



# A M E W O R K H O L D I N G S O L U T I O N S

Your single source for fixtures, components,  
parts and design/build services.

 **ADVANCED**  
MACHINE & ENGINEERING CO.

## ***Enterprising Solutions for High-Stakes Machining***

***Your company's reputation is everything, and it's riding on every job. The stakes couldn't be higher.***

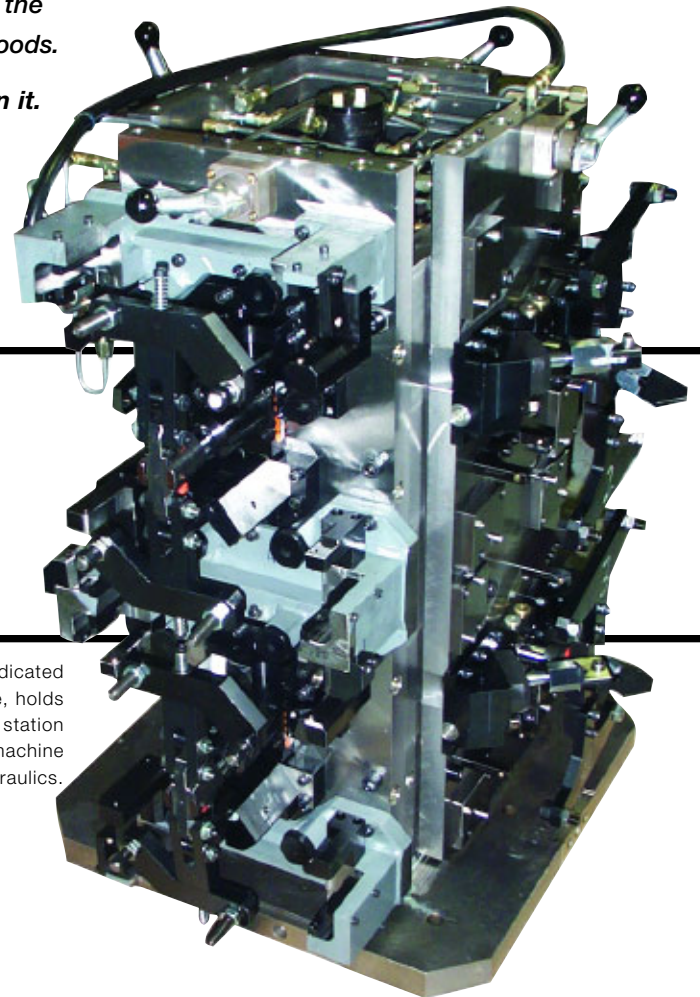
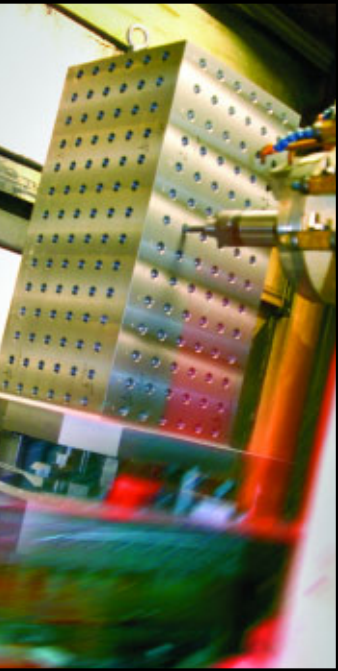
*That's why we take workholding so seriously at Advanced Machine & Engineering (AME).*

*We consider it our job to design, build and deliver innovative workholding solutions that function exactly as needed on busy production lines. That goal has not changed at AME in four decades. Our fixtures and components are designed to help you keep production moving out the door at the lowest possible cost, with absolute consistency, and with the tightest tolerances to ensure the quality and accuracy of your finished goods.*

***Our reputation, like yours, depends on it.***

### ***One-Stop Fixture Shop***

AME can handle workholding projects from design to build to ship. Our expansive North American facilities feature horizontal and vertical CNC machine centers, CNC ID/OD grinders, very large coordinate measuring machines (CMMs), an extensive inventory of components, complete design/build and technical consulting services—in short, everything you expect from a world-class workholding partner. With one call to AME, you can put our extensive resources to work for you.



Custom A-frame tombstone for dedicated hydraulic fixtures.

