FSE FOUNDRY

WHY FSE FOUNDRY?

Cast Metal Products...

...**Experience, Expertise, Flexibility** and traditional **Service** second-to-none.

FSE Foundry has over 80 years experience in ferrous and non-ferrous casting and has an intimate knowledge of many different industries and sector specialities in the UK and abroad. Whatever your casting requirement we can impart our experience to directly benefit your business cost and efficiency.

FSE Foundry has extensively dealt with architects, product designers and even sculptors for casting projects, mechanical components and machines around the world. The expertise on offer ranges widely from English Heritage to turnkey rail-safety infrastructure and from beautiful artforms to quality-critical electrical supply equipment.

Quality, quantity and budget needs are satisfied as a result of our ability to be totally flexible in our approach to mould production. Whether you require 'one-off', semi-mechanised quantities, castings less than 1 kilo or up to 400, it can be done at FSE Foundry.

Metals available range from cast and spheroidal graphitic (SG) Iron, through a range of castable aluminium to the common copper-based alloys and the more unusual high-conductivity pure copper and its alloys.

FSE Foundry employees have a wealth of experience of casting processes and will propose the most suitable and cost effective method to meet your individual needs and requirements.

FSE Foundry provides a complete cast metal service, from CAD drawing interpretation, pattern design and production, to metallurgical recommendation, casting, heat treatment and finishing, all under one roof, based at our factory near Stansted Airport in the UK.

We Guarantee to:

- Provide a quick response to enquiries
- Propose the most appropriate casting processes to meet customer requirements
- Provide a quality casting delivered on time and at a truly competitive price
- Continuously improve in order to maintain the highest possible quality and service

HISTORY

Enfield Foundry (established 1932) and Finch Seaman (established 1948) merged to form FSE Foundry in 2001. Not only did this bring together two foundries with years of experience, but it also expanded capacity to meet customer needs for speciality materials and methods.

Located in Braintree, Essex, near Stansted Airport, it is one of the best known suppliers of short run and prototype Iron and non-ferrous castings in the South of England. Its strategic location and experience in producing specialist copper alloys enable FSE Foundry to supply throughout the UK and internationally.

FSE Foundry is part of FSE Group Ltd which also owns AATi Ltd (Antislip Antiwear Treads International), designer and manufacturer of the best-in-class cast-metal pedestrian safety surfaces widely used by the rail industry and high footfall and prestigious commercial sectors.

Moulding techniques

Proposal of the optimum manufacturing techniques requires a range of casting processes:

Self-set floor

The solid sand structure of air-set sand moulds allows small to large intricate castings to be moulded. This method also keeps sand use to a minimum and the majority of it can be reclaimed without compromising quality, thus creating further savings for the customers.

Block carousel

To increase productivity we have the facilities to batch produce multiple or single pattern 'boxless' pattern jobs. Two mould handling carousels satisfy demands for economy due to their high moulding productivity and sizes of patterns which can reach up to 2000mm in length and 1000mm in width.

Moulding techniques

High definition 'Petrobond'

High definition sand mouldings are traditionally hand-moulded using 'Petrobond', clay-bonded natural sand to give an exceptional surface finish when required. This technique is mainly used when producing castings of near-net-shape, vacuum former moulds and low cost mould tools. Even the detail of a fingerprint would be visible when cast, so this method requires traditional skill in production and is mainly used for limited-run or one-off castings.

Green sand floor mould

The hand rammed 'greensand' moulding process was the most widely used method of moulding and is now largely superceded by self-set sand systems. At FSE we can still use these techniques if required due to the experience of moulders available. The main reason for choice of this process would be to utilise existing patterns which do not justify new pattern investment.

The green sand moulding process is usually used for smaller castings in both Aluminium and Copper based metals. Fine sand and clay are used, giving versatility and producing castings with excellent surface finish. 95% of the sand can be reclaimed, thus allowing a relatively low cost production technique.

Ferrous metals

Grey Cast Iron

GREY IRON : to BS 1452 1990				
Grade	Tensile Strength		Typical Hardness HB	BS 1452: 1961 (Equivalent)
	N/mm²	Tonnes/in²		
150	150	10	140 - 200	10
180	180	12	150 - 200	12
220	220	14	160 - 210	14
250	250	17	170 - 240	17
300	300	20	190 - 270	20
350	350	23	200 - 280	23

Metallurgical control of constituent elements allows the production of a range of traditional Cast Irons which exibit good vibration absortion and mechanical properties especially in compression. Machine beds up to 400kgs in weight are regularly produced, pump and valve bodies, and components for a wide range of automotive, marine, artistic and infrastructure applications.

