

# Alcoa Fastening Systems



## Aerospace Products

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products for the increasingly challenging aerospace industry.

Many companies claim to “create value”. Alcoa Fastening Systems delivers it by working passionately to understand our customers’ needs and offering best-in-class solutions. Our fastening systems provide improved joint fatigue performance, reduced assembly cost / time, improved life-cycle costs, increased reusability, and reduced weight in all aerospace materials and designs.

Alcoa Fastening Systems is committed to the future of the aerospace industry with industry-leading investments in technology and process improvements to continue to design and produce the best possible fastening systems. We are also proud of our global investment in new markets and new manufacturing operations around the world.

Alcoa Fastening Systems’ Aerospace Division has more than 5,700 dedicated fastener experts, in 22 manufacturing operations and 4 distribution / logistics centers in 8 countries, working to gain your trust and your business. Whatever the country or language, our goals are the same: customer value and customer satisfaction. You will be surprised by just how much we can do for you.

We encourage you to visit [www.alcoafasteners.com](http://www.alcoafasteners.com) to learn more about Alcoa Fastening Systems and our products. You’ll be glad you made the connection.





utilizes a disposable hex drive nut which remains on the discarded pintail following installation, and eliminates cam-out conditions for the operator.

The **MS blind bolt** is designed for both metallic and composite structures. It is a high-strength, vibration-resistant, cost-effective fastener designed to meet the most challenging blind applications. This family of blind bolts has been used successfully in many critical areas such as engine inlets and leading edge applications.

The **Ergo-Tech® blind fastening system** is designed for both metallic and composite structures. It is available in shear and tension head configurations. Its corebolt breaks flush with the top of the sleeve every time. The one-piece sleeve configuration and no threads in bearing result in high structural integrity and high-retained clamp-up. Lightweight ergonomic tools are available to install the system. The Ergo-Tech® fastener is also ideal for robotic installation.

The **Visu-Lok® blind bolt** is designed specifically for use in metallic structures. It provides versatility and security for numerous applications and assures the highest shear, tensile, fatigue, and self-locking capabilities. When installed, it forms a solid, blind side head, with guaranteed minimum pre-load levels. The **Visu-Lok® II fastener**



Alcoa Fastening Systems offers a wide variety of high performance blind rivets. Blind rivets are ideally suited for use in structures where access is limited. However, their reliability and ease of use make them a great alternative to solid rivets in many different applications. Alcoa Fastening Systems' heritage exceeds over 70 years in providing a large selection of high performance blind rivets that are the fasteners of choice for countless applications.

The **UNIMATIC® blind rivet** system is a general purpose blind rivet for aerospace applications. The bulbbed blind head, mechanically-locked spindle and

comparable blind rivets. This system meets or exceeds all of the rigorous design and performance requirements detailed in NAS1900, NAS1919, and NAS1921 specifications. The simplified single-action installation of these blind rivets permits the use of lightweight, reliable installation tools. The all-aluminum version of this system provides extremely lightweight high performance, while the Monel® alloy and stainless steel versions of this system provide high strength performance even at elevated temperatures, as well as superb corrosion resistance.

The **HuckMAX® blind rivet** system is a general purpose blind fastening system that combines important features of structural integrity and installation convenience. The system meets or exceeds all applicable requirements of industry specifications NAS1686 and NAS1687. In addition to high performance, the design of the HuckMAX® blind rivet system is such that only one tool is needed to install any diameter. This reduces the cost of assembly, and makes this fastener ideal for repair and



**flareless** tube-ends. Other tube-end configurations include ball-nose, o-ring seal, pipe, bump, and weldable. Port plugs, sleeves, nuts, bushings, caps, and ferrules are available to complement all port configurations. Shaped products include 45° and 90° elbows, tees, crosses, swivels, and other unique configurations that meet special customer needs.

