AMERICAN SUPERCONDUCTOR CORP /DE/
Form 10-K
May 28, 2015
UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, D.C. 20549

Form 10-K

x ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended March 31, 2015

OR

¨TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the Transition Period from to

Commission file number 000-19672

American Superconductor Corporation

(Exact Name of Registrant as Specified in Its Charter)

Delaware	04-2959321
(State or Other Jurisdiction of Incorporation or Organization)	(IRS Employer Identification Number)
64 Jackson Road	
Devens, Massachusetts	01434
(Address of Principal Executive Offices)	(Zip Code)

Registrant’s telephone number, including area code:

(978) 842-3000

Securities registered pursuant to Section 12(b) of the Act:

Common Stock, $0.01 par value, NASDAQ Global Select Market

Securities registered pursuant to Section 12(g) of the Act:

None

Indicate by checkmark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ¨ No x

Indicate by checkmark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ¨ No x

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes x No ¨

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes x No ¨

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 232.405) is not contained herein, and will not be contained, to the best of the Registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ¨

Indicate by checkmark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See definition of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act:

Large accelerated filer	o	Accelerated filer	x
Non-accelerated filer	o (Do not check if a smaller reporting company)	Smaller reporting company	o

Indicate by checkmark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ¨ No x

The aggregate market value of the registrant's Common Stock held by non-affiliates of the registrant on September 30, 2014, based on the closing price of the shares of Common Stock on the Nasdaq Global Select Market on that date ($14.10 per share) was $99.0 million.

Number of shares outstanding of the registrant's Common Stock, as of May 22, 2015 was 13,863,254.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the definitive proxy statement for the annual meeting of stockholders scheduled to be held on July 31, 2015, to be filed with the Securities and Exchange Commission (the "SEC"), are incorporated by reference in answer to Part III of this Form 10-K.

AMERICAN SUPERCONDUCTOR CORPORATION

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This Annual Report on Form 10-K contains forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). For this purpose, any statements contained herein that relate to future events or conditions, including without limitation, the statements in Part I, "Item 1A. Risk Factors" and in Part II under "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" and located elsewhere herein regarding industry prospects or our prospective results of operations or financial position, may be deemed to be forward-looking statements. Without limiting the foregoing, the words "believes," "anticipates," "plans," "expects," and similar expressions are intended to identify forward-looking statements. Such forward-looking statements represent management's current expectations and are inherently uncertain. There are a number of important factors that could materially impact the value of our common stock or cause actual results to differ materially from those indicated by such forward-looking statements. Such factors include: We have a history of operating losses, which may continue in the future. Our operating results may fluctuate significantly from quarter to quarter and may fall below expectations in any particular fiscal quarter; We have a history of negative operating cash flows, and we may require additional financing in the future, which may not be available to us; Our Term Loans include certain covenants and other events of default. Should we not comply with these covenants or incur an event of default, we may be required to repay our obligation in cash, which could have an adverse effect on our liquidity; We may be required to issue performance bonds or provide letters of credit, which restricts our ability to access any cash used as collateral for the bonds or letters of credit; Changes in exchange rates could adversely affect our results from operations; If we fail to maintain proper and effective internal controls over financial reporting, our ability to produce accurate and timely financial statements could be impaired and may lead investors and other users to lose confidence in our financial data; Our financial condition may have an adverse effect on our customer and supplier relationships; Our success in addressing the wind energy market is dependent on the manufacturers that license our designs; A significant portion of our revenues are derived from a single customer; Our success is dependent upon attracting and retaining qualified personnel and our inability to do so could significantly damage our business and prospects; We may not realize all of the sales expected from our backlog of orders and contracts; Our business and operations would be adversely impacted in the event of a failure or security breach of our information technology infrastructure; We may not be able to ramp up production at our newly leased manufacturing facility in Romania, and, if we are able to do so, we may have manufacturing quality issues, which would negatively affect our revenues and financial position; We rely upon third-party suppliers for the components and subassemblies of many of our Wind and Grid products, making us vulnerable to supply shortages and price fluctuations, which could harm our business; Many of our revenue opportunities are dependent upon subcontractors and other business collaborators; If we fail to implement our business strategy successfully, our financial performance could be harmed; Problems with product quality or product performance may cause us to incur warranty expenses and may damage our market reputation and prevent us from achieving increased sales and market share; Regulations related to conflict-free minerals may force us to incur significant additional expenses; Our contracts with the U.S. government are subject to audit, modification or termination by the U.S. government and include certain other provisions in favor of the government. The continued funding of such contracts remains subject to annual congressional appropriation which, if not approved, could reduce our revenue and lower or eliminate our profit; Many of our customers outside of the United States, particularly in China, are either directly or indirectly, related to governmental entities, and we could be adversely affected by violations of the United States Foreign Corrupt Practices Act and similar worldwide anti-bribery laws outside the United States; We have had limited experience in marketing and selling our superconductor products and system-level solutions, and our failure to effectively market and sell our products and solutions could lower our revenue and cash flow; We may acquire additional complementary businesses or technologies, which may require us to incur substantial costs for which we may never realize the anticipated benefits; Our success depends upon the commercial use of high temperature superconductor (HTS) products, which is currently limited, and a widespread commercial market for our products may not develop; Growth of the wind energy market depends largely on the availability and size of government subsidies and economic incentives; We have operations in and depend on sales in emerging markets, including India and China, and global conditions could negatively affect our operating results or limit our ability to

