



The Global Leader in Premium Quality **Titanium**

Perryman company

## Building on the Power of Integration



**At Perryman Company, there's no such thing as "good enough." Our consistent commitment to quality has made us a global leader in the manufacturing of titanium products.**

Since our beginning in 1988, we have strived to meet the ever-changing needs of our customers in an increasingly competitive marketplace. Today, we are firmly established as a respected melter of titanium ingot and producer of titanium bar, wire, fine wire and shapes. Still, the foundation of our company remains the same as it always has: providing the highest level of service to our customers.

Our uncompromising standards have driven us to a fully integrated manufacturing process, from melting to finished product. By managing the entire supply chain, we ensure that the most stringent standards are met to achieve the best possible product results.

As the needs of our customers continue to evolve, Perryman Company will respond with the same customer-focused approach that has made us the preferred supplier of titanium products worldwide. We look forward to growing – *and innovating* – with you.



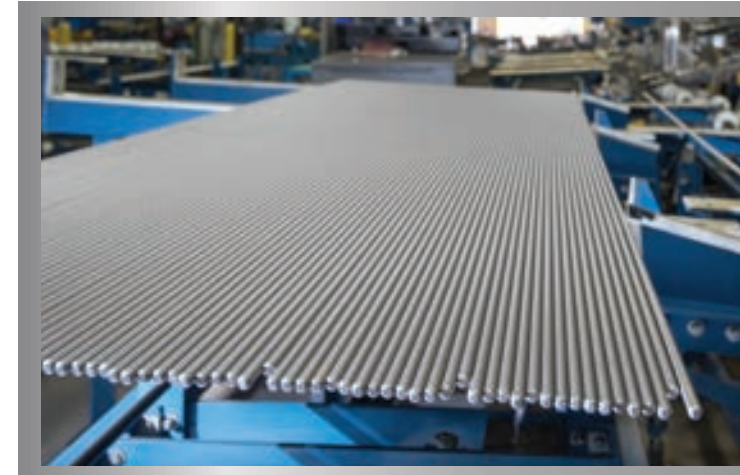
Perryman titanium is found in a diverse range of markets from aerospace fasteners to dental and medical implants. It is even utilized in football faceguards and bridge reinforcements.



## COIL & BAR PRODUCTS

### Precision Finish Coil

The manufacturing of precision finish coil begins with hot roll coil. The material undergoes a process of drawing and conditioning to produce the finished wire size. Depending on customer requirements, the material may be coated with a lubricant suitable for heading operations and near net part manufacturing.



Perryman's hot rolling process creates high-quality coil that feeds all further finishing operations. Hot roll coil is produced in sizes from 0.215" to 0.790".



