

What's New in the World of Superconductivity (June, 2007)

Power

American Superconductor Corporation (June 20, 2007)

American Superconductor Corporation has filed a registration statement with the Securities and Exchange Commission for a proposed public offering of 4,700,000 shares of its common stock. The offering will include an option for the underwriters to purchase up to an additional 705,000 shares to cover any over-allotments. The securities may not be sold nor may offers to buy be accepted until the registration statement becomes effective. The bookrunner for this offering will be Morgan Stanley.

Source:

"AMSC Announces Filing of Registration Statement for Public Offering"

American Superconductor Corporation press release (June 20, 2007)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1017694&highlight

Trithor GmbH (June 25, 2007)

Trithor GmbH, a member of the Zenergy Power Group, has announced that its HTS electromagnetic coils have successfully completed an extensive testing and technical evaluation period and are now qualified for use in commercial wind power generators. The tests were conducted by Converteam Group SAS, who reported electrical performance, electrical capacity, and electrical efficiency levels that exceeded expectations. Converteam has since placed a commercial order with Zenergy worth more than €600,000. As announced earlier, Zenergy and Converteam have agreed to jointly develop, manufacture, market and sell a range of compact, lightweight, and high-efficiency power generators for the global wind and small hydropower markets. Such generators are expected to reduce the cost of producing offshore wind power energy by 25%. The successful technical evaluation marks a key step towards realizing the commercial goals of both Zenergy and Converteam within the wind power markets.

Source:

"Successful Qualification of HTS Coils for Wind Power Generators"

Trithor GmbH press release (June 25, 2007)

<http://www.trithor.com/pdf/press-en/2007-06-25-Commercial-Order.pdf>

U.S. Department of Energy (June 27, 2007)

The U.S. Department of Energy (DOE) has announced that it will provide up to US \$51.8 million for five cost-sharing projects with the goal of advancing the development and application of HTS technology and modernizing the electricity grid in the U.S. Specifically, two of the research projects will focus on increasing the reliability and efficiency of power delivery cables, while the other three projects concern the development of fault current limiters. The projects, which are expected to last two to five years, will be managed by the DOE's National Energy Technology Laboratory. The projects will be funded using a cost-sharing scheme between the

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DOE and the selected teams, for a total project value of \$103.6 million. The DOE funding will be allocated in fiscal years 2007 – 2012, subject to appropriation from Congress. Further details of the five projects are as follows:

- 1) Power Delivery Equipment – **Southwire Company** (DOE cost share: \$13.3 million): A 13.8-kV superconducting cable will be used to connect two existing substations to solve electrical load problems in downtown New Orleans. The team also includes Oak Ridge National Laboratory and nkt cables (Germany).
- 2) Power Delivery Equipment – **American Superconductor Corporation** (DOE cost share: \$9 million): Key components required for the commercial deployment of a second-generation HTS superconductor cable and the demonstration of a single-phase prototype cable will be developed for deployment in the Long Island Power Authority (LIPA)'s power grid. In addition LIPA, the team also includes Nexans (France) and Air Liquide Advanced Technologies U.S. LLC.
- 3) Fault Current Limiters – **American Superconductor Corporation** (DOE cost share: \$12.7 million): A three-phase, high-voltage, 115-kV fault current limiter, called a SuperLimiter™, will be developed using second-generation HTS wire. The SuperLimiter™ will feature a proprietary low-inductance coil technology developed by Siemens that will make the fault current limiter “invisible” to the grid until it switches to a resistive state. The team includes Southern California Edison, Nexans (France), the University of Houston, Los Alamos National Laboratory, and Siemens AG.
- 4) Fault Current Limiters – **SC Power Systems** (DOE cost share: \$11 million): A 138-kV saturable reactor-type fault current limiter will be designed, tested, and demonstrated in the Southern California Edison (SCE) grid. In this design, a high-temperature superconductor and a direct current power supply are used to saturate an iron core that interfaces with the line in which the current must be limited. In addition to SCE, the team includes the Los Alamos National Laboratory, Air Products and Chemicals Inc., Cryo-Industries of America Inc., Consolidated Edison Company, California Edison Inc., Delta Star Inc., and Trithor GmbH (Germany).
- 5) Fault Current Limiters – **SuperPower Inc.** (DOE cost share; \$5.8 million): A 138-kV fault current limiter will be designed, tested, and demonstrated in the American Electric Power (AEP) grid. The fault current limiter will feature a matrix design consisting of parallel second-generation HTS elements and HTS coils. In addition to AEP, the team includes Sumitomo Electric Industries Ltd. (Japan), Nissan Electric Co. Ltd. (Japan), The BOC Group Inc., and the Oak Ridge National Laboratory.