Case Study – Drainage and building product assemblies

FSE Foundry supplies patterns and finished assemblies for bespoke and proprietry drainage products in Grey Iron, SG Iron and non ferrous alloys in accordance with building regulations and to customer specifications.

Ferrous metals

- Raven Row Art Gallery

Ductile Iron (SG)

DUCTILE IRON (S.G.) : to BS 2789 1985					
Grade	Tensile Strength		Typical Hardness HB	BS 2789: 1985 (Equivalent)	Elongation %
	N/mm²	Tonnes/in²			
400/18	400	25.9	<179	SG 24/17	18
420/12	420	27.2	<212	SG 27/12	12
500/7	500	32.4	170 - 241	SG 32/7	7
600/3	600	38.9	192 - 269	-	3
700/2	700	45.3	229 - 302	SG 42/2	2

Spheroidal graphitic (SG) Irons are produced by modifiying the structure of the carbon within the metallurgical structure of the basic Grey Cast Iron just before the casting process takes place. The effect on the mechanical characteristics is fundamental, producing a ductile rather than a brittle Cast Iron. SG Irons have commonly substituted for steel castings or fabricated components due to their excellent ductility, castablity and weldability.

Case Study – Selhurst Railway Station

FSE foundry is well known for its ability to produce bespoke castings to match original Listed Building features. Selhurst station has undergone a refurbishment on behalf of Network Rail and the Train Operating Company.The platform was first built in 1862 using Victorian designed iron columns to support the roof over the platform. FSE Foundry supplied SG Iron columns and brackets to the original to extend the platform roof.

Ferrous metals

Alloy Cast Irons

High Nickel, Chromium and other alloyed Specialist Irons can be used for castings that require resistance to severe abrasion, corrosion and the effect of high or cycling temperatures and impact resistance.

As an example High Si Mo Irons exhibit high temperature creep and stress rupture strengths. They are specified for numerous automotive manifolds and turbocharger castings.

Ni Hard Irons offer Brinell hardness figures in excess of 450. They are used in applications where abrasion resistance is required such as dredging, quarrying, concrete and asphalt production.

Non-Ferrous metals

Aluminium Alloys

Aluminum Alloys : to BS 1490			
Grade	Tensile Strength N/mm²	Typical Hardness HB	Elongation %
LM0	80	25	30
LM4 M	140	65 - 80	2
LM4 TF	230	90 - 120	-
LM6	160	50 - 55	5
LM25 M	130	55 - 65	2
LM25 TB7	160	65 - 75	2.5
LM25 TF	230	90 - 110	-

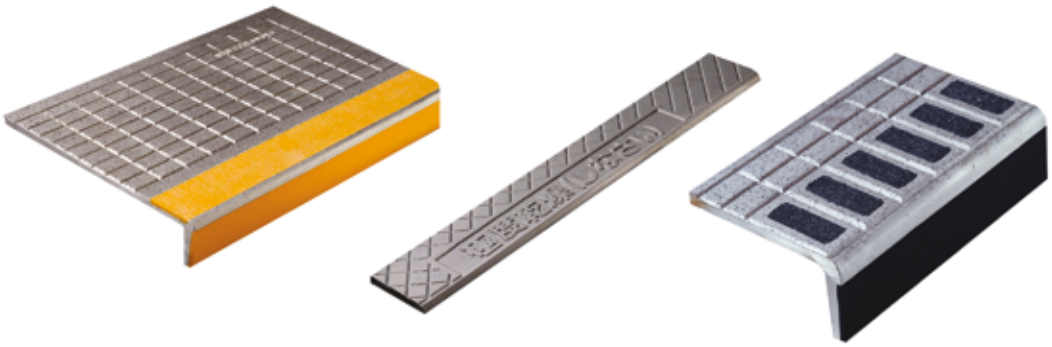
Cast Si, Mg, and Cu alloyed aluminium alloys exhibit great mechanical and corrosive resistance properties and can be used for a varied range of applications offering a light weight alternative to Copper alloys and ferrous materials.

The Copper based and Silicon based alloys LM4 and LM6 show great casting characteristics and are suitable for most general engineering purposes from intricate thin walled castings to large castings. Both have good resistance to corrosion and when subject to solution treatment and ageing, high strength and ductility can be achieved.

The magnesium based alloy LM25 finds application in most industries, from food to road transport vehicles and in practice is the general purpose high strength casting alloy, especially due to it's availability in four conditions of heat treatment.