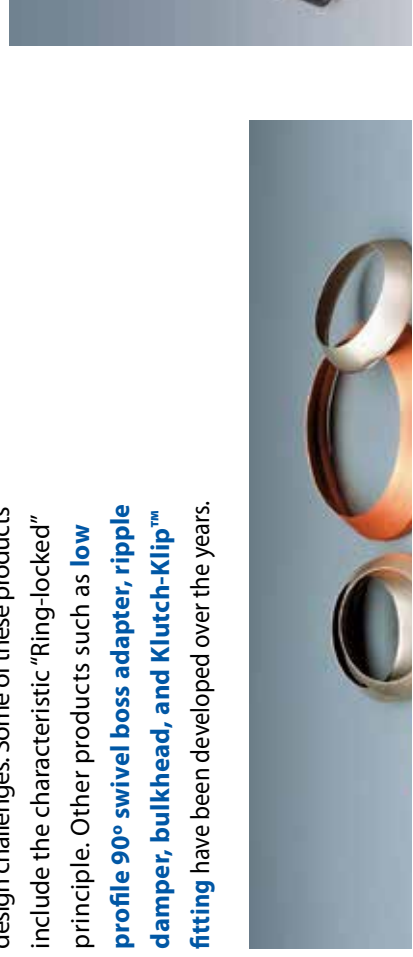
**Conical or metallic seals** effectively prevent leakage in critical applications. They eliminate potential problems caused by nicks, scratches, imperfect sealing surfaces or misalignment, as well as non-concentric conditions. The seals are easy to install and are effective in sealing light gases under extreme temperature and pressure conditions. Conical seals are designed to mate with 37° flared and flareless tube-end configurations.

Alcoa Fastening Systems also designs and manufactures a variety of **special fluid products** that meet specific customer design challenges. Some of these products include the characteristic “Ring-locked” principle. Other products such as **low profile 90° swivel boss adapter, ripple damper, bulkhead, and Klutch-Klip™ fitting** have been developed over the years.



or B-nut installation and removal. While considered semi-permanent, the adapters can quickly and easily be removed and replaced. Due to their small envelope, these adapters are significantly lighter than hex unions, resulting in weight reduction of the hydraulic package system. Standard tube-end configurations consist of beam seal, flared, and flareless. Variations of the standard design include reducers, expanders, port plugs, and solids.

**Ring Locked fluid boss inserts** are used in initial designs or to repair damaged ports. These products are able to provide high-strength surfaces in which unions are installed. A separate locking secures the insert to the boss, thus pre-





**KEENSERTS® inserts and studs** are designed to provide high resistance to torque-out and pull-out loads. Pre-assembled keys are driven down through the threads of the parent material to mechanically lock the fasteners into place. The inserts are available with free-running threads or with various types of locking devices including deformed threads, Vespel® insert, and beam lock. The studs provide a nut-end thread designed to transfer high axial loads into weak base materials. The stud or keyed end is installed into the parent material, thus eliminating the need for removing or replacing a bolt.



**Kelox® inserts and studs** are high-performance threaded products that typically require smaller diameter installation holes than other solid bushing inserts and studs. This translates into overall reduced boss sizes and weight savings. The Kelox® fasteners incorporate a pair of self-broaching keys joined by an integral ring that facilitates the driving of the keys into the structure.

**Ring Locked inserts and studs** have superior torsional resistance in both hard and soft parent materials. Inserts are available with locking and non-locking threads.

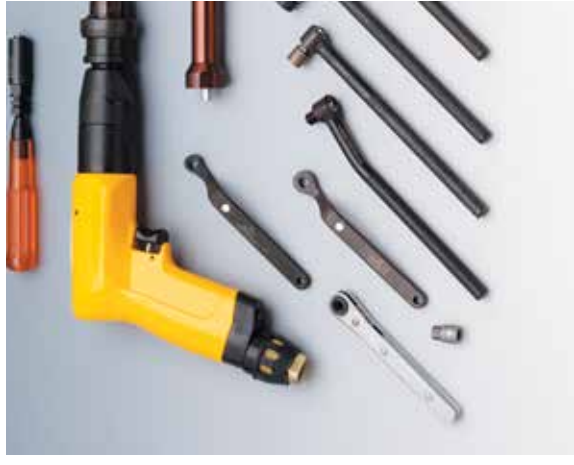
**Slimsert™ inserts** have a thin cross section, which is ideal for installation into applications requiring minimum boss configurations. This allows for reduced casting weight while adding strength. The upper end of the insert is swaged into the counterbore wall of the parent material and locks it into place.





Service technician can be placed on site to provide superior service.

For the installation of **blind rivets and blind bolts**, including The **HuckMax®**, **HUCK-CLINCH® blind rivets**, and other brands of blind fasteners, an extensive line of **pneudraulic and hydraulic tools** is available.



**Lockbolt installation tools** are also offered in both **pneudraulic and hydraulic models** to provide accurate installation of a variety of lockbolt brands and sizes.

