PRESS KIT

VALEO’S INNOVATIONS AT THE EPICENTER OF THE THREE AUTOMOTIVE REVOLUTIONS

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Valeo at the 2018 Paris Motor Show

At this year’s Paris Motor Show, Valeo is presenting its latest innovations that are paving the way for autonomous, electric and connected cars.

One example is the **Valeo Drive4U®, the first autonomous car to be demonstrated on the streets of Paris itself**. The demo car is unique in that it is fitted exclusively with series-produced Valeo sensors. These include ultrasonic sensors, cameras, radars, and, above all, eight Valeo SCALA® laser scanners, the only mass-produced Light Detection and Ranging (LiDAR) technology on the market today developed specifically for cars. On top of that, the car is equipped with artificial intelligence (AI), an essential ingredient in autonomous vehicles. AI technology is able to process all the information collected by the sensors and learn over time as the car is faced with different situations.

After organizing a number of world-first autonomous driving trial runs, including 24 hours around the Paris beltway and roadtrips around Europe and the United States, Valeo is once again leading the pack with its technological achievements in the field and rising to the major technological challenge of autonomous driving in dense and complex urban environments.

Valeo is also presenting its **48V solutions, which are speeding up and facilitating vehicle electrification** to make all-electric cars more accessible to more people. For example, Valeo has developed an all-electric urban prototype powered by a 48V Valeo motor. It can reach 100 km/h, has a range of 150 km and does not emit any CO₂. Ideally suited to city driving, the 48V solution is more economical – and therefore more affordable – than a high-voltage system.

Valeo is also showcasing the world’s first plug-in hybrid vehicle operating at low voltage (48V). More economical than a high-voltage plug-in hybrid, the system, mounted on a five-seater vehicle, makes it possible to drive in all-electric mode over around 40 km. The internal combustion engine then takes over for longer trips. Since Valeo’s 48V solutions are easy to implement in vehicles, they are set to make electric driving more broadly accessible.

In addition, Valeo is presenting **Valeo Safe InSight, a system that improves in-vehicle safety**. In particular, it can detect signs of drowsiness from the driver and helps to prevent accidents due to tiredness, which is a major cause of road accidents. It also notifies the driver if he or she becomes distracted or in the event of unseen obstacles or dangers.

Lastly, since usage patterns are changing, with **digital tools giving access to new ways of getting around, Valeo is developing technologies that promote the rise of intelligent mobility**. One example of this is the real-time map of air quality in Paris, a project undertaken in partnership with ARIA. A fleet of some twenty vehicles equipped with sensors will travel around Paris to measure levels of six pollutants in real time, feeding the data into an instantaneous air quality index (AQI) map. In time, this innovative solution should make it possible to develop an application offering customized urban itineraries that avoid peak pollution areas.

Innovation is at the heart of Valeo’s strategy, with 1.9 billion euros invested in Research and Development in 2017, or around 12% of original equipment sales. Valeo’s innovative solutions offer clear insights into the shape of mobility to come and are conducive to the development of electric, autonomous, connected cars that are widely affordable yet adaptable to individual needs.
Technologies to enable ever-more intuitive driving

Valeo Drive4U®, the autonomous car for city driving
Demonstration along the banks of the Seine (voie Georges Pompidou)

Valeo Drive4U® is the first autonomous car to be demonstrated on the streets of Paris itself. It is equipped exclusively with sensors already series produced by Valeo (see below) and with artificial intelligence.

The series-produced Valeo sensors used in the Drive4U® include eight Valeo SCALA® laser scanners (the only Light Detection And Ranging (LiDAR) scanner in series production today designed specifically for cars), four radars, four peripheral cameras, one front-view camera and a dozen ultrasonic sensors arranged all over the vehicle for 360° visibility. The calculation algorithms and artificial intelligence developed by Valeo aggregate the data from the sensors and analyze them in real time, enabling the vehicle to make the necessary driving decisions, all without compromising safety.

The vehicle’s self-learning capabilities, based on deep learning, play a fundamental role. For example, the vehicle can:

- display a 3D model of surrounding vehicles and predict their trajectories, including those not in its immediate field of vision;
- navigate in a precise and robust manner, thanks to a geolocation and mapping system developed by Valeo, which uses the Valeo SCALA® laser scanners that are already being series produced. This enables the vehicle to drive without human intervention through tunnels, in parking garages, and in other environments where a GPS signal would be lost;
- learn about the road infrastructure, in real time and with every trip, to handle a growing number of driving situations, including those not already encountered.
Valeo Drive4U® is capable of learning to manage a wide variety of driving situations in urban environments. With an autonomy level of 4, it can handle the following without human intervention:

- driving along an undivided highway;
- smart and traditional traffic lights (stop and start) and road signs;
- intersections and traffic circles;
- other road users (pedestrians, bicycles, scooters).

