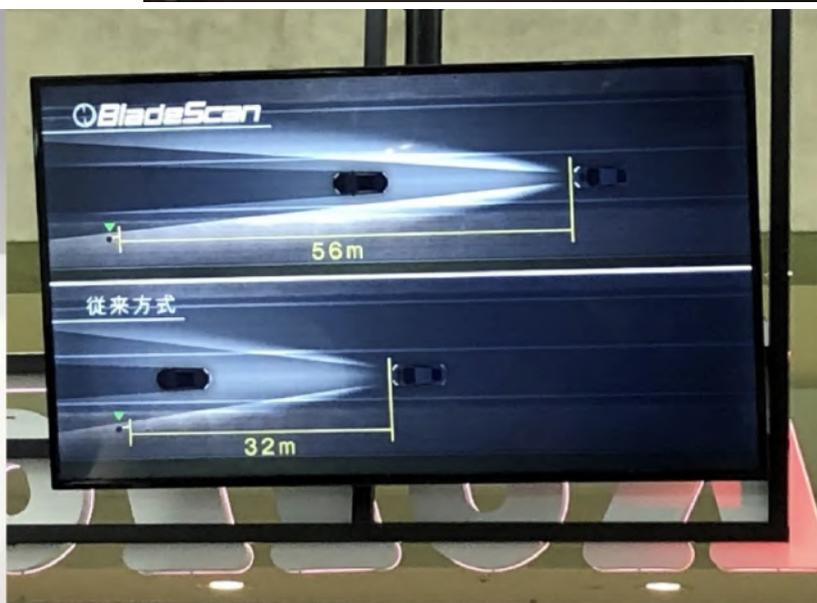
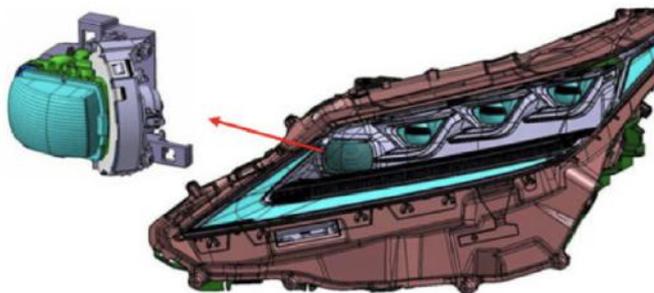
Road projecting lamps help pedestrian to vehicle communication with facial recognition linked information. For example, in a ride-hailing service the lamp recognises the road and displays reservation information on the vehicle body and on the road.



BladeScan ADB Headlamp System

By switching 12 LEDs and controlling the rotation of the blade mirrors, Koito's BladeScan ADB ensures high-resolution light distribution equivalent to the use of hundreds of LEDs while minimising the shading area. As BladeScan ADB enable to light vicinity of vehicles ahead, they help driver detect pedestrians at an early stage.

Lexus RX headlamp



Koito's road projecting headlamp support vehicles' driving by projecting information on the road, which is linked to the vehicle's navigation system. It is also expected to promote pedestrians' awareness. By using DMD with more than a million micromirrors, the headlamps control light precisely and project figures or letters on the road.

Koito also displayed their next-generation city lights and traffic signals with surrounding monitoring sensors (lidars, cameras, millimetre-wave radars) to provide information to AVs that they can't obtain with their onboard sensors.





Toyota Gosei

The supplier displayed their CASE technologies that contribute to the coming mobility society, and their concept models for future interiors and exteriors as a manufacturer specializing in rubber and plastics—modular products that combine safety functions and attractive design by integrating sensors and other electronic components into Toyota Gosei's main products such as front grilles and steering wheels, and new airbags for the age of autonomous driving where vehicle occupant position is much less consistent and predictable than it has been up to now.



This module is equipped with sensing functions that recognise the surrounding environment with cameras and millimetre-wave radars, and signage functions that use LED lights to communicate the vehicle's operating status to people nearby.



Japanese Ministry of the Environment with Nagoya University

Nagoya University presented the results of their project by the Ministry of the Environment in FY2018, «Technological Innovation to Create Society and Lifestyles for the Future». The university succeeded in developing lightweight, low-power laser high-beam headlamps, LED low beams, and other lamps used in the «GaN Vehicle,» a concept EV centred round the use of Gallium Nitride devices.



High Mounted Stop Lamp (Red LED)

Tail and Stop Lamps (Red LED)

Turn Signal Lamp (Amber LED)

The application of GaN technology reduces carbon dioxide emissions and is expected to contribute to a low-carbon motorised society. Koito headlamps on the car have GaN diode light sources.

