

BACK CALCULATION OF AN EXPLOSIVE EVENT USING SDOF AND CFD

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In the last decades large truck bombs have been used in several terrorist attacks on public and official buildings in urban environment in all corners of the world. Among these is the attack on the Alfred P. Murrah building in Oklahoma City in 1995, Marriott Hotel in Islamabad in 2008 and the attack on the building of the Norwegian Prime Minister's office in Oslo, 22nd July 2011.

The need for back calculation after such terrorist attacks is often an important part of the forensic work. Quantifying the energy release or used explosive mass can be used to understand the terrorist's capability; it can be used to check against possible detained suspect's statements or as part of the prosecutor's description of the event.

Window breakage has in numerous studies been one of the methods used to estimate the release of explosive energy from accidental or malicious events. This paper describes a method used to estimate the explosive charge mass in the Oslo terrorist attack. The method is based on first calculating the blast capacity of window panes on selected facades with a single degree of freedom method (SDOF). Secondly, numerical simulations have been performed using the Chinook Computational Fluid Dynamics (CFD) computer code from Martec Ltd. In the numerical simulation the urban terrain has been modeled in three dimensions and the blast properties at the selected facades have been recorded. A range of different charge sizes has been calculated. Finally, the observed window breakages from the event have been matched up with the calculations. Based on the comparison between the observed windows breakage and the calculations, an estimate for the explosive energy released in the event has been reached.