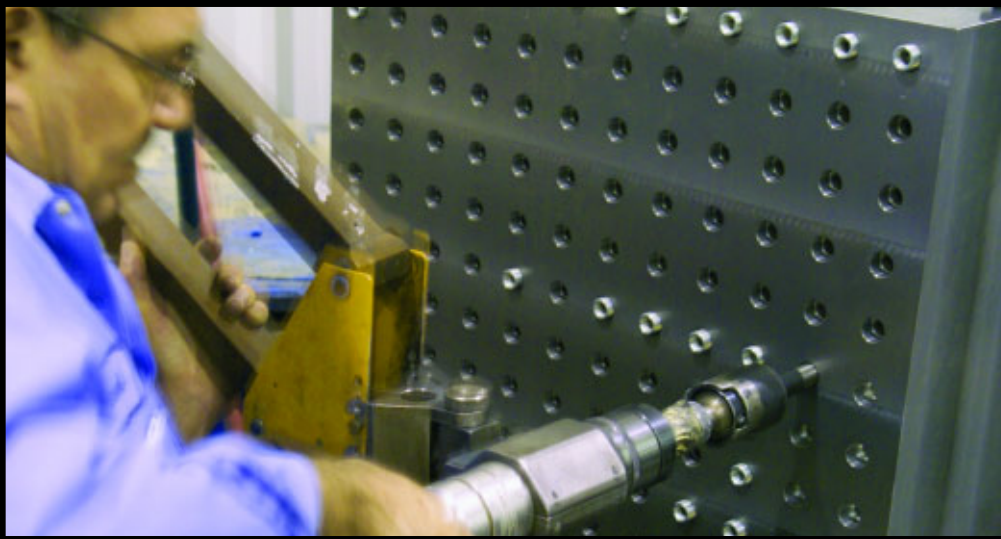
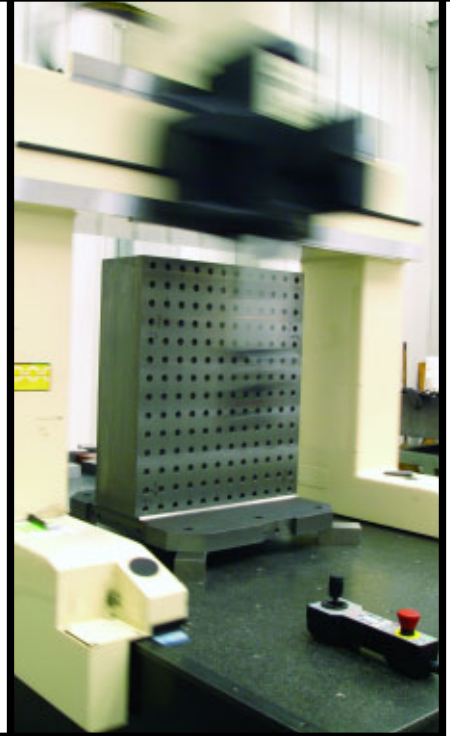
Four-station dedicated hydraulic fixture, holds four parts per station using on-machine hydraulics.

### ***Real-World Solutions***

AME started as a full-service machining company, so our workholding solutions are built on a solid foundation of technology and experience. Here you'll find in-house: project engineers, machinists, and production managers who know their way around a job shop, and have practical experience dealing with a variety of parts and production requirements. They know what works—and just as importantly, what doesn't. You get solutions that work as needed, without unnecessary surprises or delays.

### ***A Culture of Ownership***

At AME we own the end result as much as you do. Accountability permeates everything we do, from equipping our state-of-the-art facilities to training our teams to integrating new techniques and technologies into our processes. We do whatever it takes to get the right result.



AME fixtures and components are designed to hold the tightest tolerances under real-world conditions, and are performance verified with full CMM reports from AME's in-house machine shop.



TRIAG clamping components holding a customer part on an AMROK full-grid tombstone (left).

