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

Power

American Superconductor Corporation (March 7, 2007) OK

American Superconductor Corporation (AMSC) has signed a definitive merger agreement to acquire Power Quality Systems, Inc. (PQS). PQS produces reactive compensation products known as Static VAR Compensators (SVCs) that are based on proprietary thyristor switch technology. The SVCs enhance the reliability of power transmission and distribution grids and improve power quality for manufacturing operations. Utilizing PQS's proprietary thyristor switch, AMSC expects to offer SVC systems that not only have a lower initial cost, but also lower energy and maintenance costs and a smaller footprint when compared with conventional products. Greg Yurek, founder and chief executive officer of AMSC, commented, "PQS sales to date have been mostly limited to municipal and co-operative electric utilities and smaller industrial operations. AMSC expects to utilize its worldwide sales force and business relationships with large electric utilities to accelerate the growth in sales of PQS's product line. In addition, by combining PQS product offerings with AMSC's control system technology and transmission grid engineering expertise, we expect to be able to more effectively address larger-scale SVC order opportunities from utilities. The addressable market for large-scale SVC solutions in the U.S. alone is approximately $100 million annually, and it is increasing rapidly as electric utilities focus on strengthening the nation's transmission infrastructure." The all-stock transaction is valued at approximately $3.8 million and is expected to close in April 2007. With the inclusion of Windtec and PQS, AMSC's Power Electronic Systems business unit is expected to increase its revenues from approximately $25 million in FYMarch2007 to at least $55 million in FYMarch2008.

Source:

"AMSC Strengthens Utility, Industrial and Wind Energy Product Offerings with Acquisition of Power Quality Systems, Inc."

American Superconductor Corporation press release (March 7, 2007)

http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=971175&highlight

Trithor (March 12, 2007) OK

Converteam Group SAS, an international developer of systems and customized solutions for the conversion of electrical energy, and Zenergy Power plc have entered into a five-year exclusive co-operation agreement to jointly develop, manufacture, market, and sell HTS generators in the global wind and small hydropower markets. As part of this agreement, Zenergy will become the exclusive supplier of HTS wires and coils for all of Converteam's commercial activities in these fields. The partnership has been built on a long working association between Converteam and Zenergy and represents a significant opportunity for both companies who expect offshore wind power to be potentially the largest and most commercially viable market for HTS technology. Converteam is presently leading a UK Department of Trade and Industry funded project to design an 8-MW direct-drive superconducting wind generator

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based on Zenergy's HTS technology. Zenergy and Converteam have already made encouraging progress within the small hydropower sector; in October 2006, the European Commission funded the installation of the world's first HTS hydro-generator (developed by Zenergy and Converteam) at E.ON Wasserkraft GmbH's commercial hydroelectric dam in Bavaria, Germany. Zenergy and Converteam regard the commercial interest of E.ON-WK in HTS generators as a persuasive endorsement of the improvement to economic return that HTS technology can bring to renewable power generation.
Source:
"Exclusive Co-operation Agreement for wind and small hydropower applications between Converteam Group SAS and Zenergy Power plc"
Trithor press release (March 12, 2007)
http://www.trithor.com/pdf/press-en/2007-03-12-Converteam-Zen-TT.pdf

American Superconductor Corporation (March 13, 2007) OK

Windtec™, a wholly owned subsidiary of American Superconductor Corporation (AMSC), has signed a multi-million-dollar wind energy system joint development contract with Sinovel Wind Corporation Limited (Beijing, China). In addition, AMSC has a prior delivery right to sell future electrical components to Sinovel, creating a significant follow-on business opportunity for AMSC. The recent order will significantly expand Windtec's business with Sinovel; since 2005, Sinovel has ordered electrical components for 785 1.5-MW wind energy systems. The new contract will enable Windtec and Sinovel to design and jointly develop 3- and 5-MW systems that Sinovel plans to market and sell worldwide. Sinovel will have the exclusive ownership and complete industrial and intellectual property rights for large-scale onshore and offshore wind turbines developed under this contract; the company plans to begin the series production of 3-MW systems in 2009 and 5-MW systems in 2010. As of the end of 2006, Sinovel had already signed more than US $1 billion in contracts for domestically made wind energy systems. One of its customers, China Huaneng, expects that up to US $36 billion may be spent to increase wind energy capacity in China by 2020.
Source:
"AMSC Signs Multi-Million-Dollar Contract to Develop Higher Power Wind Energy Systems for Chinese Market"
American Superconductor Corporation press release (March 13, 2007)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=973175&highlight

