



## Editorial

### What We Have To Know About The India Market

After the DVN Report we published in January 2020 about lighting in developing countries—mainly India—we are proud to present this week a top notch interview with C.V. Raman, Maruti Suzuki's Executive Director of Engineering, QA & Supply Chain. Maruti Suzuki are the historic leader in passenger cars in India, and command more than half of the market; № 2 Hyundai is far behind with 16 per cent.

It is interesting to know the position of this expert concerning concerning the expectations of the Indian market: car lighting equipment is generally still very basic with incandescent filaments. Nevertheless, LEDs are increasingly present, and advanced lighting technologies—ADB and  $\mu$ LEDs, AEB and other ADAS—are beginning to appear.

Traffic safety in India lags very badly, with death rates several times higher than the best developed countries. Lighting and ADAS functions could strongly help for improvement,

Finally, despite its difficult environment, India also has a strong dynamism. For now they use the lowest-cost solutions, but now they increasingly implement new technologies like LEDs in their increasingly safer and more stylish cars. India's race toward technological progress and prosperity is still sometimes chaotic, but in the coming decades it will certainly be the most important reservoir of automotive growth.

Two other important items:

- **ALE:** DVN is actively present in the ALE event in China. A DVN exhibition booth will show the offerings and value of DVN. And two DVN team members will give presentations: Geoff Draper, formerly GTB President and now DVN Senior Regulations

Adviser; and Wolfgang Huhn, formerly head of lighting development at Audi and now DVN Senior Adviser.



• **DVN events:** we're organising two events in the second half of the year—our US workshop in Novi, MI, on 21-22 September, and a lidar conference in Frankfurt on 15-16 November. Save the dates, and watch this space for more detail!



Sincerely yours

  
DVN CEO

# In Depth Lighting Technology

## Interview: C.V. Raman, Maruti Suzuki Executive Director



BINARY COMMENT

CV Raman is Executive Director of Engineering, QA and Supply Chain at Maruti Suzuki, which holds a commanding over-half share of India's passenger car market. He graciously shared his thoughts with us about the Indian auto market and the potential for up-to-date lighting technology there.

**DVN: Production of vehicles in India evolved during the last 20 years from 0.9m in 1999 to 4.5m in 2019 with a CAGR of nine per cent. What is your feeling for the next 20 years?**

**C.V.R:** The last decade has slowed down CAGR for the Indian passenger vehicle industry. We hope 2021 will bring the industry back on a robust growth trajectory. In terms of potential, India is young nation. The government's focus on infrastructure creation has helped connect rural with urban India. Rural is a very big and growing opportunity. In addition, post-Covid, we see an increase in the popularity of personal vehicles. Above all, GDP growth rate coupled with low car penetration in India give an impetus to look on the positive side of the industry in next 20 years. For reference, approximately 30 people out of a thousand own a car in India, as compared to developed countries like the US and UK, where 980 and 850 per 1,000 own a car.

In terms of technology and regulations, passenger vehicles manufactured in India comply with safety and emission regulations that are almost at par with European regulations. Our vehicles are compliant with cleaner BS 6 emission norms [same

stringency as Euro 6, but with lower test drive speeds to reflect Indian traffic conditions] and stringent safety regulations for crash tests.

The electrification of the cars, mechatronics, and increasing need for connectivity will bring a whole set of technology disruptions in the market. So, in a nutshell, there is huge scope for growth not only in terms of volumes but tapping the new opportunity space.

**DVN: Maruti Suzuki command over 50 per cent of the passenger vehicle market and offer the six most popular cars. How do you do it? Is it sustainable?**

**C.V.R:** Some clear strengths for Maruti Suzuki are customer obsession; widest network of over 3,120 dealer showrooms in 1,992 towns and cities; excellent after-sales service support with over 4,000 workshops in over 2,000 towns and cities; assured availability of parts and accessories, and widest portfolio of good quality vehicles to meet the customer needs. All these have been built over the past 37 years and have a very positive influence on the buying decision of the customers. A car is a big-ticket purchase and assurance in the form of sales, service, parts availability goes a long way in winning customer confidence.

