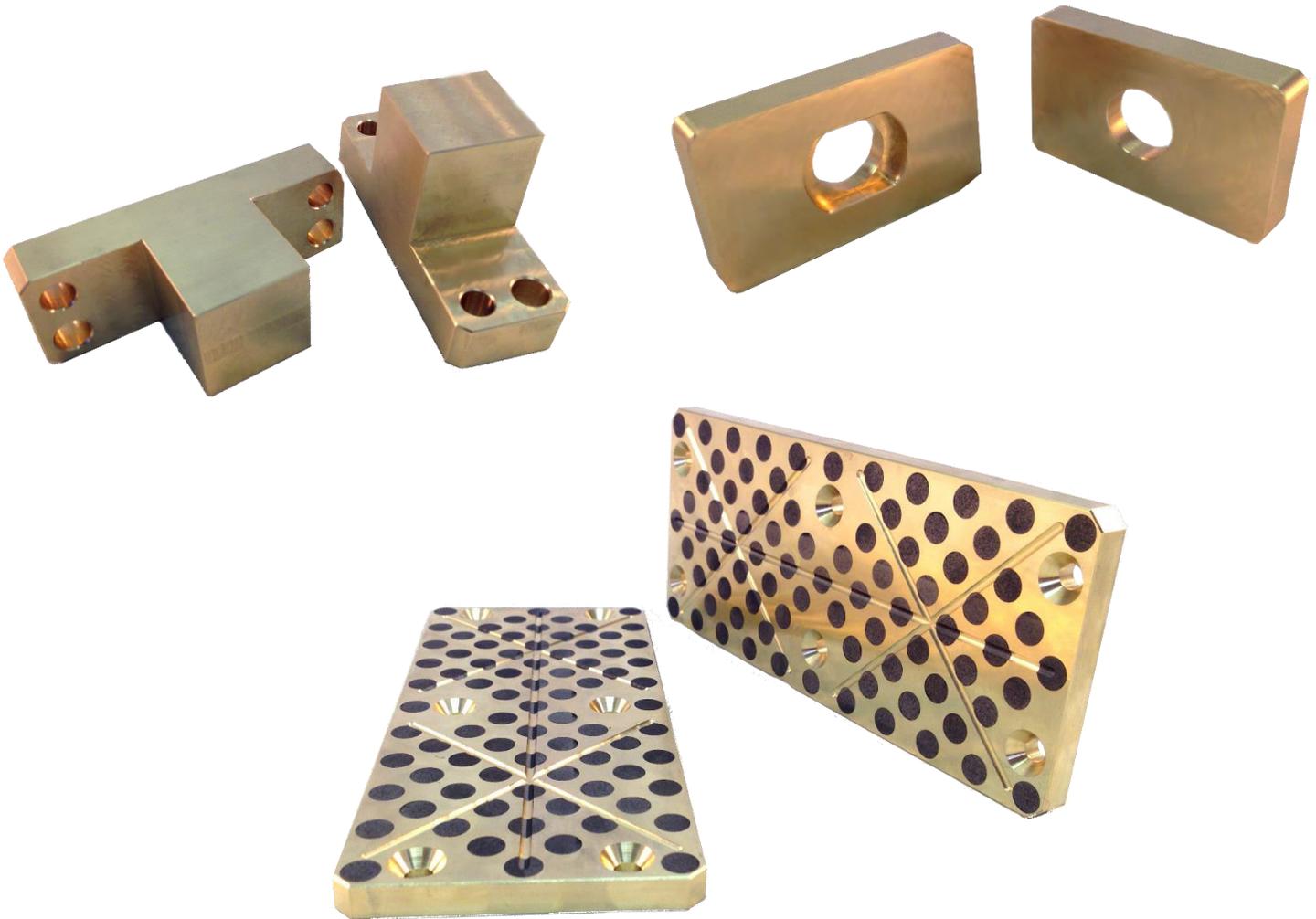


# National Wear Components

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Bronze Components Designed for Extended  
Wear Life



