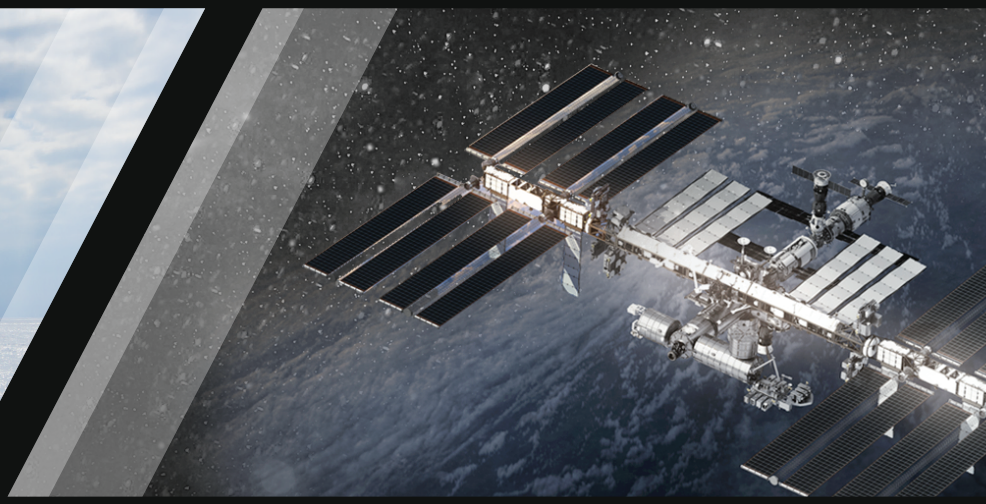
CALNETIX
TECHNOLOGIES

Company Overview



Providing High-Speed Electromagnetic Drive Solutions

Innovation That Drives Industries®

Innovation That Drives Industries®

Calnetix Technologies is making a positive contribution to society and the environment by improving the way the world harvests and utilizes energy.

Since its founding in 1998, Calnetix Technologies, LLC has developed and introduced numerous disruptive innovations across a variety of applications and industries. Our suite of high-speed technologies combined with our system integration and project execution expertise enable OEMs to develop superior products in a wide variety of industries, including defense, aerospace, marine, oil and gas, energy, motorsports, HVAC, medical, power generation, semiconductor, industrial equipment and more. Our team is uniquely equipped to provide Innovation That Drives Industries®.

Calnetix's motor generator, magnetic bearing and power electronic technologies provide reliability, power density and low total cost of ownership, while satisfying industry demand for more energy-efficient systems that reduce energy consumption, reduce harmful emissions and enhance energy security.

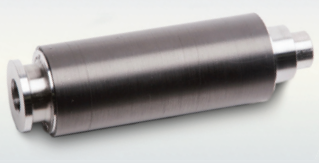
High-Speed System Offering: Motor Generators, Magnetic Bearings and Variable Frequency Drives

Permanent Magnet Motor Generators

Calnetix Technologies' Permanent Magnet (PM) Motor Generators have been developed using advanced engineering methods and materials ranging from a few watts to megawatt power levels with speeds from 10,000 rpm to 120,000 rpm and beyond. The company offers Magnaforce™ motor generators for low voltage applications (< 1 MW), such as blood pumps, turbochargers, industrial spray dryers, precision lasers and chillers, and Ultraforce™ motor generators for medium voltage applications, such as air separation, gas turbines and flywheel-based energy storage at all power levels.

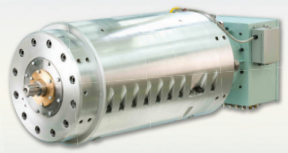
These power-dense rotor-stator sets provide full torque and exceptionally high efficiency through the operating speed range. The rotors may use a metallic or composite sleeve designed to fit the application, sometimes including corrosive and harsh internal fluids in hermetic designs.

