

CASE APPLICATION:

Blast Tamer[®] Wall Systems Contains the Blast While Containing the Costs



GENERALPLASTICS
MANUFACTURING COMPANY

BACKGROUND:

Since their introduction in 1957, rigid polyurethane foams (RPFs) have undergone numerous formulation changes to meet different product requirements. The density and chemistry of the foams are altered to meet requirements of strength, impact absorbance, fire resistance and insulating char formation based on the customer's needs and application.

THE CHALLENGE:

KEY REQUIREMENTS:

- Material with no adverse burn characteristics
- Material that would not emit toxic or substances
- A reliable container for sand ballast that would absorb blast wave energy and prevent the sympathetic detonation of adjacent explosive materials
- A nonmetal barrier system to prevent fragmentation damage
- The ability of the retainer system to maintain structural rigidity over time

The Air National Guard (ANG) contacted General Plastics as it explored rigid polyurethane foam solutions to munitions storage for its civil air defense facilities. In particular, it sought a cost-effective, nonflammable barrier solution for storage of Division 1.1 and 1.4 explosives in a smaller footprint to reduce costs.

LAST-A-FOAM® is put to the test

This LAST-A-FOAM® product's density and chemical structure have been optimized for this application. The Air National Guard requested LAST-A-FOAM® material from General Plastics due to its known fire retardant character and long product life. The product's density of 7 pounds per cubic foot was chosen due to the results of a blast energy study performed at Sandia National Laboratories. This density of foam was shown to be optimal for blast energy absorption through foam destruction.

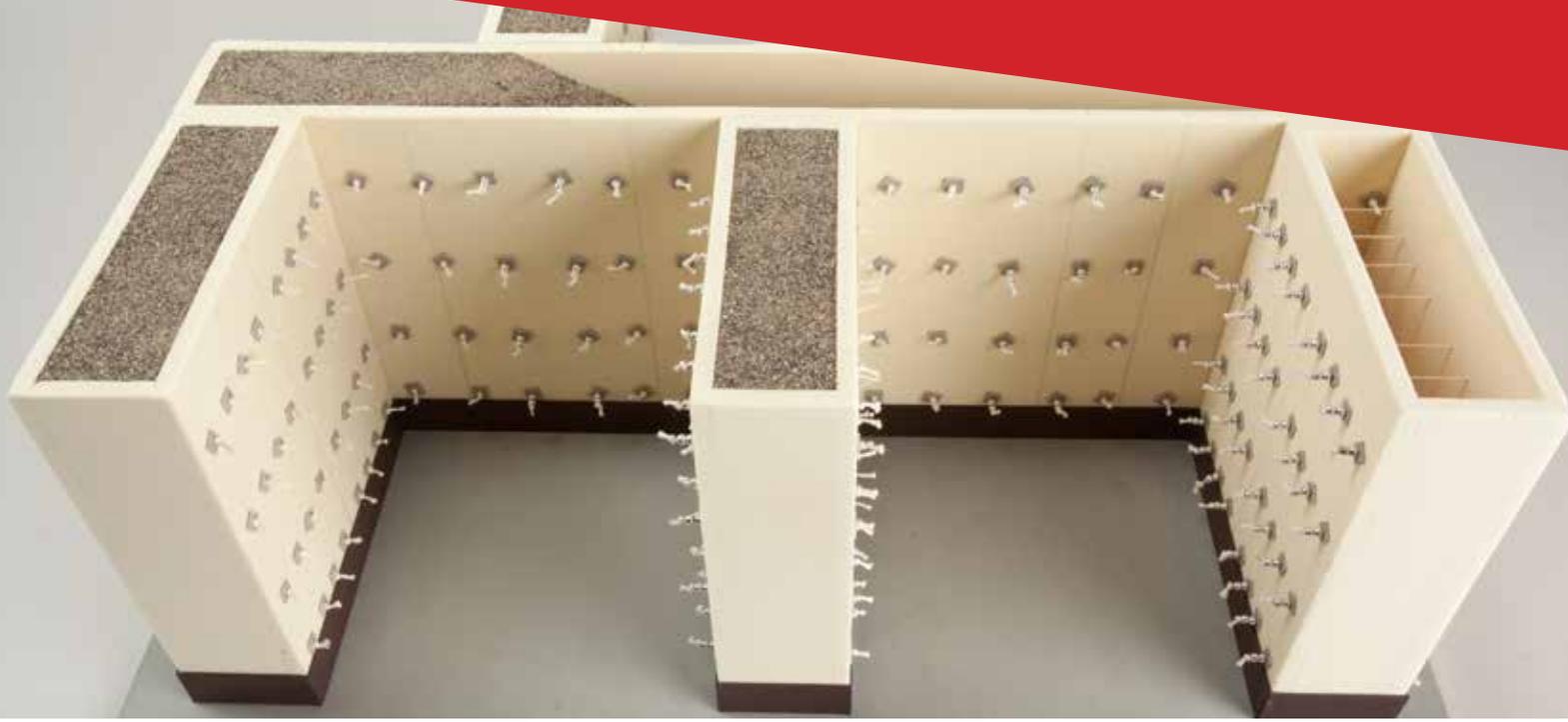
Further testing was conducted by the Structures Laboratory of the U.S. Army Engineer Research and Development Center. A downsized BLAST-TAMER® prototype cubicle was constructed on-site and filled with sand to make the test as accurate as possible. A one-pound block of C-4 plastic explosive was placed next to the cubicle. The size of the explosive charge placed inside was scaled to the size of the cubicle to simulate a worst-case scenario.

THE RESULTS:

As intended, the blast fully destroyed the BLAST-TAMER® cubicle. In the process, the explosive force of the blast was partially absorbed, then deflected upward – away from the (theoretical) pile of explosive materials adjacent to the cubicle's walls, preventing further explosions. In three different demonstrations of the system with the same 40-pound TNT charge in each, the block of C-4 did not sympathetically detonate, proving the effectiveness of the system.

Since 1994, General Plastics has supplied BLAST-TAMER® wall systems to five ANG units, with nine installations currently in place.

The BLAST-TAMER® wall system incorporates advanced technology polyurethane foam designed to mitigate inadvertent explosion in ordnance storage facilities.



BLAST-TAMER® FEATURES:

- Flame-retardant, self-extinguishing materials
- Organic material does not emit toxic fumes, leach chemicals, oxidize or support fungus
- Kevlar®-reinforced retaining cord system maintains rigidity
- Allows igloo storage of Division 1.1 and 1.4 explosives
- Ready to deploy – no painting or additional finishing required

The BLAST-TAMER® wall system is installed inside an earth-covered magazine structure. Installation usually consists of a series of cubicles that isolate different types of explosive materials from each other. The wall system allows the storage of several types of explosives in a single space. It can improve the capacity of the earth-covered magazine by up to 800 percent compared to conventional barricade systems.

BLAST-TAMER – Approved by Department of Defense Explosive Safety Board

- Increases explosive storage capacity – up to 8 times the storage density of class 1.1 explosives
- Improves space utilization in existing structures at low cost
- Absorbs and disperses blast energy upward, not to adjoining compartments
- Permits storage of different compatible munitions under the same roof
- Reduces storage-site “clear-zone” size requirements
- Easy to install; assembly does not require highly skilled workers
- Long-lasting system that requires no maintenance
- No degradation in strength or changes to material’s chemical properties over time
- Ability to retrofit many existing structures of different sizes and shapes

