



# Mastering Molten Metal

Pioneering Refractory Engineering

[www.capital-refractories.com](http://www.capital-refractories.com)



# Foreword

**A warm welcome to Capital Refractories, I trust this brochure will provide you with a clear insight into our many products and services.**

These are exciting times for Capital, I am very proud of what we have achieved over the last 30 years. During this time, we have grown from a single site supplier of refractory linings for the steel foundry industry to a large, global supplier of both refractory and ceramic materials for most molten metal applications.

**We have a growing portfolio of technical ceramics which includes:**

- Ceramic cores for the aerospace and IGT industry
- One shot and multi-use crucibles for investment casting
- Flow control nozzles for the steel, foundry and atomizing industries

Our operations have grown on a global scale with 300 staff at 9 sites and with customer support directly or indirectly in over 40 countries.

Capital has a strong reputation for developing new products and services. We invest over 10 per cent of profits back into R&D resulting in over 30% of current sales being products developed in just the last four years.

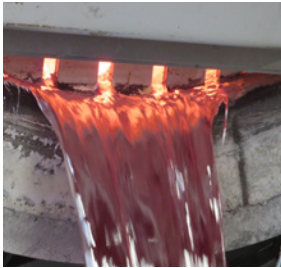
**Our latest innovations include:**

- Engineered tortuosity molten metal filters
- Rotary slide gate (no stopper) for multiple openings with ladles ranging from a few kg to 25t+ capacity
- Speed-Line precast blocks for quick turnaround in aluminium rotary furnaces

I am particularly proud of our staff who I strongly believe are our best asset.







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They are experts in their fields and provide a vast amount of experience. Based around the globe, they are always on hand to find the very best solutions for our customers.

We focus on building long-term customer relations, much of our product development is in collaboration with our customers and we strive to provide a personal approach.

After looking through the brochure, if you need further assistance in understanding Capital's products and services, please do contact one of our team of experts. We have a wide range of brochures for specific application areas, please ask for more information.

