



## Special Bar Quality Steel:

Helping Customers Push the Bounds of What's Possible



TimkenSteel is a leading special bar quality (SBQ) steel maker of small, intermediate and large bars up to 16" (406 mm) in North America. We produce some of the world's cleanest and strongest alloy steels, as well as carbon and micro-alloy steel, for demanding applications in the distribution, energy, industrial and automotive segments.

Our highly efficient steelmaking capabilities combine rigorous manufacturing practices with advanced inspection capabilities. Today, we have melt capacity of approximately two million tons of steel per year. We have invested roughly half a billion dollars to further strengthen our ability to serve our customers' toughest applications.

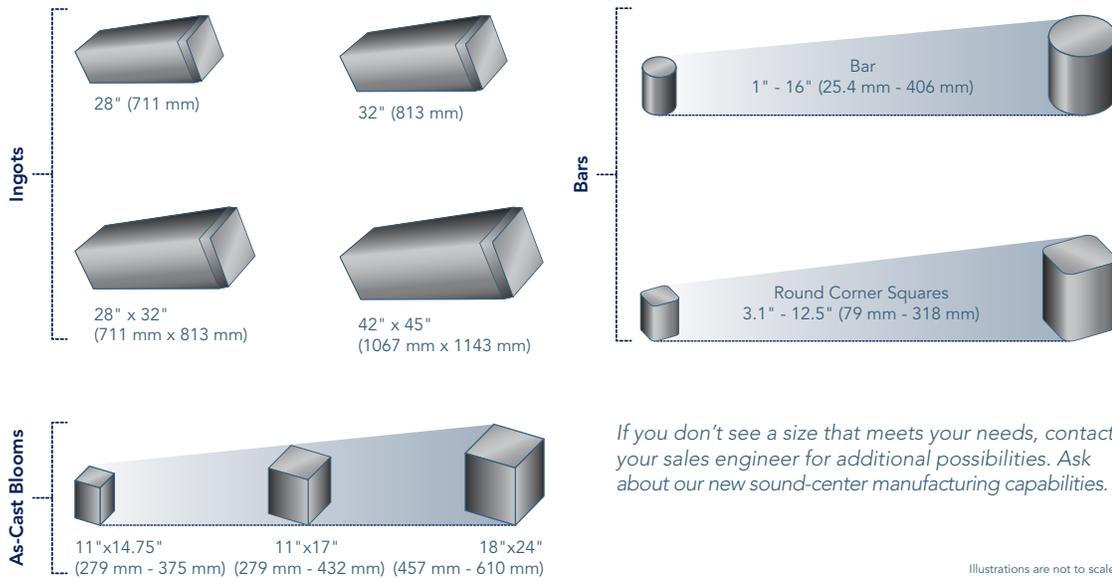
*TimkenSteel combines top equipment with leading engineering and nearly 100 years of operating experience to meet your product specifications.*