American Superconductor Corporation (March 21, 2007) OK

Windtec™, a wholly owned subsidiary of American Superconductor Corporation (AMSC), has received a follow-on order from Sinovel Wind Corporation Limited (Beijing, China) for 150 additional 1.5-MW wind energy electrical systems. The order is worth more than US $8 million. AMSC expects to ship all 150 of the electrical systems by the end of its fiscal year (March 2008). Since late 2005, Windtec has received orders from Sinovel for more than 900 electrical systems rated at 1.5 MW. Greg Yurek, founder and chief executive officer of AMSC, commented, "Sinovel has quickly emerged as one of China's largest and most respected wind energy companies. The relationship we have formed with Sinovel continues to expand as they

aggressively ramp up manufacturing capacity of their 1.5-MW wind energy systems. Over the course of only 18 months, we have received five substantial electrical system orders from Sinovel worth nearly $50 million." In 2006, Sinovel manufactured approximately 100 1.5-MW wind energy systems; in the future, they plan to increase production to 500 systems in 2007, 800 systems in 2008 and 1,000 systems in 2010.
Source:
“AMSC Receives $8 Million Order from Sinovel for Additional 1.5 Megawatt Wind Turbine Electrical Systems”
American Superconductor Corporation press release (March 21, 2007)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=975990&highlight

American Superconductor Corporation (March 28, 2007) OK

American Superconductor Corporation (AMSC) has successfully completed factory acceptance testing for its 36.5-MW HTS ship propulsion motor at Northrop Grumman’s facilities in Philadelphia. The completion of testing represents the final developmental milestone prior to the U.S. Navy taking possession of the motor. The motor was designed, developed, and manufactured by AMSC under a contract from the U.S. Navy’s Office of Naval Research. While AMSC built the electromagnetic rotor coils and the cryogenic and control systems, it subcontracted the manufacture and assembly of the other motor components. Greg Yurek, founder and chief executive officer of AMSC, commented, "The outsourcing model we have utilized for the fabrication of HTS rotating machines such as ship propulsion motors has served us well. We expect to utilize this outsourcing model for the production of all of our future HTS motors, generators, synchronous condensers, industrial motors and wind generators. In certain cases and geographies, we expect to license our designs and extensive patent portfolio for HTS rotating machines to customers who can manufacture these products utilizing our HTS electromagnetic coils." The 36.5-MW HTS motor will now be delivered to the U.S. Navy to complete its planned full-load testing. Yurek added, “The successful completion of the factory acceptance testing of the 36.5 MW HTS motor means that we can now finalize a separate contract we received from Naval Sea Systems Command (NAVSEA) for a militarized version of the HTS propulsion motor and compete for contracts for the procurement of HTS ship propulsion motors and generators for the DDG 1000 and CG (X) surface combatant ships. We believe our success in this program will lead to widespread adoption of HTS motors among large-scale naval and commercial vessels."
Source:
“AMSC Successfully Completes Factory Acceptance Testing of 36.5 Megawatt High Temperature Superconductor Propulsion Motor for U.S. Navy”
American Superconductor Corporation press release (March 28, 2007)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=978900&highlight

American Superconductor Corporation (March 29, 2007) OK

American Superconductor Corporation (AMSC) has implemented changes designed to move the company’s HTS products to the manufacturing stage and accelerate the company’s