**I hope you find this an interesting read!**

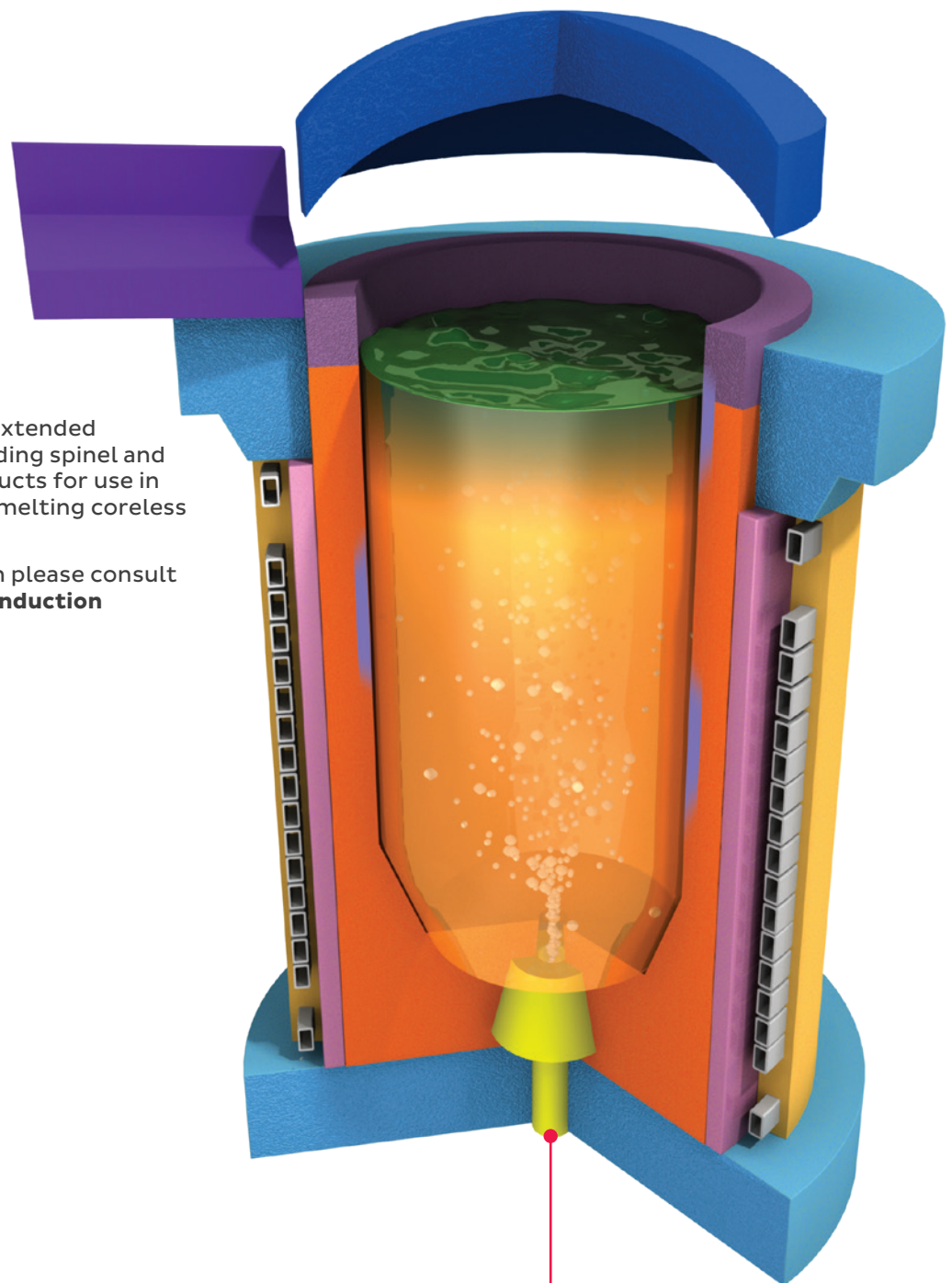


James Newsome  
**Managing Director**  
**Capital Refractories Ltd**

# Coreless Induction Furnace Air and Vacuum Melting

We manufacture an extended range of linings including spinel and mullite forming products for use in both air and vacuum melting coreless induction furnaces.

For more information please consult our **Refractories for Induction Furnaces** brochure.



Gas Diffuser

## Dry vibration linings and plastic/toppings

PRODUCT	CHEMICAL ANALYSIS / %			DESCRIPTION	SUITABLE FOR ALLOYS OF:			
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	MgO		Steel	Iron	Copp	Alu
Coral GR Series	89.3	0.1	9.9	High duty linings with a wide temperature range	●			
Coral NG Series	84.7	0.1	14.6	High performance linings with enhanced erosion resistance	●			
Coral TL Series	87.2	0.1	12.1	High duty linings for large furnaces and thermal stress	●			
Coral SP Series	84.6	0.2	14.3	Designed for use in induction furnaces for steel plants	●			
Coral CXL	85.4	0.2	13.5	General purpose lining with a wide temperature range	●		●	
Coral HB	84.9	0.5	13.2	Hard wearing lining for a variety of steel alloys	●			
Coral SXL	86.2	0.2	13	High duty lining for elevated temperatures	●			
Coral Vac	85.7	0.2	13.7	High temperature and vacuum melting applications	●			
Coral SMC	89.4	0.2	7.5	Chrome containing lining for enhanced slag resistance	●			
Coral 85	86.2	0.1	13.1	High duty lining for elevated temperatures and large furnaces	●			
Cormag 90	9.7	1.5	86	Basic Lining for continuous melting	●		●	
CRL75	74	23	-	Mullite forming lining for iron and mixed melting	●	●		
CRL80B	84.3	11.9	-	High duty mullite forming lining	●	●		
CRL65	68	29	-	Mullite forming lining with excellent thermal shock resistance		●		
C65LS	59	36	-	Mullite forming lining with non-wetting additives				●
Corvibe 90	90.7	3.2	-	High duty lining for aluminium alloys				●
Silica (all grades)	0.6	98.5	-	Quartzite lining materials		●		
WS90 Rammable	92	1.7	-	High duty phosphate bonded alumina ramming	●	●		
Almacap	74	17	-	Air setting high alumina ramming	●	●		
Capram 70	67.9	25	-	Phosphate bonded mullite plastic	●	●	●	
Toppatch	73	17	-	Air setting high alumina ramming	●	●		
Coral Cap	78	0.3	15.7	High Duty Spinel forming dry topping	●	●	●	●
Coral V40DT	36	2.2	56	Magnesia rich spinel forming topping for use with Coral V40				
CRL BDT	70.9	23.7	-	Mullite forming topping for use with CRL65 and CRL75		●		
Silkote 90	92.1	0.3	-	High purity alumina screed				
Capscreed	90.8	3.1	-	General purpose alumina screed				
D10 Plaster	77	12.5	-	High alumina repair plastic	●	●		
D10F	77	12.5	-	High alumina repair plastic	●	●		
D11	92	3	-	High purity alumina repair plastic	●			
Capram 90F	89.3	4.9	-	High purity alumina repair plastic	●			
Silcast 1600CM	61.6	32.1	-	General purpose high alumina castable				
Silcast 65	64.7	29	-	High strength mullite castable				
Mica				Various high grade mica sheets				