No one knows assembly better than Alcoa Fastening Systems. For speed, accuracy, reliability, productivity, ergonomics, efficiency, and durability, you can depend on us. Custom, automated fastening systems make short work of difficult labor-intensive tasks, while specialty-access hand tools are the perfect complement to virtually any assembly need.



Standard tools are available in pistol grip and 17° and 90° versions with offset attachments to increase usability. Each system features light, medium, and heavy-duty versions to install the smallest to the largest fasteners.

With its **Lease and Tool Management Programs**, Alcoa Fastening Systems





Electronics latching mechanisms consist of a broad range of products serving the needs of the electronics industry. **Chassis latches** are offered in a wide variety of styles and strengths. Many are used for removable electronic drawers and can seat multiple-pin connectors or RFI gaskets. **Hold-down devices** are designed to secure avionics boxes and modules in a variety of aerospace applications. **Self-compensating injector/ejector levers** provide consistent self-compensation for circuit board installation tolerances. With minimal finger pressure, multiple-pin or fiber-optic connections can be seated with controlled forces ranging from 20 to 80 pounds.



**Wedg-Tite retainers** securely fasten printed circuit boards while providing heat transfer paths. Constructed for reliability, the Wedg-Tite™ retainer has a stop nut to prevent accidental disassembly and a spring element which prevents wedge segments from rotating in the unlocked position. A unique built-in torque limiter is available for accurate, controlled force installation without the use of a torque wrench and is ideal for use in high-vibration environments.

**Latch handle systems** are comprised of various types of mechanisms and provide a means of activating latch systems where access to, or visual contact of the latch mechanism, is limited.



activation if maintenance is performed while wearing heavy gloves. **Clamps** are used for the installation and maintenance of wire bundles, hoses, tubing, cable, and conduits.

**Pawl latches** are designed to secure hinged panels and small doors. The pawl engages the frame structure through the axial rotation of an actuator that turns a wire-form or solid arm pawl. **Camloc® tension latches** are used to install light to heavy-duty hinged







Precision-formed **wrenchable nuts** offer tremendous versatility in design and functionality. Configurations are hexagon, double hexagon, castellated, and spline. Additionally, a unique line of lightweight and high-strength titanium airframe nuts has been developed for composite applications.

**Bearing locknuts** are used to secure landing gears, airframe structures, bearings, gearboxes, power transmissions, and other turbomachinery applications. Configurations include prevailing

torque locknuts available with either a metallic or non-metallic locking feature. Another style includes the use of an engaging keyway on the shaft to provide a positive locking feature.

**K-Fast™ nuts** are the most widely used fasteners of their kind in both commercial and military airframe construction. These high-strength, vibration-resistant, self-locking fasteners provide fast, reliable, and repetitive installations with tools offered by Alcoa Fastening Systems. Configurations include hexagon, double hexagon, and 8-spline.



**Anchor nuts** are extremely practical for a broad range of material fastening applications. They are especially useful in blind applications or where an attached nut facilitates maintenance.

**Shank nuts** are used primarily in hot spots and are ideal for jet and rocket engine flange assemblies, such as exhaust manifolds, afterburners, and turbo pump turbine flanges.

**Barrel nuts** are high-strength, self-locking nuts that are provided for use with bolts of tensile strength up to 260 KSI, in locations where wrenching space is

virtually nonexistent, such as in a round hole of a forging or beam.

**Clinch and stake nuts** are designed for thin panels, narrow flanges and blind applications where hex nuts would be inaccessible for wrenching, or where conditions prevent the installation of an anchor nut in thin sheets of material.



is the only structural panel fastener that feature variable length sleevebolts and receptacles, allowing single "dash number" sleevebolts or receptacles to be used on a given structure.

The **TriMil™ fastening system** eliminates problems associated with the self-locking or prevailing torque feature of other similar fasteners. In addition, its positively-locked retaining ring secures the sleevebolt to the cover when it is opened, eliminating the potential for FOD and ensuring reliable operation. Consequently, TriMil™ fasteners help avoid maintenance problems and aircraft safety concerns.

The **QR™ fastening system** is lightweight, has a small envelope, and is quick operating. Most versions lock and unlock in two turns.

The **FC43® panel fastener** is a self-captivating structural panel fastener that incorporates a grommet and uses a full shank solid bolt for increased shear and tensile properties, especially



in the .1900 to .2500 inch diameters. The grommet makes this an ideal choice in composite applications, where pull-through, or delamination, is a concern. The stud bolt can be single or multiple lead threaded, and can be combined with the Flat Beam™ locking feature for exceptionally high reusability.

