

From Launch to Deep Space



Company Overview

For more than 60 years, Ensign-Bickford Aerospace & Defense (EBAD) has delivered mission critical initiation, separation, and range safety ordnance solutions to the global Missile, Launch Vehicle, Satellite, and Manned Space communities.

Innovating for Your Mission Success

Solutions require innovation. EBAD has provided global industry influence and developed extensive capabilities since 1836. Ideas, insights, and engineering breakthroughs have made us a leading developer of the most reliable and precise space and defense energetic and mechanism solutions available.

Delivering on Promises

EBAD's history of providing high-reliability solutions is unequalled, as is the commitment to meeting delivery, safety, and performance requirements. The ability to deliver solutions to stringent customer requirements across a diverse space and defense customer base has set us apart from our competitors. The employees at each of our facilities across the country strive to meet commitments, equipping customers for mission success.

Right for Your Mission™

No other company can match the range of innovative energetic and mechanism solutions that we've developed and manufactured; this breadth of technology innovation and applications engineering is the foundation on which our success – and yours – rests. Every day the employees of EBAD strive to prove that we are “Right for Your Mission™.”

Company History

Formed in 1836 through William Bickford's invention of safety fuse, EBAD's subsequent invention of Primacord® textile braided detonating cord in the 1930s was seminal for its entrance into the space and defense markets. In the 1950s, its detonating cord product was used for separation systems on programs such as the Martin Company's Matador missile, and many subsequent missiles of that era. EBAD's participation in the Mercury, Gemini, and Apollo programs starting in the late-1950s ushered in our long-standing participation in manned space programs that is still ongoing today.

With the divestiture of its commercial mining product offering in 2004, EBAD matured its positions in the Launch Vehicle and Missile, Manned Space, EOD and Military Demolition, Breaching, and Vehicle Protection markets. In 2010, EBAD acquired its NEA® space mechanisms product line, and in 2017, acquired the TiNi™ shape memory alloy mechanisms product line, expanding EBAD's product offerings to commercial telecom, military observation and navigation, earth science, and exploration satellites and spacecraft customers.



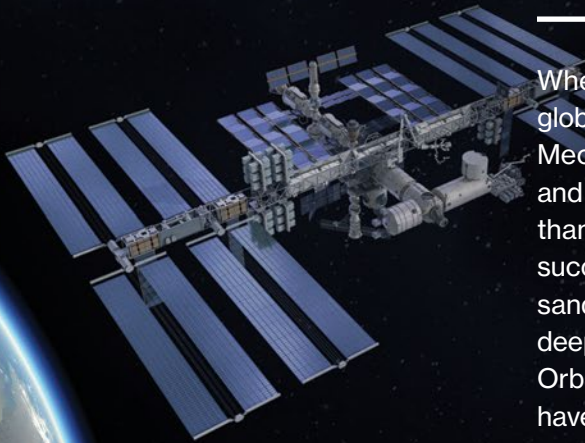
Launch Vehicle

For almost seventy years, EBAD has deployed hardware on every major U.S. launch vehicle in support of both commercial and government funded space programs. Our flight heritage for launch vehicle platforms goes back to the Atlas and Delta programs, and we are always looking ahead to providing technologies and solutions for future programs that support the continuous development of space markets to include tourism, habitation, and exploration.



Satellite

When you work with EBAD, you are working with the global leader in the Non-Explosive Hold Down & Release Mechanisms (HDRMs). EBAD has designed, qualified and delivered more HRDMs for spaceflight applications than anyone else in the world. We have 100% mission success over a twenty-year period, with over ten thousand mechanisms successfully released in space. From deep space missions to Mercury and Mars, or Low Earth Orbit (LEO) to Geostationary Equatorial Orbit (GEO), we have the technologies to meet your cost, schedule, and technical requirements.

