Case study

ATEX compliance for offshore power generation

THE CHALLENGE

The considerable power demands of offshore production and processing platforms are usually met by the use of gas turbine power generators that provide reliable and cheap energy. However, these units are encased within acoustic enclosures which create the risk of explosion as the hot surfaces and natural gas combine. The design of these enclosures is governed by the pan-European DSEAR and ATEX Regulations which require assurances that the largest undetectable gas leak will not lead to an uncontained explosion.

OUR SOLUTION

Frazer-Nash worked under a joint industry project with the Health & Safety Executive to develop a process that would provide this assurance. Using a mathematical modelling technique called Computational Fluid Dynamics (CFD), we analysed how the turbine and its enclosure were constructed.

The CFD model highlighted microscopic areas where escaped gas could pool inside the acoustic enclosures, and then simulated the ventilating airflow throughout the enclosure. This identified a series of possible leak locations which could potentially lead to an explosion. The model also established whether a cloud of sufficient size could be created without tripping the gas detectors at the exit of the enclosure.

Using this data, we then proposed a number of modifications to the enclosures, including:

- Using plating to control the ventilation flow and remove dead zones
- Modifying the ventilation flow volume
- Modifying the number, location, and setpoints of gas detectors

The Health & Safety Executive was satisfied that once the acoustic enclosures had been amended, they would fully comply with the DSEAR and ATEX Regulations.

BENEFITS

Advanced CFD is just one of the tools Frazer-Nash utilise to calculate the probability and impacts of overpressure explosion. We also use FLACS (FLame ACceleration Simulator) which is an advanced tool for the modelling of ventilation, gas dispersion, vapour cloud explosions and blast in complex process areas.

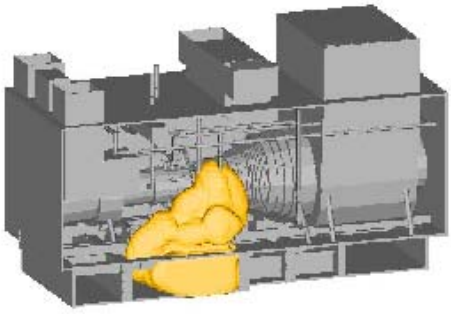

Figure 2: Predicted gas cloud inside the enclosure

Client

Various

Business need

To verify the safety and conformance to regulations of gas turbine enclosures on offshore platforms.

Why Frazer-Nash?

Frazer-Nash was one of the lead developers for CFD for ATEX and has already helped many offshore operators demonstrate compliance.

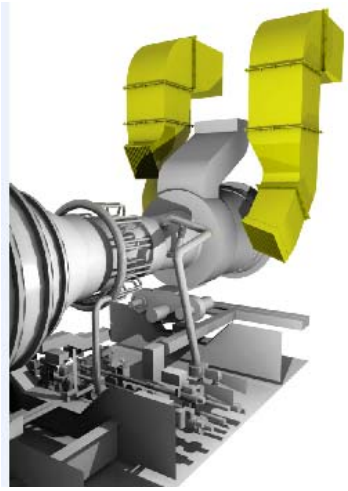

Figure 1: Complex internal layout

For more information, please contact
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