4 Chassis & Safety Division
4 SensePlanAct: Intelligent Controls for the Mobility of Today and Tomorrow
6 Continental Corporation

8 Automated Driving
10 Seamless Mobility: Automated Driving at Continental

14 Advanced Driver Assistance Systems
16 Technologies for 360-Degree Representation of the Vehicle Environment
18 Cameras and Radars
20 Environment Model and Assisted & Automated Driving Control Units (ADCUs)

22 Vehicle Dynamics
24 MK C1 Innovative Braking System
25 MK C1 HAD for Highly Automated Driving
25 Electronic Air Suspension Systems
26 Electronic Brakes for Controlling Driving Dynamics
28 Emergency Brake Assist
29 MK 100: The Latest Generation of Electronic Brakes
29 Additional Added Value Functions of the Electronic Brake
30 Safety on Two Wheels - Electronic Brake Systems for Motorcycles
31 MK 100 MIB Integral Brake System

32 Hydraulic Brake Systems
34 Continental Disc Brakes – High Performance in All Situations
36 Drum Brakes
36 Parking Brake Systems
39 Brake Actuation and Brake Assist Systems
41 Brake Assist Systems
42 Brake Hoses: Experience Counts

44 Washer Systems
44 Washer Systems for Windscreens, Headlights and Cameras
44 Water Reservoirs, Pumps, Hoses, and Connectors
44 Spot and Fan Jet Nozzles
45 Hydraulic Telescoping Nozzles for Headlights
45 Camera and Sensor Cleaning Systems

48 Passive Safety & Sensorics
50 Integrated Safety for Optimum Protection
52 From Passive Safety to Safety Domain Control Unit
54 Cooperative Safety Functions by Means of V2X Communication
55 V2X-Communication and M2XPro
57 Sensors for Passive Safety
58 Pedestrian Protection: An Innovative Pressure Sensor Recognizes Impact
59 Pedestrian Protection Sensor Improves Frontal Crash Detection
60 Active Wheel Speed Sensors
61 Integrated Wheel Speed Sensor
62 Intelligent Battery Sensor and Current Sensor Module for High-voltage
63 Chassis & Position Sensors
66 Engine and Transmission Speed Sensors
68 Electronic Control Units for Various Applications
70 System Engineering and Testing Service supplier for vehicle safety

72 Quality
72 Continental’s Global Commitment to Quality

74 Careers
74 Careers in a Dynamic Company
76 Opportunities Created by the Digital Transformation

78 Worldwide Locations
80 Locations in Germany
82 Locations in Europe
84 Locations in the Americas
86 Locations in Asia
SensePlanAct
Intelligent Controls for the Mobility of Today and Tomorrow

The direction is clear: the future of mobility leads to fully automated driving - and in the long-term to driverless driving. Integrated active and passive safety technologies and products that support vehicle dynamics are providing for ever more safety and comfort. “Integrated safety” means that we are enhancing today’s passive safety systems by integrating vehicle and surrounding information into our passive safety information.

As a result, these systems provide improved protection of vehicle occupants and vulnerable road users, based on the real, actual situation. Electronics are becoming increasingly intelligent and thus create ideal conditions for the realization of our Vision Zero, the vision of accident-free driving. At Chassis & Safety, we summarize our contribution as “Safe and Dynamic Driving towards Vision Zero.”

Chassis & Safety is a division of the Continental Corporation and focuses on developing and producing intelligent and integrated systems for a safer automotive future.

For us in the division, it is therefore essential during the development of new products to consider all possibilities of networking. And this is true not only for products but also for the necessary cooperation and teamwork within and beyond the business units. By networking individual components and taking a system approach, we develop products and system functions along the chain of effects that form the foundation for automated driving.

Our Vision Zero will therefore continue to drive our developments in safety technologies and to make safety available to everyone around the globe. For one thing is sure: only the widespread use of active safety technologies will help to achieve the EU goal of halving the number of road fatalities by 2030.

Continental has partnered with Global NCAP to launch the “Stop the Crash” information campaign. The aim is to achieve significant improvements in global road safety and steadily reduce the number of traffic fatalities, injuries, and accidents.

Our structure reflects our core competences: dynamic control systems for cars that are safe and a pleasure to drive. Globalization, growth, and excellence are the major strategic thrusts in our division, which is organized into four business units:

› Vehicle Dynamics
› Hydraulic Brake Systems
› Passive Safety & Sensorics
› Advanced Driver Assistance Systems
Chassis & Safety Division
within Continental Corporation

Continental Corporation

Dr. Elmar Degenhart
Chairman of the Executive Board
Corporate Functions:
Corporate Communications,
Corporate Quality and Environment,
Continental Business System

Frank Jourdan
Chassis & Safety Division

Wolfgang Schäfer
Corporate Functions:
Finance, Controlling,
Compliance, Law, IT

Helmut Matschi
Interior Division

Dr. Ariane Reinhart
Corporate Functions:
Human Relations and Sustainability,
Director of Labor Relations

Christian Kötz
Tire Division
Corporate Function:
Purchasing

Hans-Juergen Dünsing
ContiTech Division

Niko Setzer
Spokesman of the Automotive Board
Central Functions Automotive

Lauxmann
Systems & Technology

Stuhlmann
Finance & Controlling

Salman
North America

Haupt
ADAS

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Human Relations

Wolfram
Japan/Korea

Klumpp
Hydraulic Brake Systems

Angerbauer
Purchasing

Huo
China

Fabre
Passive Safety & Sensorics

Orgnon
Communications

Doreswamy
India

Matic
Vehicle Dynamics
Automated Driving
Automated Driving at Continental: Seamless Mobility

The challenges are huge. Around 1.3 million people in the world die every year as a result of traffic accidents. More and more vehicles are crowding our roads, creating emissions and adding to air pollution. Each day, more than 1.2 billion people spend more than 50 minutes in their cars – much of this time in traffic jams. In addition, our society as a whole is aging, and the proportion of older drivers is increasing. Personal mobility will have to change, and new technologies will help to bring this about.

The technology company Continental is facing these challenges head-on and working on solutions. This will involve the evolution of existing systems as well as the introduction of revolutionary new ones.

Continental’s Cruising Chauffeur is an autopilot for highway driving. It will provide support to drivers over longer distances and allow them to relax during their daily commutes. Automation is also playing an increasing role at low speeds – when parking, for example. Vehicles are taking over more and more such stressful tasks, including assisted parking, remote parking, garage parking, trained parking, and even valet parking. Searching for a place to park will become a thing of the past, and parking spaces will be used more efficiently. By 2030, self-driving cars (robo taxis) can be expected to have a significant share of the world market for passenger vehicles. Continental is also focusing on this new form of urban mobility.

Cruising: Traveling Relaxed

Long drives on the highway will no longer be stressful. When the driver activates the Cruising Chauffeur, the vehicle takes over the wheel. It makes due provision for traffic conditions and complies with speed limits. The vehicle stays safely in its lane. The driver does not have to resume until the vehicle leaves the highway, and sufficient warning is given in advance.
Automated Driving

Packing: The Vehicle Parks Itself
The vehicle navigates independently, detects free parking spaces and parks fully autonomously. Pedestrians and other vehicles crossing its path are detected and the driving strategy is adapted dynamically.

Driverless: Driverless Mobility with the CUbE Robo Taxi
Using an app, passengers order a driverless electric robo taxi to take them the “last mile” into the city center. Here they can choose between a private CUbE or a public one. The private CUbE drives directly to the destination without picking up other passengers; the public CUbE collects other passengers on its route, permitting efficient use of the driverless vehicle. With its built-in sensors the vehicle continuously gathers information about its environment and processes it in an environment model. In this way the driverless CUbE is able to move independently in traffic.

The components and systems necessary for automated driving are developed and manufactured throughout the world, including the USA, Japan, China, and Europe. The company is thus well positioned to meet all the needs of seamless mobility – from the user’s front door to the final destination.

The technical systems involved in automated driving are varied and complex. A task like this can only be handled by a technology company with a very broad base and an integrated approach. Continental is pushing ahead with the development of every variant of automated driving, offering solutions for a wide range of users. The systems and components include sensors for the surrounding area, electronic control units, tires, brake systems, and entire drive trains. In addition, Continental offers solutions for human-machine dialogs as well as materials and designs for the vehicle interior.

Valet parking: The car parks autonomously

Driverless mobility with the CUbE robo taxi
Forward-looking technologies with a 360° view of the surroundings provide drivers and vulnerable road users with greater safety and comfort while protecting the environment.

On the whole, driver assistance systems make road traffic safer. They are an essential element in our Vision Zero – the vision of accident-free driving. Thus they are trailblazers for the implementation of automated driving. The vehicle’s surroundings are scanned by camera, radar, and lidar to ensure maximum safety and comfort. These systems do two main things. First, they assist the driver in everyday situations, such as parking and driving in flowing traffic. In the future, they will become even more automated, reducing the burden on the driver even more. Second, they are available in dangerous situations and can intervene in driving when necessary. By doing this, they play a crucial role in avoiding accidents, thereby helping to save lives.

Realization Platform for Automated Driving
For highly developed driver assistance functions and automated driving, it is essential to have a reliable perception of the vehicle environment, a full understanding of this environment, and a driving strategy, including appropriate reactions, derived from this understanding. As a system provider, Continental supplies all the necessary components and all the intermediate steps for the realization of automated driving – from one source.

