

PRESS KIT

**VALEO'S INNOVATIONS AT THE
HEART OF THE AUTO INDUSTRY IN
CHINA**

AUTO CHINA 2018, BEIJING

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Valeo at the 2018 Beijing International Automotive Exhibition (Auto China)

The theme of Auto China 2018 is “Steering to a New Era”. The transformations taking place in today’s automotive industry are summed up by the revolution in powertrains, with the ramp-up of electrification, the advent of the autonomous vehicle and the emergence of new digital mobility services.

Valeo, the world leader in the field of CO₂ emissions reduction and intuitive driving, will unveil some of its innovations helping to steer the industry into the new era at the 15th Auto China.

Among the products on show, Valeo is placing special emphasis on new electrical systems designed to reduce energy consumption and CO₂ emissions. They cover all vehicle categories, from small urban cars to premium sedans. One in every three vehicles made around the world each year is already fitted with a Valeo electrical system. The Group’s aim is to make hybrid and all-electric vehicles increasingly accessible around the world.

This is why, at Auto China 2018, Valeo is presenting an all-electric car prototype that runs solely on a 48 V motor (*see page 5*), a perfect solution for clean mobility, suitable for urban use and much cheaper than a high-voltage electrical system. A small vehicle equipped with this technology is expected to cost approximately 7,500 euro. The Valeo prototype can drive up to 150 km between charges and reach speeds of up to 100 km/h. This level of performance corresponds to a category of zero-emission vehicles that China aims to promote by adapting its regulations.

Vehicle electrification is not just about electricity. The challenge for innovation is much broader. Solutions to control the battery temperature (to avoid overheating) and energy-efficient systems to heat and cool the vehicle interior are vital to preserve the autonomy of lithium-ion batteries. Valeo is a world leader in these technologies, which are also being showcased at Auto China 2018.

Vehicle electrification is a way to make mobility cleaner. For the time being, driving in urban centers sometimes still means getting around in polluted areas. Valeo has a system that purifies the air inside the car, depending on the level of outdoor pollution (*see page 7*).

In autonomous driving, Valeo is pursuing the same goal of making its advanced technologies more readily available. The Group boasts the automotive industry’s broadest range of sensors, comprising ultrasonic sensors, cameras, radars and LiDAR (Light Detection And Ranging) systems. These technologies act as the vehicle’s eyes and ears. Since the end of 2017, Valeo has been marketing SCALA[®], the first and only laser scanner in series production in the automotive sector. The SCALA[®] won a 2018 Automotive News PACE (Premier Automotive Suppliers’ Contribution to Excellence) Award, a prestigious accolade recognized worldwide as a benchmark for automotive innovation. Sensors need to work at all times and in all types of weather. In Beijing, Valeo will be unveiling Everview Sensor Cleaning, an automatic LiDAR cleaning device (*see page 9*).

China is the world’s largest car producer. A total of 27.5 million units were manufactured in the country in 2017, representing one-third of global production. This is why Auto China 2018 is of such paramount importance. It is even a landmark event, since innovations presented there, initially designed to respond to local issues (such as the Valeo 48 V electric motor vehicle prototype) invariably have a place well beyond the Chinese market, wherever increasing urbanization is combined with the need for clean mobility.

China and Valeo, leading the way in the electrification revolution

A pioneer and world number one in electrical systems, Valeo equips one out of every three cars on the planet with an electrical machine.

Valeo's technologies cover all vehicle segments and all uses, from small urban cars to premium sedans and SUVs. Valeo invented the Stop-Start system, which today equips millions of vehicles across the world. It also leads the field in mild hybridization, producing around 25 million 12 V systems per year. Like Stop-Start, these systems help improve the efficiency of internal combustion engines.

Valeo has also developed a hybrid system combining an electric motor running at low voltage (48 V) with a traditional engine. It recovers energy during braking and deceleration phases, using it to power the vehicle.

The 48 V hybrid offers great benefits for automakers, but even more so for vehicle users. The reduction of around 10%¹ in fuel consumption and CO₂ emissions is achieved by replacing the vehicle's traditional 12V electrical system without major vehicle modification costs. Valeo's 48 V system is to date the most affordable way for automakers to add efficient hybrid capabilities to existing models.