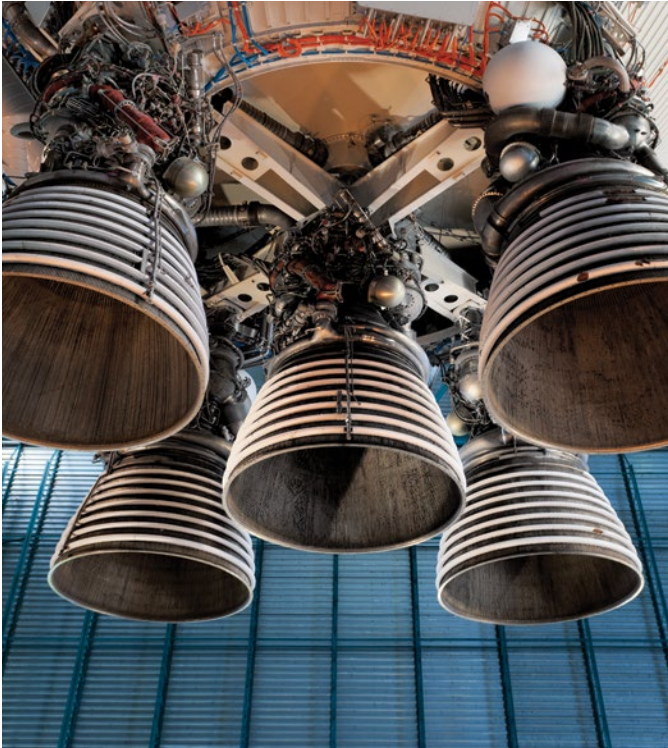


Manned Space

For over 50 years, EBAD has been a key partner to NASA ensuring mission success on every U.S. manned space flight platform since the Mercury program. The customers we serviced for Apollo are the same customers we service today for Orion, and one day, we'll service on a mission to Mars. Whether we are providing mission-critical components on the Orion or CST-100 Starliner crew capsules, or flying our hardware on every major U.S. launch vehicle, EBAD is strongly committed to achieving the U.S. Administration's mission to reach the Moon by 2024.



Product Capabilities



Initiation

Let our experience initiate your success

EBAD designs and manufactures devices tailored to meet a range of system initiation requirements for tactical missiles, aircraft, and space launch vehicles. To address technical, systems and reliability requirements, EBAD employs proven technologies, engineered and adapted to meet the system architecture requirements of our customer.

The reliability of our firing/sequencing systems is well-documented through successful implementation in multiple space flight missions. Our highly competent engineers continue to develop advanced features for greater user confidence and our systems have been approved for use at leading test facilities. In addition to producing the first flight-proven laser diode-sourced firing system, EBAD brings a patented semiconductor bridge element to our intelligent initiation system, another example of our industry leadership providing the mission-critical performance edge.



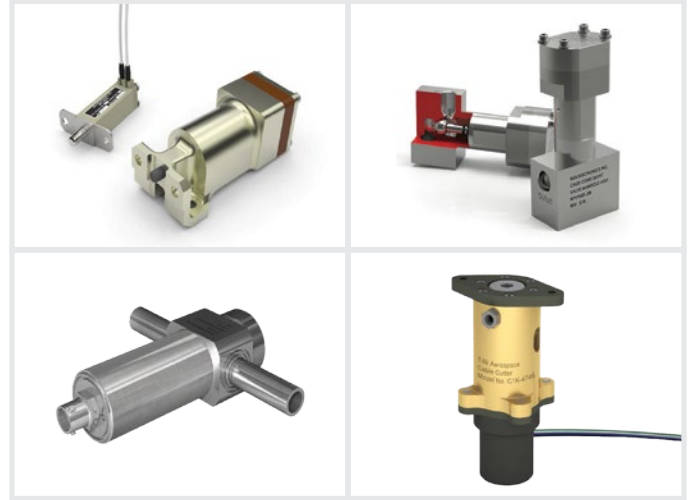
Separation, Release, & Deployment

Pioneering technologies used in the most extreme environments

Since the invention of the Linear Shaped Charge over 50 years ago, EBAD continues to pioneer Separation, Release, & Deployment technologies used in the most extreme environments. Our deep design and application experience allows us to provide customers with significant capability to meet the specific installation and performance needs. We can address key system parameters including: desired separation velocity and trajectory, debris generation issues, system size and weight, separation performance margin, induced shock, flight environments (dynamic, aero-heating), and cost.

