Drive and Enjoy Safety
Technologies for Safer Mobility
Imagine that you are sitting comfortably in a car of the future. You enter a destination address, push a button, lean back, and the car drives automatically and safely to the destination you have entered. Sounds like science fiction? Maybe – but the first technologies such as advanced driver assistance systems are already installed in today’s vehicles, paving the way there. So you can enjoy safety and arrive relaxed.

Key areas of driving safety and driving dynamics: foundation brakes, electronic and hydraulic brake systems, chassis control systems, the control of restraint systems, sensors, advanced driver assistance systems, windshield washing and electronic air suspension systems.

Driving safety for everyone
Thanks to our global footprint and customer focus we are ideally suited to addressing the various requirements of our customers and their individual vehicle classes as well as the global automotive markets. The development of scalable and modular products is one of the division’s core competencies, allowing us to adapt the latest technologies for specific markets.

After all, safety is not a privilege. It should be an integral component of mobility for everyone.

An excellent position all over the world - when it comes to driving safety, you can’t leave anything to chance. Working on that principle, Continental’s Chassis & Safety division focuses on active and passive safety technologies and on driving dynamics. Over 6,000 research engineers all over the world drive technological progress in both components and systems. A key role in these activities is played by ContiGuard®, whose performance is increasingly based on networked functions and information that previously ran independently of each other, thereby paving the way for automated driving.

Innovation power, from technical details to integration
There are more than 70 Chassis & Safety plants, development centers and test tracks in over 20 countries across the globe, where specialists work to bring “Vision Zero” – the vision of accident-free driving – to life. Truly safe mobility should keep as many accidents as possible from ever occurring in the first place. Our expertise on everything from individual sensors and actuators to our systems approach puts us in an ideal position to make the vision of accident-free driving a reality one day. We have been doing our part to get there, in some cases for decades, in key areas of driving safety and driving dynamics: foundation brakes, electronic and hydraulic brake systems, chassis control systems, the control of restraint systems, sensors, advanced driver assistance systems, windshield washing and electronic air suspension systems.
ContiGuard®

Today’s vehicles feature a large number of safety components. In that regard, the overall conditions for ensuring safe driving have never been better – assuming all components work together optimally. That’s exactly what ContiGuard® ensures. This safety concept encompasses all of the elements involved in active and passive driving safety. The key point is that the coordination of individual systems and features is always adapted to the current driving situation.

Coordination in milliseconds

Experience behind the wheel teaches us just how fast things can go from ordinary driving to a dangerous situation. During this phase, a driver’s needs change abruptly, as he or she goes from simply needing information and support that focuses mainly on comfort, to the need to react quickly to prevent or at least mitigate the effects of an impending collision. If an accident is unavoidable, the vehicle’s systems and driver need to prepare for it, mitigating the effects of every stage of the crash, right up to post-crash braking. The focus shifts from one system to another in milliseconds. Integrating and coordinating individual “lifesaving” features allows for optimum protection. All of this is what makes ContiGuard® a key technology on the path to achieving greater traffic safety.

Powerful connectivity, inside and out

The range of safety components that requires integration is already very broad today, encompassing everything from brakes, advanced driver assistance systems and their sensors to the elements of chassis control, the control of restraint systems and from the use of navigation data and GPS position location to the electronic horizon, offering information on route topography and even car-to-X communication, including eCall. The human-machine interface (HMI) is also adjusted to the specific driving situation as part of the integration that takes place in the ContiGuard® concept, with features that help focus the driver’s attention and guide his or her actions intuitively.

Proven value on the road

This comprehensive safety concept was born out of the years of experience the Chassis & Safety division has amassed in integrating systems and components. Today, it is a reality in various series-produced vehicles. But not all of the aspects involved in this networked design have to come from Continental: ContiGuard® also accommodates components from other manufacturers, along with new safety functions. Because it is scalable, the concept can be used universally for all customer and market requirements.

After all, safety is something that should be on board everywhere, at all times.