DID YOU KNOW?

When an innovation meets its market: large-scale urbanization, the growing need to find affordable mobility solutions and the requirement to emit as little greenhouse gas as possible combine to make Valeo's 48 V electric motors one of the best technological solutions for the Chinese market. This means that more than 4 million Chinese vehicles could be fitted with Valeo's 48 V mild hybrid technology by 2023.

Through the Valeo Siemens eAutomotive joint venture, Valeo also offers high-power solutions (above 60 V) for hybrid, plug-in hybrid and all-electric vehicles. In its 14 months of existence, Valeo Siemens eAutomotive has already recorded orders totaling 10 billion euro – a massive success! In fact, the Valeo-Siemens joint venture is poised to become the world leader in vehicle electrification using high-power systems.

An all-electric vehicle prototype powered by a 48 V Valeo motor: a possible way forward for mobility in cities

- A smart solution, ideally suited to urban mobility
- A unique low-voltage electric solution
- More economical than existing high-voltage solutions
- Top speed of 100 km/h and range of up to 100 km

Valeo is presenting its low-voltage (48 V) all-electric vehicle prototype at Auto China 2018. As countries and major cities become more and more intent on reducing CO₂ emissions, this system offers a new angle on the future shape of urban mobility.

The prototype is a fully functional two-seater electric vehicle capable of reaching speeds of up to 100 km/h, with a range of up to 150 km. It can be recharged at any power socket. The technological demonstrator is perfectly sized and ideally suited to the short distances and low speeds of urban driving.

DID YOU KNOW?

This prototype marks something of a turning point for Valeo, because it is the first ever vehicle powered entirely (except for the battery) by Valeo systems. While Valeo had previously designed all the components needed for powertrain and drivetrain operation, it had never before designed the engine itself. So this car is actually Valeo-powered.

The 48 V all-electric prototype is also, and above all, more economical (20% cheaper) than a high-voltage all-electric solution, largely because it can do without some of the components and systems that a high-voltage system is required to have for user safety reasons. A small vehicle equipped with this technology could cost approximately 7,500

¹ Average value based on Valeo simulations

euro.

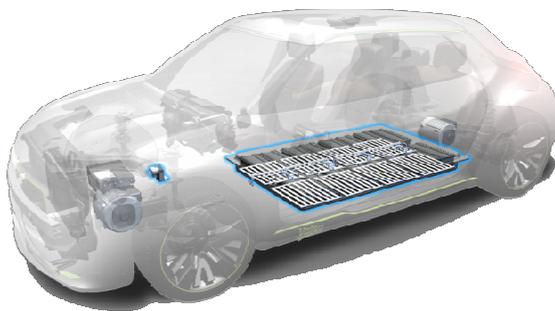
This innovation could further intensify the electrification revolution.

Thermal management of batteries: Valeo has decisive expertise for electric vehicles

The vehicle electrification revolution is not confined to the powertrain. When batteries are used to help power a car, attention must be paid to their operating temperature to ensure maximum travel range and optimize their life span.

➤ Valeo, the battery cooling expert

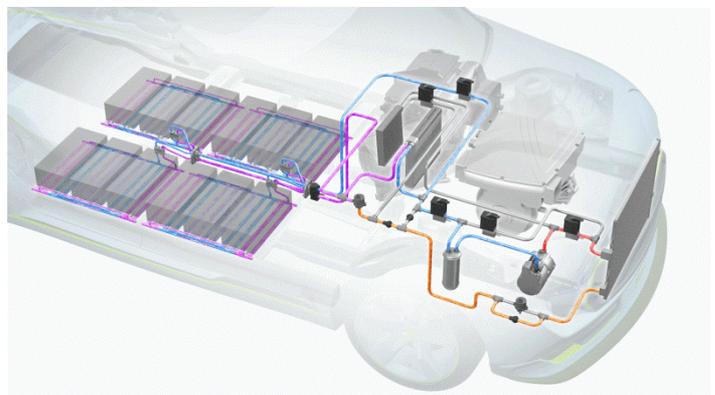
Electric vehicle batteries are sensitive to changes in temperature, particularly when charging. For optimal longevity and performance, the batteries' temperature must be maintained at between 15°C and 35°C and a consistent temperature across the cells. An increase of just 10°C above the limit determined for the battery halves its service life.



