NEW GENERATION OF BLAST WALLS FOR OFFSHORE

The increasing scarcity of fossil fuels forces oil companies to also exploit unusually difficult offshore sites, requiring new and innovative drilling techniques. These offshore sites often contain natural gas that has accumulated in the oil source cavities. Natural gas is an increasingly popular source of energy, but the extraction of gas from the seabed is a relatively new development requiring large investments in extended installations. Adequate protection is also an issue, because natural gas is highly volatile, increasing the risk of an incident. The blast walls that are currently used on offshore rigs, however, were not designed to contain the high pressure of a gas explosion in a confined space. TNO was asked to help in the design of new blast wall concepts.

GAS EXPLOSION EXPERTISE
TNO has decades of experience in the design, development and testing of armours and blast doors and walls, acting as a strategic partner to the Ministry of Defence and the international defence industry. Our extended facilities allow us to carry out our own live blast tests to map the effects of an explosion on any infrastructure. In the EXROS project TNO collaborated with Bluewater Energy Services, the famous designer, developer and operator of floating production, storage and offloading (FPSO) ships, and Van Dam, the innovative designer and builder of explosion-proof and fire-resistant doors and walls for the oil and gas industry as well as the military. Our ambition: the new blast wall concepts should include an acceptable cost-weight ratio.

ADVANCED MODELLING AND SIMULATION
The first step was to study explosions involving huge quantities of gas, including e.g. explosive properties, maximum blast pressure and the maximum rate of pressure rise. This study, using the 3D CFD software AutoReaGas for the modelling and simulation of gas explosions and blast effects that was co-developed by TNO, showed that the actual blast effects of gas explosions were not covered by existing safety regulations. Together with Bluewater and Van Dam TNO designed twenty potential blast door concepts, selecting four concepts for further development, including joints and fire protection. Advanced simulation techniques were used to determine the exact failure characteristics of these concepts. Partly also based on real material and structural tests carried out at the TNO facilities, using all kinds of experimental structures and material
Pushing the limits - combinations, the outcome of the EXROS project enabled Van Dam to design and build their new generation weight-saving blast doors. Supported by TNO.

WHAT TNO CAN DO FOR YOU
At TNO – an independent research organisation – over 4,000 experts work daily to support thousands of customers worldwide in domains ranging from Defence and Public Safety to Automotive, from IT to Human Factors. Based on deep knowledge and expertise built up in decades of projects for Navies and offshore companies worldwide, TNO helps the maritime industry to develop and apply innovative products, use sustainable resources and optimise processes and production chains.

Test on a light-weight and affordable explosion-resistant structure

Gas explosion in the TNO test lab

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