



COMPREHENSIVE REFRACTORY SERVICES FOR IRON & STEEL

CALDERYS



Calderys is a leading global provider for industries operating in high temperature conditions. We specialize in thermal protection for industrial equipment with a wide range of refractory products, and advanced solutions to enhance steel casting, metallurgical fluxes and molding processes.

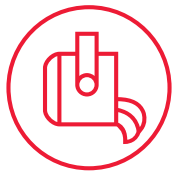
With a presence in more than 30 countries on the 5 continents and a strong footprint in the Americas through the brand HWI (HarbisonWalker International), Calderys' international network of experts ensures an end-to-end offer with tailored services.

Drawing on over 160 years of experience, we are constantly developing innovative products and techniques, optimizing costs and performance, combining world-class Research & Development and technical experts, as well as responsive supply chain and sales departments.

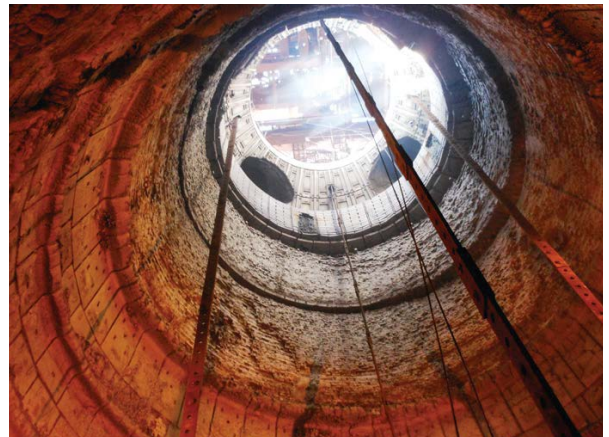
Our global structure allows us to design the customized solutions of today while anticipating the industries' needs of tomorrow.

Calderys pays particular attention to industry's impact on the environment and has a sustainability program articulated around three pillars: committed to people, accountable for our environmental footprint, and responsible for sustainable growth.

Health and safety are an integral part of how we do business, and our activities require the highest level of professionalism to carry out our projects. The same attention to detail that helps us provide personalized products and solutions is also applied to our rigorous health and safety criteria - applicable to both our own employees as well as subcontractors and temporary workers.



OUR ADDED VALUE



As a prominent ally to the Iron & Steel industry, Calderys has steadily enlarged its service solutions from ironmaking, liquid steel processing, continuous casting, reheat furnaces and other equipment. With innovation and sustainability as fundamental parts of our DNA, we have pioneered a tremendous number of new applications, such as pitch-free tap-hole clay for blast furnaces and our cutting-edge mold fluxes. Through the combination of HarbisonWalker International and Calderys' expertise, the company is offering complementary product portfolios and total care services, bringing a vast array of solutions to support customer needs in all refractory and casting fluxes applications.

What we bring to the Iron & Steel industry

- Close watch over ESG topics, such as product CO₂ footprint calculation, proposing a large range of refractory products resistant to H₂, as well as Environment, Health and Safety (EHS) concerns such as formulations improving the safety and environmental performance of our solutions.
- Complete portfolio of customized solutions from ironmaking, liquid steel processing, continuous casting, reheat furnaces and other equipment.
- Full set of refractory services: from engineering & design, installation, project management, dry-out & commissioning, to maintenance and refractory assessments.
- Process analysis including fluid flow and numerical simulations.
- Technical support from trial to after sales.

A TRUSTED SUPPLIER IN THE STEEL INDUSTRY

A world leader in refractory solutions, Calderys has a full product portfolio for all refractory needs including **monolithic refractories** and a range of **bricks**. This provides a full package refractory solution covering any possible client need including:

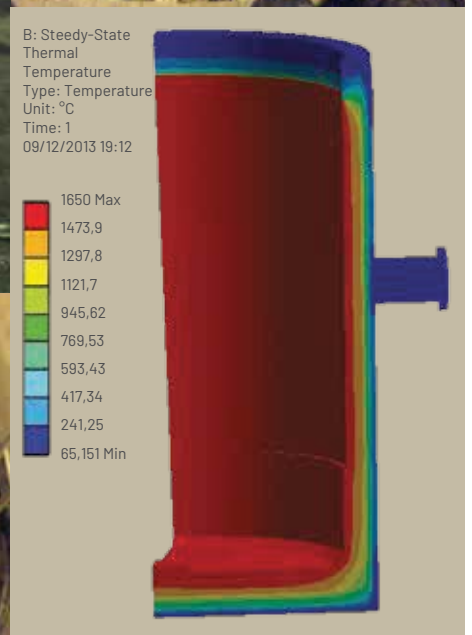
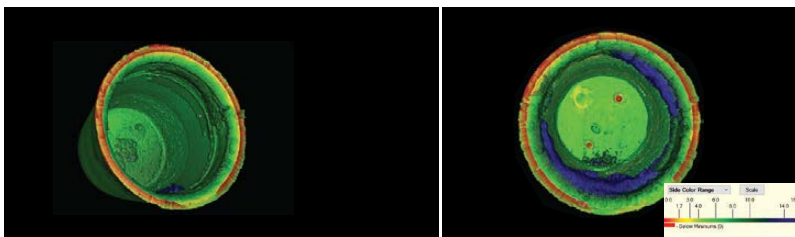
- Increasing efficiency thanks to design optimization
- Resisting common ladle stresses and preserving high steel quality with product optimization
- Increasing the availability of ladle fleet, bringing total cost optimization

STEEL INDUSTRY

Calderys is considered a reference supplier in the steel industry, offering value-added solutions based on tailor-made designs and engineering to provide refractory linings for optimal performance. Our comprehensive technology and services are a result of a world-class R&D network, local expertise from over 50 locations around the globe, and over 160 years of experience in the refractory business.