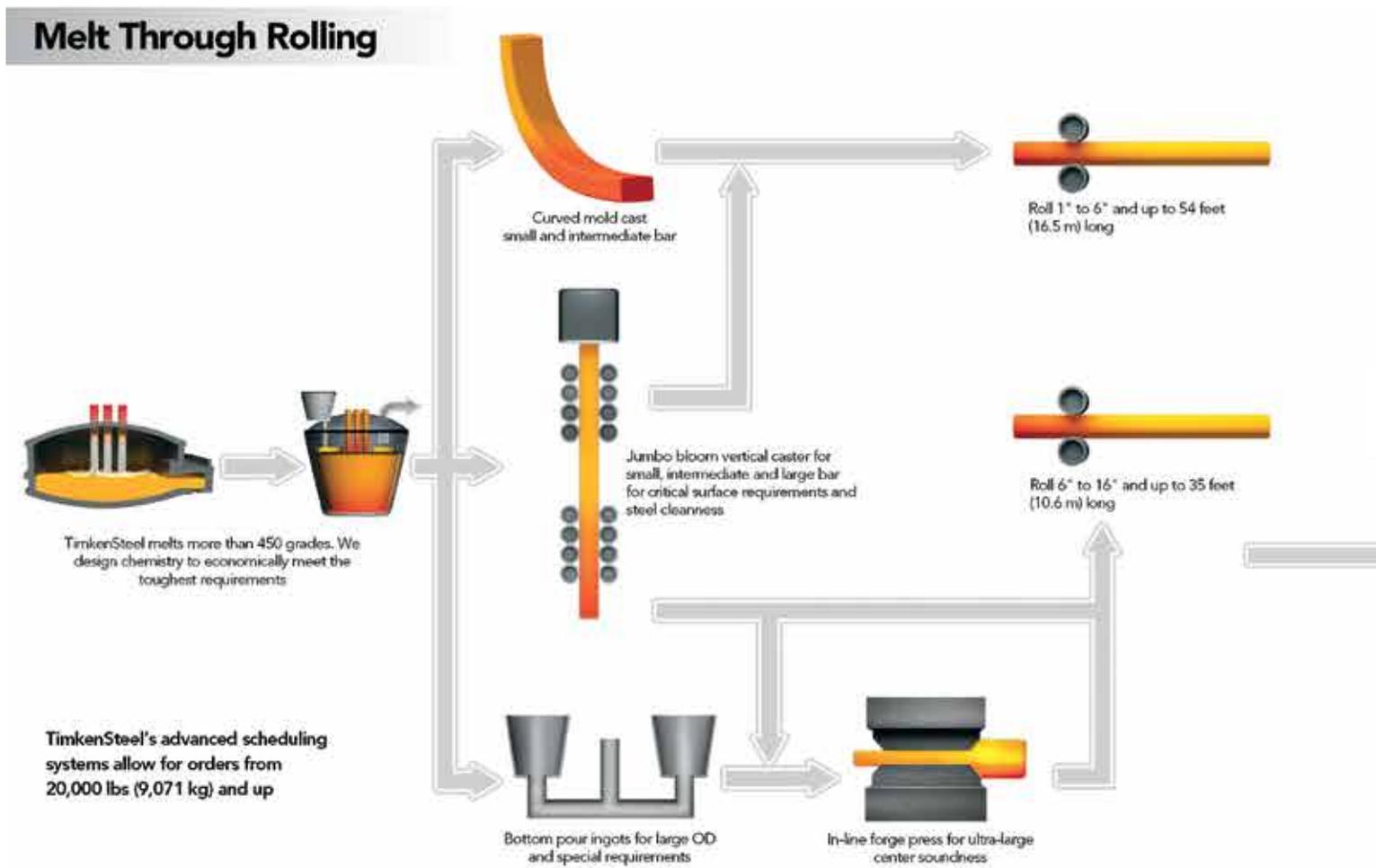
We have the capacity and flexibility to meet specific product and delivery requirements.

## Size Range

We offer the broadest size range in North America. With our options in ingot sizes and continuous cast blooms, we can meet most industry-required reduction ratios.



## Bar Manufacturing Process



*Our combination of assets ensures we meet center soundness requirements for large bar.*

## Faircrest Plant

The Faircrest Plant, located in Canton, Ohio, is one of the most advanced bar manufacturing facilities in the world. The modern melt shop and ladle refining facility feed either bottom pour ingots or our new jumbo bloom vertical caster. The new caster produces 18" x 24" blooms and is ideal for providing the needed reduction ratio for larger bars. It also produces 11" x 17" blooms to feed our Harrison Plant for small diameter bars. The in-line forge press, rolling mill and billet conditioning operations deliver SBQ bar from 6" to 16" (152 mm to 406 mm).

The large bar produced by Faircrest has quality and cleanliness levels that are ideally suited for demanding applications in energy-drilling equipment, industrial machinery, rail axles, mining equipment, automotive powertrains and drivelines, agriculture machinery, bearings and more.