From Sensor to Intelligent Reaction
The chain of action starts with detection of the vehicle environment. Environmental sensors like cameras, radar, lidar, and ultrasound generate a detailed, seamless 360-degree representation. Each sensor technology utilizes a different approach to capturing the environment, adding its own individual strengths. The fusion of this sensor data sharpens the image of the vehicle environment and is the key to obtaining a consistent view of it. However, simply gathering information continuously and processing it is not enough. The data must also be interpreted, and the contextual knowledge resulting from that interpretation must be developed.

This is the only way to cope automatically with increasingly complex traffic situations. To achieve this, a comprehensive environment model is created on the Assisted & Automated Driving Control Unit (ADCU) and the relevant driving features are implemented into it.

The ADCU is a central computer consisting of a composite of several heterogeneous computational units. It increases functionality by networking operating systems that were previously isolated. Simultaneous interventions into different systems harmonize perfectly, thanks to the central coordination of the intervention decisions. The ADCU is therefore a key component in the implementation of the necessary safety architecture – and it acts as a host for centralized environment descriptions and driving functions at the same time, ultimately realizing advanced driver assistance functions and automated driving itself.
Mono Camera
Thanks to its wide aperture angle of over 125°, the mono camera provides drivers with early detection of other road users like cyclists and pedestrians. The standard version fully meets Euro NCAP 2020 requirements.

Stereo Camera
The two “eyes” of the stereo camera perform 3D object recognition, enabling it to detect any kind of obstacle, determine its size and the distance to the object, all within one recording “take.”

Short-Range Radar
This is optimized for detecting objects at intersections, monitoring the blind spot, and assisting lane changes. The small size enables easy installation behind any bumper.

High-Resolution 3D Flash LIDAR
This sensor is a future-oriented solution that is necessary to enable highly automated and fully automated driving. The technology achieves a much more detailed and accurate field of view surrounding the entire vehicle.

Surround View
This delivers a 360° all-around view of the vehicle to help the driver with low-speed activities (parking, maneuvering, driving with a trailer, etc.). These functions will also be performed when automated driving is later introduced.

Long-Range Radar
Meeting global requirements for safety functions such as Emergency Braking, long-range radar also provides an extra level of comfort thanks to the intelligent cruise control. It is also suitable for automated driving.

Multi-Function Camera with LiDAR
The fusion of the mono camera and LiDAR can avoid rear-end collisions up to a speed difference of 50 km/h.

Short-Range LIDAR
Mounted behind the windshield, this monitors traffic in front of the vehicle and can prevent rear-end collisions in the city – with speed difference of 25 km/h up to a speed of 50 km/h.
Environment Model
A basic requirement for automated driving is the full perception and description of the vehicle environment. All the relevant information (sensor data, map data, internet) is combined in this “environment model.” The most important data handled by the model is on road users, the static environment, valid traffic rules (e.g. speed limit and no passing zone), reliable lane information, and the current and highly accurate position of the vehicle. All this data makes it possible to understand traffic situations and trigger the right reaction.

Driving Functions
Driving functions can be implemented using environmental information captured by the sensors. They avoid accidents with other road users, e.g. through automatic emergency braking or by keeping the vehicle in its lane. They facilitate complicated actions such as parking and maneuvering with trailers by assisting with the driving task or even taking it over completely. And thanks to the evolutionary development of the intelligent cruise control, the lateral and longitudinal control of the vehicle is progressing towards the ultimate goal - the self-driving car.

Assisted & Automated Driving Control Unit
The Assisted & Automated Driving Control Unit (ADCU) is a reliable multifunctional processing platform that is eminently suited for applications in highly automated driving. It integrates selected hardware and software to monitor the vehicle’s movement and control its route during operation. In addition, the ADCU uses incoming signals from onboard sensors and other information to generate an environment model.

Using this information, its route-planning algorithms determine a route that is optimal in terms of environment, safety, and convenience. In addition, the algorithms coordinate actuators in the vehicle, such as brakes, chassis, and steering.

ADC410
The entry-level ADC410 is ideal for use in standard ultrasonic parking functions.

ADC415
The entry-level ADC415 is a reliable multipurpose processor platform for applications with standard driver-assistance and safety functions.

ADC420
The ADC420 is a reliable multipurpose processor platform for driver-assistance applications and safety functions. It also hosts the backup/redundancy path for automated SAE Level 3 drive systems.

ADC424
The ADC424 is a family of reliable multipurpose processor platforms. They are ideal for standard and premium driver assistance as well as visualization functions like Surround View.

ADC426
The ADC426 serves as a reliable multipurpose processor platform for applications with Premium Assisted Driving and high-performance visualization functions.

ADC430/435
The premium family of ADC430/435 driving control units can be used to build a reliable multipurpose processor platform and are thus suitable for highly automated driving applications.
VED
You Choose the Way.
We Make the Most of it.

Adaptability is more than just an evolutionary success strategy. With its active chassis technology and electronic brakes, Continental leverages a wide range of possible interventions to adjust the vehicle’s behavior to unknown factors such as the condition of the road surface, load changes, and cornering. The goal is to ensure optimum contact with the road, no matter what the conditions. What that means for the driver is noticeable comfort, optimum cornering stability, and sporty handling.

MK C1: More Dynamic and Efficient Braking through Integration
The MK C1 is Continental’s latest innovative brake system and in production since 2016. It makes a major contribution to safe and dynamic driving, as well as energy efficiency. It enables recuperation of braking energy in a much wider range than standard regenerative brake systems, thanks to the “brake-by-wire” design.

The innovative “One-Box” system integrates the tandem master cylinder (TMC), brake booster and control systems (ABS and ESC) into a single compact and weight-saving (approximately 30%) module. Continental’s MK C1 can build up braking pressure in 150 ms (time-to-lock), which is twice as fast as conventional systems today. The regenerative braking with the MK C1 also allows for the recovery of braking energy.

Benefits:
› Reduced weight, packaging space and mounting effort
› No vacuum for braking required
› 100% recuperation of braking energy, thanks to the “brake-by-wire” design
› Braking pressure build up in 150 ms (time-to-lock), which is twice as fast as conventional systems today
› Pressure build-up is driver independent due to “brake-by-wire” design

MK C1 HAD
The MK C1 HAD system for highly automated driving has in addition to the primary brake system MK C1, a redundant (secondary) brake system in the form of the MK 100 HBE, enabling the next step towards automated driving. The MK 100 HBE can easily be integrated into an MK C1 car platform and is then mounted between the primary brake system and the front axle brakes. This is particularly economical and can be achieved with little effort, especially for small installation rates of automated driving functions in the platform. In the case of a failure of the primary brake, the MK 100® HBE takes over the deceleration of the car through the front axle and in most failure cases also through the rear axle.

Benefits:
› HAD Brake System for “fail-operational” applications
› Well known base technology
› Base brake system in vehicle platform identical for non HAD and HAD vehicles (MK C1)
› Low application and release effort

CAirS
Continental’s CAirS is a highly integrated, light weight air supply module that simplifies vehicle installation and conserves energy. To ease installation, the compressor, valve block, electronic control unit, and temperature and pressure sensors are all in one compact module. By reducing its size by 25 percent of conventional components and decreasing vehicle energy consumption, CAirS supports more sustainable and ecological mobility.
The CAirS unit allows the control of the air springs and struts to give the driver even more control over the ride characteristics. Our high-end air springs allow for a bandwidth of driving characteristics, from a soft comfort mode to a firm sport mode as well as adjusting the vehicle level according to the driving conditions. Off-road settings to raise the vehicle, aero mode to lower the vehicle at highway speeds to improve fuel economy or increase driving distance, and even lower the vehicle to make entry and exit easier.

Electronic Brakes for Controlling Driving Dynamics

**Anti-Lock Brake System (ABS)**
In the event of emergency braking, there is a risk that the vehicle’s wheels will lock. ABS prevents this by electronically controlling the braking force; the vehicle remains capable of steering and stable. ABS offers additional safety, especially in critical situations, and is practically standard in today’s cars and part of every ESC system.

**Electronic Stability Control (ESC)**
ESC is an important safety system that prevents critical vehicle states from developing. ESC is also the prerequisite for other safety technologies, such as driver assistance systems. The system constantly evaluates the data from the wheel speed sensors, steering angle sensor, yaw rate, and lateral acceleration sensor and compares the driver’s input with the vehicle’s actual behavior.

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**Oversteer**
ESC intervenes when the car threatens to oversteer by braking the outer wheels of the car. As a general rule, most of the brake force goes to the front of the wheel, where wheel slip is set at about 50 percent. This gives rise to a counter torque which compensates the yawing torque that causes oversteer.

**Understeer**
ESC intervenes when the car understeers and seeks to drift straight ahead in a curve. Here, ESC brakes the inside wheels, applying the largest brake force to the rear wheel.
MK 100: The Latest Generation of Electronic Brakes

MK 100 Modular Kit
The MK 100 is based on a modular product family and can be scaled as desired: from a motorcycle ABS, with or without an integral brake function, to high-end solutions with extremely powerful, low-pulsation pump variants. Safety and assistance functions can also be configured with the MK 100 ESC. The MK 100 opens the way to new dimensions in installation space and weight.