Driving You Safely: ContiGuard®

Closely networked components, enhanced on-board intelligence and coordinated interfaces to dock on components from other suppliers – that’s how we get to our destination better and more safely, every day.
Automated Driving: Because Driving is Fun – Just Not Always

We are individualists, even at the wheel. We like to decide for ourselves whether we would like to drive ourselves or perhaps spend our valuable time on doing something else. In the future, automated driving will make it possible for us to have it all, all the time: safety, comfort, driving fun – and, depending on the driving situation, more time for doing something else.

Advanced driver assistance systems already avoid accidents today – or at least reduce the severity of their consequences. Nowadays, drivers are increasingly accustomed to having electronic assistants to take over some of their driving tasks so that they get where they are going more relaxed, more safely, and generally also with better fuel economy. Future assistance functions will be able to do even more: Upon request, they will take over responsibility for the longitudinal and lateral control of the vehicle, when the task of driving happens to be no fun at the moment. This form of partially or highly automated driving can take on most of the burden of driving during stop-and-go phases, for example, or on long, monotonous stretches of highway. The different automation phases will not take away the driver’s control. Instead, it will give the driver an offer that was previously unavailable in this form.

Freedom to choose at the wheel
If the person intentionally decides to activate the system at the wheel, initiating automated driving, he or she can gain valuable time and freedom of action. Since advanced vehicles are increasingly networked, both internally and with their surroundings and the relevant infrastructure, they will offer drivers new possibilities, from watching a live soccer game, to accessing the internet and using various data services and apps. Automated driving creates the time windows necessary to be able to use these kinds of offerings in an ergonomically sensible and safe way. The driver decides when the right moment has come for that.

The time is ripe for this. First, automated driving represents enhanced safety, since two major factors involved in accidents – distraction and fatigue – do not apply as often. This makes the development of automated driving a further step towards accelerating the realization of our Vision Zero, and also part of the comprehensive ContiGuard® concept. Second, the ever increasing availability of better real-time data enables forward-looking energy management that further optimizes the vehicle’s driving behavior, making it even more efficient.

On the path toward automated driving
In technological terms, automated driving represents the logical next step in an evolutionary process: If advanced driver assistance systems are networked more profoundly with real-time data, traffic participants, driver information and drive systems, the ultimate result leads to fully and highly automated driving. As a system supplier, Continental is in an ideal position to develop solutions for partially automated applications, and put them into series production, for its customers. We will see the first applications involving highly automated driving from 2020 onwards, and fully automated driving – i.e. higher speeds and more complex driving situations – as of 2025.

We already have many technologies in series production which will form the basis for automated driving. Thus we are collecting the necessary experience and can optimally support this evolution. Furthermore, we have also entered into partnerships beyond our own industry – for example with the IT-industry, in order to come up with end-to-end solutions. The crucial factor here is not only the function as such, but also the appropriate human-machine interface, so that the driver knows in real time in what driving situation he is, and thus comes to trust in the new technology. On this point as well, Continental’s cross-divisional expertise offers a decisive advantage.

The route to automated driving leads through partially, highly and fully automated driving – a future which drivers can look forward to.
Mastering Unexpected Situations Safely

Almost all of us have experienced an intervention with driving dynamics at some point: the humming of the brakes, the blinking of a control light on the dashboard, the tightening of the chassis settings. Once again, intelligent vehicle dynamics has defused a tricky driving situation. You can now relax and drive on. The unexpected can wait.

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.

Intelligent vertical dynamic systems improve grip

Our electronic air suspension system features outstanding response times, making it ideally suited to adjust the damping and spring characteristics to various driving situations within milliseconds to secure a comfortable driving experience. Active damping control not only enhances tire contact with the road, but also reduces body roll movements such as pitching. Lateral stability can also be enhanced as dynamic roll stabilization makes the vehicle a safer ride during curves and critical road conditions.

Electronic control utilizes brakes to their full potential

Continental’s electronic brake systems are among the most proven active safety technologies on the market. Millions of them work in passenger cars, vans, light trucks, and motorcycles. To make such a broad spectrum of applications possible, the high-performance MK 100® generation of electronic brake systems, for example, is designed for scalability. This makes skid protection economically feasible, even in compact cars.

