

# Safeti

## Phast Risk – 3D Congested Explosions

### Transparency and accuracy for assessing risks from explosions

The latest addition to the Phast Risk application suite provides robust, accurate and flexible capabilities for managing risks from explosions. With fully featured implementations of the Multi-Energy and Baker-Strehlow-Tang models and comprehensive features for vulnerability modelling, this extension will meet all your needs for QRA, occupied building analysis and land use planning for facilities presenting flammable hazards.

Over the last 30 years there have been many accidents where explosions, such as Flixborough, Texas City and Buncefield have lead to significant damage to life, property and the environment. These have driven regulation for both risk management and land use planning, and this new software helps you meet the needs of regulation like Seveso, Bevi and the API guidelines for siting of occupied buildings.

When assessing risks to people from explosions it is necessary to predict the movement of the flammable vapour cloud and its interaction with process equipment, probability of ignition, overpressure generated if it ignites whilst moving through your plant and the effects on people in the vicinity. Phast Risk, with the congested explosion extension, provides everything you need to assess these risks.

#### Benefits

- Accurate prediction of explosion overpressure using Baker-Strehlow Tang and Multi-Energy approaches
- Easy definition of areas of congestion and confinement on a GIS map
- Building type library capabilities for effective occupied building analysis
- Powerful graphing and reporting includes FN Curves with drill down, exceedance curves and contours, and user configurable risk reports



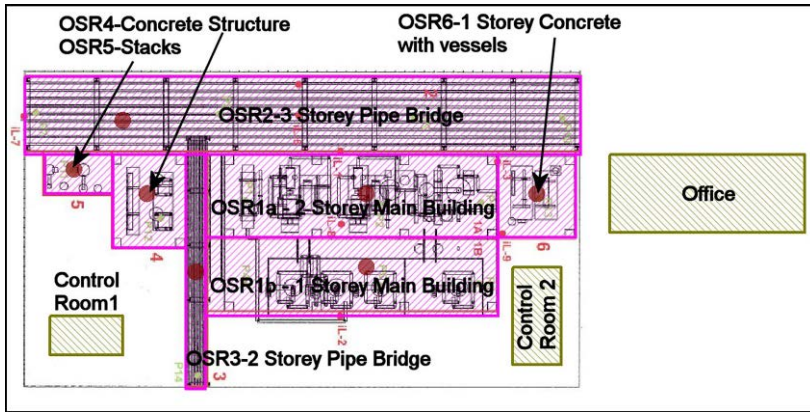
#### Key Features

- Prediction of movement of vapour cloud and its interaction with obstructions and confinement
- Built in event trees for estimating ignition probability
- Calculation of overpressure if cloud is ignited whilst moving through a region of congestion
- Effects of the overpressure and impulse on people in the vicinity of the explosion, both inside different types of building and outside
- Assess risks against acceptance criteria and effectiveness of risk reduction and mitigation measures

#### Modelling Capabilities

- Uses Phast's Unified Dispersion Model or simplified gas build-up model within obstructions
- Choose between latest published Multi-Energy and Baker-Strehlow-Tang for explosion calculations
- Occupied Building analysis using new extended building specific vulnerability modelling for
  - Explosions
  - Radiation
  - Toxics
- Automated curve selection and combination of obstructed regions based on industry guidelines

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Chemical plant broken into a number of obstructed regions with occupied buildings included (from TNO "GAMES" Report 1998)

## Modelling Overview

When assessing risks to people from hazardous facilities, accurate prediction of the effects of explosions combined with realistic estimates of the level of protection offered to building occupants are both important. The Phast Risk 3D Explosion extension takes account of congestion and confinement and the various levels of protection offered to occupants from buildings of different construction.

The program enables you to break-up your plant into a number of obstructed regions by placing these graphically on a map. Obstructed regions are created in a similar way for both ME and BST, with parameters specific to each provided to complete their definition. Alternatively, you can simply select the appropriate curve if desired.

Obstructed regions, representing explosion sources, can be specified directly or determined by the software using a number of "separation distance" criteria. These become active when a flammable cloud and an ignition source are present. Cloud concentration data is provided by the integrated Phast dispersion models.

## Industry Guidelines

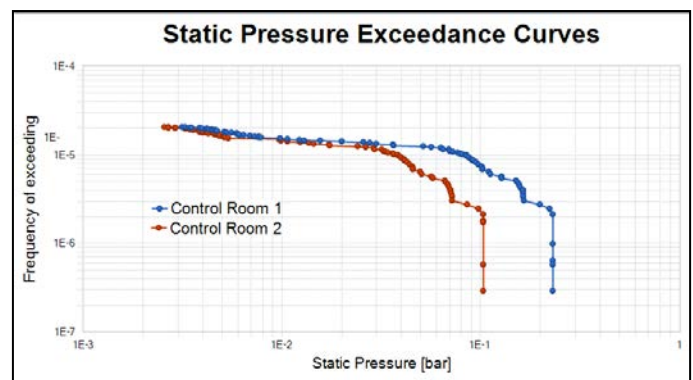
Over recent years a number of industry funded initiatives have been undertaken, such as the GAME, RIGOS and GAMES projects, and regulatory guidelines published, such as the Dutch Yellow Book, to improve both the accuracy and usability of the ME and BST models. Much of this guidance is implemented in the software.

In addition, after Texas City and Buncefield, focus has increased on building siting and land use planning. A number of guidelines have also been published in this area including API

RP 752 and API RP 753, UK CIA guidance on the location and design of occupied buildings and the BEVI regulation in the Netherlands. The software fully supports all these guidelines.

## Extended Graphing and Reporting

The extension also provides additional reporting and graphing capabilities. You can create overpressure exceedance curves for specified buildings, exceedance contours for a range of building types and "drill-down" via your FN curve to report all contributors to risk in each fatality range.



Pressure Exceedance curves for 2 building locations