PRESS KIT

VALEO UNVEILS ITS LATEST TECHNOLOGIES AT THE PARIS MOTOR SHOW
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At this year’s Paris Motor Show, Valeo is proud to present its groundbreaking technologies for intuitive, clean and connected driving. These technologies represent the hard work of nearly 12,000 engineers and technicians spread among 19 research centers and 35 development centers worldwide.

Intuitive driving

Valeo’s solutions are designed to facilitate maneuvers in urban settings, assist motorists in difficult driving situations and encourage interaction between the driver, the vehicle and the surrounding environment.

Valeo is notably showcasing four examples of unique solutions that function on all types of vehicles.

**Valeo Cruise4U, on show in the outdoor area**

At this year's Paris Motor Show, Valeo is presenting the latest version of Valeo Cruise4U, a technology demonstrator that can drive in automated mode in real traffic conditions.

"Valeo Cruise4U includes enhanced active safety features that make driving safer in both manual and automated modes."

Valeo Cruise4U can manage the vehicle's steering, acceleration, braking and other driving functions in real traffic conditions. The driver has the option of taking back control of the vehicle at any time and is notified whenever the system detects the need to return to manual driving mode. Sensors and the human-machine interface keep the driver constantly informed of any changes to the vehicle's surroundings.

This breakthrough innovation in mobility has been achieved by combining Valeo's camera, radar and LiDAR technologies with sophisticated algorithm-based software, enabling the vehicle to understand and monitor its surroundings.

These technologies include solutions that scan the environment around the vehicle and detect any obstacles at distances from as little as a few centimeters to as much as 200 meters or more, day or night, rain, fog or shine.

**LIDAR**

The LiDAR scanner is the product of an exclusive partnership that Valeo began in 2010 with Ibeo, a start-up specializing in laser scanner technology.
For Valeo, the challenge is to factor in cultural specificities in real-world and particularly difficult traffic conditions that differ from market to market, such as scooters and motorcycles driving between lanes on the Paris beltway and left-hand traffic in certain countries. To adapt to urban driving constraints, Valeo Cruise4U incorporates Traffic Jam Chauffeur software, which is designed to take control of the vehicle in dense traffic. When traveling at between 0 and 70 kilometers an hour, the vehicle automatically matches its speed to that of the car in front while staying in the same lane, thereby significantly reducing driver stress.

**Driver Monitoring**

With Valeo's Driver Monitoring system, a dash-fitted camera pointed at the driver's face detects lapses of concentration, day or night.

The Driver Monitoring system can:

- Alert the driver when it detects signs of drowsiness or distraction.
- Identify the driver, offering an additional level of security compared with key- or card-based access systems.
- Ensure at all times that the driver is actually capable of taking control of the vehicle before switching to manual driving mode – an essential feature in semi-autonomous vehicles.

**Focus on "Valeo Cruise4U's 24 Hours on the Paris Beltway"**

Valeo's autonomous vehicle will spend 24 consecutive hours driving around the Paris beltway, a highly complex environment due to a variety of factors: a lack of pavement marking in some sections, scooters and motorcycles driving between lanes, right of way for vehicles entering the beltway (contrary to standard freeway entrance rules in France), cut-off maneuvers, aggressive driving, reduced distances between cars, etc.

Valeo Cruise4U is being tested in real traffic conditions on its ability to switch between driving modes – including in traffic jams – and to change lanes autonomously.

**Park4U® Remote connected automatic valet, on show in the outdoor area**

After selling 10 million Park4U® systems throughout the world, Valeo is consolidating its lead in driver assistance technologies with the reveal of Park4U® Remote.

Park4U® Remote can perform both perpendicular and parallel parking and even enter and exit garages autonomously and safely. Using twelve ultrasonic sensors around the car and four cameras, the vehicle constantly monitors the surrounding environment with extreme precision, plans its route and calculates its trajectory until completing the parking maneuver, without any bumps or scratches.
With Park4U® Remote, the driver can also initiate and supervise the maneuver from outside the vehicle using a smartphone.