Electronic Air Suspension

The electronic air suspension system automatically adapts damping and spring characteristics, along with the vehicle’s body level, to changing driving conditions and vehicle load status.

Electronic Brake System

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.

Electronic Brake System MK C1

With the MK C1, the brake actuation feature, the brake booster and the control systems (ABS, ESC) are combined into a compact, weight-saving braking module.

Selected product technologies
Developing and producing hydraulic brake systems is a big responsibility. Ultimately, foundation brakes and their hydraulic actuators form the backbone of active driving safety. Continental has proven its expertise in this field for over a century, providing high-performing floating-caliper and fixed-caliper brakes, drum brakes, electronic parking brakes, hydraulic actuation components (boosters, tandem master cylinders, vacuum pump, housings and controlers) as well as brake hoses. The range of performance and level of comfort Continental has achieved today are the result of tireless innovation work in braking technology. We therefore combine tradition with innovation.

Brake systems for a wide range of requirements
Foundation brakes generally develop greater power than even a powerful engine. That is the only way to stop a vehicle fast enough. But when it comes to brakes, it is not just their performance, stability and durability that counts: Increasingly, brake systems are required to help keep vehicle weight down, thereby enhancing efficiency. Here, as in other areas, we are driving progress, most recently with our innovative Zero Split 4MN fixed-caliper brake. Compared to similar brakes, it can not only save as much as one kilogram of unsprung mass per wheel, but also offers advantages in terms of noise comfort, thanks to its design. Lightweight construction options are also a central feature of boosters from Continental, which can be designed and constructed to be especially lightweight, including the materials, wherever a vehicle concept requires this.

One other thing is typical of brakes: Even at a standstill, they are still needed in order to secure the vehicle. Continental solves this task comfortably and advantageously, with its electronic parking brake, which pushes the vehicle at the push of a button. The electric actuator needed for this can also enable additional assistance features, such as assistance with starting on hills.

Active support for critical braking processes
Hydraulic brake systems can actively support the driver when needed. Should a driver step on the brake pedal quickly, but not forcefully enough when he recognizes a dangerous driving situation, then this yields the characteristic signal pattern of high pedal speed at relatively low pedal force. In this situation, brake assist systems ensure that maximum braking pressure is achieved by calibrating on the full auxiliary power of the booster. In technical terms, this can be accomplished using a mechanical brake assist feature (HBA) or via a booster with an electronic brake assist function. Both solutions from Continental allow for short stopping distances even when full braking is begun hesitant – another contribution to driving safety.

Brake hoses of the highest quality
Continental is one of the world’s leading brake hose suppliers and the only one offering many years of experience in entire hydraulic brake technology. A high degree of automation and sophisticated processes provide for a world-class quality standard.

The Only Technology Where Coming to a Standstill is the Benchmark
A quick push on the brake pedal and the car comes to a stop – with a meter to spare between it and the ball. Today, our brakes have once again delivered full braking performance as a matter of course. Because we like to come to a standstill before the others do. That’s what we call progress.

www.continental-automotive.com/hydraulic-brake-systems
Good View. Good Light. Good Arrival.

Dirty windows in the winter, insects stuck to the windshield and headlights in the summer can have a serious impact on our visibility. It’s a good thing that we provide a clear view.

Poor visibility is often one of the reasons an impending danger is not noticed until too late. This risk can be minimized. Our washer systems for front and rear windshields and headlights make sure the vehicle’s visibility and lighting conditions are always optimal. The driver is the main beneficiary, but not the only one: A camera mounted at the base of the mirror that serves as the basis for advanced driver assistance systems also benefits from clear visibility. The modular solutions developed to achieve this can be configured precisely to suit the requirements of automotive manufacturers.

