

PRESS KIT

VALEO AT THE HEART OF THE 3 AUTOMOTIVE REVOLUTIONS

2017 FRANKFURT MOTOR SHOW

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Valeo at the 2017 Frankfurt Motor Show

The 2017 Frankfurt International Motor Show (IAA) is opening to the public on September 16 under the slogan “Future now” (*Zukunft erleben*).

As the world leader in CO₂ emissions reduction and intuitive driving, Valeo is presenting visitors to the 67th IAA in Germany a range of innovations relating to **powertrain electrification**, the development of **automated vehicles** and **digital solutions** that will lead to the emergence of new forms of mobility.

Among all of the new Valeo innovations on display, the emphasis is on electrification, which reduces energy consumption and CO₂ emissions in every type of powertrain, whether based on gasoline, diesel, hybrid or electric technology. For example, Valeo has developed a 48V solution that is affordable enough to make hybrid and all-electric vehicles accessible on a large scale.

Valeo also helps reduce CO₂ emissions through technologies that go beyond mere electrification. For example, Valeo has used a composite material to replace steel in structural vehicle parts, reducing their weight by 30% without compromising on rigidity. Lighter in weight, the vehicle consumes less energy.

In the area of intuitive driving, Valeo has the automotive industry’s most extensive array of sensors, spanning ultrasound detection systems, cameras, LiDAR scanners and radars. These technologies act as the vehicle’s eyes and ears. Valeo’s software merges the data captured by these sensors in the same way that the brain processes information from the five senses. Valeo is also making inroads into artificial intelligence to give vehicles the ability to learn by themselves. At the 2017 Frankfurt Motor Show, the focus is on the Valeo SCALA[®] laser scanner, the first and only of its kind to be mass produced. The SCALA[®] laser scanner will be brought to market in 2017 in a tangible illustration of Valeo’s ability to make leading-edge technologies accessible to all.

Valeo also develops digital solutions that form the foundation of new services. One such example on show in Frankfurt is Mov’InBlue™, which provides vehicle users and fleet managers with a secure, virtual, smartphone-based key, saving time and offering simpler, more straightforward car-sharing services.

The electrification revolution

Building on its status as a pioneer, and the world No. 1 in vehicles' electric systems (one in every three cars worldwide is already equipped with a Valeo alternator or starter alternator), Valeo is presenting a very comprehensive offering at this year's Frankfurt Motor Show to support the CO₂ emissions reduction revolution. As part of a four-step strategy, Valeo develops products that reduce exhaust gas from traditional internal combustion engines, designs affordable hybrid solutions that can be applied to the widest possible range of cars, offers electric motors coupled with power electronics for full-hybrid plug-in hybrids and EVs, and creates thermal systems and new materials that increase vehicles' energy efficiency.

Hybrids for all

What makes Valeo's electrification technologies so relevant is that they are compatible with all vehicle types. For urban and multi-purpose vehicles, Valeo offers 12V and 48V mild hybrid systems. For sedans, premium sedans and SUVs, the [Valeo Siemens eAutomotive GmbH joint venture](#) develops high-voltage (above 60V) hybrid, plug-in hybrid and EV solutions.

Less heat and less weight for greater energy efficiency

Valeo takes a comprehensive approach to reducing greenhouse gas emissions. At the 67th Frankfurt Motor Show, the company is presenting a range of technologies that address this challenge, including starter-alternators, a supercharger, a battery cooling system, a heat pump device for the cabin and new organic materials to reduce vehicle weight.

Valeo's 12V belt-driven starter-alternator: starting engines in the blink of an eye

Designed to replace the conventional alternator and the starter, the Valeo starter-alternator automatically and smoothly cuts off the engine when the vehicle stops and then instantly starts it again when the driver accelerates, thereby avoiding any unnecessary fuel consumption and helping to reduce CO₂ emissions. The engine turns over silently and without vibration after the softest tap of the accelerator.

The mechanism restarts in a mere 400 milliseconds – the same unit of time used to measure a blink of the human eye, which takes between 100 and 400 milliseconds.

