



SMART TECHNOLOGY
FOR SMARTER MOBILITY

PRESS KIT

VALEO INNOVATIONS AT THE EPICENTER OF TRANSFORMATIONS IN MOBILITY

VALEO AT CES 2020 – LAS VEGAS – JANUARY 2020



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Valeo at CES 2020 in Las Vegas

*“We must take change by the hand,
or rest assuredly, change will take us by the throat.”
Winston Churchill*

From January 7 to 10, 2020, Valeo will be at the CES show in Las Vegas, where the theme of mobility has become increasingly prominent in recent years, mirroring the profound transformations in the way we get around. Vehicles are gradually becoming electric, autonomous and connected.

Did you know?

The 12 labors...of Valeo, or its 12 new technological platforms

In late 2019 (December 10, 2019 Investor Day in Paris), Valeo lifted the veil on 12 new technological “platforms”. They allow products to be developed very quickly using a range of technological building blocks, including hardware and software. The resulting solutions are manufactured on a very large scale, which helps reduce their cost, but with the flexibility necessary to adapt them to the wide range of needs of vehicle manufacturers. The result is that a single product, like a 48V motor for instance, can take several forms for multiple uses (see details in the following section).

Five of the 12 technological “platforms” are for vehicle electrification (48V machines, 48/12V current converters, battery cooling, cabin temperature management and heat pump), three result from the Valeo-Siemens joint venture for high-voltage electrical products (machine, inverter and charger), and four are for driving assistance (front camera, driver monitoring, new-generation Valeo SCALA® LiDAR and autonomous POD combining sensors with dedicated cooling and cleaning systems).

Valeo expects its nine technological “platforms” alone (driver assistance and electrification combined – so without taking the joint venture’s products into account) to generate 2.6 billion euros in sales by 2022.

In this rapidly changing world, where new forms of mobility are appearing every day, Valeo has already succeeded in transforming itself. It has created a unique portfolio of products adapted to the automotive revolutions taking shape all over the world.

Thanks to massive investments in recent years, Valeo has successfully achieved the feat of creating 12 technological platforms that cement its global leadership in electrification and driving assistance. These technologies can meet a wide variety of needs and uses, equipping not only cars, but also two- or three-wheelers, robotaxis and droids. Above all, they provide safer, greener and smarter mobility.

The innovations that Valeo is unveiling at CES 2020 bear witness to this successful technological transition.

- In a world first, Valeo is showing Valeo eDeliver4U, its autonomous, electric delivery droid, developed in partnership with Meituan Dianping, China’s leading e-commerce platform for services (*find out more on page 5*). Powered by an all-electric 48V system and able to find its way all by itself thanks to its Valeo perception systems, it is well suited to zero-emissions urban areas. The droid is a practical illustration of the modularity offered by Valeo platforms, which can be used just as well for small city vehicles, such as this one, as for more traditional cars.
- Cleaner mobility relies on batteries. Batteries are the beating heart of an electric vehicle, and Valeo takes great care to ensure they run at the optimal temperature by means of innovative thermal systems, also on show in Las Vegas.
- For safer mobility, Valeo is bringing to CES three innovations that make use of artificial intelligence; among them, Valeo Move Predict.ai can anticipate the intentions of roadside pedestrians.
- The saying goes that two heads are better than one. And being smarter together is the philosophy that underpins the innovations in connectivity that Valeo is bringing to CES 2020: Valeo Smart Cocoon 4.0, Valeo Voyage^{XR}, Valeo Call^{XR} and Valeo Park4U[®].

Innovation is at the heart of Valeo’s strategy. The Group invested more than 2 billion euros in Research and Development in 2018, or close to 13% of its original equipment sales. Valeo’s innovative technologies presented at CES 2020 offer practical insights into what mobility will look like in the future.

And given that some of the products and functions developed by Valeo are already being fitted in vehicles coming off the assembly line today, that future is very near.

Did you know?

