Using CFD in Platform Design

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ABSTRACT

Hydrocarbon leaks in an offshore facility module may result in explosion and fire. Barriers (such as blast and fire walls) need to be designed to withstand certain loads and durations in order to prevent an escalation of the accident to other modules and to maintain platform integrity. However, it is a challenge to give a precise prediction of the effects of fires and explosions and thereby give the right input to the design of mitigating measures. The challenges can be solved in different ways and by use of different methods and tools. For the designers it is important to realize that the results of the assessments will vary based on the methods used! Coarse models will give higher uncertainties in the results, and more contingencies have to be built into the design, i.e. increased weight and cost are likely results.

Use of multiple and detailed CFD (Computational Fluid Dynamics) explosion and fire simulations together with risk assessment models have seen to improve and optimize design solutions in terms of explosion and fire risk. This paper describes some of Scandpower’s experiences in such studies based on the requirements in the Norwegian risk based regulations for these kinds of analyses (NORSOK Z-013 Annex G). The paper shows that CFD work for fire and blast has proved to be a success wrt finding smart solutions resulting in:

- **Reduced explosion pressures** in enclosed modules
- **Reduced weight** and **cost** due to reduced overpressures
- **Increased safety** due to more accurate results and thereby better knowledge and understanding of the risks and the necessary mitigating measures