MK 100 ESC High Plus
The MK 100 ESC High Plus meets the comfort requirements of driver assistance functions while also fulfilling the increased pressure dynamics requirements for Autonomous Emergency Braking (AEB). At the same time, it sets new standards in terms of value for money, because the system uses the MK 100 modular kit, based on a two-piston pump. It can meet these tougher requirements, which are increasingly important for the NCAP rating, thanks to a more powerful electric motor and an optimized hydraulic pump. The latest generation can be integrated into vehicle systems especially easily. The ESC sensors can already today be integrated on the circuit board of the controller. In addition, in accordance with the VDA standard, the control of the electric parking brake is integrated into the ESC. Thus a separate controller is no longer required for actuating the parking brake.

MK 100 ESC High Plus Hybrid
The MK 100 ESC High Plus Hybrid is suitable for use in conventional vehicles as well as hybrids and electric vehicles. The only additional part needed for regenerative braking is a brake pedal position sensor. The sensor measures the driver’s braking intentions, and the software divides the braking requirement dynamically between regenerative braking in the drive train and activation of the wheel brakes. This is possible because the MK 100 ESC High Plus Hybrid can store brake fluid and deliver it to the wheel brake only when needed.

Additional Added Value Functions of the Electronic Brake
With a clear increase in comfort and safety, drivers benefit from the precise, convenient, and quiet control applied by our additional safety and assistance functions. These functions range from ARP (Active Rollover Protection), TSA (Trailer Stability Assist), HSA (Hill Start Assist), and FSA (Full Speed Range Adaptive Cruise Control) to complex autonomous overlay functions for vehicle stabilization and the hydraulic brake assistant.
To improve the active safety of motorcycles, we have developed electronic brake systems for scooters and motorcycles of all classes on the basis of our tried-and-tested passenger car ABS technology.

**One-Channel Motorcycle ABS: MiniMAB**

The one-channel ABS for small and recreational motorcycles is small, light, and can be easily applied to various motorcycles. In the event of a panic brake by the driver, the ABS control on the front wheel can save the driver from falling.

**Motorcycle Anti-Lock Brake System: MK 100 MAB**

The MAB offers improved braking control and thus greater driving safety thanks to optimum braking. The MAB’s compact dimensions and light weight make it easy to integrate or “package” into the motorcycle’s design. The MAB can be optionally equipped with a pressure sensor in the front wheel circuit. This improves the robustness of the ABS control. The pressure sensor is also necessary for an ABS control that is specially adapted to cornering at steep angles.

**Motorcycle Integral Brake Systems: MK 100 MIB**

With the MIB systems, both wheels are used for braking, even though the driver only activates the handle brake. The system recognizes the request of the driver to brake and actively builds up pressure on the rear wheel. Therefore, the best possible brake performance is achieved, although the driver only activated the front wheel brake. In both systems – MAB and MIB – the Rear Wheel Lift-off Protection (RLP) functionality is included. RLP recognizes and prevents lift-off of the rear wheel and also hinders the motorcycle from unwanted somersaulting when braking hard.
Your Perfect Stop
Anytime. Anywhere.

Continental disc brakes - high-performance in all situations

As one of the world’s leading suppliers of hydraulic brake systems, Continental offers solutions for traditional brake technology and optimally adjusted actuation systems. Our product portfolio ranges from disc brakes, parking brakes, and drum brakes to brake hoses.

FN brake caliper
For years, we have enjoyed extremely good success with our FN brake caliper. Consistent further development has allowed us to achieve constantly improved braking performance and a reduction in space requirements and weight, as well as significantly optimized values for NVH (Noise Vibration Harshness) and low frictional resistance.

Our FN and the newer FNt calipers offer the familiar positive features concerning their corrosion resistance. Furthermore, the weight can be significantly reduced by using aluminum. We remain true to our strategy of developing high-tech solutions at affordable prices. Our cost-optimized FN-L calipers are therefore ideal for expanding markets such as Asia and Latin America, for example, and for affordable cars.

Proven safety for emerging markets: drum brakes
Drum brakes are radial brakes with two brake shoes that are typically pressed outward against the friction surface of the drum through hydraulic wheel cylinder actuation in service braking and through the lever in parking braking. When braking ends, springs pull the brake shoes back inward.

Drum brakes are a good combination of service braking and parking braking and offer good values for both residual torque and cost. We offer a variety of different drum brakes in the well-known simplex design. These types of brakes are suitable for entry-level vehicles up to light commercial vehicles.

2FA brake caliper (double piston pinslider)
With the 2FA pinslider for SUVs and light commercial vehicles, the fairly heavy brake housing for these applications is positioned exactly at the brake pads and discs through the service-free anchor guides. The function offers a high level of comfort and includes reduced parallel pad wear, reduced residual brake torque, and a low noise and brake judder.
Parking brake systems
Parking at the push of a button: our customers have the choice.

Conventional parking brakes

Duo servo brakes
A highly efficient, self-boosting drum brake, fitted in the brake disc hat. It is operated mechanically and is completely separate from the service brake. Its main field of application is premium-class vehicles and SUVs.

Combined caliper
The combination of service brake and parking brake in the classic FN or pinslider design is a cost-optimized solution for vehicles in the lower and upper mid-size class.

Electric parking brake systems (EPB)

In electric parking brake systems, the parking brake is not activated by pulling on a parking brake lever, but by activating an electrical switch. In response, an electronic system controls the electrical actuators that are integrated into the wheel brakes. In addition to manual operation via the switch, these systems also offer a range of automatic assistance functions for enhanced safety and comfort. We offer various EPB system solutions for different rear axle brake configurations.

We are able to cover all vehicle segments with our Electric Parking Brake technology. Our product range goes from supermini vehicles (Class A) up to Super Duty sizes within the Heavy Duty market, which includes Light Truck and SUV vehicle classes.

Shared advantages of EPB systems:
› Simple operation at the touch of a button.
› Emergency brake function in the event of service brake failure.
› Implementation of various assistance functions for safety and comfort in conjunction with the electronic brake system.
› Since there is no parking brake lever, OEMs additionally have new options in terms of design in the vehicle’s interior.

Heavy Duty 2FA
Seeing a constantly growing Truck Market especially in North America, we elaborated a Heavy Duty 2FA complementing our 2FA product portfolio. With this caliper we are now able to offer a product that can be scaled to cover even Super Duty vehicles.

EPB-Ci
The “caliper integrated” electric parking brake (EPB-Ci) is a solution for floating caliper disc brakes. A floating caliper is combined with the components of an electric parking brake. The electrical operation takes place via an electronic system integrated into the ESC (Electronic Stability Control) system. The system consists of two combined calipers with integrated actuators, one in the ESC integrated control electronics, as well as the EPB specific operation software.
EPB-DS
The EPB-DS ("duo-servo") is a solution for duo-servo brakes. The EPB-DS is used especially in premium-class vehicles, sports cars, and SUVs in whose case separating the service brake and the parking brake is particularly important.

The system consists of two electrical actuators which are integrated into the duo-servo brakes, and an electronic system that is either separate or integrated into the ESC and has the EPB-specific operation software.

EPB-Si
The electric drum brake with or without parking brake (EPB-Si) is a solution for vehicles with only drum brakes on the rear axle. The way a drum brake works is via the "simplex" principle.

The EPB-Si is especially tailored to smaller vehicles which to date have only been equipped with a mechanical parking brake.

In this instance, the so-called actuator is adapted to the virtually unchanged drum brake. The activation of the parking brake function is then controlled electrically by the integrated lever. The electronics are - as with the caliper version - integrated into the electronic stability program. This offers a high level of reliability at favorable costs.

Since the basic drum brake can remain nearly unchanged, a so-called mixed installation can be realized. One part of the platform receives an electrical, the other a hand operated parking brake function - this results in cost advantages for the vehicle manufacturer.

Brake actuation and brake assist systems
We offer customer-specific, robust and attractively priced brake actuation systems from our modular concept. All actuation components originate from our modular system and can be individually combined with each other as needed:

- Brake booster
- Tandem master cylinder
- Brake fluid reservoir
- Additional functions, such as for crash optimization or applied sensorics

This freedom to combine units enables us to implement individual solutions for vehicles of all classes and for all markets, including low-cost and lightweight solutions. This can make a significant contribution toward reducing both CO₂ emissions and costs. The availability of standard components also significantly reduces development time.

Optimized actuation systems that suit vehicles of all classes, assembled from the components of our modular system:
6 sizes of single boosters, 7 sizes of tandem boosters,
2 TMC types, and application-specific designed reservoirs.
The international benchmark in high performance: our brake actuation components

**Brake boosters**
We supply vacuum brake boosters in both single and tandem design, in all required sizes. All product variants are available in conventional steel, but also in lightweight aluminum housing versions. The tie rod version, available for all designs, features further weight reduction and also optimized deflection characteristics. Front bolt designs on a tie rod basis simplify assembly at the OEM. The latest brake booster generation (Booster Gen. III) features further weight reduction (full aluminum with reduced wall thickness) and an ultrashort installation length.

**Affordable products for the expanding markets of the world**
With our modular designed products we are in a position to meet all customer requirements, also those in low-cost markets. This includes the Affordable Brake Actuation booster (ABAC).

