



## Mitigating fire and gas risk

**Fire and gas detection systems are an important safety control at oil and gas processing facilities protecting people and assets, as they provide an early warning of a hazardous situation. Detecting such events can initiate responses to minimise the consequences of the situation, such as alarms to alert personnel and emergency equipment shutdown.**

### Background

Formal quantified risk assessments (QRAs) often recognise that fire and gas detection systems will reduce risks, yet the design of such systems is often considered a specialist skill with very little guidance available to achieve the required level of performance.

Safety and efficiency are important factors throughout the oil and gas industry and tried-and-tested technology in fire and gas detection can help deliver both peace-of-mind and high levels of detector coverage. Our client had 15 years of experience of reviewing and assessing the arrangements of detectors for new site designs and on existing installations.

### Solution

The client asked Tessella to design and build a software application to support this process. The resulting assessments of the application can form part of the regulatory safety case documentation for the installation.

The software provides a rich user interface, built using open graphic tools, which allows engineers to build or import a 3D model of the facility, navigate the model and manually place detectors

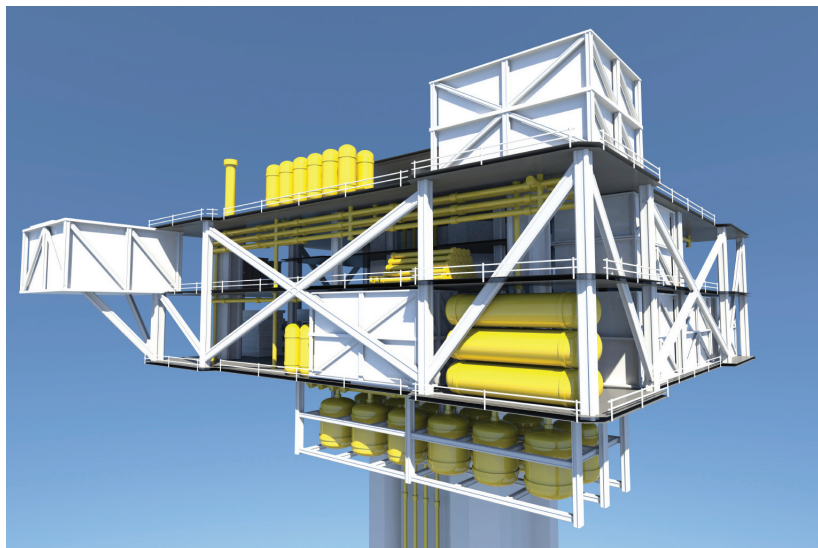
The model can be viewed from any angle including a 'detector eye' view to help fine-tune orientation. It is then possible to generate a coverage map to make a quick assessment of the proposed arrangement to identify areas where coverage is below the target value. More comprehensive report templates can then be created containing the output metrics ready for formal presentation.



The software assesses the placement and performance of detectors by simulating idealised fire and gas-release scenarios (flammable or toxic) throughout the 3D model of the site. Sophisticated techniques are used to calculate the coverage of optical fire detectors and 'point' and 'line of sight' gas detectors, accounting for obstructions presented by the 3D environment. The software also allows special regions to be defined such as walkways which need a higher level of coverage, or neighbouring areas that are covered in part by other detection systems. These features help to produce a focused set of results, allowing a model to be split into multiple study areas. The output is a coverage map of each hazardous zone and each individual detector's contribution to the coverage achieved. Redundancy can be assessed based on the contribution of each detector and the layout refined, until an optimum layout using the fewest detectors is achieved.

## Benefits

The software is therefore used to assess, optimise and design fire and gas detector layouts by maximising detector coverage, minimising redundancy and therefore ongoing maintenance effort. This practice improves safety and optimises system operation by ensuring that the number of devices used is minimised while still maintaining the levels of safety required.



above: Tessella software enables engineers to optimise location of detectors on facilities as complex as this.

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