INVESTIGATIONS OF MATERIALS WITH REGARD TO PROTECTIVE EFFECTS IN TERMS OF BLAST AND SHOCK

Eva Wilhelm[1], Jörg Wellnitz[2]

[1]ITD GmbH, Marie-Curie-Str. 6, Ingolstadt, 85055, Germany;
[2]University of Applied Science Ingolstadt, Esplanade 10, Ingolstadt, State, 85049, Germany

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The protection of human life and the reduction of harm caused by terrorist attacks or natural catastrophe have a high priority with regard to the design of buildings, military facilities or means of transportation.

The ITD have been carried out various investigations regarding two different protection types always based on the usage of chain meshwork, the types are divided into a pure and a hybrid version. The pure metallic chain meshwork was compared in different experimental tests regarding impact detonation loads. In addition, there have been done successful tests based on the GSA standards. If the application of chain meshwork is used as an ordinary curtain on the room sided face of a regular window, two major effects are observed. The first effect is the **reduction of the blasting wave** and the second also important effect is the **shiver protection**. On the other hand, a newly developed hybrid composite shows outstanding impact results, as proven by several test by the German Federal Armed Forces. According to the testing results, an **increase of impact strength up to ~60%** can be achieved by reinforcing common carbon fibre reinforced plastics (CFRP) with a metallic chain mesh layer.

The scope of this work is the general investigation of the impact behaviour of pure meshwork and fibre composites reinforced with metallic chain mesh, especially in the field of low and high velocity impacts and detonation loads. Testing should be accompanied and should serve the validation basement by looking at the possibilities of numerical simulation of the pure and hybrid material. Due to a working computational model further complex scenarios can be represented and the forecast of effects are visible and therefore a significant damage analysis is feasible.

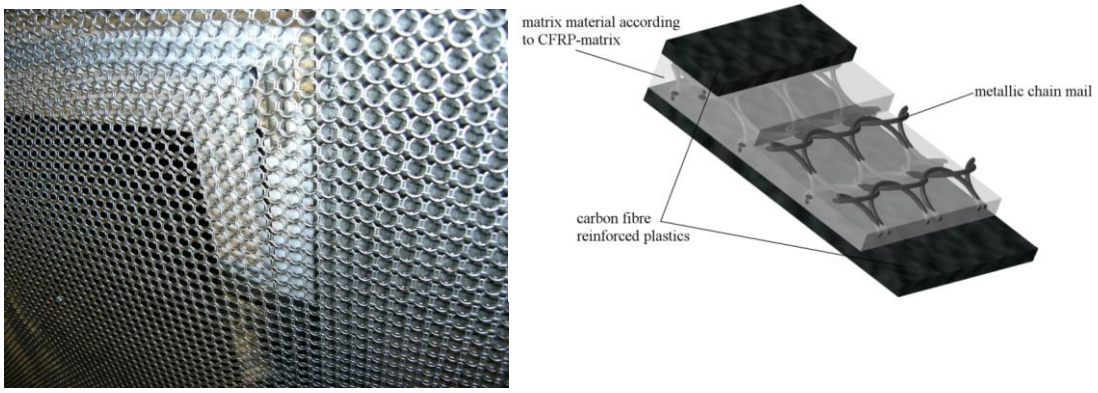

Fig. 1 The usage of pure chain meshwork as a kind of curtain (left); principle lay-up of the hybrid material (right)