

## RISK ANALYSIS FOR CHEMICAL/PETROCHEMICAL UNITS

**fluidyn-ASSESS-RISK** is a software developed by **TRANSOFT International** jointly with the UFIP (French Union of Petroleum Industries), a major organisation of French petroleum industry.

**fluidyn-ASSESS-RISK** uses the recently modified **UFIP** risk assessment methodology for petrochemical refineries to analyse all possible accidental scenarios on petrochemical sites by analytical and empirical methods. This UFIP methodology has been validated by INERIS (French National Institute for Environment and Risks).

### Objectives:

**Analysis of the consequences following an industrial accident in the framework of a risk analysis study;**  
**Impact on risk-prone zones and domino effects.**

### Software Features:

**fluidyn-ASSESS-RISK** is structured around **thirteen pieces of equipment usually found on a petrochemical site** :

Atmospheric storage, Pressurised vessel, Furnace, Boiler, Compressor, Pump, Pipe, Gasket, Branch Connection, Valves, Loading/unloading arm, Rotating component etc....

**For each combination of equipment and one petrochemical product/fluid (pure or mixed), the software offers the scenarios likely to occur from a list of 45 possible ones.**

Tank fire, Explosion with blast or fire-ball effect, BLEVE<sup>1</sup> (Boiling Liquid Expanding Vapour Explosion), Fire-ball, Blast or missile formation, UVCE (Unconfined Vapour Cloud Explosion), Flash fire, Gaseous flame jets, Boil-over, Dispersion, Pool fire .....

- An exhaustive product database to which new products or new mixtures can be added
- Modifications of input parameters to test different variables
- Scenarios with one or many equipments
- Graphical representation of the industrial units
- Single step simulation
- Monitor points for sensitive zones (accurate values obtained)
- Accidental scenarios based on current regulations
- Analysis of domino effects



Natural Gas Explosion



BLEVE in Mexico

The BLEVE scenario uses the TRC Model (Thornton Research Centre) validated by the French Environment Ministry.

### Input data

Input data are

- Characteristics :
  - of the site ;
  - of the equipment ;
  - of the fluid
- Operational and Meteorological Data,
- Thresholds,
- Probability parameters if necessary.

### Additional Models

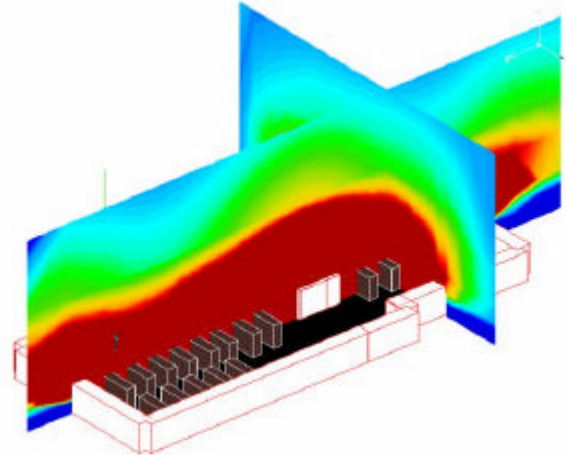
In addition, **fluidyn-ASSESS-RISK** can be coupled with the advanced 3D fluid dynamics code **fluidyn-PANEP** which is used for analysing the consequences of accidental emissions and /or **fluidyn-PANFIRE** which analyses the consequences of fire in industries and storage areas.

### Results

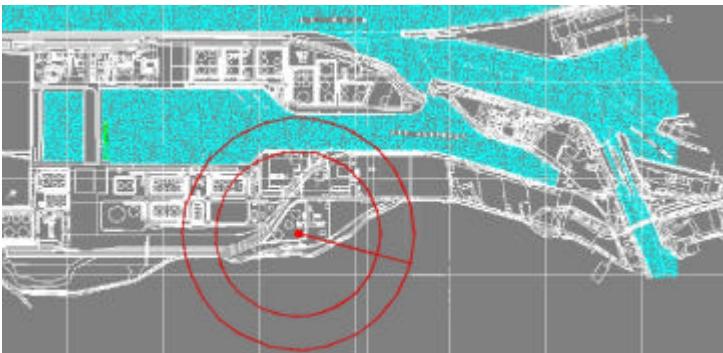
The impacts are computed in terms of :

- Heat effects
- Overpressure effects
- Missile effects
- Toxic effects

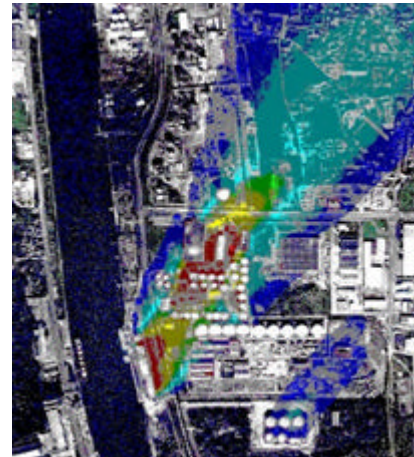
The results of the simulation are presented as damage-contours in graphics and tabular forms. Different thresholds are used: **R1 (lethal effects), R2 (equipment destruction), R3 (irreversible effects or reparable damages)** – for petroleum industry, **Z1, Z2** – for urban distances, and if required, for specific emergency plans or others.



Chemical and Aerosol fire



Impact of Boil-Over scenario



Benzene Dispersion

### Context

Risk assessment studies, authorisations for installations on sites classified as environmentally sensitive, Seveso II (European Directives) sites, risk probability calculation, defining restricted areas.



**fluidyn-FRANCE**

Le Charles Michels  
7 boulevard de la Libération  
93200 SAINT-DENIS  
France  
☎ : 33 01 42 43 16 66  
☎ : 33 01 42 43 50 33  
contact@fluidyn.com

**fluidyn-UK**

15/17, Belwell Lane  
Four Oaks, SUTTON COLDFIELD  
West Midlands B744AA  
UNITED KINGDOM  
☎ : 44 0 121 308 8168  
☎ : 44 0 121 323 2009  
contact@fluidyn.com

**fluidyn US**

1191 Crestmont Drive  
LAFAYETTE CA  
94549 -3004  
USA  
☎ : 1 925 284 1200  
☎ : 1 925 284 1240  
marketing\_USA@fluidyn.com

**fluidyn-INDIA**

146, H. S. R. Layout, sector 5  
Agara Extension,  
BANGALORE 5600 34  
INDIA  
☎ : 91 80 25526507  
☎ : 91 80 25501964  
marketasia@fluidyn.com