# Two Piece Bottom Pour Ladle Nozzle System

Capital supplies nozzle systems that can improve the bottom pouring of ladles, increasing casting quality, reducing costs and providing faster turnaround of ladles.

Our Unibore brochure provides a detailed overview of the patented Unibore\* system, and how it can be incorporated into your existing works.

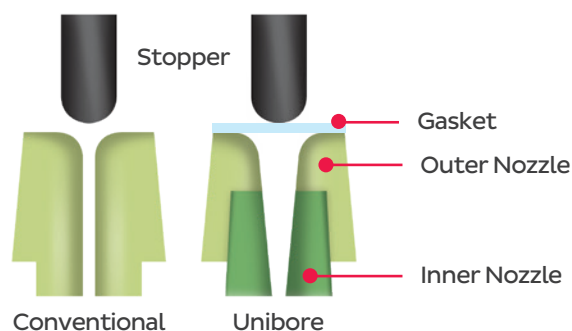
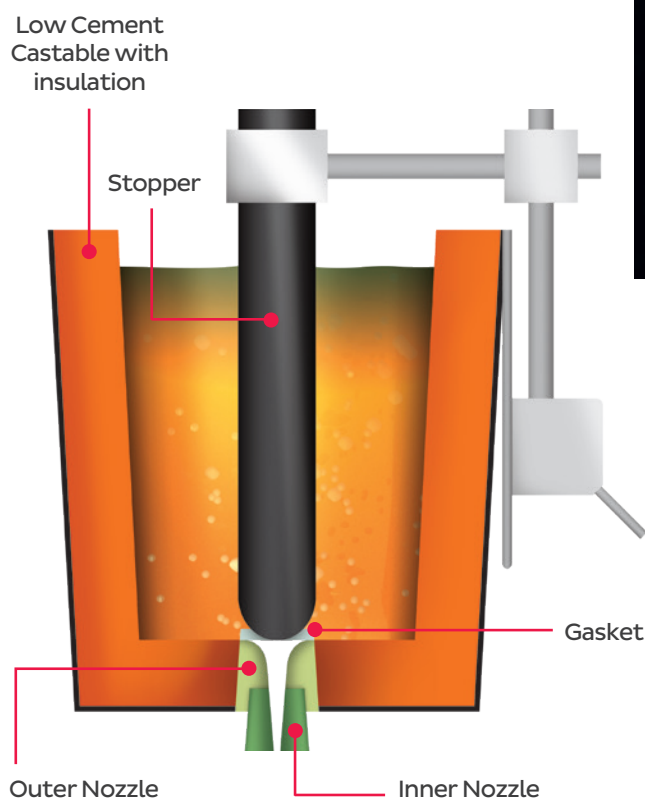
Standard RT Nozzles – available with bore sizes of 25mm, 29mm, 32mm, 38mm, 44mm, 51mm, 57mm, 64mm, 76mm – boxes of 8.

