

We Put It All Together... In Seconds.

Ball Lock™

MOUNTING SYSTEM

Maximize productivity levels and dramatically increase throughput with Ball Lock™.

Looking to realize the full benefits of lean manufacturing? Then you need the one system that puts it all together, so you can put it all together...and that's Ball Lock™.

Ball Lock™ is the industry's most popular quick-change, fixturing-flexible mounting system that can be configured to create lean-optimized solutions for your most demanding needs.

The original quick change system for fast set-ups and machine changeover.



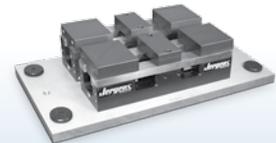
SHANKS



RECEIVERS



FIXTURE PLATES & SUBPLATES

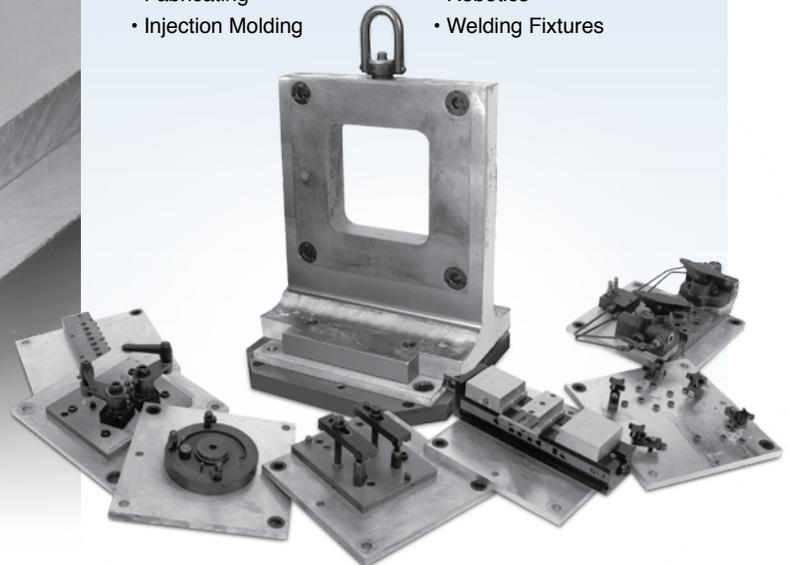


VICES



The Ball Lock™ Mounting System is used as a Quick Change Solution on the following:

- CNC Machines
- Palletized Fixtures
- Stamping
- Fabricating
- Injection Molding
- Packaging Machines
- Assembly Machines
- EDM
- Robotics
- Welding Fixtures



Lean Manufacturing and Set Up Reduction Applications

Accurately Locate and Lock Fixture Plates to Subplates in Seconds... With No Indicating Required.

Machining Cast Part

Previous Set Up Method:

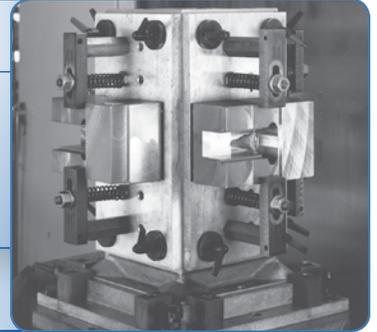
Located part with dowel pins, bolted part to tombstone fixture. Indicated part to zero datum point.

Set Up Using Ball Lock System:

Mount parts to fixture plate while machining other parts. Mount fixture plate to tombstone using Ball Lock shanks. No indicating required because system provides ± 0.0005 ($\pm 0.013\text{mm}$) repeatability.

Previous Set-Up Time:
15 minutes

Set Up Time With Ball Lock System:
60 seconds



CNC Machine Base:

Drilling and reaming forged part.

Previous Set Up Method:

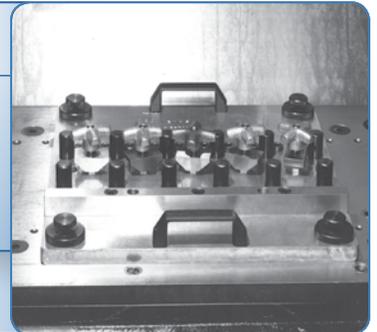
Fixture plate located with dowel pins bolted to machine base. Fixture plate and parts indicated.

Set Up Using Ball Lock System:

Parts are pre-mounted on fixture plate, which is then mounted to machine base using Ball Lock shanks. No need to indicate.

Previous Set Up Time:
7 minutes

Set Up Time with Ball Lock System:
60 seconds



CNC Vertical Machining Center

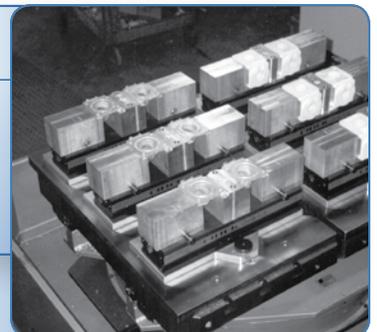
Machining aircraft valve parts

Previous Set Up Method: New Project. New Machine. No Prior History.

