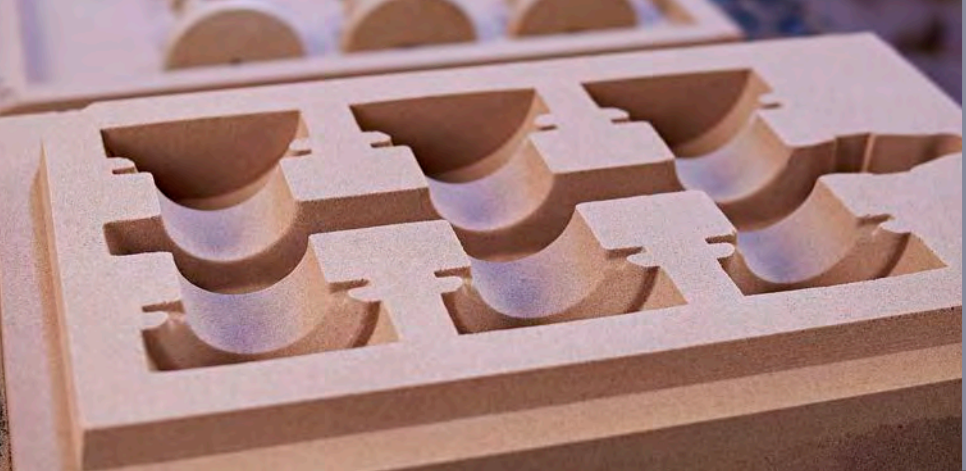




**A Single
Source Solution
for Precision Cast
and Machined
Components**



Experts in Sand, Die and Investment Casting

NovaCast provides precision cast and machined components across a wide spectrum of markets. These include oil & gas, petrochemicals, transportation and architectural metalwork. We have particular expertise in the production of pressure-tight valve and industrial pump components, complex non-ferrous castings, safety-critical components for harsh environments and a wide range of precision castings for many engineering applications.

Metals cast include alloys of carbon and stainless steel, copper, aluminium, iron, and many others. You can find detailed alloy specification sheets on our website. We also have a full range of testing, machining, surface treatment and finishing options available.



Where tradition meets technology

NovaCast combines high levels of hands-on technical expertise in many casting processes including sand casting, investment casting, gravity and pressure die casting, shell mould casting and lost foam casting of both ferrous and non-ferrous alloys. Our friendly, customer-focused approach helps customers achieve their metal casting and machining objectives through advice on technical issues, casting processes, metallurgy, and supply chain optimisation.

NovaCast is a modern business that combines the skills and craftsmanship of this most traditional of industries, with a team of young engineers using the very latest technology to meet the challenges of today's manufacturing environment. Constant investment over recent years has seen the business transformed through the introduction of technologies such as 3D printing, casting simulation, 3D modelling and state-of-the-art quality control.

When combined with an efficient UK foundry and an international supply chain that extends out to the Far East, these technologies keep costs under tight control and lead times shorter than ever before.





Design Engineering

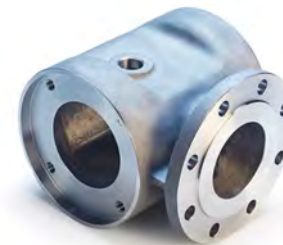
In many ways, our design engineering department creates the foundation for a successful project. They are often the point at which the customer and foundry come together to assess the project parameters, select the most appropriate casting process and alloy, identify design issues from a casting perspective and modify design geometry to mitigate defect risks. The two-way exchange of ideas and expertise, design aspirations and hands-on casting experience at an early stage is the best way to ensure that costs and lead times are minimised, and project objectives met.

Our design engineers are equipped with the latest technology enabling them to design, or refine your design, simulate the casting of your component to identify or mitigate issues, and set your project up for success. They don't, however, leave it there. At NovaCast, our design engineers are closely involved with the project management of your casting from initial design discussions through to quality-checking the finished component.



Casting Processes

NovaCast started life, over 40 years ago, as a UK-based non-ferrous foundry specialising in sand and gravity die casting. Since then, the business has evolved to deliver both ferrous and non-ferrous castings employing a range of casting processes. The UK foundry has continued to specialise in high quality sand and gravity die castings while our partner foundries in the Far East have allowed us to drive down costs and compete globally for high volume, exceptionally high-quality projects. We now offer advanced casting techniques such as investment casting, high pressure die casting, lost foam casting, shell mould casting and silica sol casting, where very high quality, dimensionally accurate castings are required.



