The Ball Lock Mounting System was designed to locate and lock two flat stationary surfaces in a machine tool. Use of the Ball Lock Mounting System in other applications can result in different forces and stresses being exerted on the system components. End users must calculate the forces and stresses generated prior to their using Ball Lock in a different application.
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...

**Machining Cast Part**

*Previous Set Up Method:*
Located part with dowel pins, bolted part to tombstone fixture. Indicated part to zero datum point.

*Previous Set-Up Time:*
15 minutes

*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 ±.0005 repeatability.

*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.

*Previous Set Up Time:*
7 minutes

*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.

*Set Up Time with Ball Lock System:*
60 seconds

**CNC Vertical Machining Center**

Machining aircraft valve parts

*Previous Set Up Method:*

*Previous Set Up Time:*
New Set Up.

*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.

*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.

*Previous Set Up Time:*
12 minutes

*Set Up Using Ball Lock System:*
Fixture plate mounted and located with Ball Lock shanks. No need to indicate.

*Set Up Time with Ball Lock System:*
45 seconds

...With No Indicating Required
**Locates**
The Ball Lock™ System accurately positions your workpiece...to within ±.0005" repeatability, minimizing the need to indicate your fixture.

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

The Ball Lock Mounting System is designed to speed accurate locating and locking of fixture plates and 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 three step process. Install receiver bushings in your machine table or subplate, and liner bushings in your fixture plate; then insert the locating shanks through the liners and into the receivers to provide accurate location. A couple of turns of the set screw in each of the locating shanks provides positive holding force. Eighteen locating shanks, two types of receiver bushings, and two types of liner bushings are available to suit your individual requirements. 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

---

**Most Commonly Asked Questions**

**Q. What is the Ball Lock System?**
A. A means of locating and locking two flat surfaces together. These are usually a fixture plate and a subplate.

**Q. How does it locate the plate?**
A. It locates in the same manner as locating pins. In other words, there are two precision bores (receiver bushings) located on two precision pins (shanks).

**Q. How many shanks (pins) do I need to locate the plate or part?**
A. Two shanks are the maximum needed to locate. Anything more is a hindrance rather than a help. (This also applies to locating pins.)

**Q. How does it lock?**
A. The Ball Lock system achieves its holding force by a combination of force generators. A threaded screw exerts force onto a center ball which, in turn, directs this force onto three balls that register on a taper seat.

**Q. How many do I need to lock the part?**
A. This would depend on the particular application, but in most cases, we would recommend that at least four shanks be used (two shanks to locate and lock, and two shanks to lock only).

**Q. If I should only locate on two shanks, how do I install the other two shanks without causing interference?**
A. This is accomplished by only using liner bushings for the locating shanks and drilling a clearance hole (shank diameter plus approximately .030") for the remaining shanks.

**Q. How close a repeatability can I expect?**
A. If the center distance between the two locating holes (receiver bushings) is held to ±.0002" tolerance, and two primary liner bushings are used, then repeatability of ±.0005" can be maintained.

**Q. What is the difference between the primary and the secondary liner bushings?**
A. The only difference between the primary and the secondary liner bushings is that the secondary liner
1.5 BALL LOCK MOUNTING SYSTEM

Mounting Method With Face Mount Bushing

Mounting Method With Back Mount Bushing

How Accurate Does Your Positioning Have to Be?
The center distance of the receiver bushings in the machine table, tombstone, or subplate should be as accurate as possible ($\pm 0.002$ recommended). Accurate location will insure a sound base for interchangeability of numerous fixture plates. For accurate repeatability within $0.0005$ of true position, both of the liner bushings in the fixture plate should be primary liners and the center distance tolerance should be $\pm 0.002$. For slightly less accurate repeatability (within $0.0015$ of true position), use one primary and one secondary liner with a center distance tolerance of $\pm 0.001$.

Q. Is there a preferable location for the liner bushing?
A. The location of the liner bushing is not critical, but in order to be consistent, we recommend that wherever possible, locate the liner bushings at bottom left and at top 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. Two and one half turns are the maximum needed to lock (whereas a 1/2–13 cap screw with one and a half diameters of thread engagement would need ten turns to lock). On CNC machines, the repeatability of fixture locations makes indicating of the fixture unnecessary.

Q. If I need to recess the fixture plate in order to have a clear surface, what do I have to do?
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! It must conform to plate thickness recommended in the catalog.

Q. What if my plate is thinner than the recommended thickness?
A. It is possible that by adjusting the depth of the counterbore for the receiver bushing, 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 stand temperatures up to 400°F. However, the “O” Ring that retains the balls could disintegrate.

Note: Be aware that thermal expansion of your plate could affect the center distance tolerance and repeatability.
Shanks and Repair Kits

- Material: Shank/Bushing, 4340 Liner, 52100
- Finish: Black Oxide
- Heat Treat: Shanks, RC 40-45 Bushings, RC 50-54 Liners, RC 62-64

Available for High Temperature Applications

- Stainless Steel available in all sizes

Ball Lock Repair Kits

Each Kit Includes:
- Replacement Screw
- Locking Balls
- Drive Ball
- O-Ring

Any Ball Lock application requires at least two sets of shanks, receiver bushings and liners. The liners are placed into the fixture plate to insure extremely accurate positioning. If more than two shanks are required (to provide additional hold down force), omit the liner bushing so that these additional holes will not interfere with your primary locating holes.