Alongside the products themselves, Calderys provides a complete range of services:

- Design
- Product selection
- Thermal calculations
- CFD analysis
- Installation
- Labor & machinery
- Supervision
- Repair service support
- Full refractory project management
- 3D laser scanner technology for erosion measurement



VALUE-ADDED SERVICES FOR STEEL MELTING SHOP

Calderys goes beyond supplying refractories by offering comprehensive value-added services designed to maximize plant performance, safety, and efficiency. We provide end-to-end refractory solutions – from design to installation, supervision, and complete refractory management.

Our service offerings

Design & engineering

- Advanced design team equipped with the latest software for CFD analysis and thermal calculations
- Customized refractory solutions for optimized performance

Installation & maintenance

- Wide range of machines from manual to fully automatic for refractory applications in Steel Melting Shops
- Precise, safe, and efficient installation ensuring minimum downtime.

Supervision & Technical support

- On-site supervision by experienced engineers.
- Day-to-day technical support and performance monitoring

Total refractory management (TRM)

- Complete management of refractories in Ladles, Furnaces, RH, LD Converter. Starting from Design to Daily Maintenance, Inspection, Installation & Mechanization
- Focused on cost optimization, efficiency, and sustainability

Our strengths

- Commitment to world-class safety standards
- Experienced & skilled service team with deep industry expertise
- Technology-driven approach with modern design tools and innovative installation methods
- Customer-focused solutions tailored to specific process requirements

Value to customers

- Enhanced operational reliability
- Optimized refractory consumption & reduced specific cost
- Improved campaign life with advanced techniques
- Long-term partnership through consistent service excellence



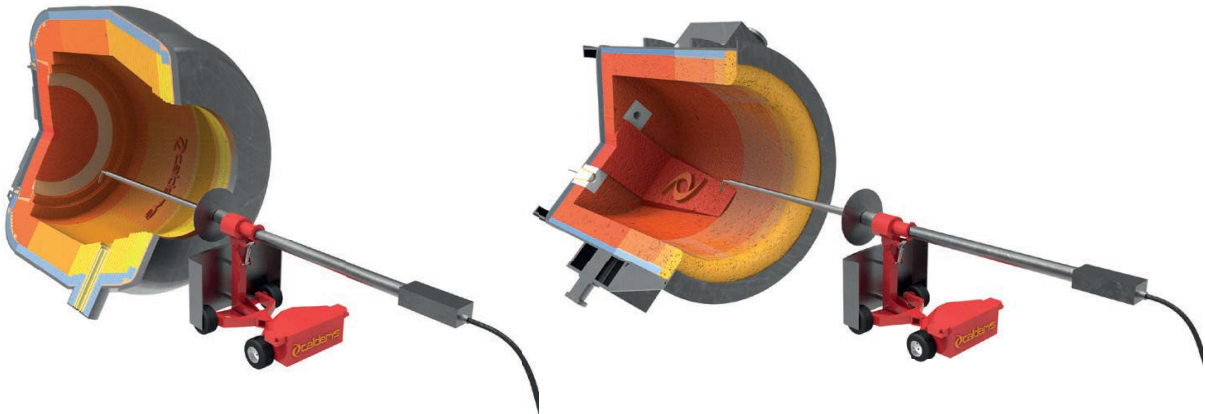
AN EXPERT IN GUNNING TECHNOLOGY

At Calderys, we are at the technical and commercial forefront in tailor-made gunning masses for electric arc furnace (EAF), energy optimized furnace (EOF), conarc furnace, basic oxygen furnace (BOF), steel ladle, RH degasser snorkels and hot repair maintenance practices, which through carefully chosen product selection and gunning maintenance practices extend the refractory lining life and therefore significantly increase the vessel availability and cost reduction.

Product name	Type	Nature of bond	Max. service temperature	Maximum grain size	MgO	CaO
CALDE® MAG DRY EAF	Dry vibrating mix for EAF	Ceramic	1,800 °C	8 mm	74.8	19.4
CALDE® MAG DRY TDVM	Dry vibrating mix for tundish	Ceramic	1,700 °C	1 mm	75.2	1.40
CALDE® MAG GUN EAF	Basic gunning mass for EAF	Chemical /ceramic	1,700 °C	4 mm	82.40	
CALDE® MAG GUN RH	Basic gunning mass for R-H	Chemical /ceramic	1,700 °C	4 mm	80.90	
CALDE® MAG GUN EOF	Basic gunning mass for EOF	Chemical /ceramic	1,700 °C	4 mm	87.0	
CALDE® MAG GUN LADLE	Basic gunning mass for ladle	Chemical /ceramic	1,700 °C	4 mm	86	

Typical value							
Fe ₂ O ₃	SiO ₂	Al ₂ O ₃	CCS, Kg/ cm ² after drying at 1,450 °C / 2 hrs	Dry density, g / cc after firing at 1,550 °C / 3 hrs	CCS, kg/cm ² after drying at 110 °C / 24 hrs	Dry density, g / cc after drying at 110 °C / 24 hrs	CCS, kg/cm ² after heating at 1,550 °C / 3 hrs
2.70	2.3	0.7		2.60			
2.30			120				
1.2				2.50	68	2.50	246
1.30					42	2.30	386
0.3					54	2.40	130
1.40					27	2.30	156

A set of solution for each vessel of the Primary and Secondary metallurgy



CALDE® RH GUN SHOOTER

Our gunning maintenance program is designed as an end-to-end solution based on CALDE® MAG GUN series, our high-performance basic gunning products.

