Continental
The Future in Motion

White Paper

Tire Technology

Comfort, safety, efficiency – tire technology has helped to shape individual transportation for generations

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Comfort, Safety, Efficiency – Tire Technology has Helped to Shape Individual Transportation for Generations

What car and commercial vehicle drivers can take for granted in 2024 is actually the result of technological advances that have take place over a period of more than 150 years.

Right from the very beginning, the development of tires has been a constant battle to bring about improvements in the triumvirate of comfort, safety and efficiency. And the Hanover-based technology company has played a vital role in this development.

When Continental was founded back in 1871 under the name Continental Caoutchouc- & Gutta-Percha-Compagnie, transportation was still very much in its infancy. The streets were dominated by pedestrians, horse-drawn carriages, wagons and early forms of bicycle. It was not until 1886 that Carl Friedrich Benz filed a patent for a four-stroke, gasoline-powered motor vehicle.

The first tires to be manufactured by Continental – alongside hoof buffers – were designed especially for horse-drawn carriages and bicycles. These tires were initially constructed from solid rubber and offered outstanding puncture protection and load capacity – vital qualities given the condition of most roads in those days. However, these tires offered very little in the way of shock absorption.

This changed when Continental developed its range of (giant) pneumatic tires. But from today's perspective, the first pneumatic tires were not very safe and did not last long. Important technological advances on the road to greater safety included the invention of the tread pattern by Continental in 1924, the launch of a newly invented low-pressure balloon tire, a milestone in modern tire development. And from 1952 on, the development of special winter tires.

The digitalization of tires ultimately opened up whole new opportunities to enhance comfort and safety. In 1999, Continental demonstrated that the data required for advanced driver assistance systems could be determined more quickly and with even greater precision when the tires themselves were used as a data source. In the quest to increase efficiency, the focus was initially on puncture protection and tire life.

Over the past few years, minimizing rolling resistance has also become one of the most important goals in the field of tire development. In 1982, Continental launched a large-scale R&D project code-named EOT (Energy Optimized Tire) with the ultimate aim of developing a tire with 25% less rolling resistance and a 30% longer service life. This project was the starting point for the development of modern fuel-saving tires and, in 1992, led to the unveiling of the ContiEcoContact for cars and, in 2012, the ContiEcoPlus tire line for commercial vehicles.

Comfort

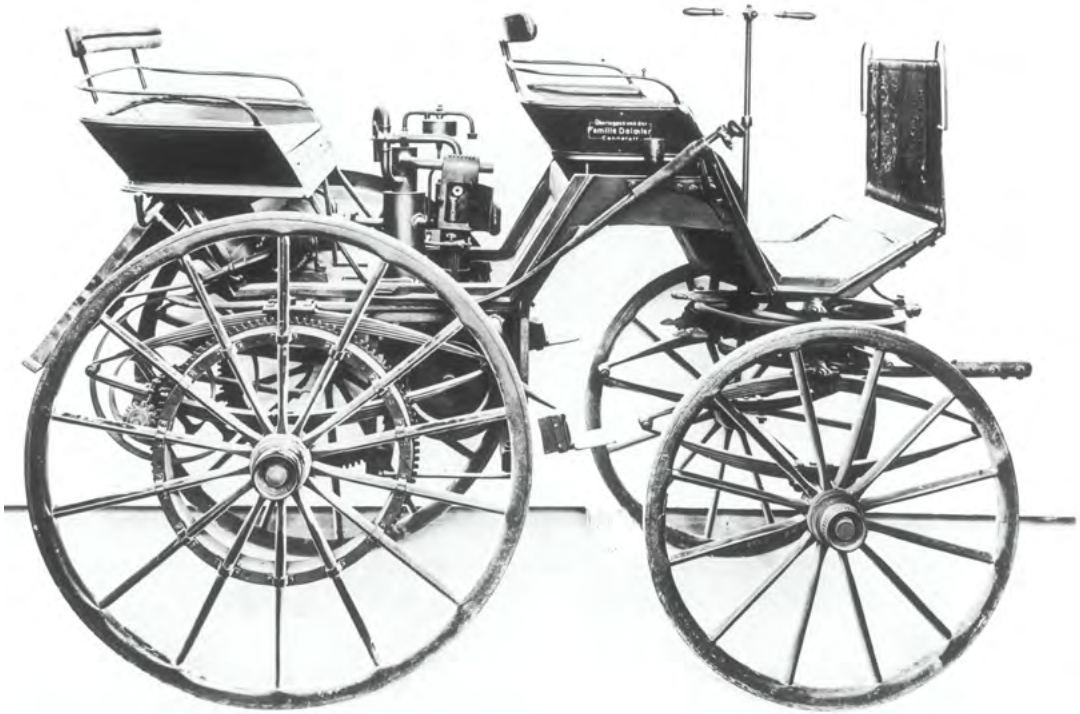
Comfort

The performance of modern motorized vehicles depends to a large extent on the quality of the tires. This applies not least to ride comfort.