Car makers

Aston Martin, UK
 Audi, Germany
 Bentley, UK
 BMW, Germany
 FCA, USA
 Daimler, Germany
 Ford, Germany
 GM, USA
 Great Wall, China
 Harley-Davidson, USA
 Honda, Japan, USA
 Hyundai Motor, Korea, Europe
 Jaguar-Land Rover, UK
 Mahindra Mahindra, India
 Nio, China
 Nissan, Japan, Europe, USA
 Opel, Germany
 Porsche, Germany
 PSA, France
 Renault, France
 SAIC TC, UK
 Shanghai-Volkswagen, China
 Seat, Spain
 Skoda, Czech Republic
 Toyota, Japan, Europe, USA
 Volkswagen, Germany
 Volvo Cars, Sweden

Univ, labs, Consultants

Andaltec, Spain
 Darmstadt university, Germany
 DEKRA laboratory, Nederland
 FEP, Franhauser, Germany
 Fudan university, China
 GranStudio, Italy
 Hannover Leibniz Univ.(HOT), Germ.
 Institut d'Optique, Fr.
 Karlsruhe Lighting Institute, Germany
 LAB, France
 Light Sight Safety, Belgium
 Nuremberg university, Germany
 Pacific Insight, USA
 Parma university, Italy
 Rensselaer university, USA
 SLD Laser—formerly Soraalaser
 UMTRI, USA
 University of California, Santa Barbara
 YoungNam University, South Korea
 Mr Shunxing Wang, China

Set Maker

AL, Germany, USA
 Bee Lighting, UK
 Denso, Japan
 Elba, Romania
 Farba, Turkey
 FIEM Industries, India
 Flex'N'gate, USA
 Grakon, USA,
 Grote, USA
 Hascovision, China
 Hella, Germany
 Hyundai IHL, Korea
 Ichikoh, Japan
 J.W. Speaker, USA
 Koito, Japan, Europe
 Lear, USA, Europe
 Lite-On, Taiwan
 Lumax, India
 Magna, USA, Austria
 Mind Optoelectronics, China
 Mobis, Korea
 NAL, USA
 Neolite ZKW, India
 Nordic Lights, Finland
 Odello, Germany
 Olsa, Italy
 Plastic Omnium, France
 Peterson, USA
 Rebo Lighting, China, Germany
 SL Corporation, Korea
 Stanley, Japan
 Tianchong, China
 Truck-Lite, USA
 Valeo, France, Spain, China
 Varroc, Germany, Czech R.
 Xingyu, China
 ZF-TRW
 ZKW, Austria
 Zodiac, France

Lighting Suppliers

3M, USA
 A2Mac1, France
 Anrui Opto, China
 AML Systems, France
 Aspöck Systems, Germany
 ASYST Technologies, USA
 Auer-Lighting, Germany
 Bicomoptics, China
 Bühler Alzenau, Germany
 Covestro, US, China, Europe
 Dajac, USA
 DBM Reflex, Canada
 Delvis, Germany
 Diodes Dynamics, USA
 Docter Optics, Germany
 Dominant Opto Tech., Malaysia
 EcoGlass, Czech Republic
 Elmos, Germany
 Enmech-Mektec, Germany
 Everlight Electronic, Taiwan, Germ.
 Excellence Opto Inc., USA, Taiwan
 GXC Coatings, Germany
 Holophane, France
 IAV, Germany, USA
 IMS, Netherland
 Infineon, Germany
 Instrument Systems, Germany
 Jenoptik, Germany
 Keboda, China
 LG Electronics, South Korea
 LG Innotek, South Korea
 LMT, Germany, China
 Luminix, USA
 Lumitex, USA
 Lumileds, Netherlands
 Maxell Joei Tech, Japan
 Merck, Germany
 Mentor Graphics, Europe, USA
 Mitsubishi Electric, Germany, Jap.
 Myotek Industries, USA
 Nalux, Japan
 Nichia, Japan
 NXP, UK
 ON Semiconductor, Europe, Asia, US
 Optis, France
 Optoflux, Germany
 Osram, Germany
 Oxyphen, Switzerland
 Panasonic, Japan
 Proper Group, USA
 Red Spot, USA
 Sabic, USA
 Samsung Electronics, Korea
 Sapphire, USA
 Sea Link International, USA
 Seoul Semiconductor, Korea
 Soraalaser Diode, USA
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 Texas Instruments, USA
 TechnoTeam, Germany
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 Weidplas CH, Switzerland
 WL Gore, USA
 Zollner, Germany

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- Japanese lighting market
- DVN Tokyo Workshop
- Camera technologies
- Varroc profile
- Mondial Paris Auto Show
- Vision congress
- Volkswagen profile

2019 Planned Reports

- LA and CES29 January
- Geneva autoshow.....19 March
- Volkswagen profil.....2 April
- Shanghai Autoshow.....7 May
- Materials in automotive lighting.....28 May
- Status of w/w Regulations.....18 June
- The future of Exterior Lighting.....23 July
- IAA Frankfort Autoshow.....17 September
- ISAL.....15 October
- 2019 Tokyo Autoshow.....5 November
- Interior lighting.....10 December