Unibore 40mm Series

Unibore 45mm Series

Unibore 65mm Series

Unibore 100mm Series



# Rotary Control Nozzles

**This manually operated system is quite different from the standard sliding gate systems that are on the market today.**

What is quite unique is that the rotating faces are on the upper extent of the inner rotating nozzle.

This helps mitigate freezing problems.

There are also many other advantages of using this system. It can incorporate a bandless set of plates, that are a consumable, while in use. It also includes a safety ring that protects from plate leaks.

The process is also very robust and has been rigorously tested by more than 3,000 heats without a gate failure. This means without the total destruction of the gate, and therefore no requirement for a new gate to be installed.

Whatever your requirements, our rotating nozzle system is available to apply to ladles with a capacity of 80 tonnes down to the smallest gate system of 150kg.

## Potential markets

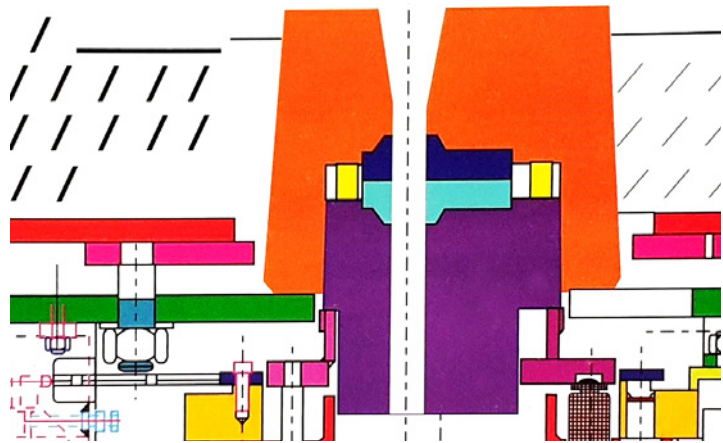
Our robust rotating nozzle system works on the principle of a sliding gate but without compromising the potential of using it in foundries.

Sliding gates are mainly used in steel mill scenarios, ie: continuous casting, mini-mills and traditional foundries which concentrate mainly on sleeve and stopper tip with nozzle configuration. These are usually only used once on large ladles.

This system works on the principle of an upper extent rotating nozzle that is protected by a unique safety ring. The constant pressure ensures metal doesn't surpass the plates and is provided by a unique gas cassette application. A big advantage is that it is very easy to maintain without a tool kit.

Looking ahead, developments are progressing to make the system usable on very small applications.

**Our unique rotating nozzle system has an upper extent nozzle system**



**Key to above graphic:**

**Colour code:**

Red: Outer nozzle

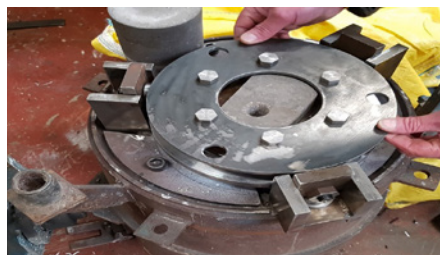
Dark blue/light blue: Consumable plates

Yellow: Unique safety

Purple: Inner Rotary Nozzle

## Markets

Steel or iron foundries that use static or automated casting lines. The system can be used on a variety of ladle sizes from 80 tonnes down to 150kg. There is also potential usage in aerospace applications.