When the International Monetary Fund – no less – looks into automotive industry transformations

In its World Economic Outlook published in mid-October 2019, the International Monetary Fund unveiled the results of its research into the car manufacturing industry. So what was behind the IMF's somewhat surprising interest in this specific sector? The industry is undergoing the effects of profound change, namely vehicle "decarbonization". For the first time since the 2008-2009 financial crisis, the global auto industry contracted in 2018, thereby contributing – in view of its weight in overall output – to the global slowdown. The report describes the near-term prospects, which "remain sluggish", adding that "efforts to decarbonize pose a fundamental challenge". The IMF notes that the automotive industry, which weighs in at 5.7% of global GDP and 8% of international trade, contracted by 1.7% last year in number of manufactured units.

The decrease in financial aid in China, anti-pollution standards in Europe, possible customs barriers and societal pressures stemming from climate change are converging to place the global automotive industry in a situation unprecedented in its history. At its level, Valeo can offer solutions, notably to make mobility cleaner and safer at broadly affordable prices. (Source: AFP – October 2019)

Valeo, transformations for cleaner mobility

*“There is nothing wrong in change,
if it is in the right direction.”*

Winston Churchill

Valeo has long specialized in designing systems that help reduce CO₂ emissions. In 2018, products that directly or indirectly contribute to reducing CO₂ emissions accounted for more than 50% of Valeo's original equipment sales (products sold directly to automakers for new vehicles, representing 84% of sales). One in three vehicles worldwide is fitted with a Valeo product that helps to reduce CO₂ emissions.

Did you know? 48V, light electrification but heavy order backlog

It is estimated that nearly 4 in 10 new vehicles produced worldwide in 2030 will be fitted with mild hybrid electrical systems (up to 48V). Valeo to date accounts for 40% of global order intake for electrical systems of this type. As of end-2019, order intake for Valeo's 48V and mild hybrid solutions amounted to 7.5 billion euros.

The first new mass-produced vehicles equipped with this hybrid technology, some of which will be sold worldwide, are gradually entering the market.

Through the Valeo Siemens eAutomotive joint venture, Valeo is the world number one in high-voltage (i.e., greater than 60V) systems for electric vehicles. The technologies developed by the joint venture have increased the value of Valeo content per vehicle very sharply: between sevenfold (for all-electric vehicles) and ninefold (for plug-in hybrid vehicles).

Valeo is also the pioneer and world leader in 48V automotive systems. Valeo's 48V machines are “chameleons”. They adapt to individual situations while delivering exceptional performances. They can be mounted in different positions within the vehicle, depending on the automaker's requirements. That is what turns Valeo's 48V systems into a “technological platform”.

In addition to traditional cars, new small all-electric urban vehicles can be powered solely by Valeo 48V systems. They include autonomous shuttles, robotaxis, two- and three-wheelers, and even delivery droids.

In a world first, Valeo is unveiling Valeo eDeliver4U, its autonomous, electric delivery droid, developed in partnership with Meituan Dianping, China's leading e-commerce platform for services



At CES 2020 in Las Vegas, Valeo is presenting its autonomous, electric delivery droid prototype, Valeo eDeliver4U, developed in partnership with Meituan Dianping, China's leading e-commerce platform for services, which operates popular food delivery service Meituan Waimai.

The two groups signed a strategic cooperation agreement at last year's CES to develop a last-mile autonomous delivery solution.

At 2.80 m long, 1.20 m wide and 1.70 m tall, the droid can deliver up to 17 meals per trip, autonomously negotiating dense and complex urban environments at about 12 km/h without generating any pollutant emissions. With a range of around 100 km, this prototype gives us a glimpse of what home delivery could look like in the near future, especially in the ever-growing number of zero-emissions zones that are being created around the world. Meituan Dianping's connected delivery locker allows for safe delivery to the end customer, who can book through a smartphone application.