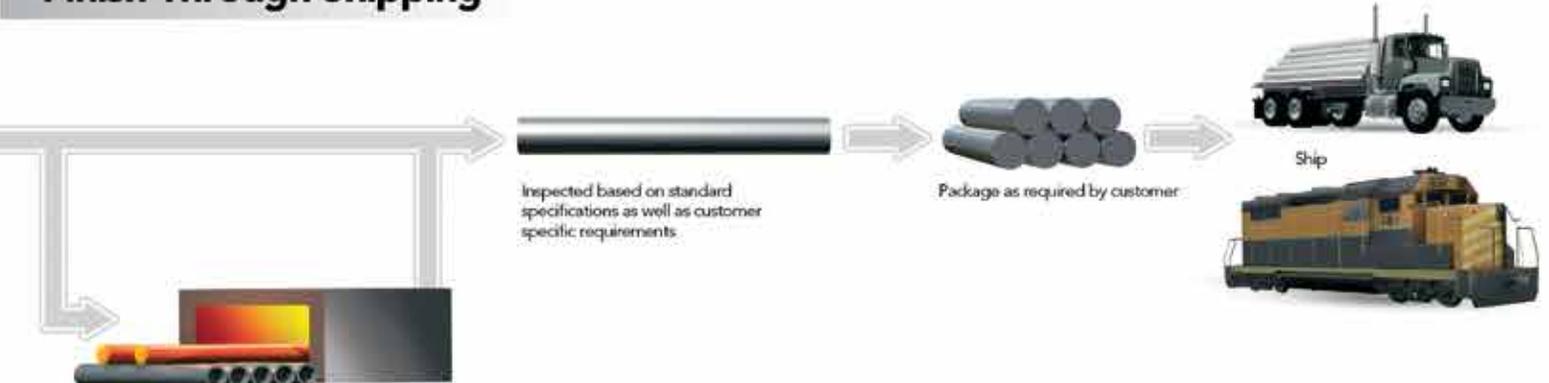


## Harrison Plant

Also located in Canton, Ohio, our Harrison Plant melts, continuously casts, rolls and finishes specialty carbon and alloy steels. Like the Faircrest facility, production starts by melting scrap steel using electric arc furnaces. We process the steel to customized requirements in our ladle furnace and ladle refining facility. We sequence cast the steel on a four-strand, 11" x 14.75" bloom caster and roll it on billet and horizontal-vertical bar mills to laser-measured size and length.

The Harrison plant produces small and intermediate bar for the automotive, distribution, energy and industrial market segments. The applications typically demand the most of steel such as crankshafts, gears, drill collars and bearings.

## Finish Through Shipping



**Heat Treat**  
Largest quench and temper capacity of any North American steel provider. TenkenSteel designs the chemistry and heat-treat recipe to economically meet the toughest challenges.

# Investing In Customer Satisfaction

We invest on a large scale to meet our customers' SBQ bar demands. Recent investments of nearly half a billion dollars have increased TimkenSteel's capacity and capability. Some of our more recent additions include an in-line forge press, jumbo bloom vertical caster, ladle refiner, small-bar rolling mill, ultra-large bar peeler, additional thermal-treatment facilities and a large-bar ultrasonic test inspection line.

## Faircrest Steel Plant Investments

### Ladle Refiner

The ladle refiner, paired with the jumbo bloom vertical caster, increases the Faircrest plant's shippable capacity by 25 percent and allows for a broader range of chemistries.

### Jumbo Bloom Vertical Caster

Our new caster is the largest continuous bloom vertical caster in the world and the only one of its kind in North America. It combines the efficiency of continuous casting with the cleanness levels of ingots.

The vertical design, specially engineered and optimized tundish, electromagnetic stirring and mechanical soft reduction ensure product consistency, quality and the clean steel for which TimkenSteel is known.

This caster improves our efficiency and flexibility, expands our product range and increases our capacity to meet the demand for large-bar SBQ steel. Customers realize improved product consistency and surface quality, along with optimized yield for cut lengths.

*The jumbo bloom vertical caster provides the efficiency of continuous casting while ensuring the cleanness levels of ingots.*

### In-Line Forge Press and Rolling Mill

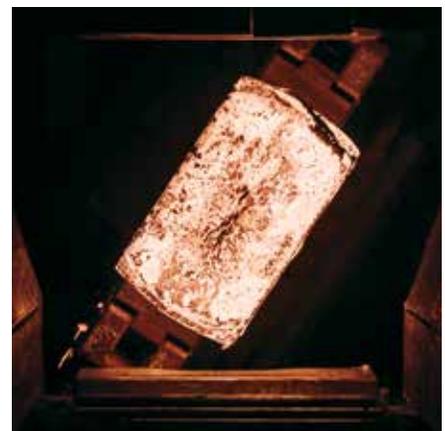
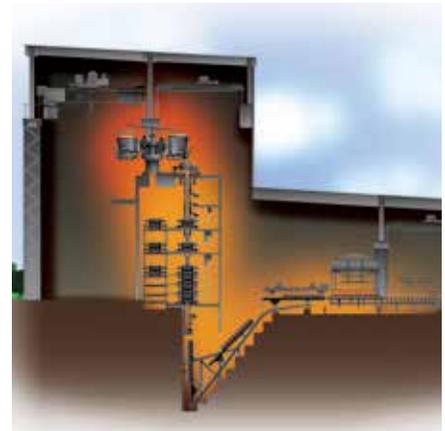
The 3,300-ton in-line forge press enhances center soundness of a larger cross-section of special bar quality steel. The process - combined with rolling - improves shape and size control to deliver consistent foot-weight and size tolerances. This helps improve the dependability and performance of critical components in applications for large bar worldwide.