Our product development is built on pillars of design; technology; safety; performance, and comfort & convenience. In recent years, the company have successfully democratised technology to meet customer aspirations. Technologies like AGS, S-CNG, smart hybrid and others have met with overwhelming customer response. While these technologies satisfy customer needs across demographic and price spectrum, they also help to reduce the carbon footprint.

On the network front, we have successfully differentiated our network to meet aspirations of all kinds of customers with models like the Nexa and Arena, and our True Value portal for quality-checked used cars, and our commercial vehicles. Such segmentation helps to address specific needs of each customer.

**DVN: Road safety is difficult in India. Do you think that lighting can be a part of the solution to improve safety and how?**

**C.V.R:** Road safety requires a holistic approach. There are four critical areas, four Es: enforcement, education, engineering, and employment. Vehicle engineering is critical and lights play an important role in improving on road visibility. Lighting today is not just an aesthetic feature anymore. Advance features like auto levelling, cornering lamp, road projections, interior lighting alerts for the driver, dynamic change of light intensity to reduce glare, and so on are some of the measures that can lead to improvements in road safety. Another aspect that we can work on is the glare suppression from the moving traffic while still meeting regulations.

However, the cost effectiveness of these solutions is a key challenge. The idea of migrating to safer technologies may not penetrate unless these are cost-effective and at par with the halogen counterparts. So, innovation and value should seek a balance, to succeed.

**DVN: Compared to developed countries, how do you compare the Indian market and particularly what are the needs for car lighting?**

**C.V.R:** The Indian market is rapidly evolving with lots of regulations, and technologies are being inducted at par with developed nations. Indian customer aspirations are also changing fast, and they are more digital and tech savvy in this information age.

Similarly, the lighting needs have also evolved alongside. Lighting today not just serves a purpose of providing visibility, rather consumers see lighting as a most important aesthetic element.

The charm for white light, and definitely more light output gives customer a sense of more safety.

Today's traffic ensures that people spend a lot of time in their cars. Alongside, the car is associated with family need. Aligning with that, the interior lighting may evolve to provide greater comfort to the customer.



XL6 LED MULTI-REFLECTOR HEADLAMP



XL6 LED TAIL LAMPS

As such, lighting meets aesthetics, safety, and comfort needs and is directly linked to consumer's emotions. Sleek and stylish bold signatures, performance-oriented lamps, and interior ambient lighting have all taken precedence to meet these needs. These requirements of aesthetics and performance can be met by LED. With increased penetration of LED, industry must explore cost-effective solutions for automobile lighting.

**DVN: India is certainly a market where cost is especially important. Have you some examples of specific conception for cost optimisation for headlamps or rear lamps?**

**C.V.R:** India is a highly cost-sensitive market. The digital age has made customers well aware of global trends and developments. This creates a strong aspiration and desire to possess newest technology and features.

Alongside the demand for features of a high end car, the customers demand low cost. For automakers, especially the R&D team, this is a big challenge from the customer.

In the area of vehicle lighting specifically, such challenges are successfully met by Maruti Suzuki as well our competitors. To illustrate, automakers have worked on aesthetics through usage of bulb-based signatures that keep the cost in control while delighting the customers.

Bi-halogen projectors are used to keep the lamp compact and cost efficient by eliminating the need of additional high beam chambers. Skilful integration of multiple

functions into a single unit helps to minimise parts and save costs. Integration of fog lamp and cornering lamp is one such innovative strategy deployed successfully.

**DVN: Some say India is following the technological evolution of developed countries with around 7 years' time lag. What is your perception?**

**C.V.R:** Open communication channels are driving awareness amongst consumers, regulators, automakers, and suppliers. High focus on aspects of environment, human safety, resource conservation, and technology development is driving this. Based on the market situation and evolution of technology, India aspires to be at par with western economies, while keeping business realities in focus.