expand our operations outside of these countries. Changes in India's or China's political, social, regulatory and economic environment may affect our financial performance; Our products face intense competition, which could limit our ability to acquire or retain customers; Our international operations are subject to risks that we do not face in the United States, which could have an adverse effect on our operating results; Adverse changes in domestic and global economic conditions could adversely affect our operating results; We may be unable to adequately prevent disclosure of trade secrets and other proprietary information; Our patents may not provide meaningful protection for our technology, which could result in us losing some or all of our market position; There are a number of technological challenges that must be successfully addressed before our superconductor products can gain widespread commercial acceptance, and our inability to address such technological challenges could adversely affect our ability to acquire customers for our products; Third parties have or may acquire patents that cover the materials, processes and technologies we use or may use in the future to manufacture our Amperium products, and our success depends on our ability to license such patents or other proprietary rights; Our technology and products could infringe intellectual property rights of others, which may require costly litigation and, if we are not successful, could cause us to pay substantial damages and disrupt our business; We have filed a demand for arbitration and other lawsuits against our former largest customer, Sinovel, regarding amounts we contend are overdue. We cannot be certain as to the outcome of these proceedings; We have been named as a party in various legal proceedings, and we may be named in additional litigation, all of which will require significant management time and attention, result in significant legal expenses and may result in an unfavorable outcome, which could have a material adverse effect on our business, operating results and financial condition; and our common stock has experienced, and may continue to experience, significant market price and volume fluctuations, which may prevent our stockholders from selling our common stock at a profit and could lead to costly litigation against us that could divert our management's attention;. These and the important factors discussed under the caption "Risk Factors" in Part 1. Item 1A of this Form 10-K for the fiscal year ended March 31, 2015, among others, could cause actual results to differ materially from those indicated by forward-looking statements made herein and presented elsewhere by management from time to time. Any such forward-looking statements represent management's estimates as of the date of this Annual Report on Form 10-K. While we may elect to update such forward-looking statements at some point in the future, we disclaim any obligation to do so, even if subsequent events cause our views to change. These forward-looking statements should not be relied upon as representing our views as of any date subsequent to the date of this Annual Report on Form 10-K.

PART I

Item 1. BUSINESS

Overview

American Superconductor Corporation ("AMSC®") was founded on April 9, 1987. We are a leading provider of megawatt-scale solutions that lower the cost of wind power and enhance the performance of the power grid. In the wind power market, we enable manufacturers to field highly competitive wind turbines through our advanced power electronics products, engineering, and support services. In the power grid market, we enable electric utilities and renewable energy project developers to connect, transmit and distribute power through our transmission planning services and power electronics, and superconductor-based products. Our wind and power grid products and services provide exceptional reliability, security, efficiency, and affordability to our customers.

Our company has designed wind turbines for or licensed wind turbine designs to more than 10 wind turbine manufacturing customers including Inox Wind Limited ("Inox") in India and Beijing JINGCHENG New Energy ("JCNE") in China. We have also served over 100 customers in the grid market since our inception, including American Electric Power and Long Island Power Authority in the United States, EDF Group in France, Korean Electric Power Corporation in Korea and Ergon Energy in Australia. We serve customers globally through a localized sales and field service presence in our core target markets.