Set Up Using Ball Lock System: Using Ball Lock Jig Saw Plate on Multi-Purpose Subplate enables operator to mount two more vises on the fixture. No indicating needed.

Previous Set Up Time:
New Set Up.

Set Up Time With Ball Lock System:
80 seconds setting up six vises.



Two-Sided Tombstone

Drilling and tapping cylindrical bodies.

Previous Set Up Method:

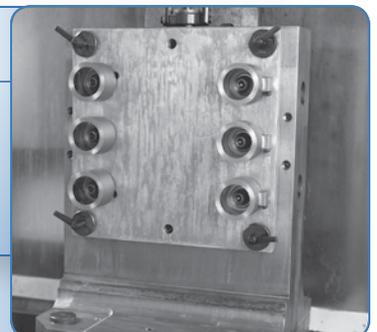
Fixture located and bolted to tombstone. Had to be indicated.

Set Up Using Ball Lock System:

Fixture plate mounted and located with Ball Lock shanks. No need to indicate.

Previous Set Up Time:
12 minutes

Set Up Time with Ball Lock System:
45 seconds





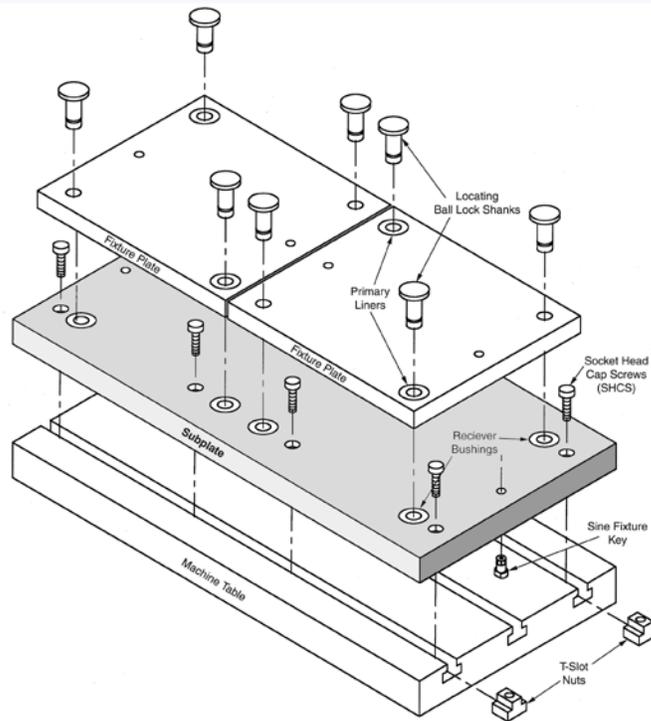
Locates

The Ball Lock™ System accurately positions your fixtureplate with a repeatability of $\pm 0.0005"$ ($\pm 0.013\text{mm}$) or better, minimizing the need to indicate your fixture.



Locks

The Ball Lock System securely holds fixture plates to subplates with up to 20,000 lbs. (9000 kg) of hold-down force per shank.



The Ball Lock Mounting System is designed to speed the accurate locating and locking of fixture plates to subplates. The system consists of three parts: a Locating Shank, a Liner Bushing, and a Receiver Bushing. Using the Ball Lock Mounting System is a simple process: Install a subplate with receiver bushings on your machine table; add your fixture plate with two locating liner

bushings; then insert two locating shanks through the liners and into the receiver bushings to provide accurate location. $2\frac{1}{2}$ turns of the set screw in each of the locating shanks provides positive holding force. Additional Ball Lock™ Shanks are inserted through clearance holes in the fixture plate and set screws tightened for additional holding force distributed across

the fixture plate.

It is recommended that the use of the Ball Lock Mounting System for locating and clamping of fixture plates be incorporated in a systematic process. All fixture plates should have two locating points positioned as far apart as possible. There is no advantage to having more than two

The Ball Lock™ Mounting System

provides a method of quickly and accurately locating fixtures onto machine tables. The Ball Lock™ Mounting System has done for machining centers what the Japanese SMED concept did for presses. Instead of single minute exchange of dies, Ball Lock™ provides single minute exchange of fixtures. Fixtures can often be exchanged in less than a minute and with position repeatability of $\pm 0.0005"$ ($\pm 0.013\text{mm}$). Fixtures can be exchanged between different machines when both are using the Jergens Ball Lock™ Mounting System.