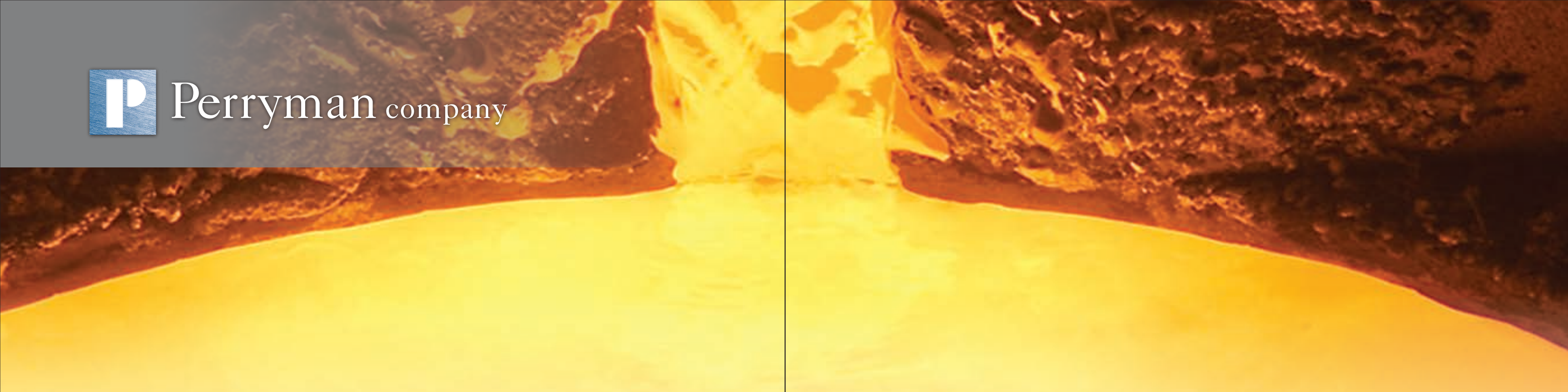
### Centerless Ground Bar

The typical path for producing finished centerless ground bar includes turning and grinding of the surface to finished size prior to final inspection. Smaller diameter bar sizes may also be produced via a coil-to-bar process. In this case, hot roll coil is straightened into bar lengths before grinding to finished size. Precision centerless ground bar products undergo additional processing to achieve tight tolerances.



Additional features such as line marking, chamfering and cut-to-length bars are among the value-added services offered by Perryman.





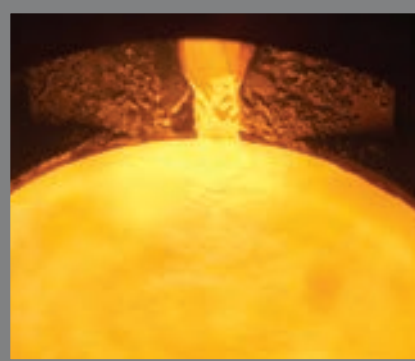
### Fully Integrated Titanium Manufacturing

From the very beginning of the manufacturing process, *quality* is our top priority. It starts with careful selection of premium raw materials from suppliers who meet the strict criteria established by the Perryman Company technical organization. Our supplier approval process includes verification that ISO and other industry-quality standards are met or exceeded.

#### Blending



#### Melting



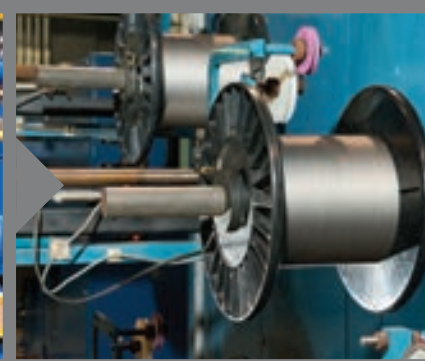
#### Breakdown



#### Hot Rolling



#### Finishing



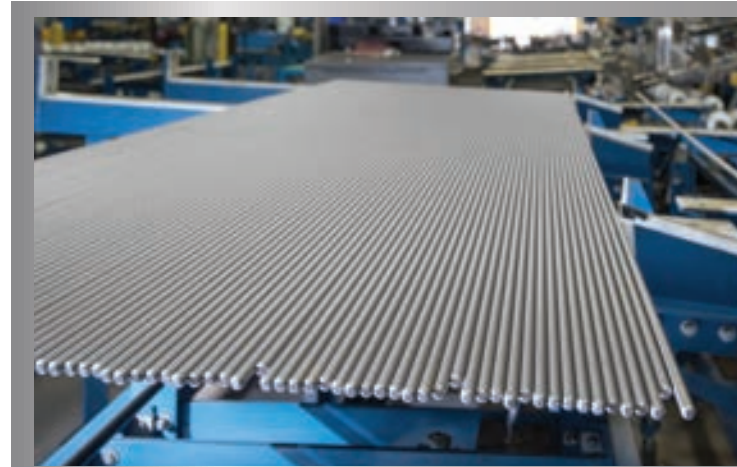
## COIL & BAR PRODUCTS

### Precision Finish Coil

The manufacturing of precision finish coil begins with hot roll coil. The material undergoes a process of drawing and conditioning to produce the finished wire size. Depending on customer requirements, the material may be coated with a lubricant suitable for heading operations and near net part manufacturing.