Our wind and power grid solutions help to improve energy efficiency, alleviate power grid capacity constraints and increase the adoption of renewable energy generation. Demand for our solutions is driven by the growing needs for renewable sources of electricity, such as wind and solar energy, and for modernized smart grids that improve power reliability, security, and quality. Concerns about these factors have led to increased spending by corporations as well as supportive government regulations and initiatives on local, state and national levels, including renewable portfolio standards, tax incentives, and international treaties. We estimate that today's total annual addressable global market for our wind and grid solutions is approximately $10.0 billion.

We segment our operations into two market-facing business units: Wind and Grid. We believe this market-centric structure enables us to more effectively anticipate and meet the needs of wind turbine manufacturers, power generation project developers and electric utilities.

- Wind. Through our Windtec Solutions™, our Wind business segment enables manufacturers to field wind turbines with exceptional power output, reliability, and affordability. We supply advanced power electronics and control systems, license our highly engineered wind turbine designs, and provide extensive customer support services to wind turbine manufacturers. Our design portfolio includes a broad range of drive trains and power ratings of 2 megawatts ("MW") and higher. We provide a broad range of power electronics and software-based control systems that are highly integrated and designed for optimized performance, efficiency, and grid compatibility.
- Grid. Through our Gridtec Solutions™, our Grid business segment enables electric utilities and renewable energy project developers to connect, transmit and distribute power with exceptional efficiency, reliability, security and affordability. We provide transmission planning services that allow us to identify power grid congestion, poor power quality, and other risks, which help us determine how our solutions can improve network performance. These services often lead to sales of our grid interconnection solutions for wind farms and solar power plants, power quality systems and transmission and distribution cable systems. We also sell ship protection products to the U.S. Navy through our Grid business segment.

Our fiscal year begins on April 1 and ends on March 31. When we refer to a particular fiscal year, we are referring to the fiscal year beginning on April 1 of that same year. For example, fiscal 2014 refers to the fiscal year beginning on

April 1, 2014. Other fiscal years follow similarly.

Competitive strengths

We believe our competitive strengths position us well to execute on our growth plans in the markets we serve.

- Unique Solutions for the Wind and Grid Markets. We believe we are the only company in the world that provides wind turbine manufacturers with an integrated approach of wind turbine design and engineering, customer support services and power electronics and control systems. We also believe we are the only company in the world that is able to provide transmission planning services, grid interconnection and voltage control systems as well as superconductor-based transmission and distribution systems for power grid operators. This unique scope of supply provides us with greater insight into our customers' evolving needs and greater cross-selling opportunities.

- Differentiated Technologies. Our PowerModule™ power converters are based on proprietary software and hardware combinations and are used in a broad array of applications, including our D-VAR® grid interconnection and voltage control systems, as well as our wind turbine electrical control systems. Our proprietary Amperium® superconductor wire was engineered to allow us to tailor the product via laminations to meet the electrical and mechanical performance requirements of widely varying end-use applications, including power cables and fault current limiters for the Grid market.
- Highly Scalable, Low-Cost Manufacturing Platform. We can increase the production of our proprietary power electronics and superconductor technologies at costs that we believe are low relative to our competitors. Our proprietary manufacturing technique for Amperium wires is modular in nature, which allows us to expand manufacturing capacity at a relatively low incremental cost.
- Robust Patent Position and Engineering Expertise. As of March 31, 2015, we owned more than 390 patents and patent applications worldwide (including international counterparts to U.S. patents), and had rights through exclusive and non-exclusive licenses to more than 220 additional patents and patent applications worldwide. We believe our technology and manufacturing knowledge base, customer and product expertise and patent portfolio provide a strong competitive position.

Strategy

Building on these competitive strengths, we plan to focus on driving revenue growth and enhancing our operating results through the objectives defined below.

- Provide Solutions from Power Generation to Delivery. From the generation source to the distribution system, we focus on providing best-in-class engineering, support services, technologies and solutions that make the world's power supplies smarter, cleaner and stronger.
- Focus on "Megawatt-Scale" Power Offerings. Our research, product development, and sales efforts focus on megawatt-scale offerings ranging from designs of power electronics for large wind turbine platforms to systems that stabilize power flows, integrate renewable power into the grid and carry power to and from transmission and distribution substations.
- Pursue Emerging Overseas Markets and Serve Key Markets Locally. We focus our sales efforts on overseas markets that are investing aggressively in renewable energy and power grid projects, and we have been particularly successful in targeting key Asian markets, including India and China. As part of our strategy, we serve our key target markets with local sales and field service personnel, which enables us to understand market dynamics and more effectively anticipate customer needs while also reducing response time. We currently serve target markets such as Australia, China, India, South Africa, the United Kingdom, and the United States.
- Product Innovation. We have a strong record of developing unique solutions for megawatt-scale power applications and will continue our focus on investing in innovation. Recently, our product development efforts have included our Resilient Electric Grid ("REG") system for the electricity grid.