Valeo's 12V belt-driven starter-alternator can be seamlessly and easily integrated into the engine, reducing installation costs. It can be adapted to all gearbox types, be they manual or automatic.

THE 12V STARTER-ALTERNATOR: HEIR TO THE STOP-START SYSTEM

The Valeo-invented starter-alternator was first brought to market in 2004 and has since become standard around the world. Valeo took the system to the next level in 2010 by integrating control electronics. More than 3.5 million starter-alternators have been sold to date.

Valeo's 48V belt-driven starter-alternator: the affordable hybrid solution

Valeo has developed a hybrid system that combines a conventional internal combustion engine with a low-voltage (48V) electric motor. Compatible with all vehicles currently in production, it is the most economic method available to automakers today for introducing hybrid technology into existing vehicles. Valeo's 48V system generates strong benefits for a cost significantly lower than a high-voltage hybrid solution.

Known as Valeo's mild hybrid technology, the 48V system recovers energy from braking and



deceleration, which it stores in a battery to then powers the vehicle. The starter-alternator can reduce fuel consumption and CO₂ emissions by up to 10%¹. By paving the way for the development of new functions in the car, it also offers other benefits such as:

- Adding extra power during acceleration, thereby enhancing driving comfort without increasing fuel consumption. Power can be boosted by up to 15kW for 20 seconds, with average power of 8kW.
- Supplying electricity to the vehicle cabin to power the growing number of energy-hungry applications and functions.
- Driving in all-electric mode over short distances and in urban traffic jams.

The Valeo solution has currently been selected for 12 applications by local and international automakers, primarily in China and Europe.

High-voltage electric motor, power electronics, high performance without the excess

The Valeo Siemens eAutomotive joint venture has developed a system that combines an electric motor with an inverter (or control electronics) to offer the power of a sports car without the excessive fuel consumption, and the functions of a four-wheel drive without all of the mechanical parts needed for a 4x4 transmission.

Volvo was the first automaker to harness these innovations in its premium Volvo S90 sedan and XC90 T8 four-wheel drive plug-in hybrids. In both vehicles, the electric motor and its inverter (control electronics) are mounted on the rear axle and connected to an electric device on the front axle that turns the vehicle into an electric four-wheel drive.

Combined with an internal combustion engine, the electric powertrain system enables the vehicles to deliver 400 horsepower and 640 newton-meters, with low levels of pollutant emissions (59 grams of CO₂ per kilometer) and moderate fuel consumption (2.5 liters per 100 kilometers in the NEDC).

Valeo's 48V e-supercharger, nearly seven times faster than a turbo

An effective way to reduce a vehicle's energy consumption is to downsize the engine. To provide the required power and thereby maintain the same level of performance, one virtually standard solution consists in adding a turbocharger that uses engine exhaust gas. The downside is the mechanical turbine's relatively long response time, which creates the impression that the engine lacks torque (force) at low revolutions.



Valeo has developed an electric supercharger that can instantly deliver additional torque to engines at low revolutions. While a turbocharger requires 1.5 to 2 seconds to activate, Valeo's 48V e-supercharger only takes 220 milliseconds, making it 6.8-times faster. The solution can be incorporated into gasoline, diesel and hybrid engines and also adapts to 12V and 48V electric systems.

Valeo's e-supercharger premiered on the world market in 2016 and the same year received a PACE Award, one of the most prestigious accolades in automotive innovation.

Valeo's market-leading battery cooler

To operate, electric vehicles need batteries, which are costly and highly sensitive to changes in temperature, particularly when charging. For optimal longevity and performance, the batteries' temperature must be maintained at between 15°C and 45°C and consistent across the cells. An increase of just 10°C above the limit determined for the battery halves its service life.



¹ Non-contractual Valeo estimate made prior to approval testing.

Valeo's technologies protect batteries from the risk of degradation. Leveraging its extensive experience in the area, Valeo offers automakers a wide variety of solutions for both hybrid and all-electric vehicles, as well as designing and manufacturing compact systems to meet all of their needs across the price spectrum.

