



REFRACTORY SOLUTIONS FOR **IRON & STEEL**



HarbisonWalker International

Every day around the world, HarbisonWalker International's people and products stand up to the challenges and pressures of every job. And for 150 years, we've been the gold standard for refractory products in the iron and steel industry.

We deliver one of the industry's widest, deepest lines of solutions. Our world-class products perform to the highest degree. And by bringing intensity, reliability, and passion to work every day, we're able to provide superior value to our customers and their businesses.

Get to know the experts who anticipate, respond, and deliver like no one else. We're nearly 2,000 people with one goal: to keep your business moving forward.

READY TO PUT OUR INTENSITY TO WORK FOR YOU?

At HarbisonWalker International, we live the iron and steel business. We've been leaders and innovators since the beginning. As the inventors of COMANCHE®-type ladle brick to the secondary steel market in the late 1990s, HWI revolutionized the ladle refractory market. Today the tradition continues with our energy-efficient ladle preheater systems incorporating smart burner technology and Emisshield® coatings.*

In addition to product leadership, we have the largest field presence in the US iron and steel industry, and we pride ourselves on world-class customer service that begins with one call. Our dedicated iron and steel application specialists provide highly customized solutions and have a depth of knowledge unparalleled in the industry.

Our Value-Added Service (VAS) team can provide a wide range of support, from simple consultation to on-site installation services. We have equipment rental services and a full range of inventory solutions. We can also provide priority access to our Advanced Research and Technology Center testing services. Our role can be customized to your needs. We can step in as simply a product supplier, or we can take the job all the way through installation. You decide.



*Emisshield® coatings are manufactured by Emisshield, Inc.
Emisshield® is a registered trademark of Emisshield, Inc.



PRODUCTS THAT PASS THE TEST. EVERY DAY.

Have high expectations for your refractory products? We do too. Our products set benchmarks for the industry, including PHANTUM®, ISOTAP®, COMANCHE®, VERSAFLOW®, SHOT-TECH®, HP-CAST®, AMERICLASE and BARRICADE.

The competitive edge you're looking for starts with us—and with your dedicated HWI application specialist. They're experts who will understand every inch of your iron and steel process and who will work intensely to optimize your refractory performance.

With the right products identified, we deliver with lightning speed—the products you need, when you need them. Our 30 global sourcing centers across North America are strategically placed. We ship around the world at a moment's notice. And, we stock our most popular products so that you can have them the same day or the next day. How can we work with you to reduce your potential for downtime?

Want to save time and money? Want to improve your productivity? Talk to your HarbisonWalker International sales representative today. Don't have one? Call **1-800-492-8349**.

MADE FROM A DIFFERENT MOLD.

Meet our problem-solving, fly-into-action, whatever-it-takes people who are driven to minimize your downtime. We're beyond responsive. We're beyond reliable. And here's how:

- Dedicated personnel ready to respond 24 / 7 / 365
- 30 North American global sourcing centers which shipped over 130,000,000 pounds last year—most with same-day or next-day delivery
- 17 manufacturing facilities in North America, as well as one in the United Kingdom and one in Indonesia
- Supply partners in China and Europe to support the full range of customer needs
- HWI associates and partners strategically located around the world—and ready to take your call

With the right mix of products and technology, HarbisonWalker International has one of the best operations in the world to deliver what you need, when you need it. No one produces more tonnage in the United States, and our manufacturing footprint spans the globe.

What sets the people of HWI apart? We have a burning desire for answers, excellence, and accuracy. We're thorough and meticulous. And absolute accountability is baked into our DNA.