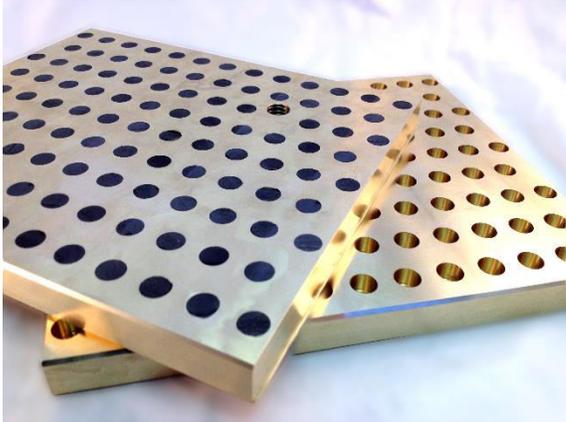
[www.nationalbronze.com](http://www.nationalbronze.com)

National Bronze Mfg. Co.  
800-875-3558 (Toll Free)  
586-791-9044 (Fax)

# National Wear Components

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## INTRODUCTION



Since 1911 National Bronze Mfg. Co. has been a leading manufacturer of bronze based components. Throughout the last 100 plus years, National Bronze Mfg. has developed various technologically advanced product lines to meet customers' needs.

Whether it's steel for automobile tires, tubes for pipelines, aluminum for façade structures, or offshore wind power generation; the machines used in the manufacturing of metal products must ensure flawless and reliable production. Bronze wear parts have played a crucial role in steel mill equipment for many years. Various bronze alloys provide many of these machines with reliable wear parts ranging from plate liners to sleeve bushings and everything in between.

National Bronze Manufacturing has been providing companies worldwide with reliable spare parts for all stages of production. The right spare parts must be available so that production doesn't stop. That's why some of the Nation's largest steel mill equipment repair companies have trusted National Bronze Manufacturing with the manufacturing of these critical components. Our bronze wear parts provide maximal performance thanks to the highest original quality and quick delivery times.



# National Wear Components

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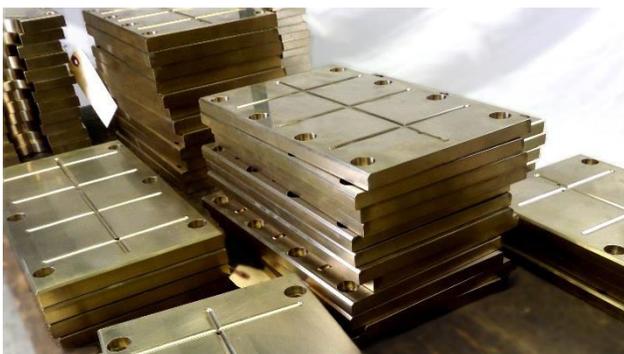
## WHY BRONZE?

Bronze is one of the world oldest metals. The earliest bronze alloys date to 4500 BC. It is a metal that has proved the test of time, and continues to be a superior material choice for a number of applications today.

One of the benefits of using bronze based components is the number of different bronze alloys that are available. Bronze alloys have a huge variety of uses that reflect their versatile physical, mechanical, and chemical properties. By adding or subtracting various elements from the alloy mixture, specific properties can be achieved in order to adapt to the needs of the particular application.

Specific Bronze Alloys are formulated to achieve the following advantages for wear applications:

- Low wear rate
- Ability to run dry
- Can be lubricated with water or process fluids as well as grease or oil
- Close clearances to give stable shaft and lower seal wear
- Good wear life in dirty conditions
- Resistant to chemicals
- Low coefficient of friction
- High compression strength