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.

➤ A "smart" thermal system developed by Valeo

When it is cold outside, how can you warm up the inside of a car that does not have a combustion engine providing energy? And how can you cool it down when it is hot outside, without reducing vehicle travel range? These are the sort of questions that have to be solved on electric vehicles to ensure that users enjoy not only the best comfort, but also a sufficient travel range, even when they live in extreme climates.



Valeo develops smart thermal systems.

Whatever the type of electric powertrain chosen by an automaker, Valeo can offer a suitable system. Energy resources are controlled so that the right level of comfort is delivered without compromising the vehicle's travel range. Valeo's systems can recover energy, store it, transfer it and reuse it depending on the desired application. They can also extend an electric vehicle's range by up to 30% in winter and up to 20% in summer.

For example, Valeo offers a reversible heat pump that harvests available ambient energy to heat, cool and demist electric vehicle cabins.

This technology will soon be available on the Chinese market.

Valeo also offers electrically driven compressors (EDCs) for cooling batteries and heat pump systems. In addition to optimizing energy consumption, they are quiet, which adds to vehicle comfort. Valeo has signed new contracts with Chinese equipment manufacturers.

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.

Breathing easily in the car, a crucial concern in China – and elsewhere

Vehicle electrification is a way to make mobility cleaner. The powertrain revolution is underway. For the time being, driving in urban centers often still means getting around in polluted areas.

Already a leader in cabin air filters, Valeo has expanded its range of technologies to automatically purify the air in the vehicle interior, depending on the level of outdoor pollution. At Auto China 2018, Valeo is presenting the following solutions in this area:

- a high-efficiency filter that traps 98% of ultrafine particles and toxic gases. Made from tight-knit reinforced fibers, the Valeo PM_{2.5} filter offers a level of efficiency high enough to comply with the provisions of the pollution standard adopted by China in 2016. Valeo also offers filters that neutralize up to 96% of pollen allergens. Their surface coating is made from a natural polyphenol extract, which inhibits the allergenic effects of pollen;
- a high-performance ionizer that cleans and deodorizes the cabin;
- an air purifier connected to sensors that detect inside and outside air quality and convey this information via the human-machine interface in real time. Passengers can even switch the air purifier on remotely from their smartphones to pre-condition the cabin before entering the car.



All these technologies improving the air quality are on display in the Valeo OXY Zen demonstration vehicle, alongside other solutions that also contribute to well-being in the cabin. Among these is a fragrance diffuser and the AquAIRius[®] mister, which instantly refreshes passengers sitting in the rear of the vehicle.

Seeing, perceiving and understanding, the first decisive stages of autonomous driving

In the same way that people rely on their senses to drive, autonomous vehicles need input from different sensors. The Group offers the most comprehensive portfolio of sensors on the market, comprising ultrasound sensors, cameras, radars and its SCALA[®] device, the first and only series-produced laser scanner in the automotive industry. The SCALA[®] won a 2018 Automotive News PACE (Premier Automotive Suppliers' Contribution to Excellence) Award on April 9, 2018. This prestigious accolade is recognized worldwide as a benchmark for automotive innovation.

Sensing the vehicle's environment is one of Valeo's main specialties. Processing the data captured by those sensors is a further area of expertise. Valeo software merges the data in the same way that the brain processes information from the five senses.

Valeo also develops artificial intelligence (AI) systems that give vehicles the ability to learn by themselves. Processing algorithms and artificial intelligence systems are coupled to enable the vehicle to make its own decisions. To further enhance its AI expertise, Valeo announced in 2017 the launch of Valeo.ai, a global research center in artificial intelligence and deep learning dedicated to automotive applications. The development of the autonomous car involves a series of successive stages, with widespread take-up of automated functions already well under way.

Seeing and perceiving in any situation and in all weather conditions is the first decisive step. That is why Valeo has launched Valeo Everview, the first fully automatic cleaning device for LiDAR sensors, a key component for the development of autonomous driving.