Market opportunities

Our solutions address two substantial global demands:

- the demand for renewable sources of electricity, and
- the demand for modernized, smart power grid infrastructure that alleviates capacity constraints and improves electricity reliability, security, and efficiency.

Wind market overview

According to GlobalData, a research firm, nearly 52 Gigawatts (GW) of wind generation capacity were added worldwide in 2014, as compared to 35 GW in 2013. GlobalData anticipates that more than 53 GW of additional capacity will be added in 2015.

Several factors are expected to drive the future growth in the wind power market, including substantial government incentives and mandates that have been established globally, technological improvements, turbine cost reductions, the development of the offshore wind market, and increasing cost competitiveness with existing power generation technologies. Technological advances, declining turbine production cost and fluctuating prices for some fossil fuels continue to increase the competitiveness of wind versus traditional power generation technologies.

Our solutions for the wind market

We address the challenges of the wind power market by designing and engineering wind turbines, providing extensive support services to wind turbine manufacturers and manufacturing and selling critical components for wind turbines.

- Electrical Control Systems. We provide full electrical control systems or a subset of those systems ("core electrical components") to manufacturers of wind turbines designed by us. Our electrical control systems regulate voltage, control power flows and maximize wind turbine efficiency, among other functions. To date, we have shipped enough core electrical components and complete electrical control systems to power more than 15,000 MW of wind power. We believe our electrical control systems represent approximately 10% of a wind turbine's bill of materials. We believe that the total addressable market for electrical control systems was approximately $3.0 billion annually in 2014.
- Wind Turbine Designs. We design and develop entire state-of-the-art onshore and offshore wind turbines with power ratings of 2 MW's and higher for manufacturers who are in the business of producing wind turbines or who plan to enter the business of manufacturing wind turbines. These customers typically pay us licensing fees, and in some cases royalties for wind turbine designs, and purchase from us the core electrical components or complete electrical control systems needed to operate the wind turbines.
- Customer Support Services. We provide extensive customer support services to wind turbine manufacturers. These services range from providing designs for customers' wind turbine manufacturing plants to establishing and localizing their supply chains and training their employees on proper wind turbine installation and maintenance. We believe these services enable customers to accelerate their entry into the wind turbine manufacturing market and lower the cost of their wind turbine platforms.

Our approach to the wind energy markets allows our customers to use our world-class turbine engineering capabilities while minimizing their research and development costs. These services and our advanced electrical control systems provide our customers with the ability to produce standardized or next-generation wind turbines at scale for their local market or the global market quickly and cost-effectively. Our team of highly experienced engineers works with clients to customize turbine designs specifically tailored to local markets while providing ongoing access to field services support and future technological advances.

Grid market overview

It is widely believed that the electricity grid in the U.S. is in need of modernization through a technology upgrade if it is to maintain reliability and adapt to the changing market needs. In fact, a recent report written by The White House and titled, "Economic Benefits of increasing Electric Grid Resilience in Weather Outages" found that economic damage from weather-related power outages averaged between $18 and $33 billion per year between 2003 and 2012 – and went as high as $75 billion in 2008 and $52 billion in 2012, as a result of damage caused by Hurricanes Ike and Sandy, respectively. Furthermore, the electric grid is also vulnerable to equipment failure, acts of terror, and threats to cyber security. Recent events and the reliance of safety, security, and economy on the electricity grid have prompted broad recognition worldwide of the need to modernize and enhance the reliability and security of power grids.

Power grid operators worldwide face various challenges, including:

- Stability. Power grid operators are confronting power quality and stability issues arising from intermittent renewable energy sources and from the capacity limitations of transmission and overhead distribution lines and underground cables.
- Reliability. Traditional transmission lines and cables often reach their reliable voltage stability limit well below their thermal threshold. Driving more power through a power grid when some lines and cables are operating above their voltage stability limit during times of peak demand can cause either unacceptably low voltage in the power grid (a brownout) or risk of a sudden, uncontrollable voltage collapse (a blackout).