Designed to provide perfect alignment of chassis and plug-in modules of electronic equipment, **Eccentrix™ adjustable shear alignment pins** pro-

tect against damaging shock, shear loads and chassis warpage. The pins transfer shear loads from the chassis to the rack ahead of sensitive components which could otherwise be damaged. Easily adjusted with standard tools, Eccentrix™ pins eliminate the need for costly precision hole location and heavy precision slides, resulting in weight and cost savings.



Alcoa Fastening Systems supplies a wide variety of **captive screws** for any type of application where it is important that the attachment screw for a panel stays with that panel. Numerous head styles, recesses, sizes, configurations, and materials offer options that fulfill the requirements of any captive screw application. Fully-retracting captive screws automatically retract flush with the panel when released from mating threads, which allows equipment to be removed or installed without the possibility of jamming or damage.

**Turn-Loc® captive screws** are especially suited for front panel applications where easy fingertip operation is needed. The stainless or anodized aluminum finish, and the knurled knob, make this the perfect choice for good panel design and ease of access. They are available as fully or partially retracting versions in fixed or floating installations. Turn-Loc® fasteners are also available in low and high profile assemblies.

Alcoa Fastening Systems' range of **1/4-Turn fasteners** offers secure locking and quick unlocking with a simple



**Aero-Lite®** and **Veri-Lite® fastening systems** allow the overall length of the pin to be reduced while maintaining the same grip capability and strength level as those of the Hi-Lok® system it is based on. This enhancement reduces the weight of these systems by as much as 15% for applications where weight is critical.

The **Flite-Tite® fastening system** is designed specifically for composite skin applications where electrical conductivity is paramount, such as in applications subject to lightning strikes. The Flite-Tite® system uses a stainless steel or titanium sleeve to develop an interference fit without composite delamination, and provides the grounding needed through the structure. The system is available either with a titanium pin and nut for lightest weight, or with an Inconel® alloy 718 pin and nut for highest strength and temperature resistance.

**system** delivers high-fatigue resistance without sacrificing strength in an efficient, dependable, all-purpose fastening system. Installation in difficult access conditions is no problem with Hi-Lok® fasteners and a wide range of sizes and material combinations make it a versatile solution for many assembly problems.

In situations where a controlled interference fit is needed, **HI-TIGUE® fasteners** offer all of the benefits of the Hi-Lok® system along with a unique bead design that enhances the fatigue performance of the structure.



from Alcoa Fastening Systems, feature precise preload control for automatic installation and help provide the airframe industry with high-speed efficiency and





THE DEVELOPMENT OF THE FIRST LOCKBOLT fastener was pioneered in the mid 1940s. Since that revolutionary design, which greatly simplified the assembly of structures, Alcoa Fastening Systems has led the way with innovative designs that have been instrumental in improving structural integrity and reducing manufacturing costs around the world. Products are available in both unified and metric sizes. Installation tool systems are also offered.

**D-head, slab head and spline head.** Styles include **self-retaining** and **self-wrenching**. **Custom designs** are also available to meet our customers' exacting requirements.

The selection of recess drives available on Alcoa Fastening Systems' externally threaded products is comprehensive. The popular **cruciform-ribbed drive** with its cam-out resistant features is just the beginning. The **offset cruciform recess** provides torque-tight, tamperproof screws or bolts. The slanted three-wing design of the **tri-slot recess** ensures reliable insertion at above average torque, and for optimum security, only



the mating tri-slot driver can remove the fastener. The **Torx®** and **Torx Plus®** **recesses** provide reduced risk of both recess damage during installation, and damage to the structure when fasteners are removed. The conical **Hi-Torque recess** assures positive alignment of tool and recess at the beginning of installation, and is ideally suited to handle the stresses of hostile environments.



**NAS lockbolts** are available in a number of materials and configurations designed to meet the most demanding application requirements. The collar, swaged into the lock grooves of the pin, forms a high-strength, vibration-resistant joint.

The **GP™** and **LGP® lockbolt** families improved on the NAS lockbolt family by optimizing the lock groove design. This optimization makes the GP™ and LGP® lockbolt systems significantly lighter than comparable threaded fastening systems.

The **HUCKCOMP® lockbolt** is a high-strength, lightweight fastener intended for use in composite material applications. The flanged titanium collar enhances joint integrity by spreading a high clamp load over a large area, thereby reducing the bearing stress applied to the composite material.

water absorption, improved fuel tightness, and enhanced fatigue performance and electrical continuity. These features make it the system of choice in the most demanding composite applications.