Source:

“DOE Provides up to \$51.8 Million to Modernize the U.S. Electrical Grid System”

U.S. Department of Energy press release (June 27, 2007)

<http://home.doe.gov/news/5180.htm>

American Superconductor Corporation (June 28, 2007)

American Superconductor Corporation (AMSC) has announced that it will receive up to U.S. \$21.7 million in funding from the United States Department of Energy (DOE) for two new HTS projects. The projects consist of the in-grid deployment of an HTS cable and a fault current limiter (FCL) utilizing AMSC's second-generation HTS wire (branded as 344

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superconductors). The HTS power cable will be installed in the Long Island Power Authority (LIPA) power grid and will be a transmission voltage (138 kV) extension of the first-generation HTS cable system that is currently being installed. AMSC will act as the project manager and wire supplier, while Nexans will manufacture the cable and Air Liquide Advanced Technologies U.S. LLC will provide the cryogenics system. The DOE will provide \$9 million in cost sharing for this \$18 million project.

In the second project, AMSC will develop a three-phase 115-kV FCL using 344 superconductors; the FCL will then be tested in-grid. The FCL will feature a proprietary low-inductance coil technology developed by Siemens AG that will make the FCL 'invisible' to the grid until it switches to a resistive state. AMSC will manage the project, and Siemens, Nexans, the University of Houston, and the Los Alamos National Laboratory will participate. The DOE will provide \$12.7 million in cost sharing to this \$25 million project.

Greg Yurek, AMSC founder and CEO, commented, "We are delighted that the DOE has chosen AMSC to lead two superconductor projects in its initiative to modernize the U.S. power infrastructure. These DOE projects provide an immediate market for our 344 superconductors once we commence volume production of this wire in December 2007." AMSC also expects to compete for wire orders from one or more of three other DOE-funded power cable and FCL projects.

Source:

"AMSC Wins Two New Department of Energy Superconductor Power Grid Projects"

American Superconductor Corporation press release (June 28, 2007)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=1020516&highlight

Trithor GmbH (June 29, 2007)

Trithor GmbH, a wholly owned subsidiary of Zenergy Power plc, has announced that the U.S. Department of Energy has awarded a US \$11 million grant to Zenergy's wholly owned subsidiary, SC Power Systems, Inc. (California), for the design, testing, and installation of a high-voltage fault current limiter (FCL) in the Californian electricity grid. The new FCL will represent a scaled up version of Zenergy's proprietary grid stability device. SC Power will lead and coordinate the project team, which includes other members of the Zenergy Group (including Trithor); the Los Alamos National Laboratory; Delta Star, Inc.; Southern California Edison (SCE); and the Consolidated Edison Company of New York, Inc. The FCL will be tested in the SCE grid with support from Con Ed.

Source:

"US \$11 Million Grant from the U.S. Department of Energy for High-temperature Superconductor Fault Current Limiters"

Trithor GmbH press release (June 29, 2007)

<http://www.trithor.com/pdf/press-en/2007-06-29-DOE%20Grant.pdf>

Communication

National Institute of Standards and Technology (June 1, 2007)

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Researchers at the National Institute of Standards and Technology (NIST), in cooperation with NTT Corp. (Japan) and Stanford University, have sent a 'quantum key' – the latest in encryption technology – over a record 200-km fiber optic link. In addition to setting a distance record for quantum key distribution (QKD), the research also represents the first gigabit-rate experiment to produce secure keys. QKD systems transmit single photons with different electrical field orientations, representing 1s and 0s, that can be used to form quantum keys for the encryption and decryption of messages. Since eavesdropping changes the state of the photons, quantum encryption is theoretically unbreakable. A key component of the experiment was the use of ultrafast superconducting single-photon detectors. The Russian-made detectors, constructed from superconducting niobium nitride nanowires, have excellent timing resolution and a very low false count rate because of their low-noise cryogenic operation. The detectors operate on the principle that a single photon forms a hot spot when it hits the nanowire, increasing the current density at that points until it exceeds the critical current and forms a non-superconducting barrier across the nanowire, creating a voltage pulse. The starting edge of the voltage pulse pinpoints the photon's arrival time. The present experiment offers an approach to the use of practical inter-city terrestrial quantum communications networks, in addition to long-range wireless systems using communication satellites. The research was described in the June 1 issue of Nature Photonics.

Source:

"Long-distance record – 'Quantum keys' sent 200 kilometers"

National Institute of Standards and Technology press release (June 1, 2007)

http://www.nist.gov/public_affairs/releases/qkd_longdistance.html

ISCO International, Inc. (June 26, 2007)

ISCO International has reached an agreement with its lenders to restructure a debt facility that was due in August 2007. The debt, amounting to approximately US \$11.7 million in maturing principal and accrued interest (9%) will be restructured as follows: 1) \$1.5 million will be immediately converted into ISCO common stock (\$0.18 per share), and 2) \$10.2 million in convertible notes, at a 7% interest rate, maturing in August 2009 will be convertible into common stock at a fixed rate of \$0.20 per share. The new convertible notes are subject to the customary conversion features, closing procedures, and exchange-related approvals as well as shareholder authorization for 1) an increase in the number of shares available for issuance, and 2) the issuance of new shares upon conversion of the notes. John Thode, CEO of ISCO, commented, "Many shareholders have expressed concern regarding the upcoming maturing debt. I am pleased to announce that we have reached agreement with our lenders on a favorable restructuring of our debt. ...these two Lenders, including their affiliates, are also the two largest equity holders in the Company. We especially view their agreement to replace the debt with an equity convertible instrument, at a lower interest rate, and to reduce their secured debt position by adding additional equity as powerful affirmation of the Company's strategy."