See page 1.19 for additional Shank styles and options.

Locating Shank Dimensions

<table>
<thead>
<tr>
<th>Fixture Plate Thickness ± .005</th>
<th>Shank Part Number</th>
<th>Shank Diameter (mm)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Maximum Holdown Force (lbs)</th>
<th>Recommended Screw Torque (Ft/lb)</th>
<th>Hex Wrench Size For Set Screw</th>
<th>Repair Kit Part Number</th>
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U.S. Patent No’s. 3,498,653 4,135,418

Ball Lock Mounting System

H & O DIE SUPPLY, INC 1-800-222-5441 sales@hodie.com
### Receiver Bushings

Two styles of receiver bushings are available. Generally, the face mount receiver bushing is utilized in blind hole applications (Slip Fit). The back mount receiver bushing is used in through hole applications (Light Press Fit).

#### Back Mount

![Back Mount Image](image1)

#### Face Mount

![Face Mount Image](image2)

### Installation Dimensions

#### Face Mount

<table>
<thead>
<tr>
<th>Shank Dia. (mm)</th>
<th>Face Mount Part Number</th>
<th>Actual O.D. +.0000 - .0004</th>
<th>Clearance Drill Diameter E</th>
<th>Bore +.0005 -.0000</th>
<th>Depth +.002 -.0000</th>
<th>Tap Size &amp; Depth¹</th>
<th>Bolt Circle Diameter 3 PL Equally Spaced</th>
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#### Back Mount

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¹Cap Screws Supplied with Face Mount Bushings.

### Liners

Locating repeatability will determine if one primary and one secondary or two primary liners are needed. With two primary liners, repeatability of ±.0005" can be maintained if the two holes for receiver bushings are held to a centerline distance of ±.0002" tolerance.

#### Liner Dimensions

<table>
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<tr>
<th>Fixture Plate Thickness ±.005</th>
<th>Shank Diameter (mm)</th>
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Multi-Purpose Subplates

The Jergens Multi-Purpose Subplate is ideal for adapting your machine tools to accommodate most fixtures. Its versatility, coupled with the quick change capabilities of the Ball Lock Mounting System, makes it ideal for any size production run.

20x40 Multi-Purpose Subplate

- Material: FreMax™ 15 Steel or Equivalent
- Thickness: 1 1/4"
- Thickness Tolerance: ± .005
- Weight: 285 Lbs.
- Subplate will accept combinations of six different standard Ball Lock Fixture Plates
- Includes installed Ball Lock Receiver Bushings
- Ideal solution to increase production
- Made in U.S.A.

Fixture Plate Options for Multi-Purpose Subplates – Aluminum or Steel

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<th>Fixture Plate* Part Number</th>
<th>Thickness of Fixture Plate</th>
<th>Number of Fixture Plates That Mount on Multi-Purpose Subplate</th>
<th>Receiver Bushing Center Distance</th>
<th>Receiver Bushing Size</th>
<th>Required Ball Lock Shank Part Number</th>
<th>Number of Shanks Required Per Fixture Plate</th>
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<td>1&quot;</td>
<td>2</td>
<td>17 x 17</td>
<td>25 mm</td>
<td>49612</td>
<td>4</td>
</tr>
<tr>
<td>28719 (20 x 16) Fixture Plate</td>
<td>3/4&quot;</td>
<td>1</td>
<td>16 x 12</td>
<td>20 mm</td>
<td>49601</td>
<td>4</td>
</tr>
</tbody>
</table>

* See next page for dimensional data on fixture plates. Part numbers shown for aluminum plates, also available in steel.
** Counterbored to 1" at mounting holes.
# Ball Lock Mounting System

## Fixture Plates for Use on Multi-Purpose Subplate

### 14x14 Fixture Plate

<table>
<thead>
<tr>
<th>Material</th>
<th>Alca Plus Cast Aluminum or FreMax 15 Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>Thickness Tolerance</td>
<td>±.005</td>
</tr>
<tr>
<td>Weight (14x14)</td>
<td>Aluminum 14 lbs., Steel 42 lbs.</td>
</tr>
<tr>
<td>Weight (16x16)</td>
<td>Aluminum 18 lbs.</td>
</tr>
</tbody>
</table>

### 16x16 Fixture Plate

<table>
<thead>
<tr>
<th>Material</th>
<th>Alca Plus Cast Aluminum or FreMax 15 Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>1&quot;</td>
</tr>
<tr>
<td>Thickness Tolerance</td>
<td>±.005</td>
</tr>
<tr>
<td>Weight (16x16)</td>
<td>Aluminum 18 lbs.</td>
</tr>
</tbody>
</table>

### 16x16 Modular Grid Fixture Plate

<table>
<thead>
<tr>
<th>Material</th>
<th>FreMax 15 Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>1 1/8&quot;</td>
</tr>
<tr>
<td>Thickness Tolerance</td>
<td>±.005</td>
</tr>
<tr>
<td>Weight</td>
<td>80 lbs.</td>
</tr>
</tbody>
</table>

### Jigsaw Interlocking Plate

<table>
<thead>
<tr>
<th>Material</th>
<th>Alca Plus Cast Aluminum or FreMax 15 Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>Thickness Tolerance</td>
<td>±.005</td>
</tr>
<tr>
<td>Weight (14x14)</td>
<td>Aluminum 14 lbs., Steel 42 lbs.</td>
</tr>
<tr>
<td>Weight (16x16)</td>
<td>Aluminum 18 lbs.</td>
</tr>
</tbody>
</table>

