

## **A cutback in energy loss – High efficiency storage choke in new Dynamic Energy Storage device**

*Graben-Neudorf, Germany, May/June 2012.* Saving energy that would otherwise have been wasted and storing it for use when needed later – that is the function of the Dynamic Energy Storage device (DES) from German company Michael Koch GmbH, a manufacturer of braking resistors. The storage choke installed in the Dynamic Energy Storage device is supplied by SMP and its high level of efficiency and low power loss are important elements in the energy-efficient design of the energy storage device.

"We were thinking about an option that would function independently of the network to replace the braking resistor and store energy in certain cases long before the development of our DES", says Michael Koch, managing director of Michael Koch GmbH. The result of these deliberations was unveiled by the company at the Hannover Trade Fair in 2011.

The Dynamic Energy Storage device (DES) increases the energy efficiency of an electric drive system. It provides storage capacity in the order of about two kilojoules. As a temporary storage device it collects the kinetic energy from one or more drive units that has been converted into electrical energy, and releases this back into the system as it is needed. As a peripheral device for frequency inverters or servocontrollers, the DES serves as a network-independent solution for tasks that were previously performed by network-sensitive recovery units or ballast resistors that dissipated energy. With short repeat times there is also nothing to rival the intelligence of the DES, which renders configuration and even commissioning unnecessary. For example, if its full capacity is used every five seconds in electric drive technology applications, the energy savings in a three-shift operation over the course of a year are equal to about 3500 kilowatt hours.

### **Storage choke with low power loss**

"For our DES, we use a storage choke that has been specially designed by SMP for temporary storage of the electrical energy in the energy storage device", continues Koch.

"The deciding factor in our choice was its relatively low power loss and the professional consulting service we received from SMP managing director Vasilios Gemenetzis and sales manager Stefan Schauer. We were very impressed by the company's excellent response

time as well as the extremely rapid delivery of samples, practically within hours, and the fast time to delivery of an initial series“, Koch continues warmly. Of course, the physical proximity of SMP and Michael Koch GmbH – there are only twelve kilometres between them – is no small advantage for the purpose of cooperation. The meetings that were essential for resolving technical questions could be arranged easily and conducted face-to-face.

The storage choke is used in a standard buck-boost inverter. An electrolytic capacitor is charged from a high to a lower voltage via the buck converter function. The boost converter function is used to support the DC intermediate circuit with the energy from the electrolytic capacitor. In both cases, the electrical energy is "buffered" in the storage choke.

### **Good EMC behaviour and compact design**

SMP Sintermetalle Prometheus GmbH & Co KG (SMP) provides inductive components for frequency inverters in a wide range of industrial applications. These are generally low-loss, have good EMC behaviour and are of compact design. When integrated in the input area of the frequency inverter they are responsible for energy recovery. In the output area of the inverter they serve as filter chokes. Because of their compact design and low noise output the chokes are also used as stand-alone chokes and in a common mode configuration in the intermediate circuits of the frequency inverters.

### **High efficiency and low stray field**

The core material of the chokes consists of low magnetorestriction powder composites, which are developed individually by SMP for each application. These materials have exceptionally low eddy current and hysteresis losses, so the inverters are extremely efficient. The choke's closed construction also ensures a low-intensity stray field. Accordingly, this makes it possible for other components to be positioned around the chokes without exposing them to magnetic influences from the choke. The space-saving configuration has enabled the volume of the assembly to be reduced by about 25 percent. In addition, chokes from SMP run exceptionally quietly, so the inverters can also be installed in residential areas.

SMP chokes are designed for frequencies up to 200 kiloHertz and currents as high as 1000 Ampere. They are available with diameters ranging from 36 to 300 millimetres with weights of 50 grams to 130 kilograms. Protection types from IP00 to IP66 are available according to the intended application. The chokes can be used in temperatures up to 180° Celsius. All components are compliant with RoHS and REACH restrictions, the materials used are UL

listed. The inductive components are suitable for use in inverters for wind turbines, solar inverters, railway technology, medical engineering as well as drive technology and power electronics.

**Photos:**

Photo 1: Cross-section through an SMP storage choke wrapped in a high-frequency wire strand

Photo 2: The DES energy storage device by Michael Koch stores braking energy

**SMP at the following trade shows:**

Intersolar 2012, 13 to 15 June 2012, Neue Messe Munich, Germany: Hall A6 Stand 456

Electronica 2012, 13 to 16 November 2012, Neue Messe Munich, Germany: Hall B6 Stand 153

**Company information:**

SMP Sintermetalle Prometheus GmbH & Co KG develops and manufactures inductive components and magnetically soft materials, cores and mouldings. Based in Graben-Neudorf near Karlsruhe, Germany, the company was founded in 1982 by Vasilios Gemenetzis and today employs 150 people. Research and development have been key aspects of the company's philosophy ever since its foundation. SMP's product range includes low-loss inductive custom components based on in-house-developed powder composites, such as filter, commutating, step-up converter, power recovery and single-conductor chokes. Many of its products are used in the railway industry. The market for inverters for photovoltaic systems that feed solar energy into the electricity grid and for converters for wind turbines is also experiencing strong growth. SMP has become one of the key global suppliers of magnetically soft materials for industrial applications, serving customers throughout the world.

**Contact:**

SMP Sintermetalle Prometheus GmbH & Co. KG  
Ottostraße 4  
D-76676 Graben-Neudorf, Germany  
Tel: +49 (0)7255 716 0  
Fax: +49 (0)7255 716 160  
E-mail: [info@smp.de](mailto:info@smp.de)  
Internet: [www.smp.de](http://www.smp.de)

**PR Contact:**

TPR International  
Christiane Tupac-Yupanqui



**Sintermetalle Prometheus  
GmbH & Co KG**

D-76676 Graben-Neudorf

[www.smp.de](http://www.smp.de)

PO Box 11 40

D-82133 Olching, Germany

Tel: +49 (0)8142 44 82 301

Fax: +49 (0)8142 44 82 302

Email: [c.tupac@tradepressrelations.com](mailto:c.tupac@tradepressrelations.com)

Internet: [www.tradepressrelations.com](http://www.tradepressrelations.com)

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