COIL PRODUCTS



Perryman's hot rolling process creates high-quality coil that feeds all further finishing operations. Hot roll coil is produced in sizes from 0.215" to 0.790".



### Raw Materials and Blending Operations

In preparation for melting, we blend a precise mixture of raw materials to create the desired chemistry for the titanium alloy being melted. These include titanium sponge, titanium turnings, titanium feedstock and master alloying elements. Continual testing, lab verification and documentation are standard practices throughout the preparation process. Our meticulous attention to detail during this phase ensures a titanium product of the highest quality.

Perryman's melt facility produces ingots with weights greater than 12,000 pounds.



### Melting Operations

Perryman's melting facility employs Electron Beam Cold Hearth Melting (EB) and Vacuum Arc Remelt (VAR) technologies, both of which operate under vacuum. These melting techniques allow for optimized management of raw materials while providing our customers with a reliable, one-stop supplier of choice. We are also able to recycle nearly 100% of our own internally generated titanium revert.

### Ingots Breakdown

Perryman's advanced breakdown facility is capable of converting titanium ingots up to 33" in diameter to various sizes and configurations down to 4" round billets. The mill employs a rolling process to break down ingots. It is the first of its kind dedicated to titanium and it operates in a highly automated manner.

### Hot Rolling Mill

Our hot rolling operations are highly automated and use the industry's best technology. Billets are processed on a two-high reversing mill that reduces the size of the titanium material. The hot roll material then travels through additional mills where it is further processed into either hot roll bar or coil, depending on the final product.

### Product Finishing

Perryman's hot roll bar and coil products follow a variety of finishing paths, depending on the final product to be manufactured. All products must pass rigorous inspection processes to ensure that they meet requirements for size, tolerance, condition, microstructure, mechanical properties and any other industry specifications requested by the customer.



Automation allows for highly repeatable billet production, minimizing variability throughout Perryman's process.

### Centerless Ground Bar

The typical path for producing finished centerless ground bar includes turning and grinding of the surface to finished size prior to final inspection. Smaller diameter bar sizes may also be produced via a coil-to-bar process. In this case, hot roll coil is straightened into bar lengths before grinding to finished size. Precision centerless ground bar products undergo additional processing to achieve tight tolerances.



Additional features such as line marking, chamfering and cut-to-length bars are among the value-added services offered by Perryman.



BAR PRODUCTS

## FINE WIRE & SHAPED BAR PRODUCTS

FINE WIRE PRODUCTS



### Premium Fine Wire

In the fine wire operations, titanium coils are further processed into smaller diameters through a series of drawing steps to meet the size and shape required by the customer. Fine wire products are typically provided on spools or supplied in straight lengths. Weld wire is supplied on spools. For additive manufacturing, Perryman's advanced materials operations produces wire that has been used for direct wire feed in additive manufacturing and for atomization processes used in producing titanium powder. Advanced material spooled wire is free of cast and helix, allowing the wire to feed off of the spool as straight wire.



Fine wire products are available with anodized, bare or chemically milled surfaces.



SHAPED BAR PRODUCTS



### Net Shapes

The shapes group converts bar material into a variety of configurations through a process of drawing and rolling that is based on the desired product size and tolerance requirements. Our unmatched technical expertise enables us to produce custom titanium shaped products that meet individual customer specifications.

## A DEDICATION TO INNOVATION

**Innovation** is an important part of the Perryman heritage. Since our founding in 1988, we have looked beyond the customary ways of titanium manufacturing. Through the years, we have continually discovered and developed new and more efficient means of production.

The Perryman spirit of innovation extends beyond our processes and equipment. It is also at the core of our customer relationships. Our customers know we are always driven to **"Do it better. Do it smarter."** That is why they trust us to support them in meeting their critical requirements.



A full complement of analytical equipment ensures our products meet specifications.

From the raw materials we select, to the equipment, people and processes we employ to get the job done, Perryman is completely committed to producing only the finest titanium products.



From beginning to end, quality is confirmed throughout the process.