Forged rolled bar improves efficiency and quality as well as:

- Enhanced product consistency;
- Enhanced size control, reducing or eliminating the need to rough turn;
- Larger heats leading to less product testing; and
- Soundness throughout, benefiting from our forging and rolling processes.

This industry-leading size range makes TimkenSteel the only North American steel company that direct rolls steel with guaranteed sound centers through 16" (406 mm).

*This second refining station at Faircrest supports our commitment to improve customer service and increases flexibility for making more complex grades of high-performance steel.*



## Typical Ultra-Large Bar Sizes

Bar Size OD (Inches)	Bar Size OD (mm)	Bar Size Length (feet)	Bar Size Length (meters)
13	330	27	8.2
14	356	23	7.0
15	381	20	6.1
16	406	18	5.5

The in-line forge press allows TimkenSteel to offer SBQ bar up to 16" (406 mm) with guaranteed sound centers.

### Large-Bar Ultrasonic Test Inspection Line

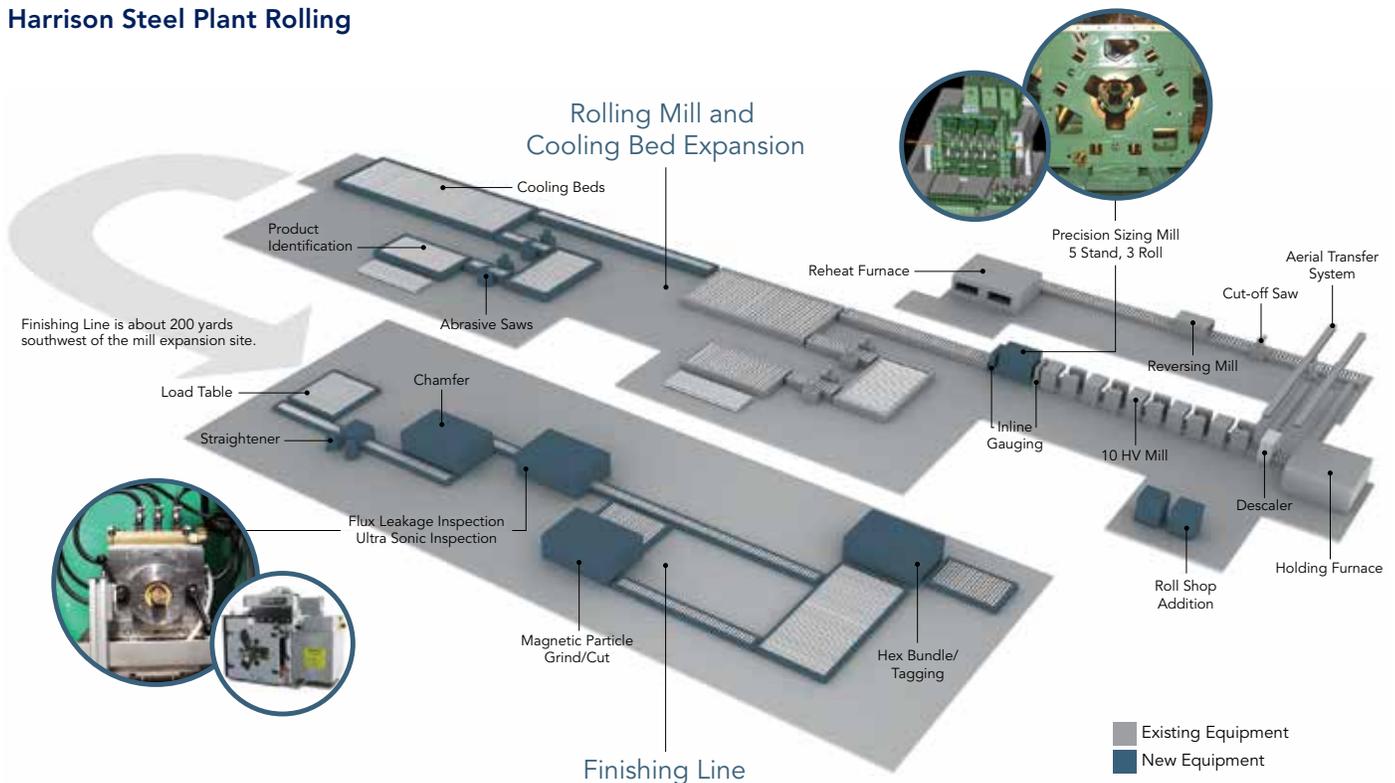
This inspection line increases our large bar finishing capacity and helps ensure large bar sound-center quality. The cutting-edge inspection line allows full body inspection for bar diameters ranging from 6" to 16" (152 to 406 mm) and for lengths up to 35 feet (10.6 meters).