# National Wear Components

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## Rolling Mills

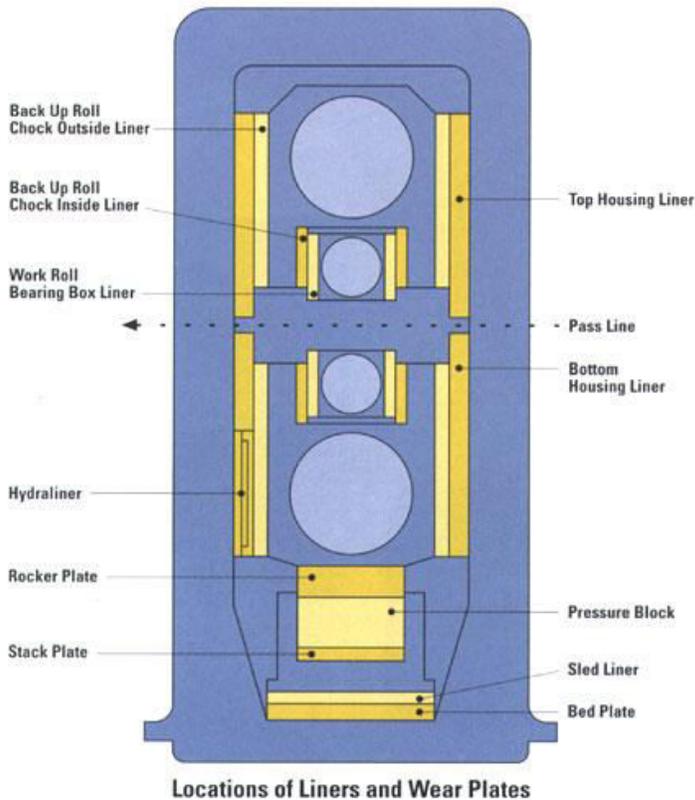
Rolling mills date back hundreds of years, with the invention of the rolling mill being credited to Leonardo Da Vinci. Bronze liners and wear plates are used in multiple locations throughout the rolling mill. They are critical to achieving maximum quality of the product being rolled. For a mill to roll any product to an accurate shape and size, the alignment of the rolls and roll gap must be precisely maintained.

Bronze liners are used on multiple wear surfaces throughout a rolling mill. The ultimate goal of the bronze liners is to assist in keeping the roll center lines at precisely the desired locations. In addition to a high quality end product, use of the proper bronze liners can minimize maintenance costs. Liner systems of bronze alloys can be engineered to maximize liner life. Maintenance costs are reduced when the liner system is engineered so that the less expensive and easier to replace liners wear out and the surfaces of the more expensive and difficult to replace liners do not incur wear



# National Wear Components

## ROLLING MILLS CONTINUED...



Two very popular bronze alloys used for rolling mill liners are C93200 SAE 660 Bearing Bronze and C95400 Aluminum Bronze. The C932 bronze can be used in liners that are easier to replace. This alloy is not as hard as the C954 Aluminum Bronze and has excellent wear properties. Liners manufactured from this alloy can be used in locations that are easy to replace, use of the C932 Bearing Bronze Liner can protect the more expensive and critical components.

C95400 Aluminum Bronze Liners are harder than the C932 Bronze Liners and can be used in areas that are more difficult to replace and must last longer. C95400 Aluminum Bronze liners have a high resistance to corrosion, and thus can be used in corrosive environments. Corrosion tends to be a problem in hot mills at or below the pass line where the parts are exposed to water and high temperatures. Corrosion can cause pitting and flaking, leading to liner wear. Water and scale at high temperatures cause erosion to the liner surfaces.



# National Wear Components

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## Extrusion Press



An application that utilizes various Wear Plates are in Metal Extrusion Presses. Aluminum Bronze Wear Plates are used to support the heavy assemblies as they slide back and forth during operation. These types of presses may slide back and forth up to 300 times per day, supporting a 30,000lb container. Aluminum Bronze is the bronze alloy of choice due to its high tensile strength and low coefficient of friction when mated with moving elements made of hardened steel.



Also Aluminum Bronze has the ability to form if there is a slight misalignment. Aluminum Bronze Wear Plates will slightly redistribute itself so it's precisely aligned with the axis of motion. This means longer bearing life and less down time for the press itself. Add its ability to operate in harsh environment under high temperatures and Aluminum Bronze Wear Plates outperform the other various alloys.