In line with the regulatory changes, suppliers also have to keep pace with the support from their overseas principals. With industry volumes going up, the opportunity becomes even more attractive. Lately, the geopolitical changes make India a worthwhile candidate for locating manufacturing and R&D facilities. The Indian Government's "Make in India" initiative is a positive invite for such business into India. Progressive component makers who see the potential of this opportunity have already invested in R&D centres in India.

**DVN: Can you present some of your best achievements for lighting products?**

**C.V.R:** We have developed all basic technologies that could delight Indian customer. In front lighting, we have developed products ranging from LED projector units to LED multi-reflector lamps, to LED fog lamps, to integrated LED turn signal and DRL. All have been successfully launched into the market. Some of the examples of our recent products as available in Indian market are the LED multi-reflector headlamp in our XL6 model, and we also have LED projectors along with Integrated LED turn/DRL in the latest version of our Vitara Brezza.



BREZZA INTEGRATED LED TURN/DRL AND LED PROJECTORS



BREZZA LED TAILLIGHT SIGNATURE

In rear Lighting also, we have used direct lighting, thick lens, light guides depending upon styling requirements to create wow-effect for the customers. The same can be seen in models like Vitara Brezza, XL6, etc.

**DVN: What is currently the prevalence of LEDs in Maruti Suzuki products? How do you see the future of the competition between**

## **filaments and LEDs in India for front and rear lamps?**

**C.V.R:** Maruti Suzuki has a good presence in LED variants in many models and prevalence is increasing slowly. LEDs do form an important portfolio in all recent projects, or at least a differentiation is created between variants through usage of bulbs and LED lamps packaged in the same space. The same can be seen in many of the Maruti Suzuki models already running in the market.

Talking about my current perception and inputs that we gauge with our local partners, LED is a winner when it comes to head on head competition. Today, the automotive grade LED enquiries and new business demands with LED lamps have gone up significantly. Next 5-10 yrs, studies point out that light bulbs may have reducing trend with share being replaced by their LED counterparts.

Halogens have an advantage of low cost and still prevails significantly in the market. But, there is still a huge price gap between LED and halogen lamps, which is still a deterrent for automakers to deploy LEDs in lower variants, though there is an immense potential for LEDs. Once this price gap is reduced, the trend may take a clear shape.

## **DVN: How are you involved in the most advanced technologies, like ADB? What could be the future of this technology in India?**

**C.V.R:** ADB (Adaptive Driving beam) is a new technology for the Indian market and requires a lot of calibration as per Indian traffic conditions, infrastructure, and landscape. Also, the costs associated with introduction of such technologies are so huge that it might find restricted usage in high-end cars only.

For India, affordability is a key challenge, so development of a cost-effective ADB solution for the Indian market is what needs to be studied further. We request our partners to develop an India-specific, cost effective solution for the ADB technology.

## **DVN: How do you see the development of ADAS and autonomous cars in India and for Maruti Suzuki? How do you see the future of lighting?**

**C.V.R:** For the developed countries, where there has been an enhanced focus on ADAS and autonomous driving, the lighting future is going to adopt a new role. The purpose of headlamps would broaden from providing visibility, to the driver assistance by communicating with its surrounding environment (including other vehicles, pedestrians, cyclists, etc). Trends toward ADAS, lighting digitalisation, and increasing integration of advanced sensors will enhance the functional content of lamps. However, the technology is itself in an evolution phase in developed countries. But when we see the trend for India, realisation of ADAS and autonomous driving might still have a big time frame, though significant studies might kick off in isolations and provide a good basic framework for adoption ahead.

Lighting will still assume a conventional role of providing visibility but with an enhanced aesthetics, safety, performance and comfort. Country-specific solutions have to be studied and increase LED prevalence with the hope that innovations and ecosystem will drive lower costs.

