



Press release

Nexans supplies the world's first high temperature superconductor contactless bearing to go on test for an industrial application

Paris, 21 September 2005 – Nexans, worldwide leader in the cable industry, has supplied the world's first contactless bearing based on high-temperature superconductors to go on test for use in an industrial application. The customer for this prototype is Siemens AG's Corporate Technology division, which is evaluating it for use in electrical machinery.

Siemens is carrying out intensive research on high-temperature superconductors (HTS), and recently started operation of a 4 MVA generator designed for ships, containing a rotor with an HTS magnet. The HTS' high current densities result in compact designs for engine and generator applications. This is especially important in marine applications, where low weight and small dimensions allow efficient use of space and permit new types of ship design that cannot be realised using conventional engines. The contactless HTS bearing also benefits from the high current densities in the HTS, though in this case these help to keep a rotating shaft suspended in a magnetic field.

With the help of a magnetic field, the HTS bearing holds a rotor equipped with permanent magnets in contactless suspension, and can bear a nominal load of 500 kg. The bearing was developed and built by Nexans SuperConductors GmbH (NSC), based in Hürth (Germany), in collaboration with Nexans' refrigeration technology experts in Hanover and designed in cooperation with specialists at the IMAB Institute at the Brunswick Technical University. The superconductors were manufactured and assembled in Hürth. The copper stator that bears the superconductor and the rotor were also developed and produced at NSC.

A "safe" technology

"HTS bearings are inherently safe, something which distinguishes them from other contactless bearings", explains Dr. Joachim Bock, the Managing Director of NSC. Permanent magnets alone cannot produce a stable state. Bearings based on electromagnets (active magnetic bearings) require a constant current supply to make the control adjustments to balance the load. The passive HTS bearing does not require this type of regulation as the YBCO (yttrium barium copper oxide) crystals react individually when they approach the rotor's permanent magnets – here arranged in a ring form: the super conductor becomes a permanent magnet under the influence of

an external magnetic field. *“This HTS permanent magnet keeps the shaft in a stable position by levitation and also counterbalances radial and lateral forces”*, explains Jean-Maxime Saugrain, Nexans’ superconductor activities Manager.

270 superconductor elements

The HTS cylinder consists of 270 individual YBCO bulk crystals produced by NSC which are arranged on a copper body with a diameter of around 325 mm and a height of 305 mm. A refrigerating machine cools the copper cylinder containing the superconductors to around -210°C. A 10⁻⁷ mbar vacuum in the bearing prevents the icing that would occur due to freezing of moisture in the atmosphere. The stator’s copper mass retains the low temperature, enabling the bearing to bear its load for several more hours even if the refrigerating machine breaks down.

Tested within Siemens

After pretesting at NSC the HTS bearing is currently undergoing thorough tests at Siemens. Reliable operating data will be gathered and limit values for utilisation in rotating machinery will be produced. It has already proved its main qualities on the test bench: it can be cooled to -245°C (the minimum requirement was -210°C), can bear a load of up to 690 kg (the minimum requirement was 500 kg) and can support engine speeds of up to 3,600 revolutions/min. The bearing gap also represents an outstanding achievement, as the rotor equipped with permanent magnets runs in the “warm bore” in a gap just 1 mm wide. There is also only 1 mm distance between the insulating cryostat wall and the HTS material at a temperature of -245 °C. Differential temperatures of up to 270°C are insulated over this short distance.

About Nexans

Nexans is the worldwide leader in the cable industry. The Group provides an extensive range of advanced copper and optical fibre cable solutions for the infrastructure, industry and building markets. Nexans cables and cabling systems can be found in every area of people’s lives, from telecommunications, information and energy networks in aeronautics and aerospace, the automobile industry, railways and construction to petrochemical and medical applications. With an industrial presence in 29 countries and offices and commercial activities across the world, Nexans employs 20,000 people and generated sales of EUR 4.8 billion in 2004. Nexans is listed on the Paris stock exchange. You can find further information at www.nexans.com.

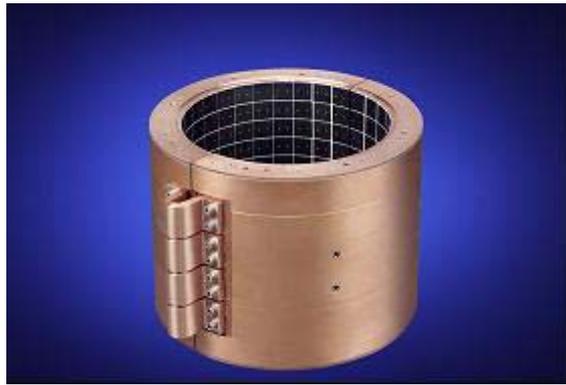
Nexans develops and manufactures superconducting materials, components and systems, in particular superconducting cables and fault current limiter elements, as well as flexible and rigid cryostats which constitute key components for superconducting systems.

About Siemens Corporate Technology

In the 2003/2004 financial year, Siemens invested EUR 5.1 billion in research and development. More than 45,000 staff are employed in research and development across the world. With 48,000 current patents, the Group is a world leader in this area. The Corporate Technology (CT) central department employs more than 1,700 staff in key and cross-sectional technologies that impact on all managerial areas. Within Siemens, CT is also responsible for global patent management, environmental protection, work on international standardisation committees as well as the Corporate Information Research Centre. You can find out more on the internet at www.ct.siemens.com. Current press releases, including releases on the HTS generator, are available under “CT press”.



Cryogenic housing with cooling machine



HTS cylinder with 270 individual YBCO crystals
monted in two copper half shells

Contacts :

Press

Céline Révillon

Tél. : +33 (0)1 56 69 84 12

Celine.revillon@nexans.com

Investors Relations :

Michel Gédéon

Tél. : + 33 (0)1 56 69 85 31

Michel.gedeon@nexans.com