The first tires for bicycles and early automobiles were made of solid rubber and offered, at best, slightly improved shock-absorbing properties than the original steel-covered wooden wheels for horse-drawn carriages and trailers. The most important development step in this area was the invention of the pneumatic tire. The trapped, pressurized air drastically enhanced both the shock-absorbing properties and ride comfort. Continental started producing pneumatic tires back in 1892 – initially just for bicycles but then, from 1898, for cars too. Development was accelerated when square-woven linen fabric was replaced by finely woven fabric cord in the carcass. The use of cord not only made tires much more pliant and, in turn, more comfortable, but also enabled engineers to gradually abandon the complex high-pressure tires with stabilizing internal pressures of around 9 atm in favor of low-pressure tires, which resulted in significantly improved shock-absorbing properties. In 1943, Continental finally filed a patent for the tubeless tire, an invention whose underlying technological principle has come to dominate the post-war era of tire manufacture right into the modern age. In addition, the processes involved in repairing, maintaining and caring for tires have become much easier over time.
Key advances in this respect included the invention of the detachable rim in around 1908 and tread wear indicators (TWIs) integrated in the circumferential grooves following the introduction of a statutory minimum tread depth. Among the most recent developments designed to make it easier than ever for fleet operators to manage entire vehicle fleets are Continental's sensor systems, which record data on the inside of the tire and transmit it automatically to control and display equipment in the vehicle or directly to the cloud. For the first time ever, this allows fleet managers to carry out automated tire maintenance on an as-needed basis rather than the manual, routine tire maintenance they had performed up until then.

150 Years of Pioneering Spirit and Innovative Strength

When Continental was founded back in 1871 under the name Continental Caoutchouc- & Gutta-Percha-Compagnie, transportation was still very much in its infancy. The streets were dominated by pedestrians, horse-drawn carriages, wagons and early forms of bicycle.



It was not until 1886 that Carl Friedrich Benz filed a patent for a four-stroke, gasoline-powered motor vehicle. The first tires to be manufactured by Continental – alongside hoof buffers – were designed especially for horse-drawn carriages and bicycles. These tires were initially constructed from solid rubber and offered outstanding puncture protection and load capacity – vital qualities given the condition of most roads in those days. However, these tires offered very little in the way of shock absorption. Even the smallest of obstacles caused the vehicle to jolt upward as it passed over them, which is why all tire manufacturers started looking for ways to increase the comfort of their products. As early as the mid-1880s, Continental was experimenting with "hollow-space" – or "cushion" – tires. The names of these tires were derived from the fact that the hard solid rubber was hollowed out. But this hollow space did not contain air and was instead filled with a soft foam rubber – a technique that was comparatively complex to implement and yielded only slight improvements in shock-absorbing characteristics.

1892: Continental Produces the First Pneumatic Tires

Things changed suddenly just a short time later.

In 1892, as the free-wheeling bicycle with coaster brake was starting to enjoy global popularity, Continental became the first German company to manufacture pneumatic bicycle tires. The trapped, pressurized air drastically enhanced both the shock-absorbing properties and ride comfort. It was only logical, therefore, to apply this new design principle to cars, which were still fitted with solid wood tires.

1898: Continental Starts Producing Pneumatic Tires for Cars

Continental started manufacturing early pneumatic tires for cars back in 1898.

The principle underlying these early pneumatic tires remains largely unchanged: A thin, air-filled tube enclosed in a stable outer cover. Unlike with bicycles, however, it was some time before solid car tires were completely superseded by pneumatic tires. This was because the comparatively high vehicle weight initially required a complex high-pressure principle that prevented the superior shock-absorbing properties from fully manifesting themselves. On top of this, early pneumatic tires were severely lacking in durability. But this changed when the less pliant square woven linen fabric in the carcass was replaced by finely woven fabric cord. The use of cord not only made tires much more pliant and, in turn, more comfortable (and better able to cope with high speeds), but also enabled engineers to gradually abandon the complex high-pressure tires of 9 atm (the equivalent of 17.666 bar) in favor of low-pressure tires (balloon tires) of just 3 atm (5.88 bar), which resulted in significantly improved shock-absorbing properties. Replacing linen with cord also improved durability. In 1921, Continental became the first German company to launch a cord tire – and in 1924, it launched a new and improved version: the low-pressure balloon tire. These advances ultimately spelled the demise of solid car tires. The last car to be fitted with solid tires was the Trojan Limited in 1929.