# Lighting News

## ZKW Press Ahead on Sensor-Light Integration

LIGHTING NEWS



The ZKW partnership with Israeli startup Newsight Imaging has gained real traction since its 2019 inception. Newsight won ZKW's "Drive Light Sight" competition in 2019. Now, a new ADB prototype has been developed as an initial result of the coöperation; the high beam can be integrated directly into the headlamp with its associated sensors and controller. This eliminates the need for a separate front camera.

The project, currently known as "senseZ", could be ready for series production by ZKW soon, whose CEO Oliver Schubert says "The autonomous high beam system can be added to [new models] or used to retrofit older vehicle models that do not have a front camera or an infrastructure designed for ADB. However, the innovation can also be used to upgrade existing adaptive high beam technology with a higher resolution".

SenseZ consists of an integrated ADB module installed in the headlamp. The control signals for the adaptive light are delivered by a light-sensitive sensor, also integrated. This allows for intelligent, vehicle-independent control of the high beam to automatically throw shade at other road users at night so they're not glared.

The innovation is also easy to integrate into the vehicle architecture without many additional steps, because neither an interface to the vehicle electronics nor camera

data from the vehicle itself is required. An initial prototype in a test vehicle is being used to optimise the unit's function.

*Newsight's machine vision technology for the automotive industry can sense the world in 3D. Their CMOS image sensors are present in many applications in the mobility field, and take part in great innovations in the automotive industry.*

# New Himax LCoS Platforms for AR HUDs

LIGHTING NEWS



Himax Technologies, a fabless manufacturer of display drivers and other semiconductor products, have unveiled their latest LCoS (liquid crystal on silicon) technology, called Phase Modulation LCoS, for holographic displays in AR HUDs (augmented-reality head-up displays).

Himax demonstrated an AR HUD platform using their PM LCoS as holographic display to provide a more compelling visual experience than conventional HUDs. The AR HUD provides brighter images with higher contrast, and displays multi-focal plane images concurrently. It operates efficiently with low power consumption, and boasts lower cost and smaller form factor than previous solutions. For automotive AR HUDs with two focal planes, the information displayed on the dashboard is projected directly onto the windshield in the driver's line of sight with focus at 50 cm. Another long-range plane focused around 10 metres fuses augmented reality information, such as navigation map and driving instructions, with far-field real world images for the driver to see intuitively on windshield. The AR HUD also features a proprietary computer-generated holographic engine for real time augmented reality information fusion as well as image distortion adjustment to fit for different windshield curvatures.

*Himax Technologies' expertise is in display imaging processing technologies. They are a worldwide market leader in display driver ICs and timing controllers used in vehicles, digital cameras, car navigation, virtual reality equipment, and many other consumer electronics devices. They also offer CMOS image sensors, wafer-level optics for AR devices, and 3D and ultralow-power smart sensing components.*

# Christophe Périllat is New Valeo Deputy CEO, Director

## LIGHTING NEWS



Valeo's Board of Directors appointed Christophe Périllat Deputy Chief Executive Officer and Director of the France-based global auto parts supplier.

These appointments are in line with the succession plan of Jacques Aschenbroich as published last October. The succession plan provides that the roles of Chairman of the Board of Directors and Chief Executive Officer will be separated next January, with Aschenbroich continuing as Chairman of the Board of Directors until the end of his current term of office as Director in May 2023. He'll be succeeded by Christophe Périllat as Chief Executive Officer from January 2022. Périllat moves up from Associate Chief Executive Officer, a role he has held since last October.

Having joined the Valeo Group in 2000, Christophe Périllat has held several management positions in a number of Group companies gradually increasing in size, until he became Chief Operating Officer in 2011 and Associate Chief Executive Officer in October 2020. Previously, Christophe Périllat worked in the aeronautics industry with the equipment manufacturer Labinal, in supply chain, plant, project and subsidiary management positions in France and in the United States. He is graduated from École Polytechnique and École des Mines, and holds an Executive MBA from HEC.