The droid's autonomy and electric power are delivered by Valeo technologies that are already series produced and aligned with automotive industry standards, thereby guaranteeing a high-level of safety. The droid operates autonomously using perception systems including algorithms and sensors. It is equipped with four Valeo SCALA® laser scanners (the only automotive LiDAR already fitted to vehicles in series production), a front camera, two fisheye cameras, two radar devices and six ultrasonic sensors, coupled with software and artificial intelligence. The electrified chassis features a Valeo 48V motor and a Valeo 48V inverter which acts as the system's "brain" and controls the power, a speed reducer, a 48V battery, a DC/DC converter and a Valeo 48V battery charger, as well as electric power steering and braking systems.

Valeo is equipping droids made by startup TwinswHeel

(Dynamic demonstration on the test track at Piero's)

Valeo's sensor and electric propulsion technologies also equip two droids developed by French startup TwinswHeel, shown on the test track at CES.

These two autonomous droids, dubbed TH03 and TH05, can transport loads of 60 kg and 130 kg respectively, at a speed of 7 km/h, assisting a person, whom they follow at a distance of 5 cm to 3 m. Operating in closed locations (factories, maintenance centers, warehouses, shopping centers, airports, train stations), as well as outdoors, these droids can help perform logistical and delivery tasks.

TH03 is equipped with cameras, ultrasonic sensors and an electronic control system from Valeo.

TH05 carries the same technologies, plus a Valeo SCALA®, the only automotive-grade LiDAR already in series production.

TH05 is also powered by a 48V electric motor from Valeo.

These two TwinswHeel droids offer a fresh illustration of the ability of Valeo technologies to equip emerging forms of electric and autonomous transportation.

Taking care of the batteries: treating your heart well always pays off

Beyond powertrain systems, Valeo plays a key role in the development of the electric vehicle through its expertise in battery thermal management, an area in which it is a world leader.

The battery is the heart of an electric vehicle. It accounts for 40% of its value. If you want to go a long way in your electric vehicle, you need to take special care of your batteries – even more than the car itself. Just like for the human body, the temperature has to be constantly monitored, protected and kept at the right level. If it's too cold, it won't deliver its full power. And if it's too hot, it can go completely dead.

Did you know?

The more battery chemistry progresses, the more Valeo is involved

Third-generation lithium-ion batteries allow increasing amounts of energy to be packed into the same amount of space. More efficient, these batteries are also more sensitive to temperature variations and have a low optimal operating range (its cells must be kept between 15°C and 40°C at most). This requires extremely fine-tuned, precise cooling, which Valeo has developed.

Electric vehicles and infrastructure for connection to electrical networks are moving toward increasingly fast charging times. In the same way as a smartphone heats up when it is being charged quickly, battery temperatures can also increase very sharply (and sometimes too much). Valeo has developed battery cooling control technologies for all fast charging systems, going up to 350 kW.

Valeo masters all the technologies needed for battery cooling. Smart control of all thermal systems ensures optimum battery performance, during both charging and driving, while also preserving the battery's life span. Starting in 2020, Valeo battery cooling systems will be a feature of a large (in number of units) electric vehicle platform of a leading German automaker. Going a step further, Valeo will soon offer thermal modules as aftermarket components. This means that systems already on the market will be able to benefit from the latest cooling technologies.

Valeo, transformations for safer mobility

*“To improve is to change;
to be perfect is to change often.”
Winston Churchill*

With its driving assistance technologies and expertise in active safety, Valeo aims tirelessly to make roads safer. In addition to its constancy, Valeo also has the ability to develop technologies at high speed. It all began with the first ultrasonic parking assistance systems in 1991. The story gathered pace from 2004. Since then, no two years have gone by without Valeo launching yet another world first in driving assistance systems, starting with the first lane departure warning system and continuing through to the first image-processing system enabling drivers to “see through” their trailer or caravan for maximum visibility, offered by Valeo XtraVue Trailer® in 2019.

Valeo has established itself as the world leader in the design and production of driving assistance sensors, allowing finely tuned perception of the vehicle’s environment. It also has the market’s most extensive sensor portfolio to date (including LiDARs, cameras, radars and ultrasonic sensors), and above all the one and only series-produced automotive-grade LiDAR fitted on vehicles already on the market.