**Tandem master cylinders (TMCs)**
We offer master cylinders in the highly compact plunger design for all required diameters and strokes as well as for various types of brake circuit designs (straight or stepped bore).

**Brake fluid reservoirs**
We design reservoirs specifically for each vehicle application, but use standardized subassemblies such as filler caps and fluid level indicators as much as possible.

**Brake assist systems**
Danger detected - braking force boosted: brake assist systems ensure maximum vehicle deceleration in emergencies, even when little force is exerted on the pedal. Brake assistants are important helpers in emergencies in which the driver reacts quickly, but does not brake energetically enough, leading to dangerously long stopping distances. The brake assist detects panic situations based on the speed at which the pedal is depressed and activates the booster or the EBS hydraulic unit. This means that even when little force is exerted on the pedal, the vehicle achieves maximum deceleration.
Brake hoses – experience counts
Continental is one of the world’s leading brake hose suppliers and has many years of experience with the entire hydraulic brake technology. Our high level of expertise with respect to the installation in the vehicle, as well as optimized assembly processes and a high degree of automation, secure a world class quality standard.

Brake hose Type 9 – proven competence
Continental’s hose Type 9 started with series production in 2005, and its combination of EPDM inner and outer rubber with double layer PVA yarn offers a high degree of dynamic strength, pressure, and thermal resistance as well as chemical robustness to oil, fuel, and all environmental impacts. Extensive own test benches and laboratories are available for testing according to all customer-specific requirements.

Brake hose Type 11 – Optimal installation with little space
Continental’s hose Type 11, which went into series production in 2012, is the consequent development of the Type 9 brake hose with the same material properties, but with design modifications for optimized functional characteristics. Thanks to design modifications, a hose diameter of 9 mm was realized. This allows for optimal installation even where space in the wheel arch is tight. The brake hose Type 11 combines the excellent performance of Type 9 with a weight reduction, in order to meet the requirements of our customers on environmental compatibility and the considerate usage of resources.

Type 12 – high performance brake hose
In series production since January 2013, the Type 12 is a subsequent evolution of the Type 11 brake hose, focusing on the improved volumetric expansion at an increased temperature. With the new braid material, a reduced volumetric expansion has been achieved at a maximum 1.5 cm³/m at 100 °C and 200 bar.

Molded Parts
In addition to conventionally mounted components, Continental also produces hoses for which synthetic parts are applied by means of injection molding technology. This allows new design freedom in the geometry, in addition to further weight savings.
Washer Systems for Windscreens, Headlights, and Camera Systems

Having a dirty windscreen or headlights is a risk to any driver. For these conditions, Continental offers modular products and solutions with intelligent applications. The results are clean windscreens, headlights and camera systems, providing a clear view ahead, increasing the safety of the vehicle and that of the oncoming traffic.

Our scalable, modular products offer vehicle manufacturers either complete water-conserving washer systems or individual components, tailored specifically to any vehicle class – from affordable cars to premium models. The products can be matched to any car manufacturer’s requirements and installation prerequisites. Our considerable experience allows us to provide our customers with optimum support during the technical design and configuration phases of their washer systems.

New automotive trends mean that the washer systems of the future will have to meet different requirements: reduced overall vehicle weight, tighter requirements with regard to pedestrian protection, design and aerodynamics, and the increasing installation of sensors and passive safety systems. Our engineers develop the products to meet these challenges.

Water reservoirs – two production technologies
Water reservoirs from Continental are produced using either blow molding processes or injection molding processes. They are typically supplied as pre-assembled systems with integrated or attachable filling supports in which components such as pumps, fill level sensors, hoses, or wire harnesses are already installed. All reservoir systems are shipped ready to install into the vehicle and have been checked for functionality and leak tightness.

Reliable pump systems for all vehicle classes
Our mono and dual pumps are known for their functional reliability and scalability for all performance classes. Their shape, geometry of electrical and hydraulic connections, noise emissions, and EMC (electromagnetic compatibility) interference suppression can be tailored to the customers’ requests.

Hoses – cost-optimized designs to meet customer requirements
Depending on the specific use, a number of different materials are available, including EPDM, TPV, PP, PA, and mixed forms, so that the optimum solution for each customer can be generated. The portfolio is supplemented by solutions for fully and partially heated hose systems.

Connectors for easy installation with the utmost safety
Continental can provide various modular component connector systems for hoses, in order to offer customized hose connection assemblies for all vehicle classes. Our snap-on and plug-in connections support fast installation and removal of these hose systems. An audible clicking noise during installation confirms to the operator that the connection is assembled correctly, giving our customers greater certainty during installation.
Washer nozzles for clean front and rear windscreens

Spot and fan jet nozzles

Spot jet nozzles with one to three washer jets, as well as fan jet nozzles (fluid logic), remove dirt from the front windshield and rear window. Various types of nozzles can be used and adjusted depending on customer specific requirements regarding the spray pattern. To achieve optimum water distribution with outstanding washer results and minimal water consumption, the fluid logic nozzle is recommended. The advantage of the spot jet nozzle, by contrast, lies in the precision of the targeted spots on the windshield, and thus the ability to calibrate the spray pattern. With a heated configuration, the vehicle’s windows can be cleaned reliably, even at critical temperatures. Continental also offers its customers different heating options, from heating the nozzle only to fully heated systems.

Front nozzle-hose assembly

For especially challenging visual requirements, and to reduce work on OEM assembly lines, Continental’s portfolio includes pre-assembled front nozzle-hose systems. In these products, the nozzles and hoses are assembled in our production plant together with all required grommets, markings, tapes, protectors, and fasteners. Smooth transitions between the nozzle and hose meet our premium customers’ exacting requirements when it comes to design and functionality. These ready-to-install, pre-configured nozzle chains are also available with heated nozzles or as fully heated systems with combined hose-nozzle heating.

Nozzles on the wiper arm

The increasing use of cameras for advanced driver assistance systems in the interior mirror requires innovative new features of windshield cleaning. For this purpose, Continental develops and manufactures nozzle systems for installation on the wiper arm. These achieve optimal cleaning results with minimal visual obstruction during the cleaning process, both at standstill and at Vmax. These systems are also available in unheated and heated versions. With the improvement of the camera function, a reduction of view obstruction during the washing process and a reduction of water usage go hand in hand.

Headlight cleaning with hydraulic telescoping nozzles

Dirt on the headlights reduces the brightness, dissolves the important zone between light and dark, and means that the shape of the light is also lost. The view of the driver is impaired and oncoming traffic can be blinded. This applies regardless of the type of lamps used and by no means only from a luminous flux of 2,000 lumens, from which the headlamp cleaning systems are mandatory. Intelligent light systems such as matrix headlights can suffer a serious decline in performance when dirty and thus rely on clean headlights for best performance.

The hydraulic headlight washer nozzles are extended via a pump and operate according to the piston principle. The upside-down design protects the piston seal against wear caused by dirt from the outside. Thanks to a new valve function, the systems are highly performant, even with thin, lightweight windshield washer hoses and windshield washer pumps.

Camera and Sensor Cleaning Systems

The dynamic progress of assisted and automated driving functions is increasingly leading to the integration of sensors and camera systems in the front and rear of the vehicle. The functions will enhance the future use of Surround View and Mirror Replacement through to so-called smart applications.

These systems not only provide images, but also actively intervene with braking and steering maneuvers in hazardous situations or dim the high beams. Therefore, in order to ensure the correct working of these functions, cleaning will become an absolute necessity. Concerning this matter, Continental provides solutions which are already in series production (e.g. Night Vision cleaning system).
Integrated Safety – Connect and Protect
An Unbeatable Team: Passive Safety & Sensorics

Extended networking – within the vehicle and among vehicles – offers significant additional potential for safety functions. Therefore, passive safety and sensor technology go together. In particular, by linking driving dynamics sensors and surrounding sensors with passive safety systems, we are able to develop effective integrated safety concepts.

Knowledge enhances safety. Sensors deliver this knowledge. By supplying information on a vehicle’s state and its surroundings, they provide an improved basis for controlling passive safety – for example, in a Safety Domain Control Unit (SDCU). The SDCU therefore represents a well-developed and comprehensive airbag control unit that includes sensor data from chassis functions and also uses data from driver assistance systems (radar or camera) in the control of passive safety.

The ideal is to prevent an accident from happening at all. When this is not possible, passive safety can be increased through networking with sensor information. This permits the creation of more effective deployment strategies for protecting passengers and vulnerable road users (pedestrians, cyclists) in especially dangerous situations.

Individual sensors and sensor clusters serve to provide information in advance. They deliver comprehensive data on driving dynamics and the state of the vehicle, such as wheel speed and, if needed, also the vehicle’s position. Furthermore, data on the surroundings can also be processed.

Networking in the Vehicle and Beyond
Some sensors are located not only in the ego-vehicle: V2X networking allows vehicles to “see around the corner” and apply accident-avoidance strategies in an early response to possible accident situations. This cooperative principle of sharing information with other vehicles will take us closer to the goal of Vision Zero, which means accident-free driving. At the same time, it is reassuring to know that one always has passive safety at the highest level.