### 20x20 Fixture Plate

<table>
<thead>
<tr>
<th>Material</th>
<th>Alca Plus Cast Aluminum or FreMax 15 Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>1&quot;</td>
</tr>
<tr>
<td>Thickness Tolerance</td>
<td>±.005</td>
</tr>
<tr>
<td>Weight (14x14)</td>
<td>Aluminum 14 lbs., Steel 42 lbs.</td>
</tr>
<tr>
<td>Weight (16x16)</td>
<td>Aluminum 18 lbs.</td>
</tr>
</tbody>
</table>

---

H&O DIE SUPPLY, INC 1-800-222-5441 sales@hodie.com
**Pre-Machined Ball Lock Steel Subplates**

### 16x16 Subplate

**Part Number**

49101

Equipped with four 20mm receiver bushings for use with 14x14 or 16x16 fixture plates. Ideal for horizontal machining centers or multiple pallet machining centers.

- **Material:** Fremax™ 15 steel plate
- **Flat within:** .001
- **Thickness:** 1-1/8"
- **Thickness tolerance:** ±.005
- **Weight:** 81 lbs.

To make the job easier, the Ball Lock Quick Change Kit includes all components needed in a single package. See page 1.15 for details.

### 16x25 Dual Station Subplate

**Part Number**

49111

Equipped with twelve installed 20mm receiver bushings to easily locate and mount the following fixture plates:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Number of Fixture Plates</th>
<th>Plate Width and Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>28713</td>
<td>1</td>
<td>14&quot;x14&quot;</td>
</tr>
<tr>
<td>28715</td>
<td>1</td>
<td>16&quot;x16&quot;</td>
</tr>
<tr>
<td>28711</td>
<td>2</td>
<td>12&quot;x14&quot;</td>
</tr>
<tr>
<td>49012</td>
<td>2</td>
<td>12&quot;x14&quot;</td>
</tr>
</tbody>
</table>

- **Ideal for vertical machining centers.**
- **Thickness:** 1-1/8"
- **Weight:** 128 lbs.

### 10x15 Bridgeport™ - Style Subplate

**Part Number**

49121

Equipped with four installed 16mm receiver bushings and 1/2" mounting holes. Used with the Bridgeport™ style fixture plate.

- **Thickness:** 3/4"
- **Weight:** 32 lbs.
Pre-Machined Ball Lock Fixture Plates

- Material: Alca Plus Cast Aluminum* or FreeMax 15 Steel
- Flat within .005
- Thickness tolerance ± .005
- 6061-T651 plates, flat within .001 available upon request

Pre-Machined Ball Lock Fixture Plates

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Weight (lbs)</th>
<th>Weight (lbs)</th>
<th>Plate Width and Length (in.)</th>
<th>Plate Thickness (in.)</th>
<th>Ball Lock Shank Size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td></td>
<td>Steel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28706</td>
<td>9</td>
<td>28806</td>
<td>9.97 x 16</td>
<td>.75</td>
<td>20</td>
</tr>
<tr>
<td>28711</td>
<td>12</td>
<td>28811</td>
<td>12 x 14</td>
<td>.75</td>
<td>20</td>
</tr>
<tr>
<td>28715</td>
<td>18</td>
<td>28815</td>
<td>16 x 16</td>
<td>.75</td>
<td>20</td>
</tr>
<tr>
<td>28722</td>
<td>16</td>
<td>28822</td>
<td>12 x 14</td>
<td>1.00</td>
<td>25</td>
</tr>
<tr>
<td>28724</td>
<td>19</td>
<td>28824</td>
<td>14 x 14</td>
<td>1.00</td>
<td>25</td>
</tr>
<tr>
<td>28726</td>
<td>24</td>
<td>28826</td>
<td>16 x 16</td>
<td>1.00</td>
<td>25</td>
</tr>
<tr>
<td>28719</td>
<td>23</td>
<td>28819</td>
<td>20 x 16</td>
<td>.75</td>
<td>20</td>
</tr>
<tr>
<td>28727</td>
<td>38</td>
<td>28827</td>
<td>20 x 20</td>
<td>1.00</td>
<td>25</td>
</tr>
<tr>
<td>28731</td>
<td>11</td>
<td>28831</td>
<td>10 x 15</td>
<td>.75</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>28801</td>
<td>16 x 16</td>
<td>1.125</td>
<td>20</td>
</tr>
</tbody>
</table>

Note: Each plate has two primary liners installed.

Custom Sizes Available
Jergens will make any size Ball Lock fixture plate or subplate to your specifications. Call 1-800-JERGENS for further information.

10x15 Fixture Plate Bridgeport™ Style

<table>
<thead>
<tr>
<th>Aluminum Plate Part Number</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>28731</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Steel Plate Part Number</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>28831</td>
<td></td>
</tr>
</tbody>
</table>

12x14 Fixture Plate

<table>
<thead>
<tr>
<th>Aluminum Plate Part Number</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>28711</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Steel Plate Part Number</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>28811</td>
<td></td>
</tr>
</tbody>
</table>

* Alca Plus is a trademark of Alcoa Aluminum Co.
Pre-Machined Ball Lock T-Columns

- Material: Class 40 Meehanite cast iron
- Also available in Aluminum
- Ball Lock Receiver Bushings and Liners installed
- Provides accurate fixturing base for CNC machining centers
- Perpendicularity is .001 per foot

**Custom Sizes Available**
We are able to quote you on your special requirement columns, pre-machined with or without the Ball Lock components installed in place. Call 1-800-JERGENS for design specification information.