**INSIDE VALEO PARK4U® REMOTE**

- 12 sensors
- 4 cameras
- 1 fusion control unit
- Algorithm-based software

**Smart Lighting Experience for enhanced safety**

Valeo is giving visitors at this year’s Paris Motor Show the opportunity to discover its Smart Lighting Experience solution, which showcases two smart lighting innovations: **High Definition Lighting** and Valeo’s **Kinetic system**. With these two revolutionary technologies, vehicles driving in automated mode can communicate with the surrounding environment using their headlamps and rear lights, projecting or displaying images in a variety of situations and thereby improving safety.

**High Definition Lighting** is a groundbreaking system that projects customized images or messages onto the road in front of the vehicle by altering the shape of the beam. The innovation can, for example, project such information onto the road as directions from a GPS navigation system or warning messages when the vehicle’s sensors detect a potential danger in automated driving mode.

**Kinetic rear lights** can communicate with the surrounding environment by displaying pictograms or personalized messages. A car in automated driving mode equipped with a Kinetic system can inform the vehicle behind it whenever its sensors detect a hazardous situation, such as emergency braking ahead or a pedestrian about to cross the road. Kinetic technology can also be used to personalize vehicles. Users will, for example, be able to choose a scenario that plays out when they unlock their car (activation of rear light effects when they open the doors) by selecting a pictogram or predefined moving pattern.
Cleaner driving
Reducing emissions of CO₂ and pollutants is one of society’s most critical needs. To meet this need, Valeo develops innovative technologies that are designed to lower energy consumption by electrifying powertrains, optimizing overall thermal management and improving aerodynamics. These three focuses help increase the efficiency of all engine types.

From micro-hybrid to all-electric solutions
To help automakers reduce energy consumption and CO₂ emissions, Valeo offers a wealth of technologies ranging from the Stop & Start and eSupercharger solutions to systems for all-electric vehicles.

Valeo is also working to consolidate its world-leading position in electrical systems and further accelerate its expansion in this field. To this end, the Group joined forces with Siemens in April 2016 to form a joint venture entirely dedicated to high-voltage powertrains. For Valeo, the challenge now is to maintain its technological lead and strengthen its product line by offering a comprehensive selection of high- and low-voltage technologies, including micro-hybrid systems, all-electric solutions and everything in between.

Electrifying powertrains
Valeo’s 48V solutions can be applied across all vehicle segments, to both gasoline and diesel engine models. They are particularly well-suited to urban cars and compact sedans, which are the top-selling vehicles on the European market.

Making its world premiere at this year’s Paris Motor Show is Valeo’s e4Sport, a new solution designed to increase engine performance while reducing fuel consumption and CO₂ emissions.

Valeo 48V e4Sport: a unique system for exceptional performance
The 48V e4Sport recovers a maximum amount of braking energy and stores it in a 48V battery for various uses, such as:

- **Increasing engine torque**, via the starter-generator.
- **Maximizing engine power** during acceleration and boost phases, using the electric supercharger.
• **Driving in all-electric mode** and, when on low-grip surfaces, improving performance by connecting the rear axle to the 48V eRAD, effectively transforming the vehicle into a four-wheel drive.

Against a backdrop of increasing vehicle electrification, the 48V e4Sport completes the already wide range of hybrid innovations from Valeo, the world leader in 48V solutions. It joins other such groundbreaking products as Hybrid4All, which delivers an affordable hybrid solution based on the 48V starter-generator, and e4Boost, which combines hybridization and performance by adding the electric supercharger to the starter-generator.

**Optimizing thermal management**
Vehicle thermal management has become one of the keys to keeping CO₂ emissions down without compromising on passenger comfort.

**Electric and plug-in hybrid vehicles**
In a world exclusive, Valeo is presenting a series of innovative thermal management technologies for electric and plug-in hybrid vehicles at this year's Paris Motor Show.

