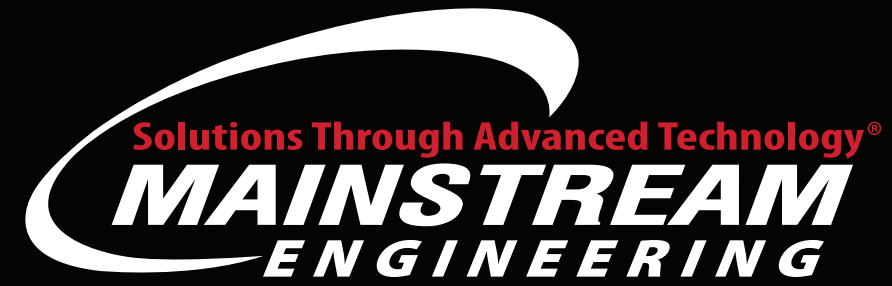
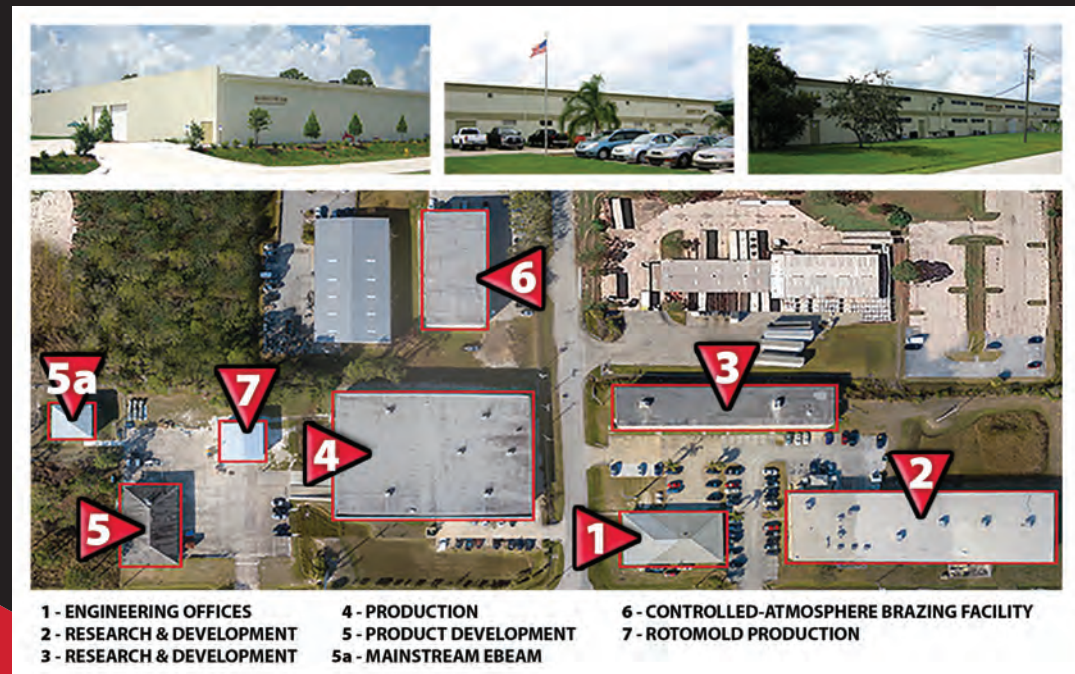


Awards and Honors

- ▶ **Department of Energy**
SBIR/STTR Small Business of the Year
- ▶ **Regional Winner SBA**
Small Business Prime Contractor of the Year Award for Southeastern U.S.
- ▶ **State of Florida**
Governor's New Product Award
- ▶ SBA Blue Chip Enterprise Initiative Award (multiple years)
- ▶ NASA Technology Commercialization Award
- ▶ SBA Tibbetts Award for Commercialization (two years)
- ▶ **U.S. House of Representatives**
Mainstream's QwikBoost performance additive honorably mentioned on the floor of the House for its role in reducing energy consumption

Our Campus



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History

Founded in 1986, Mainstream is a solution-oriented, research, development and manufacturing small business located in Rockledge, FL. Mainstream started out with two R&D contracts from the U.S. Air Force. Today, Mainstream is a premier R&D company that focuses on transitioning advanced technologies into high-quality and cost-effective military and commercial products. Areas of expertise include heat transfer, fluids, thermodynamics, mechanics, chemistry, nano-technology, and power. Mainstream is currently providing solutions to NASA, DOD, DOE, DOT, DOC, USDA, and industry through externally-funded R&D programs. Mainstream also has extensive internally-funded R&D to support our externally-funded R&D and to transition R&D into commercial products. Mainstream's products are sold worldwide and we hold a Department of Defense Commercialization Index of 95%.

Facilities

Mainstream's 10-acre complex, located in Rockledge, Florida, consists of more than 100,000 ft² of research, development, and manufacturing facilities. Our quality management system controls all activities in our facilities and operations and is certified to ISO 9001:2015. We have laboratories for thermal components and systems, environmental chambers, fuels research, internal combustion testing, dynamometers, power electronics, materials research, electron beam materials processing, nanotube furnaces, vapor deposition furnaces (ZnS and SiC), and physical and analytical chemistry. We have the unique ability to braze coldplates and other heat exchangers (e.g., condensers, radiators, brazed-plate, phase-change thermal storage) in a controlled atmosphere furnace. Other production capabilities include machined components, sheet metal assemblies, tubing assemblies, wire harnesses, printed circuit board assemblies, rotomolded parts, injection molded components, and powder coating. Final assembly occurs on our flexible, manufacturing line with interactive production system to provide maximum traceability, facilitate assembler feedback to supervisors, improve assembler accountability, maximize assembly line visibility/transparency, monitor key production metrics, assess key quality characteristics on a continuous basis, and store production and quality records together at the serial-number level.