# John D'Agostino is New Docter Optics XVP

LIGHTING NEWS



After 16 years at Philips/Lumileds and nearly six at Seoul Semiconductor, John D'Agostino has landed at Docter Optics. He has been named Executive Vice President responsible for the US/NAFTA market and Docter's vehicle lighting activities.

As Seoul Semiconductor Vice President he was responsible for the North American automotive market, so he brings automotive expertise and sharp business experience.

Docter CEO Martin Enenkel says "We are very glad John finally becomes a Docter and joins our top motivated team of optic specialists. With passion, experience, expert knowledge and professional on-site service we are looking forward to develop through the whole supply chain the next generation of lighting solution for a secure future".

# Driver Assistance News

## Tesla Trial Luminar Sensor Musk Scorned

### DRIVER ASSISTANCE NEWS



Tesla have a contract to use lidars from Luminar Technologies for testing and development, as it seems. A photo posted on social media last week, of a Tesla Model Y with a roof rack of lidar sensors, spurred speculation that the two companies are working together, sending Luminar's shares up more than 10 per cent that day. While similar images of Teslas with lidar sensors have appeared before, it was unclear until now what the relationship is between Tesla and Luminar.

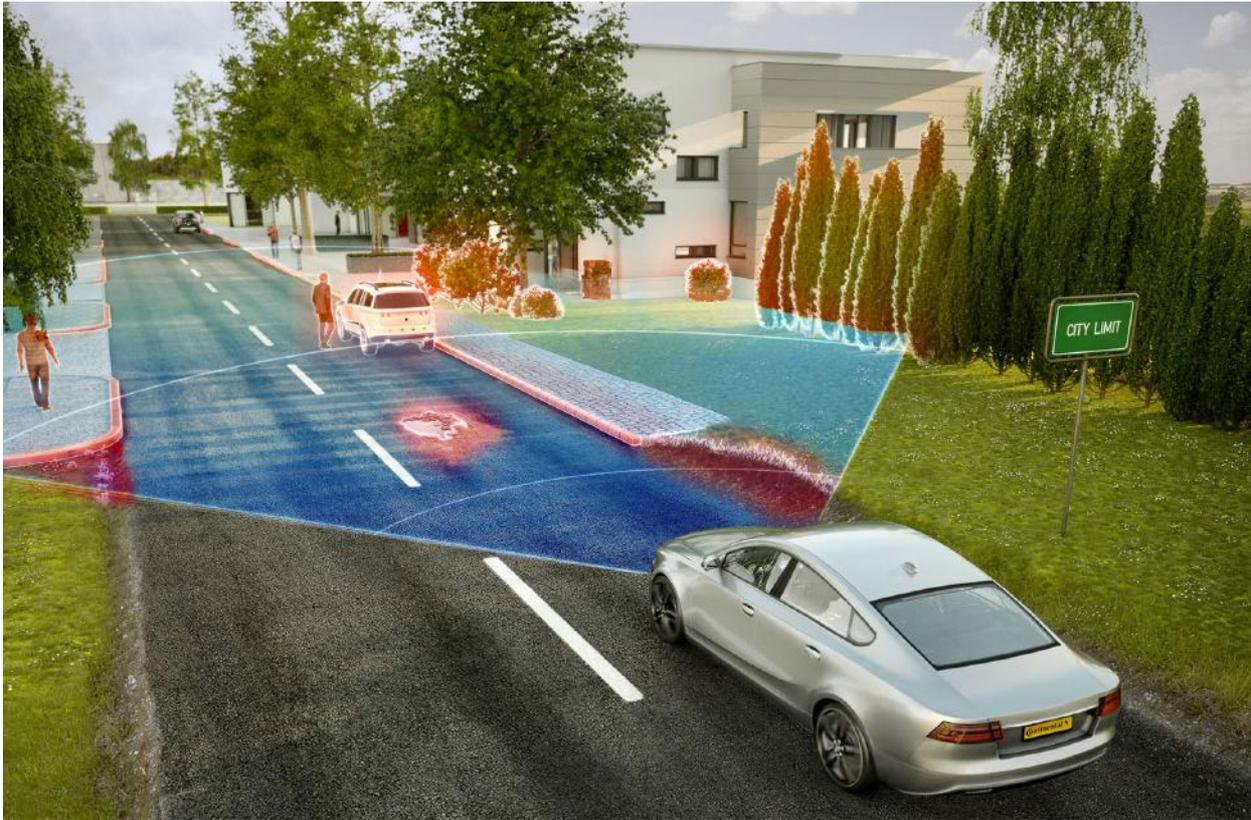
Luminar sold Tesla the sensors on that Model Y as part of an agreement between the companies. Bloomberg News confirmed with the California Department of Motor Vehicles that the manufacturer's license plate on the photographed vehicle belongs to Tesla.

