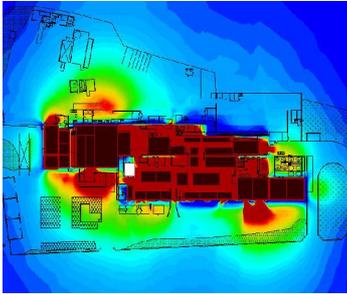# *fluidyn* -PANFIRE

EVALUATION OF HEAT FLUXES SOLID / LIQUID FIRES

fluidyn-**PANFIRE** is the module of *fluidyn*-**PANACHE** dedicated to the 3D numerical simulation of environmental accidents, such as the combustion of solid products and release of gases and liquids.

fluidyn-**PANFIRE** calculates the heat fluxes generated by the combustion of the stored products (hydrocarbons, papers, plastics, cartons, alcohols….) under selected weather conditions. It helps to establish a 3D estimate of the heat radiation generated by fires and combustion thereby allowing comparisons with the statutory thresholds by taking into account the material (nature, combustion rate and proportion), 3D geometry of the warehouses and mitigation measures (firewalls, sprinklers and obstacles).

In fact, analytical and empirical models cannot be used anymore for accident scenarios of complex geometries, which may include firewalls, water curtains as well as different stored products. *fluidyn*-**PANFIRE** is integrated with a 3D heat radiation model, thereby enabling a 3D visualisation of results.
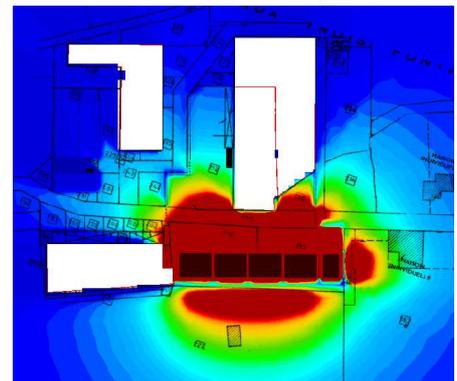
fluidyn-**PANFIRE** has many integrated models to calculate heat flux adaptable to different scenarios:

- solid, dry bulk or rack fires,

- pool fires in retention bunds,

- fires inside buildings…
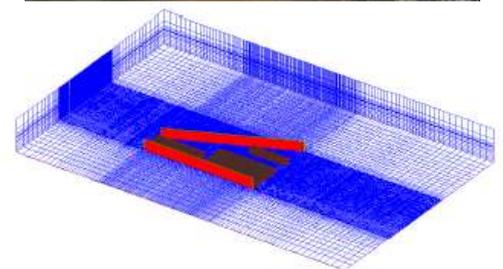
Il it based on the NFPA, GESIP (Blue Book), INERIS and TNO (Yellow book) methodology.

The study is conducted in a single phase.

The user can define the site interactively, by specifying the position of the storages and stock characteristics, the position of firewalls and sprinklers and if necessary, topography.

An internal database of the software is available and modifiable to define the solid and liquid products (base elements).

The software determines the flame geometry (form and height) from the storage and fuel geometry. The firepower (flame radiation) is characterized by the fuel type and the net 3D flux radiated is calculated by integrating the attenuations due to the flame form and air absorption.
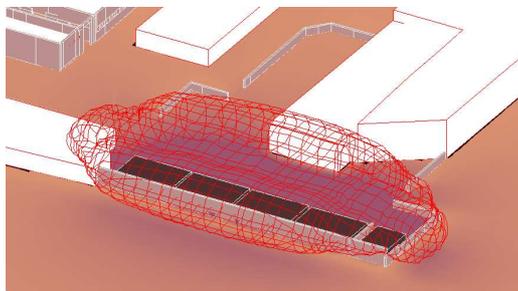
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The simulation results (heat fluxes and concentrations) are presented in graphic form. The dangers are quantified by the risk zones: heat flux values greater than 3 kW/m2 for SEI (threshold of irreversible effects), 5 kW/m2 for SEL (threshold of lethal effects) and 8, 12, 16 or 20 kW/m2 for domino effects or for any other threshold value defined by the user during post-processing

The user can also represent the iso-surfaces, the iso-contours and the sections in 3 dimensions to study the effects of heat radiation.

APPLICATION FIELDS:

This software tool is used for impact studies, danger studies, to obtain permission to install industries on environmentally sensitive sites, SEVESO sites. The main clients are environmental consultancy firms, industries and local bodies.

REFERENCES:

ABSE, AIRELE, ATOUTS HSE, AVENTIS, BLAIS Env, BURGEAP, CEM, COELYS, CONDITECK, ECE, ED, EXCIPE, ICE, ICF, IDE, IKE, JOHNSON CONTROL, NEXTER, NORISKO, OCE, SERVICES COOP, SONOVISION, PAPREC, ROCKWOOD, etc.

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