

FROST & SULLIVAN

VALEO

2022
MARKET
LEADER

GLOBAL AUTOMOTIVE
LIDAR INDUSTRY

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each award category before determining the final award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Valeo excels in many of the criteria in the global automotive light detection and ranging (LiDAR) space.

AWARD CRITERIA	
Growth Strategy Excellence	Technology Leverage
Implementation Excellence	Price/Performance Value
Brand Strength	Customer Purchase Experience
Product Quality	Customer Ownership Experience
Product Differentiation	Customer Service Experience

Industry Introduction and Technology Leverage

The automotive industry uses sensors, such as radars and cameras, to gather and process road data to offer advanced driver-assistance features. However, sensors working individually cannot handle higher-level autonomy because each sensor type has different characteristics. Radars provide constant distance

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**– Kamalesh Mohanaragam,
Research Manager**

and velocity measurements and superior all-weather performance but face issues with resolution and mapping finer details at longer ranges. Cameras provide high-resolution, two-dimensional (2D) information, but their performance is affected by low-light conditions and adverse weather. They also depend on artificial intelligence (AI) and software to translate captured data into three-dimensional (3D) interpretations. Both sensor types work within a certain field of view (FoV) and have limited spatial coverage, leading to imprecise path planning. As autonomy advances to higher levels, autonomous vehicle (AV) sensor technologies require robust perception systems providing high-resolution

object information under all operational conditions. Automotive LiDAR sensors are essential to next-generation perception sensing systems for automated and autonomous driving of Level 2+ and above,

following amendments to the European New Car Assessment Program (EuroNCAP) to include autonomous emergency braking (AEB), pedestrian detection, and other features in environments beyond daylight. LiDAR sensors offer precise 3D measurement data over short-to-long ranges, even in adverse weather and lighting conditions, and will bridge the shortfall of radars and cameras to offer high-precision environment perception. Valeo, with its strong leadership position, is expected to clock multifold volume growth organically.

Established in 1923 in France, Valeo is a global automotive supplier and the only supplier offering commercialized mass-produced automotive-grade LiDAR sensors. The company manufactures SCALA®, the automotive industry's first commercial 3D LiDAR sensor for AV applications. Valeo SCALA® is a 3D mechanical scanning LiDAR sensor that offers wide Field of View (FoV) at 145 degrees; with its AI-based integrated software, it detects, recognizes and classifies static and dynamic objects up to a distance of 200 meters in all weather and lighting conditions. It even measures the density of raindrops to calculate the right braking distance. This technology advancement combining wide FoV and large-range sensing is a key enabler to highly and fully AVs. Valeo's sensor portfolio includes ultrasonic sensors, cameras, and radars, providing intelligent sensing solutions for advanced driver-assistance systems (ADAS) and autonomous applications. With its broad sensor portfolio and underlying full-stack software solutions, Valeo provides high functionality and safety to customers, including original equipment manufacturers (OEM) and mobility service providers. Frost & Sullivan believes Valeo's strong value chain partnerships and early-market mover advantage in autonomous applications enable Valeo to offer a better price/performance ratio than other AV solution providers.



Figure 1. Valeo SCALA® Generation 2

Customer Ownership and Purchase Experience

The ability of AVs to perceive and localize their environment precisely is a major challenge to customers at the end of the AV value chain. Valeo offers customers Drive4U, an affordable, high-precision, robust localization and mapping solution for ADAS and AV applications. Drive4U demonstrates advanced localization and mapping capabilities for Level 4 AVs using a combination of deep learning algorithms, AI solutions, and Valeo's broad sensor portfolio, including SCALA®. Drive4U enables the vehicle to understand the requirements of individual sensors, subsystems, and control models to provide 360-degree visibility, high-perception localization sensing and precision, and mapping without additional input layers such as the Global Positioning System (GPS). Valeo capitalizes on its localization algorithms and mapping systems to allow vehicles to locate their position with extreme precision supported by crowdsourcing. By sending information from Valeo's LiDAR sensors to the cloud, each vehicle creates and continuously updates a dynamic mapping network. In return, the vehicle benefits from centimeter-level localization (within 12 centimeters compared to 5 meters for a standard GPS without corrections) by comparing its perceived immediate environment with dynamic mapping to determine its exact position.