The cleaning system is fitted with a small retractable arm and several nozzles that spray cleaning fluid and clean the sensors automatically. It only uses 25 ml of cleaning fluid, versus 100 ml for 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 car's design or change its esthetics.

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

With the rise of autonomous driving, Valeo is making electronics an integral part of mechanical systems, which is particularly vital when the car has to interact with its outside environment. When the vehicle approaches pedestrians standing at the edge of the road, how can the vehicle get across the message that it has seen them and – even better – that it knows they want to cross the road? By using the intelligent lighting systems developed by Valeo. The car uses its headlights to project a temporary pedestrian crossing onto the road, letting pedestrians know that it is safe to cross.

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.

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.

One in every three vehicles worldwide is fitted with a Valeo electrical system. In intuitive driving, Valeo boasts the widest range of sensors on the market. Its SCALA[®] is the only LiDAR (Light Detection And Ranging) scanner developed specifically for cars in series production today. SCALA[®] won a 2018 Automotive News PACE (Premier Automotive Suppliers' Contribution to Excellence) Award, a prestigious international accolade that recognizes innovation, at the prize ceremony held on April 9, 2018 in the United States. More than 12 million vehicles worldwide are already fitted with Valeo automated parking systems. World-first runs by Valeo autonomous vehicle demonstrators include 24 hours around the Paris beltway and tours of Europe and the United States.

Valeo also develops digital solutions that improve everyday convenience for vehicle users, such as Valeo In'Blue[®], a securely shareable virtual smartkey for locking, unlocking and starting a vehicle from a smartphone.

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

Innovation at the heart of the strategy

Innovation is a cornerstone of Valeo's strategy, with R&D drawing a budget approaching 1.9 billion euro in 2017, i.e., nearly 12% of the Group's OEM sales. In 2017, Valeo filed more than 2,000 patents worldwide and for the second year in a row took first place in the intellectual 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.

Valeo's approach to innovation starts with a detailed worldwide analysis of major trends in society (demographics, population aging, urbanization, shifts in mobility needs, etc.) over a timeframe of 30 to 50 years, providing input for drawing up a detailed ten-year technology roadmap.

Teams at Valeo's 20 research centers and 35 development centers worldwide harness and continually enrich the most advanced skills in areas such as artificial intelligence, deep learning and big data, working with an agile, flexible startup spirit to design and develop innovative new technological solutions. Valeo also fields a network of 1,000 experts on key subjects, tasked with specifying and sharing best practices in innovation and design.

Across a wide ecosystem spanning universities, laboratories, companies in other industry sectors and startups, Valeo leverages cooperative innovation to diversify its sources of inspiration and streamline its development cycles. Valeo estimates that there are around 30,000 startups whose work in relevant areas may hold particular interest. To help it pinpoint the most promising cooperation opportunities, Valeo invests in venture capital funds such as Cathay Innovation, which is especially active in the San Francisco Bay Area, China and France.

In December 2017, Valeo announced an investment of 375 million yuan (~50 million euro) in Cathay CarTech Fund – Cathay Capital's first RMB fund – to acquire a stake in China's automotive and mobility ecosystem. Cathay CarTech will focus on China, with plans to invest up to 1.5 billion yuan (~200 million euro) in innovative companies and start-ups.

China is the world's largest automotive market and is leading the new mobility sector, following a strategic roadmap at the cutting-edge of innovation in the three revolutions taking place in the automotive industry: electrification, autonomous & connected cars and digital mobility.

Valeo key figures

18.6 billion euro in sales in 2017

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

27.6 billion euro in order intake in 2017 and 6.1 billion euro for the Valeo-Siemens joint venture, created in December 2016