### Commitment to Quality

*Quality first* is the operating philosophy of Perryman employees and is at the core of our Quality Policy. The integrity of our product and our name is dependent on each and every employee maintaining the highest standards of conduct and adhering to the quality standards established.



### Accessible Technical Expertise

Perryman offers unmatched technical support at every stage of the manufacturing process. From the initial design to the finished product, our customers have full access to highly qualified engineers and metallurgists. Our team specializes in products that meet industry specifications as well as customer specific requirements. Perryman's technical expertise is second to none, and we stand ready to assist you at any time during the process.

### Trusted Testing Capabilities

Perryman maintains two testing facilities: one in California, PA and one in Houston, PA. Both testing laboratories utilize advanced testing equipment that enables us to meet or exceed industry requirements. Because we manage every step in the process, everything manufactured by Perryman has complete traceability, with full material identification from raw materials through finished product.

### Approvals

ISO9001, AS9100, Nadcap and other customer approvals.

### Testing Performed by Perryman Includes:

- Metallics, O, N, C, H and trace elements
- Tensile Testing
- Double Shear Testing
- Lab Heat Treatment for Capability Testing
- Complete Metallographic Preparation and Evaluation
- Hardness and Micro Hardness Testing





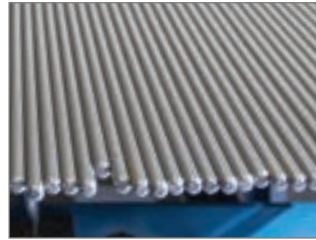
## PRECISION FINISHED COIL

**SIZE RANGE:** • 0.099" (2.51 mm) dia. to 0.575" (14.60 mm) dia.

**TOLERANCE:** • Customer specified or industry standards • Coil weights are billet dependent

**ALLOYS:** • Titanium 6Al/4V, 6Al/4V Eli, 6Al/7Nb, 3Al/2.5V, 6Al/6V/2Sn • Titanium Commercially Pure Grades 1, 2, 3, 4  
• Beta alloys • Other alloys available upon request

**PACKAGING:** • Precision dead cast loose wound coils from 34" (863 mm) to 36" (914 mm) I.D.  
• Coil weights are nominally 100 to 250 lb. coils (45 to 113 kg) with capability up to 500 lbs. (227 kg)



## CENTERLESS GROUND BAR

**SIZE RANGE:** • 0.062" (1.57 mm) dia. to 12.00" (304.80 mm) dia.

**TOLERANCE:** • 0.062" to 0.4990"  $\pm 0.0005$ " (1.57 mm to 12.67 mm  $\pm 0.012$  mm) • 0.500" to 0.999"  $\pm 0.001$ " (12.70 mm to 25.37 mm  $\pm 0.025$  mm)  
• 1.00" to 2.00"  $\pm 0.002$ " (25.40 mm to 50.80 mm  $\pm 0.050$  mm) • 2.01" to 4.00"  $\pm 0.003$ " (51.05 mm to 101.60 mm  $\pm 0.076$  mm)  
• For bar above 4.00" (101.60 mm) dia. per AMS 2241  
• Bar lengths are typically 10 ft. (3.0 m) to 12 ft. (3.6 m) random • Other lengths available upon request

**ALLOYS:** • Titanium 6Al/4V, 6Al/4V Eli, 6Al/7Nb, 3Al/2.5V, 6Al/6V/2Sn • Titanium Commercially Pure Grades 1, 2, 3, 4  
• Beta alloys • Other alloys available upon request

**PACKAGING:** • Packaged suitably for domestic and international shipments • Chamfering and line marking available upon request



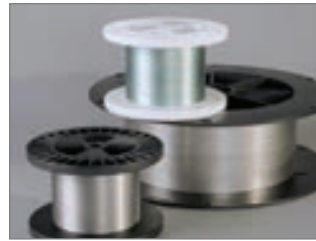
## PRECISION CENTERLESS GROUND BAR

**SIZE RANGE:** • 0.1181" (3.00 mm) dia. to 0.500" (12.70 mm) dia.

**TOLERANCE:** •  $\pm 0.00015$ " ( $\pm 0.0038$  mm)  
• Bar lengths are typically 10 ft. (3.0 m) to 12 ft. (3.6 m) random • Other lengths available on request

