

TrimGuard boosts choke valve impact resistance

INDUSTRY

Oil & gas, offshore

LOCATION

Norwegian North Sea

PROJECT

New solution for choke valve damage avoidance

The challenge

Protecting choke valves from extreme internal damage caused by sudden impact of fluid-borne objects is an enduring challenge for offshore operators. Should a choke trim collapse, there is a high probability that downstream systems could over-pressurise, leading to a major safety concern.

Operator requirements for the impact resistance of choke valves typically range from 37 to 700 joules. However, manufacturing a valve where the trim itself has the required resistance can be prohibitively expensive. A common solution is to fit choke valves with a protective element, often in the form of a cage.

The solution

Severn's R&D team had been working on a novel protective cage technology – TrimGuard – with superior impact resistance and high flow capacity. TrimGuard involves the use of a bespoke cage to surround the entire choke valve trim. Protecting the choke trim and providing minimum pressure loss across the cage are conflicting requirements that require careful consideration. As part of the development, extensive FEA (finite element analysis) and CFD (Computational Fluid dynamics) were conducted to create a final optimised design.

While development was ongoing, a Norwegian operator placed an order for non-collapsible choke valves with an impact resistance of 600J. Severn seized the opportunity to test TrimGuard and built a test rig capable of 600J impact.

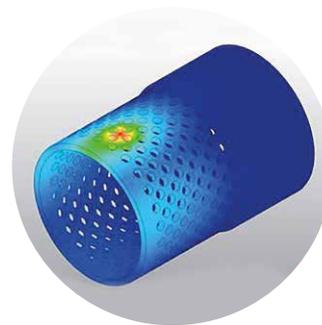
Witness testing for impact resistance involved exposing TrimGuard to a 37J impact then a 600J impact. However, on the day of the test the operator witness asked for the test rig to be modified to test at 700J impact. Following modification for the higher impact value the test was undertaken and the valve trim remained undamaged.

The outcome

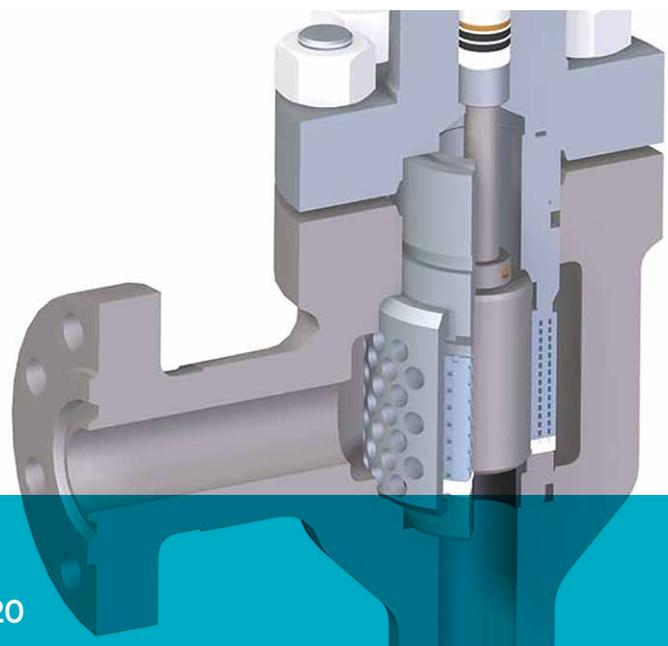
Witness testing showed that choke valves fitted with TrimGuard qualify for the upper end of the choke valve impact resistance spectrum, and beyond. The process also proves a high validity between FEA software and final test results on physical valve products.



Actual TrimGuard 360 test specimen



TrimGuard 360 FEA results



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Trim guard 120