

## PERFORMANCE OF BLAST TESTS IN THE GERMAN LARGE BLAST SIMULATOR (LBS) TO VALIDATE THE FRENCH FLUID/STRUCTURE NUMERICAL SIMULATION

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### **Abstract:**

As part of a Franco-German cooperation, WTD 52 conducted three series of blast tests to validate the French simulation approach of structures under blast loads.

The first series of tests aimed to study blast wave interactions in a variety of complex 3D environments. Based on the results, an exemplary setup was selected for a second series of tests to investigate the response of a reinforced concrete structure in this configuration. The third test series dealt with metallic cylinders. WTD 52's task was to set up all scenarios with instrumentation in its Large Blast Simulator and to conduct blast tests with overpressure time-histories similar to nuclear blast profiles.

The first series included arrangement combinations with four cubes, one cuboid, and two cylinders. They were built as rigid steel structures and equipped with pressure sensors on all sides flush with the surfaces. In addition, the blast front propagation around the bodies was recorded by applying the Edgerton Shadowscopy technique.

The second series of tests was conducted using a mock-up representing a three-story reinforced concrete building at a scale of 1:4. Two configurations were tested: direct loading from the blast wave and loading behind an obstacle that shielded the concrete structure from the direct impact of the shock front. The test instrumentation was specifically aimed at recording the structural deformation.

The third series of tests was performed with thin metal cylinders of two different heights filled with water at four different levels. Here, the deformation of the cylinder was recorded using high-speed video, as was the behavior of the water content.