Respect for Environmental Concerns
In addition to enhancing safety, we are using our expertise in sensor technology to make driving more economical and more environmentally friendly. Information on the engine speed and battery level can help to increase fuel efficiency and therefore contribute towards a better environment.
Integrated Safety

From the Airbag Control Unit to the Safety Domain Control Unit
Airbags have been a standard element of vehicle safety equipment for many years. For the most part, the basic safety functions are technically mature. However, there are many ways in which they can be extended to cover other applications and functions as part of an overall safety concept. In this extended active role, electronic safety systems can help not only to limit the potential damage in an accident; they can also serve to prevent accidents by integrating diverse information from environment sensors and the vehicle itself.

Continental’s modular SPEED concept (Safety Platform for Efficient & Economical Design) is a development platform by means of which passive safety systems, even tried-and-tested ones, can be repeatedly updated in keeping with the state of the art and augmented by new functions. The results have been incorporated in a number of product generations over the past ten years. They are currently visible in three product lines that have been developed and optimized step by step.

**Airbag Control Unit**
The ACU covers the classic passive safety functions, which differ only in the scope of features. But even here, there are ways to extend and elaborate the functions. For example, airbags can be actuated in several steps depending on the vehicle speed and severity of the impact, thus giving vehicle occupants optimum protection in a crash.

**Safety Control Unit**
This is now standard equipment in every mid-size car. Purely passive functions are increasingly being augmented by active control elements. By integrating driving dynamics sensors, it is possible to control safety functions such as active safety belts (reversible belt tensioners). In dangerous situations, vehicle occupants are brought into an optimal sitting position before the crash occurs. Post Crash Braking is another function that can be integrated into the Safety Control Unit. This goes into action in the second phase of an accident if, say, the car runs into a crash barrier as a direct consequence and the driver fails to react. In these and comparable situations the vehicle is automatically braked to prevent follow-up accidents that could further endanger the vehicle occupants or other road users. The Damage Estimator is an example of a function that extends beyond the accident itself. It diagnoses the damage to the vehicle and gives the vehicle owner backend information for quick estimation of the scope of repairs.

**Safety Domain Control Unit**
The SDCU is mainly for high-end applications and has a number of additional functions specifically designed to reduce the risk of an accident and limit the damage in the first and later phases of an accident. One attribute that makes it so effective is that it integrates information from forward-looking environment sensors. This makes it possible to estimate the severity of an accident before it occurs and condition the restraint systems accordingly. The system can react more quickly, in this way providing better protection to vehicle occupants and vulnerable road users. Embankment Safety Control is another safety function that can be integrated. It detects when a vehicle is moving down a steep slope, either directly or as the consequence of an accident. It initiates emergency braking, thus reducing the probability of a rollover or subsequent accident. To be effective in automated driving, a vehicle safety concept must take a wide range of possible applications and error scenarios into account. The SDCU can serve as a fallback level so that the vehicle can be brought into a safe state if the main automated functions fail.
For example, if there is a system failure or if the driver does not take control of the vehicle when asked to, the system brings the vehicle to a safe stop through a minimum-risk maneuver.

Focus on Integrated Development
When developing passive and integrated safety components, Continental takes a holistic approach. Technical improvements can have direct consequences for enhancements in all three product lines.

Continental has its eyes on the future but is always anchored in the present. For example, its developers are currently working on extended post-crash braking. The system will be launched under the name Safe Stop – Lane Crossing Prevention Control. It will not only be able to brake a vehicle automatically; it will also intervene in the steering to keep the vehicle in its lane after an accident or a collision against a crash barrier.

At the Interface to Active Safety
Data from the vehicle’s own sensors and from the surroundings create the basis for further cooperative safety functions through networking with other road users by means of V2X communications (vehicle-to-vehicle, vehicle-to-infrastructure).

› The Electronic Brake Light allows forward-looking driving. It warns if a vehicle in traffic ahead is braking, even if other vehicles obscure the direct view of the braking vehicle.

› Intersection Movement Assist allows vehicles to receive messages from other vehicles approaching an intersection. The application calculates the probability of a collision and warns the driver if an accident is imminent – even when the other vehicles are concealed.

› The Left-Turn Assist based on V2X alerts the driver of an impending collision due to the presence of a hidden approaching vehicle during a left turn. It intervenes only if there is an increasing likelihood of an accident and the driver does not react to the warning.

› Emergency Vehicle Warning alerts the driver about the location and movement of emergency vehicles such as ambulances. The driver can thus react promptly and open an emergency access route.

V2X-Communication and M2XPro
Ad-hoc networking through V2X has the potential to substantially increase driving safety. Direct information from other vehicles can improve the decision-making of drivers and automated driving functions. To fulfill this task, V2X technology must be as fast and reliable as possible – and it must be available globally. To date, short-range communication and long-range communication are two different systems with dedicated Electronic Control Units (ECUs). Networking both types of communication more closely will bring safety benefits.

Next to the V2X One Box stand-alone unit, Continental also offers a Hybrid V2X solution that integrates technologies not only for 4G and 5G
network access, but also Dedicated Short Range Communication (DSRC) and Cellular-V2X for direct V2X communication. This enables vehicle manufacturers to overcome a big challenge when deploying V2X on a global scale. Contrary to regular mobile network communication, the technical path to establish direct V2X communication varies globally. Some regions prefer the established DSRC and others lean toward the upcoming Cellular-V2X standard. With Continental’s new hybrid V2X solution, the same hardware and software platform can be used to support either communication standard, reducing not only cost but also complexity for a global application of V2X communication.

A practical example highlights the driving safety benefits of networking short- and long-range communication in one box. If vehicles approach a construction site, short-range V2X communication begins to communicate this situation within a half mile range. As a result, the driver is prepared for the situation when the car reaches the actual construction site or the end of a forming line of traffic. If seamless long-range communication also transmitted this warning with a longer lead time, the driver would be offered more options, having more time to prepare for a forming traffic jam or to get into the recommended lane, as an example.

The Motion Information to X Provider (M2XPro) is an intelligent localization sensor. It merges GNSS (Global Navigation Satellite System) information with the driving dynamics sensors (steering angle, inertial and wheel speed sensors) present in the vehicle and delivers a robust, extremely precise calculation of the vehicle’s current position. An integrity measurement supplies status information relating to the system state and data quality, information that is essential for the system’s self-monitoring functions.

Sensors for Passive Safety

Intelligent sensors for detecting a collision provide the SPEED control unit the decisive basis for the activation of protective mechanisms. Therefore, collision sensors that are placed at strategic locations in the vehicle play a key role for passive safety.

Quick Reaction to Side Crashes

pSAT pressure satellites, which have put Continental at the forefront of the world market since 1996, were developed specifically for side crashes. Substantially faster reaction times are required for the deployment of the side airbags because the system has to fire the life-saving airbags within just five to ten milliseconds. In addition, vehicle crumple zones offer hardly any protection for the occupants in side crashes compared to frontal collisions. Here, the pressure satellite also delivers excellent results in situations such as pole crashes in which the vehicle suffers a side impact with a narrow obstacle or when the vehicle is hit by a raised bumper as is the case with many sports utility vehicles (SUVs).

The standard pSAT dry-zone pressure satellite moreover offers cost and time advantages in terms of installation: without any need for additional tools or fasteners, it can be pressed into place in the counterpart on the door with just a single motion, thanks to a novel mechanical concept.

Acceleration Satellite Sensor

In a head-on collision, the tried and tested gSAT acceleration satellite provides that decisive extra safety. The satellites measure and supply the information on the acceleration values in the rigid vehicle structures to the control unit in the event of a crash. SPEED can determine both the duration of intrusion and the intensity of the crash, and activate life-saving restraint systems in just milliseconds.
Pedestrian Protection: An Innovative Pressure Sensor Recognizes Impact
Pedestrians don’t have any crumple zones - that puts them at particular risk. Continental’s pedestrian protection system reduces the risk of head injury in the event of a collision. Within 10-15 milliseconds of an impact, the active hood of the vehicle is triggered and raised by special actuators. This reduces the risk of death or severe injury to the pedestrian from hitting the hood and underlying engine block.

Based on pSAT technology, the Pedestrian Protection System consists of an air hose that is laid across the entire width of the car in its front bumper. The hose is situated directly behind the foam block that is fitted at the front of the vehicle to absorb energy. Standardized pressure sensors (pSAT) are installed at either end of the air-filled pressure hose. When a vehicle collides with an obstacle, the resulting pressure exerted on the hose through the front bumper and foam block creates a typical waveform that is detected by the two sensors at the ends of the hose and forwarded to the SPEED control unit. The product received a PACE award in 2014.

Pedestrian Protection Sensor Improves Frontal Crash Detection
Refinement of the proven PPS-pSAT system also permits analysis of a front-end crash. Especially the differentiation between particularly complicated types of crashes, such as those with small overlap or those at an angle, can be reliably detected. If the deployment order of passive restraints can adapt to the accident scenario, the protection of a vehicle’s occupants will increase.

Benefits:
- Rapid recognition of every required pedestrian impact situation
- Excellent robustness
- Easy to integrate and cost-optimized design
- Redundant system for maximum safety
Sensor Components for Additional Tasks

Sensors provide key information on a whole range of vehicle conditions. Some of these are directly relevant to safety. In many other cases this information forms the basis for functions which are aimed at the “megatrends” of comfort and efficiency.