APPLICATIONS >

Argon Oxygen Decarburization (AOD)

Basic Oxygen Furnace (BOF)

Blast Furnace

Casthouse

Coke Oven

Degasser

Electric Arc Furnace (EAF)

Hot Blast Stove

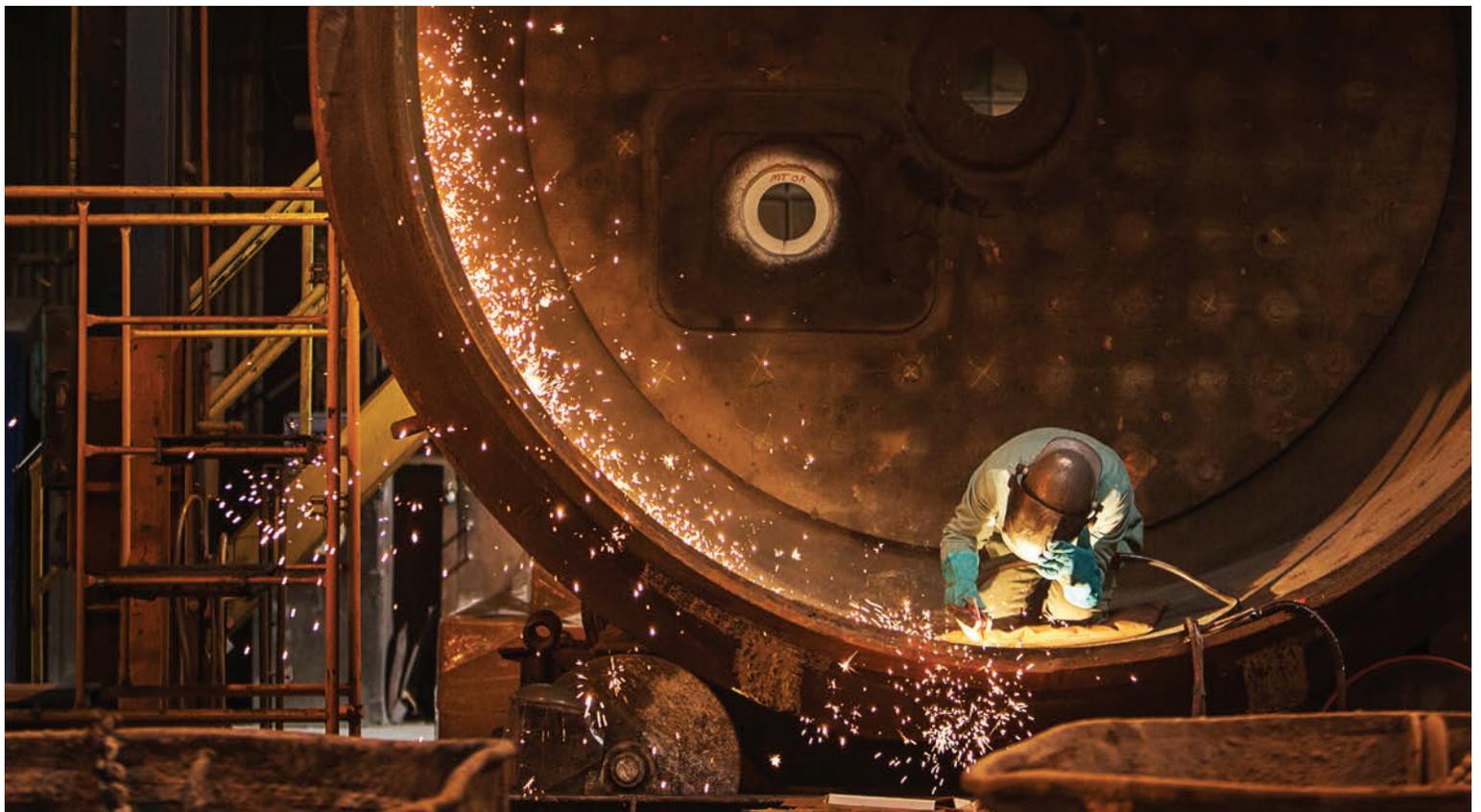
Iron Ladle

Reheat Furnace

Steel Ladle

Torpedo Ladle Car

Tundish



APPLICATIONS

ARGON OXYGEN DECARBURIZATION (AOD)

HWI offers a proven, complete refractory package for the Argon Oxygen Decarburization (AOD) process. From high purity rebonded fused-grain to high purity direct-bonded magnesia chrome refractories, our products provide you with the properties you need to extend campaign performance. HWI also offers synthetic dolomite products to provide unique customer specific solutions to withstand modern AOD practices with more hydration resistance than natural dolomite.

