



Pioneer in battery development **50 years of battery expertise at Bosch Power Tools** First cordless power tools as early as 1969

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- ▶ 50 years of battery innovations for users
- ▶ Extensive pioneering work by Bosch throughout the entire history of batteries
- ▶ Systematic expansion of the cordless segment for professionals and DIYers

Leinfelden – Bosch Power Tools launched the first cordless power tools on the market 50 years ago: a hedge cutter and a drill with a battery to hang over the shoulder. The battery, a 12 volt lead-gel battery, nowadays reminds of a car battery and weighed a proud 5.5 kilograms in 1969 – the hedge cutter was therefore ready for use for one whole hour. It was possible to cut a hedge around 20 meters long. Afterwards, the hedge cutter had to be charged for a period of between six and eight hours. Bosch thereby laid the foundation for the development of numerous cordless power tools. “Our expertise in batteries has been a central element of the innovations in recent decades. We are shaping the technical development of the industry and constantly perform pioneering work,” said Henk Becker, President of the Robert Bosch Power Tools GmbH. “It is our claim to have the smallest and most powerful batteries on the market, to replace corded tools by cordless tools in the long term. Cordless tools make work easier for our users – whether at home, in the garden, in professional workshops or on construction sites.”

Bosch consistently expanded its expertise in batteries and just under five years later launched a grass shear, the first tool with an integrated battery for hobby gardeners. The grass shear had a cutting width of 80 millimeters and was able to cut lawn edges, small grass areas and ornamental bushes for around 45 minutes on a single charge. Bosch used a new battery cell technology for the first time: The grass shear was operated with a dry battery containing four nickel-cadmium cells. The main advantages of this battery: High energy density and a long lifetime. It could be recharged a hundred times. This was well received by the users: The cordless grass shear from Bosch led for the first time to the development of

a market for cordless power and garden tools in Germany in 1974. The Business with cordless tools at Bosch picked up speed.

Bosch set the next milestone in 1984 with the world's first professional cordless hammer drill – the GBH 24 V. By bringing battery technology to the hammer drill, Bosch was able to meet the needs of professional users and continued to expand its position as a battery pioneer. The cordless hammer drill represented the only way to carry out certain work far away from power sockets, for example, during installation work in the revived prefabricated house construction industry. Scaffolders needed the cordless tool to drill holes in the wall high up while electricians required it to affix antennas and lightning conductors. The GBH 24 V offered professionals the flexibility they needed while maintaining high performance and capacity. The basis for this was a dry battery containing 20 nickel-cadmium cells, whose internal resistance was more than one third lower than that in conventional batteries and thereby ensuring high level efficiency: With one battery charge, professionals were able to drill over 60 holes.

In 1998, a series of innovative cordless drill for professionals followed: two models with 14.4 and 12 volts ran on new cadmium-free battery cell technology. The battery packs made out of nickel metal hydride were considerably more compact and lighter than conventional nickel-cadmium batteries, and at the same time had more capacity. A 2.0 Ah battery with nickel metal hydride technology, for example, offered the same capacity as a 2.0 Ah battery with nickel-cadmium technology, but it was 20 percent lighter and around one third smaller.

In 2003, the world's first power tool with a lithium-ion battery revolutionized the market: the Ixo cordless screwdriver. The world's most popular power tool has been sold more than 18 million times and has long enjoyed cult status. Thanks to lithium-ion technology, which at that time was only known in mobile phones, the Ixo was always ready to use – without battery self-discharge or a memory effect: Most of the energy was therefore still available even after one year without use and without any losses during recharging. The battery cells were also up to 40 percent lighter than conventional nickel-cadmium cells: Weighing just 300 grams, the Ixo was a lightweight.

The batteries have become increasingly more compact and at the same time more powerful. Today, they power autonomous lawnmowers such as the Indego S+ and new high-performance tools such as the Biturbo tools for professionals. "Innovations such as Biturbo will be the drivers of our business," said Henk Becker emphasizing the trend towards ever smaller and more powerful tools. "We are continuously expanding our cordless systems in order to offer users, through our 50 years of accumulated expertise in batteries, many other innovations which ideally fulfill their needs."

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The Robert Bosch Power Tools GmbH, a division of the Bosch Group, is one of the world's leading providers for power tools, power tool accessories and measuring tools. In 2018, its roughly 20,000 associates generated sales of 4.6 billion euros, about 85 percent of which outside of Germany. With brands such as Bosch and Dremel, the division stands for customer focus and great engineering progress. The core success factors are innovative strength and pace of innovation. In 2019, Bosch Power Tools will again launch more than 100 new products onto the German market in its four business segments power tools, accessories, measuring tools and garden tools.

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

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