An example of this part of the sensor portfolio is the compact Wheel Speed Sensor element, which provides important information for ABS or ESC systems. Other examples are the brake pad wear indicator and the chassis and position sensors.

Wheel speed is measured using the anisotropic magnetoresistance (AMR) effect. This method and the integrated information processing feature enable our latest generation of sensors to handle the following functions:

- Measurement of rotational speed (even at low vehicle speed)
- Air gap measurement
- Dependable functionality with large air gaps (up to 4.5 mm between sensor and encoder)
- Standardized VDA data protocol
- High resistance to extreme temperatures, from -40°C to +150°C
- Internal signal monitoring

Wheel Speed Sensors and Electric Parking Brake Cables Integrated into a Single Harness

Continental has integrated the cables for the wheel speed sensors and the electric parking brake (EPB) into a single harness, making the company one of the first manufacturers to offer such a combination of components.

Combining wheel speed sensors with the EPB cable results in lower development, product, and assembly costs compared to individual components. We can therefore offer car manufacturers a high-quality, robust, and cost-optimized solution for a growing market trend.

The cable is highly durable and has a high level of fold and bendability. Furthermore, a complete integration of wheel-speed functions is possible. The integrated wheel speed sensor and EPB cable underline our approach of integrating functions and are suitable for all vehicle classes.

Active Wheel Speed Sensors

The control systems for ABS, TCS, and ESC determine the wheel speed based on signals sent by the wheel speed sensors. This information is used to prevent the wheels from locking or to determine when the wheels are spinning. Appropriate action is taken to maintain the vehicle’s stability and steering responses. In addition, it is possible to capture the rotational direction - this function supports the hill start assist and the park assistance system, for example.

The rotation speed of the wheels is derived from the signals of the wheel speed sensors

The rotation speed of the wheels is derived from the signals of the wheel speed sensors

Integrated wheel speed sensor plus EPB cable
Chassis & Position Sensors

Sensors for Active Chassis Control Systems

Active chassis control systems use wheel path sensors and low-g acceleration sensors to measure the wheel and body acceleration in the direction of the vehicle’s vertical axis (the z-axis). The system control unit uses these incoming signals and additional information to determine the vehicle status. Depending on the control strategy, the optimum shock absorption force is calculated for each wheel and the active shock absorber is set to that amount. This resolves the traditional conflict of goals between sporty and comfortable chassis tuning, at least in part. Continental offers the sensor types needed for this task.

Vertical Axis Acceleration Sensors (BSZ)

Continental offers analog and digital acceleration sensors to measure horizontal and vertical acceleration as part of chassis control. With their different areas of low-g measurement, these BSZ sensors capture both the movements of the vehicle’s body and the acceleration of axles and wheels.

Additional fields of application for acceleration sensors:

› Active damping systems for engine mountings
› Rear flap control systems
› Incline sensors for motorcycles, passenger cars, trucks, and construction and agricultural machines
› Vibration measurement in systems for the active engine bearing or for preventive maintenance and service in vehicles

Intelligent Battery Sensor (IBS)

The Intelligent Battery Sensor (IBS) is used primarily for the widespread start-stop function, which helps reduce CO₂ emissions. The IBS analyzes the charge status of the 12-volt lead acid battery on an ongoing basis. In this way, higher-level control units, such as the engine control unit and body controller, are informed whether the state-of-charge (SOC), state-of-health (SOH/aging), and state-of-function (SOF/power ability) of the battery are sufficient for the engine to be automatically switched off and restarted. Monitoring the battery’s current, voltage, and temperature makes it possible to enhance the reliability of the entire vehicle power system. Since many vehicle breakdowns have traditionally been due to batteries that have weakened with age or are overloaded, the IBS is an important component in advanced energy management. It utilizes battery capacity intelligently in order to save fuel, while keeping the vehicle available.

Current Sensor Module (CSM)

The current sensor module (CSM) is ideal for use in high-voltage lithium-ion batteries in hybrid and electric vehicles. It is based on the same measurement principle as the IBS and supplies additional information on diagnostics and insulation to the higher-level battery management system (BMS), thus satisfying the precision requirements for these vehicles.
**Chassis Position Sensor (CPS)**

Movements of a vehicle’s body and changes in the vehicle’s position – such as those depending on the load of the vehicle and in the case of uneven driving surfaces – can lead to the vehicle’s main headlights, especially those using LED or high-pressure gas discharge lamps (mostly xenon), blinding oncoming traffic. The European Union has taken this into account, passing new legislation to regulate automatic headlight ranges and improve traffic safety. CPS-type angle sensors are used to determine the vehicle’s current position and adjust the range of the main headlights accordingly.

**Automatic regulation of the main beams with Chassis Position Sensors for greater road safety**

In principle, CPS sensors are also suitable for other tasks that require position information, such as chassis control or to determine the position of the gas, clutch, or brake pedal.

**Inertial Measurement Unit for Sensing Vehicle Dynamics**

The inertial measurement unit reports the current movement status of the vehicle to all requesting units. The verified signals on raw, pitch, and roll rates and on longitudinal, lateral, and vertical acceleration are transmitted to the data bus via a standardized interface. In complex control algorithms, these signals are used to improve comfort and safety applications for passenger and commercial vehicles (ESC, ADAS, automated driving), motorcycles (optimized curve ABS), and industrial and agricultural vehicles.
Engine and Transmission Speed Sensors

For engine management, speed and position sensors (known as phase sensors) provide information on the exact position of the crankshaft or camshaft.

This information provides the basis for the regulation of ignition and injection times, and for fresh gas and exhaust gas regulation. In addition to observing legal exhaust gas levels, this also ensures optimization of the engine performance, a reduction in fuel consumption, and improved running smoothness. Modern speed and position sensors must in this case comply with the increasing requirements with regard to rapid engine synchronization and fast, optimized starting (start & stop).

The main tasks for engine speed and position sensors:

▷ Determination of the position, the rotational direction, and the speed of the engine (speed of the target wheel)
▷ Determination of the exact position of the crankshaft/camshaft = piston position (electronic mapping of the target wheel position)

The main functions of modern engine speed and position sensors:

▷ True Power On (camshaft) and direction sensing (crankshaft)
▷ Axial or radial reading
▷ Use of self-learning IC (optimization of the signal precision by adaptive reading of the target wheel profile)
▷ Very high level of precision (+1° typical) and reliability of the signal (repetition accuracy)
▷ High temperature resistance (-40°C to +150°C) and vibration resistance

On a manual transmission, the speed sensor captures the vehicle speed at the gearbox and provides this information to the speedometer. In the case of automated transmissions (step automated transmission, continuously variable transmission, dual clutch transmission, or automated manual transmission), one to three sensors are mounted in the gearbox. They deliver the input, or output, or the intermediate gear speed to the transmission control unit (TCU), which is responsible for managing the whole system.
Electronic Control Units for Various Applications

In addition to our broad expertise in this sensing area, our planning competence is visible in the field of electronic control units, similar to the Safety Domain Control Unit.

Continental is highly innovative and is a leader in the development of control units (ECUs) tailored specifically to customers. This ensures a maximum degree of flexibility.

With our build-to-print control unit business, we meet our customers’ requirements with regard to reliability, functional scope, and quality.

Air Suspension Control Unit
The air suspension control unit manages the vehicle’s air suspension system. It optimizes passenger comfort and vehicle dynamics. It perfectly adapts the vehicle to the road, thus reducing pitch and roll movements and providing increased safety.

Benefits and features:
» Determination of current road and driving conditions
» Calculation of nominal damper valve current
» Efficient, continuous control and adjustment of vehicle height, pitch & damping
» Continuous optimization of balance for driving safety
» Vehicle height and comfort can be configured by driver

Dynamic Roll Stabilization
Together with the Schaeffler Group we are developing Electric Dynamic Roll Stabilization (eDyRoS®). Continental is supplying the electronic control unit. Depending on the situation, the system actively resists the vehicle’s movement by twisting the front and rear stabilizer bars. Electric Dynamic Roll Stabilization contributes to more agile and safer driving, plus more responsive steering, especially during cornering. In addition, driving comfort as a whole is significantly improved.

Damping Force Regulation
Damping Control Continuous (DaCC) continuously regulates the damping force depending on road conditions and driving speed. The driver can adjust the damping conditions. Each sensor continuously measures the vehicle movements. The ECU adjusts the variable electromechanical damper valve using the software.

Control Unit for the Electric Parking Brake
The Electric Parking Brake Control Unit (EPB-ECU) provides a fully automated control of different types of EPB actuators, e.g. caliper integrated actuators or cable pullers.

The EPB-ECU controls the actuator and provides smart functionality, recognizing when to apply and release the parking brake. To do this, the EPB-ECU is fully integrated into the vehicle’s network architecture. The EPB-ECU evaluates data from various engine, transmission, and wheel sensors, as well as tracking the position of the clutch and throttle.

Control Unit for the Electric Valve Pump
The Electric Vacuum Pump Control Unit provides safe and reliable control, including driver warning in case of a malfunction within the vacuum system. In addition, it provides a full diagnostic capability by using integrated safety master-slave controllers, the evaluation of one or two vacuum sensors, a power module with soft start capability, and a CAN bus communication.
You Provide the Vehicle Design. We'll Provide the Safety. Safety Engineering Services.