## *The Workholding Experts*

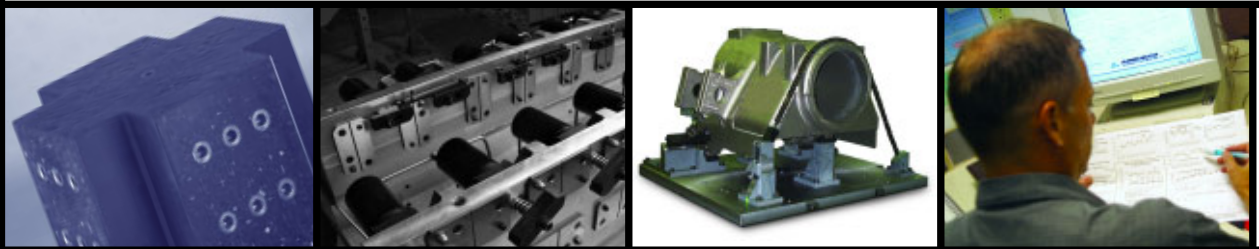


Whether you need hydraulic or pneumatic fixtures, modular components, Self Aligning Fixture Elements (S.A.F.E.) grids, force cartridges, tombstones, locating systems, or high-density workholding systems, AME can deliver. Workholding is a core competency at AME, so with one call, you can add fixturing expertise to your existing skill sets. AME workholding solutions include:

- **AMFORCE**™ Power-Off Mechanical Clamping Cylinders (p. 6)
- **AMROK**™ Tombstones (p. 7)
- **AMFLEX**® /S.A.F.E. Self-Aligning Fixture Elements (p. 8)
- **S.A.F.E.-LOCK** Fixture Plates (p. 9)
- **TRIAG** Modular Workholding Systems (p. 10)

### *Tailored to You*

Dedicated or modular. Manual or hydraulic. Machining or inspection fixtures. Incremental or turnkey services. AME workholding solutions are tailored to your needs, timeline and business plan. Do you want us to work with existing CAD drawings from your in-house design team? No problem. Do you want AME to be responsible for every phase of your project from start to finish, or simply provide à la carte services at key points in the development process? The choice is yours. However you work with AME, we'll make sure our services are a perfect fit.



### *Total Quality Focus*

At AME, we're obsessed with quality at every level—in design, production, process control, staffing, training and more. We even focus on the quality of team interactions—at the department level, across the supply chain, and in working with our customers. This unrelenting focus on quality is a defining

attribute of AME, and the reason why our ISO 9001:2000 - certified workholding solutions are used by some of the biggest manufacturers in the world including Lockheed Martin, Rolls Royce, Boeing, Caterpillar, Toyota Machinery, Honeywell and others.

### ***Well Designed, Well Built***

AME fixtures hold extremely tight manufacturing tolerances hour after hour, run after run. It starts with in-house designers who use advanced 3D CAD modeling technology to create durable fixtures that produce reliable, consistent results. The AME design team is backed by the most

highly refined ISO-certified processes in the industry, including stringent quality control measures that are built into every phase of the AME manufacturing process. Fixture performance is verified in-house with full CMM reports, which are generated for every fixture and are available on request.



AME designers can import customer-generated CAD drawings into a state-of-the-art 3D CAD modeling system where early concepts are refined and improved. AME's in-house teams can get involved at any point in the process: conceptual development, design, prototyping, machining, inspection, assembly and test. Or AME can own the entire process from concept through completion for turnkey, worry-free delivery.

AME's North American sites are equipped to handle virtually any size project, from the smallest components to the largest, most complex fixtures.

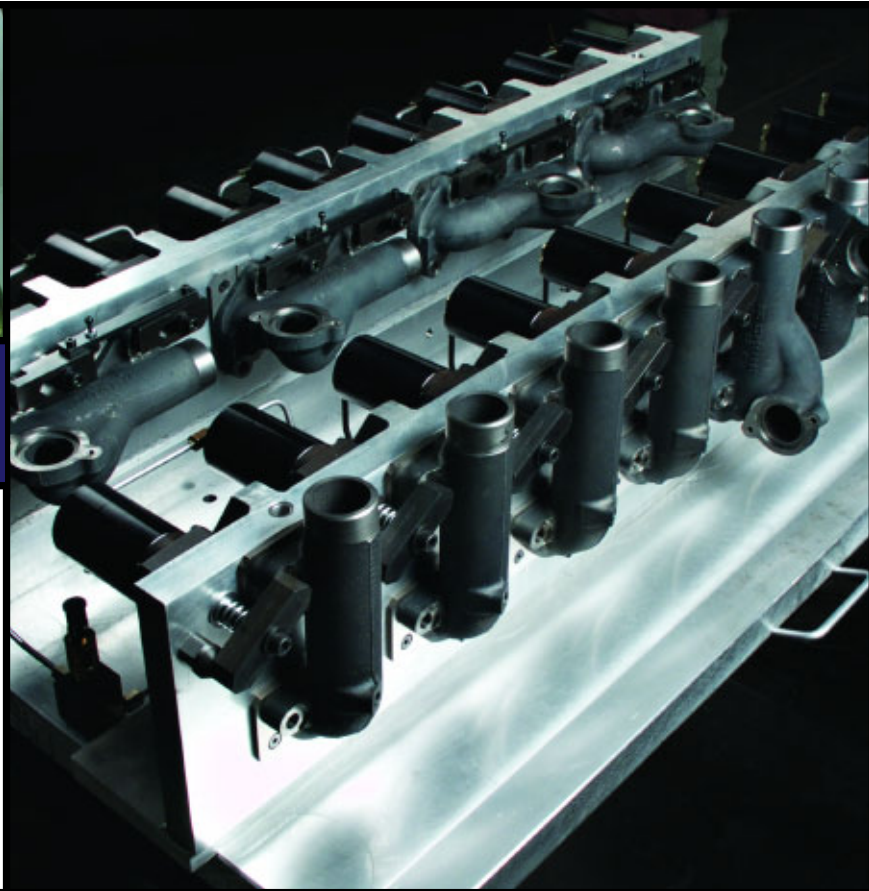
## **AMFORCE™ Power-Off Mechanical Clamping Cylinders**