The **LHP™ lockbolt** has all of the benefits of the HUCKCOMP® lockbolt fastener with the added benefits of higher temperature performance and enhanced fatigue strength. These benefits are the result of the unique lock groove configuration and collar design of this system.

The **XPL® lockbolt** is the latest addition to the Alcoa Fastening Systems lockbolt family. With a grip range that is more than twice that of other systems, each part number can be used in more than twice the applications. This means fewer part numbers to inventory. The wide selection of materials and diameters make the XPL® fastener the most versatile lockbolt system ever.

The **Flite-Tite® sleeved-threaded lockbolt** is designed specifically for composite skin applications where electrical conductivity is paramount,



ranging from the unique loader slot and loader slot rod end bearings, to split ball and split race. These bearings and rod ends are used in all types of aircraft applications such as nose and main landing gears, engine mounts, flight control surfaces, doors, etc.

**Expandable Diameter Fasteners (EDF)**

use tapered sleeves or bushings that, when activated, expand to create a tight fit in a hole. The sleeves can be activated by various means, including the use of a nut or bolt for torque, or other mechanisms such as a wrap around cam handle. These fasteners provide a rigid structural joint. The radial tightness minimizes vibration and cyclic fatigue loads, and helps resist shock loads. EDFs are available in a variety of materials and finishes for extreme corrosive or high temperature environments.



The **Asp® fastening system** provides a simplified method of fastening composite, honeycomb, metallic, or other materials that are sensitive to fastener clamp-up or installation force conditions. Clamping force can be infinitely adjustable within maximum recommended torque limits and no further load is applied during installation. The Asp® fastener has a positive mechanical lock for use in vibration and FOD critical installations. It installs quickly and easily, thus eliminating the need for potting, bushings, inserts, or stepped hole preparation.

Other specialty products include shear, tie and brake bolts; thrust reverser and leading edge slat pins; adjusters; bush-

ing the highest quality production tooling in the industry for more than 30 years. Offering a complete line of tooling products and services, including **flat and cylindrical dies, header tooling, thread die regrind, and cut-down services**, Alcoa Fastening Systems' Mairroll® is the supplier of choice for today's demanding aerospace and commercial user.

**Thread dies** feature Super M-42 material, which is vacuum heat-treated and tempered for maximum toughness and durability. This provides the longest possible thread rolling life. All dies are synchronized and center-matched to reduce variability in set-ups. Alcoa Fastening Systems' Mairroll® manufactures all standard, controlled major, and modified thread forms to meet customer needs. Custom form requirements can also be met. Precise and accurate thread forms assure the customer quality parts that meet or exceed today's stringent aerospace and commercial quality standards.

sorted sizes. Alcoa Fastening Systems' Mairroll® features a complete line of punches, including cruciform, cruciform-ribbed, offset cruciform, offset cruciform-ribbed, tri-slot, and many others. The tooling is manufactured from a variety of materials such as M-2, M-42, and various carbide grades. Tooling can be custom designed and manufactured to suit customer needs.





# ODUCTS LOCATIONS

## Kingston, NY

Installation Tools  
Huck

## Leicester, UK

Bolts, Tie-Rod Bolts  
North Bridge

## Casablanca, Morocco

Machined Parts, Tooling

## Montbrison, France

Bushings, Fluid Products, Nuts, Specialty Products  
SNEP

## Nemesvamos, Hungary

Nut Blanks, Industrial Inserts

## Manchester, NH, USA

## Sylmar, CA

Bearings, Bolts, Studs, Specialty Products  
Valley-Todeco

## Suzhou, China

Pins, Lockbolts, Panel Fasteners  
Huck, Camloc

## Torrance, CA

Blind Fasteners, Collars, Inserts & Studs,  
Latching Mechanisms, Panel Fasteners  
Camloc, RAM, Voi-shan, Tridair, Rosán,  
Deltron, Microdot

## Toulouse, France

Bolts, Screws, Specialty Products  
Meccero

## Tucson, AZ

## Sales

### Arlington, TX

### Cergy, France

### Hamburg, Germany

### Leesburg, VA

### Leicester, UK

### Takatsuki City, Japan

### Torrance, CA

## Distribution / Logistics

### Aichach, Germany

### Cergy, France

### Waigaoqiao, China

### Simi Valley, CA

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