### Ultra-Large Bar Peeling

We can offer our product line in a peeled condition when tighter tolerances on the OD are required. Hot-rolled and forged-rolled bar may be ordered in a peeled size up to 15.5" (393 mm).

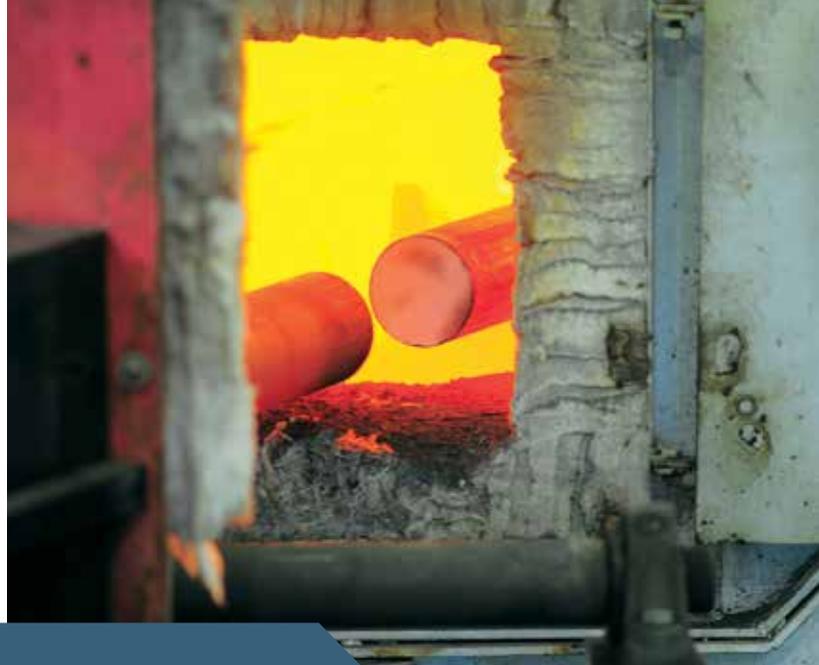


## Harrison Steel Plant Rolling



### Small-Bar Rolling Mill

A 76,000-square-foot expansion to the Harrison facility extended our rolling, finishing and inspection capabilities down to 1" (25.4 mm) diameter. The precision rolling mill – the first of its kind in North America – allows for hydraulically adjusting roll gap dynamically during rolling. This gives superior dimensional control in a hot-rolled bar. The Precision Sizing Mill allows customers to request any size from 1" - 5" (25.4 mm – 127 mm) with tolerances down to one-half ASTM size limits.



## Thermal Treatment

Our industry-leading thermal treatment capabilities provide a diverse range of processing options to meet demanding strength and hardness requirements – regardless of order size. We continue to develop these capabilities and broaden our sophistication in custom thermal-treat offerings so you can rely on innovative product designs and proven quality. Few others offer this combination of metallurgical and thermal-treat knowledge, setting us apart from the competition.

We provide tailored solutions to meet our customers' needs through our value-added steel bars, tubes and billets for challenging applications. Our approach to manufacturing integrates our melting, rolling, piercing and finishing operations, ensuring a complete chemistry and economical solution from start to finish.

Our thermal treatment includes:

### **Quench and Temper**

The quenching and tempering processes heats steel uniformly to a temperature above a critical range and cools it rapidly in water. This treatment helps achieve specific levels of strength and toughness to meet customer requirements.