At CES 2020, Valeo will once again be demonstrating its ability to invent technologies for safer mobility, including an intelligent system capable of predicting the behavior, intentions and trajectories of other road users, as well as two unique, complementary systems for ultra-precise vehicle location.

Valeo Move Predict.ai: predicting the intentions of road users

(demonstration at Piero’s)



Valeo Move Predict.ai, a technology unveiled as a world first at CES 2020, can detect vulnerable road users located in the vehicle’s immediate vicinity, such as pedestrians, cyclists, skaters and scooter riders, and predict their intentions. The technology is based on combining Valeo’s expertise in 360° perception around the vehicle, thanks to its sensors (latest generation of fisheye cameras and Valeo SCALA® LiDAR), with artificial intelligence.

Valeo Move Predict.ai can perform a detailed analysis of the scene surrounding the vehicle, the behavior of road users, their level of attention or distraction, factoring in whether or not they are using a mobile phone for instance. It uses this information to predict their intentions, such as crossing the road, and associated trajectories. And it can then instantly alert the driver of potential risky behavior by a road user, activating the emergency braking system if necessary.

Valeo Move Predict.ai represents a major advance in active safety – one that could considerably reduce the number of accidents involving vulnerable road users and at the same time contribute to the development of autonomous driving in urban areas.

The technology can be fitted on cars as well as on new mobility vehicles such as robotaxis and delivery droids.

Valeo SpotLocate, a few centimeters make for a giant technological leap

(dynamic demonstration at Piero's)

Hyundai, Hexagon's Positioning Intelligence Division, Valeo and a major mobile network operator are presenting a new technology that allows a vehicle to pinpoint its position on the road with centimeter-level precision.

The use of GPS positioning has become extremely widespread, particularly in the automotive industry. But this technology approximates positioning to within several meters only (between 1.5 and 3 meters in optimum conditions). It is therefore insufficient to determine, for example, which lane a vehicle is in. The new Valeo SpotLocate system offers ten times greater precision, which will help make roads safer. After an emergency braking maneuver, for example, the vehicle can share information about the maneuver and its exact location with other vehicles.

This technology will allow cities to streamline traffic flows by transmitting real-time information about vehicle locations. The system will facilitate the development of autonomous vehicles by improving all levels of driving automation from level 2 to level 5. Lastly, onboard navigation systems will be able to display more precise and user-friendly maps on their screens.

The solution can be rolled out rapidly, because it uses a combination of standardized technologies:

- The data transmission channels already exist in the mobile operator's network.
- The stationary receivers, which are part of localization infrastructure, and the TerraStar X correction technology are already in place, thanks to Hexagon.
- The automotive-grade telematics control unit has already been developed by Valeo. It tracks the vehicle and guarantees the security of data exchanges.
- The capacity to integrate these systems into the vehicle has already been fully acquired by Hyundai.

The system can be offered at an affordable price. It is perfectly aligned with Valeo's philosophy of launching series production of its cutting-edge technologies, in line with the automotive industry's high standards.

Valeo Drive4U® Locate, when the car does its own real-time mapping
(dynamic demonstration at Piero's)

Valeo is presenting a system that allows vehicles to locate their position with extreme precision, thanks to localization algorithms and mapping systems drawing on Valeo's perception systems. Mapping is dynamic, constantly enriched by crowdsourcing, i.e., calling on input from all vehicles.

Valeo Drive4U Locate® will facilitate the development of autonomous vehicles by providing an additional level of safety, not to mention optimized vehicle fleet management.

This is the case of the demonstration performed using five vehicles on the road in Las Vegas: a Drive4U Locate® vehicle demonstrator and four fleet vehicles, all fitted with the Valeo SCALA® sensor, to date the one and only series-produced automotive-grade LiDAR (Light Detection and Ranging) technology fitted on vehicles already on the market. LiDAR is a key factor in the development of autonomous driving.