Vehicle LiDARs require a clean field of vision in all seasons and road conditions. This is where Valeo's new generation LiDAR cleaning comes in, with two innovations: the device offers a de-icing feature, which works by heating the telescopic nozzle that sprays the cleaning fluid. Second, it cleans the front of the LiDAR by spraying a curtain of liquid across its entire surface, rather than just spraying from a single point, as is the case when using a traditional nozzle. Designed to be built into the sensor itself, Valeo's cleaning solution is invisible and does not affect the vehicle's appearance.

Valeo also offers customers the Valeo Mobility Kit comprising generic hardware, such as ultrasonic sensors, high-resolution fish-eye cameras, and state-of-the-art LiDAR sensors, and software plug-and-play features to help customers offer automated driving solutions. Valeo takes advantage of its Tier 1 supplier position in the value chain to work closely with automakers to provide tailored solutions at industry-standard costs. Unlike start-up competitors, Valeo can manufacture LiDAR sensors at its manufacturing facility in Germany and meet any expenditure potentially arising from warranty issues. The majority of its competitors in the automotive market are start-ups lacking funds to manufacture sensors and address requirements in warranty claims. Backed by a strong team of engineers, designers, and manufacturing experts, Valeo is well-positioned to cater to present and future market demands. Valeo has signed supply agreements with four leading OEMs, including Audi, Daimler, and Honda. Its order book now stands close to half a billion euros, reflecting Valeo's market leadership.

One of Valeo's value propositions is driving innovation in solutions, including developing ADAS and autonomous solutions. Valeo generates 46% of revenue through technologies that enable safety assistance. Its latest innovation in automated valet parking, a Level 4 autonomous feature, allows the vehicle to park itself autonomously using the vehicle's installed cameras and software. Valeo also develops solutions for green mobility, health and well-being, and safety to meet the dynamic needs of the mobility industry. Frost & Sullivan commends Valeo for its robust, next-generation solutions for AV applications.

Growth Strategy and Implementation Excellence

In early 2000, Valeo invested in safety assistance innovation and established market leadership in parking assistance systems using ultrasonic sensors. Valeo's growth strategy focuses on innovation in solutions

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and market expansion in high-growth countries. The company positions itself as a technology company for electric and AV applications and has solidified its market leadership by equipping one-third of global electric and AV volumes with innovative solutions. The company has invested more than €500 million since 2017 to develop 12 new technology platforms satisfying the demand resulting from connected, autonomous, shared, and electric (CASE) vehicles convergence. The 12 platforms are forecast to generate €2.60 billion in sales through 2022. The company

backs its growth strategy with research, technology, and OEM partnerships and acquisitions, such as AV OEM partnerships with Daimler and Audi. Valeo expects to produce one billion sensors by 2025. Frost & Sullivan lauds Valeo for positioning itself as automakers' preferred partner by offering innovative solutions with the best value proposition and quality standards while establishing market leadership.

Brand Strength

Valeo is a top global automotive Tier 1 supplier with nearly 100 years of experience. The company operates in 33 countries and has more than 187 manufacturing facilities worldwide. It is a leader in wiper systems, lighting systems, powertrain electrical systems, driving-assistance systems, thermal powertrain systems, thermal climate control systems, transmission systems, interior control systems, and telematics. The company expects to lead electrification and autonomous technologies as two-thirds of high-voltage electric vehicles above 60 volts from European automakers between 2019 and 2022 will feature Valeo's high-voltage systems.

Valeo supplies to more than 50 major OEMs globally and has a diverse customer base. Its top 5 customers contributed 53% to its revenue, while its 10 largest customers accounted for 81%. The company is not reliant on any single OEM for revenue.