**ALLOYS:** • Titanium 6Al/4V, 6Al/4V Eli, 6Al/7Nb, 3Al/2.5V, 6Al/6V/2Sn • Titanium Commercially Pure Grades 1, 2, 3, 4  
• Beta alloys • Other alloys available upon request

**PACKAGING:** • Boxed suitably for domestic and international shipments • Chamfering and line marking available upon request



## PREMIUM FINE WIRE AND WELD WIRE

**SIZE RANGE:** • 0.006" (0.152 mm) to 0.125" (3.18 mm) • Custom specific designs — rectangles, squares and special profiles  
• Straight lengths available 0.050" (1.27 mm) to 0.125" (3.18 mm) maximum

**TOLERANCE:** •  $\pm 0.0003$ " ( $\pm 0.0076$  mm) or finer

**ALLOYS:** • Titanium 6Al/4V, 6Al/4V Eli, 6Al/7Nb, 3Al/2.5V, 6Al/2Sn/4Zr/2Mo • Titanium Commercially Pure Grades 1, 2, 3, 4  
• Beta alloys • Other alloys available upon request

**PACKAGING:** • Standard 12" spools • Special packaging available on request  
• Loose coil available from 0.062" (1.57 mm) to 0.125" (3.18 mm)



## ADVANCED MATERIALS FOR ADDITIVE MANUFACTURING

**SIZE RANGE:** • Sizes: 0.045" (1.14 mm) to 0.125" (3.18 mm) — supplied on spools  
• Sizes: 0.062" (1.57 mm) to 0.125" (3.18 mm) can be supplied as loose coils of wire

**TOLERANCE:** •  $\pm 0.002$ " ( $\pm 0.050$  mm)

**ALLOYS:** • 6Al/4V, 6Al/4V Eli, • Titanium Commercially Pure Grades 1, 2, 3, 4  
• Other alloys available upon request

**PACKAGING:** • Custom size spools as requested  
• Special packaging available upon request



## NET SHAPES

**SIZE RANGE:** • Rectangles and Flats: Minimum 0.250" (6.35 mm) up to 1.75" (44.45 mm) by 2.75" (69.85 mm) — a 4:1 ratio  
• Squares: 0.250" (6.35 mm) up to 2.00" (50.8 mm)  
• Custom profiles available upon request

**TOLERANCES:** • Large Shape  $> 1.00$ " (25.4 mm) Wide • Standard Bar:  $\pm 0.020$ " ( $\pm 0.50$  mm) • Precision Bar:  $\pm 0.015$ " ( $\pm 0.381$  mm)  
• Small Shape  $\leq 1.00$ " (25.4 mm) Wide • Standard Bar:  $\pm 0.010$ " ( $\pm 0.25$  mm) • Precision Bar:  $\pm 0.005$ " ( $\pm 0.127$  mm)

**LENGTHS:** • 10 ft. (3.0 m) to 12 ft. (3.6 m) random as standard • Custom lengths available upon request  
• Cut lengths tolerance  $\pm 0.0787$ " ( $\pm 2.0$  mm)

**ALLOYS:** • Titanium 6Al/4V, 6Al/4V Eli, 6Al/7Nb • Titanium Commercially Pure Grades 1, 2, 3, 4  
• Beta alloys • Other alloys available upon request

**PACKAGING:** • Packaged suitably for domestic and international shipments





**At Perryman, it all comes down to quality.**

We believe in utilizing the best equipment and processes, employing the best people, and manufacturing specialty titanium products that are second to none.

That's what we do every day. And that's what has made us the premier titanium products manufacturer worldwide.

**Experience the Perryman advantage.**

We would like the opportunity to demonstrate the difference that a total focus on quality and customer support can make.

Call us to learn more about what we can do for you and your company.

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**Perryman** company