1943: Continental Files a Patent for the Tubeless Tire

In 1943, Continental finally filed a patent for the tubeless tire, an invention whose underlying technological principle has come to dominate the post-war era of tire manufacture right into the modern age.

The starting point for this groundbreaking development was the shortage of foreign currency and commodities that prevailed at that time, which forced engineers to start research into new raw materials. Since it was not possible to produce tire tubes from synthetic nitrile rubber, engineers started experimenting with an airtight seal for the tire sleeve on the rim, an innovation that would do away with the need for tubes. At the time, the Imperial Patent Office doubted the applicant's ability to "establish the credibility of the claimed technical development". However, it was Continental that ultimately conceived this design principle, which remains widespread to this day.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BUNDESREPUBLIK DEUTSCHLAND

Urkunde

über die Erteilung des Patents

893 164

Für die in der angefügten Patentschrift dargestellte Erfindung ist in dem gesetzlich vorgeschriebenen Verfahren

der Continental Gummi-Werke Aktiengesellschaft, Hannover

ein Patent erteilt worden, das in der Rolle die oben angegebene Nummer erhalten hat. Das Patent führt die Bezeichnung

Ohne Luftschlauch benutzbarer Fahrzeugluftreifen

und hat angefangen am 14. Dezember 1943.

Deutsches Patentamt

Die Patentgebühr wird in jedem Jahr fällig am 14. Dezember.

The Detachable Rim

Continental not only played a pioneering role in improving ride comfort, but also made important contributions to facilitating tire maintenance and servicing due to its range of specialist systems.

One groundbreaking development in this area was the detachable rim for cars, which was introduced in 1908 and made it much easier to change the tire. This was especially important because not only was the removal process from the rim bead extremely tricky and awkward, but early pneumatic tires also had much shorter service lives than they do today. While the ADAC confirmed in its 2020 summer tire test of the 235/55 R17 size that the Continental EcoContact 6 had the longest service life of all comparable products at 48,300 kilometers, earlier tires achieved only a fraction of this. Indeed, Continental's earliest tires lasted just 500 kilometers. By 1920, the average service life was around 6,000 kilometers. From 1921, the first cord tires from Continental lasted for around 15,000 kilometers.

TWI – Minimum Tread Depth at a Glance

While it used to be the case that an irreparable puncture would usually spell the end of a tire's life, it is nowadays much more likely that a tire needs to be changed because it has reached the legally prescribed minimum tread depth.

To allow drivers to quickly establish the condition of their tires, modern tires are equipped with tread wear indicators. Tread wear indicators (TWIs) are tiny bars – usually positioned transverse to the direction of travel – in the grooves of the main tread. Once the tire has worn down so much that the indicator is level with the tread, the tire has to be replaced. This is the case when the tire has only the legally prescribed minimum tread depth of 1.6 mm. Continental's winter tires additionally feature indicators at a tread depth of 4 mm to show the remaining tread depth at which the tire's winter properties start to diminish.

Your One-Stop Shop – Modern Service Contracts for Fleet Customers

For a long time, Continental has offered a range of attractive packages aimed specifically at fleet operators.

ContiEuroService (CES) – a breakdown service specially designed for large international transport fleets – was established in 1978 and has expanded over the years to include a range of additional optional services. In 2010, Continental bundled all its services for fleet customers under the name "Conti360° Fleet Services". The Conti360° contract offers a professional tire management package with a range of agreed service standards and prices. Customers can choose between the Conti 360° service contract and Conti 360° per-kilometer contract. Both contracts are modular in structure and can be adapted in line with customer needs. With the Conti 360° service contract, the standards and prices are fixed, although customers pay for services/products only when they actually use/purchase them. The Conti 360° per-kilometer contract contains a fixed price per kilometer, regardless of the extent to which customers use/purchase the associated services/products.