Systematically designed components for a clear view
Reservoir systems from Continental are shipped ready to install and have been checked for functionality and leak tightness. In the case of pre-assembled systems with integrated or attachable filling supports, components such as pumps, fill level sensors, hoses or wire harnesses are already installed at the customer’s request. The reservoir shape and the geometry of the electrical and hydraulic connections, along with noise emissions and electromagnetic compatibility, are tailored to the customer’s specifications.

Concepts for targeted water use on the front and rear windshields
To meet various requirements, Continental has developed spot jet nozzles with one to three washer jets, fan jet nozzles with fluidic technology and a combination nozzle that does both. The spot jet option lets the driver spray individual areas of the window on a targeted basis, with the ability to calibrate the spray pattern. Fluidic nozzles are aligned more toward optimum water distribution with minimal water consumption. The combination nozzle offers the benefits of both nozzle designs.

A heated configuration makes it possible to clean the vehicle’s windows reliably even at cold temperatures.

No loss of light due to dirt
A film of dirt or dust on the headlight lenses can absorb or scatter light. This negatively affects visibility and causes glare for oncoming traffic. In this segment as well, Continental offers a solution, in the form of hydraulic headlight cleaning nozzles. Their varying telescoping lengths and nozzle heads and the available options for snap-on or plug-in connections allow for versatile adjustment to the equipment requirements of various vehicle classes.

Driver and other traffic participants profit from good washer systems.

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Restraint systems, such as seat belts and airbags, protect vehicle occupants when all available options for preventing an accident through further active interventions have been exhausted. Previously, these types of protection have been designed for specifically defined accident types, such as side or frontal impacts. Real-world traffic doesn’t always fit these scenarios, however. When a driver loses control of the vehicle because it has gone off the road, for example, there are a lot of forces at work on both the vehicle and the people inside it. In this kind of situation, seat belts and airbags can only provide optimum protection if they are controlled and triggered at the right moment and in the right order.

Sensors for situational intelligence
To provide passive safety systems with this ability – situational intelligence – we network them with sensors. Many sensors already come standard in vehicles, supplying information on the current driving situation, but also a driver’s intentions. As soon as the airbag control unit receives this information, high-performance algorithms can determine the nature of the accident earlier and adjust the passive protection flexibly to suit the situation. Further expansion of this integration in the future will transform the airbag control unit into a comprehensive safety (domain) control unit that offers optimized protection in all situations.

Comprehensive protection for all road users
Pedestrians and bicyclists also benefit from new passive safety systems. Innovative, pressure-based sensors, for example, make it possible to better protect pedestrians from the consequences of a vehicle impact by activating safety systems such as an active vehicle hood or window airbag.

Innovative sensors for advanced powertrains
One challenge for sensors and passive safety comes from advanced powertrains like those used in hybrid and electric vehicles. There are two main reasons for this. First, these kinds of vehicles recover energy when braking, through regenerative braking. The brake has to feel the same to the driver at all times, so sensors are used to determine the driver’s braking intention. The second challenge: In an accident, the high-voltage battery must be cut off from the vehicle’s electrical system right away in order to protect the occupants and rescue teams from electric shocks. And that too, calls for sensors.

Feedback from the active gas pedal
One of the greatest influences on driving stability is naturally exerted by the driver, in the form of how much power he or she demands via the accelerator. We have taken this crucial interface and further developed it into an active gas pedal. The Accelerator Force Feedback Pedal (AFFP®) sends a discreet signal to the driver when it would be better to ease up on the gas – in the interest of safety, or simply to save fuel.

Electronics for a wide range of applications
We supply the right electronics for various applications, such as the controls for the electronic parking brake, the electric vacuum pump and the electric power steering. Our products include a wide range of high-quality control units that can be tailored to specific customer requests.
Alongside our many strengths, people have one weakness that turns out to pose a risk on the road: A driver may cope just fine with the very same situation a hundred times, but then, the 101st time, he or she might be tired, absentminded or dealing with a child in the back seat. That’s all it takes, and suddenly an accident can no longer be prevented. That’s where our advanced driver assistance systems come in.