Commonly Asked Questions

Q. What is the Ball Lock™ Mounting System?

A. It is a means of locating and locking two flat surfaces together, normally a fixture plate and a sub-plate.

Q. How does it locate?

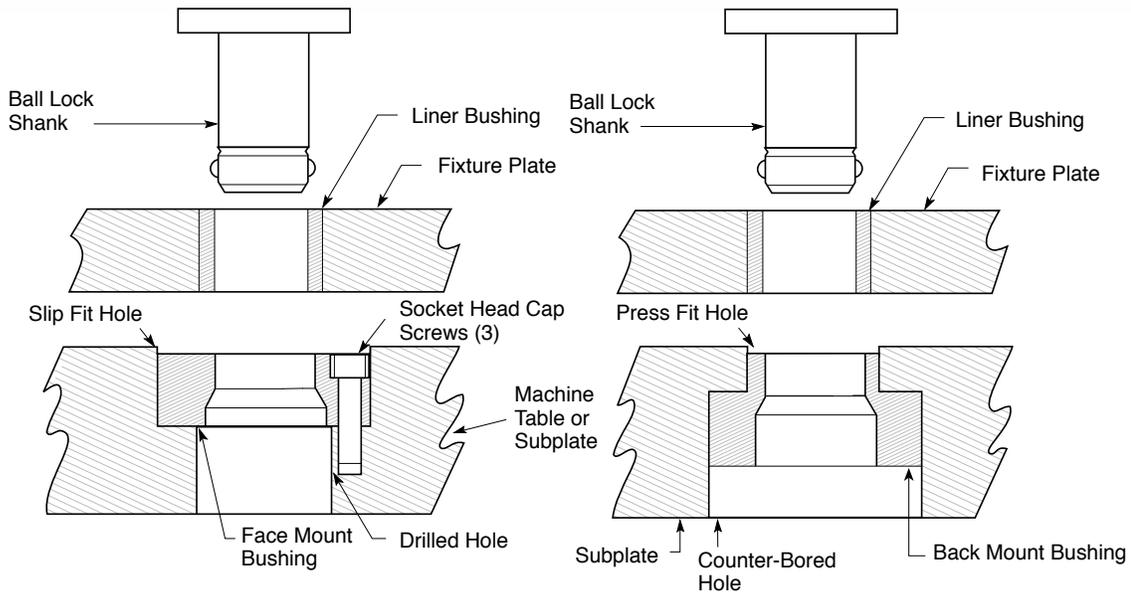
A. Similar to locating pins, two Ball Lock™ shanks (pins) pass through two precision liner bushings on the fixture plate and into two precision receiver bushings on the subplate.

Q. How does it lock?

A. Inside the shank are three balls that expand into a tapered groove in the receiver bushing. This action draws the plates together. The locking balls are activated by turning a setscrew in the head of the shank, which pushes a 4th ball to distribute the clamping forces between the 3 locking balls.

Q. How many shanks are required to locate and lock each fixture?

A. Only two shanks, passing through bushings in the fixture plates, are required for location. However, additional shanks passing through clearance holes in the fixture plate will provide additional holding force distributed across the plate.



Mounting Method With Face Mount Bushing

Mounting Method With Back Mount Bushing

locating points. If more than two flanged shanks are required to provide additional hold-down force, omit liner bushings in the additional holes in the fixture plate and allow 0.030" (0.76mm) over the nominal size. The additional clearance will insure that these holes have no influence on the locating holes.

How accurate should positioning be?
The center distance of the receiver bushings in the machine table, tombstone, or subplate should be as accurate as possible $\pm 0.0002"$ ($\pm 0.005\text{mm}$) recommended. Accurate location will assure interchangeability of numerous fixture plates. For accurate repeatability within $\pm 0.0005"$ ($\pm 0.013\text{mm}$)

of true position, both liner bushings in the fixture plate should be *primary* liners and the center distance tolerance should be $\pm 0.0002"$ ($\pm 0.005\text{mm}$). For a slightly looser fit, repeatability within 0.0015" (0.04mm) of true position, use one *primary* and one *secondary* liner with a center distance tolerance of $\pm 0.001"$ ($\pm 0.003\text{mm}$).

Q. Is there a preferable location for the liner bushing?

A. System repeatability is improved if the liners are located at opposite corners of a rectangular fixture plate. For consistency, we recommend locating the liner bushings at top left and bottom right.

Q. What are the advantages of using the Ball Lock™ System over the conventional method of dowel pins and cap screws?

A. Both locating and locking are accomplished in the same motion. Ball lock™ shanks require only 2.5 turns to lock a 1/2–13 (M12) screw with 3/4"

(18mm) of thread engagement require 10 turns to lock. On CNC machines, the repeatability of fixture locations makes indicating of the fixture unnecessary.

Q. How do I recess the fixtureplate for a clear surface ?

A. Counterbore the fixture plate to a diameter large enough to allow easy removal of the shank.

Note: The thickness of the plate section under the head of the shank is critical and must conform to mounting instructions .

Q. What if my plate is thinner than the recommended thickness?

A. By adjusting the depth of the counterbore for the receiver bushing in the subplate, you can still use the Ball Lock™ System. If there are any questions on this type of application, please call 1-800-JERGENS.

Q. Can I use the shanks in a heated environment?

A. The shank is made of alloy steel, heat treated to 40-45Rc and should with stand temperatures up to 400°F. (200°C).

Note: Thermal expansion of fixture plates may affect the center distance tolerance and repeatability.