The digitalization of tires has opened up whole new service potential to ensure the correct tire pressures and temperatures, Continental developed digital tire pressure monitoring systems in 2013 that featured tire sensors, initially for individual vehicles under the name ContiPressureCheck. In 2017, a similar system has been launched for fleet operators under the name ContiConnect Yard. The system is based on Continental-made tire sensors, which transmit the acquired data to various display equipment. This allows fleet managers to perform automated, targeted tire maintenance rather than the manual, routine tire maintenance they had performed up until then. Since then, Continental has continiously further developed its product portfolio ContiConnect. Today, ContiConnect is available as the mobile only solution Lite and the all-encompassing solution ContiConnect Pro.

Since 2024, Continental offers automated tire tread depth measurements. Fleet operators are now able to obtain precise and daily updated data on the rate of wear of their commercial vehicle tires. With a new generation of the ContiConnect tire sensor in conjunction with AI-based algorithms, upcoming tire services for individual commercial vehicles as well as entire fleets can be planned with precision. This increases the safety and efficiency of the fleet, saves costs and helps to reduce its CO_2 emissions. Continental offers automated tire tread depth measurements for the first time thanks to its new ContiConnect sensor generation.

Safety

Safety

Continental's primary brand promise is to ensure maximum driving safety on all roads and in all conceivable weather conditions.

The development engineers strove right from the outset to make the tires – the vehicle's only point of contact with the road – as safe as they could possibly be. This was also an absolutely vital task because, compared with today's products, early pneumatic tires with their non-textured treads offered little grip, especially in rainy and wintry conditions. The pioneering spirit and innovative prowess of Continental's engineers made an important contribution toward ensuring that today's Continental tires offer maximum safety whatever the road and weather conditions. An early milestone was achieved in 1904, when Continental unveiled the first textured car tire. In addition to directional control, it offered grip even under drive and braking forces.

Over the following years, further developments included improvements in the transfer of force and all-round contact with the road surface. This culminated temporarily in the Continental FP ("fine profile") in 1936, which was the first all-rounder tire suitable for all weathers as well as urban and rural roads.

The wintry weather conditions that prevailed especially in northern Europe often caused roads to become buried under deep snow and presented early tires with an almost insurmountable challenge. This did not change until 1952 when Continental's first mud-and-snow tire heralded the age of the specialized winter tire. This highly innovative product attracted much attention when, in 1953 and under the supervision of a notary, a convoy of vehicles fitted with Continental's mud-and-snow tires traversed the snow-covered St. Gotthard Pass into Switzerland and thus successfully completed the first-ever winter tire test in history.

In 1972, Continental launched the first winter tire to exhibit a tread that truly was designed for a range of wintry conditions. Until then, manufacturers had relied solely on design elements such as spikes. In 2000, with the ContiWinterContact TS 790 V XL, Continental became the first company to achieve the "V" speed index for winter tires, developing a cold-weather specialist that was also approved without restriction (so with no load derating) for speeds of up to 240 km/h. The digitalization of tires opened up whole new opportunities to enhance driving safety. By the turn of the millennium, coordinating all the systems involved in executing a braking operation made it possible to develop a mid-size-class vehicle that could brake to a standstill from a speed of 100 km/h in just 30 meters. At this time, the average braking distance was as much as 36 to 40 meters. At around the same time, Continental also developed its ContiSeal technology, which is capable of completely eliminating the risk of punctures. In the OEM sector, tires featuring ContiSeal self-sealing technology were first fitted in 2009 on the Volkswagen Passat CC with the "R-Line" equipment specification for sporty requirements. Today, customers all over the world with all sort of different vehicle types place their trust in this technology.

1904: Continental Invents the Tread for Car Tires

However, it was not until 1904 that Continental showcased the world's first car tire to feature a textured tread.

Continental's developers were ahead of the pack when, according to German trade publication Der Radmarkt, they developed the first "anti-slipping" pneumatic tire for bicycles back in 1894. This early tread pattern initially took the form of circumferential longitudinal stripes, but while it offered a degree of directional control, it still failed to deliver any grip under drive and braking forces. Just one year later, therefore, Continental presented its "riveted anti-skid tire", a near-identical-looking forerunner to its studded tires. The series of rivets in the tread were designed to facilitate the transfer of force and prevent foreign bodies from penetrating the tire. In the same year, with the Haferkorn [oat grain] tread featuring intermeshed tread lugs, the first tire with a tread enabling all-round contact with the road surface was launched. Continental unveiled the first (balloon) tire with a directionally-oriented tread pattern for enhanced grip at the end of the 1920s, the first "non-skid" tire for urban roads in 1932 and, with the Continental FP ("fine profile") in 1936, the first all-rounder – a tire designed for all weathers as well as urban and rural driving. This degree of safety was achieved thanks to the siped tire tread. The sharp edges of the sipes penetrated the greasy layer that often covered roads in those days, wiped it away and gave the tire an additional contact surface.