Each vehicle plays a part in the creation and continuous updating of dynamic city mapping by sending the information collected by Valeo LiDARs (static objects including work areas, new infrastructure, etc.) into the cloud. In return, each vehicle benefits from centimeter-level localization (within 12 cm, versus 5 m for a standard GPS without corrections), by comparing the perception of its immediate environment with dynamic mapping to determine its exact positioning.

A vehicle's ability to perceive its environment and locate itself very precisely is a major challenge in the development of advanced driving assistance systems and autonomous vehicles.

Did you know?

Artificial intelligence? Maybe we should say collective intelligence!

Artificial intelligence embedded in Valeo cameras, developed in partnership with the CEA

Autonomous vehicles could not exist without artificial intelligence or deep learning. Artificial intelligence technology processes the data recorded by its own perception systems, in other words its "eyes and ears".

Valeo, the world's leading manufacturer of driving assistance systems, has entered into a research partnership with the **CEA**, a French scientific, technical and industrial research agency, to develop deep learning algorithms tailored to Valeo's Surround View cameras.

DeepManta technology, developed with CEA-LIST – one of the technological research institutes of the CEA – can perform 360° and 3D analyses of the vehicle's environment. Cars, two-wheelers, cyclists, pedestrians, traffic lights and signs, and any obstacles in the vehicle's path are identified, and their possible trajectories predicted. This in turn serves to define the autonomous vehicle's navigable space using images filmed by Valeo cameras. A key feature of the DeepManta intelligent neural network is that it consumes little energy to perform its calculations – a major advantage in the automotive world (on top of savings, it also means less heat produced by the processing systems).

The Valeo eDeliver4U and Valeo Drive4U® vehicles on show at CES 2020 are equipped with DeepManta technology.

Valeo, transformations for smarter mobility

“This is not the end.

It is not even the beginning of the end.

But it is, perhaps, the end of the beginning.”

Winston Churchill

Who would have imagined that the car could bring us to the brink of teleportation? What was pure science fiction just three years ago is starting to take on the outlines of reality. The immersive experience provided by Valeo Voyage^{XR} actually comes very close to teleportation. By combining Valeo technologies with virtual reality systems that are already available to consumers, Valeo teams have developed the world's first immersive communication system for vehicles, creating a unique cross-reality (XR) experience. And this is just the beginning. Thanks to reduced latency, faster speeds, more data exchanged and a better connection to the cloud, the arrival of 5G will open up a host of new opportunities in mobility, paving the way for the development of new connectivity services.

With Valeo's help, motor vehicles have now become an integral part of the digital revolution. The four innovations presented below indicate the magnitude of what is to come.

Valeo VoyageXR and Valeo CallXR **or how to get friends and loved ones on board virtually**

(dynamic demonstration at Piero's)

Valeo Voyage^{XR} and Valeo Call^{XR} bring friends and loved ones on board the vehicle virtually, offering an immersive communication experience.

Equipped with a virtual reality headset and joysticks, the Valeo Voyage^{XR} user is as if teleported into the back of the vehicle, even if it is located at the other end of the world, with a 360° view of what is happening in and around it. The augmented reality headset brings the virtual passenger into the moving vehicle via sound and image. They can see the driver, talk to him or her, and interact. Meanwhile, the virtual passenger is visible to the actual moving driver in the form of an avatar displayed in the rearview mirror. This teleportation comes courtesy of the combined use of Valeo perception systems located outside and inside the vehicle, plus connectivity.

The Valeo Call^{XR} system allows you to start a video conference with the vehicle's driver or passengers, simply using a tablet or a smartphone, and see what's happening, both inside and outside the vehicle. This Valeo technological solution combines ultrasonic sensors, cameras and machine learning algorithms.