AMFORCE™ Cartridge Cylinders are unique in the industry, providing an innovative new way to safeguard fixtures, machines, workpieces and operators. AMFORCE Cylinders allow parts to be mechanically clamped and hydraulically unclamped, so workpieces are held securely in place at all times, even in the event of a power or hydraulic failure. It's an extra degree of insurance for protecting expensive parts and equipment.

- Power-off mechanical clamping holds parts securely in place when power fails
- Hydraulically operated unclamping simplifies part removal
- Rigid, oversize construction ensures long life
- Wide variety of mounting styles, sizes, and clamp arms available
- Simple piping or manifold mount design
- Tapped hole on rod end supports custom components and retrofits



Custom designed AMFORCE cylinders inside a dedicated fixture (above) and standard AMFORCE cylinders on an automotive-related fixture (right).



## AMROK™ Tombstones

AME provides a variety of cast iron, aluminum or steel tombstones, as well as TRIAG epoxy mineral tombstones (page 10). Class I or Class II tombstones are available in standard or custom configurations, from semi-finished plain face to full-grid patterns with precision bushings and threaded inserts. All steel and cast iron tombstones and plates are stress relieved to provide dimensional stability, and can be custom fit to the machining center using any point of reference including edge locator with hardened and ground wear pads, center locator, or custom specified mounting holes.

AMROK tombstones are precision engineered to hold the industry's tightest tolerances for flatness (.0005/12 in.), parallelism (.0005/12 in.), perpendicularity (.0008/12 in.), and surface finish (63 RMS)\*. The tombstones are built then verified

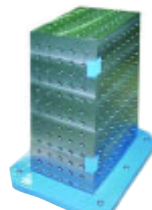
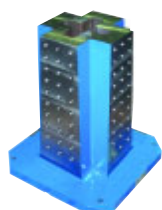
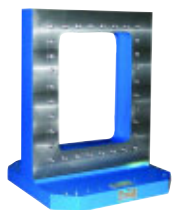
using AME's in-house coordinate measuring machines, so conformance of design can be verified with a full CMM report, available upon request.

AMROK tombstones are available in virtually any style, including (but not limited to):

- Cubes
- Double Angles
- Window Frames
- Single Angles
- Cross Columns
- Octagons
- Hexagons
- Triangles
- Y Tombstones
- Plates
- Risers
- Consoles
- Angle Blocks
- Specials

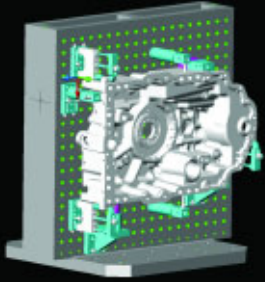


This large cast iron fixture, created for a commercial/military aircraft builder, weighs 15,015 lbs. and stands 70 inches tall, with a 67 x 71.25-inch base.



\* A complete table of Class I and Class II tolerances for AMROK tombstones is viewable online. Just visit [www.ame.com](http://www.ame.com), then search "AMROK" and select the AMROK Ordering Guide.

## AMFLEX®/S.A.F.E. Self-Aligning Fixture Elements



High-performance CAD systems are used to design and verify custom workholding configurations for any type of part.