**Cast Iron T-Columns With Ball Lock Receiver Bushings Installed**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>Wt. (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>69101</td>
<td>16.375</td>
<td>1</td>
<td>16</td>
<td>16</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>4</td>
<td>19.875</td>
<td>425</td>
<td></td>
</tr>
<tr>
<td>69111</td>
<td>22.375</td>
<td>1</td>
<td>20</td>
<td>20</td>
<td>19</td>
<td>17</td>
<td>17</td>
<td>4.7</td>
<td>25.875</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>69121</td>
<td>26.375</td>
<td>1.5</td>
<td>25</td>
<td>25</td>
<td>23</td>
<td>22</td>
<td>21</td>
<td>4</td>
<td>29.875</td>
<td>1125</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions continued from above.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>M</th>
<th>N</th>
<th>O (mm)</th>
<th>P (mm)</th>
<th>Fixture Plate Part Number</th>
<th>Sub Plate Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>69101</td>
<td>4.875</td>
<td>3.5</td>
<td>20</td>
<td>20</td>
<td>28717</td>
<td>49102</td>
</tr>
<tr>
<td>69111</td>
<td>5.375</td>
<td>3.5</td>
<td>25</td>
<td>25</td>
<td>28745</td>
<td>49103</td>
</tr>
<tr>
<td>69121</td>
<td>5.375</td>
<td>3.5</td>
<td>35</td>
<td>25</td>
<td>28746</td>
<td>49104</td>
</tr>
</tbody>
</table>

**Note:** Window sections are also available on T-Columns. Window size and location (Q and R Dimensions) to be specified by customer.

**Engineering Changes**
Product improvement is a continuing process at Jergens. Specifications and engineering data are subject to change without notice. If current information is critical to your design, it is suggested that you contact Jergens Technical Sales Department to verify any dimensions or specifications.

**Use Hoist Ring 23411 for lifting and handling – Order separately.**
Pre-Machined Ball Lock 4-Sided Tooling Columns

- Material: Class 40 Meehanite cast iron
- Also available in Aluminum
- Ball Lock Receiver Bushings and Liners installed
- Provides accurate fixturing base for CNC machining centers
- Perpendicularity is .001 per foot

Cast Iron 4-Sided Tooling Columns With Ball Lock Receiver Bushings Installed

<table>
<thead>
<tr>
<th>Part Number</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>Wt. (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>69001</td>
<td>10</td>
<td>10</td>
<td>20</td>
<td>1</td>
<td>16</td>
<td>18</td>
<td>6.75</td>
<td>14</td>
<td>14</td>
<td>1.75</td>
<td>23.875</td>
<td>4.875</td>
<td>3.875</td>
<td>510</td>
<td></td>
</tr>
<tr>
<td>69011</td>
<td>12</td>
<td>12</td>
<td>25</td>
<td>1</td>
<td>20</td>
<td>20</td>
<td>8</td>
<td>17</td>
<td>17</td>
<td>1.625</td>
<td>28.875</td>
<td>5.375</td>
<td>3.875</td>
<td>736</td>
<td></td>
</tr>
<tr>
<td>69021</td>
<td>16</td>
<td>16</td>
<td>26</td>
<td>1.5</td>
<td>25</td>
<td>25</td>
<td>11.50</td>
<td>21</td>
<td>21</td>
<td>2</td>
<td>29.875</td>
<td>5.375</td>
<td>3.875</td>
<td>1122</td>
<td></td>
</tr>
</tbody>
</table>

Dimensions continued from above.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>O  (mm)</th>
<th>P  (mm)</th>
<th>Fixture Plate Part Number</th>
<th>Sub Plate Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>69001</td>
<td>20</td>
<td>20</td>
<td>28741</td>
<td>49102</td>
</tr>
<tr>
<td>69011</td>
<td>25</td>
<td>25</td>
<td>28742</td>
<td>49103</td>
</tr>
<tr>
<td>69021</td>
<td>35</td>
<td>25</td>
<td>28743</td>
<td>49104</td>
</tr>
</tbody>
</table>

Custom Sizes Available
We are able to quote you on your special requirement columns, pre-machined with or without the Ball Lock components installed in place. Call 1-800-JERGENS for design specification information.

Use Hoist Ring 23411 for lifting and handling – Order separately.

Engineering Changes
Product improvement is a continuing process at Jergens. Specifications and engineering data are subject to change without notice. If current information is critical to your design, it is suggested that you contact Jergens Technical Sales Department to verify any dimensions or specifications.
# Standard Subplates and Fixture Plates for Tooling Columns

**Standard Steel Subplates for Tooling Columns**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Pallet Size (mm)</th>
<th>For Tooling Columns</th>
<th>A (in.)</th>
<th>B (in.)</th>
<th>Receiver Size (mm)</th>
<th>Thickness of Subplate (in.)</th>
<th>Wt (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>49102</td>
<td>400</td>
<td>69001, 69101</td>
<td>14</td>
<td>14</td>
<td>20</td>
<td>1.125</td>
<td>7.9</td>
</tr>
<tr>
<td>49103</td>
<td>500</td>
<td>69011, 69111</td>
<td>17</td>
<td>17</td>
<td>25</td>
<td>1.25</td>
<td>13.7</td>
</tr>
<tr>
<td>49104</td>
<td>630</td>
<td>69021, 69121</td>
<td>21</td>
<td>21</td>
<td>35</td>
<td>1.375</td>
<td>24.0</td>
</tr>
</tbody>
</table>

Note: Mounting holes can be provided per customer specification. Supplied with Ball Lock Receiver Bushings installed.