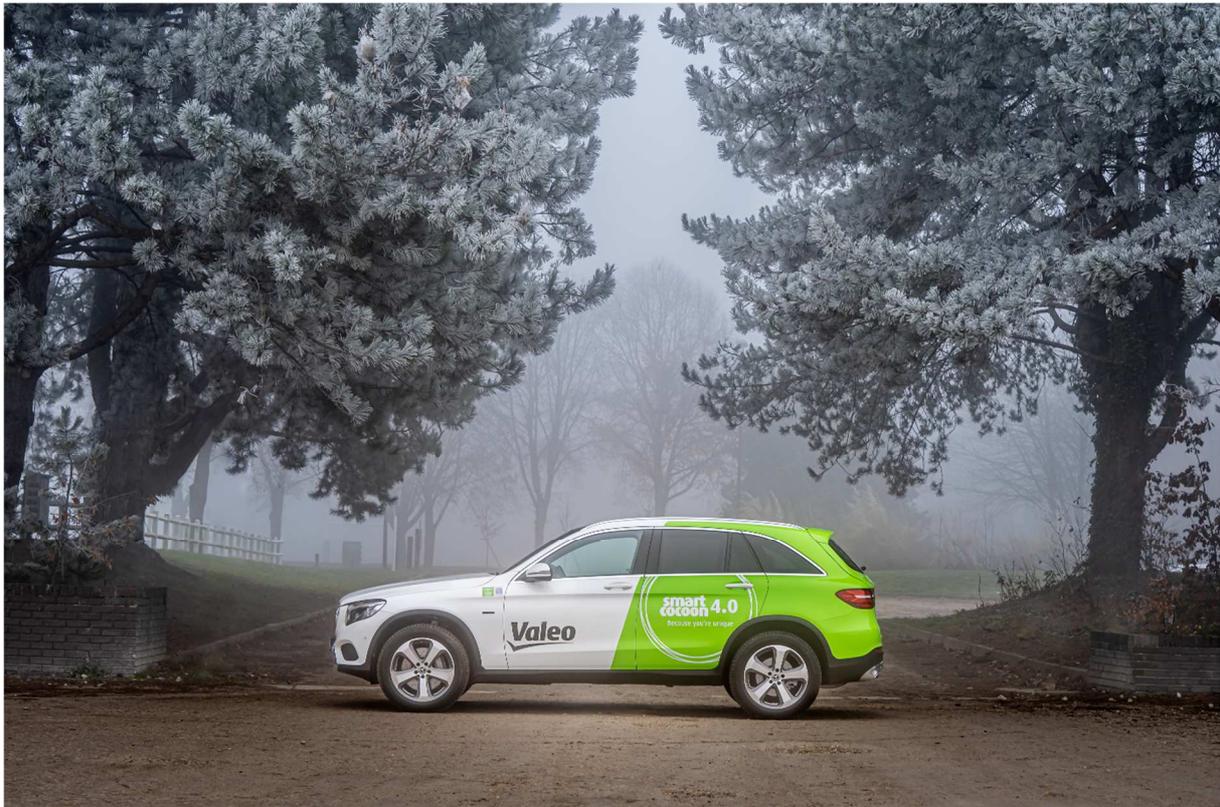
Valeo Park4U®, when the car learns its lessons

(dynamic demonstration at Piero's)

The world leader in parking assistance systems, with 35% of the global market, Valeo is presenting the latest version of its Valeo Park4U® autonomous parking system. Using machine learning technology to reproduce a parking maneuver that it has previously learned, the vehicle can park itself autonomously, with such precision that it can not only detect a charging station and line itself up perfectly, but also plug itself in automatically, making charging a seamless experience for the driver.

Heading toward empathic vehicles with Valeo Smart Cocoon 4.0

(demonstration at Piero's)



What could be more subjective than comfort? We are all unique, as are our senses. So could a vehicle work out our preferences and make things feel just right for us? You bet it could, thanks to Valeo Smart Cocoon. This innovative technology allows Valeo to create personalized comfort bubbles adapted to each passenger depending on their characteristics, such as their build, their heart rate or the type of clothing they're wearing. Adjusting the environment to suit each person's needs also improves energy efficiency, with savings of up to 30%. The system leverages artificial intelligence and the information captured by various sensors to deliver personalized comfort through a combination of temperature, lighting, sound effects and fragrance. The interior lighting, for example, adjusts automatically to reflect the temperature and reinforce the feeling of comfort, with warm shades for heat and pale shades for cool. The vehicle also becomes empathic in the sense that it can take into account the physiological state of its driver and passengers, by detecting signs of fatigue, distraction, emotion and stress.