AMFLEX® Modular Workholding systems feature a unique clamping technology that virtually eliminates the effects of part distortion during machining. The technology uses self-aligning ball pads that automatically adjust to the contours of a workpiece and hold it securely in place for accurate, stress-free clamping. Four standard configurations provide a variety of ball diameters and unit sizes to accommodate different workpieces. Ball elements are available with either a smooth or serrated face. Smooth balls hold precision heights of +/- .0005 in., serrated balls hold semi-precision heights of +/- .005 in.

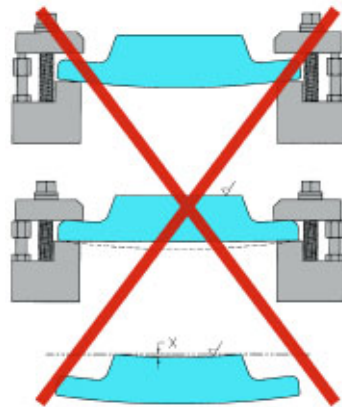
A variety of grid base sizes provides great freedom and accuracy in positioning com-

ponents with this system. Two-inch center-to-center full-grid design with threaded inserts and precision bushings support vertical, horizontal and round clamping techniques.

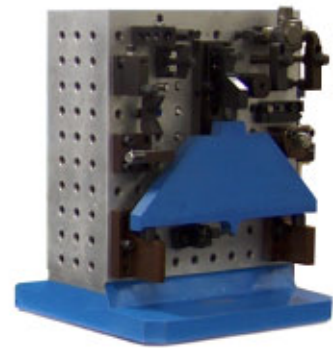
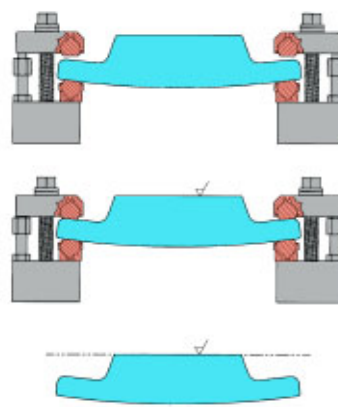
Engraved alphanumeric row and column identification allows proven set-ups to be recreated quickly, economically and accurately. AME's internal CMM reports are available upon request.

No-hole, tapped hole, bored and tapped hole, and S.A.F.E. grid patterns are available in virtually any style of tombstone offered by AME.

Conventional Clamping



Stress-free clamping with the AMFLEX Workholding System



AMFLEX workholding systems use self-aligning ball pads to hold workpieces firmly in place. The workholding system adapts to the natural contours and irregularities of the workpiece for stress-free clamping.

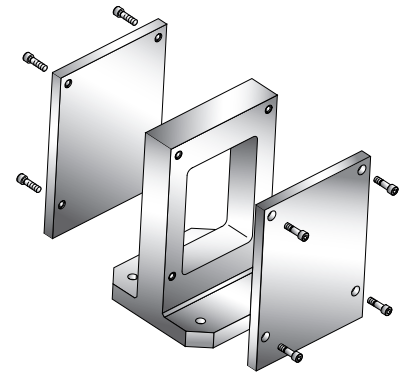
A few of AME's many AMFLEX components are shown here on an AMROK tombstone.



