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What's New in the World of Superconductivity (August and September)

Power

American Superconductor Corporation (September 5, 2007)

American Superconductor Corporation (AMSC) has received a follow-on order from a major U.S.-based semiconductor chip manufacturer for a Power Quality Industrial Voltage Restorer (PQ-IVR). The customized device, rated at 107 MVAR and including 10 D-VAR® modules, will be utilized at a large wafer fabrication facility in Southeast Asia. The order marks the third substantial order for a full-factory power quality solution from the semiconductor industry and is also the first order for which a PQ-IVR will be shipped outside of the U.S. The PQ-IVR will be used to prevent momentary sags in voltage, which account for more than 90% of factory downtime. PQ-IVR solutions are installed at the interface between the power lines and the factory, where they detect voltage disturbances and instantly restore the voltage to the normal level, thereby protecting sensitive microprocessor-based manufacturing equipment. AMSC expects to commission the PQ-IVR at the Southeast Asian facility during the first half of calendar 2008.

Source:

"AMSC Receives Follow-on Order from Semiconductor Chip Manufacturer for Power Quality Solution"

American Superconductor Corporation press release (September 5, 2007)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1048065&highlight

American Superconductor Corporation (September 18, 2007)

American Superconductor Corporation (AMSC) has received a follow-on order from Sinovel Wind Corporation (Beijing, China) for approximately US$ 20 million in wind turbine electrical systems. The order follows a $70 million order that was received from Sinovel Wind in July 2007. The present order will be shipped within AMSC's fiscal year 2008 (ending March 31, 2009); the power electronics systems will be utilized in Sinovel's 1.5-MW wind energy systems. Greg Yurek, founder and chief executive officer of AMSC, commented, "AMSC's wind power business continues to expand globally, with China serving as our largest market. As Sinovel Wind continues its rapid production ramp, we are also working closely with two additional customers in China to help them initiate production of wind turbines in order to meet China's growing demand for zero-emission, wind generated electricity. We see strong potential to add a fourth Chinese customer this fiscal year and are working with other potential customers to expand our reach into other countries." The Global Wind Energy Council estimates that approximately 1,347 MW of wind-generated electrical capacity was installed in China in 2006 and expects that 8,000 MW of additional capacity will be added between 2007 and 2010.

Source:

"AMSC Receives Follow-on Order for $20 Million in Power Electronics for Chinese Wind

Turbines"
American Superconductor Corporation press release (September 18, 2007)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1052543&highlight

Zenergy Power plc (September 24, 2007)

Zenergy Power plc has received its first commercial order for a full-scale HTS induction heater. The order was placed by the industrial aluminum supplier, Weser Alu GmbH; Weser Alu will install the HTS heater as a replacement for an existing copper-based aluminum heater in its manufacturing facility in Minden, Germany. The HTS unit will reduce the amount of energy required to heat one ton of aluminum by nearly half: from about 270 kWh to just below 160 kWh. In addition to an energy efficiency level of over 90% (compared with 35% to 45% for conventional copper-based induction heaters), the HTS induction heater requires a shorter heating time, produces a considerably better temperature distribution, and will increase productivity levels, compared with the characteristics of conventional induction heaters. Weser Alu and other potential customers have commented that these performance characteristics make HTS induction heaters significantly advantageous, compared with conventional induction heaters. Zenergy believes that this order represents the first sale of an industrial-scale commercial device utilizing HTS materials.

The initial unit, which completed development and testing just four months ago, was developed and built by Bültmann GmbH and Zenergy with the aid of the German Environmental Fund. Dirk Schötz, Head of The Climate Protection and Energy Department of the German Environmental Fund, commented, 'As an environmental fund, it is our responsibility to seek out – and invest in – technologies and products capable of making a positive impact on the way in which businesses carry out industrial processes. Zenergy's induction heater is one such product, and furthermore is one of a rare category of products that are capable of aligning the interests of business with those of the environment. It is for this reason that we supported the development of the HTS induction heater, and it is for the same reason that we now witness such a rapid adoption of the technology by its target industry. The cost savings, productivity performance and environmental benefits make the induction heater a compelling product, and we are proud to have assisted in its development.' The current annual market for induction heaters is estimated to be 2 billion euros.
Source:
"Commercial Order for Full Scale HTS Induction Heater"
Zenergy Power plc press release (September 24, 2007)
http://www.trithor.com/pdf/press-en/2007-09-24-IH-Sale.pdf

American Superconductor Corporation (September 25, 2007)

American Superconductor Corporation (AMSC) has introduced a Static VAR Compensator (SVC) product line and has received its first transmission-level SVC order from the Bonneville Power Administration (BPA), the operator of 75% of the high-voltage transmission grid in the Pacific Northwest. The SVC will provide 95 MVAR of dynamic reactive compensation for a transmission line in Oregon. AMSC expects to commission the device in early 2009.