**Small application**



**Standard application**

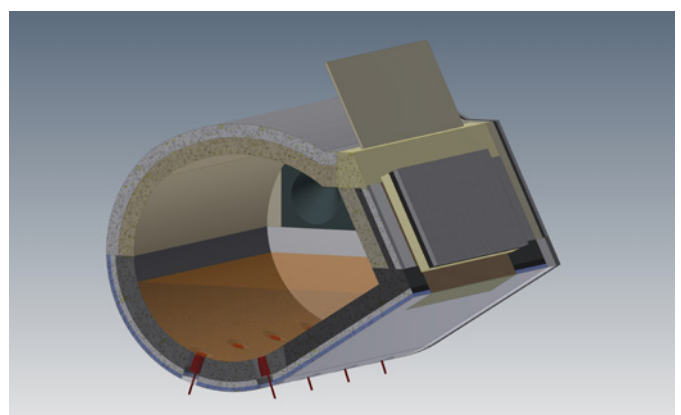
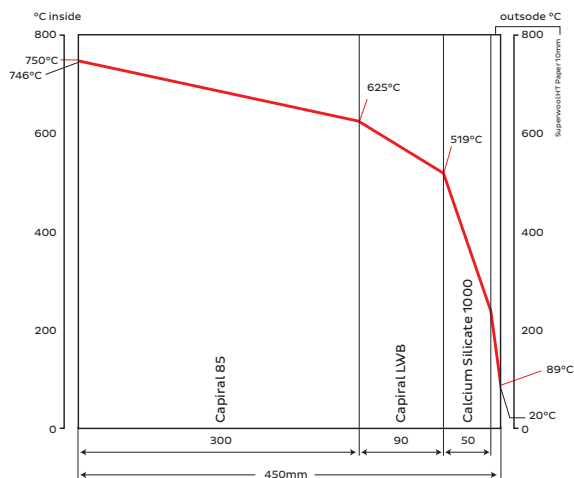
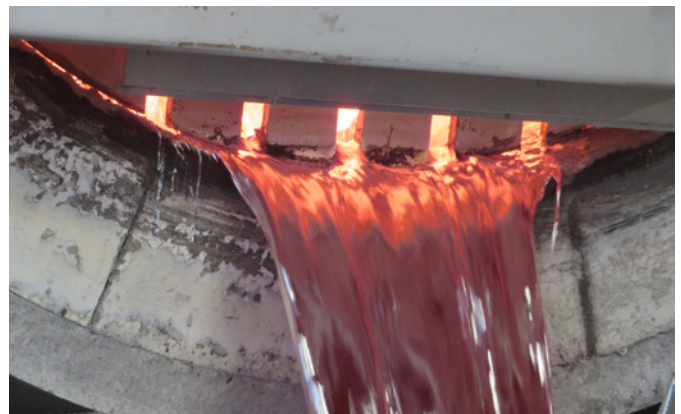
# Refractory Solutions for Aluminium

**Capital Refractories Ltd provides a range of refractory solutions for the aluminium industry.**

Our solutions include a comprehensive range of monolithic and shaped products and we offer both design and installation services.

Capital provide both traditional and innovative bespoke services, whatever is required.

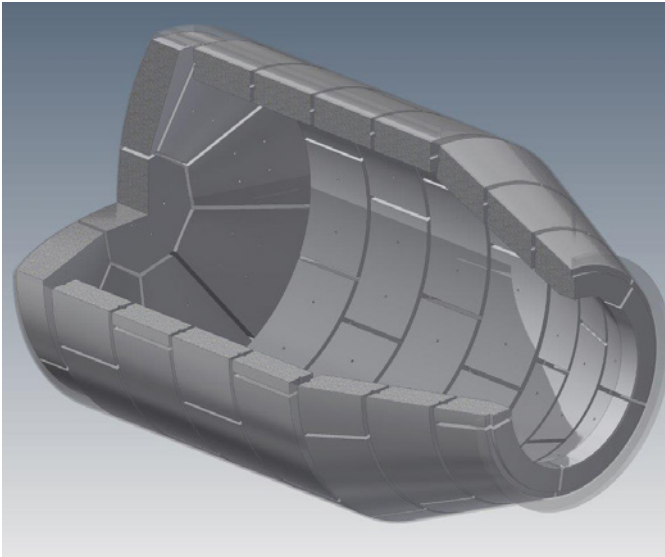
These pages give a brief overview, please consult our **Refractory Solutions for Aluminium** brochure for more information.