The Model Y with the sensors was spotted in Palm Beach, Florida by Grayson Brulte, a consultant to the autonomous-vehicle industry who lives in the area. The photos he posted ignited fanned market speculation that notoriously cocksure Tesla CEO Elon Musk might be backpedalling on his insistence that lidar is for losers and that he can develop a camera-only self-driving system without radar and lidar sensors used by the entire rest of the industry.

Luminar, which went public in a \$3.4bn reverse merger last year, have production agreements to supply their lidar sensors to Volvo Car and the flagship R brand of SAIC Motor.

# ZF, Continental, Arbe Developing 4D ADAS Radar

## DRIVER ASSISTANCE NEWS



Range, velocity, and azimuth have long been the key dimensions that radar systems use to perceive a vehicle's surroundings. With 4D radar, another dimension has been added: elevation.

Traditional radar- and camera-based systems for L<sup>2</sup> and L<sup>2+</sup> AD functions typically have a range of around 200 m. Adding elevation boosts the vehicle's view of its surroundings and increases the system's range, while Improved resolution provides greater detail of the scene.

Part of the appeal of the technology is not only being able to detect more details about the driving landscape, pedestrians, and objects, but also having more data about situations typically challenging to sensors, such as harsh weather conditions.

ZF will supply their 4D radar with increased resolution, starting next year, to SAIC—China's largest automaker. The system has a range of 350 m, and 16 times better resolution than typical automotive radar.

Continental also have a higher-resolution system using elevation, with a range of 300m.

Israeli startup Arbe have a 300-metre "ultra-high resolution" 4D radar, which the company will provide to Chinese AV tech company AutoX's L<sup>4</sup> robotaxis. And another Israeli company, Vayyar, have a 4D imaging "radar-on-chip" that can be used for ADAS and for in-vehicle monitoring, such as child-presence and seat belt reminders.

Aside from these 4D systems' ability to identify many more data points than systems that don't incorporate elevation, another key point is being able to see the dimensions and orientations of other vehicles, allowing the system to separate and classify vehicles in the road that are close to one another.

The market for 4D radar is expected to hit USD \$6.4bn in revenue by 2025, according to Guidehouse Insights.

# ADASTEC Selects Teledyne FLIR Thermal Sensors

DRIVER ASSISTANCE NEWS



ADASTEC recently debuted flowride.ai, the world's first level-four, full-size, full-speed autonomous bus platform. The flowride.ai automation platform is designed to operate 24 hours a day, every day of the year, including through ever-changing weather conditions, requiring the need for thermal cameras from Teledyne FLIR. In combination with a suite of other sensor modalities, thermal cameras help create a safe autonomous vehicle system for mixed traffic environments, where other vehicles, bicyclists, and pedestrians are sharing the same roadway.

ADASTEC integrated thermal cameras with the primary focus on improving detection and safety of all vulnerable road users on or near the road and at bus stops. Furthermore, thermal cameras are a key sensor technology to more readily distinguish and classify pedestrians who are partially obscured by nearby vehicles and other common roadway and urban objects.