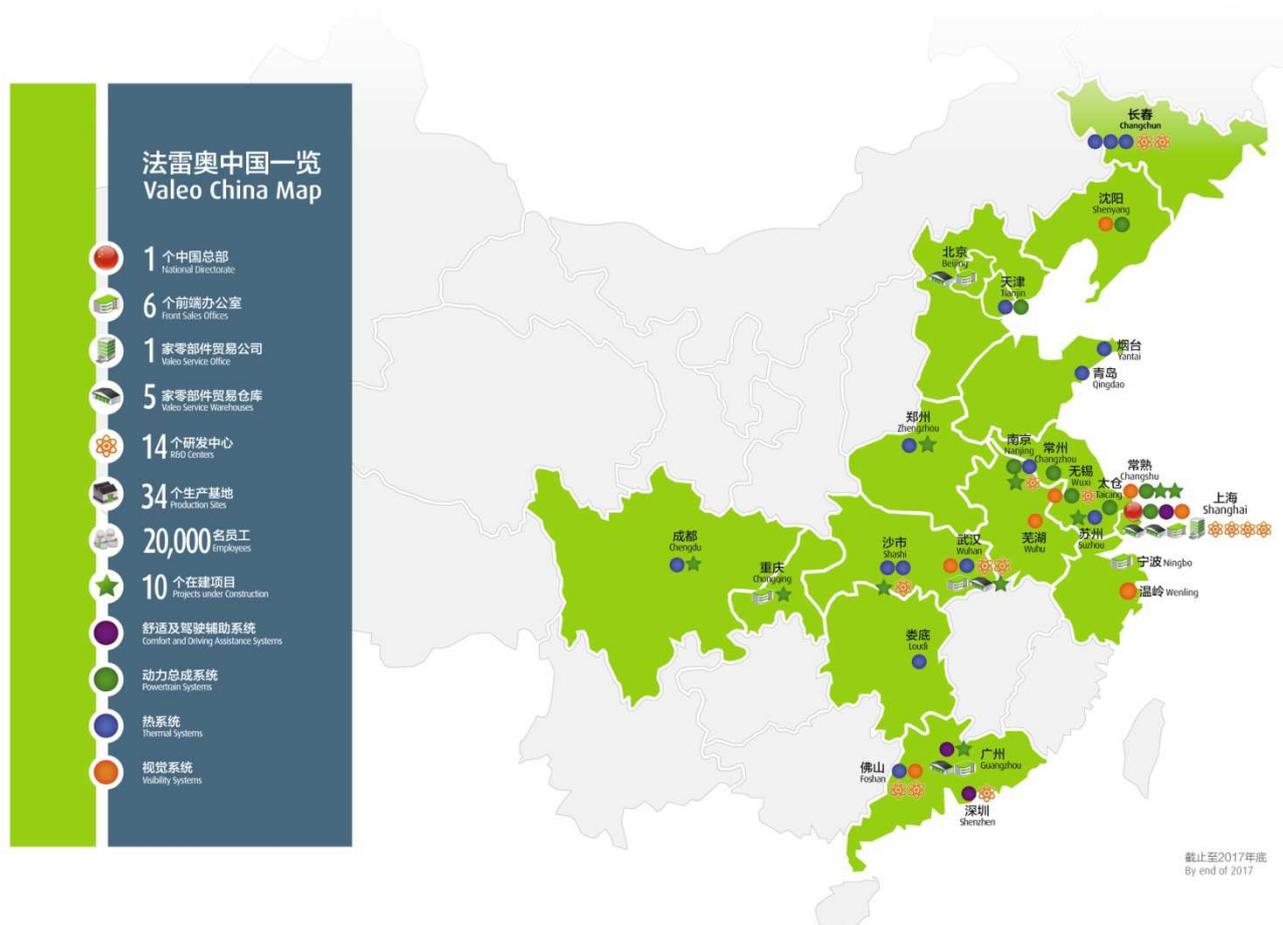
⇒ 50% of 2017 order intake was for innovative products released less than three years ago

A footprint in 33 countries

⇒ 184 plants, 20 research centers, 35 development centers, 15 distribution platforms

111,600 employees

Valeo in China



Key figures in 2017

- China accounted for 16% of the Group's total OEM sales, up 17% on 2016, outperforming the market by 15 points, and 27% of its order intake.
- Chinese automakers accounted for 31% of the China's sales and 38% of its order intake in China.

Teams & industrial operations

- 20,000 employees – Valeo's largest country in terms of employees
- 34 plants
- 14 R&D centers
- 5 distribution platforms

Appendix

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