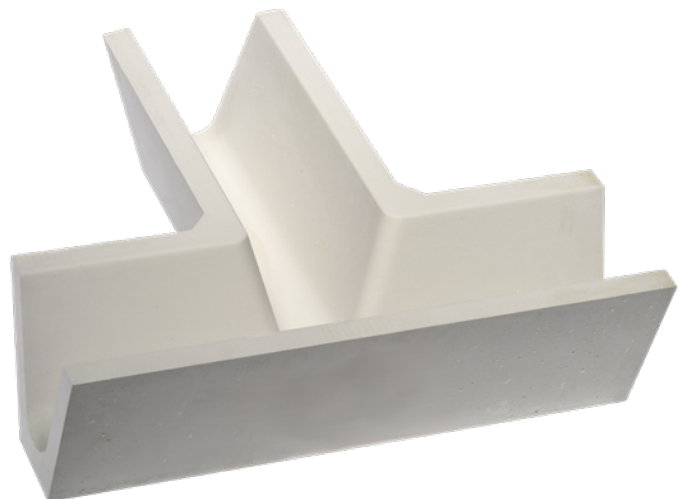
**Refractory design and installation for all types of aluminium furnaces**



**Monolithic and Speed-Line innovative big block designs for tilting rotary furnaces**



**Left. gas diffusers for melting and holding furnaces**



**Above, high quality precast shapes for metal transfer and control**



**Amourcast high fracture toughness composite shapes for skimmers and stirring booms, door surrounds and nose ring blocks**

# Gas Diffusers Metal Treatment Solutions

**Capital Refractories produce directional and permeable gas diffusers for:**

- Induction furnaces
- Reverberatory furnaces
- Ladles (foundry and steel plant)
- Launderers

Benefits of gas diffusers include reduction in scrap rate due to porosity and inclusions,

reduced rework and rectification and more uniform distribution of alloying elements and de-oxidants.

For more information please consult our **Gas Diffuser** brochure, this can be obtained from our country distributors or from our head office.





## Crucibles Air and Vacuum Melting

**Capital Refractories sro, a wholly owned subsidiary is a purpose-built facility in the Czech Republic for the manufacture of isostatically pressed and vibrocast crucibles.**

Capital sro has established itself as a quality manufacturer of crucibles to the investment casting and precious metals industry as well as a principal supplier of precast products to the vacuum precision melting industry.

We also offer numerous ancillary products and materials used within the investment foundry industry.

For more detailed information please consult our Crucibles brochure, this can be obtained from our country distributors or from our head office.







CAPITAL INJECTION  
CERAMICS

# Capital Injection Ceramics

**Capital Injection Ceramics (CIC), a division of the Capital Refractories Group, specialises in the manufacture of injected ceramic cores used in the IGT, aerospace, medical, hardware and automotive industries.**

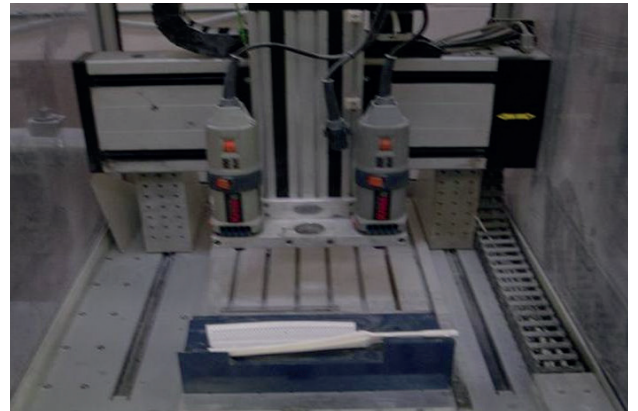
CIC has an established and proven range of core bodies. These are suitable for use for casting by Equiax, Directional Solidification and Single Crystal processes and can be used when casting in nickel, chrome and cobalt based stainless steels, high temperature steels, and aluminium.

