Press release
Bosch Compact

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Emissions-free, safe, fascinating: Bosch is shaping present and future mobility
These are the highlights at the IAA 2019

- Diesel, gasoline, synfuel, electricity, and hydrogen: modern powertrains are making vehicles more efficient and helping the environment.
- Cities, freeways, parking garages: automated driving is making traffic safer and more convenient.
- Apps, data, cloud: connectivity is turning the car into a smart device on wheels and enhancing driving enjoyment and safety.

Stuttgart and Frankfurt, Germany – Bosch wants to make mobility as emissions-free, safe, and fascinating as possible. At the IAA 2019, the technology and services company is showcasing its latest solutions for personalized, automated, connected, and electrified mobility. You will find Bosch in hall 8, booth C 02 as well as at the Agora exhibition space.

Shuttle concept and technology showpiece at the Bosch booth

Bosch IoT Shuttle – vehicles for the future of urban mobility:
In the future, driverless shuttles will be a common sight on city streets around the world – whether they are transporting goods or people. Thanks to their electrical powertrains, the shuttles will glide through city centers and be seamlessly connected with their surroundings. Bosch technology for automating, electrifying, personalizing, and connecting can be used in these sorts of shuttles.

Rolling chassis – electromobility platform:
Electrical powertrains, steering systems, brakes – Bosch has all the building blocks of electromobility in its portfolio. As part of a development partnership with the chassis and automotive technology expert Benteler, the company is demonstrating how all Bosch products for electric vehicles can be integrated with one another. The rolling chassis showpiece is, among other things, helping Bosch to strategically refine products to meet such requirements.

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Gasoline, electricity, and stacks – Bosch technology for all powertrain types

Bosch wants to make mobility energy-efficient and eco-friendly whatever the application, so it offers solutions for all powertrain types – including efficient internal-combustion engines, fuel-cell powertrains, and various stages of electrification.

Fuel-cell system – e-mobility for the long haul:
Mobile fuel cells offer long ranges, short refueling times, and – with hydrogen produced using renewable energy – emissions-free vehicle operation. Together with the Swedish company Powercell, Bosch plans to commercialize a fuel-cell stack. In addition to the stack, which converts hydrogen into electrical energy, Bosch is developing all the essential system components to a production-ready stage.

48-volt systems – lower consumption and CO_2 emissions:
Bosch 48-volt systems offer entry-level hybridization for all vehicle classes by providing an auxiliary motor to assist the internal-combustion engine. The technology stores braking energy from recuperation and makes it available during acceleration. This reduces fuel consumption and CO_2 emissions by up to 15 percent. Bosch offers all the system's major components.

High-voltage solutions – greater range for hybrid and electric vehicles:
Electric vehicles and plug-in hybrids make mobility possible with zero local emissions. Bosch helps vehicle manufacturers design these kinds of powertrains and supplies the necessary systems. The e-axle combines the power electronics, electric motor, and transmission into a single unit. The efficiency of this compact module has been further optimized for greater range.

Thermal management – setting the right temperature in electric cars and hybrids:
Bosch uses intelligent thermal management to increase the range of electric and hybrid vehicles. Precise distribution of heat and cold improves the efficiency of the battery and ensures that all components are working within their optimum temperature range. The thermal-management system also delivers a pleasant temperature inside the vehicle.

Flexible air-pollution measurement system – better air quality in cities:
Air monitoring stations are big and expensive and they measure air quality only at a few selected points. Bosch's air-pollution measurement system consists of compact boxes which can be flexibly distributed around cities. They measure particulate matter and nitrogen dioxide as well as temperature, pressure, and

humidity in real time. Bosch creates an air-quality map on the basis of these measurements and uses it to advise cities on traffic planning and management.

eMountain bike – making light work of tough terrain on two wheels:
Electrified mountain bikes are currently the strongest-growing segment of the eBike market. The new Bosch Performance Line CX drive system is optimized for sporty cycling and features a compact profile. Its freewheel clutch makes riding feel natural even without motor assistance.

Assistance systems and automation – Bosch is teaching cars to drive
Safety, efficiency, traffic flow, time – automation is one of the keys to many challenges of tomorrow's mobility. Not only does Bosch have a broad portfolio of driver assistance systems, but the company also systematically develops its systems, components, and services further with a view to partial, highly, and fully automated driving.

Automated valet parking – green light for driverless parking:
Bosch and Daimler have installed the automated valet parking system in the Mercedes-Benz Museum parking garage in Stuttgart. It is the world's first driverless (SAE Level 4) parking function to be officially approved. The automated valet parking service is activated via a smartphone app. As if guided by an invisible hand, the car parks itself without a safety driver.

Front camera – image processing with algorithms and AI:
The front camera combines image-processing algorithms with AI methods. In congested urban traffic, it can for example recognize and classify partially obscured or crossing vehicles, pedestrians, and cyclists quickly and reliably. This allows the vehicle to trigger a warning or emergency braking.

Radar sensors – surround sensors for complex driving situations:
The latest generation of Bosch radar sensors are even better at capturing the vehicle's surroundings – including in bad weather or poor light conditions. Their greater detection range, wide aperture, and high angular resolution mean automatic emergency braking systems can react more reliably.

Vehicle motion and position sensor – precise localization for vehicles:
Bosch has developed a sensor that allows automated vehicles to precisely determine their position: the VMPS vehicle motion and position sensor. This enables automated vehicles to determine their exact position in the lane while driving. The VMPS uses global navigation satellite system (GNSS) signals supplemented with data from a correction service as well as from steering-angle and wheel-speed sensors.

