

Power electronics

Company Core Technology

Background

Countless products and systems, from intelligent energy systems and industrial drives to CT scanners, would not be possible without power electronics. That's because power electronics are used wherever the form or frequency of electricity must be modified. Power conversion is the primary function of power-electronic converters to provide electric power in the right place at the right time and in the appropriate form and quality. Power electronics are therefore a basis for electrification, since they operate whenever electric energy is generated, transmitted, consumed or stored.

Power electronics are becoming increasingly important in our electrified world. When it comes to energy savings and the resulting reduction of CO₂ emissions, power electronics play a major role in providing solutions for the integration of renewable energy sources into power grids and for hybrid and full electric vehicles as well as public transport. In our digital world, power electronics also play a fundamental role as an access point for services within the Internet of Things – power electronics being the prime data source and the place for control execution.

Importance for Siemens

The global market for power-electronic converters is steadily growing and is expected to reach €36 billion in 2022. New applications such as renewable sources of electric power, DC infrastructure, energy storage, robotics and e-mobility make up the mass markets for power electronics. Residential photovoltaics, storage, and electric vehicles, for example, require faster innovation cycles.

Key elements of data acquisition and the active influence on power infrastructures will increasingly make power-electronic devices subject to individualization with regard to offered functionalities.

But the market size is not the only thing relevant for Siemens – the huge applications of power electronics is equally important. An increasing number of electrical and electronic devices are being interconnected through the Internet. Hardware- and software-based systems are getting smarter, and their functionalities are growing. This means that power electronics are becoming more and more important to the Siemens business as a whole.

The next inverter generation places high demands on developers. This is because the structure of future inverters must be standardized and adaptable so that they can be easily integrated into overarching systems. Consequently, a high degree of functional integration, standardization of interfaces and a rich spectrum of software-defined functionalities are key. New semiconductor materials allow for highly compact designs, high reliability, robustness and increased efficiency in power conversion.



SIEMENS

Ingenuity for life

Virtual prototyping of power-electronic systems in hardware and software that use integrated PLM-tool-chains and modular architectures facilitate rapid design cycles, thereby shortening the time-to-market. And standardization of power-electronic hardware enables software-defined individualization of functionalities.

Further information

[siemens.com/innovationday](https://www.siemens.com/innovationday)
[siemens.com/press/inno2017](https://www.siemens.com/press/inno2017)

Success stories and research focus

Siemens experts analyze power-electronic systems along the entire value chain to optimally combine the physical and digital worlds in the areas of industry and energy. When it comes to "Company Core Technology – Power Electronics", these experts focus on three main topics:

- With functional integration, they integrate components such as sensors, semiconductors, control and cooling systems – formerly individual units – into products and add new functionalities to them. These technologies increase customer value, power and efficiency, reduce volume and also cut system costs.
- Flexible, modular and scalable architectures to reduce time-to-market and enable individualization.
- The development of intelligent software-defined converter systems. The aim of the Siemens experts is to redefine the development of power-electronic systems as well as the way they are integrated in cloud environments.

The first prototypes have already been successfully transferred to the Siemens business units.