Some of the enhancements CIC can provide to the cores produced include coating of the core to reduce/eliminate core/metal reactions, these include cobalt, zircon and alumina. Strengthening of the core is another process that can be provided, if required, by use of a range of resins.

CIC has proven its capability by successfully producing some of the largest and most complex blades and vanes for aerospace and IGT customers with over 400 tools developed for production. Customers such as the PCC Group, Doncasters Group, CPP Group (formally ESCO) and Mitsubishi.

CIC is certified to AS9100, the highly respected aerospace quality management standard. CIC has been manufacturing cores that are included in the following programmes: Boeing 787 Dreamliner, Rolls Royce Viper, Trent and Pratt & Whitney PW305 programme. More than 90% of CIC's work is for Siemens, GE, Alstom, Pratt & Whitney & Rolls Royce engine programmes

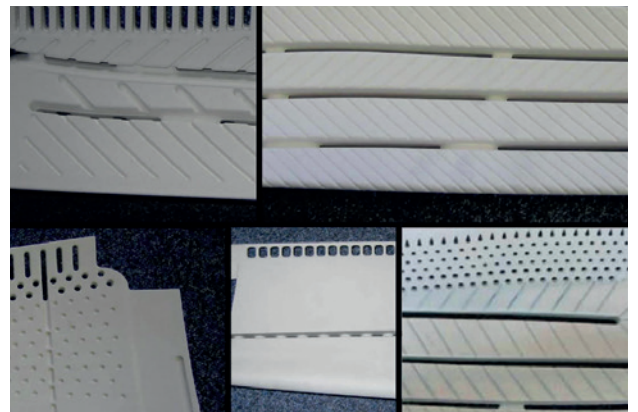
For more detailed information please consult our **Capital Injection Ceramics** brochure, this can be obtained from our country distributors or from our head office.



CNC finishing



CNC finishing



Examples of cores produced

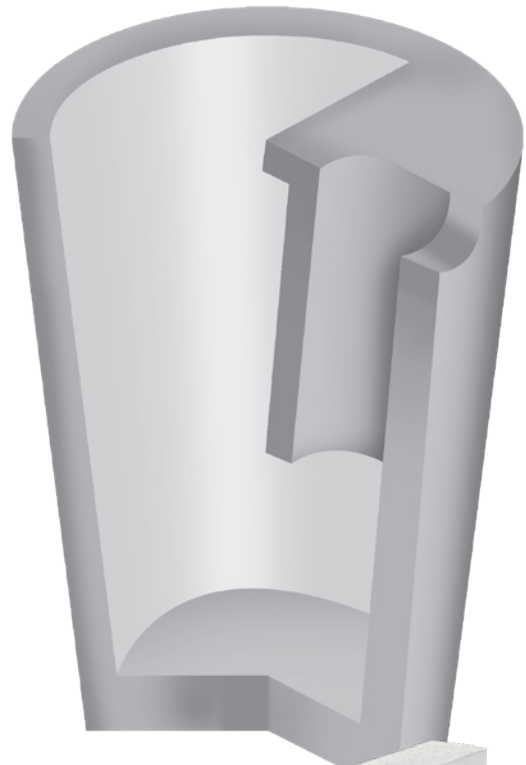


IGT engine

## Shapes for Superalloys and Investment Casting

**Capital Refractories has established itself as a quality manufacturer of special precast shapes.**

We can provide a range of products to suit your needs, such as tundish and launder sections. For more information please refer to our specialised precast shapes brochure, or consult a Capital expert.





## Filters



**Capital is pleased to introduce its latest offering to the molten metal industry – MetCon G (patent pending) – a unique carbon filter/flow control device designed for use with steel and heavy iron.**

MetCon G filters are made from a specially formulated carbon bonded ceramic, the carbon bond gives superior hot strength and thermal shock resistance.