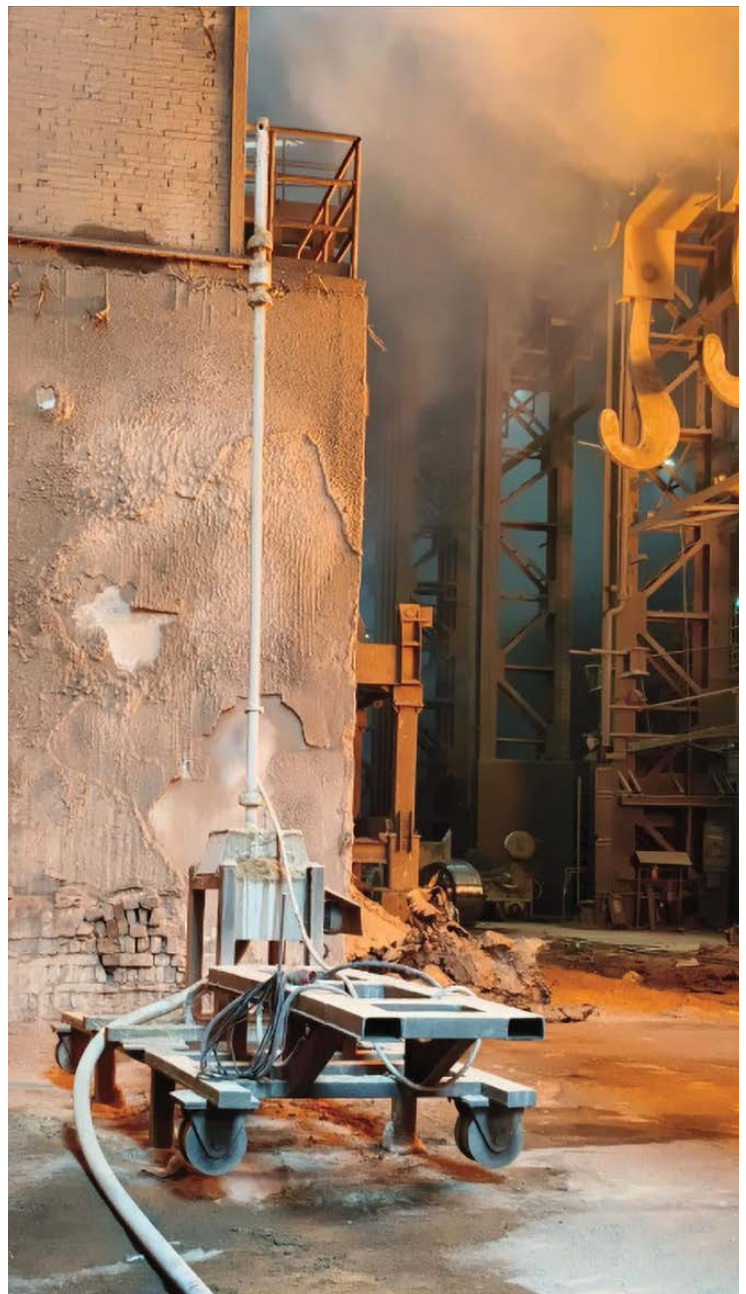
- Enhanced high-temperature strength and superior slag corrosion resistance.
- Optimized mineralogical design ensures rapid sintering and excellent stickability on hot surfaces.
- Engineered grain size distribution and binder matrix to deliver low rebound loss and high gunning efficiency.
- Tested magnesia source for consistent chemical stability and corrosion resistance in aggressive metallurgical condition.
- Adapted to a wide range of customized gunning machines for each vessel.

Providing you with

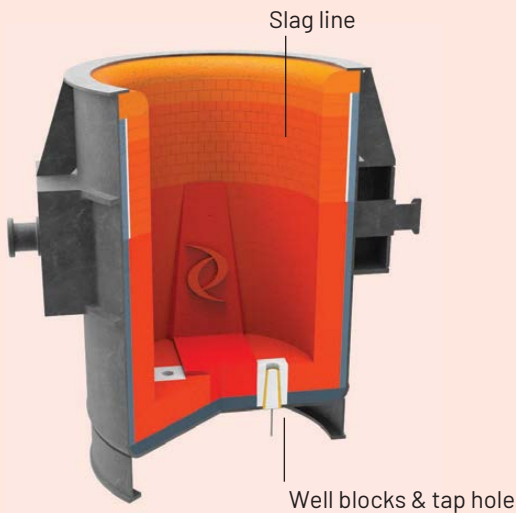
- Fast, durable and cost effective gunning maintenance
- Good gunability and sticking at high application temperatures

Resulting in

- Increased vessel availability
- Large and considerable energy savings
- Reduced total refractory costs



GUNNING MAINTENANCE PROGRAM FOR STEEL LADLE



Slag line

Aggressive secondary-metallurgy slag can severely attack magnesia-carbon bricks. Hot gunning helps maintain a more uniform wear profile along the ladle wall, extending lining performance and supporting reliable ladle operation. Calderys designs specialized equipment to enable hot gunning with ladles positioned either horizontally or vertically.