All of this can be done on roads that might be undergoing construction work, have faded or no markings or be mired in gridlock with frequent stopping and starting.

**Valeo, a major player in automotive industry AI**

Artificial intelligence (AI) is having profound impacts on the automotive industry, and Valeo has been working on AI applications for the past six years in anticipation of the sea change. All Valeo products will be equipped with AI technology, including its lighting, thermal, electric and automated driving systems. To support the transition, Valeo now has some 100 AI, machine learning and deep learning experts on its team.

Valeo has stepped up its AI ambitions with Valeo.ai, the first global research center dedicated to AI for automotive applications. Based in Paris, Valeo.ai is slated to become a world-class research lab. It will be the beachhead for Valeo’s AI research, in liaison with universities and scientists, including INRIA, Écoles des Mines and École Normale Supérieure.

Valeo will be penetrating the entire mobility value chain with its AI technology, thanks to its product applications and the knowledge that will come out of its Valeo.ai research center.

**Did you know?**

**VALEO, GLOBAL LEADER IN DRIVING ASSISTANCE SENSORS**

Valeo is the world’s leading manufacturer of driving assistance sensors, which act as the eyes and ears of autonomous vehicles and therefore drive progress in the field.

Valeo began producing sensors back in 1991, with the first ultrasonic sensors for reversing radars. Today, Valeo offers the most comprehensive portfolio of driving assistance sensors on the market, comprising ultrasonic sensors, radars, cameras and the SCALA®, the first and only mass-produced laser scanner in the automotive industry. The Group has already produced around one billion sensors, of all types, and will produce over a billion more in the next four years. Valeo also specializes in merging the data generated by these sensors, helping the car make sense of its environment, surrounding vehicles and obstacles.

Thanks to its sensor and data fusion expertise, Valeo has achieved a number of world-first runs by autonomous vehicles, including roadtrips around Europe (13,000 km across six countries) and the United States (21,000 km), and 24 hours around the Paris beltway.

**Valeo MyMobius, the Valeo take on the smart car**

Demonstration at the Valeo outdoor area

Valeo MyMobius is a unique solution that transforms the relationship between driver and vehicle. This human-machine interface combines Valeo technologies with artificial intelligence developed by CloudMade¹.

In concrete terms, the vehicle’s Valeo systems, including sensors and connectivity modules, send data collected in the vehicle into the cloud for analysis by CloudMade’s profiling solutions.

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¹ CloudMade is a 50%-owned pioneering start-up in machine learning and artificial intelligence, with a focus on designing applications for the car industry.
MyMobius learns from drivers' habits to anticipate their needs, customize the onboard environment and enhance safety. The data collected and processed in the cloud is used to activate vehicle functions without the need for user intervention. For example, without requiring direction from the driver, the car can propose personalized itineraries based on drivers' habits and agenda. To improve safety, it can also automatically maintain a safe distance from other vehicles.

MyMobius also integrates Valeo XtraVue, a solution that shows drivers what is happening on the road, incorporating data from the car in front. Leveraging a vehicle-to-vehicle communication network, video streamed from connected vehicles on the road ahead is shown on the car’s display, helping drivers anticipate upcoming obstacles and situations. Enhanced visibility and fuller information affords reassuringly safe conditions for overtaking, for example.

**Valeo everView: ensuring that sensors are always operational for autonomous driving**

_Demonstration at the Valeo outdoor area_

Autonomous vehicles are equipped with a multitude of sensors that enable them to analyze their surroundings. As these sensors need to be able to work at all times and in all types of weather, it is vital that they be clean at all times. With this in mind, Valeo has developed a range of three fully automated cleaning systems for all types of cameras and LiDARs:

- The cleaning systems for cameras include several types of nozzles, usually with a small retractable arm, that spray just the right amount of cleaning fluid onto the external lens. These can be combined with drying systems, and Valeo also offers a de-icing feature to ensure maximum performance in winter.

- Valeo everView Centricam is Valeo’s latest innovation to keep the camera’s field of view constantly clear. Rain, mud, dust, etc. are removed by centrifugation.