The Valeo-developed battery cooling system maintains the battery cells in hybrid and electric vehicles at an ideal operating temperature – below 45°C – while ensuring a consistent temperature across the cells. The batteries are cooled by either refrigerant or glycol circulating through a chiller inserted optimally into the battery pack.

Valeo can design battery cooling systems of all sizes to adapt to any vehicle type, whether hybrid, plug-in hybrid or all-electric. Thanks to the solution's ultra-flat design, the plates and tubes make excellent contact with the battery pack, thereby ensuring a uniform temperature. Valeo is the leader on this market, with a projected market share of 15% in 2018.

Valeo's environmentally friendly heat pump

World premiere – Valeo outdoor area

Valeo has taken inspiration from the construction industry to develop a reversible heat pump, which heats, cools and demists electric vehicle cabins. What makes the new Valeo design unique is that it does not use chemical refrigerants.

In addition, compared with conventional heat pumps, the Valeo solution extends vehicle range by nearly 15% at temperatures of between 0°C and 15°C, and by nearly 30% at temperatures of between 0°C and -20°C (see "Did you know" above).

DID YOU KNOW?

In urban driving conditions in winter, a vehicle operating in all-electric mode uses practically as much energy to heat the cabin as it does to drive.

In this situation, the thermal management challenge is to ensure passengers enjoy the level of comfort they expect while using as little energy as possible. For this reason, Valeo develops various heat pump architectures that deliver optimal cabin heating and superior air conditioning performance, with a minimal impact on electric vehicle range.

The technology will be debuting on a premium vehicle to be released before the end of 2017.

Lightweight composite material, reducing part weight by 30%

World premiere – Valeo stand

Valeo has worked to develop structural vehicle parts made from a composite material that reduces the weight of a vehicle's body parts by 30% compared with steel equivalents, at a comparable price. The innovation is the product of Valeo's work to invent solutions that curb pollutant emissions from internal combustion engines and increase the range of electric vehicles by reducing vehicle weight.

DID YOU KNOW?

The heavier a vehicle, the more fuel (or electricity in the case of an electric vehicle) it consumes while driving. For this reason, work to reduce the vehicle's overall weight is an essential part of the commitment to curb CO₂ emissions linked to excessive fuel consumption and also increase EV range.

Valeo's lightweight composite material is made of glass fibers impregnated with resin. An initial application for the material has

today been found in a component on the front of the vehicle, which is subject to the highest rigidity and resistance requirements. The material also provides the same shock-absorption capacity, guaranteeing a level of safety equivalent to steel parts.

The new material is also more esthetically pleasing, a quality appreciated by automakers as they no longer have to hide or paint parts that are visible when the hood is open.

The automated and connected car revolution

The vehicle of the future will be automated and connected. Valeo has been working on automated features to make driving intuitive for many years, and its automated parking systems already feature in 12 million vehicles worldwide. An essential component of these automated driving systems are sensors, and Valeo offers the most extensive range – ultrasonic sensors, cameras, radars and LiDARs – on the market. It is also the only automotive supplier in the world to mass produce laser scanners.

Valeo MyMobius, intuitive driving, Valeo-style

World premiere – Valeo outdoor area

Valeo MyMobius, which is making its world premiere at the Frankfurt Motor Show, is a one-of-a-kind solution combining technologies from Valeo and CloudMade. The Valeo MyMobius concept vehicle learns from drivers' habits in order to anticipate their expectations, customize their environment and enhance safety. Valeo systems installed in the vehicle – sensors, HMIs and connectivity modules – send usage and contextual data to the cloud to be processed by CloudMade's profiling solutions. Valeo MyMobius proactively caters to drivers' needs, offering personalized itineraries and settings. Throughout the journey, the vehicle suggests customized routes based on an understanding of the driver's habits. In addition, Valeo MyMobius can detect complex situations and suggest driving assistance functions. These synergies between connectivity, intuitive interfaces and automation systems provide a unique and seamless experience.