Well block & tap-hole

Our application equipment is designed to also maintain the floor, blocks and plugs of the ladle.

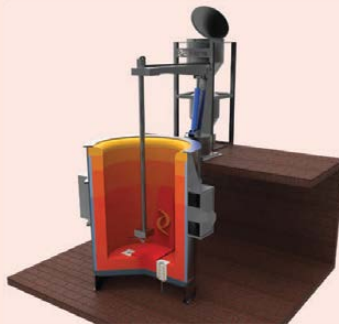
CALDE® GUN SHOOTER



3 DIFFERENT GUNNING MACHINES DEDICATED TO THE LADLE



CALDE® MACHINE DRY GUN
Rotary dry gunning machine



CALDE® MACHINE LADLE V
Vertical gunning device for hot or cold maintenance



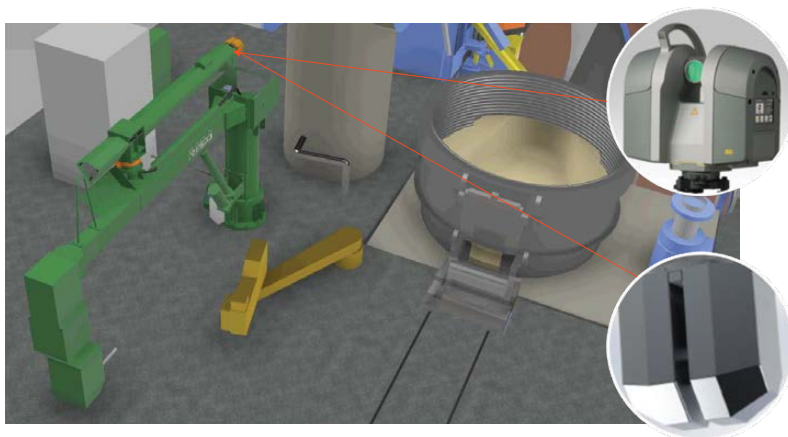
CALDE® MACHINE LADLE H
Horizontal gunning device for hot or cold maintenance

HOT MAINTENANCE PROGRAM FOR ELECTRIC ARC FURNACE

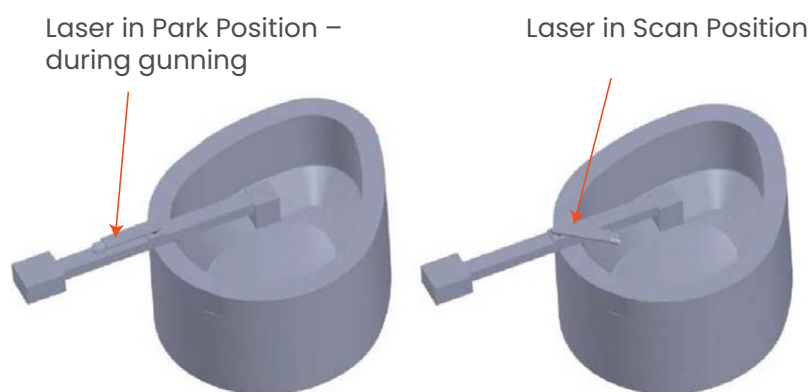
Gunning machine

Apart from pressure vessel gunning machine, Calderys offers EAF gunning manipulators & Shooter for EAFs.

- EAF gunning manipulator with laser scanner for residual refractory lining measurement.
- Gunning manipulator for highly efficient gunning repair of any part of the EAF.