In urban winter driving conditions, a vehicle in all-electric mode needs almost as much energy for heating as it does for driving. To significantly increase vehicle range, Valeo offers new vehicle thermal management strategies:

• **A smart thermal network for plug-in hybrid powertrains**, combining the internal combustion engine, electric propulsion system and battery pack. This system enhances energy efficiency by adapting energy transfer, storage and recovery methods to the vehicle's different operating modes. Valeo also offers extremely compact, high-performance Li-ion battery pack cooling solutions that increase battery reliability and lifespan.

• **Individualized, adaptive comfort rather than overall cabin comfort**, using more localized airflow at the right temperature to reduce energy needs to a minimum while offering active comfort solutions suited to each passenger. This approach requires a better understanding of how the human body and mind react to heat. Valeo also offers quiet air conditioning systems equipped with a very high-performance electrical compressor as well as compact, lightweight HVAC architectures and supplementary cabin modules that hone in on the ideal temperature to strike the perfect balance between energy savings and comfort.

• **Reduced energy needs in the winter to keep occupants at a comfortable temperature**. To this end, Valeo offers innovative architectures featuring heat pumps combined with a dual-flow air conditioning system designed to increase the air change rate in the cabin and significantly reduce power consumption during winter, without misting the windows. These new technologies all help improve thermal management in the vehicle, substantially boosting fuel economy and reducing CO₂ emissions per kilometer. They can also extend an electric vehicle's range by up to 40% during the winter and 20% during the summer.

**Conventional powertrain vehicles**
Valeo develops technologies that improve thermal management in internal combustion vehicles, with the aim of reducing CO₂ and NOₓ emissions. To this end, Valeo offers
thermal management solutions based on a number of components and modules, including:

- **The Valeo-designed engine cooling unit**, which is now lighter and more compact thanks to the latest generation of enhanced-performance radiators and condensers.
- **The Valeo-developed water-cooled condenser**, which further reduces the bulk of the cooling unit and, in addition, opens up more possibilities for its integration in cramped engine environments, such as in hybrid vehicles.
- **The water-cooled charge air cooler**, which improves acceleration response time and charge air stability.
- **More efficient and robust exhaust gas recirculation (EGR) coolers**, which help reduce NOx emissions in diesel engines and improve fuel economy in gasoline engines.
- **An exhaust heat recovery system** that accelerates the warming times of the engine (reducing fuel consumption) and the vehicle's interior (increasing comfort).
- **A thermal accumulator** featuring Valeo's patented phase-change material. Thanks to its encapsulated design, the accumulator can store heat for up to nine hours. This heat can then be used to warm the coolant, thereby speeding up engine and cabin heating times.
- **A thermoelectric generator** that produces electricity from recovered exhaust heat, offering a new source of energy and, by extension, further scope for reducing fuel consumption.

**Improving aerodynamics**

At this year's Paris Motor Show, Valeo is also showcasing a range of products that improve vehicle aerodynamics while freeing up space at the front of the car and generating significant energy savings. These include:

- **The light-weight bolster**, a robust, reduced-weight solution that preserves performance and cabin safety thanks to an innovative glass, carbon-fiber and thermoplastic-resin-based composite material that is:
  - 30% to 40% lighter than steel.
  - 25% to 30% lighter than aluminum.
- **The active grille shutter system**, which closes the radiator grille shutters at the front of the vehicle when the air conditioning is not at the highest setting, improving the aerodynamic drag coefficient by an average of 9% and halving engine warm-up times in very cold weather.
- **The compact engine cooling module**, an extremely condensed unit featuring latest-generation high- and low-temperature radiators as well as an innovative water-cooled condenser, which frees up space in the front of the vehicle without impacting comfort or air conditioning energy consumption.

**Connected driving**

Connected vehicles transmit and receive data to and from the surrounding environment in real time. This enables them to continuously adapt to traffic conditions and share information on their status. It also gives drivers the possibility of remotely parking their vehicle in a tight space using their smartphone. Thanks to the February 2016
acquisition of on-board telematics leader peiker and a partnership with Capgemini, Valeo has further strengthened its positions in the area of new connected services.

**Telematics**

Valeo's know-how in on-board electronics, enriched with peiker's technological expertise, has allowed the Group to offer automakers new telematics systems equipped with the high-speed connectivity and cybersecurity features that this extremely fast-growing market demands.