---

## Fixture Plates for Standard Tooling Columns and T-Columns

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Aluminum (lbs)</th>
<th>Steel (lbs)</th>
<th>For Tooling Columns</th>
<th>Fixture Plate Size (In.)</th>
<th>H (In.)</th>
<th>G (In.)</th>
<th>Liner Size (mm)</th>
<th>Fixture Plate Thickness (In.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28741</td>
<td>14</td>
<td>43</td>
<td>69001</td>
<td>10x20</td>
<td>6.75</td>
<td>18</td>
<td>20</td>
<td>.75</td>
</tr>
<tr>
<td>28742</td>
<td>28</td>
<td>86</td>
<td>69011</td>
<td>12x25</td>
<td>8</td>
<td>22</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>28743</td>
<td>39</td>
<td>119</td>
<td>69021</td>
<td>16x26</td>
<td>11.50</td>
<td>23</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>28747</td>
<td>18</td>
<td>55</td>
<td>69101</td>
<td>16x16</td>
<td>14</td>
<td>14</td>
<td>20</td>
<td>.75</td>
</tr>
<tr>
<td>28745</td>
<td>41</td>
<td>125</td>
<td>69111</td>
<td>20x22</td>
<td>17</td>
<td>19</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>28746</td>
<td>61</td>
<td>186</td>
<td>69121</td>
<td>25x26</td>
<td>22</td>
<td>23</td>
<td>25</td>
<td>1</td>
</tr>
</tbody>
</table>

Supplied with Ball Lock Liner Bushings installed.

---

## Fixture Plates for Tooling Column Subplates

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Aluminum (lbs)</th>
<th>Steel (lbs)</th>
<th>For Subplate</th>
<th>E (In.)</th>
<th>F (In.)</th>
<th>I (In.)</th>
<th>J (In.)</th>
<th>Liner Size (mm)</th>
<th>Fixture Plate Thickness (In.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28717</td>
<td>18</td>
<td>55</td>
<td>49102</td>
<td>16</td>
<td>16</td>
<td>14</td>
<td>14</td>
<td>20</td>
<td>.75</td>
</tr>
<tr>
<td>28727</td>
<td>38</td>
<td>114</td>
<td>49103</td>
<td>20</td>
<td>20</td>
<td>17</td>
<td>14</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>28732</td>
<td>58</td>
<td>177</td>
<td>49104</td>
<td>25</td>
<td>25</td>
<td>21</td>
<td>21</td>
<td>35</td>
<td>1</td>
</tr>
</tbody>
</table>

Supplied with Ball Lock Liner Bushings installed.

---

### Aluminum and Steel Expansion

*Note: Aluminum and steel expand at different rates. Please take this information into consideration when creating your own Ball Lock fixture and subplates.*
Quick Change Kits

Everything You Need to Change Fixtures in Less Than One Minute

The Jergens Ball Lock™ Quick Change Kits speed fixture changeover in all types of manufacturing operations. Each kit includes two aluminum fixture plates with liner bushings installed; one steel subplate with receiver bushings installed; and four 20mm Ball Lock shanks with working loads of 3000 lbs. each. While one fixture plate is on the machine, the operator can load parts on the other. This minimizes downtime for true set-up reduction. To enable the subplate to be mounted on a slotted table without the need to indicate the subplate, sine fixture keys can be used. The sine fixture key reamed holes are oriented parallel to the receiver bushings on the subplate and to the liner bushings on the fixture plate. These also allow the fixture plate to be mounted on a toolroom mill without the need to indicate it. This is extremely useful when machining location points on your fixture.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Kit Includes</th>
</tr>
</thead>
</table>
| 49001    | 2 - 3/4"x14"x14" aluminum fixture plates with 20mm liner bushings installed  
|          | 1 - 1-1/8"x16"x16" steel subplate with receiver bushings installed  
|          | 4 - 20mm Ball Lock Shanks |
| 49002    | 2 - 3/4"x16"x16" aluminum fixture plates with 20mm liner bushings installed  
|          | 1 - 1-1/8"x16"x16" steel subplate with receiver bushings installed  
|          | 4 - 20mm Ball Lock Shanks |
| 49004    | Bridgeport™-Style  
|          | 2 - 3/4"x10"x15" aluminum fixture plates with 16mm liner bushings installed  
|          | 1 - 3/4"x10"x15" steel subplate with receiver bushings installed  
|          | 4 - 16mm Ball Lock Shanks |
Pre-Engineered Ball-Lock™ Fixture Kits for HAAS*

These kits include:
- Steel Subplate
- Aluminum Fixture Plate(s)
- Pre installed receiver and Liner Bushings
- Ball-Lock Shanks
- T-Slot nuts for mounting subplate to machine table
- 2 Sine Fixture Keys for accurate subplate locating
- Socket head cap screws

Benefits:
- Save time specifying and ordering
- Saves installation time and cost
- Eliminates potential installation errors

Ask about other manufacturers available.