Laser scanner arm at the Park position



CALDE EAF GUN MANIPULATOR

Fettling machine

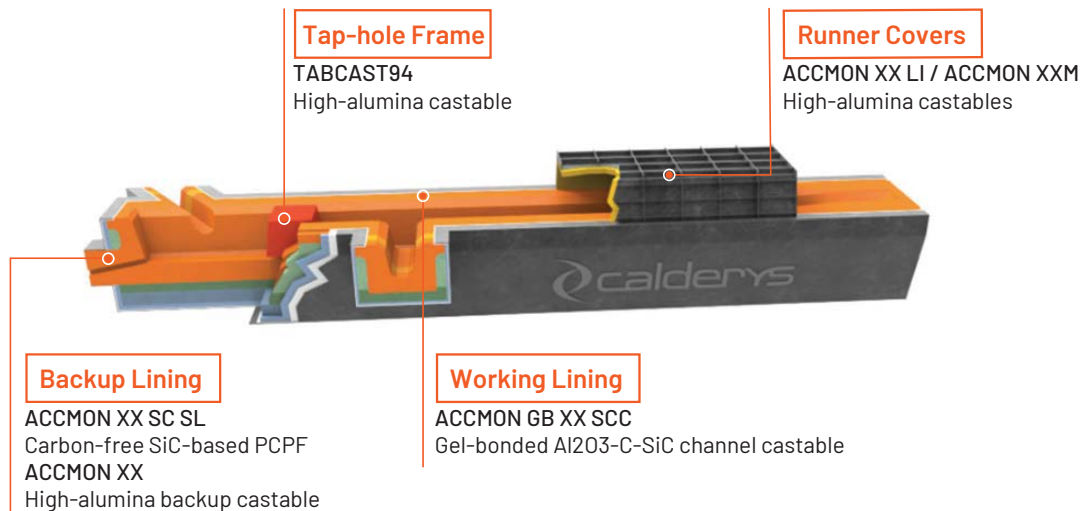
for EAF bank & bottom hot repair



CAST HOUSE SERVICES

Blast furnace runner management system

At Calderys, we understand that each section of your blast furnace runner system operates under unique thermal, mechanical, and chemical conditions. That's why we offer specialized castables and shapes for every zone – delivering superior service life, minimized downtime, maximum efficiency and improved safety to our customers.



Calderys delivers complete refractory packages — from design and supply to installation and maintenance — ensuring your blast furnace runs efficiently and reliably.

1. Working lining

- Gel-bonded Al₂O₃-C-SiC castables for runner working lining
Grade: ACCMON GB XX SCC
Features: High erosion resistance, non-wettability to molten metal
- High alumina castable for tap-hole frame
Grade: TABCAST94
Features: High refractoriness and mechanical strength

2. Backup lining

- Carbon-free SiC-based PCPF
Grade: ACCMON XX SC SL
Features: Excellent oxidation resistance, structural stability
- High-alumina backup castables
Grades: ACCMON XX
Features: Reliable cost competitive insulation and thermal shock resistance

3. Runner covers

- High-alumina castables
Grades: ACCMON XX LI, ACCMON XXM
Features: Resists thermal cycling and gas exposure

Why choose Calderys runner solutions?

- High performance in extreme conditions
- Extended campaign life, reduced downtime
- Customized solutions as per BF operating conditions with IIT-K research based regression analysis
- Backed by expert technical support & on-site service

INNOVATIONS

Driving performance, safety, and efficiency in blast furnace operations

- **Industry-first automated heating system for blast furnace troughs**

Pioneered the industry's first fully automated heating system, ensuring uniform preheating, reduced fuel consumption, and improved refractory performance.

- **Market leadership in ramming mass solutions**

Torch bearer in providing specialized ramming mass solutions for mini blast furnaces with single taphole operations, setting the benchmark for quality and consistency.

- **Conversion to pooling-type trough designs**

Expertise in transforming non-pooling troughs into pooling types to extend campaign life and lower the specific refractory cost per ton of hot metal.

- **Deployment of mechanized wrecking solutions**

Utilization of mechanized demolition equipment such as KT Grant, EX70, and Brokk to minimize man-machine interface, enhance safety, and reduce downtime during relining.

- **Dedicated on-site technical excellence**

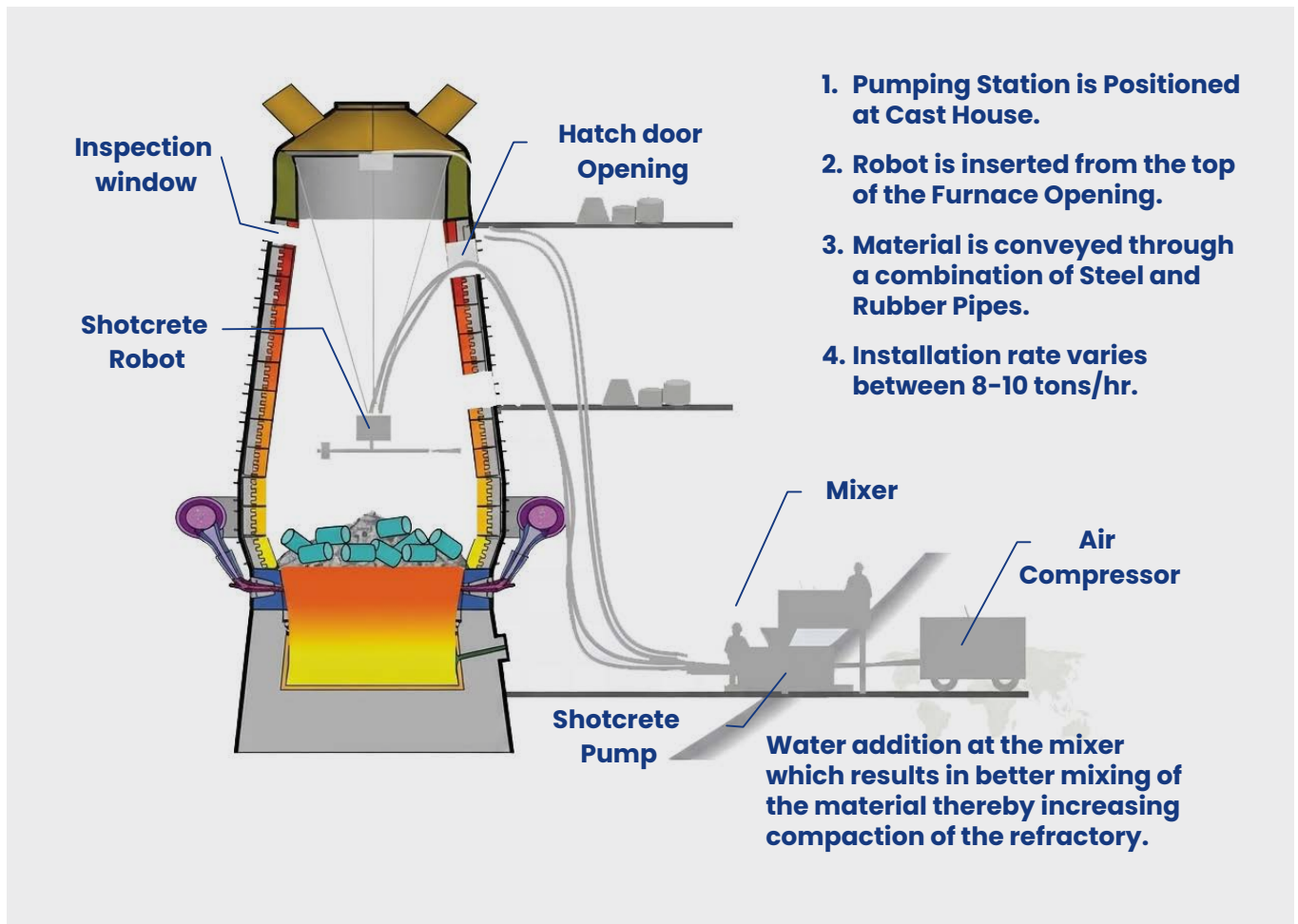
A team of highly skilled site engineers delivering customer-centric 24/7 technical support, ensuring quick response and consistent operational improvements.