The SVC product line is based on AMSC's proprietary thyristor switch technology, which

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AMSC obtained during its acquisition of Power Quality Systems, Inc. (PQS), in April 2007. PQS had previously installed over 60 similar thyristor-based systems throughout North America. These solutions are utilized by utilities to dynamically control voltage, thereby maintaining a high reliability and preventing grid instabilities. The thyristor switch technology enables SVC systems that have a lower initial cost as well as lower energy and maintenance costs in addition to a smaller footprint, compared with conventional SVC systems. AMSC is the only North American manufacturer of SVCs for the growing transmission grid market. AMSC estimates that the current annual power grid market for reactive compensation solutions is at least $250 million, worldwide. This market is expected to grow considerably as global demand for electricity increases and as grid operators invest to improve the reliability of their power grids.
Source:
“AMSC Introduces Static VAR Compensator Product Line and Receives First Order”
American Superconductor Corporation press release (September 25, 2007)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1055083&highlight

Zenergy Power plc (September 26, 2007)

Zenergy Power plc has been commissioned by a global metals producer to adapt their HTS induction heater design specifically for the processing of heavy non-ferrous metals. This specialized HTS induction heater will be used to heat heavy non-ferrous metal billets under very demanding industrial conditions. Zenergy’s proprietary HTS components will enable the heater to realize significant reductions in energy consumption, with consequent savings in operating costs and reductions in carbon emissions. Zenergy considers this commitment of funds as a significant commercial endorsement of the benefits enabled by the efficiency of their HTS induction heater technology.
Source:
“HTS Induction Heater Design Contract”
Zenergy Power plc press release (September 26, 2007)
http://www.trithor.com/pdf/press-en/2007-09-26-HTS-IH-Design_Contract.pdf

Magnet

HTS-110 (August 3, 2007)

HTS-110 (New Zealand) has shipped a 5-T HTS beamline magnet to the Hahn-Meitner Institute (HMI; Berlin, Germany). The magnet will be utilized for magnetic diffraction research at the Berlin Electron Synchrotron (BESSY), Germany’s advanced synchrotron radiation facility. The magnet, which weighs less than 100 kg and occupies slightly more space than a carry-on suitcase, is the most powerful magnet that HTS-110 has completed to date, achieving a magnetic field of 5.4 T during testing. The magnet is cooled by a pulse tube cryorefrigerator, enabling low-maintenance cooling and quiet, low-vibration operation. Professor Michael Meissner, head of the sample environment group at HMI, elaborates, "The HTS-110 cryomagnet has been designed to adopt a 3-stage closed cycle refrigerator (CCR) that allows rotation of the sample in the field. This kind of unique set-up marks a milestone in cryogen-free

sample environment systems for beamline condensed matter research, allowing experiments to be performed at temperatures from 0.6 K to 600 K and at magnetic fields up to 5.4 T."

HTS-110 expects to ship a second 5-T HTS beamline magnet to the Australian Nuclear Science and Technology Organization (ANSTO) in the near future.

Source:
"HTS-110 ships class-leading 5 tesla beamline magnet to HMI, Germany"
HTS-110 press release (August 3, 2007)
http://www.hts-110.com/news/coverage/5T-HMI-BESSY.html

Quantum Computer

National Institute of Standards and Technology (September 26, 2007)

Researchers at the National Institute of Standards and Technology (NIST) have successfully transferred information between two qubits via microwave energy along a microfabricated aluminum cable. The setup, which resembles a miniaturized cable-television transmission line, includes superconducting circuits and multi-tasking data bits that obey the rules of quantum physics. This "quantum bus" could potentially be utilized in ultra-powerful quantum computers. Furthermore, the superconducting components utilized in the set-up offer the added benefit of being easier to manufacture and scale up to a commercial level than many competing candidate technologies for the storage and transfer of data in a quantum computer. Ray Simmonds, an NIST physicist who worked on the project, commented, "We tested a new element for quantum information systems... [that is] really significant because it means we can couple more qubits together and transfer information between them easily using one simple element." The research was reported in the September 27 issue of *Nature*. Together with the results reported simultaneously by a Yale University group in the same issue of *Nature* (see below), the NIST and Yale results demonstrate three essential actions required for the basic functions of a superconductor-based quantum information processor of the future.

