TRANSLUCENT LIGHTWEIGHT PROTECTIVE STRUCTURES

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Exterior pre-detonation layers provide protection against rocket and mortar attacks. Typical NATO approved materials for these layers are plywood and steel-plates. The functionality of these materials is indisputable but the use as façade elements is restricted to military camps due to its opacity.

The following work was done to develop a translucent material and its façade construction which is capable to achieve the same standards as the commonly used pre-detonation layers and is additionally capable to withstand blast loads. Material testing as well as numerical modeling was done to choose possible materials or material combinations. This includes penetration test and modeling of a complete façade construction including additional blast load. Façade constructions were developed by a combination of plastic façade elements supported by steel framing. The whole façade is able to slide to prevent early destruction of the façade elements. Free field testing in form of mortar fire completed these studies.

Results of the experimental and numerical studies indicate that façade elements made of translucent plastics are capable to detonate the fuze of a mortar. The results of the tests and numerical calculations also certify that lightweight structures are not only capable to withstand blast loads due to its ductility but also to reduce the blast load behind the structure.