



2 wheels – 200 years

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The world's most successful means of transport celebrates its birthday

The future is electric

- ▶ One billion bicycles: the world's number one means of transport
- ▶ First eBikes already being developed in the late 19th century
- ▶ Bosch eBike Systems helping to shape future biking mobility

Stuttgart/Reutlingen – In Mannheim, Germany, on June 12, 1817, Karl Drais set off for the first time on his so-called "running machine". His invention formed the basis for the subsequent development of the bicycle – the world's most successful means of transport. 2017 marks the 200th anniversary of the invention of the bicycle. The bicycle is more than just technology: it is also culture, tradition and history, a link between past and future. And the bicycle is constantly reinventing itself. The next stages in its evolution has now been reached: electrification, automation, networking. The eBike is one of the world's most successful electrically-powered vehicles and a pacesetter as far as future mobility is concerned. As the market leader in the premium segment for eBike drive systems, Bosch eBike Systems is a key driving-force behind this ongoing development process.

Brief history of the bicycle

Bicycles have become the world's most popular means of transport: they account for approximately one billion vehicles on the world's roads. By comparison: the total number of private cars worldwide is currently estimated to be in the region of 500 million. In "car country" Germany alone, 45 million private cars are far outnumbered by no less than 81 million bicycles – of which some 3 million already have motor support. The bicycle soon had clear advantages over other methods of transport. By the late 19th century, bicycles could be used to cover respectable distances speedily and with little difficulty. And mobility on two wheels had economic advantages: in England, for example, the cost of purchasing and keeping a horse was in the region of £1,900, whereas only about £20 was required in order to get around on two wheels. Thus, the bicycle took the place of the stagecoach as the most successful vehicle. As Claus Fleischer, Head of Bosch eBike Systems, explains: "Mobility is a basic human need. The

bicycle "democratized" mobility: the nobility and the bourgeoisie lost their privilege. The result: mobility became available to the broad mass of citizens." At the same time, the bicycle was a forerunner of the automobile. Innovative developments such as ball bearings, spoked wheels and pneumatic tyres spelt rapid advances in the development of the bicycle – and necessitated the use of lightweight components. Fleischer adds: "Many of the components installed in cars were originally designed for the bicycle. The automobile in its present form would be almost inconceivable without the invention of the cycle. So the car and the bicycle have never been opposed to each other, so to speak: they belong more or less to the same mobility family."

A lengthy tradition: Bosch and the bicycle

The visionary Robert Bosch was also aware of the advantages of the two-wheeler. From 1890 onwards, the founder of the company visited his customers in Stuttgart on a modern "safety bicycle", which was a little-known means of transport in Germany. The fashion in continental Europe at that time was still the penny-farthing – with its huge front wheel and much smaller rear wheel acting as a stabiliser. But Robert Bosch opted for a technology which he considered both trendsetting and viable for the future.

In 1923 the Bosch company introduced a dynamo light for bicycles, consisting of a dynamo and a headlamp; more than 20 million of these were manufactured between then and the 1960s.

In 2009 the bicycle was again firmly in the focus of the Bosch Group – this time in electrified form. In 2012, three years after its founding, the Bosch eBike Systems startup had established itself as the European market leader for eBike systems in the premium segment. Within a few years the company, together with its partners and customers, succeeded in developing the bike with the electric tailwind into the fastest and most effective means of transport in today's urban traffic.

New opportunities thanks to electromobility

At present there are more than three million pedelecs on Germany's streets and roads. This development has taken some time in order to achieve a breakthrough. At the end of the 19th century the electric motor offered a promising traffic solution. Electricity was the basis for clean, modern mobility. In 1895 several inventors applied for patents for the first bicycles with electric motors. But they were too far ahead of their time. There were two factors which stood in the way of swift development: the substantial weight of the electrically driven bikes and the lack of battery range. The weight problem was resolved in 1991 with the invention of the lithium-ion battery. Since then, capacities have increased progressively. Nowadays the eBike will travel more than 100 kilometres on a single charge. The batteries became affordable as a result of the mass production of laptops – and nothing more stood in the way of the success

story of the eBike. Pedelecs have found their place in society, they are a characteristic feature of urban life, and they are seen as a milestone on the road to future mobility.

Bosch eBike Systems promotes sustainable mobility

For Bosch eBike Systems, the "birthday" of the bicycle is good reason to celebrate. The market leader is committed in many different ways to achieving mobility that is both economically and ecologically meaningful. The eBike is the ideal answer to shortages of resources, climate change, urbanisation and increased emissions. These are all decisive factors in the "mobility mix".

Fleischer concludes: "To ensure the ongoing success story of the bicycle, more and more people need to switch to the eBike, federal regions and local councils need to improve the cycling infrastructure still further, and business and industry need to continually bring proven, technically high-quality products on to the market. We have already begun developing the mobility of the future."

- ▶ Further information on Robert Bosch and his first two-wheeler under:
<http://blog.bosch.com/history/en/2016/08/18/cutting-edge-on-two-wheels-robert-bosch-hits-the-road/>
- ▶ Further information on the first Bosch bicycle light of the year 1923 under:
<http://blog.bosch.com/history/en/2016/03/24/on-the-trail-of-the-bosch-bicycle-light/>

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About Bosch eBike Systems

A new generation of bikes is taking town and country by storm and is already a part of everyday life. eBikes are a modern means of transport for modern people: people in a hurry and people who prefer to take it easy, the fit and the comfort lovers, commuters and pleasure cyclists and, of course, young and old. The tailwind of technology-leading eBikes made by what are already more than 60 leading brands in Europe is powered by components that Bosch is developing to perfection. The Bosch portfolio ranges from the highly efficient drive unit (motor and gearbox) and high-quality batteries to a smart on-board and cycle computer that can be used intuitively. Perfect coordination of components holds the key to typical Bosch performance in terms of both comfort and efficiency.

Like other Bosch products, the eBike systems benefit from the Bosch Group's technology and production know-how. From conception and engineering to manufacturing, marketing and after-sales service, Bosch eBike Systems constantly set new standards for the eBike industry. The Bosch Group's experience in the areas of electric motors, sensor technology, displays and lithium-ion batteries ensures that Bosch eBike systems use technology that is invented for life and that eBike users have their fun.

For more information please visit www.bosch-ebike.com

About Bosch

The Bosch Group is a leading global supplier of technology and services. It employs roughly 375,000 associates worldwide (as of December 31, 2015). The company generated sales of 70.6 billion euros in 2015. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiaries and regional companies in some 60 countries. Including sales and service partners, Bosch's global manufacturing and sales network covers some 150 countries. The basis for the company's future growth is its innovative strength. Bosch employs 55,800 associates in research and development at 118 locations across the globe. The Bosch Group's strategic objective is to deliver innovations for a connected life. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life."

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