



Case Study: NovaCast engages with Xylem VA/VE programme to improve castings

Engaging in the Xylem VA/VE process delivered cost and weight reductions through:

- Refinement of casting patterns
- More accurate contraction allowances
- A reduction in draft angles
- Tighter machining allowances
- Component design enhancements

The Background

Driving down costs, improving efficiency and enhancing the performance of products lies at the heart of the Value Assessment and Value Engineering (VA/VE) discipline. As one of the leading global water technology companies, Xylem has a truly international supply chain and engages in cost engineering efforts to ensure optimum costing and coordination of direct material purchasing and sourcing for Xylem products globally.

Cost Engineers work across functions and businesses to provide costing and financial acumen, as part of the target setting costing process, to ensure competitive supplier pricing. These Cost Engineers also play a key role within Xylem's Value Engineering Center of Excellence; analysing components and product costs as part of the VA/VE process.

As one of Xylem's key suppliers of cast components, including pump bodies and impellers in Cast Iron and Stainless Steel, NovaCast has engaged in the process enthusiastically as it provides an opportunity to further strengthen its relationship with this important customer.

There is a tendency among suppliers subjected to the rigours of a VA/VE process to see this purely as a way of squeezing their profit margins and locking them in to a rigid pricing structure. NovaCast, however, has taken the opportunity to propose improvements in casting geometry design and casting processes which are not only reducing costs but also weight and subsequent machining processes.

The Challenge

The Xylem VA/VE process aims to produce innovative, high quality, reliable and technically advanced water handling and management products. Producing cost savings must not compromise the integrity of the products or their ultimate performance. The challenge set for NovaCast, therefore, was to find ways of driving down costs across

the full range of castings produced for Xylem, while maintaining the excellent quality, performance and finish of the castings delivered – all without compromising the agreed production schedules and supply-chain management services that form such an important part of the ongoing relationship.



“The process has produced tangible results that are delivering ongoing savings and product improvements for Xylem.”

Richard Phillips
Sales Director, NovaCast

The Solution

One of the benefits of the VA/VE process is that it challenges every aspect of the production process from performance specification and metallurgy to geometry design, casting processes and machining. It encourages engineers, designers and managers at all levels and stages of the process to optimise their contribution with a focus on driving down production costs and looking for performance improvements.

Production solutions set when a product first comes to market are rarely optimised as different criteria often drive decision-making. Sometimes that may be speed to market, sometimes production techniques could default to tried and tested solutions or production tolerances may be overly cautious. Whatever the reason, later refinement of processes can often result in significant improvements once a product or cast component has been in production and engineers have time to revisit the process.

There is a tendency to shy away from making adjustments to existing patterns as considerable investment will often have been made in creating them. However, NovaCast's 3D Modelling software has allowed analysis of existing patterns to identify areas where refinement could deliver cost and efficiency improvements.

The areas identified for refinement on one pump body were as follows:

- More accurate accounting for differing contraction allowances between Cast Iron and Stainless Steel as well as appropriate correction allowances for Aluminium castings.
- Reducing taper/draft angles - these allow castings to be removed easily from the mould.
- Reducing machining allowances.

In addition to employing new software technologies in the process, NovaCast also made use of the latest 3-D printing techniques to produce new patterns more efficiently than was possible before. The new pattern design was 3D printed in foam as a 'pattern prototype' along with any core boxes required. The foam prototypes were then cast to produce Aluminium patterns which were then CNC machined all over. Sample castings confirmed that all measurements were correct and that a suitable machining allowance had been attained.



The Solution

The reductions in draft angle and machining allowance both contributed to a reduction in the weight of the casting, as less material was used, which also lowered material costs.

The diagrams below show the differences in machining allowances required for Cast Iron and Stainless Steel versions of the same component:

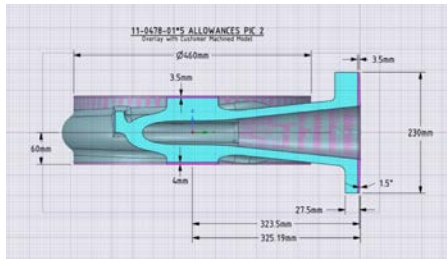


Fig. 2: Cast Iron Machining and Draft Angle Allowances

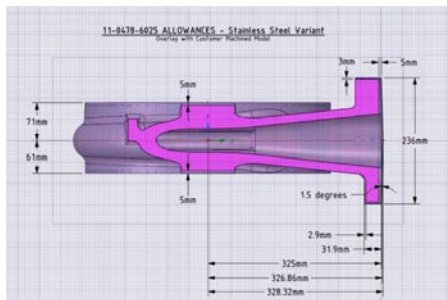


Fig. 3: Stainless Steel Machining and Draft Angle Allowances

NovaCast also proposed an additional change in the component design as a way of further reducing weight and cost. The design of this component included a large fixing foot; by adjusting the design to remove material from the centre of the foot, material could be saved without any loss in performance. This change would reduce the finished machined part weight by 1.25Kg when cast in Cast Iron and by 1.4Kg when cast in Stainless Steel.

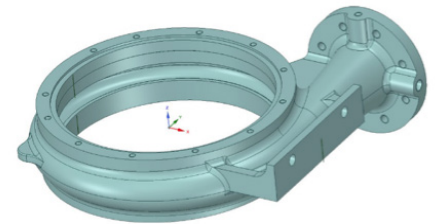


Fig. 4: Original part design

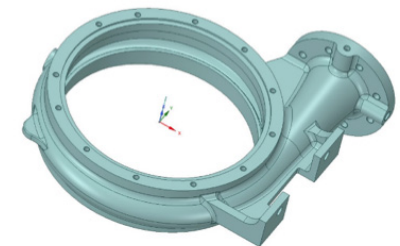


Fig. 5: Modified part design



New Work – New Patterns: As new projects are proposed it is clear that the new technologies available, such as 3D modelling, casting simulation software and 3D printing are allowing us to get closer and closer to the optimum casting geometry first time. To achieve this, however, it is important that customer design engineers work closely with foundry engineers and designers at the earliest opportunity.

Reduced Machining: A reduction in the amount of machining required to achieve the design specification (whether for size or surface finish) is one of the benefits attained

through changes mentioned above. A reduction in machining can also be achieved, however, through analysis of its purpose. Some of the machining processes on the Xylem components were only in place for fixturing/holding purposes. As further processing may be different (between different suppliers) then some of the machining operations may not be required.

In addition, it was found that some machining operations were simply in place for ‘clearance’ purposes. In these cases it was found that general machining tolerances, which were typically ± 0.4 , could be opened up reducing the need for such tight control when being produced.

Conclusions

Through comprehensive engagement in the Xylem VA/VE process, NovaCast has been able to use its wealth of expertise and experience in casting geometry design, pattern engineering and casting processes to help Xylem achieve significant product improvements while lowering production costs.

process has been complex and time consuming but it has produced tangible results that are delivering ongoing savings and product improvements for Xylem. For us, it’s rewarding because we can really demonstrate the expertise we have and further cement an important ongoing relationship between our companies”

Richard Phillips, Sales Director at NovaCast commented; “This



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 and many others. A full range of testing, machining, surface treatment and finishing options is also provided.

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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