Blast furnace shotcrete solutions:

Calderys brings over 160 years of global expertise in refractories and a proven track record across blast furnaces worldwide. With our versatile shotcrete product basket, dynamic application teams, and deep industry know-how, we deliver fast, reliable, and durable lining solutions tailored for the stack and hearth.

Shotcreting is more than just a repair method, it is a strategic solution to extend furnace campaign life, reduce downtime, minimize heat loss, and optimize burden distribution and fuel rates. Backed by Calderys' engineering excellence, customers can count on safe execution, consistent performance, and operational efficiency.



Our expertise:

With over 160 years of experience in refractory engineering, Calderys provides a complete shotcreting package:

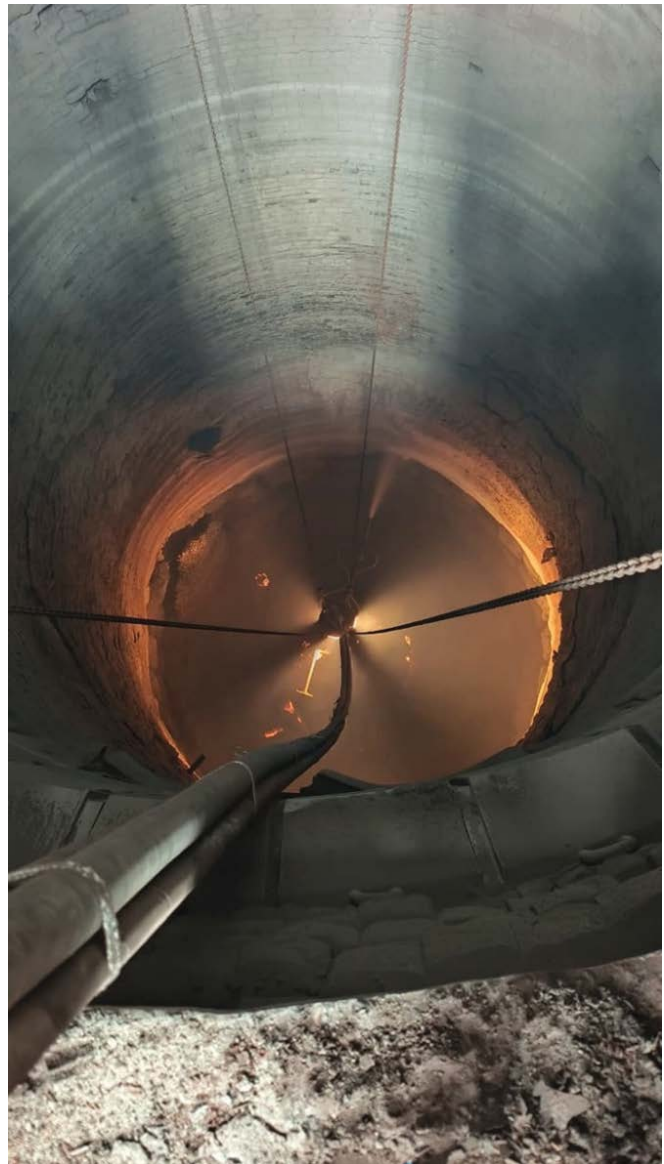
- Engineered shotcrete materials tailored for blast furnace stack and hearth
- Specialized robotic and manual spraying equipment
- Expert services from design to application and dry-out



Why shotcreting in blast furnaces?

