

# Ballistic protection with novel lightweight composites

Gerald Pilz

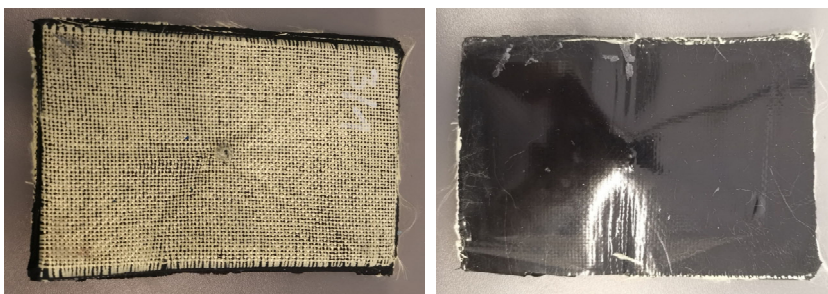
## Impact of gaseous hydrogen on the durability of pressurized polymer pipe systems

Mobile military defense structures should be easy to transport, practical to assemble and ensure reliable ballistic protection. Low component weight is therefore a key requirement, for which fiber-reinforced high-performance composites are predestined. An innovative material structure with structurally acting failure mechanisms should prevent puncture. Accordingly, the primary objectives of the project are:

- Application-oriented laboratory impact tests up to 25 m/s (s. Fig. 1) paired with ballistic tests in the field.
- Creation of an effective material concept to achieve ballistic protection and a self-healing function with lightweight potential (s. Fig. 2).
- Production of bulletproof composite components as a modular ballistic defense system.

**Fig. 1**

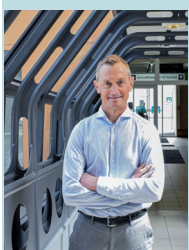
Set-up for advanced impact testing up to 25 m/s and 1700 J with precise force-deformation measurement in the millisecond range via high-speed video documentation



**Fig. 2**

Aramid fiber-reinforced test panel as example for an impact resistant multi-layer structure after impact test

The resulting material concept with its material structure-property and processing relationships is thus also transferable to other areas of application in which the highest and most durable damage tolerance is required for impact loaded lightweight structures.



### GERALD PILZ

Materials Science and Testing of Polymers  
[gerald.pilz@unileoben.ac.at](mailto:gerald.pilz@unileoben.ac.at)

**RESEARCH FOCUS:** Mechanical and thermo-mechanical characterization of high performance plastics (technical thermoplastics and fiber reinforced plastics)

**PROJECT:** HiProtect - Development of a novel lightweight material composite with ballistic and self-healing protective properties

**PROJECT PARTNERS:** Carbon-Solutions Hintsteiner GmbH (Hintsteiner) Federal Ministry of Defence

**FUNDING:** FORTE defense research program of the Austrian Research Promotion Agency (FFG)