Valeo has 63 research and development (R&D) centers with 18,480 employees focused on creating products and services that address the automotive industry's challenges. With innovation at the heart of its operations, Valeo invests significantly in R&D. For instance, even though the Comfort & Driving Assistance Systems division accounted for only 19% of revenue in 2020, the company spent close to 40% of its total R&D budget on this division. Frost & Sullivan believes Valeo's R&D spending, combined with its modular mobility kit, will enable OEMs to offer Levels 2+ and 3 functionalities without long lead times and Levels 4 and 5 through next-generation LiDAR sensors.

Price/Performance Value

The main drawback of LiDAR sensors today is their high cost. In 2012 when technology giant Google used these systems, they came with a price tag of about \$70,000. A decade of innovation has driven the price down considerably to about \$1,000. Some suppliers offer a \$500 price point for low-specification and low-

performance LiDAR sensors tailored to specific OEM demands for Level 2+ features. These sensors can be scaled to offer superior performance but scalability pushes the cost. Considering recent developments within the LiDAR space, along with economies of scale, there is immense potential for significant price reduction in these systems to about \$500 by 2025. Valeo's competitive price/performance ratio augurs well for its growth in the industry.

Conclusion

With SCALA[®], Valeo exhibits excellence in strategy and innovation implementation of new technologies, making Valeo the de-facto choice of OEMs and cementing its market leadership. To offer solutions that understand market needs and industry requirements, the company launched Drive4U, which provides high-precision localization and mapping for Level 4 AVs. These solutions help Valeo address industry challenges while retaining market leadership. With innovation as its key growth strategy, Valeo will strengthen its global market presence and extend its solution offerings in the electric and AV market.

With its strong overall performance, Valeo earns Frost & Sullivan's 2022 Global Market Leadership Award in the automotive LiDAR industry.

What You Need to Know about the Market Leadership Recognition

Frost & Sullivan's Market Leadership Award recognizes the company that achieved the greatest market share resulting from outstanding performance, products, and services.

Best Practices Award Analysis

For the Market Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

Growth Strategy Excellence: Company demonstrates an ability to consistently identify, prioritize, and pursue emerging growth opportunities

Implementation Excellence: Company processes support efficient and consistent implementation of tactics designed to support the strategy

Brand Strength: Company is respected, recognized, and remembered

Product Quality: Products or services receive high marks for performance, functionality, and reliability at every stage of the life cycle

Product Differentiation: Products or services carve out a market niche based on price, quality, or uniqueness (or some combination of the three) that other companies cannot easily replicate

Technology Leverage: Company is committed to incorporating leading-edge technologies into product offerings to enhance product performance and value

Price/Performance Value: Products or services provide the best value for the price compared to similar market offerings

Customer Purchase Experience: Quality of the purchase experience assures customers that they are buying the optimal solution for addressing their unique needs and constraints

Customer Ownership Experience: Customers are proud to own the company's product or service, and have a positive experience throughout the life of the product or service

Customer Service Experience: Customer service is accessible, fast, stress-free, and of high quality

About Frost & Sullivan

Frost & Sullivan is the Growth Pipeline Company™. We power our clients to a future shaped by growth. Our Growth Pipeline as a Service™ provides the CEO and the CEO's growth team with a continuous and rigorous platform of growth opportunities, ensuring long-term success. To achieve positive outcomes, our team leverages over 60 years of experience, coaching organizations of all types and sizes across 6 continents with our proven best practices. To power your Growth Pipeline future, visit Frost & Sullivan at <http://www.frost.com>.

The Growth Pipeline Engine™

Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.

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Key Impacts:

- **Growth Pipeline:** Continuous Flow of Growth Opportunities
- **Growth Strategies:** Proven Best Practices
- **Innovation Culture:** Optimized Customer Experience
- **ROI & Margin:** Implementation Excellence
- **Transformational Growth:** Industry Leadership



The Innovation Generator™

Our 6 analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.

Analytical Perspectives:

- **Mega Trend (MT)**
- **Business Model (BM)**
- **Technology (TE)**
- **Industries (IN)**
- **Customer (CU)**
- **Geographies (GE)**