- Capacity. The traditional way to enable increases in power grid capacity without losing voltage stability is to install more overhead power lines and underground cables. However, permitting new transmission and distribution lines can take 10 years or more due to various public policy issues, such as environmental, aesthetic, and health concerns. In urban and metropolitan areas, installing additional conventional underground copper cables is similarly challenging, since many existing underground corridors carrying power distribution cables are already filled to their physical capacity and cannot accommodate any additional conventional cables. In addition, adding new conduits requires excavation to expand existing corridors or create new corridors, which are costly and disruptive undertakings.
- Efficiency. Most overhead lines and underground cables use traditional conductors such as copper and aluminum, which lose power due to electrical resistance. At transmission voltage, electrical losses average about 7% in the United States and other developed nations, but can exceed 20% in some locations due to the distance of the line, quality of conductor, and the power grid's architecture and characteristics, among other factors.

- Security. Catastrophic equipment failures caused by aging equipment, physical and cyber threats, and weather related disasters can leave entire sections of an urban environment without power for hours or days. It can be difficult to recover from extended power outages in urban load centers, worsening situations where the personal safety of residents and the economic health of business are threatened.

Our solutions for the grid market

We address these challenges in the Grid market by providing services and solutions designed to increase the power grid's capacity, reliability, security and efficiency. We also provide advanced ship protection equipment for the U.S Navy in this segment as each Navy ship can be thought of as having its own power grid. Our solutions include:

- Superconductor Wire and Applications. Conventional conductors of electricity, such as aluminum and copper wire, lose energy due to resistance. Using a compound of yttrium barium copper oxide ("YBCO"), we manufacture and provide high-temperature superconductor ("HTS") wire that can conduct many times more electricity than conventional conductors with no power loss. We have developed full system solutions that we expect to sell directly to customers. This business model leverages our applications expertise, drives value beyond the wire and enables us to recognize revenue and take ownership over the marketing and sales of the full systems. These systems include:
  - Resilient Electric Grid Systems. Our REG system has two primary applications that increase the reliability and the capacity of the urban infrastructure. For applications focused on reliability improvement, the REG cable is best used in a "ring" or "loop" configuration to interconnect nearby urban substations. This enables urban utilities to share transmission connections and excess station capacity, while controlling the high fault currents that naturally result from such interconnections, providing protection against the adverse effects that follow the loss of critical substation facilities in urban areas. For applications focused on capacity improvement, the REG cable can be used in a "branch" configuration. In this application, the REG cable connects an existing large urban substation with a new, much smaller, and more simplified substation within the city at a lower cost. The smaller urban substation does not need large power transformers and takes up much less space, thereby significantly reducing real estate, construction, and other related costs in the urban area. The key component to the REG system is a breakthrough cable system that combines very high power handling capacity with fault current limiting characteristics; features that are attributable to our proprietary HTS wire. Assuming all urban substations in major cities in the U.S. could be connected with our REG system, we believe the total annual addressable market is approximately $5.0 billion.
  - Ship Protection Systems. The primary focus of our ship protection systems ("SPS") has been degaussing systems. These systems reduce a Naval ship's magnetic signature, making it much more difficult for a mine to detect and damage a ship. Traditionally made of heavy copper wire, degaussing is required on all Navy combat ships. Our HTS advanced degaussing system is lightweight, compact, and often outperforms its conventional counterpart. This HTS system is estimated to enable a 50 to 80 percent reduction in total degaussing system weight, offering significant potential for fuel savings or options to add different payloads. The core components of a degaussing system are transferable to other applications being targeted for ship implementation. We are also continuing to work on expanding HTS technology into the fleet through a variety of applications for power, propulsion, and protection equipment. We estimate that the total addressable market for HTS-based, SPS systems for the U.S. Navy fleet to be between $75.0 million and $120.0 million per year between the years 2020 and 2025.
- We are also providing full system solutions through a partnership with industry leader Nexans:
  - Stand-alone Fault Current Limiters. Used in substations, superconductor fault current limiters ("SFCLs") act as surge protectors for the power grid. SFCLs can help protect the grid by reducing the destructive nature of faults, extending the life of existing substation equipment and allowing utilities to defer or eliminate equipment replacements or upgrades. Together with Nexans, we offer SFCLs for medium voltage alternating current ("AC") networks.