Valeo MyMobius components:

- 1 human-machine interface
- 1 microphone
- 2 screens
- Steering wheel touch controls
- 1 peiker antenna
- Valeo XtraVue technology
- CloudMade technologies (zero-click navigation, predictive calling)

Close-up on Valeo XtraVue, an integral part of MyMobius

Demonstration – Valeo outdoor area

Valeo's XtraVue innovation uses a telematic antenna installed on the car², combined with a laser scanner, and Valeo's camera system to show drivers what is happening on the road even outside their line of sight, streaming video from other connected vehicles and roadside infrastructure cameras onto the car's display. Leveraging existing public 4G and vehicle-to-vehicle (V2V) networks, the technology merges this data and creates a simple, enhanced view of the road. For drivers, it is like being able to see right through the obstacles in front of the vehicle, improving their vision and leaving them better informed to safely and calmly overtake other vehicles.



CloudMade is a pioneering start-up in machine learning and artificial intelligence, with a focus on designing applications for the car industry.

It specializes in the development of smart and innovative big data-driven automotive solutions such as a machine learning platform which seeks to improve and personalize vehicle comfort and safety for drivers and their passengers.

On November 11, 2016, Valeo announced it had acquired a 50% stake in CloudMade.

Valeo Park4U[®] Home

World premiere – Valeo outdoor area

Valeo is presenting Park4U[®] Home, a technology that enables vehicles to park in automated mode in complex private settings. When the driver carries out a manual parking maneuver, the system memorizes the journey (up to 50 meters) and the specific surroundings so that it can carry out the maneuver autonomously the next time around. The driver stays in control of the vehicle via their smartphone. The system carries out the maneuver safely by using data from the cameras, ultrasound sensors and laser scanner, even when it encounters obstacles.

Park4U[®] Home components

- 12 sensors
- 4 cameras
- 1 SCALA[®] laser scanner
- 1 fusion control unit

² Developed by the unit formed following Valeo's acquisition of Germany-based peiker in 2016.

Valeo 360AEB (Autonomous Emergency Braking)

Demonstration – Valeo outdoor area

Valeo 360AEB protects nearby pedestrians when vehicles are performing low-speed maneuvers.

Valeo 360AEB delivers a 360-degree view around the vehicle thanks to four built-in miniature cameras and several ultrasound sensors which alert the driver to any potential obstacles and, when necessary, bring the vehicle to an automatic halt to prevent impact. By “eliminating” blind spots, this technology is especially useful for large vehicles such as SUVs and pick-up trucks, particularly for reversing.

2018

The year in which backup cameras will become compulsory in all new vehicles in the United States

Should the driver fail to respond to any warnings, the system – which detects stationary and moving objects – intervenes by applying the brakes. In this way, the innovation protects pedestrians, the vehicle and its occupants.

Valeo 360Vue® 3D: full visibility, right around the vehicle

Demonstration – Valeo outdoor area



The intuitive and ergonomic [360Vue® 3D](#) system is designed to help drivers maneuver their vehicles with greater accuracy. It works by giving the driver a bird's eye view of the vehicle on the dashboard screen. The 3D, 360-degree image it provides of the surrounding environment ensures full visibility right around the vehicle.

The system consists of four miniature digital cameras and an image processing program.

Valeo everView sensor cleaning system

World premiere – Valeo outdoor area

As part of its development strategy for automated driving and in response to growing demand from automakers, Valeo is launching the first completely automatic cleaning system for LiDAR (Light Detection And Ranging) sensors.

The LiDAR cleaning system is equipped with a small retractable arm and multiple nozzles that spray cleaning fluid and clean the sensors automatically.

The Valeo Everview LiDAR cleaning system uses just 25 ml of cleaning fluid per wash versus the 100 ml consumed by the non-automatic systems of its competitors. This allows for a lighter, more compact reservoir as well as lower vehicle CO₂ emissions. The cleaning fluid is sprayed evenly as the arm extends, thereby optimizing the cleaning process across the sensor's entire surface. As an additional option, Valeo also offers a defrosting feature to ensure maximum performance in winter.

The system works seamlessly with all conventional pumps and can be installed without having to rethink the design or change the car's aesthetics.

Beginning in 2020, this new system will be fitted to the vehicles of a leading German brand.