The Valeo-peiker telematics range now features innovative vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication technologies that are compatible with forthcoming mobile Internet services (4G+). And Valeo-peiker intelligent antenna modules combine all vehicle communication technologies into a single unit, optimizing performance while reducing costs.

**Mov'InBlue, on show in the public display area**

Valeo and Capgemini have joined forces to develop Mov'InBlue, the market's first industrial-scale connected mobility solution. By combining Valeo InBlue® smart key technology with Capgemini's digital expertise, the partners have created a car-sharing service for corporate fleets and car rental companies that includes secure virtual-key management, real-time vehicle data collection and a large number of fleet-management tools. Valeo and Capgemini are officially launching Mov'InBlue on the market at this year's Paris Motor Show.

The Mov'InBlue solution offers several standout technologies. One notable example is direct vehicle-smartphone communication (with Valeo InBlue® technology) for locking and unlocking the vehicle without accessing a GSM network, making the service substantially easier to use in underground parking lots.

**Remote Clean4U™, a remote windshield defrosting and cleaning system**

Valeo is giving visitors at this year's Paris Motor Show a first-hand glimpse of Remote Clean4U™, a remote windshield defrosting and cleaning system that is controlled via a smartphone application.

Remote Clean4U™ has two innovative functions that the driver can control remotely: Defrosting, which automatically defrosts a windshield in less than 90 seconds without the car engine running, and Debugging, which in record time washes away insects stuck to the windshield.

Each function uses its own special cleaning fluid, which is distributed through Valeo's innovative and exclusive AquaBlade® windshield wiper system. The fluid is not projected onto the windshield but spread with precision across its entire surface, cleaning it more evenly and uniformly without wasting fluid.

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1 AquaBlade® also makes the vehicle 2 kilograms lighter as only a small amount of fluid is needed to clean the windshield. CO₂ emissions are reduced by 0.2 grams as a result.
More enjoyable driving

To improve cabin air quality and sensory well-being, Valeo develops a range of innovative products that are designed to protect passengers' health and make their journey more enjoyable.

Very high efficiency PM$_{2.5}$ filter

Valeo has developed a very high efficiency PM$_{2.5}$ filter that traps almost 100% of ultrafine particles (<2.5 µm) in order to reduce the concentration of toxic pollutants in the cabin and thereby protect passengers' health.

Made from close-knit, reinforced fibers, the PM$_{2.5}$ filter reduces particle concentration inside the vehicle to levels that meet World Health Organization (WHO) recommendations of a maximum of 25 µg/m$^3$ per 24 hours. Even in highly polluted environments, the recycling system can reduce particle concentration to as low as almost 0 µm/m$^3$ in under 5 minutes once activated, mitigating the risk of cardiovascular and respiratory problems. When charged with polyphenols (anti-allergen version only), the filter also helps prevent allergic reactions due to its ability to neutralize up to 96% of pollen allergens. For optimal efficiency, Valeo recommends changing the filter at least once or twice a year.

Scent diffuser, standard on PSA Group vehicles

To give drivers and their passengers a personalized sensory experience, Valeo has developed a scent diffuser. Currently featured in PSA Group vehicles, the module offers a selection of three fragrances on board as well as different intensity and diffusion-cycle settings for optimizing comfort.

The scent diffuser will be even more personalized in the future. Valeo is working to combine the module with sensors that can analyze what the driver and passengers are experiencing and then diffuse the ideal scent, with relaxing notes in traffic jams, energizing aromas to ward off driver fatigue and so on.
INNOVATION STRATEGY

Anchored in CO₂ emissions reduction and intuitive driving, innovation forms the basis of Valeo’s strategy. The vast resources committed by the Group to remain at the cutting edge of technology are a testament to this strategic focus. In 2015, Research and Development (R&D) at Valeo represented €1.3 billion, 1,406 patents, 12,000 engineers and technicians, 19 research centers and 35 development centers.