Continental's First Mud-and-Snow Tire

Continental is also considered a pioneer in winter road safety.

The wintry weather conditions that prevailed especially in northern Europe often caused roads to become buried under deep snow and presented early tires with an almost insurmountable challenge. An early precursor to the modern winter tire was conceived in 1934 when one of the first tires designed specially for rugged terrain and snowy, high-altitude regions was launched in the form of the Continental Type Aero Gelände. But the development history of specialized winter tires did not begin until 1952 when Continental introduced the first mud-and-snow tire. The very name of the "mud-and-snow" (M&S) tires gives some clue as to the conditions on the roads in the 1950s, especially in northern Europe. Snow-clearing technology was still in its infancy, and many roads were not paved and turned to mud at the first sign of winter.

This is why the coarse tread design of the Continental M+S strongly resembled the side view of a toothed wheel. This highly innovative product attracted much attention when, in 1953 and under the supervision of a notary, a convoy of vehicles fitted with Continental's mud-and-snow tires traversed the snow-covered St. Gotthard Pass into Switzerland and thus successfully completed the first-ever winter tire test in history. As the situation on the roads started to change over the years that followed and the massive increase in the volume of traffic meant more and more vehicles became stuck on roads covered with icy snow, all the tire models developed up to that point were unable to cope. In response, Continental unveiled its range of studded tires in 1963.

ContiWinterContact TS 790 V XL – the First “Real” Winter “V” Tire

When studded tires were banned in most European countries (1975 in Germany), it was on Continental’s chemical experts to come up with a solution.

In 1972, Continental launched the first winter tire without studs, featuring instead – and for the first time ever – a tread compound that was truly suitable for a range of wintry conditions. The sipe system featuring thousands of tiny slots in the tread became increasingly common in tire production and enabled a fine-lugged tread pattern for the first time. This offered many more gripping edges, in turn improving the tire’s ability to maintain contact with snow-covered road surfaces. Ever since then, winter tires have undergone rapid technological development. Shortly before the turn of the century, however, Continental unveiled a pioneering new innovation. The ContiWinterContact TS 790 featured a brand-new sipe system called “cross-linked sipes”, in which the sipes were no longer perpendicular to the tire surface but instead arranged at an angle. In 2000, with the ContiWinterContact TS 790 V XL, Continental became the first company to achieve the “V” speed index for winter tires, developing a cold-weather specialist that was also approved without restriction (so with no load derating) for speeds of up to 240 km/h. Winter tires with the “V” speed index were actually already available one year earlier, but drivers of heavy vehicles like a Mercedes E-Class station wagon who wanted to have winter “V” tires fitted were still not allowed to drive at speeds above 220 km/h – until, that is, the launch of the ContiWinterContact TS 790 V XL. These speed restrictions were imposed because legislators prescribed a “load derating” due to the severe deformation of the tires at high speeds, which is why, in response, Continental developed the first “real” winter “V” tire with an exceptionally high load index. So when the tire was rolling at high speeds, this special design compensated for the prescribed load derating.

“30-Meter Car” Achieves Sensational Braking Performance

The increasing digitalization of cars – and, in turn, their tires – has opened up whole new opportunities to enhance driving safety.

In 1999, Continental demonstrated that the data required for advanced driver assistance systems could be determined more quickly and with even greater precision when the tires themselves are used as a data source. This constituted the birth of the “intelligent tire”. The capability of a tire – as a central element of the overall vehicle system – to communicate with other safety-critical components led one year later to a groundbreaking project: the “30-Meter Car”. Coordinating all the systems involved in executing a braking operation made it possible to develop a mid-size-class vehicle that could brake to a standstill from a speed of 100 km/h in just 30 meters. At this time, the average braking distance was as much as 36 to 40 meters. This equated to a reduction in braking distance of as much as 25%.

Efficiency

Efficiency

Over the past few years, minimizing rolling resistance has become one of the most important goals in the field of tire development.