Sand Casting

The production of complex, mainly non-ferrous sand castings is the core business of our UK Foundry. It is the simplest production method but has many advantages, particularly for short-run or complex castings with multiple cores or for larger castings. NovaCast can produce sand moulds by hand using greensand for smaller quantities and resin or petro bonded techniques using a semi- automated process for larger quantities. Up to 70% of sand used in the process is reclaimed and re-used, meeting our environmental objectives.



Sand casting benefits:

- 1 Low tooling costs and fast set-up compared to investment or die casting.
- 2 Large casting sizes possible. NovaCast is able to cast Aluminium alloys up to 110kg and ferrous alloys up to 3000kg using sand casting methods.
- 3 Complex and intricate castings can be achieved with multiple internal cores.
- 4 It is possible to achieve low gas porosity for pressure tight castings.
- 5 Up to 70% of the sand used in the process is reclaimed.
- 6 Very versatile; many different kinds of metal alloy can be cast using this process.
- 7 Sand casting is best suited to low volume or complex non-ferrous castings or large ferrous castings.

Gravity Die Casting

NovaCast specialises in producing high quality gravity die castings at its Melksham foundry. The facility is ideally suited to producing medium-run components from aluminium and other non-ferrous alloys for applications across a wide range of industries. Gravity die casting is a permanent mould casting process that produces very high-quality surface finishes with thin walls and cast-in inserts so intricate shapes can be cast rapidly and little subsequent machining is required.

Gravity die casting benefits:

- 1 Excellent dimensional accuracy
- 2 Smooth cast surfaces
- 3 Thinner walls can be cast allowing intricate shapes
- 4 Inserts, such as threads, heating elements and high-strength surfaces can be cast-in
- 5 Secondary machining is reduced or eliminated
- 6 Production rates can be rapid making longer production runs possible
- 7 Tensile strength is higher than with sand casting



Investment Casting

NovaCast has built a reputation for manufacturing high quality, investment cast components, primarily in carbon and stainless steel. Castings include pressure tight valve and pump bodies, machined and balanced impellers and many other highly specified products. The investment casting process delivers high integrity castings that are dimensionally accurate, very versatile and have low repeat run costs. NovaCast has worked with several manufacturers to replace expensive fabrications with high quality investment cast components which are more cost effective, stronger and more aesthetically pleasing.

Investment casting benefits:

- 1 Great versatility; suitable for casting most metals
- 2 Allows very intricate castings to be produced
- 3 Smooth surface finishes are possible with no seam line so machining and finishing are reduced or eliminated
- 4 Allows un-machinable parts to be cast accurately instead
- 5 Excellent dimensional accuracy
- 6 High volume production can be achieved with low repeat costs
- 7 Can be used to prototype and prove designs prior to die casting tooling investment
- 8 Is ideally suited to smaller, intricate or complex designs although we can cast up to 250kg



Shell Mould Casting

Shell mould casting is a metal casting process similar to sand casting, in that molten metal is poured into an expendable sand-based mould. However, in shell mould casting, the mould is a thin-walled shell created by applying a sand-resin mixture around a pattern. The pattern, a metal piece in the shape of the desired part, is reused to form multiple shell moulds. A reusable pattern allows for higher production rates, while the disposable moulds enable complex geometries to be cast.

Compared to sand casting, this process has better dimensional accuracy, a higher productivity rate, and lower labour requirements. It is often used for small to medium parts that require high precision.

Shell mould casting is used for both ferrous and non-ferrous metals. The most commonly used are cast iron, carbon steel, alloy steel, stainless steel, aluminium alloys, and copper alloys. Typical parts cast using this process are small-to-medium in size and require high accuracy, such as gear housings, cylinder heads, connecting rods, and lever arms.

Shell Mould Casting benefits:

- 1 It can be completely automated - lowering labour costs and facilitating mass production
- 2 Good and consistent surface finishes lower machining costs compared to sand casting
- 3 As no moisture is present in the shell, very few gases are produced and those that are escape through the thin shell walls easily as the sand is permeable
- 4 The process allows complex shapes in a large range of sizes
- 5 Little scrap is produced and what there is can be recycled. The sand-resin mix can be recycled by burning off the resin at high temperatures.
- 6 A wide variety of metal alloys can be cast with this process
- 7 Typical tolerances are just 0.005 mm/mm and the cast surface finish is 0.3–4.0 micrometers (50–150 μin) – this is better than sand casting because a finer sand is used. The resin also assists in forming a very smooth surface.

Lost Foam Casting

Lost foam casting is, in terms of casting processes, a relatively recent innovation that exhibits characteristics of both Investment casting and sand casting. It is a form of evaporative pattern casting where the pattern is of foam rather than wax. The foam pattern is covered in refractory material, as in investment casting, but the 'shell' is then surrounded by compacted un-bonded sand to give it strength. When molten metal is poured into the shell the foam pattern vaporises on contact. The result is a process that delivers the quality and accuracy of investment casting with the lower costs and greater flexibility of sand casting.



Lost Foam Casting benefits:

- 1 Dimensionally accurate with typical linear tolerances of just $\pm 0.005\text{mm/mm}$ and excellent surface finish, typically between 2.5 and $25\mu\text{m}$
- 2 Requires no draft to aid removal from the mould and minimum wall thicknesses are just 2.5mm with no upper limit. Cast parts can range from 0.5kg to several tonnes
- 3 Has no parting lines and no flash is formed providing an excellent surface finish without the need for further machining
- 4 Fewer steps are involved than with investment casting, so costs are lower
- 5 Risers are not normally needed so less metal is used, and less finishing is required
- 6 Natural directional solidification takes place, so casting is predictable with few defects
- 7 Foam patterns are easy to manipulate, carve, glue and handle
- 8 Multiple parts can be consolidated in a single complex casting, reducing the need for post casting assembly
- 9 Suitable for aluminium and nickel alloys, steels, cast irons, stainless steels and copper alloys

Silica Sol Castings

Silica sol casting is a form of investment casting. The process is very similar except that the investment mould is made from silica sol zircon sand mixed with refractory powder. Silica sol zircon sand is exceptionally fine-grained (10-20 Microns) and can be mixed to a slurry with very low viscosity when creating the mould. The result is a casting method that delivers dimensionally accurate castings with excellent as-cast surface finishes. Crucially, the silica sol zircon moulds can withstand temperatures up to 2000°C, making them very useful when casting high temperature alloy steels and stainless steels.

Gravity die casting benefits include:

- 1 Great versatility; suitable for casting most metals.
- 2 Will allow very intricate castings to be produced with thin walls.
- 3 Smooth surface finishes are possible with no parting line so machining and finishing are reduced or eliminated.
- 4 Allows un-machinable parts to be cast accurately instead.
- 5 Excellent dimensional accuracy
- 6 High volume production can be achieved with low repeat costs.
- 7 Tensile strength is higher than with sand casting
- 8 Is ideally suited to smaller, intricate or complex designs.
- 9 Low material wastage.



Precision Machining

NovaCast can provide castings raw, with proof-machining or full precision machining as required, in both its UK machine shops or those operated by partner foundries in the Far East. Quality assurance and testing is provided in the UK. Options include turning, milling, grinding and drilling with final inspection once machining operations are complete and all machining is carried out in ISO9001:2015 accredited machine shops.





Metal Finishing and Surface Treatments

NovaCast routinely provides a wide range of metal finishing and surface treatments to its cast products to enhance their mechanical or aesthetic properties and to protect the metal's surface.

All cast components undergo a fettling process which removes risers and excess material before the surface is further enhanced through finishing and shot-blasting or peening, as appropriate, to improve flatness and appearance.

We can then provide any form of surface treatment required including plating and sulphuric or chromic anodising, for enhanced durability and corrosion resistance. Alocrom, which is a chromate conversion coating, can be used where a less durable surface finish is required.

Castings can also be subjected to various heat treatment techniques that can be used to harden them, change the properties of the alloy or remove internal stresses. NovaCast is able to advise on the options and deliver castings that are optimised for their operating environment.

Castings can be finished according to customer specification, with wet painting and powder coating being the most common. The choice depending on whether aesthetics or durability and resistance to abrasion is the primary objective.

Quality Control

Quality Shines Through

It is no coincidence that NovaCast has a reputation for providing consistently high quality machined and finished castings. Quality assurance and testing is as much a core capability as metallurgy and casting expertise.

A Commitment to Quality

Consistently delivering precisely what our customers need in terms of specification, integrity and resilience is made possible by the commitment of NovaCast's management to invest in essential skills and the latest technology. Whether manufacturing takes place in our UK foundry or in partner foundries in the Far East, NovaCast takes full responsibility for quality checks, testing and approval to ISO9001:2015 standards prior to delivery to our customer.



Certificate Number: 11468 ISO9001



Testing Options

Dimensional Accuracy: Carried out using Mitutoyo and Faro Coordinate Measuring Machines (CMM) installed within a heat-controlled inspection facility in Melksham, Wiltshire. All castings are soaked for at least 24 hours prior to measuring.

Mechanical Properties Testing used to check that alloys and castings are within specification:

- 1 Hardness Testing: A non-destructive test giving a numerical value, which can be used to assess the machinability and wear resistance of an alloy.
- 2 Tensile and Impact Testing: Conducted on test specimens to measure ultimate tensile strength, yield strength, elongation and reduction of area data. Other tests can determine the ductility and strength of a sample by measuring the amount of energy absorbed during fracture.
- 3 Service Load Tests: Conducted on the entire casting to measure deflection when a load is applied. Hydraulic pressure tests can be carried out to destruction or a pre-determined proof load and spin tests can be used for rotating components.

Chemical Testing determines whether the chemical composition of an alloy, which can have a large impact on the properties of the casting, are within specification. A specially cast sample is analysed using spectrographic atomic absorption or x-ray fluorescence.

Casting Integrity: Non-Destructive Testing (NDT)

The integrity or soundness of a casting can obviously have a dramatic impact on the performance of a cast component but very often defects can be hidden within the structure of the casting. Various non-destructive tests can be specified by customers and undertaken by NovaCast to prove the integrity of castings prior to delivery.

NDT options include:

- 1 Visual inspection
- 2 Dye penetration and fluorescent powder testing
- 3 Magnetic particle inspection
- 4 Ultrasonic testing
- 5 Radiographic inspection
- 6 Eddy current inspection
- 7 Pressure testing

An International Supply Chain

NovaCast is a business with a global outlook. With customers across the UK, in the USA, Canada, the Middle East and throughout the EU, we recognised many years ago that to compete globally and to be able to offer our customers the best quality at the lowest prices we needed to set up relationships with foundries in the Far East. Doing this allowed us to offer highly competitive solutions across a much wider range of casting processes and alloys.

Today, NovaCast thrives in highly competitive markets, such as cast stainless steel, where we are now able to provide outstanding quality and long production runs. Our customers take advantage of lower production costs in the Far East while having the peace of mind that dealing with a trusted UK foundry provides.



Markets Served

Offshore/Onshore Energy (Oil & gas, petro-chem, nuclear, shipping/marine): Harsh environment and safety-critical castings ranging from safety relief valves and explosion-proof enclosures to fracking pumps and safety couplings in bronze and aluminium.

Transport: Safety-critical cast components for rail applications including cast braking and signalling system components as well as a wide variety of compressor and valve parts. Many castings are subjected to pressure and mechanical testing as well as NTD to ensure their integrity.

Valve and Pump Components: We are specialists in the casting and machining of pump and valve components used in offshore oil & gas, petrochemicals, automotive, solids handling, agriculture, railway, marine, nuclear and commercial heating. A particular specialism is in the investment casting, machining and balancing of carbon and stainless steel impellers.

Defence: We have provided a wide range of castings for use within the defence industries where high integrity castings with rigorous non-destructive testing requirements are demanded and delivered.

Architectural Castings: Expertise and craftsmanship, built up over many years, allows NovaCast to work closely with architects, designers, artists and sculptors to create a wide variety of creative and architectural castings.

General Engineering: Contact us for advice and guidance on anything from foundry casting, component design and metallurgy to testing, machining and finishing options. On projects ranging from complex one-off castings to production requirements running into many thousands. We specialise in converting complex fabrications and assemblies to single cast components. These are cheaper to produce, provide enhanced performance and are more aesthetically pleasing.





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