Did you know?

C.A.S.E., a new acronym in the automotive world designating its four transformations

It's singular enough to be worth underlining: a new acronym has found its way into the auto industry vocabulary – C.A.S.E. Four letters, one for each of the revolutions taking place simultaneously in cars: Connected, Autonomous, Shared and Electric. American consulting firm McKinsey & Company coined its own version of it as early as 2017, excitedly calling the disruptive trends shaping the industry the "ACES". One of the firm's experts noted that a car that's only a few years old "is probably smarter" than your smartest device [phone, laptop or smartwatch]. "And your next car," he added, "will be even smarter: more sensors, more connectivity, more processing power." (Source: "How the auto industry is preparing for the car of the future" – McKinsey & Company, December 2017)

Valeo, the technology leader at the epicenter of the transformations shaping mobility

*“It’s not enough that we do our best;
sometimes we must do what is required.”*

Winston Churchill

Valeo partners with all automakers worldwide. As a technology company, Valeo proposes innovative products and systems that contribute to the reduction of CO₂ emissions and the development of autonomous and connected vehicles.

A leader in each of its businesses

- Powertrain Systems: world no. 1
- Driving Assistance Systems: world no. 1
- Visibility Systems: world no. 1
- Thermal Systems: world no. 2

Strategically integrated areas of expertise

Leaders in their segments, Valeo’s four Business Groups pool their respective know-how to offer innovations that meet market needs. For example, the combined expertise of the Comfort & Driving Assistance Systems and Visibility Systems teams has enabled the development of cleaning technology to ensure that the sensors used in driving assistance systems continue to operate optimally. Synergies have also been generated between the Comfort & Driving Assistance Systems teams, which have developed cameras that can measure the physiological data of vehicle occupants, and the Thermal Systems teams to develop a smart system that creates a thermal comfort bubble for each vehicle occupant.

An impressive pace of five Valeo innovations per day

- 13% of Valeo’s original equipment sales were invested in Research and Development in 2018, a ratio comparable with that of the world’s tech giants (source: survey published by U.S. magazine *Strategy+Business*).
- More than 2 billion euros were invested in R&D in 2018.
- 2,145 patents were filed worldwide in 2018, representing more than five inventions protected each day.
- Valeo is the leading patent filer in France and among the top 20 in Europe.
- The number of people working in R&D at Valeo has risen from 6,000 in 2009 to 20,000 today.
- 53% of 2018 order intake was for innovative products released in the last three years.
- Open innovation: Valeo diversifies its sources of inspiration by forging partnerships with universities, laboratories, industry leaders and startups.
- Cutting-edge processes: Valeo’s robot density is three times higher than the auto industry average.

A leader in AI for automotive applications

In 2018, Valeo recorded 1 billion euros in order intake for AI-enabled products.

Its teams already include 200 experts in artificial intelligence, machine learning and deep learning.

Created in 2017, Valeo.ai is the no. 1 global research center dedicated to AI for automotive applications.

A continuous succession of world firsts

1991: production of the first ultrasonic sensors for parking assistance applications

2003: invention of the Stop-Start system

2007: first automated parking system

2010: first system to offer a 360° bird's-eye view of the vehicle's surroundings

2014: first secure, smartphone-based virtual key system

2016: roadtrips around Europe and the US and the 24-hour Paris beltway run, all in an autonomous vehicle

2017: production launch for the world’s first series-produced automotive-grade LiDAR (Light Detection and Ranging) system

2018: demonstration of an autonomous vehicle in Paris, fitted exclusively with series-produced sensors