At almost 50%, the biggest contributor to rolling resistance is the tread, with the rubber compound alone accounting for 40%. This means that reducing rolling resistance is primarily the job of material researchers. The development of concepts for "energy-saving tires" goes back to the energy crises of the mid to late 1970s. In 1980, working in collaboration with and with funding from the German Federal Ministry for Research and Technology, Continental started work on a fundamental study into the design- and material-related variables impacting the rolling resistance of commercial vehicles. This study yielded a whole series of possible solutions. Silica had for the first time largely replaced carbon black, which required fossil fuels in its production. The new filler stabilized the network of bonds among the individual materials used to create the rubber compound. Tires constructed in this way adhered to the road surface more effectively despite having lower rolling resistance. Over the same period, Continental's car tire research team developed the "cap-and-base" principle, which combines abrasion-resistant tread compounds with shock-resistant tread compounds and thus helps to reduce rolling resistance by up to 15%. As soon as the fundamental study was complete, Continental launched a large-scale R&D project codenamed EOT (Energy Optimized Tire) in 1982 with the ultimate aim of developing a tire with 25% less rolling resistance and a 30% longer service life. This project was the starting point for the development of modern fuel-saving tires and, in 1992, led to the unveiling of the ContiEcoContact for cars and, in 2012, the Conti EcoPlus tire line for commercial vehicles. Other technical milestones on the road to the efficiency-optimized tire included the flat belt concept and finite element method. In 2011, and aimed specifically at the growing market for electric and hybrid vehicles, Continental unveiled the Conti.eContact, the first tire of its kind to be designed according to the "tall and narrow" principle. It was slimmer than conventional tires, but had a relatively large diameter. Since 2020, Continental has been shipping OEM tires that are another 20% more efficient than the standard class of European tire label "A". This innovation was supported by, among other things, the "Green Chili 2.0" rubber compound, which ensures lower energy absorption through the tire on contact with the road – without any compromises on any of the relevant conflicting goals.

Lowering Rolling Resistance means Reducing Energy Consumption

In light of high gasoline prices, significantly increased environmental awareness and the rise of electric vehicles, minimizing rolling resistance has become one of the main goals of tire development over the past few years.

Rolling resistance describes the mechanical energy of a rolling tire that is converted to thermal energy per unit distance of travel, resulting from the rotation and deformation of the tire. Rolling resistance is thus derived from the hysteresis of the material during deformation. The higher the hysteresis of the material, the more mechanical energy is converted to heat and the higher the rolling resistance. Or, in less technical terms: As the tire rolls along the road, the tread and sidewalls in the flattened zone of the ground contact area become deformed as a result of flexing. The degree of deformation is influenced by the tire pressure, wheel load, vehicle speed and road surface characteristics. This deformation causes energy to be lost – energy that the engine has to make up for. It is the goal of developers to keep this energy loss to a minimum in order to save fuel (or electric energy).

From a sustainability perspective, it does not make any difference whether tires are fitted to combustion-engine or electric vehicles. Reducing energy consumption is key. This results in lower fuel consumption for combustion-engine vehicles and longer range for electric vehicles and, as long as the electricity used for charging does not originate solely from renewables, lower emissions for both drive types. Other ways for developers to reduce energy consumption including reducing rolling resistance and enhancing the aerodynamic qualities of the tires.

Since energy efficiency is also important to vehicle manufacturers and, in turn, the tire OEM sector for reducing CO_2 emissions from manufacturer fleets, this has been a priority for Continental for many years now.

Conflicting Goals in Tire Development

While reducing rolling resistance involves minimizing energy losses, it is the complete opposite when it comes to braking: The tire has to dissipate as much energy as possible, which is no problem on dry roads.

In wet weather, however, the process of energy dissipation works only if the rubber compound absorbs as much energy as possible during braking. These opposite scenarios – energy dissipated has to be minimized during normal driving and maximized during braking – results in conflicting goals. Tire developers cannot resolve conflicts of this kind; instead, when developing new components, they have to always take into account both aspects to ensure that they both remain at a high level.

Success Factors: Silica and Cap-and-Base Principle

The development of concepts for “energy-saving tires” goes back to the energy crises of the mid to late 1970s.