- TOMAHAWK® and SUPER NARMAG® FG – Rebonded fused grain products for the tuyere pad and tuyeres
- NARMAG® FG, SUPER NARMAG® 142, SUPER NARMAG® 145 – Rebonded fused grain and fused grain-containing products for the barrel and bottom
- PRODOL AOD 66 – Fired Magnesia-lime product for tuyeres and tuyere pad
- PRODOL AOD 66 Z – Fired Magnesia-lime product for tuyeres
- PRODOL AOD 75 – Fired Magnesia-lime product for barrel, cone, and bottom

BASIC OXYGEN FURNACE (BOF)

HWI was the first refractory producer to introduce resin bonded magnesia carbon refractories in BOFs and to this day we are the leading supplier of BOF refractories in the United States. HWI has a variety of specialized refractory solutions for every area in the BOF including safety/tank lining, zoned working lining configurations, sleeve and surround block options, and gunning mixes that were engineered for different areas of the furnace.

BOF BRICK

- Safety Lining: NARTAR® 7, SUPER NARTAR® R, BOF TANK, and NARMAG® HRB
- Working Lining: HWI analyzes individual current and historical shop conditions and offers customized lining solutions.
- Bottom/Stadium: Customized BOF 700 and 800 series, NARTAR® TS, and NARTAR® XR.
- Barrel: BOF 700, 800, 900 and ISOTAP® which have been carefully customized for optimal metal content, carbon levels, and magnesia purity.
- Cone: BOF 700 series, NAREZ AM5, and SUPER NARTAR® R, with an option for co-molding each product.

BOF GUNNING

- Cone: BASIC 187 GM-60-S
- General Vessel Maintenance: BASIC 187 GM-90 and BASIC 187 GM-93
- Taphole Replacement and Maintenance: AMERICLASE 98 S

BLAST FURNACE

HWI has supplied stack brick for a majority of the blast furnaces in North America. HWI Blast Furnace brands include: UFALA®, KALA®, KX-99® BF and H-W® 3-75. Bottom block include the UFALA® and KALA® brands. HWI also supplies monolithics for the off-gas system, stockline area, and shell packing.

CASTHOUSE

HWI was a pioneer in the casthouse trough and runner refractories. Key products include D-CAST® TRC-OR PLUS and D-CAST® TRC-SR PLUS. D-CAST® XZR-OR is the number one brand for tap-hole faces.

COKE OVEN

HWI supplies a complete portfolio of products (including monolithics) for both the conventional type battery and non-recovery type. Products include:

- Silica Brick: ANH®-SRD, ANH®-SHD
- Clay Brick: ALAMO® CH, KALA®

DEGASSER

HWI supplies mag-chrome brick for RH and DH degassers. Key brands here include SFG®-US, SFG®, and 60DB®. We fabricate snorkel assemblies and provide maintenance products, such as BASIC 187 GM RH gunning material, to extend the campaign of the vessel. HWI supplies alumina monolithics and high alumina brick for tank degassers. Key brands include the SHOT-TECH® family and KRUZITE®-70.





ELECTRIC ARC FURNACE (EAF)

A number of furnace design and operational improvements have been made over time. Furnace design improvements include water-cooled panels, oxygen burners, eccentric bottom tap (EBT) tapholes, and continuous scrap feeding. Operational improvements include foamy slag, slag chemistry, and scrap compositions. These improvements have necessitated a higher degree of refractory customization than was previously required. HWI has the ability to zone the furnace with a wide range of quality refractory products and refractory solutions to suit individual operations. Whether it's unique mix technologies or innovative engineering solutions, HWI has your EAF refractory needs covered.

- EAF 200, 600 and BB series offer industry leading performance for mag-carbon refractory sidewall shapes
- ISOTAP® – Isostatically pressed mag-carbon tapping solutions
- AMERICLASE – Monolithic gunning and hearth technology utilizing domestic raw materials secures price stability and superior refractory performance
- Unique and patented pre-cast and pre-assembled solutions for ease of use and increased mechanical stability
- Automated application equipment solutions providing ergonomic and application efficiencies

HOT BLAST STOVE

HWI can provide all qualities of wall brick and checker brick for a complete stove including IFB. Our portfolio includes domestic and foreign brick. Domestic brands include UFALA® MCR, UFALA® XCR, KALA® and KX-99®. We can also supply the pre-cast shape assemblies for the various openings in the stove.