Two key focuses

**Intuitive driving**
As market surveys show, drivers would like to mitigate the less pleasant aspects of driving, like traffic jams and long journeys, and use this time for entertainment, rest or other activities, such as work or phone calls. To meet its customers’ expectations, Valeo has developed the concept of intuitive driving and made it a key focus. At Valeo, this concept encompasses all technologies that make cars more intuitive, safer, and easier to drive based on the user experience.

Valeo is already the world leader in driver assistance, boasting technologies that enable cars to park themselves or drive autonomously on highways. For this reason, the Group is well positioned to cater to customer needs, and now offers a wide range of technologies – from the Valeo Cruise4U vehicle to connected services such as Valeo InBlue® and Remote Clean4U® – that will enable it to take advantage of all the opportunities in this growth market.

**CO₂ emissions reduction**
Valeo’s R&D strategy also aims to assist the transition to low-carbon mobility, pursuing the Group objective of reducing fuel consumption and CO₂ and pollutant emissions without compromising on driving performance or pleasure. Valeo rises to this challenge by developing innovative technologies that are designed to increase the efficiency of internal combustion engines, electrify powertrains and optimize vehicles’ overall weight and thermal management systems.

At the same time, the Group studies worldwide social trends on an ongoing basis, from urban mobility to regulatory change, to stay in tune with market expectations and anticipate structural shifts in the sector. This approach determines Valeo’s priorities in terms of technological innovation, which range from reducing CO₂ and pollutant emissions to conserving raw materials.

**Start-up spirit**
The connected, autonomous and clean car of tomorrow will have little in common with that of previous generations. To design and produce this vehicle, today’s automotive industry needs to integrate an increasingly wide variety of skill sets. For this reason, Valeo works with players of varying size and vocation, ranging from start-ups and universities to major groups.
Open innovation

Valeo pursues an adaptable innovation strategy based on agility and flexibility to keep abreast of social megatrends and continue tailoring products to its customers' needs. With this in mind, the Group has diversified its sources of inspiration and its partnerships, with initiatives such as the Valeo Innovation Challenge for students, now in its third consecutive year; the acquisition of a stake in Cathay Capital, a cross-border investment vehicle dedicated to venture capital financing for innovative start-ups; collaborations with Safran and Mobileye; the acquisition of an equity interest in Aledia; and the signature of a cooperation agreement with Ibeo.

Start-up incubator

What sets Valeo apart as a major Group is that it knows how to nurture the start-up spirit. Valeo refuses to centralize innovation, instead harnessing 19 research centers and 35 development centers around the world, staffed with autonomous teams capable of quickly rolling out useful mobility solutions for end customers worldwide.

For this reason, Valeo has always believed in collaborative innovation and regular, personalized interactions with start-ups. Some encounters culminate in an acquisition, as was the case in 2007 with Connaught Electronics (now the Group's world excellence center for cameras). Others result in the purchase of equity interests, as with LED technology start-up Aledia.

Valeo has also strengthened its open innovation ecosystem in 2016 by acquiring interests in several venture capital funds, thereby ensuring worldwide access to thriving local start-up networks in the San Francisco Bay Area, Shanghai, France (via Bpifrance) and elsewhere. This initiative is boosting the Group's visibility and attractiveness among up-and-coming entrepreneurs, and is already generating a deal flow of some 100 opportunities a month.

The Valeo Innovation Challenge

In a bid to create more opportunities to reach students directly, Valeo started a new breed of contest in 2013 called the Valeo Innovation Challenge. The contest asks students to come up with a new product or system, or a new application for an existing solution, that will make cars smarter and more intuitive by 2030. With this contest, Valeo aims to build on its open innovation strategy by strengthening ties across the academic world.

TOP 100 GLOBAL INNOVATORS

Valeo was ranked among the 100 most innovative companies in the world in the Thomson Reuters 2015 Top 100 Global Innovators.
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 intuitive driving. In 2015, the Group generated sales of €14.5 billion and invested over 10% of its original equipment sales in research and development. Valeo has 148 plants, 19 research centers, 35 development centers and 15 distribution platforms, and employs 88,800 people in 32 countries worldwide.

Valeo is listed on the Paris stock exchange and is a member of the CAC 40 index.

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