In 1980, working in collaboration with and with funding from the German Federal Ministry for Research and Technology, Continental started work on a fundamental study into the design- and material-related variables impacting the rolling resistance of commercial vehicles. This study yielded a whole series of possible solutions, leading to the development of a “brown truck tire” in 1981. Silica had for the first time largely replaced carbon black, which required fossil fuels in its production. The new filler stabilized the network of bonds among the individual materials used to create the rubber compound. Tires constructed in this way adhered to the road surface more effectively despite having lower rolling resistance. Over the same period, Continental’s car tire research team developed the “cap-and-base” principle, which combines abrasion-resistant tread compounds with shock-resistant tread compounds and thus helps to reduce rolling resistance by up to 15% and, in turn, fuel consumption by around 2.5% – and all this with the concomitant reduction of rolling noise. To this day, the “cap” ensures good road holding, abrasion-resistance and directional stability. The “base” reduces rolling resistance and absorbs the transmission of shocks to the carcass. The side section acts as an optimal transition between the tread and sidewall.

Another Milestone: ContiEcoContact

Before they were used in truck tires, silica compounds in the tread and the cap-and-base principle were first used in the volume production of car tires.

In 1992, Continental unveiled the ContiEcoContact – its first efficiency-optimized tire. The ContiEcoContact was followed in 1997 by the ContiEcoContact EP, which also featured, for the first time ever, the newly developed flat belt concept and finite element method. The flat belt concept ensured a flatter-than-ever contour and thus reduced deformation of the steel belt in the ground contact area. Rolling resistance decreased further and tire life increased. The finite element method employed computer-aided calculations to ensure a more balanced distribution of pressure across the ground contact area. In conjunction with the flat belt concept, this ensured more uniform abrasive wear characteristics and, in turn, extended the life of this fuel-saving tire. The ContiEcoContact EP replaced the CT 22, offered 20% lower rolling resistance and a 30% longer tire life and was also markedly superior to its predecessor in all aspects relating to safety.

After 44 million of these tires were sold, it was superseded in 2003 by the ContiEcoContact 3 and then, in 2011, by the ContiEcoContact 5. Compared with the ContiEcoContact 3, this offered around 20% reduced rolling resistance and a 12% longer service life. This enhanced performance was achieved through a series of modifications in the tread, carcass/sub-structure, sidewall and area around the bead core. Developers also focused on the tread contact to exploit potential for reducing rolling resistance, their methods of choice being to create a very flat contour and specially tailor the distribution of the tread depths accordingly in order to reduce movement of the belt structure and, in turn, longitudinal and lateral slip. The tread pattern was composed of extra-thin sipes in the tread blocks, which reduced braking distances in wet conditions, and were extremely fine so that the tread blocks did not buckle during driving and thus lost less energy. A special core profile made from a harder material made the tire stiffer and yet, in combination with its completely new compound, helped to reduce the extent of deformation in the bead area. Thanks to new polymer chains that bound the silica in the tire compound more firmly in the compound, the movement of the chemical components within the compound was reduced and grip in wet conditions was increased.

So since those very early days, the most important parameters for developers looking to increase the efficiency of the ContiEcoContact range have not changed.

2012: European Fuel Economy Record

In 2012, the ContiEcoContact 5 played a vital role in the European fuel economy record set by Knut Wilthil and Henrik Borchegrevink from Finland, who drove a Ford Mondeo ECOnetic a staggering 2,536.4 kilometers on just one tank of diesel fuel.

This was the longest recorded distance that a standard diesel vehicle had covered on European roads without having to refuel. Average consumption was 2.79 liters. Since then, the EcoContact 6 has been launched. Continental introduced the “Green Chili” concept to describe the continuously enhanced and refined ultra-low-resistance tread compound.

Innovative Tire Solutions for Vans: from VancoEco to VanContact Eco

Again in 2011, the significant development advances that Continental achieved with the ContiEcoContact series were applied in a brand new and special tire line for vans: the VancoEco.

Today, Continental has been working with van manufacturers for more than a decade to provide highly efficient tires for newly produced vans and transporters. The latest VanContact Eco features an innovative tire construction that balances the conflict between wet performance and rolling resistance to a new level. The newly developed compound mix has a stabilising effect on the tire. This results in reduced rolling resistance and high fuel efficiency or extended range for electric vehicles.

2011: The First Tire Designed Specially for Electric Vehicles

To cater to the growing market for electric and hybrid vehicles, Continental showcased its Conti.eContact at the International Motor Show Germany in 2011.