Valeo Cockpit

Demonstration – Valeo stand

Valeo is unveiling the [Experience of Traveling](#) cockpit, which boasts features that correspond to three distinct phases of the driving experience: “task of driving” when the driver is in full control, “experience of traveling” when the semi-automated vehicle is driving itself, and “back to drive” when the driver takes back control of the vehicle.

During the “task of driving” phase, the cabin environment displays driving assistance features to enhance safety, for example by helping to overcome blind spots and identifying road hazards by reflecting light on the windshield, etc.

During the “experience of traveling” phase, the driver delegates the task of driving to the vehicle and ambient lighting then changes to softer colors while a relaxing fragrance fills the cabin, transforming the journey into a genuine sensory experience.

During the “back to drive” phase, visual cues around the cabin interior guide the driver’s eyes toward the steering column, safely leading them to focus their attention on the road. At the same time, the Valeo system releases an energizing fragrance to help the driver regain concentration.

Valeo Oxy’Zen: fresh, purified cabin air

Demonstration – Valeo outdoor area

The Valeo Oxy’Zen demonstration vehicle purifies the air, customizes the olfactory atmosphere and ensures thermal comfort. The driver can activate these features remotely for immediate comfort from the moment he or she gets in the car.

Valeo Oxy’Zen offers 99.8% protection against fine particles and toxic gases and also diffuses a refreshing mist in high temperatures.

Valeo Sightstream® a camera system to replace side view mirrors

Demonstration – Valeo outdoor area

Sightstream® improves safety by enhancing the driver’s perception of driving conditions. Cameras are installed where the side view mirrors are usually mounted. The video image displayed on the screens offers better visibility in all weather, even at night. In the demonstration on display in the outdoor area of the Frankfurt Motor Show, the interior rear view mirror is also replaced by a camera.

Sightstream® eliminates blind spots, improves safety when car doors are opened and makes it easier for the driver to change lanes and overtake other vehicles.

By removing the side view mirrors, Sightstream® offers new styling potential. With the elimination of the interior rearview mirror, for example, it will be possible to rethink the rear of the vehicle and improve its aerodynamics.

Enhanced aerodynamics for reduced CO₂ emissions

Thanks to its aerodynamic design, Sightstream® enables automakers to eliminate up to 1.3 grams of CO₂ per kilometer. The new camera system also considerably reduces the noise caused by conventional mirrors.

Valeo C-Stream

Demonstration – Valeo outdoor area



The Valeo C-Stream dome module, which is on display in the outdoor area, provides real-time analysis of what’s happening inside the vehicle. Using interior cameras that observe the driver and passengers, the system maps out the vehicle’s cabin and, during automated driving, analyses the driver’s position and alertness. This enables it to adjust the time required for the driver to take back control of the vehicle before switching back to manual mode, thereby improving onboard safety during the transition between automated and manual driving mode. The system also adapts the driving style to reflect whether there are children in the car, for example.

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

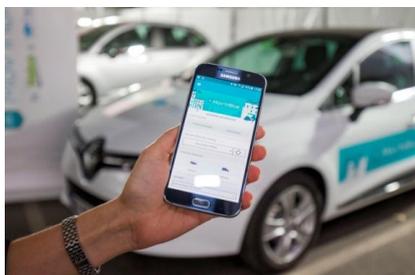
Remote Clean4U™ has two innovative functions that the user can control remotely: **Defrosting**, which automatically defrosts a windshield in less than 90 seconds without the car engine running, and **Debugging**, which in record time washes away insects stuck to the windshield.

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.

The shared car and digital services revolution

Mov'InBlue, a car-sharing and fleet management solution

Mov'InBlue – New Mobility World Hall



Mov'InBlue™ is a secure vehicle reservation and fleet management solution developed in partnership with Capgemini, a leader in consulting, technology and outsourcing services. Based on Valeo's InBlue® smart key technology, it allows users to lock and unlock their vehicle and start the engine all from their smartphone, without access to the GSM network.

With Mov'InBlue™, car rental companies can offer their customers an end-to-end digital experience from vehicle pick-up to drop-off, eliminating the constraints of face-to-face service such as reception, opening hours, long lines and hard-to-find vehicles. At the same time, Mov'InBlue™ reduces the amount of time vehicles are off the road for inspections, cleaning, refueling and other maintenance operations, and enables lessors to develop new business models, such as car rentals by the hour.