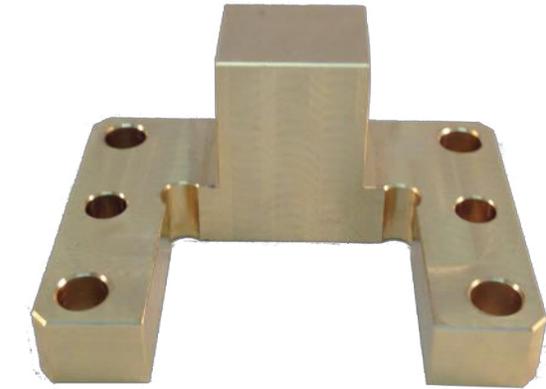
# National Wear Components

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## INDUSTRIAL AUTOMATION

These bearings tend to be called names like guide blocks, wear plates, and liners. They vary in size and shape but generally all of them utilizing milling machining versus turning machining used in the manufacture of the bronze sleeve bushing type products. These bronze bearings utilize the various properties of the bronze alloys much like their round counterparts do.

Generally used in applications where metal will be rubbing against metal. By using a bronze guide block or liner the bronze acts as a sacrificial part while at the same time giving higher wear properties to the assembly. With proper lubrication these parts can provide performance for great ranges of operation time. The difference that the wear plates, liners, and blocks have is the surface and method of which the load will be born upon. This factor should be taken into consideration when designing these types of parts.



# National Wear Components

## CHEMICAL RESISTANCE

The following decision chart provides guidance on the selection of the 3 most popular bronze alloys according to the environmental conditions of the application.

Definitions	
R	Resistant
O	Resistant depending on construction, oxygen content, temperature, etc.
X	Not Recommended

STRONG ACIDS	Concentration %	Temperature in °C	C93200	C95400	C86300
Hydrochloric Acid	5	20	X	O	X
Hydrofluoric Acid	5	20	O	O	X
Nitric Acid	5	20	X	X	X
Sulfuric Acid	5	20	O	R	X
Phosphoric Acid	5	20	O	O	X
<b>WEAK ACIDS</b>					
Acetic Acid	5	20	X	O	X
Formic Acid	5	20	X	R	X
Boric Acid	5	20	X	R	X
Citric Acid	5	20	X	R	X
<b>BASES</b>					
Ammonia	10	20	X	X	X
Sodium Hydroxide	5	20	O	R	O
Potassium Hydroxide	5	20	O	R	O
<b>SOLVENTS</b>					
Acetone		20	O	R	O
Carbon Tetrachloride		20	O	O	O
Ethanol		20	O	R	O
Ethyl Chloride		20	O	R	O
Glycerin		20	O	R	O
<b>SALTS</b>					
Ammonium Nitrate			X	X	X
Calcium Chloride			R	R	R
Magnesium Chloride			R	R	R
Magnesium Sulfate			R	R	R
Sodium Chloride			R	R	R
Sodium Nitrate			R	R	R
Zinc Chloride			X	O	X
Zinc Sulfate			O	O	O
<b>GASES</b>					
Ammonia			O	O	O
Chlorine			X	X	X
Carbon Dioxide			R	R	O
Fluorine			X	X	X
Sulfur Dioxide			O	O	X
Hydrogen Sulfide			O	O	O
Nitrogen			O	R	X
Hydrogen			O	R	X
<b>FUELS &amp; LUBRICANTS</b>					
Paraffin		20	R	R	R
Petroleum		20	R	R	R
Fuel Oil		20	R	R	R
Diesel Fuel		20	R	R	R
Mineral Oil		70	R	R	R
<b>OTHERS</b>					
Water			R	R	O
Sea Water			O	R	X
Resin			R	R	O
Hydrocarbon			R	R	O