In addition to storing and transferring information, NIST's resonant cable can also be utilized to "refresh" superconducting qubits. With design improvements, the NIST technology might be used to repeatedly refresh data and extend the lifetime of qubits by more than 100-fold, enough to realize a viable short-term quantum computer memory. The cable could also theoretically be used to transfer quantum information between matter and light, enabling quantum computers to be linked to ultra-secure quantum communications systems.

The NIST research was supported in part by the Disruptive Technology Office.

Source:
"Digital cable goes quantum"
National Institute of Standards and Technology press release (September 26, 2007)
http://www.nist.gov/public_affairs/releases/quantum_cable.html

Yale University (September 26, 2007)

Scientists at Yale University have taken two major steps toward the realization of quantum computers. The scientists have been investigating the use of solid-state devices (resembling microchips) as the basic building blocks for the design of a quantum computer.

Now, the team has successfully sent a photon signal on demand from a superconducting qubit onto a wire and has transmitted the signal to a second, distant qubit on the same chip. This accomplishment marks the move of quantum computing from “having information” to “communicating information”. Previously, information in a superconducting system could only be transferred from one qubit to a neighboring qubit. The Yale team, however, was able to engineer a superconducting communication “bus” that can be used to store and transfer information between distant qubits on the same chip. Additionally, the team has also succeeded in developing a photon source that can consistently produce discrete microwave photons. The group views their success as the first step toward making the fundamentals of quantum computing useful. Their approach could, in principle, be extended to multiple qubits, connecting the parts of a future, more complex quantum computer. The Yale team’s accomplishments were reported in sequential issues of *Nature* (September 20 and September 27).
Source:
“Yale scientists make 2 giant steps in advancement of quantum computing”
Yale University press release (September 26, 2007)
http://www.yale.edu/opa/newsr/07-09-26-01.all.html

Communication

Superconductor Technologies Inc. (September 24, 2007)

Superconductor Technologies Inc. (STI) has signed a term sheet to form a joint venture with Hunchun BaoLi Communication Co. Ltd. (BAOLI). The joint venture will focus on the manufacturing and marketing of STI’s SuperLink® interference elimination solution for the Chinese market. STI will provide an exclusive license for the enabling technology, while BAOLI will provide the manufacturing expertise and financing. The joint venture will collaborate with China’s Ministry of Information Industry and related organizations to conduct evaluations of the SuperLink ® technology for possible deployment by China Telecom, China Mobile, Netcom, Unicom Railcom, and Satcom. The term sheet awards BAOLI 55% of the joint venture’s equity, while STI will receive the other 45% plus a royalty on sales. The two parties expect to sign a binding definitive agreement by the end of 2007. QiangHua Shao, General Manager of BAOLI, commented, "With SuperLink's proven field performance and the expected cost reductions from manufacturing in China, we believe this strategic relationship can deliver solutions needed by China's new 3G network. The telecom market in China has a complicated spectrum plan, with no guard band between some of the neighboring channels. By reducing interference and increasing base station sensitivity, the sharp filtering of STI's SuperLink solution can offer significant advantages."
Source:
“Superconductor Technologies Signs Term Sheet for Joint Venture With Hunchun BaoLi Communications”
Superconductor Technologies Inc. press release (September 24, 200)
http://phx.corporate-ir.net/phoenix.zhtml?c=70847&p=irol-newsArticle&ID=1054844&highlight

ISCO International, Inc. (September 25, 2007)

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ISCO International, Inc., has released a new state-of-the art duplexer/filter solution as part of its RF^2 family of products. The new duplexer/filter solution recently completed a field evaluation with a major US CDMA wireless operator, in which it provided unprecedented adjacent frequency band protection. The ISCO solution replaced a significantly more costly and complex competitor's solution, while providing superior overall performance. The customer has placed more than US$700,000 in orders for the new ISCO RF^2 duplexer/filter solution, which should be delivered in the fourth quarter of 2007.

Source:
"ISCO International Unveils High Performance Duplexer/Filter"
ISCO International, Inc. press release (September 25, 2007)
http://www.b2i.us/profiles/investor/ResLibrary.asp?ResLibraryID=21556&f=1&BzID=826&Nav=1&LangID=1&s=0&Category=135

(Akihiko Tsutai, Director, International Affairs Department, ISTEC)

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