This solution will enable corporate fleet managers to promote efficient car-sharing by optimizing reservation scheduling and key management, for example. Real-time data collection on maintenance, usage rates and more will also allow them to manage both the size and availability of their fleet.

Mov'InBlue™ is compatible with more than 95% of vehicles on the road.

Cyber Valet Services, an automatic parking solution

Demonstration – Valeo outdoor area

Cyber Valet Services is a unique solution jointly developed by Valeo and Cisco, which enables vehicles equipped with Valeo Park4U® Auto technology to park safely and autonomously, i.e., without a driver on board, in connected car parks. How it works: the driver simply gets out of his/her vehicle at the car park entrance and activates the automatic parking system using a smartphone. The vehicle then continues its journey in automatic mode until it has finished parking. In just a few clicks, it can be set in motion again to meet the driver at the designated pick-up point in the car park.



The vehicle drives itself inside the car park by combining the power of automatic parking technologies (**Valeo Park4U®**), Valeo onboard telematics and secure key systems (Valeo InBlue®) with Cisco Parking Controller technologies, which equip car parks with Wi-Fi, video sensors and artificial intelligence-based solutions.

The vehicle sensors, together with the information provided by the equipment installed in the car park, allow the vehicle to map out its environment with a high level of accuracy and anticipate and calculate its journey at any time up to the completion of the parking maneuver. The vehicle is able to navigate complex parking facilities in total safety, even multi-story garages, by processing all of the necessary information with the help of an integrated GPS service and the vehicle's own sensors.

In addition to the space freed up by optimized parking, equipped car parks will be able to provide customers with convenient new services such as automatic car washing, maintenance and automated electric vehicle charging. For vehicle fleet managers, this service will optimize car park use by reducing the time it takes to drop off and pick up vehicles.

Innovation: at the heart of Valeo's strategy

The two focuses of Valeo's growth strategy

1 Innovation

Innovative technologies for CO₂ emissions reduction and intuitive driving.

2 Geographical expansion

Geographical expansion in high-growth potential regions, especially in Asia and emerging countries.

The automotive industry is being disrupted by three simultaneous revolutions: powertrain electrification, the rise of automated and connected vehicles, and the development of digital technology, which are giving rise to new forms of mobility.

Innovation, the cornerstone of Valeo's strategy

Powered by its innovation strategy, which dates back to 2009, Valeo is at the epicenter of these three revolutions. By investing heavily in technologies aimed at reducing CO₂ emissions and by developing intuitive driving, Valeo is anticipating new market demands and accelerating its profitable growth.

Substantial financial and human resources

In 2016, Valeo invested 11.1% of its original equipment sales in Research & Development, i.e., 1.6 billion euros. The Group aims to maintain its technological leadership, anticipate new trends and develop new technologies to meet its customers' expectations. In

2016, Valeo filed more patents in France and with the European Patent Office than any other French company.

In 2016, Valeo increased the number of research engineers in its workforce by 18% compared with 2015. It now employs 13,700 engineers in 20 research centers and 38 development centers worldwide to design and develop technologies for the car of tomorrow.

To promote innovation, Valeo has also stepped up its commitment to open innovation, expanding its ecosystem and partnerships with universities, laboratories, companies and start-ups.

In line with this commitment, the Group has diversified its sources of inspiration and its partnerships, with initiatives such as the Valeo Innovation Challenge for students; the acquisition of a stake in Cathay Capital, a cross-border investment fund dedicated to venture capital financing for innovative start-ups; collaborations with Safran; the acquisition of an equity interest in navya and CloudMade and the acquisition of gestigon.

The Group's innovation strategy is paying off – in 2016, innovative products introduced less than three years ago accounted for 50% of the Group's order intake.

1.6
billion euros
invested in R&D

No. 1
Valeo is the leading French company in terms of patents filed in France (994 patents filed with the industrial property institute [INPI]) and with the European Patent Office (612 patents).

13,700
engineers

20
research centers

38
development centers

APPENDIX

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