Case Study – AATi

AATi Ltd are part of the FSE Group, manufacturing and fabricating antislip antiwear treads for the high-footfall public stairway environment such as Railway stations and Metros. FSE Foundry plays a key role in the casting and manufacture of the treads, not only in Aluminium alloys, but also Iron and Copper-based alloys. These stairway products are made and finished in-house to a registered design specified by London Underground, Network Rail and comply with European and USA Building Regulations including DDA (Disability Discrimination Act) requirements for social inclusion in the public environment.



Copper Based Alloys

Castable Copper-based alloys are very versatile to the engineering designer and offer a number of benefits over other metals. Good corrosion resistance being noble in the comparative electrochemical series, coupled with bio-fouling resistance, mean that the application range can vary from plumbing fixtures, impellers, propellers and pumps to bearings, valves and building products such as the AATi stair nosing treads.

Copper Base Alloys : to BS 1400					
Grade	Type	Tensile Strength N/mm²	0.2% Proof N/mm²	Typical Hardness HB	Elongation %
Aluminium Bronze	AB1	550	200	130	18
Aluminium Bronze	AB2	650	280	150	12
Gunmetal	G1	270	130	85	16
Gunmetal	LG2	230	110	65	10
Gunmetal	LG4	240	130	70	12
Phosphor Bronze	PB1	270	170	80	10
Leaded Phosphor Bronze	LPB1	190	80	70	3
Lead Bronze	LB2	220	110	65	5
Silicon Brass	SCB3	180	70	45	12
High Tensile Brass	HTB1	480	200	110	18

Case study – Cambridge Library

Working alongside a renowned sculptor, Harry Gray, FSE helped produce a memorable set of stacked books acting as parking bollards in Gunmetal now situated in front of Cambridge University Library remodelled in 2006. After casting the 'bookstacks' to the sculptor's requirements FSE Foundry designed and fabricated an intricate bearing system allowing some parts of the heavy stacks to rotate to the designer's requirements.

At FSE foundry we are proud to be able and willing to go beyond normal casting requirements. Our skilled and multi-disciplinary workforce from diverse casting and engineering backgrounds can often facilitate not only your casting needs but a fully finished and working product.

Pure Copper and its close Alloys

Copper Alloys:					
Type	Alloy Grade	Conductivity % IACS	0.2% Proof N/mm²	Typical Hardness HB	Elongation %
High Conductivity Copper	HCC1	93	40	40	25
Chrome Copper	CC1 TF	90	230	95	15
Nickel Silicon Chrome Copper	CNS-CR	43	400	200	6

FSE Foundry has specialised in sand castings for resistance welding and electrical switchgear for over 50 years. This experience and expertise within the industry means we can produce high purity castings for transformers, busbar terminations, catenary parts, switchgear and high heat-transfer parts.

Close control of the casting and heat treatment variables ensure that the demanding conductivity and mechanical properties are achieved often to over 98% IACS for HCC1 and 90% for CC1. The incorporation of often-complex water-cooling tubes within the casting is also a speciality using Nickel and Nimonic alloy prefabricated tubes.

Equipment

Pattern making and Rapid Prototyping

FSE Foundry has in-house pattern making and CAD design facilities. We produce prototype wooden and resin equipment (often using rapid prototyping) and first-off castings usually within several weeks from receipt of order. We regularly reproduce castings using a sample casting where the original patterns are not available, saving cost and reducing leadtimes. Our pattern makers and network of subcontractors have extensive experience with the Company and have a wealth of knowledge adhering to high levels of accuracy and tolerance, requiring a thorough understanding of foundry processes and technology.

Core making- Cold box, shell and CO2 sand cores

In-house core making facilities produce all necessary cores and tooling for manufacture, ensuring all castings meet required specification and quality. Many characteristics of a casting and casting quality are influenced by the core.

Tube Fabrication

Some casting types that are manufactured at FSE Foundry require additional fabrication to meet specification. Many Copper alloy welding gun arms and some Aluminium 'vacuum former' work incorporates Nickel, Inconel or Copper water cooling tubes, all of which are made in-house with precision bending jigs somtimes to pressure testing limits.

Finishing

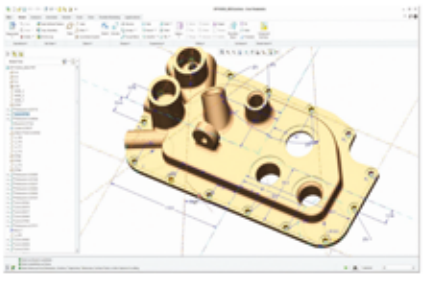
At FSE Foundry we have the equipment and personnel to go beyond the casting process and also be involved in further processes such as sand blasting, fettling, polishing and coating. Further CNC machining can be arranged and carried out by well established sub-contractors.