Calnetix Rotor



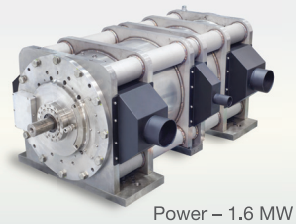
Calnetix Stator

Magnaforce™ Motor Generator



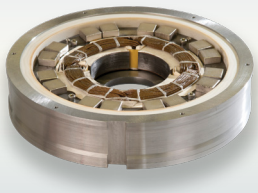
Power – 750 kW
Speed – 12,000 RPM
Voltage – 440 V

Ultraforce™ Motor Generator

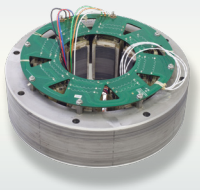


Power – 1.6 MW
Speed – 16,000 RPM
Voltage – 6,600 V

Powerflux™ Magnetic Bearing



Xcelflux™ Magnetic Bearing



Active Magnetic Bearings

Calnetix Technologies specializes in high-speed rotating machinery supported by patented Active Magnetic Bearings (AMBs), which help optimize system efficiency and enhance reliability and sustainability. The company offers PM biased Powerflux™ Magnetic Bearings and electro-magnetic biased Xcelflux™ Magnetic Bearings. Calnetix team has developed bearings with radial load capacity ranging from 25lbs to over 5,000lbf and axial load capacity ranging from 100lbf to over 10,000lbf. Both types of bearings have been utilized in a wide variety of commercial and industrial systems, including blowers, compressors, Organic Rankine Cycle (ORC) systems, turboexpanders, flywheels and many more.

Calnetix's AMBs present unique advantages over conventional roller or fluid-film bearings. Unlike conventional bearings, AMBs suspend the target rotor in a magnetic field. The result is a non-contact oil-free rotor support system with extremely low friction and no contact wear. The AMBs enable hermetically sealed turbomachinery designs with no rotating seals to the outside environment, leading to low risk of hazardous leakages and fluid losses.

Variable Frequency Drives

Calnetix Technologies offers high-performance, power dense and energy efficient variable frequency drives (VFDs) and inverters for power generation and power conversion. Calnetix has adopted both traditional silicon and silicon carbide (SiC) technologies in its power conversion systems at power levels ranging from 10 kW to over 1 MW. Calnetix's variable speed drives (VSDs) deliver energy efficiency and reliability to drive profitable operations in a wide range of industrial applications, such as organic rankine cycle (ORC), chillers, turboexpanders, turbochargers and flywheel energy storage systems. The company offers both off-the-shelf and custom solutions that are cost effective and robust by leveraging its existing technology and advanced engineering capabilities.

Enercycle™ DC-1000 Inverter

Vericycle™ 300

Vast Array of Solutions for Defense, Aerospace and Industrial Applications

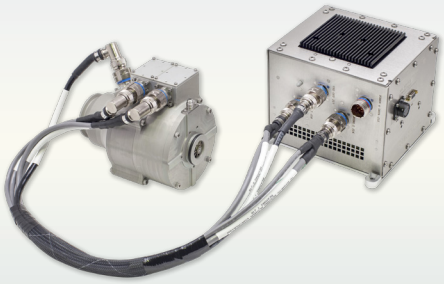
APPLICATIONS EXPERIENCE

From high pressures and temperatures to highly corrosive environments, we have worked through many environmental, economic and time-to-market challenges to fit our customers' needs. Combining our products, capabilities and years of experience, we provide comprehensive integration services to assist customers in the design, development and production of the most advanced systems for defense, aerospace and industrial programs. Some of the solutions that we developed for our customers are described below.

High-Speed Pumps, Blowers and Compressors

Calnetix Technologies' core technology has enabled many of the power and thermal management systems, such as air cycle systems (environmental controls) and vapor cycle systems, in industrial equipment, military and commercial aircraft, and in satellite and space missions. For example, Calnetix designed and developed an in-line blower system on magnetic bearings to drive the airflow through a CO2 removal system, which was successfully installed on the International Space Station and has been operating continuously since February 2023. Likewise, our high-speed blower system utilizing high-speed motor and magnetic technologies helped cool semiconductor lasers for one of our customers in semiconductor manufacturing industry. Our blower systems have a compact design with the latest magnetic bearing centrifugal oil-free technology that ensures constant air flow and the highest air volume.