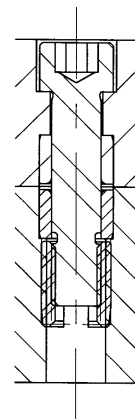
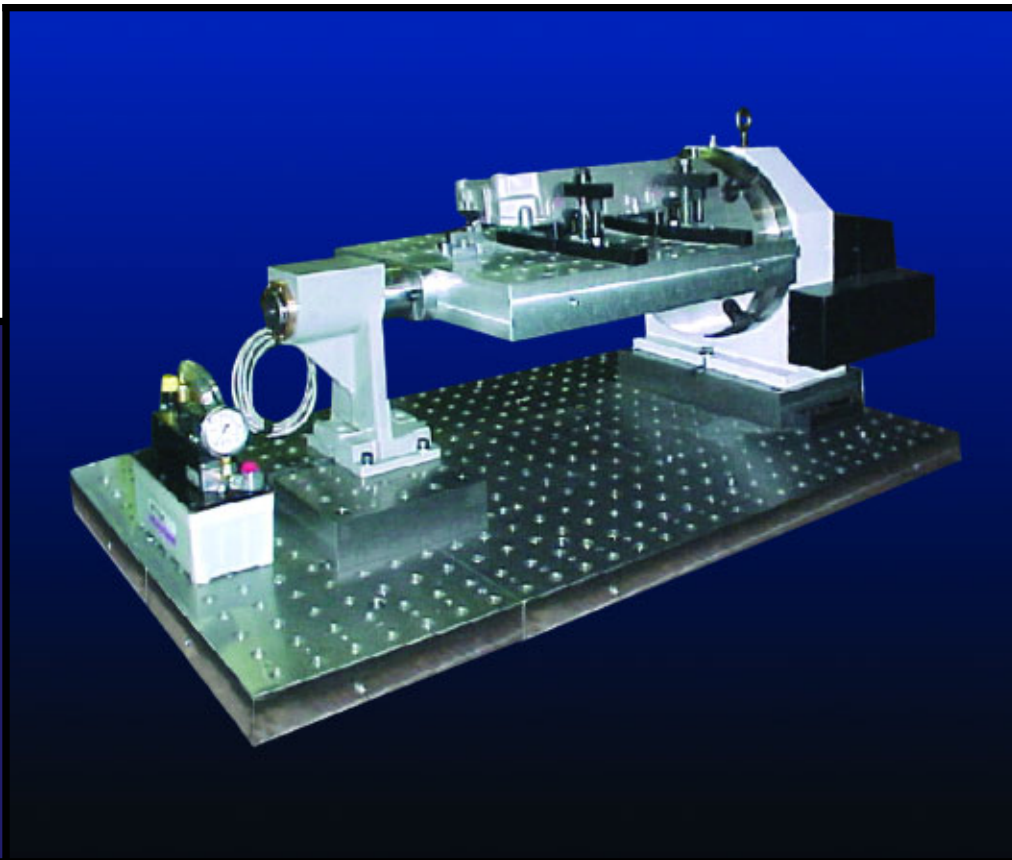
## S.A.F.E.-LOCK Fixture Plates

AME continues to lead the industry in self-aligning interchangeable fixture plate systems with S.A.F.E. LOCK precision fixture plates. These plates can be mounted quickly on any AMFLEX® grid base including window frames, cubes, double angles, machine pallets and more. Change-over is fast and easy—just remove the precision dowel screws and mounting plate,

position a new plate, re-insert the screws and secure. The self-aligning plates mount horizontally or vertically for dedicated machining, and are located quickly and accurately with precision bored and hardened bushing holes for the dowel screws. No guesswork, just fast and accurate placement.



S.A.F.E.-Lock Fixture plates on a window frame tombstone. Co-axial positioned bushings and threaded inserts allow both positioning and clamping in every hole. Hardened precision bushings mean high durability and easy replacement.




Dowel pins with precision bushings and threaded inserts are used to accurately locate and mount fixture plates and AMFLEX components.

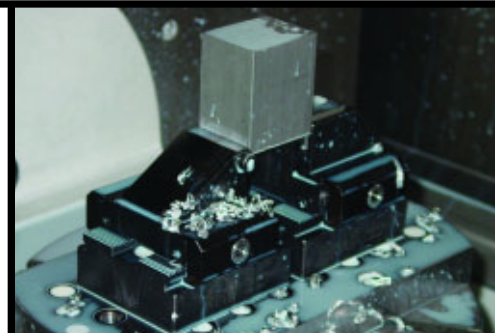
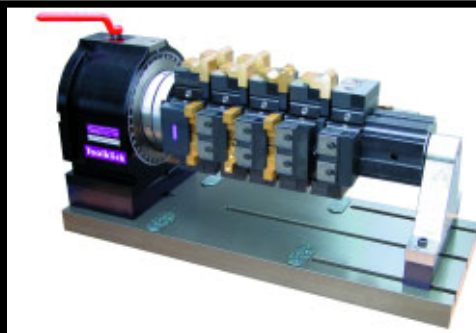
## TRIAG Modular Workholding Systems

TRIAG workholding systems combine the characteristics and performance of a dedicated fixture in a platform that is completely modular and can be retooled as needed. TRIAG has a history of rethinking the status quo to produce innovative approaches to workholding. Here are some examples:

