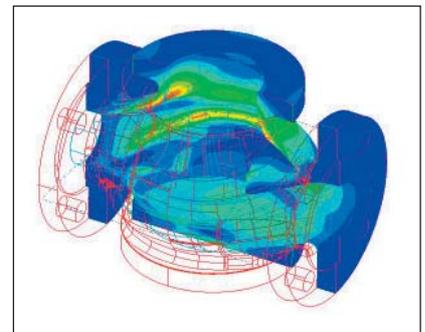


3D Modelling Used to Optimise Valve Design for Compliance with PED

Northvale Korting, an SME valve company employing less than thirty people, have supplied process control valves and fluid handling products for many years. However, their valve designs were less than optimal, and a hesitancy to invest in design tools such as 3D modelling and finite element analysis meant that the designs often failed to satisfy the Pressure Equipment Directive (PED). When the opportunity to form a partnership with Cti under the ICT Carrier Programme arose, Northvale Korting recognised it as a low risk chance to see how the technology could work for them.

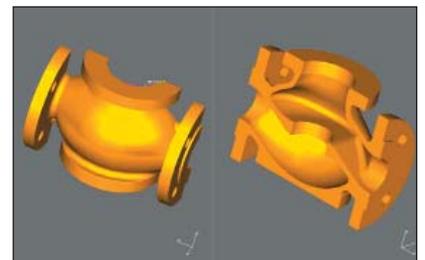
Key project objectives

- optimise the design of a 50mm control valve using a suitable 3D modelling package
- provide design information which will allow the valve design to meet the Pressure Equipment Directive
- provide expert knowledge and support in the selection process for the most appropriate 3D modelling package
- develop modelling awareness and strategies for the range of control valves manufactured by Northvale Korting
- design the valve to take issues of castability and casting manufacturing cost into account
- measure the effectiveness of the exercise in terms of its weight, machining time and flow characteristics during actuation
- reduce the total manufacturing cost and time of the valve, thereby ensuring product competitiveness



Industrial impact

- Northvale Korting have realised the beneficial aspects of 3D modelling and is planning to invest in the technology
- the PED requirements of the valve have been met using finite element analysis rather than the traditional mathematical calculations
- the ICT training provided by the Cti design team removed many of the technical barriers and helped the company to understand the process
- the benefits of 3D modelling have been recognised and many other features can be used by the company to improve global penetration
- castings manufactured using the new design are 19% lighter in spite of design changes which added material
- reduced casting processing times within the machine shop
- the supply of castings from offshore has meant that the total valve cost has reduced by up to 30% and throughput times have reduced by 5%
- the competitiveness of carbon steel valve bodies has improved the stocking policy as cast iron variants of the same design have been replaced with steel
- the ICT Carrier Programme has contributed to the survival of the company, securing the employment of a number of people



Why was this work necessary?

Northvale Korting (recently having become part of the Flow Systems Technologies group of companies) are a small company who produce process control valves and fluid handling products. Many of the products have been designed and specified to meet bespoke process applications. Valve designs have been developed based upon the application of market intelligence, engineering expertise and performance characteristics obtained from 'real time' test results. As a result, castings are purchased in a diverse range of materials, with high quality assurance requirements.

The valve designs are highly functional, but since they are based upon the combination of experience and mathematical calculation, they are typically less than optimal in terms of fluid flow and overall weight. As such, this approach to valve design fails to satisfy the Pressure Equipment Directive (PED).

From a founding perspective, valve designs were not optimal as the design process was conducted with little or no input from the supplying foundry. As a result casting quality has been compromised with supply and quality issues prevalent.

Global sourcing throughout the valve sector has resulted in the company seeking a competitive edge to retain market share. The valve market has become highly price sensitive requiring rapid delivery. The reduction in profit margins has resulted in limited funds being made available for investment in non-tangible assets such as 3D modelling. The perceived benefits of e-manufacturing have been long recognised by Northvale Korting design engineers, but such investment has been difficult to justify. The ICT Carrier programme provided Northvale Korting with the opportunity to investigate at low risk the benefits of ICT within the valve casting supply chain. As a result of investigations, Northvale Korting are now considering three CAD software packages: Solid Works, Solid Edge and Autodesk Inventor.

Lessons learned from the project

Throughout the duration of the project, a number of trends and potential obstacles to the success of the project were identified:

- selected partner foundries were very reluctant to support the initiative in spite of the low risk
- UK foundries are typically three times more expensive than their overseas competition
- the use of emerging technology such as Replicast® still cannot bridge the financial gap between the UK and overseas foundries
- supply chain issues, such as quality and reliability of delivery, have not been apparent
- the support given by software vendors needs enhancement from 'specialist' design engineers
- change is slow
- greater Government initiatives and financial support is required to assist SMEs in their continued search for long term survival.

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