- FACTS Systems. Flexible alternating current transmission system – or FACTS – is a system that consists of power electronics and other static components used for controlling power flow and voltage in the AC transmission system. FACTS products aim to increase controllability and power transfer ability of a network, which allows more effective utilization of existing assets and reduces the need for new transmission lines, and facilities to increase electricity availability. Our FACTS sales process begins with our group of experienced transmission planners working with power grid operators, renewable energy developers, and industrial system operators to identify power grid constraints and determine how our solutions might improve network performance. These services often lead to sales of grid interconnection solutions for wind farms and solar power plants, power quality systems for utilities and heavy industrial operations and transmission and distribution cable systems. Our transmission planners work with our customers on the following solutions:
  - D-VAR® Systems. The power that flows through AC networks comprises both real power, measured in watts, and reactive power, measured in Volt Amp Reactive ("VARs"). In simple terms, reactive power is required to support voltage in the power network. D-VAR systems can provide the reactive power needed to stabilize voltage on the grid. These systems also can be used to connect wind farms and solar power plants to the power grid seamlessly as well as to protect certain industrial facilities against voltage swells and sags. GlobalData and AMSC estimate the market for FACTS systems such as D-VAR was more than $1.4 billion in 2014 and that this market could increase to nearly $1.6 billion by 2020.
  - D-SVC Systems. Our D-SVC systems are a cost-effective solution that allow large industrial loads to operate on the AC power system while minimizing the impacts of voltage sags and flicker problems, and also provides dynamic, distribution level voltage regulation and power factor control solutions for utilities. Our D-SVC system automatically applies VARs on a cycle-by-cycle basis to maintain steady line voltages adjacent to large inductive loads such as motors, welders, arc furnaces and pipeline pumping stations.

Core Technologies

Superconductors

Our second generation ("2G") HTS wire technology helps us address the smart grid infrastructure market opportunity by providing components and solutions designed to increase the power grid's capacity, reliability, security and efficiency. Our wire, known as Amperium wire, conducts electricity with zero resistance below about -297 degrees Fahrenheit. Additionally, our 2G wire has the ability to switch to a resistive state whenever a fault current exceeds a predetermined value. This characteristic is a key enabler to our REG system. The technology can be used in many applications including electricity transmission cables, superconducting generators, voltage regulators and degaussing systems for naval vessels. Superconductor power cables, which are a class of high-capacity, environmentally-benign, and easy-to-install transmission and distribution cables, address power grid capacity issues by increasing the thermal limit of existing or new corridors. Superconductor power cables are cylindrically shaped systems consisting of HTS wires (which conduct electricity) surrounded by electrical insulation encased in a metal or polymeric jacket.

Currently, power cables are made primarily using copper wires. Power cables incorporating our Amperium wire are able to carry up to 10 times the electrical current of copper cables of the same diameter. These cable systems also bring efficiency advantages. Traditional cable systems heat up due to the electrical resistance of copper, causing electrical losses. Electrical losses at transmission voltage average about 7% in the United States and other developed nations, but can exceed 20% in some locations due to the distance of the line and the power grid's architecture and characteristics, among other factors. Conversely, HTS materials can carry direct current ("DC") with 100% efficiency and AC with nearly 100% efficiency when they are cooled below a critical temperature. As a result, AC HTS power cables lose significantly less power to resistive heating than copper cables, and DC HTS power cables have no energy losses due to resistive heating.

PowerModule Power Converters

Our family of PowerModule power electronic converters incorporates power semiconductor devices that switch, control and move large amounts of power faster and with far less disruption than the electromechanical switches historically used. While today our PowerModule systems are used primarily in wind and power grid applications, they also have been incorporated into electric motor drives, distributed and dispersed generation devices (micro-turbines, fuel cells, and photovoltaics), power quality solutions, batteries, and flywheel-based uninterruptible power supplies.

Our wind turbine electrical control systems and our D-VAR systems incorporate our PowerModule technology.

Customers

We have designed wind turbines for or licensed wind turbine designs to more than 10 wind turbine manufacturing customers including Inox in India and JCNE in China. We have also served over 100 customers in the grid market since our inception, including American Electric Power and Long Island Power Authority in the United States, EDF Group in France, Korean Electric Power Corporation in Korea and Ergon Energy in Australia. We serve customers globally through a localized sales and field service presence in our core target markets.

Facilities and manufacturing

Our primary facilities and their primary functions are as follows:

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