IRON LADLE

HWI offers two different lining designs for iron ladles: a conventional high-alumina type design (KRUZITE®-70) and a premium lining design requiring less maintenance. Our KRUZITE-70® brand can be found at just about every steel shop in the USA and our NARCARB® BSC / IRONMASTER® brands have provided excellent life, especially in the impact and high wear areas of the ladle.

REHEAT FURNACE

The processing of steel today requires a wide variety of heat treating or reheat furnaces. HWI provides a wide variety of products for lining these furnaces using products from our SHOT-TECH®, PLASTECH®, and VERSAFLOW® families. For lower temperature heat treating furnaces, our HP and HTZ ceramic blankets have been used successfully throughout the industry.

STEEL LADLE

HWI is the largest domestic manufacturer of steel ladle refractories. Our extensive and diverse portfolio of products allows us to provide the lining configuration that best fits our customers' needs and budget. As the inventors of COMANCHE® we revolutionized ladle refractory practices. Today, the tradition of innovation continues with our new, unique, dual-carbon bonded slagline brick: BARRICADE SLB 128.

ALUMINA MAGNESIA CARBON BRICK

- COMANCHE® HS – With bauxite and some higher purity materials
- COMANCHE® GOLD – With bauxite and higher purity materials
- COMANCHE® FA – With high purity materials
- COMANCHE® PLATINUM – With very high purity materials
- COMANCHE® FA SUPER – With high purity materials

MAGNESIA CARBON BRICK

- MAGNUM – High quality fused grain, anti-oxidants, and high purity graphite
- PHANTUM® / PHANTUM® SUPER – Premium fused grain, anti-oxidants, and high purity graphite
- RENEGADE® – Good quality fused grain, anti-oxidants, and high purity graphite. With the presence of special additives, this brick exhibits permanent expansion during service which keeps the lining tight.
- BARRICADE – Newest line, dual carbon system, premium fused grain, anti-oxidants, and high purity graphite

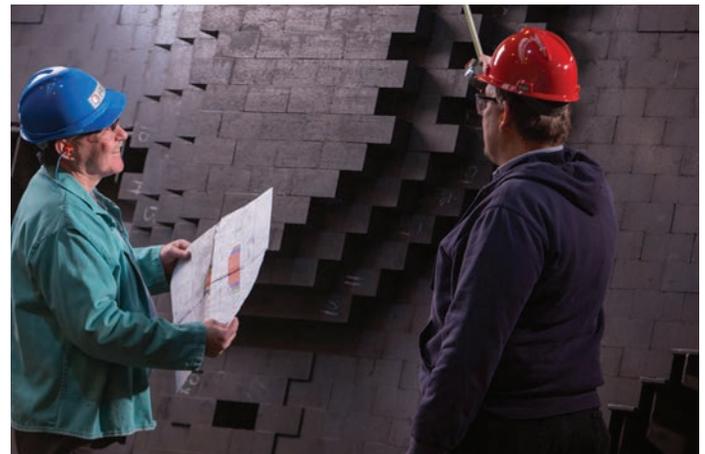
TORPEDO LADLE CAR

HWI has provided torpedo ladle brick for both the standard high-alumina type design and the non-maintenance lining design. Our KRUZITE®-70 brand can be found at just about every steel shop in the USA and our NARCARB® BSC / IRONMASTER® brands have had unparalleled success in plants where no maintenance is required. The NARCARB® BSC brand has also shown excellent results in the impact areas of the ladles.

TUNDISH

Over the years tundish technology has developed from a reservoir of molten metal that allows you to continually cast while a ladle is being changed to a complex refining vessel that ensures production of consistent, clean, and quality steel. HWI provides both industry proven and respected products as well as continuing to offer innovative solutions to our customers through automated delivery systems and custom designed products and shapes.