- Valeo has also developed LiDAR everView, a cleaning technology for LiDAR sensors that only uses 25 ml of cleaning fluid, versus 100 ml for the non-automatic systems of its competitors. Beginning in 2020, it will be fitted on the vehicles of a leading German brand.
Technologies designed to cut CO₂ emissions and enhance air quality

48V city car: all-electric technology on a budget

Valeo is presenting a two-seater all-electric urban prototype operating at low voltage (48V). It can reach 100 km/h, has a range of 150 km and does not emit any greenhouse gases. The compact vehicle is ideally suited to the short distances and low speeds of urban driving.

The 48V powertrain system is 20% cheaper than a high-voltage all-electric solution, and can easily be integrated into a vehicle. This innovative solution could well make electric vehicles more readily available worldwide.

VALEO, PIONEERING VEHICLE ELECTRIFICATION

The pioneer and world number one in vehicle electrification, Valeo fits one in every three cars worldwide with electrical systems for reducing CO₂ emissions. From mild hybrid to high-power solutions, Valeo electrification technologies span the full spectrum of usage needs across all vehicle segments, from small urban cars through to SUVs and premium sedans. Valeo invented the Stop-Start system and, with annual production of around 25 million units, leads the field in mild hybrid solutions (12V and 48V), which recover braking energy and improve the efficiency of internal combustion engines.

Through the Valeo Siemens eAutomotive joint venture, Valeo is also coming to the forefront of the global market in high-power (above 60V) systems for hybrid, plug-in hybrid and all-electric models. By the end of June 2018, Valeo Siemens eAutomotive had already recorded orders totaling 10.8 billion euros. With a 15% market share in 2018, Valeo also leads the field in the battery cooling systems needed to ensure satisfactory battery life and performance.
Valeo 48V: the affordable hybrid solution

Demonstration on open road

Valeo is unveiling the world’s first plug-in hybrid vehicle operating at low voltage (48V). The new solution, mounted on a five-seater vehicle, makes it possible to drive in all-electric mode over around 40 km, the internal combustion engine taking over for longer trips. Using GPS, the vehicle automatically switches to all-electric mode as soon as it enters a restricted traffic area. What’s more, when the driver enters a destination into the GPS, the vehicle can adapt its use of the electric powertrain accordingly. Valeo’s 48V plug-in hybrid is more economical as the average cost of 48V technology is about 20% less than classic high voltage plug-in hybrid technology.

Valeo’s real-time air quality map, setting the stage for new innovations

Map updated in real time at the Valeo stand

Air quality is a key concern for Valeo. At the 2018 Paris Motor Show, Valeo is unveiling a map that serves to track pollution levels in the streets of Paris in real time. A unique, innovative system created in partnership with ARIA Technologies\(^2\), the map instantly displays air quality levels in the city, illustrating how pollution varies according to area and time and allowing users to visualize the state of the air they breathe, much like maps that represent traffic conditions.

Valeo technologies are able to collect information on the concentration levels of six pollutants: fine particles (PM 10 and PM 2.5), carbon monoxide, nitrogen dioxide, sulfur dioxide and ozone. These data are recorded by onboard sensors. 19 vehicles (15 Keolis public transportation vehicles and four G7 Green taxis) fitted with Valeo sensors will be driving all around Paris from September 2018 to January 2019 on a daily basis.

\(^2\) ARIA Technologies develops atmospheric modeling in France, bringing together an experienced team of engineers and researchers specialized in air. Headquartered in Hauts-de-Seine, France, the company works alongside major institutions and research centers in the field in France and the rest of Europe.
Valeo believes that understanding pollution levels in urban areas is vitally important. With meaningful, reliable data, collected in an innovative way, Valeo will be able to create new, cleaner mobility solutions that it can then make available to its automaker customers.

By having precise information on air quality in a specific location, it will be possible, for example, to generate customized routes to avoid peaks in pollution, or activate pollution control systems inside cars.

Even as all these data are being collected, Valeo is presenting two innovative technologies to ensure cleaner cabin air and calculate road routes that limit exposure to polluted areas:

**Valeo Oxy’Zen: purer cabin air for city drivers**

Demonstration at the Valeo outdoor area

Valeo Oxy’Zen purifies the air inside the car, which, according to research, can be up to four times as polluted as the air outside. An ultra-high-efficiency filter eliminates 98% of ultrafine particles from cabin air, while a high-performance ionizer cleans and deodorizes the cabin and pollution sensors provide real-time updates about the air quality in and outside the vehicle. The system is activated automatically when necessary. Passengers can switch the air purifier on remotely from their smartphones to pre-condition the cabin before entering the car.