Connected horizon – even more precise and up to date:
Bosch is continuing to refine the connected horizon. Automated driving requires ever more precise information in real time about the road ahead – for instance danger spots, tunnels, or the angle of bends. The connected horizon uses highly accurate map data to provide the vehicle with this kind of information safely and reliably.

Electric steering systems – key to automated driving:
Electric power steering is one of the keys for increasingly automated driving. Thanks to its multiple redundancies, Bosch's electric steering system offers additional safety. In the rare event of an error, it can still maintain at least 50 percent of the electric steering functionality in conventional and autonomous vehicles.

Communication between vehicles, their surroundings, and users – Bosch is bringing seamless connectivity to mobility
Vehicles that warn each other of dangers or need no ignition key: Bosch connected mobility makes life easier for road users while increasing safety, convenience, and driving enjoyment. Operation is simple thanks to intuitive human-machine interface (HMI) solutions. A range of services tailor mobility to individual needs.

3D display – instrument display with deep-view effect:
Bosch's new 3D display creates a convincing three-dimensional effect in the vehicle cockpit that both drivers and passengers can see. This improves visualization to assistance systems, for example the reversing camera. Drivers enjoy an even clearer overview of relevant information, such as the distance to obstacles or vehicles.

Perfectly keyless – smartphones instead of keys:
The Bosch keyless access system works with a virtual key stored on a smartphone. The system enables drivers to automatically unlock their vehicle, start the engine, and lock the car again. Sensors installed in the car recognize the owner's smartphone as securely as a fingerprint and open the vehicle only for them.

Semiconductors – building blocks of connected mobility:
Without semiconductors, modern vehicles would simply grind to a halt – and Bosch is the leading supplier of chips to the automotive industry. Bosch chips

help navigation systems when the GPS signal is interrupted, for instance, and they keep driving behavior steady. These chips also turn off the power in electric cars in the event of an accident to protect occupants and enable the emergency services to do their job safely.

V2X communication – data exchange between vehicles and their surroundings:
Connected and automated driving is possible only if vehicles communicate with each other and with their surroundings. However, no uniform global technical basis for vehicle-to-everything (V2X) data exchange has yet emerged. Bosch's hybrid V2X connectivity control unit is technology-neutral and can communicate via Wi-Fi as well as cellular networks. This means vehicles can warn each other of hazardous situations.

Vehicle computer – next-generation electronics architecture:
Increasing electrification, automation, and connectivity are placing ever higher demands on automotive electronics. Bosch is developing the necessary secure, powerful control units, known as vehicle computers, and putting them to work for the powertrain, in automation, and for infotainment.

Battery in the cloud – services for longer battery life:
Bosch's new cloud services increase the service life of batteries in electric cars. Smart software functions analyze the status of the battery based on real-time data from the vehicle and its surroundings. It recognizes stress factors for the battery, among them high-speed charging and multiple charge cycles. On the basis of the data collected, the software then calculates measures to counter cell aging, such as optimized recharging processes.

Predictive road-condition services – anticipating potential hazards:
Rain, snow, and ice change the road's surface grip, or friction coefficient. To let automated vehicles know how they need to adapt their driving behavior to current conditions, Bosch has developed its cloud-based road-condition services. Information about weather, road-surface characteristics, and surroundings as well as the expected friction coefficients are passed on to connected vehicles via the cloud in real time.

Interior camera – observer for more safety:
Microsleep, distractions, or a forgotten seatbelt: what happens inside a vehicle can have far-reaching consequences. The Bosch interior monitoring system, which is optionally available in both single- and multi-camera configurations, recognizes critical situations in a matter of seconds and warns the driver. This means increased safety.

Press photos: #1728556, #1156595, #1849989, #2658357, #1147919, #1709802, #694337, #1713652, #2068019, #1156702, #2715345

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BOSCH PRESS CONFERENCE:

Tuesday, September 10, 2019, from 12:55 to 13:10 CEST with Dr. Volkmar Denner, chairman of the board of management of Robert Bosch GmbH and Dr. Stefan Hartung, chairman of the Mobility Solutions business sector, at the Bosch booth C 02 in Hall 8.

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Mobility Solutions is the largest Bosch Group business sector. In 2018, its sales came to 47.6 billion euros, or 61 percent of total group sales. This makes the Bosch Group one of the leading automotive suppliers. The Mobility Solutions business sector pursues a vision of mobility that is accident-free. emissions-free, and fascinating, and combines the group's expertise in the domains of automation, electrification, and connectivity. For its customers, the outcome is integrated mobility solutions. The business sector's main areas of activity are injection technology and powertrain peripherals for internal-combustion engines, diverse solutions for powertrain electrification, vehicle safety systems, driver-assistance and automated functions, technology for user-friendly infotainment as well as vehicle-to-vehicle and vehicle-to-infrastructure communication, repair-shop concepts, and technology and services for the automotive aftermarket. Bosch is synonymous with important automotive innovations, such as electronic engine management, the ESP anti-skid system, and common-rail diesel technology.

The Bosch Group is a leading global supplier of technology and services. It employs roughly 410,000 associates worldwide (as of December 31, 2018). The company generated sales of 78.5 billion euros in 2018. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT company, Bosch offers innovative solutions for smart homes, smart cities, connected mobility, and connected manufacturing. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to deliver innovations for a connected life. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life." The Bosch Group comprises Robert Bosch GmbH and its roughly 460 subsidiary and regional companies in over 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. The basis for the company's future growth is its innovative strength. At nearly 130 locations across the globe, Bosch employs some 68,700 associates in research and development.

Additional information is available online at www.bosch.com, iot.bosch.com, www.bosch-press.com, twitter.com/BoschPress