Ask about other manufacturers available.

Call customer support services at 1-800-537-4367 or see Jergens Ball Lock kits for HAAS* catalog for additional information.

*HAAS is a trademark of HAAS Automation Inc.
Ball Lock™ For Rotary Indexers

Problem:
Although your rotary indexer increases the versatility of a vertical machining center, it has one major limitation: set-up is so laborious and time-consuming that it limits the machine’s flexibility. In many cases, folks dedicate their units to a single machine tool to avoid the agony of an extended set-up and changeover.

Jergen’s Solution:
Our new Ball Lock Mounting System for Indexers provides a two-pronged solution.

First, Ball Lock mounting plates free up your machine tool for additional work by allowing a fast and accurate quick change of the complete indexer. No longer will you spend hours doing set up. The Ball Lock System does it in minutes, with repeatability at ±0.0005” (±0.013mm). Low profile, positive clamping, proven in over ten years of field use.

Second, the Ball Lock System puts your fixture plate changeovers into high gear. By mounting the round subplate to the indexer faceplate, you’ll “plug-in” new fixtures in record time (less than 60 seconds).

Benefits:
• Maximize indexer utilization
• Eliminate lengthy set-ups
• Accurate fixture plate changover in seconds

Subplates and fixture plates come with bushings pre-installed.

---

H & O DIE SUPPLY, INC 1-800-222-5441 sales@hodie.com
Building a System

### Standard Systems

<table>
<thead>
<tr>
<th>Part</th>
<th>A</th>
<th>B</th>
<th>Thickness</th>
<th>Liner</th>
<th>Shank</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>28707</td>
<td>8&quot;</td>
<td>6&quot;</td>
<td>0.75&quot;</td>
<td>16mm</td>
<td></td>
<td>3.5 lbs.</td>
</tr>
<tr>
<td>28708</td>
<td>10&quot;</td>
<td>8&quot;</td>
<td>1.00&quot;</td>
<td>20mm</td>
<td>49608</td>
<td>7.0 lbs.</td>
</tr>
<tr>
<td>28709</td>
<td>12&quot;</td>
<td>10&quot;</td>
<td>1.00&quot;</td>
<td>20mm</td>
<td>49602</td>
<td>11.0 lbs.</td>
</tr>
</tbody>
</table>

### Custom Systems

<table>
<thead>
<tr>
<th>Part</th>
<th>A</th>
<th>B</th>
<th>Thickness</th>
<th>Receiver</th>
<th>Hole</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>49107</td>
<td>8&quot;</td>
<td>6&quot;</td>
<td>0.75&quot;</td>
<td>16mm</td>
<td>1.00&quot;</td>
<td>11.0 lbs.</td>
</tr>
<tr>
<td>49108</td>
<td>10&quot;</td>
<td>8&quot;</td>
<td>1.00&quot;</td>
<td>20mm</td>
<td>2.00&quot;</td>
<td>21.0 lbs.</td>
</tr>
<tr>
<td>49109</td>
<td>12&quot;</td>
<td>10&quot;</td>
<td>1.00&quot;</td>
<td>20mm</td>
<td>2.00&quot;</td>
<td>33.0 lbs.</td>
</tr>
</tbody>
</table>

Material:
- Fixture Plate: Alca Plus™ cast aluminum, ±.005 thickness tolerance
- Subplate: Fremax™ 15 steel, ±.005 thickness tolerance

**Engineering Changes**

Product improvement is a continuing process at Jergens. Specifications and engineering data are subject to change without notice. If current information is critical to your design, it is suggested that you contact Jergens Technical Sales Department to verify any dimensions or specifications.
Accessories

**Tapered Caps and Plugs**
Keep debris out of your subplate’s receiver bushings when they are not in use. Polyethylene caps easily snap in and out.

<table>
<thead>
<tr>
<th>Receiver Bushing Diameter</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>49201</td>
</tr>
<tr>
<td>16</td>
<td>49202</td>
</tr>
<tr>
<td>20</td>
<td>49203</td>
</tr>
<tr>
<td>25</td>
<td>49204</td>
</tr>
<tr>
<td>30</td>
<td>49205</td>
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<td>35</td>
<td>49206</td>
</tr>
<tr>
<td>50</td>
<td>49207</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Plate Thickness</th>
<th>Shank Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>34315</td>
<td>1/2</td>
<td>16mm</td>
</tr>
<tr>
<td>34316</td>
<td>3/4</td>
<td>20mm</td>
</tr>
<tr>
<td>34328</td>
<td>3/4</td>
<td>25mm</td>
</tr>
<tr>
<td>34329</td>
<td>1</td>
<td>25mm</td>
</tr>
<tr>
<td>34334</td>
<td>3/4</td>
<td>30mm</td>
</tr>
<tr>
<td>34335</td>
<td>1</td>
<td>30mm</td>
</tr>
<tr>
<td>34339</td>
<td>3/4</td>
<td>35mm</td>
</tr>
</tbody>
</table>

**Lifting Handles**
For easy handling of fixture plate.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Plate Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>33701</td>
<td></td>
</tr>
</tbody>
</table>