With the ability to see up to 4 times farther than headlights at night, thermal cameras detect heat, or infrared energy, produced and reflected by everything on earth. Thermal sensing excels in driving situations where other sensor technologies might be challenged, including low-visibility and high-contrast conditions: nighttime, shadows, dusk, or sunrise, or while facing direct sun or headlight glare. As a passive sensing modality thermal is not affected or blinded by other active sensors including lidar or radar and is effective in challenging weather conditions such as fog, smoke, and dust.

The flowride.ai automation platform features two Teledyne FLIR thermal cameras : one is positioned at the front of the bus to scan looking forward, while the second camera is mounted on the right-side of bus at the rear, scanning side-to-side. These placements are vital to detect pedestrians, bicyclists, and even animals that move toward the path of the bus, especially pedestrians standing in proximity to nearby bus stops.

# Tesla Back Away From Radar, Toward Camera-Based Vision

DRIVER ASSISTANCE NEWS



Tesla have updated their website to state that Model 3 and Model Y cars built for North America and shipping this month will no longer be equipped with radar; Tesla's sensor suite previously relied on radar as well as eight cameras.

On Tesla's earnings call last month, notoriously mouthy CEO Elon Musk called radar a "crutch" he wants to do away with in pursuit of full autonomy. Musk is likewise notoriously opposed to lidar technology "We are continuing the transition to Tesla Vision, our camera-based Autopilot system", says the company's website. "Beginning with deliveries in May 2021, Model 3 and Model Y vehicles built for the North American market will no longer be equipped with radar. Instead, these will be the first Tesla vehicles to rely on camera vision and neural net processing to deliver Autopilot, Full-Self Driving and certain active safety features."

The move comes as Tesla's driver-assistance suite, problematically marketed under the "Autopilot" name, is facing increasing regulatory scrutiny in the United States, where NHTSA and the National Transportation Safety Board have launched investigations into a fatal Texas crash that killed two men in April. Tesla have admitted to authorities such as the California Department of Motor Vehicles that "Autopilot" does not do as its name is meant to suggest.

# General News

## Top Ten Sellers in Europe, January to April

### GENERAL NEWS



Land Rover, Fiat, Honda, Lexus, Nissan, Peugeot, and Mercedes-Benz brands all reported substantial sales percentage increases.

The Volkswagen Golf was Europe's № 1 seller in April, its second consecutive top finish, with a volume of 18,984. The Golf was followed by the February's top-seller, the Peugeot 208, and then by the Peugeot 2008. The Renault Clio finished the month in fourth place, and the Opel/Vauxhall Corsa in fifth.

### ***Top 10 sellers in Europe, first four months 2021***

***Source JATO Dynamics***

Peugeot 208	VW Golf	Toyota Yaris	Opel Corsa	Peugeot 2008	VW Tiguan	Renault Clio	VW T-Roc	Citroën C3	Škoda Octavia
80,000	77,000	75,000	72,000	71,000	70,000	69,000	67,000	63,000	61,000

# Toyota, Honda Supplier Relations Are Still Best: Index

## GENERAL NEWS



US WORKING RELATIONS INDEX DOMESTIC & JAPANESE ANNUAL STUDY

Toyota and Honda rank first and second in Plante Moran's 21<sup>st</sup> annual OEM-Supplier Working Relations Index, the same two places occupied by the Japanese automakers every year since 2011. Toyota held their N° 1 spot with 347 points, and Honda came in second with 316. General Motors advanced 20 points to 289 to take third place, while fourth-place Ford fell 15 points to 249. Nissan scored 211, while FCA/Stellantis dropped 28 points to a distant last in the rankings at 170.

Automakers pay close attention to the study because positive supplier relations bring benefits like better pricing, more investment in innovation and technology, more sharing of technology, and better supplier support. All these factors contribute to the automakers' operating profit and competitive strength.

Plante Moran conducted the annual study this year from mid-February to mid-April. Respondents represented 841 salespersons from 503 tier-1 suppliers, representing about 60 per cent of the six automakers' annual buy. The supplier-respondents represented 45 of the top 50 North American suppliers and 81 of the region's top 100 suppliers.