It was the first tire of its kind to be designed according to the "tall and narrow" principle, so it was slimmer than conventional tires and had a relatively large diameter. It was developed on the basis that the tread contact of a tire designed according to this principle is subjected to less deformation and thus loses less energy. Thanks to their special design, these tires had up to 15% lower rolling resistance and were subjected to less abrasive wear than conventional products. Continental's Conti.eContact, which was fitted as standard on the Renault Twizy, had as much as 30% lower rolling resistance than conventional tires. By 2016, it was discovered that the benefits of the tall and narrow design could even be realized for Nordic winter tires such as the ContiVikingContact 6 and IceContact 2. In 2012, the Conti.eContact won the iF Product Design Award.

2014: The First Continental Tire Earns the EU Tire Label “AA” Rating

From 2014, Continental already offered two specialized tires for electric and hybrid vehicles.

Both were produced under the Conti.eContact model designation, but differed in terms of how they were designed for the two drive types. While the Conti.eContact size 20% for electric vehicles offered around 30% less rolling resistance than a conventional pneumatic tire, the Conti.eContact for hybrids offered “just” 20% less rolling resistance but was capable of being fitted to a very high-powered car or SUV in sizes 17 and 18 inches. Continental continued to employ the “tall and narrow” principle for electric vehicles. In sizes 17 and 18 inches, the Conti.eContact for hybrids more closely resembled conventional models and was the first Continental tire to earn the EU tire label “A” rating (mandatory from 2012) in terms of both rolling resistance and braking in wet conditions.

Since the mid 2000’s all passenger car tire developments from Continental have focused on low rolling resistance, low rolling noise and high mileage without compromising or limiting safety. In its tire development, Continental also considers the higher weight of electric vehicles that results from the weight of the battery.

Therefore, the company has also been producing passenger car tires with the special HL load index since 2021. These tires have an increased load capacity.

The premium tire manufacturer has been optimizing all current lines in the whole tire portfolio for all types of drive. Since 2023 the EV Compatible logo on the tire wall clarifies which tire models are designed for use on electric vehicles and to optimize their range. Because of this, Continental tires are always the right choice – regardless of whether it is a combustion engine or an electric vehicle.

Technological Advancements Enhance Durability and Efficiency

Of course, all tires of this brand benefit from the technical advances that Continental has achieved for its ultra-efficiency-optimized tire lines.

Continental is continuously striving to optimize its tread compounds and increase abrasion resistance without compromising on safety. The sixth and seventh generation – and especially the PremiumContact and EcoContact lines – demonstrate that over the past few years, Continental has already developed a whole range of technologies that optimize tread compounds and reinforcement materials as well as the contour and tread design and thus significantly reduce abrasive wear.

The PremiumContact 7, for example, has a very long tire life and thus is subject to less wear per kilometer driven. This would not have been possible without a series of design measures and new technologies that enabled Continental to reduce the rolling resistance of the EcoContact 6 by as much as 20% in relation to the standard value for the EU tire label "A" rating. This innovation was supported by, among other things, the "Green Chili 2.0" rubber compound, which ensures lower energy absorption through the tire on contact with the road.

With these performance values, the EcoContact 6 is not only setting new standards across the industry but also making an important contribution to helping Continental's OEM customers to achieve their WLTP (Worldwide Harmonized Light-Duty Vehicles Test Procedure, an international test procedure for car tires fleet targets).

EU Regulation Will Further Reduce CO_2 Footprint of Trucks

To meet the targets of the Paris Climate Accords, the first CO_2 emission performance standards regulation for newly registered heavy-duty commercial vehicles (EU Regulation 2019/1242) was passed by the European Commission in 2019.

The regulation demanded a reduction of average CO_2 emissions from new heavy duty commercial vehicles: by 15% by 2025 and by 30% by 2030, compared to the reference period from July 2019 to June 2020.

In 2024, the European Union updated its regulations to set new targets for new heavy duty vehicles for the years 2030, 2035, and 2040. For 2030, the reduction in CO_2 emissions is set to 45%, increasing over the years to a 90 % reduction by 2040. Different targets apply to different vehicle groups, depending on their weight, among other things.

To ensure the formulated reduction targets can be monitored and achieved, the European Commission introduced the simulation tool VECTO (Vehicle Energy Consumption Calculation Tool) to calculate the emissions of vehicles.

Find more information about VECTO in our whitepaper Commercial Vehicle Tires

Can’t get enough of tires?

We have six more whitepapers for you that shed light on various aspects of tires. In-depth texts provide a quick overview and a technical introduction to the corresponding topic. Click on the respective image to access the whitepaper you are interested in.

In case of any further questions, please get in touch with one of our Tires media contacts. You can find a list of contact persons **here.**

Continental
The Future in Motion

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