Engineering Research and Development

Our Mission: To research and develop emerging technologies. To engineer these technologies into superior quality, military and private sector products that provide a technological advantage.

Thermal Control

Our solutions range from rugged HVAC/R equipment to specialized high-heat-flux cooling systems. Our systems and components are designed specifically for severe environments such as extreme temperatures, sand/dust, salt-fog, shock, and vibration.

Our fundamental research in two-phase fluid dynamics, heat transfer, and thermodynamics is integrated into high-heat-flux solutions, which include jet impingement, spray cooling, Direct Vapor Compression™ cooling, microchannel cooling, and non-traditional solutions as needed. These advanced cooling techniques reduce size, weight and power for future military systems such as directed energy weapons and high-power electronics.



Energy and Sustainability

We develop innovative and practical solutions that tackle emerging challenges in thermochemical conversion, separation processes, and diagnostics. We combine our fundamental expertise in chemistry and engineering to develop custom pilot plants and integrated units for applications ranging from converting waste and biomass into liquid fuels, to deployable systems for water and fuel purification. Additionally, we create smart sensors for real-time analysis of trace compounds and quality control, formulate new chemical products, and perform basic research on membranes, catalysts, and process intensification.



Power Electronics

We use the latest wide bandgap (both SiC and GaN) devices to develop high-efficiency, size- and weight-optimized power converters and variable speed drives for a wide range of demanding military, space and commercial applications. We specialize in low- to medium-power (1 kW to 500 kW) and low- to medium-voltage (24 V to 1700 V) systems. Mainstream develops and produces components and systems specifically for the rugged military environment where size, weight and power are critical. Mainstream's power electronics team has extensive experience designing and testing to military standards such as MIL-STD-461, MIL-STD-1399, MIL-STD-810, and MIL-STD-704.



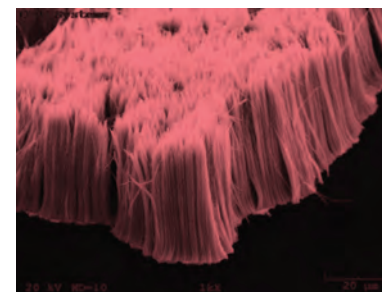
Mechanics

Our design solutions encompass a broad range of technologies including compact high-efficiency power generation, turbomachinery, custom test hardware, and mechanical system components. Our R&D includes compact highly-efficient internal combustion engines/generators, such as our AMD45 diesel engine, as well as compressors, turbines, and pumps for refrigeration, air, steam, and other process fluids. We develop unique test hardware, such as air-cycle machines, fast-acting valves, and accelerated life testing enclosures allowing for multiple environmental simulations. The newest addition to this area is an integrated product team dedicated to source development and reverse engineering of hard-to-source mechanical hardware.



Materials Science

We have decades of state-of-the-art development in nanomaterial synthesis and assembly for electrochemical and solid-state energy technologies. Our facilities include the first-in-industry superconducting electron accelerator facility for Electron Beam Enabled Advanced Manufacturing (EBEAM), enabling materials discovery through far-from-equilibrium thermal processing. We lead industry in polymer/gel membrane and electrode technologies for fuel cells and gas separation. Our capabilities also include a diverse set of vapor phase growth pilot-scale reactors for high surface area nanostructured electrodes, semiconductors, and infrared optics materials manufacturing.



Production and Manufacturing

Our Products

Building on Mainstream's success as an R&D company, our products are designed to provide a technological advantage over the competition because our engineers strive to create solutions where none previously existed.

 Mainstream's products are proudly made in the United States, resulting in superior quality. **ISO 9001:2015 Certified**

Mainstream's product line includes:

- ▶ **Environmental Control Units (ECUs)**
Air-conditioning and heating for military shelters
- ▶ **Modular Refrigeration Units (MRUs) and Tricon Refrigerated Container Systems (TRCS)**
Thermal Control for shipping containers
- ▶ **Lightweight Diesel-Engines and Generators**
Portable power that is lighter and more reliable
- ▶ **Improved Tray Ration Heaters (TRHi)**
Lightweight mobile field feeding solutions
- ▶ **Biomass Conversion**
Pyrolysis reactors and bio-oils
- ▶ **QwikProducts™**
Heating, Ventilation, Air Conditioning and Refrigeration Products



Solutions...

- ▶ Compact cooling systems for high-power electronics and high-energy lasers
- ▶ High-heat-flux coldplates with integral controls (e.g., single- and two-phase microchannel, two-phase spray cooling, synthetic jet, liquid jet impingement, and cavitation enhanced systems)
- ▶ First vapor-compression refrigeration compressor on the International Space Station
- ▶ First magnetic-bearing centrifugal-compressor-based chiller
- ▶ Ruggedized military environmental control units and refrigeration units
- ▶ Heat pump-augmented TMS demonstrator for NASA's Lunar Outpost
- ▶ Advanced nanotube-enhanced passive heat transfer surfaces and composites
- ▶ GaN and SiC based military inverters and motor drives
- ▶ New high-yield method of creating heavy fuel from biomass with conversion efficiencies exceeding 60% (by weight) and organic landfill volume reductions greater than 47% (by volume)
- ▶ New battery and fuel cell technologies