These systems process information on the vehicle’s surroundings and compare it against the current driving situation. The emergency brake assist feature for urban areas, for example, recognizes when a collision is likely in urban traffic and autonomously initiates full braking if the driver fails to react in time.

As soon as a vehicle’s surrounding area sensors detect that a driving maneuver is risky, the electronic assistants draw the driver’s attention back to the task of driving. Depending on the specific concept, this may take place in the form of a warning message or as a helpful intervention. This depends on the range and accuracy with which the sensors detect objects, road features and distances. These factors, the basis of advanced driver assistance, are one of Continental’s core competences.

A quick glance to the right to look at the traffic light? And the person in front of you has already braked, and you didn’t see it in time. Good thing our sensors are always watching and have already activated the brakes. Entirely automatically – all for this one moment when you happen to have inadvertently looked away.

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Always vigilant, always ready to respond
Camera-based driver assistance systems, for example, help drivers stay within the lane. When the driver crosses a lane marking without activating the blinker, these features either warn the driver or offer a gentle steering recommendation to prevent unintended lane changes. Other camera functions are based on the automatic recognition of traffic signs. These functions help the driver when he or she accidentally overlooks a posted sign. One application is the displaying of the currently valid speed limit helping to avoid fines for speeding. Other functions inform the driver about no passing zones and warn the driver if he is entering the road or highway the wrong way.

Relief from tiring driving tasks
Another contribution to traffic safety consists in relieving the driver from monotonous, tiresome driving situations. Maintaining a safe distance from the vehicle ahead of you – including in stop-and-go traffic – is one of these situations. Our Adaptive Cruise Control feature can reliably take this task off your hands. When driving at night, many drivers rarely switch manually between high and normal beams, because they feel that the pressure to shift quickly is bothersome. Continental’s intelligent headlamp control feature takes on this function, ensuring optimum lighting conditions – while also showing consideration for oncoming traffic.

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Quality

What that means at the product level is that every division wants every product to be seen as the benchmark of quality in the automotive supply industry. Chassis & Safety lives and breathes this holistic view of quality. It is in the DNA of our organization - an organization that, for example, has spent decades developing brake technology that everyone trusts. All of the division’s values are aligned in this direction, along with our processes and organizational structure.

Quality starts with development
Because the products we make at Chassis & Safety are widely varied, complex and have a bearing on safety, and because of our customers’ detailed specifications, quality starts with our internal processes. The product lifecycle (PLC) is the common thread running through all of these activities. Our ‘Quality First’ mission encompasses binding processes, methods and standards along the entire PLC. Principles such as Design for Six Sigma help design products to deliver on the promised characteristics, right from the start. After all, a product is only good if the customer evaluates it as such. “Quality First” therefore helps to ensure quality both during development and in the field.

Quality is measurable
Meeting requirements - that’s what it means to deliver quality. With this in mind, production of Chassis & Safety products is also subject to binding principles. One of the cornerstones of high delivery quality is being able to solve “problems” right away, right where they occur (the principle of jidoka). This is the only way to achieve sustained low PPM (Parts-per-Million) rates without outliers.

When it comes to supplier management, too, we strive to do things the right way from the very beginning. That means involving suppliers in the product development process at an early stage so that they have the best possible opportunity to contribute their knowledge. At the same time, our suppliers are responsible to uphold the same quality standards as Continental.

Quality is a hands-on process
Quality is the result of each and every individual’s work. To really live by this principle, freedom and motivation to take action on a person’s own responsibility is a core value at Continental. That, along with awareness of how we work together, forms an important part of our internal attitude toward quality. “Quality First” follows the principle of individual responsibility, supported by the entire organization, which provides tools and processes while also supporting the individual employee and fostering his or her professional growth.

Safe driving, preventing accidents and mitigating the consequences of accidents are ambitious goals. All of them call for solutions, systems and components that reliably meet the requirements set for them - and do so in a complex, networked vehicle environment. These kinds of products demand an organization that is consistently focused on quality. To achieve this, Continental aims to be no less than the best in its class.
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