Shotcreting is not just a fast repair method, it directly contributes to better furnace performance and operational efficiency:

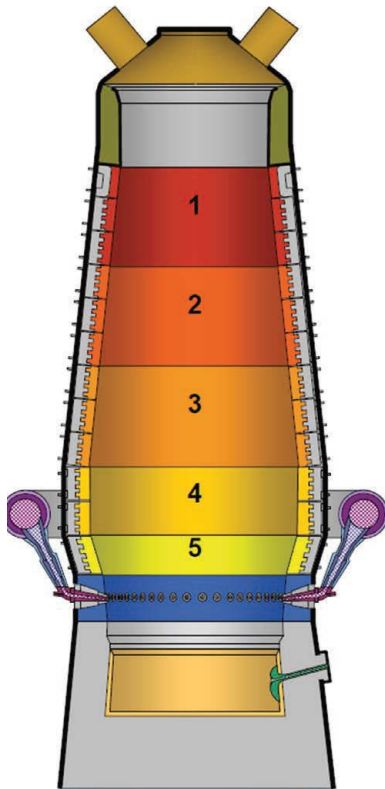
- **Quick repairs & longer life –**
Strengthens worn zones and extends campaign duration.
- **Lower rebound and wastage of materials** compared to traditional application processes.
- **Reduced downtime**
Faster application means higher furnace availability and productivity.
- **Superior thermal profile**
Dense, low-porosity linings minimize heat loss, ensuring energy efficiency.
- **Improved burden distribution**
Smooth, even inner surface enhances gas flow and burden descent, reducing channeling.
- **Optimized fuel rates**
Better insulation and thermal stability help lower coke and fuel consumption.
- **Safer operations**
The shotcrete repairs ensure the protection of the shell and cooling membranes which improves the operating conditions of the furnace.



Lining solutions

- **Single-lining solution** – One grade across bosh, belly, and stack for simplicity and consistency.
- **Zonal lining solution** – Optimized refractory selection for each critical zone.

Zone	Shotcrete product for Single-lining solution	Shotcrete product for Zonal lining solution	Advantage
Hearth	ACCSHOT BF HS2	ACCSHOT BF HS2	High SiC-carbon, excellent slag resistance, long service life
Tuyere band	ACCSHOT BF HS2	ACCSHOT BF HS2	High strength & conductivity, stable under severe thermal stress
Bosh	ACCSHOT BF S R	ACCSHOT BF 15 R ACCSHOT BF 7 R ACCSHOT BF 30 R	Resistance to alkali/slag penetration, stable heat transfer
Belly	ACCSHOT BF S R	ACCSHOT BF 15 R ACCSHOT BF 7 R ACCSHOT BF 30 R	Superior thermal shock resistance and mechanical stability
Lower stack	ACCSHOT BF S R	ACCSHOT BF 15 R ACCSHOT BF 7 R ACCSHOT BF 30 R	High abrasion resistance to descending burden
Middle stack	ACCSHOT BF S R	ACCSHOT BF S R	Balanced thermal conductivity and structural strength
Upper stack	ACCSHOT BF S R	ACCSHOT BF S R	Lightweight lining to reduce heat loss



Blast furnace zone	Single-lining solution	Zonal lining solution
1. Upper stack	ACCSHOT BF S R	ACCSHOT BF S R
2. Middle stack	ACCSHOT BF S R	ACCSHOT BF S R
3. Lower stack	ACCSHOT BF S R	ACCSHOT BF 30 R ACCSHOT BF 15 R ACCSHOT BF 7 R
4. Belly	ACCSHOT BF S R	ACCSHOT BF 30 R ACCSHOT BF 15 R ACCSHOT BF 7 R
5. Bosh	ACCSHOT BF S R	ACCSHOT BF 30 R ACCSHOT BF 15 R ACCSHOT BF 7 R

Why Calderys shotcrete solution?

Choosing Calderys means partnering with a trusted global leader in refractories, backed by decades of innovation and successful furnace campaigns. Our value lies not just in products, but in the confidence we bring to every project.

Proven global expertise

Successful shotcreting experience across various types and capacity of blast furnaces.

Versatile product basket

Wide range of shotcrete solutions engineered for different zones, operating conditions, and customer needs.

Dynamic & skilled teams

Trained applicators and supervisors who ensure safe, efficient, and reliable execution.

Deep industry know-how

Decades of understanding blast furnace operations and challenges, enabling customized refractory solutions.

Integrated offering

End-to-end support covering material selection, supply, application, and dry-out supervision.

Customer-centric approach

Long-term partnerships with leading steelmakers worldwide, built on trust and performance.

Environment friendly solutions

Calderys provides materials well suited to Indian conditions which ensures less choking and wastage.

TAP HOLE CLAY (THC)

RELIABLE SEALING.

