GexCon

FLACS *comes to the aid of National Security Issues!*

In recent years the vulnerability of society to terrorist actions has been clearly demonstrated, e.g. through September 11, 2001. More recent attacks, like Madrid and the London bombings, also confirm that there are people around looking for possibilities to create maximum impact to society.

To prevent the worst scenarios to take place tools can be used for consequence predictions and evaluations of protective measures. The consequences of terrorists using high explosives or releasing toxic chemicals will generally be higher if taking place either indoor, underground, or in urban city centers. Consequence prediction tools which do not account for detailed geometry are not very useful. The GexCon CFD (=Computational Fluid Dynamics) tool FLACS™ is among the more efficient tools to use when geometry effects are critical.

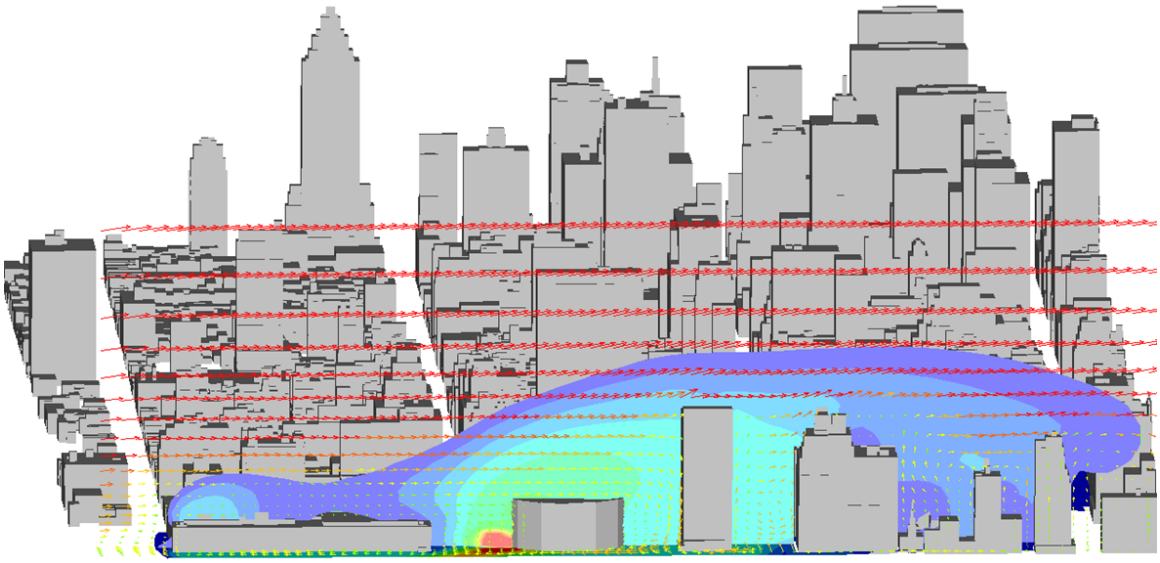
FLACS™ is a leading software for gas explosion predictions e.g. in petrochemical installations, and is used commercially by companies all over the world. With the same interfaces the software can efficiently produce realistic predictions of the pressure propagation from high explosives e.g. located in urban areas, or any kind of indoor scenario where people may be gathered, like subway stations, airports, stadia or shopping malls. A typical approach for such a security study e.g. in an airport, could be to evaluate the consequences from simulated detonations with a critical mass of high explosives if detonated at several locations. Evaluations can then me made to determine which scenarios could result with main building structures to fail, or where too many people may be at risk. As a consequence of these model predictions, measures may be taken , such as e.g.

- potentially weak structures may be strengthened or protected
- change designs to limit unnecessary pressure reflection / other contributing effects
- limit the number of people in the more risky areas
- make it more difficult for bombers to reach the most vulnerable areas
- improve screening methods for certain key infrastructure that are identified to be at more risk

Similar studies could be done for a range of other scenarios.

In recent years GexCon and FLACS™ have been involved in many gas dispersion modeling activities. Some of these have focused on potential threats from terrorist actions including the spread of toxic tracer gas or industry chemicals (TICs) like chlorine in urban areas. In many situations the FLACS™ simulations will indicate that building effects will enhance the vertical dilution of gas, and thus help reducing the risk from toxic releases, but in other situations the flow pattern (or lack of such) in certain urban areas may significantly increase the risk compared to predictions by simple screening tools. A relevant focus for a security study of releases of TICs would be to identify the critical

areas where the building array would enhance the risk, and thereafter take measures to limit the possibilities to have major releases taking place in these areas (e.g. by not allowing truckloads of TICs into these zones). Similar studies can also be performed inside buildings or underground facilities.



This simulation illustrates some of the challenges when trying to understand gas dispersion in a downtown urban area, the gas plume after a release and flow velocity vectors are shown. The potential release is taking place at the red location (red=high concentration). It can be seen that gas is spread 500m upwind (to the left) relative to prevailing wind direction because the tall buildings may locally change wind direction on the ground. For this particular scenario one very positive effect can also be seen, that the tall buildings may dilute the gas plume by vertical spread.

For more information contact :-

Dave Price *PGDip Eng, FIFSM,*
Managing Director
GexCon UK Ltd

Tel : +44 (0) 1695 726565
Mob: +44 (0) 7767 620014

www.gexcon.com