High-Speed In-line Blower System



Calnetix also supplies the high speed motor, variable speed drive power stage, and magnetic bearings for the high-efficiency, super capacity (HES-C) chiller , which has helped to increase cooling capacity and performance while reducing acquisition and lifecycle cost. Similarly, our core technologies have helped increase the speed of oil-free air compressors for one of our customers in the industrial and medical/ pharmaceutical industry.

High Speed Starter Generator

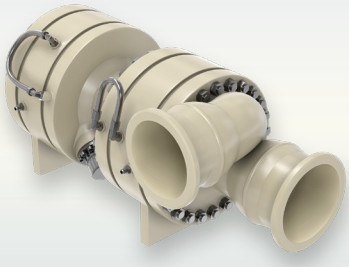
High-Speed Starter Generator

Calnetix offers starter generator systems that reduce operating costs, improve reliability and system efficiency. In addition to low lifecycle cost, Calnetix's Magnaforce™ motors and generators are designed to provide maximum power density and optimum thermal performance while meeting the most stringent weight and efficiency requirements. For instance, Calnetix designed and manufactured a power-dense machine for a motorsports customer rated at 100 kW and weighing just 7.5 kg in a 2 liter volume. This is equivalent to a machine power density of 13 kW/kg and 43 kW/L. This technology and expertise could meet many requirements in aerospace applications where maximum power density and lowest weight are paramount.

Circulation Pumps for Gen IV Reactors

Nuclear power generation is re-emerging as a strong contender for clean and sustainable energy. Many nuclear power plants are HTGR (high-temperature gas reactor) type, utilizing high pressure gas as a working fluid in the primary loop of the system. Calnetix Technologies' Powerflux™ magnetic bearings, Magnaforce™ PM motor and Vericycle™ variable frequency drives are being utilized in the primary circulators for advanced nuclear microreactors and emerging small modular reactor (SMR) applications to enable a step-change in performance and reliability.

Reactor Circulator



Power Conversion and Motor Controls

Calnetix Technologies offers energy efficient VFDs and inverters for power generation, power conversion and motor controls. Drive solutions from Calnetix encompass the full power chain, from power source to delivery of mechanical torque or vice-versa. The company developed the SiC based, power dense Enercycle™ DC-1000 inverter for electrified military vehicles to drive traction motors and/or pair with hybrid electric generators to provide mobility and on-board electrical power. Continuing this advancement in power dense technologies, Calnetix is also developing a fully integrated bidirectional export power inverter that will provide reliable bidirectional export power for hybrid electric vehicles and field deployable microgrid operations.

Enercycle™ DC-1000 Inverter

Calnetix has produced hundreds of Vericycle™ bidirectional drives for a specific ORC application rated around 125 kW for the purpose of recovering heat from industrial processes. Additionally, under an award by the U.S. Department of Energy, Calnetix has developed and tested a 1 MW 10 kV SiC inverter with the 1.6 MW high-speed PM motor, which can be used in many industrial sectors, including natural gas compression, air compression, air separation, and various power generation and turbo-expansion applications.

Enercycle™ DC-400 Inverter

Hybrid Electric Aircraft Systems

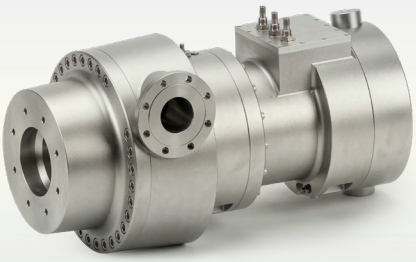
Calnetix Technologies' Magnaforce™ motor generator systems are designed to increase aerospace prime propulsion efficiency, while meeting specific system requirements. Calnetix is developing integrated propulsion systems, which includes lightweight Magnaforce™ motors and Enercycle™ power electronics. The integrated system can reduce energy consumption and installed size and weight, while improving reliability, operational flexibility, enabling aerospace platforms to meet future climate goals and standards.