EBAD's technology portfolio is continually expanding, providing our customers with a wide range of solutions supporting the aerospace and defense markets, ranging from pyrotechnic to non-energetic products and devices, making us the supplier of choice for any mission. From debris-free Frangible Joint Assemblies, to high preload Separation Bolts, to ultra-low shock NEA® Hold Down & Release Mechanisms and resettable TiNi™ Ejectors, EBAD offers diverse technologies to help customers solve the most challenging separation events.

Product Capabilities



Flight Termination

A precise solution

EBAD is a leader in Flight Termination Systems. Our Flight Termination Systems (FTS) provide redundant explosive assemblies capable of terminating the flight of airborne missiles or launch vehicles when they veer from their targeted path. Our innovative systems have been designed and developed to sever structures, to create aerodynamic instability, for motor destruction, or destruction of other major vehicle elements.

As an FTS systems integrator, EBAD offers a range of initiation devices (ESAD, Electro-Mechanical Safe & Arm) and transfer lines (FCDCAs) that send signals to an option of Destruct Charges (Bulk Destruct Charges, Linear Shape Charges, Bi-Directional Destruct Charges, and Conical Destruct Charges). Flight Termination Systems typically utilize Flexible Confined Detonating Cord Assemblies (FCDCA) for initial ignition (via a Safe & Arm Device) and manifold assemblies and an output charge, typically Linear Shape Charge Assemblies (LSCA) or bulk charges.

Devices

Devices for some of the most extreme environments

For over 186 years, EBAD has engineered and developed devices for some of the most extreme environments and stringent safety requirements in the aerospace and defense markets. Our devices are engineered to perform a variety of mission critical functions across launch vehicle, missile, and satellite applications.

We provide our customers with a selection of pyrotechnic and non-energetic solutions, ranging from one-shot devices that are pyrotechnically actuated, to electrically actuated devices.

Our Cutters are designed to cut bolts, cords, fuel lines, electrical cables, or just about any target that requires severing. Isolation valves and pressure vessel penetrating devices initiate fluid flow for fuel or cryogenic systems, thrust vector and altitude control systems, or systems that require rapid release of pressure.

Pin Pullers and Pin Pushers are used anywhere from pinning missiles in place in launchers, to deploying wings, to providing delta velocity for fairing and stage separation.

TiNi™ Mechanisms

Quality and performance

EBAD's TiNi™ products are non-pyrotechnic and field resettable, utilizing shape memory alloy to perform the necessary actuation for a variety of products and end applications. EBAD's TiNi™ products offer a variety of solutions for satellites, subsea and aerospace and defense applications, to include the release of satellite solar arrays, subsea ballast releases, launch locks, cable cutters and other types of hold/release components. Launch vehicle and satellite products are manufactured with the utmost regard to quality assurance, and EBAD is committed to being the industry leader in both quality and performance.



NEA® Mechanisms

Space-flight proven

EBAD is the global leader of non-explosive release mechanisms for mission critical space applications. From low earth orbit to deep space missions, our products are selected by the most demanding customers for assured mission success. Non-Explosive Actuators (NEAs) are commonly used for Non-Pyrotechnic Hold Down & Release and other actuation functions on satellites, spacecraft, launch vehicles, missiles, and other space and defense platforms. EBAD's NEA® Mechanisms utilize our split spool technology and are manufactured into:

- Hold Down & Release Mechanisms (HDRM)
- Pin Pullers
- Lithium-ion Cell Bypass Switches
- Isolation Valves
- Ejector Release Mechanisms (ERMS)



EBADTM
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Right for Your MissionTM



640 Hopmeadow St | Simsbury, CT 06070

860.843.2289 | ebad.com