- TRIAG's modular workholding systems use *compactCLAMP*, *powerCLAMP* and *microCLAMP* technology to hold from mid-size to very small parts in very high densities while allowing easy part change for fast retooling.
- Breakthrough clamping designs minimize interference, so machine spindles have full access to workpieces, even in high density applications. Access is even better for five-axis machines using TRIAG's *5axesCLAMP*.
- TRIAG's vacuum clamping techniques provide outstanding accuracy for machining extremely large, flat parts while ensuring that workpieces are handled gently.
- TRIAG's new sub-zero ice clamping technology provides adhesive strength up to 20 times greater than vacuum clamping, ideal for irregular, fragile parts that are difficult to grasp.
- TRIAG's zero-point OPP fixture positioning device allows highly accurate location of fixtures, tombstones and vises onto the machine table, dramatically reducing setup time.
- TRIAG pioneered lightweight epoxy mineral tombstones that have characteristics similar to cast iron but are as light as aluminum. The tombstones are also compact, rigid and economical—the perfect foundation for holding extremely tight tolerances.

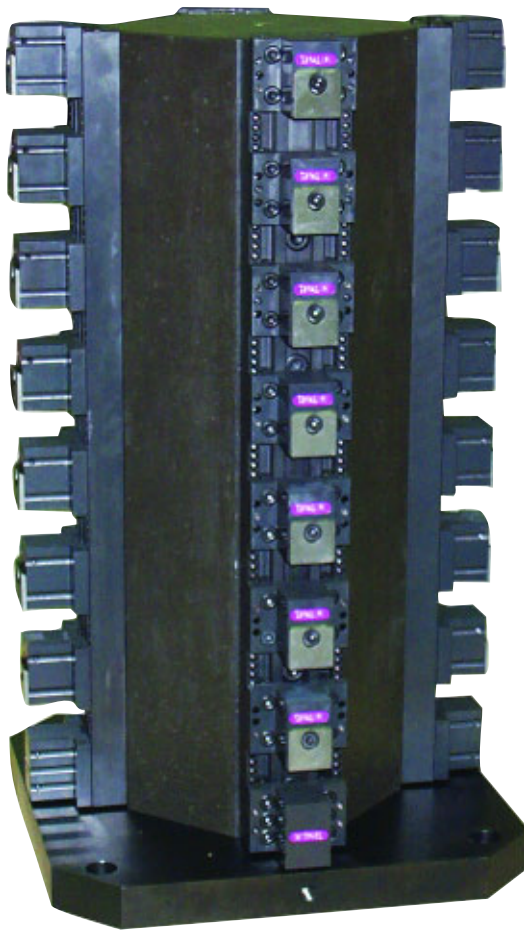
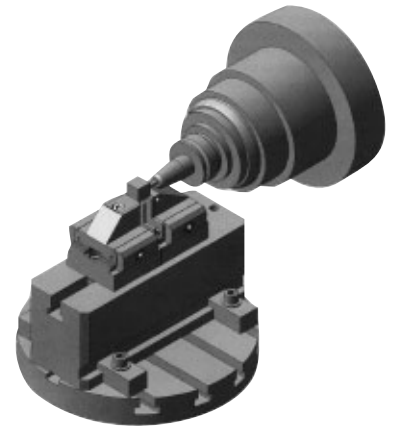


TRIAG compactCLAMPs, shown here, holding various parts on a TRIAG epoxyMINERAL tombstone.



TRIAG powerCLAMPs on a TRIAG trunion indexer (above left). The TRIAG 5axesCLAMP (part of the powerCLAMP family) was developed specifically for 5-axis machines (above right).

TRAIG base rails mount perfectly to AME standard grids, allowing AME to quickly integrate TRAIG's technology into dedicated fixtures that can be retooled as needed. AME is the exclusive U.S. distributor of TRAIG products.



**TO LEARN MORE:**  
Search "TRAIG" at [www.ame.com](http://www.ame.com) or use the enclosed business reply card to request a TRAIG brochure.

### ***One Call, Once And For All***

With one call to AME, you can solve your workholding problems once and for all with in-house design/build services, components, and real-world machining expertise. We know what works in workholding, and we're here to help. To learn more, please call 815-962-6076 or click [www.ame.com](http://www.ame.com) today.

*We've got you covered. For 50 years, AME's sister company, Hennig Corp., has been designing and producing custom covers for state-of-the-art machine tools. Hennig telescopic steel covers are reliable, durable, and perfectly tailored to protect against corrosion, debris and common workplace contaminants. There's no better way to protect your investment on the shop floor.*



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