Calnetix has designed a variety of solutions combining gas turbines and PM motor generators ranging from small compact solutions, like auxiliary power units (APUs) for today's advanced fighter aircraft to self-contained industrial power generation systems, rated at 500 kW or more. Gas turbine-based range extenders with Calnetix's high-speed starter generator provide the highest power-to-weight ratio, ultra-low emissions, the ability to operate on alternative fuels and unmatched reliability for hybrid electric aircrafts.

Power and Thermal Management for Data Centers

Calnetix's high speed permanent magnet (PM) motors provide data centers with a highly efficient solution for meeting the increasing cooling and reliability demands of AI-driven, high density computing. These motors deliver smoother, higher performance operation than induction based equipment while reducing mechanical complexity. They also enable compact, reliable direct drive power generation systems for onsite energy needs. These motors can be paired with Calnetix's Powerflux™ magnetic bearings, for reduced wear and stable operation at high speeds, and integrated with Calnetix's high frequency variable speed drives that allow precise modulation of motor speed for optimal cooling performance. Together, these technologies offer a cohesive, scalable, and modular platform that enhances efficiency, controllability, and long term reliability across data center power and thermal management infrastructure.

High Speed Compressor



High-Value Manufacturing and Full Life Cycle Support

Calnetix Technologies provides high-value manufacturing, and full product life-cycle support for our global OEM partners at our over 58,000 square-foot facility located in Cypress, California. Production lines are designed to be scalable, with production staff cross trained for further flexibility in factory floor loading. Our production employees are continually advancing their knowledge and skill sets. Our in-house manufacturing capabilities include:

- CNC and high precision machining (+/- 0.0001)
- Grinding
- Fabrication of tools (designed in-house by our manufacturing engineers)
- Turning and grinding of rotors
- Magnet bonding
- Rotor sleeving (metallic and composite)
- Rotor assembly
- Rotor balancing
- Lamination stacking
- Stator winding
- Motor generator assembly and test
- Power electronics assembly and test
- Actuator assembly and test
- Magnetic bearing assembly and test

Research & Development Capabilities

Calnetix Technologies' highly qualified and renowned engineering team includes subject matter experts in multiple disciplines. The team is uniquely positioned to deliver a comprehensive design process that balances magnetic, thermal and structural factors to ensure an optimal design solution. To maintain our competitive advantage, Calnetix makes a significant investment in research and development activities every year that far exceeds industry standards. Calnetix offers in-house analysis capabilities and a vast array of designs, which include the following:

- Permanent Magnet Electromagnetic Machine Design
- Mechanical and Stress Analysis
- Rotordynamics Analysis
- Power Electronics / Motor Controller Design
- Thermodynamics and Turbomachinery Aero Design
- Sensing and Control Design for Magnetic Bearing Systems
- System Integration, Control and Process Optimization
- Special Testing and Qualification at the Component and System Level

Quality

Calnetix Technologies is dedicated to meeting and exceeding customer expectations by providing quality products and services. We continually invest in improving our engineering design and manufacturing capabilities. Our quality management system (QMS) is certified to ISO 9001:2015 and enables us to design and produce the highest quality products, provide the best service and offer the best value to the customer. From estimating proposals, purchasing, production planning and control to manufacturing, inspection, packaging and shipping, our QMS provides the controls necessary to ensure that products comply with applicable customer and regulatory requirements, and provides the framework to continually improve processes and customer satisfaction.

International Organization for Standardization
ISO
9000
Quality Management

Resources You Need

We've built our website not around just products and applications, but on solutions and experiences. Some useful information on our website include:

Technical Papers | **Product Videos** | **White Papers** | **Brochures** | **Product Advantages**

Log on to **www.calnetix.com** or scan the QR code to learn more about Calnetix and its solutions.

CALNETIX TECHNOLOGIES

Innovations That Drives Industries®

6200 Gateway Drive
Cypress, CA 90630 USA

+1.562.293.1660

info@calnetix.com

www.calnetix.com