In today's cars, the design is more important than ever for the brand image. However, safety requirements are becoming increasingly rigorous, and they must be met. We'll assist you in all matters relating to safety engineering, from initial development through procurement of components to prototype testing.

We'll develop safety systems for your vehicle and follow up with comprehensive simulations. Then we'll test the vehicle in our special facilities. We'll put your vehicle through rollover tests, side crash simulations and the standard offset crash. We'll check pedestrian protection and carry out a wide range of tests on the driver assistance systems.

With more than 25 years of experience, we are one of the leading system engineering and testing service suppliers for active and passive vehicle safety. From testing services to full system engineering, we take responsibility for developing vehicle safety technology throughout the entire vehicle development process.

Based in our location in Alzenau, Germany, we provide a state-of-the-art test infrastructure with crash and sled testing.
Our Global Commitment to Quality

Our customers recognize us as a benchmark for quality. We are proud of our quality-focused culture. It’s what we mean by One Continental.

Automobile manufacturers and car drivers worldwide expect our products to be of the highest quality. And rightly so. After all, millions of people entrust their lives to their cars. Quality is thus an essential basis for Continental’s success. In short, it is both a core competence and a competitive advantage.

As One Continental, we are committed to building a quality-driven culture. Our aim is to be the leading quality and technology company in our industry. Quality is our top priority.

Ownership
At Continental we put quality first. We make this commitment credible through exemplary conduct. We assume responsibility in order to foster and strengthen a culture of continuous improvement – all with the goal of developing an understanding of quality in line with the philosophy of One Continental.

Transparency
We continually make substantial, measurable progress for our customers by providing complete and accurate data to everyone. By promoting transparency throughout the company we are able to make wise decisions and practice intelligent risk management.

Disciplined Implementation
We create a structure of standards along the entire value chain and optimize it on an ongoing basis. We help to set up processes and standards, and we adhere to them throughout the product lifecycle.

Yokoten
We share our experience and knowledge, and we apply best practices as part of a learning organization. We promote quality awareness by solving problems systematically and sharing what we learn.

Robustness
Quality starts by understanding our customers’ expectations. We deliver reliable performance in all of our services and throughout the lifetime of our products.
Our Recipe for Your Professional Success: A Dynamic Company, Flat Hierarchical Structures, and Flexible Decision-Making Channels

Our employees represent the success and the reputation of Continental. They are driven by the idea of doing great things, always giving their best, and letting their actions speak for themselves. We combine technological, ecological, economic, and personal aspects of performance. With us, you can find the ingredients for your own recipe for professional success: challenging projects, early responsibility, appreciation of your personal commitment, and an inspiring as well as international environment that is shaped by our four company values – Trust, Passion To Win, Freedom To Act, and For One Another – in our day to day working life.

We help everyone who wants to get ahead to find the right career path for them. For people of high potential who do not wish to embark on a traditional management career, a career as a Continental expert is an attractive career path. We select technical experts in R&D and production and develop them so that they can use their highly specialized knowledge to accelerate and be able to shape technological progress in strategically important fields. Whether management or expert career, we value our employees because they play a key role in the long-term business success of Continental. Our experts ensure that we maintain and expand our strong market position.

Europe, Asia, North and South America, Africa, and Australia – We’re Offering You a World of Opportunities

At Continental, you can hit the ground running. With locations for production, research & development in more than 50 countries, we offer excellent conditions for individual and professional development. Use the many possibilities and freedom to put your ideas into action.

Getting started: How to Score at Continental

Are you self-confident, team-oriented, and not short of empathy and persuasiveness? Then you have some of the fundamental soft skills that we expect from our present and future employees.

Come and start your career with us!

www.continental-karriere.de
www.facebook.com/ContinentalKarriere
www.continental-people.com
Digital Transformation
Future Work @ Continental

New Dynamism through Digitalization
It’s a fact: digitalization is here to stay. It is affecting all areas of life. For companies, it is opening up new business models and changing existing ones. Thus the digital transformation offers great opportunities for Continental. The resulting new dynamism and the increasing individualization of society underline the necessity for changes in current working conditions – and this is why we launched the Future Work campaign in 2016.

The key campaign topics:

▶ Diversity management: For a wide range of creative ideas and solutions
▶ Leadership: An inspiring leadership culture, in which it’s enjoyable to demonstrate full commitment and to achieve excellence
▶ Flexibility: Adaptable working conditions that make it easy for our employees to concentrate on essentials and to balance their working and personal lives for optimal, lasting performance
▶ Learning: Lifelong learning and a seamless transfer of knowledge that enable us to offer our customers our best solutions

In 2017, Continental created transparent solutions for flexible working conditions – worldwide, for all employees and at all levels.

This will give our employees the necessary flexibility to achieve a better balance between their jobs and their personal interests. Flexible working conditions will provide them with the opportunity to create a work environment that is tailored to their personal requirements. Because this much is certain: if you have a choice, you’re going to be more motivated. Thus we all win with flexible working conditions: our employees win, because they can make their lives more individual, and Continental wins, because our employees can develop their abilities and skills in the best possible way and thus continue to grow. And that’s what we want to promote!

The Future Work campaign crystallizes our intention to offer our employees a more colorful, more diverse and more individual workplace. This will make us well prepared for the future challenges of an increasingly networked digital world.
Worldwide Locations

- Auburn Hills (USA)
- Brimley (USA)
- Culpeper (USA)
- Morganton (USA)
- San José (USA)
- Santa Barbara (USA)
- Henderson (USA)
- Seguin (USA)
- Silao (MEX)
- Las Colinas (MEX)
- Ayala Morelos (Cuautla/MEX)
- Guadalajara (MEX)
- Querétaro (MEX)
- San Luis Potosi (MEX)
- Várzea Paulista (BR)
- Salto (BR)
- Jičín (CZ)
- Adršpach (CZ)
- Frenstat (CZ)
- Zvolen (SK)
- Timisoara (RO)
- Sibiu (RO)
- Iasi (RO)
- Veszprém (H)
- Budapest (H)
- Cairo
- Montenotte (I)
- Frankfurt (GER)
- Gifhorn (GER)
- Rheinboellen (GER)
- Korbach (GER)
- Hanover-Stoecken (GER)
- Lindau (GER)
- Alzenau (GER)
- Schwabach (GER)
- Regensburg (GER)
- Nuremberg (GER)
- Ingolstadt (GER)
- Bebra (GER)
- Karben (GER)
- Ulm (D)
- Memmingen (GER)
- Yokohama (J)
- Asahi (J)
- Monbetsu (J)
- Hamakita (J)
- Calamba (PHI)
- Pangyo (ROK)
- Sejong (ROK)
- Icheon (ROK)
- Penang (MAL)
- Manila (PHI)

- Shanghai (CN)
- Changshu (CN)
- Lian Yun Gang (CN)
- Heihe (CN)
- Changchun Moonlake (CN)
- Jiading (CN)
- Yancheng (CN)
- Yangzhou (CN)
- Chongqing (CN)

- Stuttgart (GER)
- Frankfurt (GER)
- Gifhorn (GER)
- Rheinboellen (GER)
- Korbach (GER)
- Hanover-Stoecken (GER)
- Lindau (GER)
- Alzenau (GER)
- Schwabach (GER)
- Regensburg (GER)
- Nuremberg (GER)
- Ingolstadt (GER)
- Bebra (GER)
- Karben (GER)
- Ulm (D)
- Memmingen (GER)

- Birmingham (GB)
- Ebbw Vale (GB)
- Mechelen (B)
- Palmela (P)
- Toulouse (F)
- Lewes (GB)
- Frankfurt (GER)
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- Ingolstadt (GER)
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- Ulm (D)
- Memmingen (GER)

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- Budapest (H)
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- Memmingen (GER)
Continental Teves AG & Co. oHG
Headquarters
Chassis & Safety
Postfach 900 120
60441 Frankfurt a. M.
Guerickestraße 7
60488 Frankfurt a. M.
Phone +49-69-76 03-1

Continental Teves AG & Co. oHG
Postfach 1560
38516 Gifhorn
Alfred-Teves-Straße 11
38518 Gifhorn
Phone +49-5371-83-0

Continental Teves AG & Co. oHG
Jädekamp 30
30419 Hannover
Phone +49-511-976-01

Continental Automotive GmbH
Osterhofener Straße 19
93055 Regensburg
Phone +49-941-790-0

ContiTech Schlauch GmbH
Continentalstraße 3-5
34497 Korbach
Phone +49-5631-581 638

ADC Automotive Distance Control Systems GmbH
Peter-Dornier-Straße 10
88131 Lindau
Phone +49-8382-96 99-0

Continental Safety Engineering International GmbH
Carl-Zeiss-Straße 9
63755 Alzenau
Phone +49-6023-942-0

Continental Automotive GmbH
Postfach 63
55492 Rheinböllen
Teves Straße
55494 Rheinböllen
Phone +49-6764-10-1

Conti Temic microelectronic GmbH
Ringlerstraße 17
85057 Ingolstadt
Phone +49-841-881-0

Continental Temic GmbH
Sieboldstraße 19
90411 Nuremberg
Phone +49-911-95 26-0

Continental Automotive GmbH
Sodener Straße 9
65824 Schwalbach
Phone +49-6196-87-0
BELGIUM