**Sine Fixture Keys**
Locate subplates or fixture plates to slotted machine tables without having to slot the plate. Available in inch sizes from 1/2” to 7/8” slots, and in metric sizes from 14mm to 22mm slots.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Table Slot Size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>39501</td>
<td>1/2</td>
</tr>
<tr>
<td>39502</td>
<td>9/16</td>
</tr>
<tr>
<td>39503</td>
<td>5/8</td>
</tr>
<tr>
<td>39504</td>
<td>11/16</td>
</tr>
<tr>
<td>39505</td>
<td>3/4</td>
</tr>
<tr>
<td>39506</td>
<td>13/16</td>
</tr>
<tr>
<td>39507</td>
<td>7/8</td>
</tr>
</tbody>
</table>

**Fast Acting Ball Lock™ Shanks**

<table>
<thead>
<tr>
<th>Ball Lock Shank Diameter (mm)</th>
<th>Fixture Plate Thickness (in.)</th>
<th>Jergens Ball Lock Shank w/Jergens Thumb Screw</th>
<th>Jergens Ball Lock Shank w/Elesa Adjustable Handle</th>
<th>Jergens Ball Lock Shank w/Jergens Toggle Clamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>1/2</td>
<td>49607-S</td>
<td>49607-H</td>
<td>49601-S</td>
</tr>
<tr>
<td></td>
<td>3/4</td>
<td>49608-S</td>
<td>49608-H</td>
<td>49602-S</td>
</tr>
<tr>
<td>20</td>
<td>3/4</td>
<td>49601-S</td>
<td>49601-H</td>
<td>49601-T</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>49602-S</td>
<td>49602-H</td>
<td>49602-T</td>
</tr>
<tr>
<td>25</td>
<td>3/4</td>
<td>49611-S</td>
<td>49611-H</td>
<td>49611-T</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>49612-S</td>
<td>49612-H</td>
<td>49612-T</td>
</tr>
<tr>
<td>30</td>
<td>3/4</td>
<td>49621-S</td>
<td>49621-H</td>
<td>49621-T</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>49622-S</td>
<td>49622-H</td>
<td>49622-T</td>
</tr>
<tr>
<td>35</td>
<td>3/4</td>
<td>49631-S</td>
<td>49631-H</td>
<td>49631-T</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>49632-S</td>
<td>49632-H</td>
<td>49632-T</td>
</tr>
<tr>
<td></td>
<td>1-1/2</td>
<td>49633-S</td>
<td>49633-H</td>
<td>49633-T</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>49634-S</td>
<td>49634-H</td>
<td>49634-T</td>
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</table>

**Fast Acting**

<table>
<thead>
<tr>
<th>Assembly</th>
<th>T-Screw</th>
<th>Part Number</th>
<th>Assembly</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>49607</td>
<td>43904</td>
<td>49607-H</td>
<td>34314</td>
<td>N/A</td>
</tr>
<tr>
<td>49608</td>
<td>43904</td>
<td>49608-H</td>
<td>34315</td>
<td>N/A</td>
</tr>
<tr>
<td>49601</td>
<td>43904</td>
<td>49601-H</td>
<td>34315</td>
<td>49601-T</td>
</tr>
<tr>
<td>49602</td>
<td>43905</td>
<td>49602-H</td>
<td>34316</td>
<td>49602-T</td>
</tr>
<tr>
<td>49611</td>
<td>43907</td>
<td>49611-H</td>
<td>34328</td>
<td>49611-T</td>
</tr>
<tr>
<td>49612</td>
<td>43908</td>
<td>49612-H</td>
<td>34329</td>
<td>49612-T</td>
</tr>
<tr>
<td>49621</td>
<td>43910</td>
<td>49621-H</td>
<td>34334</td>
<td>N/A</td>
</tr>
<tr>
<td>49622</td>
<td>43911</td>
<td>49622-H</td>
<td>34335</td>
<td>N/A</td>
</tr>
<tr>
<td>49631</td>
<td>43913</td>
<td>49631-H</td>
<td>34339</td>
<td>N/A</td>
</tr>
<tr>
<td>49632</td>
<td>43913</td>
<td>49632-H</td>
<td>34339</td>
<td>N/A</td>
</tr>
<tr>
<td>49633</td>
<td>43914</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>49634</td>
<td>43914</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**NOTE:** All shanks are 5/8” diameter.

**Fast Acting Ball Lock™ Shanks**

<table>
<thead>
<tr>
<th>Ball Lock Shank Diameter (mm)</th>
<th>Fixture Plate Thickness (in.)</th>
<th>Jergens Ball Lock Shank w/Elesa Adjustable Handle</th>
<th>Jergens Ball Lock Shank w/Jergens Toggle Clamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>1/2</td>
<td>49607-S</td>
<td>49601-S</td>
</tr>
<tr>
<td></td>
<td>3/4</td>
<td>49608-S</td>
<td>49602-S</td>
</tr>
<tr>
<td>20</td>
<td>3/4</td>
<td>49601-S</td>
<td>49601-T</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>49602-S</td>
<td>49602-T</td>
</tr>
<tr>
<td>25</td>
<td>3/4</td>
<td>49611-S</td>
<td>49611-T</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>49612-S</td>
<td>49612-T</td>
</tr>
<tr>
<td>30</td>
<td>3/4</td>
<td>49621-S</td>
<td>49621-T</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>49622-S</td>
<td>49622-T</td>
</tr>
<tr>
<td>35</td>
<td>3/4</td>
<td>49631-S</td>
<td>49631-T</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>49632-S</td>
<td>49632-T</td>
</tr>
<tr>
<td></td>
<td>1-1/2</td>
<td>49633-S</td>
<td>49633-T</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>49634-S</td>
<td>49634-T</td>
</tr>
</tbody>
</table>

**NOTE:** Toggle activated shanks produce about 1/2 the standard hold down force.
Lite Lock™
Mounting System

Light Duty Mounting System Locates and Locks One Plate to Another
The Jergens Lite Lock Mounting System is a cost-effective method of eliminating downtime and reducing the changeover cycle in the production process. With only one moving part, changing assembly fixtures, fixture plates, or any process involving mounting one plate on top of another, becomes a simple and quick operation.