Source:

"ISCO International Announces Debt Restructuring Agreement"

ISCO International, Inc. press release (June 26, 2007)

<http://www.b2i.us/profiles/investor/ResLibrary.asp?ResLibraryID=20423&f=1&BzID=826&Nav=1&LangID=1&s=0&Category=135>

Fusion

Oxford Instruments plc (June 26, 2007)

Oxford Instruments plc has announced that its wholly owned subsidiary, Oxford Superconducting Technology (USA), and Alstom Magnets and Superconductors (France) have formed an alliance to win supply contracts in the European Union for niobium-tin superconducting strands to be used in ITER, a joint international research and development project that aims to demonstrate the scientific and technical feasibility of fusion power. ITER will make extensive use of niobium-tin superconducting magnets to contain the fusion reaction and will require more than 500 tonnes of niobium-tin superconducting strands. At least 90 tonnes of these strands, with an expected market value of €47 million, are expected to be sourced from within the European Union. The Alstom-Oxford Instruments consortium will likely be one of four EU manufacturers of niobium-tin superconductors competing to supply ITER. Steven Parker, President of Oxford Superconducting Technology and the Commercial Director for Oxford Instruments plc, commented, "I am delighted with the opportunity to collaborate on the supply of conductor to ITER. OST's advanced niobium-tin strand design and manufacturing technology, coupled with the strong operational capabilities at Alstom, should provide a very robust platform from which we can jointly supply the ITER project."

Source:

"Alstom Magnets and Superconductors and Oxford Superconducting Technology announce EU alliance"

Oxford Instruments plc press release (June 26, 2007)

<http://www.oxford-instruments.com/wps/wcm/connect/Oxford+Instruments/Internet/Press/Current+News/Alstom+Magnets+and+Superconductors+and+Oxford+Superconducting+Technology+announce+EU+Alliance>

Accelerator

Argonne National Laboratory (June 8, 2007)

The Argonne Tandem-Linear Accelerator System (ATLAS), a leading facility for nuclear structure research in the United States, will receive an important upgrade. ATLAS is the world's first superconducting linear accelerator for heavy ions. The new upgrade is known as CARIBU – which stands for Californium Rare Ion Breeder Upgrade. The upgrade will enable the acceleration of neutron-rich fission fragments from a californium-252 source, thereby allowing the study of the neutron-rich nuclei that account for a large proportion of the heavy elements in the universe. Consequently, researchers will be able to study unstable isotopes that, until now, have been beyond the scope of current physics research facilities. Argonne physicist, Don Geesaman, commented, "CARIBU will make about 400 new beams available that we've never been able to accelerate before." CARIBU will cost US \$4.75 million, with \$3.6 million coming from new funding and the remainder coming from a redirection of ATLAS funding. The project is funded by the U.S. Department of Energy's Office of Nuclear Physics. The project is scheduled for completion in the second quarter of fiscal 2009.

Source:

“ATLAS upgrade allows scientists to reach even further for the stars”

Argonne National Laboratory press release (June 8, 2007)

http://www.anl.gov/Media_Center/News/2007/PHY070608.html

This article is published under the courtesy of Argonne National Laboratory.

CERN (June 22, 2007)

CERN has announced that the Large Hadron Collider (LHC)'s start up will now occur in May 2008. A number of minor delays occurring during the final months of the LHC's installation and commissioning in addition to one of the machine's components (the “inner triplet”) failing a pressure test have led to the dropping of a low-energy run originally scheduled for this year. The cooling of the LHC's first sector to its operating temperature of 1.9 K has taken longer than scheduled but has enabled the LHC's operations team to iron out teething troubles and to gain experience that will be invaluable to cooling the machine's seven remaining sectors. Lyn Evans, LHC Project Leader, commented, “The low-energy run at the end of this year was extremely tight due to a number of small delays, but the inner triplet problem now makes it impossible. We'll be starting up for physics in May 2008, as always foreseen, and will commission the machine to full energy in one go.” Tests on powering up the first sector have now begun, and the cool down of the second sector will soon commence.

The CERN Council has also agreed to increase CERN's funding for the years 2008 – 2011. CERN Director General Robert Aymar commented, “This is an important vote for the future of particle physics in Europe. It allows us to consolidate the laboratory's infrastructure, prepare for future upgrades of the LHC, and to re-launch a program of R&D for the long-term future.”

Source:

“CERN announce new start-up schedule for world's most powerful particle accelerator”

CERN press release (June 22, 2007)

<http://press.web.cern.ch/press/PressReleases/Releases2007/PR06.07E.html>

(Akihiko Tsutai, Director, International Affairs Department, ISTE C)

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