Continental Automotive Benelux bvba
Generaal de Wittelaan 5
2800 Mechelen (B)
Phone +32 - 15 - 289 511

FRANCE

Continental Automotive France SAS
1, Av. Paul Ourliac B.P. 83649
31036 Toulouse (F)
Phone +33 - 561 - 19 88 88

UNITED KINGDOM

Continental Teves UK Ltd.
Waun-y-Pound Industrial Estate
Ebbw Vale (Gwent) NP23 6PL
South Wales (GB)
Phone +44 - 14 95 - 350 350

ITALY

Continental Brakes Italy S.p.A.
Corso Marconi, 160
17014 Cairo Montenotte
Savona (I)
Phone +39 - 019 - 50 71 - 1

PORTUGAL

Continental Teves Portugal Sistemas de Travagem, LDA.
Parque Industrial das Carrascas
Estrada National 252 km 11
2950-402 Palmela (P)
Phone +351 - 21 - 238 - 75 00

ROMANIA

Continental Automotiva Romania s.r.l.
Tehnopolis Park
B-dul Poitiers no. 10
70067 Iasi (RO)
Phone +40 - 232 - 307 - 002

SLOVAKIA

Continental Automotive Systems Slovakia s.r.o.
Cesta ku Continentalu 8950/1
96001 Zvolen (SK)
Phone +421 - 45 - 53 18 112

CZECH REPUBLIC

Continental Automotive Czech Republic s.r.o.
Hradecka 1092
50601 Jicin (CZ)
Phone +420 - 493 - 589 - 111

HUNGARY

Continental Automotive Hungary Kft.
Napmatka u. 6
1106 Budapest (HU)
Phone +36 - 1 - 881 - 95 00

Continental Czech Republic, s.r.o.
Horni Adrspach 109
54952 Adrspach (CZ)
Phone +420 - 491 - 589 - 111

Continental Automotive Hungary Kft.
Huzgyari ut 6-8
8200 Veszprem (HU)
Phone +36 - 88 - 540 100

Zvolen, Slovakia
**BRAZIL**

**Continental Automotive do Brasil Ltda.**
Av. Duque de Caxias, 2422
Jardim Santa Lúcia
13223-901 – Várzea Paulista/SP (BR)
Phone +55 - 11 - 45 96 - 80 00

**Continental Brasil Indústria Automotiva Ltda.**
Av. Marechal Rondon, 1768
Pedregulho
13323-900 – Salto/SP (BR)
Phone +55 - 11 - 4028 - 81 50

**MEXICO**

**Continental Automotive Mexicana S.A. de C.V.**
Las Colinas
Paseo de las Colinas 219
Parque Industrial y de Negocios, Las Colinas
C.P. 36270 Silao Gto. (MEX)
Phone +52 - 472 - 722 - 8101

**Continental Automotive Mexicana S.A. de C.V.**
Paseo de los Industriales Oriente No 700
Parque Industrial FIPASI
Carretera Silao Irapuato Km. 5.3
C.P. 36100 Silao Gto. (MEX)
Phone +52 - 472 - 722 - 77 00

**Continental Automotive Guadalajara Mexico, S.A. de C.V.**
Camino a la Tijera No. 3
Km. 3.5 Carr. Gdl-Mor. Tlajomulco de Zuñiga, Jalisco. C.P. 45640
Guadalajara (MEX)
Phone +52 - 33 - 38 18 - 20 00

**USA**

**Auburn Hills North**
**Continental Automotive Systems, Inc.**
One Continental Drive
Auburn Hills, MI 48326 (USA)
Phone +1 248 - 393 - 5300

**Auburn Hills South**
**Continental Automotive Systems US, Inc.**
2400 Executive Hills Blvd.
Auburn Hills, MI 48326 (USA)
Phone +1 248 - 209 - 4000

**Continental Automotive Systems, Inc.**
1103 Jamestown Road
Morganton, NC 28655 (USA)
Phone +1 828 - 584 - 5300

**Continental Automotive Systems, Inc.**
One Quality Way
Fletcher, NC 28732 (USA)
Phone +1 828 - 654 - 2000

**Continental Automotive Systems, Inc.**
13456 Lovers Lane
Culpeper, VA 22701 (USA)
Phone +1 540 - 825 - 4100

**Continental Automotive Systems Inc.**
3901 North First Street
San Jose, CA 95134 (USA)
Phone +1 408 - 982 - 9308

**Continental Advanced Lidar Solutions US, LLC**
6307 Carpinteria Ave, Suite A
Carpinteria, CA 93013 (USA)
Phone +1 805 - 252 - 1619

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Auburn Hills, our NAFTA headquarters and engineering center
Locations in Asia

CHINA (PR)

Continental Holding China Co., Ltd
Shanghai
538 Dalian Road
Yangpu District
200082 Shanghai (CHN)
Phone +86-21-60 60 30 00

Continental Automotive Systems Changshu Co., Ltd.
58 Dongnan Road, CSEDZ
215500 Changshu, Jiangsu (CHN)
Phone +86-512-52 35-88 18

Continental Automotive Corporation (Lianyungang) Co., Ltd.
No. 17 Gaoxin 4th Road
Songtiao, Lianyungang
222006 Jiangsu Province (CHN)
Phone +86-518-85 15-17 35

Shanghai Automotive Brake Systems Co., Ltd.
600 Xingxian Road, Jiading,
201815 Shanghai (CHN)
Phone +86-21-39 16-39 16

Continental Huayu Brake Systems (Chongqing) Co., Ltd.
No. 181, Liangjiang Avenue, Jiangbei District, 401133, Chongqing (CHN)
Phone: +86 - 23 - 88 39 - 70 11

Continental Automotive Systems (Shanghai) Co., Ltd.
Test Center Yancheng
660 Shugang Road, Dafeng district
224100, Yancheng, Jiangsu (CHN)
Phone: +86-515-83 60-91 19

Continental Automotive Systems (Shanghai) Co., Ltd.
Winter Test Center Heihe
Halatai Reservoir, Xigangzi 164322,
Heihe, Heilongjiang (CHN)
Phone: +86 - 456 - 829 - 29 97

Nisshinbo Continental Precision Machining (Yangzhou) Co. Ltd
No. 111 Lehe Road, Xiancheng Industrial Zone 225200,
Yangzhou, Jiangsu (CHN)
Phone: +86 - 514 - 8091-19550

INDIA

Corporate Office
Continental Automotive Components (India) Pvt. Ltd.
3rd Floor, Gold Hill Supreme Software Park - East Tower,
Shanthipura Road,
Electronic City II Phase Industrial area, Bangalore,
Karnataka - 560100, (IND)
Phone +91 - 80 - 66799313

Continental Automotive Components (India) Pvt. Ltd.
Plot No. 16, Sector-5,
IMT Manesar - 122050
Gurgaon, Haryana (IND)
Phone +91-124 - 4660216

Continental Automotive Brake Systems (India) Pvt. Ltd.
Plot No. 179-180, Sector - 5,
IMT Manesar - 122050
Gurgaon, Haryana (IND)
Phone +91-124 - 3833742

Continental Automotive Components (India) Pvt. Ltd.
Technical Center India
Gold Hill Supreme Software Park - West Tower
Shanthipura Road, Electronic City II Phase Industrial area, Bangalore,
Karnataka - 560100, (IND)
Phone +91-80 - 66796000
Locations in Asia

JAPAN

Headquarter
Continental Automotive Corporation (JV)
New Stage Yokohama Bldg.
1-1-32 Shin-Urashimacho,
Kanagawa-ku
Yokohama
Kanagawa, 221-0031 (J)
Phone +81-45-444-3600

Continental Engineering Center
1-1-23 Shin-Urashimacho
Kanagawa-ku, Yokohama
Kanagawa 221-0031 (J)
Phone +81-45-444-3600

Continental Automotive Corporation (JV)
8000 Nakaze
Hamakita-ku, Hamamatsu
Shizuoka 434-0012 (J)
Phone +81-53-588-3399

Continental Automotive Corporation (JV)
27 Numanoz, Monbetsu,
Hokkaido 099-6241 (J)
Phone +81-158-26-9030

KOREA

Continental Automotive Korea Ltd.
6-7th Floor, Solid Space Building
220, Pangyoyeok-ro,
Bundang-gu, Seongnam-si,
Gyeonggi-do, 13493 (ROK)
Phone +82-31-697-3800

Continental Automotive Systems Corporation
45-29, Saeum-ro, Icheon-si,
Gyeonggi-do, 467-080 (ROK)
Phone +82-31-634-7400

Continental Automotive Electronics LLC
74-7 Geumhoseonmal-gil,
Bugang-myeon,
Sejong-si, 339-942 (ROK)
Phone +82-44-270-6116

PHILIPPINES

Continental Automotive Systems Corporation
16 Ring Road, LISP2-SEZ
Barangay La Mesa
Calamba City 4027,
Laguna (RP)
Phone +63-49-545-1463

Continental Automotive (Thailand) Co., Ltd.
16th Floor, G Tower, South Wing,
9 Rama 9 Road, Huaykwang,
Huaykwang, Bangkok 10310 (THA)
Phone +66-2232-1888

Continental Engineering Center, Yokohama, Japan
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