# P34 Consequence Analysis Methodology for Building Damage Prediction Due to External Blast

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## Abstract:

Safety evaluation, risk assessment and decisions on prevention and protection measures require simple fast running methods. It is a challenge to develop a consequence analysis method that is relatively simple, but still has the ability to discern between different cases, scenarios and buildings.

In the past years, TNO has participated in the FP7 framework project SPIRIT (EU funded) to generate and provide technology and know-how for the protection of buildings and people against terrorist threats and to minimize the consequences of a terrorist threat/attack. In the project a software tool has been developed that enables the user to estimate quantitatively the risks and consequences of terrorist attacks. The SPIRIT tool visualizes the results in an interactive manner. One of the modules in this tool is a module for the prediction of building façade damage due to external blast.

A parametric study was carried out of the blast loading on the envelope of different sized buildings and the subsequent damage of façades (within a relevant range of blast resistance). The results were used to develop a method to predict the façade damage in an effective and efficient way. Thanks to a special mapping procedure and a dedicated interpolation procedure, the method can be used for any type of façade with a known resistance level, and for any type of building. This method is incorporated in the damage prediction module.

Additionally, the module incorporates a prediction of the possible injury to people behind the façade. The state-of-the-art knowledge regarding behind wall and façade injury and lethality is still very limited. However, based on the limited information and the experience at TNO with the topic, a new pragmatic approach has been developed to predict the number of casualties (lethality) behind the façade.

## Notes: