Case Study: A global response during a global pandemic

NovaCast's international supply chain delivered:

- Rapid response during a global pandemic
- Support to critical care providers
- Design Engineering expertise to solve pre-existing design issues
- Top quality investment cast Stainless Steel and Brass components
- Seamless international supply chain

The Background

The global pandemic has presented manufacturing and logistical issues for companies all over the world. For NovaCast, the challenge has been to maintain the supply of components to critical industries at a time when its own supply chains have been under pressure. For a modern foundry, supporting customers is about more than producing top quality cast components.

NovaCast is increasingly called upon to work closely with customer design teams and to take responsibility for solving design issues that often go beyond casting geometry.

One such challenge was presented to NovaCast by an Australian pump manufacturer that had some issues with a set of eight cast Stainless Steel components and two Bronze impellers for one of its pumps. Faced with a combination of technical and design challenges, together with tight deadlines and logistical obstacles presented by the pandemic, NovaCast needed every part of its organisation to perform.

The Requirement

The pump manufacturer had already designed the geometry of the cast components with another supplier and had test samples cast. These test castings highlighted some significant issues with the casting geometry as well as quality consistency concerns in the test samples. Based on these results, the manufacturer was not confident to proceed with the foundry they were working with. They needed, therefore, to locate another foundry that was not only technically competent to Investment Cast the intricate components to a very high standard but also one that could assess the current patterns to identify the cause of the issues being experienced. Added to this was the considerable time-pressure created by the pandemic.

NovaCast was selected for the project because of its experience in investment casting, its in-house engineering design capability, and its ability to resolve the issues rapidly as well as deliver the cast components to a very tight deadline.

> **“This was a really challenging project that tested us in all sorts of ways. It really showed how the expertise we have in various parts of our business from engineering design to precision-casting, spread across the world and working in partnership with our customer, can produce outstanding results to very tight deadlines if needed.”**
>
> **Richard Phillips,**
> **Sales Director, NovaCast Ltd.**

The Solution

The first stage in the process was to assess the casting geometry to verify the integrity of the designs and identify the cause of the issues presenting in the test castings. NovaCast produced test samples by creating wax moulds from the existing patterns, then casting from these to observe the outcome. It was determined that there was a discrepancy between the CAD designs and the patterns that had been produced – either because of changes to the CAD files that had not been implemented when the patterns were created, or because the manufacture of the patterns was inaccurate and poorly executed. NovaCast’s design team in the UK, working with the customer in Australia, modified the designs as required using 3D Modelling, software, CAD and Casting Simulation software. New tests on the revised designs and re-made patterns, conducted at NovaCast’s partner foundry in China, showed that the patterns were then accurate and producing excellent test results.

To ensure a very high-quality finish and consistent castings, the Silica Sol investment casting process was selected. This allows intricate castings with thin walls and excellent surface finishes. The process is well suited to casting Stainless Steels and produces dimensionally accurate castings.

Fig 1: Highly accurate tooling is required to produce wax patterns

Fig 2: Wax patterns are carefully checked for imperfections

Fig 3: Wax pattern ‘trees’ are created and dipped in ceramic slurry

Fig 4: Slurry-coated wax trees are dipped in silica sol zircon sand

The Result

The Stainless Steel castings were produced in CF8 alloy (equivalent to 304 Grade Stainless Steel) and the Brass impellers cast in H59 (GB equivalent HPb59-1, EN CuZn39Pb2), a Brass alloy that is relatively hard and strong. Weights of the components ranged from 15kg for the main Steel casing down to 1.45kg for a Steel front cover adaptor. The two Brass Impellers weighed 1.7kg for the Discharge Impeller and 3.9kg for the Suction Impeller.

to investment casting VDG O690-D1 standards. All quality checks, using CMM equipment, were carried out at the foundry, prior to despatch. The sets of castings were shipped direct from the foundry in China to the customer's Australian manufacturing plant, taking advantage of the free trade agreement between China and Australia.

Richard Phillips, Sales Director at NovaCast commented; "This was a

Fig 5: Silica Sol moulds are baked to eliminate moisture and remove any residual wax

Fig 6: Silica Sol can handle the very high tempertures required for Stainless Steel castings

Having been through a very rapid re-design and testing process, the sampling stage was missed out in order to deliver 5 complete sets of the castings very quickly, which allowed the manufacturer to meet its urgent orders.

The castings were manufactured at NovaCast's partner foundry in China

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Fig 7: Silica Sol castings deliver tight tolerances and excellent as-cast surface finishes

About NovaCast Limited

NovaCast has over 40 years of ferrous and non-ferrous metal casting experience extending into markets as diverse as transport, utilities, offshore and general engineering. The company's non-ferrous foundry, based in Melksham, England, is supported by a fully risk-managed supply chain that extends out to the Far East allowing NovaCast to provide a single source solution for precision cast and machined components. NovaCast has particular expertise in the production of pressure-tight valve and industrial pump components, complex non-ferrous castings and a wide range of precision castings for many engineering applications. Metals cast include alloys of Carbon and Stainless Steel, Copper, Aluminium, Nickel and many others with a full range of testing, machining, surface treatment and finishing options.

To discuss your requirements, call a member of NovaCast's team on +44 (0) 1225 707466 or email sales@novacast.co.uk

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