**Valeo Clean Road**

Valeo has also developed an application called “Clean Road” that can calculate the best route in terms of air quality. It takes into account the number of kilometers to be traveled, the time it will take and the air quality along the way. Leveraging vehicle-to-cloud connectivity, an algorithm works in real time to refine its knowledge of the data collected (real-time information from the vehicle’s sensors and public data) and calculate the cleanest route.
Technologies to enhance onboard safety and comfort

Valeo Safe InSight: perception systems supporting onboard safety
Demonstration at the Valeo outdoor area

Human error is the main cause of road accidents, with 54% of car-related fatalities in Europe a direct result of driver inattention. Valeo’s innovative Safe InSight solution addresses this major safety challenge using a combination of Valeo sensors and cameras installed inside the vehicle. Valeo Safe InSight is able to:

- identify the driver to automatically adjust to his or her preferences;
- alert the driver if the system detects signs of drowsiness or distraction and notify the driver of unseen obstacles or dangers;
- assess the driver’s alertness when switching back to manual driving mode in vehicles with autonomy levels of 3 and 4;
- adapt driving style in autonomous driving mode to passengers on board, for example children;
- adjust airbag strength to each passenger’s position and weight;
- detect if a child has been left alone in the vehicle and trigger a sound and light alarm on the user’s smartphone. The US House of Representatives has passed a bill that would make this function compulsory and NCAP (European New Car Assessment Program) has already included this feature in its 2022 roadmap.

Valeo Smart Cocoon: a thermal comfort bubble adapted to each passenger
Demonstration at the Valeo outdoor area

The Valeo Smart Cocoon is a system offering a localized thermal comfort bubble adapted to each passenger according to his or her physiological characteristics. Biosensors and infrared cameras gage the thermal profile of each passenger based on heart and breathing rates, clothing, age, gender and body type in order to fine-tune the vehicle’s internal temperature.

Valeo Smart Cocoon provides personalized comfort while minimizing demand on vehicle energy, with up to 30% energy savings (in winter). This is particularly important for optimizing electric vehicle range. In summer, a mist dispenser and fans activate automatically by following the movements of passengers and, in winter, radiant panels heat the inside of the vehicle to quickly reach the desired level of warmth and comfort, thereby reducing overall consumption and noise. The use of color in the interior lighting enhances the sensation, with warm shades for heat and pale shades for cool. Specifically, at equal temperatures, red lighting gives the sensation of a 2°C (~4°F) increase and blue light an impression of a 2°C (~4°F) decrease.
Valeo, the automotive supplier driving the mobility revolutions

Valeo is an automotive supplier, partner to all automakers worldwide. As a technology company, Valeo proposes innovative products and systems that contribute to the reduction of CO₂ emissions and to the development of autonomous and connected cars.

Valeo-designed, Valeo-made high-tech products stand at the intersection of the three revolutions disrupting today’s automotive industry now more than ever before: vehicle electrification, autonomous vehicles and digital mobility.

Innovation is at the heart of Valeo’s strategy, with R&D drawing a budget approaching 1.9 billion euros in 2017, i.e., nearly 12% of the Group’s original equipment sales. In 2017, Valeo filed more than 2,000 patent applications worldwide and took first place in the industrial property institute (INPI) ranking of French companies filing patents in France. Innovation is clearly instrumental in driving Valeo’s growth, with products introduced less than three years ago representing 50% of order intake in 2017.

Across the Group’s 20 research centers, some 20,000 researchers are currently working on around 2,800 R&D projects in fundamental research, advanced engineering and the development of new technologies. Valeo also has 36 development centers. Through the study and analysis of major social trends, Valeo is developing a technology roadmap looking 10 years into the future, which anticipates the future demands of customers and end users.

For more than 10 years now, Valeo has been working to develop its innovation ecosystem, built on partnerships with universities, laboratories and research centers, start-ups and pioneers from other industries. Through multi-party development programs, participants pool their knowledge, reducing costs, development cycles and time to market.

**Key figures:**

18.5 billion euros in sales in 2017

- Target: 27 billion euros in sales in 2021
- 50% of 2017 order intake was for innovative products released in the last three years

1.9 billion euros in R&D spending in 2017 (nearly 12% of the Group’s OEM sales)

More than 2,000 patents filed worldwide in 2017

- Biggest patent filer in France in 2017 (1,110 patents filed with the INPI)
- Biggest French patent filer with the European Patent Office

A footprint in 33 countries

115,000 employees, including 20,000 R&D engineers

185 plants, 20 research centers, 36 development centers, 15 distribution platforms