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drive to profitability. These actions include a reduction in force, the consolidation of facilities, and the streamlining of operations. Together, these changes are expected to yield a cost savings of US $4 million for the current fiscal year. The company also expects to cut its rate of cash burn in half, compared with the previous fiscal year. As a result, AMSC expects to achieve a positive EBITDAS in FYMarch2009. In addition, AMSC has reorganized its business segments into two new units: AMSC Superconductors and AMSC Power Systems. AMSC Superconductors will combine the capabilities of the previous AMSC Wires and SuperMachines units and will focus on the production of HTS wire and coils, the design and development of HTS products (including motors and fault current limiters), the licensing of HTS product designs, and the management of large-scale HTS projects. Meanwhile, AMSC Power Systems will focus on the production of power electronic systems for the utility, industrial, and wind power markets, as well as providing licensed designs for wind energy systems through its subsidiary, Windtec™. Greg Yurek, founder and chief executive officer of AMSC, commented on the company's realignment: "AMSC has built a significant portfolio of technology, patents and know-how related to HTS rotating machines - machines we have built and tested to verify our technology. It has never been our plan to invest in the substantial infrastructure needed to manufacture large-scale motors, generators, synchronous condensers, industrial motors and wind generators. Instead, we have utilized an outsourcing model. Going forward, AMSC Superconductors plans to license designs for HTS rotating machines to companies that have the infrastructure to manufacture these systems… AMSC would receive license and consulting service fees from these companies and would benefit from a growing stream of royalty payments and revenues from the sale of HTS wire and coils to its licensees… With our HTS motor and synchronous condenser projects now virtually complete, it is the opportune time to consolidate our superconductor-based operations into AMSC's state-of-the-art facility in Devens, Massachusetts. These initiatives will help commercialize HTS products faster and also accelerate the company's drive to profitability."
Source:
"AMSC Realigns Operations to Accelerate Drive to Profitability"
American Superconductor Corporation press release (March 29, 2007)
http://phx.corporate-ir.net/phoenix.zhtml?c=86422&p=irol-newsArticle_Print&ID=979322&highlight

Material

Superconductive Components, Inc. (March 7, 2007) OK

Superconductive Components, Inc. has reported its financial results for the fourth quarter and year ending December 31, 2006. The company's total revenues for the fourth quarter more than doubled to $3,622,238, compared with $1,147,377 for the same period in the previous fiscal year. This increase was led by significantly higher product sales in the photonics/optical market. Gross profit also increased to $765,724, compared with $279,364 for the same period in the previous fiscal year. The company ended the year with a backlog of $1.4 million, compared with $0.6 million at the end of fiscal 2005. Dan Rooney, Chairman, President and Chief Executive Officer, commented, "We are very pleased with the record revenue, improved

gross profit, and net income for the fourth quarter 2006. These results also contributed to solid improvement for the full year 2006 compared to 2005. Importantly, we ended the year with business momentum and anticipate realizing further benefits in 2007." For the full year, total revenues increased 133% to a record $8,045,792 for fiscal 2006, compared with $3,457,182 for fiscal 2005. Product sales rose 153% to $8,003,700, compared with $3,167,743 for the previous year, mainly because of an increase in sales to photonics/optical and thin film battery customers. The gross profit for fiscal 2006 increased by 94% to $1,788,244, compared with $919,861 for fiscal 2005.

Source:

" Superconductive Components, Inc. Reports Record Fourth Quarter 2006 and Full-Year Results"

Superconductive Components, Inc. press release (March 7, 2007)

http://www.sciengineeredmaterials.com/investors/ne/earnings/scci46.htm

Medical

University of Houston (March 6, 2007) OK

Researchers from the University of Houston and the University College of London have developed a novel detection procedure combining nanotechnology and advanced magnetic sensing based on HTS SQUID technology. The resulting probe promises to be more accurate, more cost-effective, and safer than existing methods for staging and treating various cancers, including breast cancer. The probe is essentially a supersensitive magnetometer that is then used to track the presence of magnetic nanoparticles injected into the tumor or surrounding area during surgery. The researchers have already constructed a "proof of concept" device, and the detection procedure will soon be examined in a clinical trial of women undergoing breast cancer surgery at University College Hospital in London. The detection procedure will also be examined in clinical trials in Japan and Europe before the end of 2007. The researchers have patented the probe and formed a medical devices company – Endomagnetics Inc. – to bring their technology to the marketplace. Production is expected to begin in 2008.

Source:

"Probe to detect spread of breast cancer co-developed by UH scientist"

University of Houston press release (March 6, 2007)

http://www.uh.edu/admin/media/nr/2007/03march/030507abrazdeikis_bcprobe.html

Varian Medical Systems (March 22, 2007) OK

Clinical treatments using the world's first commercial superconducting cyclotron for routine medical use have begun at the Paul Scherrer Institute (PSI) in Switzerland. The facility will enable high-precision proton therapy treatments to be performed for a range of cancers and is expected to facilitate more accurate treatments with fewer side effects. Varian Medical Systems' Accel group produced the cyclotron, which is the facility's key component. The cyclotron is highly efficient and reliable, has a low energy consumption, and includes several modern treatment features like spot scanning, enabling a highly effective proton dose distribution in three dimensions and beam intensity modulation. Lester Boeh, vice president of

