

CELEROTON ULTRA-HIGH-SPEED ELECTRICAL DRIVE SYSTEMS

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Celeroton
ultra-high-speed electrical drive systems

Problem

Emerging all-electrical dental and medical drills, next generation PCB drilling spindles for the microelectronic market, ultra-compact compressors for heat pumps and air conditioning and fuel cells for future cars all have in common the strong demand for ultra-high-speed electrical drive systems with speeds up to 1 million rpm. For these ultra-high speeds, the traditional machines and electronics are not feasible anymore. In addition, the single parts of a drive system cannot be developed independently. An optimal design must include all system components from software to mechanics to the final product. Furthermore, due to the highly compact designs, no position sensors can be placed within the housings.

Solution

Celeroton's ultra-high-speed electrical drive systems (motor and electronics) allow for sensorless speed control of the electric motor up to speeds of 1 million rpm. The systems are based on research and prototypes realised at the Power Electronic Systems Laboratory of the Swiss Federal Institute of Technology (ETH) Zurich. These miniaturised ultra-high-speed electrical drives resolve several industry needs such as

- Highly lightweight and compact systems
- Increase in productivity
- Higher efficiency

With ultra-high-speed electrical drive systems, several new products become feasible, such as ultra-compact and lightweight compressors for the automotive industry and home appliances as well as the replacement of air turbines for dental and medical drills.