The Lite Lock Mounting System, like the heavier duty Jergens Ball Lock™ Mounting System, locates and locks two plates together accurately and quickly. By simply pushing the release button located on the Lite Lock cartridge, an operator can change the top plate, loaded with parts, in a matter of seconds!

This quick release concept is adaptable to a wide range of applications and machinery. It eliminates the need for conventional fasteners such as bolts and screws.

The Lite Lock Mounting System is available as a complete assembly or as individual components for installation on your existing plates. Several sizes of top and receiver plates are available.

The accurate repeatability and rugged design is ideal for the following applications:
• Product assembly
• Part transfers
• Fusion welding
• Electronic assembly
• Laser machining
• Light machining
• Circuit board drilling
• Laser etching
• Product finishing

Plate Specifications:
• Plate Material: 6061 T651 Aluminum
• Plate Thickness: 1/2", ±.003
• Plate Flatness: Flat and Parallel within ±.002
• Plate Width and Length: ±.003
• Repetitive Accuracy: ±.003
Slide Lock Mechanism standard on 8"x10" and 12"x12" Receiver Plates.
Available as option for smaller plates. Order Part Number 49303.

**Complete Assembly**

<table>
<thead>
<tr>
<th>Plate Size</th>
<th>Top and Receiver Plate Assembled Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; x 6&quot; x 1/2&quot;</td>
<td>49341</td>
</tr>
<tr>
<td>6&quot; x 8&quot; x 1/2&quot;</td>
<td>49342</td>
</tr>
<tr>
<td>8&quot; x 10&quot; x 1/2&quot;</td>
<td>49343</td>
</tr>
<tr>
<td>12&quot; x 12&quot; x 1/2&quot;</td>
<td>49344</td>
</tr>
</tbody>
</table>

**Kits**

**Top Plate Hardware Kit**
(includes tie down pin and two dowel pins)

| Part Number | 49302 |

**Receiver Plate Hardware Kit**
(includes two bushings and an assembled cartridge)

| Part Number | 49301 |

Length of adjusting rod can be modified to size.

**Blank Plates**

<table>
<thead>
<tr>
<th>Plate Size</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; x 6&quot; x 1/2&quot;</td>
<td>49321</td>
</tr>
<tr>
<td>6&quot; x 8&quot; x 1/2&quot;</td>
<td>49322</td>
</tr>
<tr>
<td>8&quot; x 10&quot; x 1/2&quot;</td>
<td>49323</td>
</tr>
<tr>
<td>12&quot; x 12&quot; x 1/2&quot;</td>
<td>49324</td>
</tr>
</tbody>
</table>

**Special Orders**

Call us with your special requirements for any product shown in the Ball Lock Mounting System section:
- Pre-Machined Ball Lock Fixture Plates
- Subplates
- Pre-Machined Tooling Columns
- Lite Lock™ Assemblies and Components

---

*Lite Lock Cartridge side-mounted on rectangular plates.
# Set-Up Reduction Worksheet

## Benefits of Set-Up Reduction (Capacity)

<table>
<thead>
<tr>
<th>Current Method</th>
<th>Example (actual case study):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes per set-up = _______ minutes</td>
<td>60 minutes</td>
</tr>
<tr>
<td>Number of set-ups per 8 hour shift = _______ set-ups</td>
<td>1.5 set-ups</td>
</tr>
<tr>
<td>Total minutes of set-up per shift (set-up minutes x number of set-ups) = _______ minutes</td>
<td>90 minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Using the Ball Lock System</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes per set-up = _______ minutes</td>
<td>8 minutes</td>
</tr>
<tr>
<td>Number of set-ups per 8 hour shift = _______ set-ups</td>
<td>1.5 set-ups</td>
</tr>
<tr>
<td>Total minutes of set-up per shift (set-up minutes x number of set-ups) = _______ minutes</td>
<td>12 minutes</td>
</tr>
<tr>
<td>Increased capacity per machine per shift (current method - Ball Lock method) = _______ minutes</td>
<td>78 minutes</td>
</tr>
<tr>
<td>Savings per machine per shift = _______ minutes</td>
<td>78 minutes</td>
</tr>
<tr>
<td>Increased capacity (number of minutes / 60) = _______ hours</td>
<td>1.3 hours</td>
</tr>
</tbody>
</table>

## Benefits of Set-Up Reduction (Profit)

| Machine cost per hour = $_______ | $80.00 |
| Increased production hours per shift (increased capacity from above) = _______ hours | 1.3 hours |
| Savings (profit) per machine per shift (machine cost per hour x increased production hours) = $_______ | $104.00 |