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emerging businesses for Varian, said, "This is a real landmark for our proton therapy business and good news for European cancer patients. Varian/Accel's superconducting cyclotron enables proton therapy to be delivered in the most accurate, effective and efficient manner possible and we are delighted that treatments are underway at PSI."
Source:
"New Varian/Accel Superconducting Cyclotron Enables Year-Round Proton Treatments at Leading European Research Institute"
Varian Medical Systems press release (March 22, 2007)
http://varian.mediaroom.com/index.php?s=home&item=510

Communication

ISCO International Inc. (March 23, 2007) OK

ISCO International Inc. has announced that it will showcase a variety of new products and product applications, including the company's digital Adaptive Notch Filter platform (dANF), at CTIA Wireless 2007 in Orlando, Florida. The dANF will be featured in the CTIA Wireless "Emerging Technology Awards" display area, a special section that displays the most innovative wireless products and applications. The dANF is a cost-effective solution that utilizes adaptive interference identification techniques to mitigate the effects of dynamic interference in wireless networks, which would otherwise reduce the network's capacity. The recent expansion of CDMA and UMTS technologies into the AWS and 850/900 MHz spectra has created unique interference challenges; the dANF platform will enable these technologies to be deployed with greater flexibility and minimal spectrum loss.
Source:
"ISCO INTERNATIONAL TO SHOWCASE NEW RF SOLUTIONS AT CTIA WIRELESS 2007"
ISCO International Inc. press release (March 23, 2007)
http://www.iscointl.com/news.htm

Basic

Cornell University (March 5, 2007) OK

Researchers at Cornell University, in cooperation with the Université de Sherbrooke (Canada), the Universities of Tokyo and Kyoto (Japan), and the National Institute of Advanced Industrial Science and Technology (Japan), have postulated a new explanation for why superconductivity in cuprates is sometimes stalled by a form of electronic "gridlock". Understanding this obstacle is crucial to increasing the maximum temperature at which superconductivity could conceivably occur. Using scanning tunneling microscopy and tunneling asymmetry (TA)-imaging to examine lightly hole-doped cuprate crystals, the researchers were able to identify strong variations in the electronic structures of some copper-oxygen-copper bonds distributed randomly through the crystal. The researchers also found larger rectangular regions with missing electrons that were spaced four units of the crystal lattice apart; these regions may represent the first direct observation of electronic "nanostripes" in cuprates. The

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nanostripes were aligned with the crystal lattice but were otherwise distributed at random. The group speculated that by increasing the number of holes in the material, the nanostripes might combine into the orderly stripes seen in other experiments. The researchers plan to apply TA-imaging to more heavily doped materials that exhibit such stripes to determine whether the stripes are made up of oxygen-centered holes. The key challenge, however, will be to understand how the localization of the holes into the observed patterns suppresses superconductivity. The research was reported at the annual meeting of the American Physical Society and is the cover story for the March 9 edition of *Science*.
Source:
"Imaging 'gridlock' in high-temperature superconductors" by Bill Steele (Cornell Chronicle)
Cornell University press release (March 5, 2007)
http://www.news.cornell.edu/stories/March07/superconductor.gridlock.ws.html

Argonne National Laboratory (March 20, 2007) OK

Researchers at Argonne National Laboratory, in collaboration with researchers at the University of Tennessee and Brigham Young University, have discovered how subtle changes in the structures of electron-doped superconductors can switch superconductivity on and off. By heating $Pr_{1-x}LaCe_xCuO_4$ (the samples of which were produced at the Central Research Institute of Electric Power Industry, Japan), they were able to repair small, delicate flaws in the material's microscopic structure that had not previously been detected. The group was able to detect the subtle flaws by correlating measurements of copper atom positions, obtained using X-rays generated at Argonne's Advanced Photon Source, with measurements of oxygen atom positions, obtained using neutrons generated at the National Institute for Standards and Technology Center for Neutron Research. These measurements revealed a small change in the placement of both copper and oxygen atoms during heat treatment, leading to a perfect structure and superconductivity. Since the change was fully reversible, the material could essentially be cycled from a flawed to perfect structure, thereby enabling superconductivity to be switched off and on. The research has been published in *Nature Materials*, available online. The Department of Energy's Office of Basic Energy Science, the U.S. National Science Foundation, and the Japan Society for the Promotion of Science provided funding for this research.
Source:
"New research reveal subtlety of superconductivity"
Argonne National Laboratory press release (March 20, 2007)
http://www.anl.gov/Media_Center/News/2007/news070320.html

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

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