The filters are suitable for carbon steel with a carbon content greater than 0.15%, manganese steels and low alloy steels. They are also excellent for the filtration and flow control of heavy iron castings such as ductile iron windmill hubs.

**Other benefits of the MetCon G filter system include:**

- Effective in filtering out slag and other non-metallic inclusions
- Efficient at reducing turbulence in the molten metal stream
- The design of the filter provides a tortuous pathway throughout
- Engineered to provide consistency in design
- The filters can be produced to give the optimal porosity for any metal or alloy

For more detailed information please consult our **MetCon G** brochure, obtained from our country distributors or from our head office.



# Refractory Services

Capital provide the very best in refractory design and installation for a number of applications including:

- Tilt Rotary Furnaces
- Melting and holding aluminium furnaces
- Tower melters
- Incinerators
- Cremators
- Inspection services, installation supervision
- Precast

Refractory services, as part of the Capital Refractories Ltd group, is here to offer solutions for all refractory installations. From small repairs to full turnkey installations. No job is too big or small.

Capital Refractories has been manufacturing and supplying high quality refractories to metal melting and other heat process industries for nearly 70 years.

Our team of experts can offer guidance regarding your requirements, whatever the installation. For example, we can work with castable and brick, holding, rotary furnaces and nose ring blocks.

For more information, please consult our **Refractory Services** brochure which can be obtained from our country distributors or from our head office.

**Pictured below, an example of work our refractory services team have completed**



# Foundry Nozzles

**Foundry Nozzles are available in a range of Alumina grade material qualities to suit casting requirements. Our nozzles are made from high purity raw virgin materials with no added Grog.**

A combination of excellent cosmetic appearance and dimensional accuracy promotes stable casting conditions. All our nozzles are available in a wide variety of bore sizes and are widely used in bottom pour ladle applications, where flow control is of paramount importance. Our efficient manufacturing techniques enable short reliable lead times.

- Dimensionally accurate
- Large material catalogue to suit all requirements (please ask for details on alternative materials)
- Lean manufacturing provide provides our customers with short and reliable lead times

## Foundry Nozzle Product Range:

### Pm600

- High thermal shock resistant
- Economic material, to suit most low tempcast

### Pm700

- Providing extra erosion resistance while still remaining economically priced

### Pm850

- Superior erosion resistance

## AtomiZIR, Zirconia and Zircon Atomising Nozzles for Powder Metallurgy

Capital produce a wide range of atomising nozzles in a range of Zirconia and Zircon materials. These are suitable for use with a wide range of alloys including aluminium, lead, iron, steel and super alloys.

Our nozzles comprise high dimensional accuracy, erosion resistance and controlled porosity.

Additions of calcium, magnesium and rare earth oxides are used in zirconia compositions as



stabilising agents to enhance thermal shock resistance.

Composite nozzles are also available which combine a erosion resistant insert, with a chemically bonded high alumina or zircon outer.

## Advantages of the AtomiZIR Nozzle

- Stable flow characteristics achieved through close dimensional control and erosion resistance
- Suitable for both water and gas atomisation of ferrous and non-ferrous metals.
- Excellent erosion resistance combined with reduction of cracking from thermal shock.
- Can be used in a variety of casting environments.
- Available in a wide range of shapes and sizes to suit all atomising requirements.



## Auxillary Products

Capital Refractories provide auxiliary products for use in the foundry, steel plant and associated hot process industries such as: mica slip plane, fibre, blanket and paper, thermocouples and lances, holloware, pour cups, scorifiers and installation equipment.

For more detailed information please consult our **Auxillary Products** brochure, this can be obtained from our country distributors or from our head office.





## Contact Details

For supply and additional information about Capital Refractories, or if your country is not listed, please contact Capital's UK Head Office, see back of brochure for details.

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Del Sol Services  
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#### **USA— Other States**

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