Heat treatment

Annealing and precipitation hardening and tempering can be carried out on site.

Rapid Prototyping

FSE Foundry have the capabilities to use the advance technologies such as rapid prototyping, through the use of in house 3D CAD design. 3D printing, designs can be produced including the production of casting sand moulds as opposed to patterns.



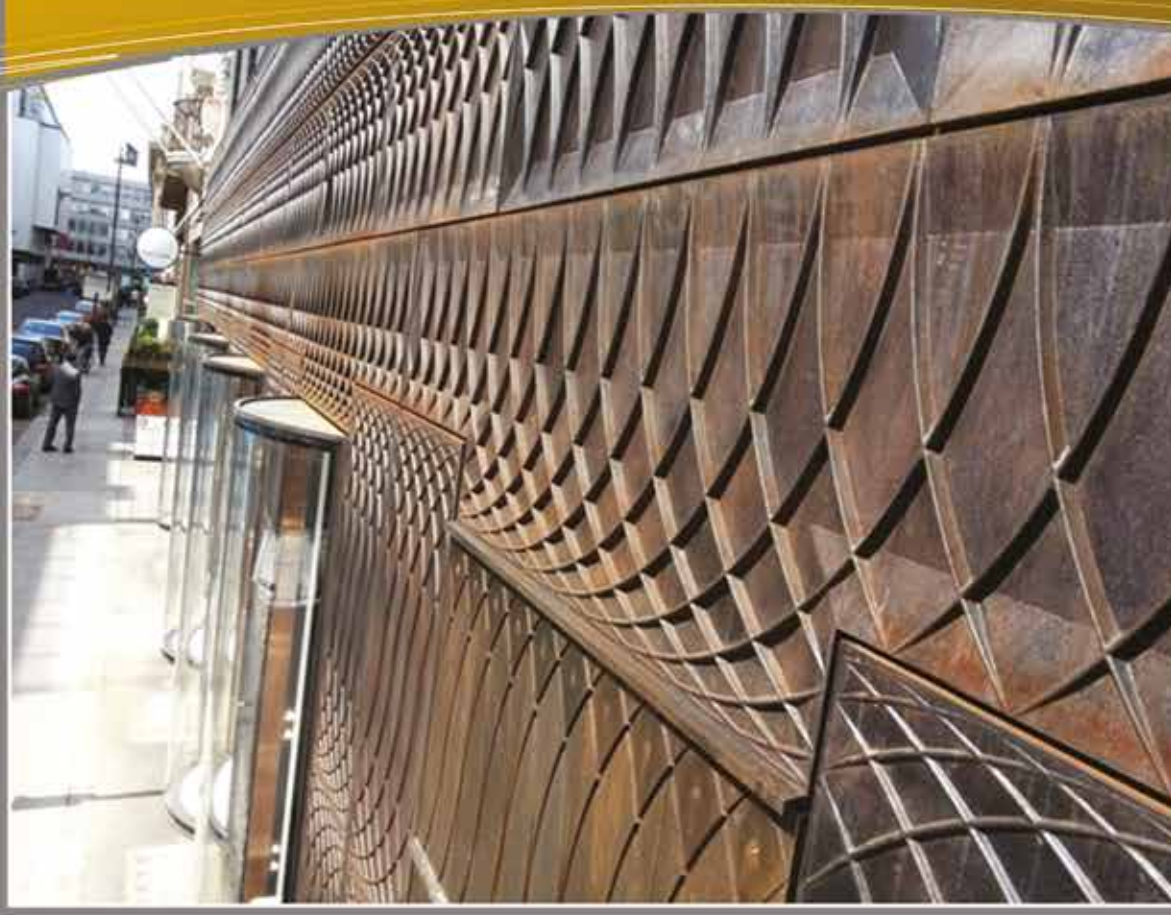
Melting

FSE Foundry exclusively uses modern, versatile and eco-friendly electric induction and resistance furnaces, which have allowed us to offer the wide range of materials. Our equipment also allows us a high degree of metallurgical control, ensuring that we consistently deliver a high quality, clean metallurgical product.

Casting abilities –

Up to 400kg in Ferrous castings (Cast Iron, SG Iron, Alloyed Irons)
Up to 300kg in Non-Ferrous Alloys, High Conductivity Copper and Alloys, and Up to 200kg in Aluminium Alloys

Cladding Projects



Unique shop front designed by 6A Architects for client - Paul Smith

Slinden Services - Replica large SG Window frames were supplied to convert a listed industrial building to dwellings.

Restoration Projects

Contact

To discuss your Cast Metal Product requirements please contact the FSE Foundry commercial office at:

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