

- VALVES AND COMPONENTS FOR GAS-,
- CRYO- AND POWER ENGINEERING
- AIRCRAFT, NAVAL- AND SPACE INDUSTRY

## Specials “The Compact Valve Block”

*Submarines are well known for the lack of space on board where every cubic metre of space is precious and its use is subject to a well-thought out design process.*

*If a new way can be found to make better use of the available space then the options and scope for development in submarine construction will be improved. One example of such an improvement is the valve block developed by Stöhr Armaturen, for the oxygen supply in the HDW (Howaldtswerke–Deutsche Werft GmbH) submarines in Kiel, a ThyssenKrupp Marine Systems company.*

Previously a panel was installed containing many individual valves and extensive pipe work and fittings but now a better and more compact solution was required. The combination of many individual parts not only requires precious space, but because of the number of parts used the expense of the numerous test regulations in submarine construction increases too.

In this regard HDW (Howaldtswerke–Deutsche Werft GmbH) remembered the expertise and many years of good experiences working with STÖHR Armaturen, and commissioned Stöhr for the development and manufacture of a compact valve block. The novel design must take into account the special and challenging requirements of submarine construction and the expense of testing welded joints. This led to lower cost for the shock test and associated tests with the valve block concept.

A difficult task, as the particular requirements associated with handling oxygen also had to be met. During filling when the oxygen is in a liquid aggregate state, then both the liquid and gas forms need to be taken into account for the extraction. Liquid oxygen tends to oxidize and harden organic materials, changing the material substance and making it brittle. A seal material capable of handling cryogenic temperatures at elevated pressures was required. The selected seal must maintain its sealing integrity at values  $<1.0 \times 10^{-8}$  mbar<sup>3</sup>/s, down to a temperature of minus 268°C. Replacement of the seal during maintenance of the valve block should be easy and without the need to recondition the grooves of the valve.

With HTMS, High Tech Metal Seals from Belgium, Stöhr found an experienced partner for metal seals who was able to assist Stöhr in the development of a valve block that replaced the function of the individual valves, reducing the space required and unit weight by half. This goal was achieved by reducing the numbers of medium contacting holes and optimising machinability.

When doing this, many special and safety functions had to be fulfilled, for example the leakage monitoring of all sealing points leading outwards. The complexity of this task required the implementation of 3 High Performance HTMS seals in a row.

The design and manufacturing know-how of Stöhr as well as the use of the Metal C-Sealing rings from HTMS, High Tech Metal Seals, ultimately brought about the desired result – a valve block that saves space, weight and test expenditure, and offers the advantages in the matters of safety and reliability. Thanks to their great enthusiasm and know-how for valve technology, Stöhr Armaturen came up with an innovative and tailor made solution. The valve block which is easy to assemble on the front side of the tank, exceeded all requirements.



**STÖHR Valves – meet the extremes.**