### **Anneal**

Annealing is heating uniformly to a temperature within or above the critical range and cooling at a controlled rate to a temperature under the critical range. We use this treatment to produce a definite microstructure, usually one designed for best machinability. We also use annealing to remove stresses, induce softness and alter ductility, toughness or other mechanical properties.

### **Normalize**

In the normalizing process, we heat steel uniformly to a temperature above the critical range and cooling in air to room temperature. This treatment produces a recrystallization and refinement of the grain structure, giving the product uniformity in hardness and structure.

*Our engineers design the optimal steel chemistry with the optimal heat-treat recipes to economically meet physical property needs for demanding applications.*

*As a leading steelmaker in North America with a unique focus on SBQ, we consistently meet our quality promise.*

## Quality Levels

We produce steel solids to a range of quality levels, including Parapremium™, aircraft, bearing and commercial. We produce our steel to a range of global industry standards (including AISI, ASIM, JIS, DIN, IOS), and are able to meet precise customer specifications for the most demanding requirements.

- **Parapremium™ (AMS 2304):** Manufactured in accordance with industry specification AMS 2304 for extremely critical or highly stressed parts. Applications involve exceptionally stringent requirements for magnetic particle inspection and macro-etch limits.
- **Aircraft (AMS 2301):** Produced in accordance with industry specification AMS 2301 for important or highly stressed aircraft parts. Other applications involve additional stringent requirements for magnetic particle inspection and macro-etch limits.
- **Bearing:** Typically produced from alloy carburizing grades and high-carbon chromium grades for anti-friction bearings manufacturing. Manufactured in accordance with ASTM A 534, A 295 and A 485.
- **Commercial:** The basic or standard quality level for alloy steel bars. Melted to chemical ranges and limits, and inspected and tested to meet normal requirements for regular alloy steel applications.



## SBQ Product Summary Table

Grades	Rolled Sizes	Quality Levels	Thermal Treat
<p><b>Carbon Steels</b> 1018, 1045, 1060, etc.</p> <p><b>Alloy Steels</b> 13xx, 33xx, 4xxx, 51xx, 86xx, 93xx and many more</p> <p><b>Special Engineered Steels</b> High-Strength Steels, Micro-alloy Steels, Weldable High-Strength Steels, Impact Steels, etc.</p> <p><b>TimkenSteel melts more than 450 grades and counting.</b></p>	<p><b>Small to Intermediate</b> 1" - 5" (25.4 mm -127 mm) Any Size</p> <p><b>Intermediate to Large</b> 5-1/8" (130 mm) 5-1/4" (133 mm) 5-1/2" (140 mm) 5-5/8" (143 mm) 6" (152 mm) 6-1/4" (159 mm) 6.5" (165 mm) 6.75" (171 mm) 7" (178 mm) 7.25" (184 mm) 7.5" (190 mm) 7.75" (197 mm) 8" (203 mm) 8.25" (210 mm) 8.5" (216 mm) 9" (229 mm) 9.25" (235 mm) 9.5" (241 mm)</p> <p><b>Large to Ultra-Large</b> 10" to 16" (254 mm to 406 mm) Every 1/2" to ASTM tolerances</p>	<p><b>Parapremium</b> (AMS 2304)</p> <p><b>Aircraft</b> (AMS 2301)</p> <p><b>Bearing</b> (ASTM A534, A295, A485)</p> <p><b>Commercial</b> (A29)</p>	<p><b>As-Rolled</b></p> <p><b>Single Thermal Treat</b> Anneal, Spherodize Anneal, Normalize, etc.</p> <p><b>Double Thermal Treat</b> Normalize &amp; Temper Quench &amp; Temper Double Quench &amp; Temper etc.</p>

### Answering Customers' Toughest Challenges

TimkenSteel customizes every product and service we deliver to meet customers' specific needs. Our focus is on improving performance by addressing the toughest challenges, whether that requires a special bar quality (SBQ) steel bar or seamless mechanical tube, a precision steel component, honing, drilling or thermal-treatment services or a supply chain solution.

Our engineers are experts in materials, processing and applications, so we can work closely with each customer to deliver flexible solutions related to our products as well as their applications and supply chains. We believe few others in our industry can consistently deliver that kind of breadth, customization and responsiveness.



For more information, visit [www.timkensteel.com](http://www.timkensteel.com) or call us at 866.284.6536 (USA), +44 1455 826320 (Europe), +52 (55) 5876 9888 (Latin America), +52 (81) 8123 6147 (Mexico) and 021-60231080 (China).