Depending on the load requirements, various different concepts can be applied. An important factor is the maximum interruption time at which continued operation of the system is still guaranteed. Another significant role is played by the connected load to be secured or switched over.

For extreme transfer demands in the microsecond range, only Thyristor-based, static systems are considered. However, these typically have a limited connected load capacity, require considerable investments and have considerably high running costs, e.g. due to permanent losses through the cooling system. For this reason, their use is usually reserved to the protection of important mainframe computer systems.

Large rotating loads, such as pumps or fans, can often be switched over with simple, e.g. residual voltage dependent transfers in the range > 300 ms.

Research has shown that there is a growing need for transfer systems which allow transfer times between these two alternatives.

Here, we describe a transfer system based on optimized medium voltage circuit breakers which obtains transfer times of 30 ms. With this transfer time, industrial load groups, which are normally characterized by a mixture of rotating and non-rotating loads, can be operated continuously, without interruption.

**Control of the High Speed Transfer System**

The control system of the transfer system must guarantee both the shortest possible processing time and the highest possible level of safety. The control sy-
The system is based on the High Speed Transfer Device from ABB [1], which has proven itself in use in power plants and industrial facilities. The system is alerted via optimized under- or overvoltage detection as well as power direction recognition, ensuring fast initiation of the transfer. All general technical conditions affecting the implementation of the transfer are monitored and taken into account by the system.

If the prerequisites for a transfer are met, a open command is issued to the supplying circuit breaker and a close command is sent to the circuit breaker of the stand-by feeder simultaneously.

**Optimized switching device: Circuit breaker in vacuum technology**

As a switching device the ABB circuit breaker type VM 1-T in vacuum technology is used. With regard to its response time, this circuit breaker with magnetic drive was considerably optimized for the High Speed Transfer System and achieves an opening time of 9 ms as well as a closing time of 16 ms. It is available for operating currents from 24 kV and nominal currents of up to a maximum of 2 500 A.

**Example of use – Shipping Center**

Otto [2], the worlds mail-order-business leader operates a Shipping Center for small volume articles (Fig. 2) in the town of Haldensleben in Saxony-Anhalt, Germany. Thanks to its highly automated material flow systems, the logistics center is a central element of Otto’s logistics, and also plays a major role in providing the customer with excellent service.

The Shipping Center is supplied by a total of 12 1-MVA transformers from four medium voltage stations. Lighting, ventilation/air conditioning and materials handling make up each a third of the electrical load in the logistics center.

When the asynchronous motors run in generating mode following a supply failure, the consumers are supplied with usable energy to support the process for short periods of time through the existing rotating machines in the domestic and conveying technology areas.

**Literature**


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**Fig. 2.** The Otto Shipping Center in Haldensleben, Saxony-Anhalt, Germany

**Fig. 3.** Oscillogram of a 30 ms transfer in the Haldensleben Shipping Center

- U1 Voltage of the main feeder
- U2 Voltage of the stand-by feeder
- U3 Voltage of the busbar

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Dipl.-Ing. (FH) Kai Jantke (39) studied electrical engineering for energy management at Hamburg Technical College. He is responsible for energy management and automation in the technology and buildings department at Otto GmbH & Co KG, Hamburg. E-mail: kai.jantke@otto.de

Dipl.-Ing. Ralf Krumm (36) studied electrical engineering for electrical energy technology at the University GH Siegen. He is a group leader with responsibility for product management and also for development coordination of High Speed Transfer Devices at ABB Calor Emag Hochspannung GmbH in Mannheim. E-mail: ralf.krumm@de.abb.com

Dipl.-Ing. (FH) René Vieille (36) studied electrical engineering for electrical energy systems at the Magdeburg College of Mechanical and Electrical Engineering. He is technical procurator of the public utility facility Haldensleben GmbH and is responsible for the entire technical department. E-mail: rene.vieille@swhdl.de