- DOSSOLITE & NARSPRAY® – Spray lining family of products
- NARCOTUN® – Dry vibrate family of products
- NARCON® CASTABLES – Back up linings and tundish furniture





Service Like You've Never Seen

We're the thought leaders. The researchers. The innovators. The tech geeks. We're the refractory partners who won't melt when the heat is on, who live to solve your greatest challenges. Every day at HWI, we design solutions that help improve efficiencies, make installations easier, extend campaign lives, and save customers millions of dollars. And it all begins with our intensely driven service teams.

APPLICATION TECHNOLOGY: FERROUS METALS

HWI's Application Technology Group is driven by changes in the marketplace and focuses on market responsiveness—recognizing and anticipating customer needs and developing the solutions to meet them. To ensure that HWI stays on the cutting edge of product development, the Application Technology Group maintains a complete and uninterrupted development cycle for each new product. This cycle directly links market intelligence to the knowledge and expertise in three key areas:

- Product application
- Product design
- Process and manufacturing

The Application Technology Group for Ferrous Metals is composed of ceramic, metallurgical, and mechanical engineers with many years of experience in steelmaking, refractory production, fundamental research, and applied development. The combined application of these skills results in many unique refractory designs and process solutions for iron and steel making applications. Customer benefits are ultimately measured by a decrease in the relative cost of refractories per ton of steel produced.

VALUE-ADDED SERVICES (VAS)

Enjoy the utmost in service. HarbisonWalker International's dedicated VAS team provides on-site management, installation, equipment, inventory management, heating solutions, and testing to the iron and steel industry. Benefits include:

- Single-source responsibility that delivers cost savings
- Just-in-time delivery of refractory materials, ensuring the freshest product on the jobsite
- Quick response times, minimizing outages and downtime
- More in-depth knowledge of your business, yielding the best refractory solutions
- Embedded HWI team member support and resources at your site

GLOBAL PROJECTS AND ENGINEERING

The Global Projects and Engineering Team specializes in greenfield construction, manufacturing and plant modernization, and also services the advanced engineering needs of existing facilities. These services include the following benefits:

- End-to-end delivery of refractories: drawings, products, and installation
- Strong conceptual drawing capabilities with meticulous attention to detail

Call **412-375-6920** to mobilize a HarbisonWalker International projects team today.

ADVANCED TECHNOLOGY AND RESEARCH CENTER (ATRC)

HWI has two ATRC centers for learning, testing, exploration, and innovation. Here in the United States, ATRC houses some of the brightest minds in the refractory industry. Our team of research and development experts works directly with our customers to design, test, and trial new products and applications. ATRC China serves as an important raw materials and qualifications lab. Services include:

- Research and development of new applications and products
- Customer-focused product development
- Comprehensive technical analysis
- Quality-assurance testing
- Benchmark and failure analysis of refractory material
- Slag analysis
- Postmortem analysis
- Introductory refractory training to more highly customized education that is specific to your business (at your place or ours)

To learn more, contact us at: VAS@thinkHWI.com.



GLOBAL SOURCING CENTERS

- 30 North American global sourcing centers providing one of the quickest response times in the industry
- Dedicated sales personnel ready to respond 24 / 7 / 365
- Ready-to-ship inventory of our best-selling iron and steel products
- Usually shipping with same-day or next-day delivery
- Staging and shipping to anywhere in the world
- Inventory solutions tailored to your business

Call **1-800-887-5555** to immediately be connected to the global sourcing center nearest you.



INSTALLATION, SERVICE, AND SUPPORT

- Support from HWI's network of premier independent contractor/installers
- Small emergency repairs to new plant construction
- Skills, resources, and experience to meet demanding specifications and time constraints



EDUCATION AND TRAINING

- Ongoing educational seminars at our Advanced Technology and Research Center
- Customized, on-site training for iron and steel customers upon request
- Iron and steel webcasts and video training modules upon request

At HarbisonWalker International, the bottom line is this: We live the iron and steel business. We rise to every challenge and do whatever it takes to get the job done. **Put our intensity to work for you.**



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