# National Wear Components

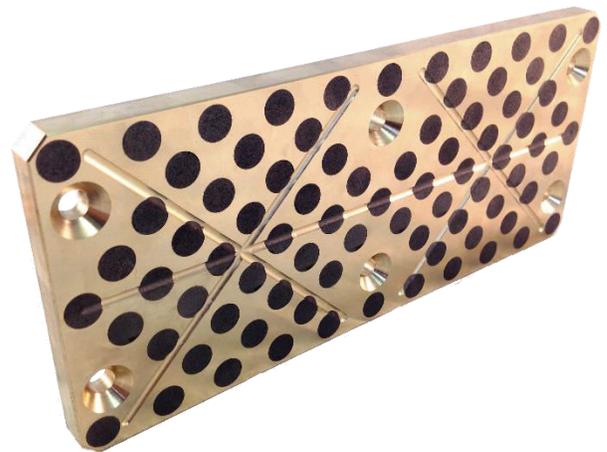
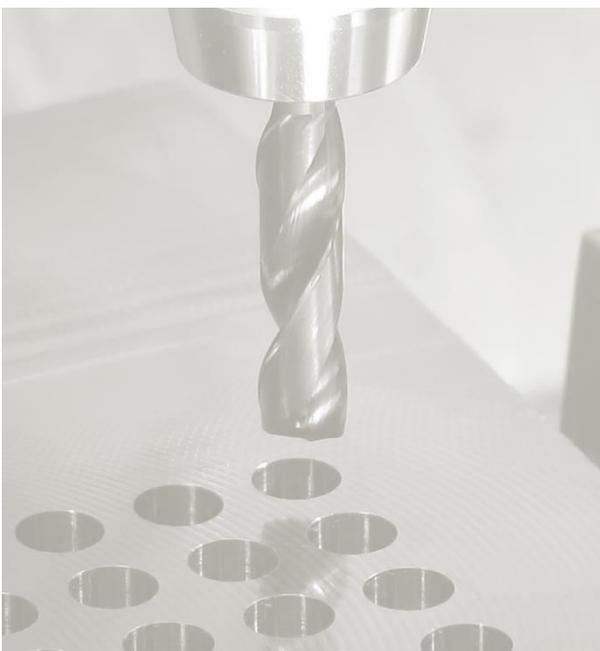
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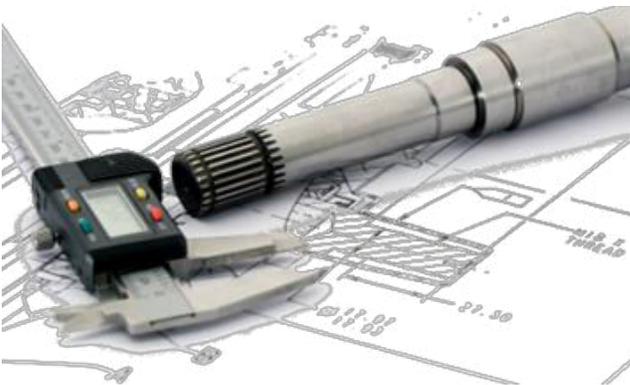
## SOLID LUBRICANT PLUGS

If your application does not allow for external lubrication, you still have options. We will machine your part out of the cast bronze alloy material and mill and plug the bearing with solid lubricant inserts. These inserts are graphite based and provide the self-lubrication needed for a number of critical applications.

The graphite acts as a film that covers the bearing surface, much in the same way that graphite will cover your fingers if you rub a pencil over them. These solid lubricant plugs are a great option for applications with higher temperatures where standard lubricants would burn away.



# National Wear Components



## EXPERIENCE THE NATIONAL DIFFERENCE

### **Superior Customer Service**

National Bronze Mfg is a customer centric company. Every process change, technological advancement, and improvement is done with the sole focus on improving our customer's experience.

This experience begins with our qualified quoting team. These experienced technicians use computerized modeling software to assure that our customers receive the most competitive and reliable pricing.

### **Quality Standards**

National Bronze Mfg. has developed a multifaceted Quality Management Program. This system is fully documented and constantly monitored. We consistently exceed our customer's quality expectations.

### **Inventory Management**

Throughout our 100 plus years we have developed and maintained a very loyal customer base. Many of these customers take advantage of our customized inventory management programs. These programs have benefited our customers through both lower costs and drastically reduced lead times.