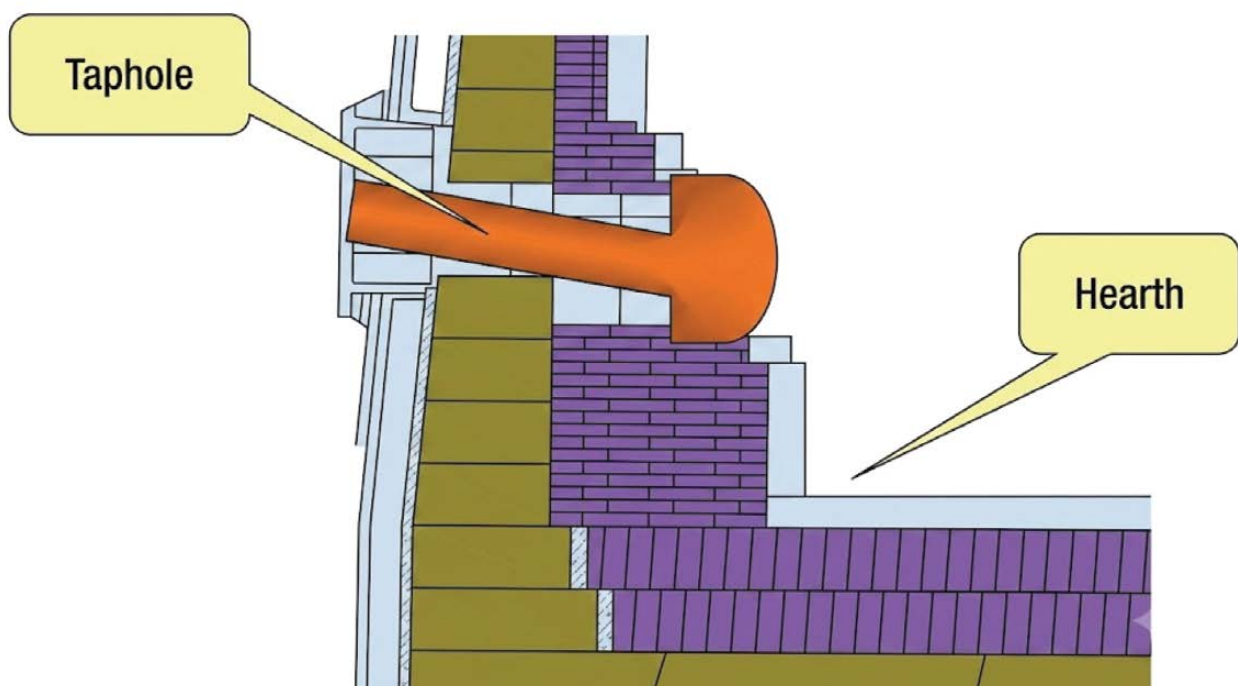
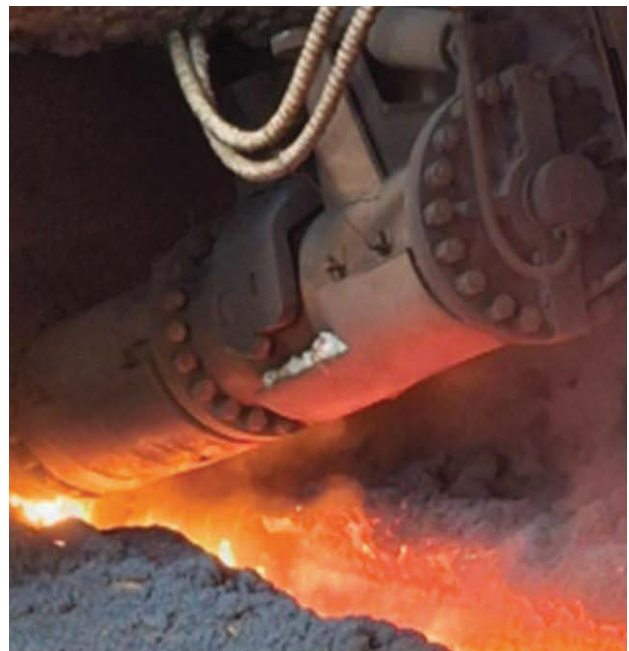
SMOOTH TAPPING.

ENHANCED PRODUCTIVITY.

Product overview

Tap Hole Clay is a high-performance refractory material specifically engineered for the efficient sealing and controlled opening of blast furnace tap holes. Designed to endure extreme temperatures and high-pressure conditions, it ensures safe, reliable, and consistent tapping of molten metal and slag.

Calderys Tap Hole Clay is formulated using premium raw materials and cutting-edge manufacturing techniques. This ensures superior quality and consistent performance across a wide range of blast furnace operations, meeting the demanding requirements of modern ironmaking processes.



Key features

- **High plasticity & workability**
Ensures easy application and smooth ramming.
- **Excellent thermal resistance**
Performs reliably under extreme heat and pressure.
- **Controlled opening & closing**
Enables precise tapping operations, improving safety and efficiency.
- **Optimized setting time**
Balances working time and hardening for operational flexibility.
- **Custom formulations**
Tailored grades available based on furnace size, tapping cycle, and customer needs.

Applications

- **Blast furnaces**
For sealing and reopening the tap hole during iron making.
- **Mini blast furnaces (MBF)**
Suitable for smaller scale operations requiring high consistency.
- **Integrated steel plants**
Ensures reliable and long tap-hole service life with fewer interruptions.
- **Custom solutions**
Can be adapted for specific metallurgical conditions and equipment.

Product range

We offer various grades of THC tailored to:

- Furnace size (Mini to Jumbo BF BF)
- Tap-to-tap time
- Clay gun pressure compatibility
- Both successive and alternate casting (Short to long GUTKO)

Advantages to customers

- Enhanced furnace availability
- Reduced maintenance downtime
- Improved tapping consistency
- Lower total cost of operation







www.calderys.com

