ArmorBlast™ Coating Withstands Explosion

The University of Missouri, Rolla, tested ArmorThane's ArmorBlast coatings on a structure of concrete masonry units (CMU) to simulate public buildings. When explosives were detonated, the results surprised the UMR Explosives Laboratory.

"While the researchers had tested other brands of polyurea that debonded and often split," reads Dr. Jason Baird's report. "ArmorBlast proved extremely high in elongation, toughness, and adhesion." It formed a *skin* on the CMU blocks that did not split and debond.

Blasting Set-Up

ArmorThane expressly developed the sprayed-on ArmorBlast coating to create an exceptionally strong structure for blast mitigation, impact resistance, and casualty reduction from hostile explosive attacks. To verify this achievement, masons from the Rolla Technical Institute constructed four adjoining walls from CMU blocks and standard mortar with reinforcing wire.

Each wall was prepared for a different test including an uncoated Control wall (North). Both video and digital still photography documented the events.

Three walls were coated as follows:

- West: 1/8" coating on outside – without primer
- East: 1/8" coating on outside – with primer
- South: 1/8" coating on outside and inside without primer

Each test used a two-pound C-4 charge centered in the middle of the wall. The charge was detonated at a stand-off distance of 36" in open air testing. This is a blast equivalent to 209 pounds of reflective force per square inch.

Test Results

With the first two-pound charge, the Control wall (North) cracked vertically in the center of the back side opposite the charge position. Small cracks also formed randomly

on the front and vertical hinge cracks were found on either side where the uncoated wall attached to the other walls.

In the next two explosions, the ArmorBlast coating on outside without primer (West) and the East wall with primer showed nearly identical results. There was no visible damage to the outside face. Small vertical tension cracks formed on center of the back side. There was no movement of the wall due to deflection.

Pushing the Limits

The remaining wall (South) had ArmorBlast on the inside and out and no primer. The blast did no visible damage to either side. Because of this, researchers decided to continue blasting to determine the point of wall failure.

The next blast was set on the South wall with a two-pound C-4 charge at 18 inches distance rather than 36 inches. There was still no visible damage.

For the third blast of the South wall, UMR researchers created a more even distribution of pressure by setting a charge composed of 280 feet of 50 grains-per-foot (the explosive core loading) detonator cord, divided into four sections of 70-foot lengths. Each section was looped between parallel wires strung between the uprights of a pipe frame; then the four were attached to an electric detonator. The plane of the charge was placed just six inches from the wall. Blast pressure is difficult to calculate given a charge at that size and distance.

“The blast pressure is very large, much larger than a CMU wall should withstand,” reads Dr. Jason Baird’s report.

The shot fired nearly simultaneously. The wall bowed-in and pushed back at the bottom nearly one-half inch but held together. Researchers also noted two small cracks in the outer coating layer. There was no other visible damage.

The fourth and final explosion in the test series on the South wall was a contact shot, utilizing two pounds of C-4 placed directly against the center of the outside of the wall. Researchers expected the shot to create a hole through the wall, but wanted to find out if the wall would fail completely and lose portions of its structure.

As predicted, the blast created a hole completely through the wall that measured approximately eight inches in diameter in the front of the wall, and nearly three-feet-wide by three-feet-high in the inside coating layer. However, there was no structural failure with the rest of the wall remaining intact.

Conclusions and Applications

The UMR conclusion was that ArmorBlast increased the resistance of CMU structures to explosions, especially when coated inside and out. ArmorThane will be marketing its use for the prevention or reduction of structural damage and injury from terrorism and other hostile aggressions toward public buildings, sporting events, VIP residences, and additional target areas.

Besides CMU structures, ArmorBlast has excellent adhesions to different substrates such as metal and concrete. Therefore, other applications include armored transport vehicles, limousines, bunkers, and combat equipment.

“Our goal has been to build a more secure environment for high visibility personal in political, government, military, and private sector positions,” says ArmorThane president, Garry Froese.

ArmorBlast is a two component 100% solid polyurea that can be spray applied at temperatures from 18°F to 150°F. Temperature exposure ranges from -40°F to 350°F with high tensile strength and chemical and water resistance. In addition to explosions, the coating adds maximum durability against extreme elements. Use on machinery, bridges, pipelines, chemical tanks, and containment linings reduces the risk of corrosion, excessive impact, and high wear that will cause consequential damages and environmental hazards.

Contact ArmorThane at 800.227.2905 or visit www.armorthane.com.

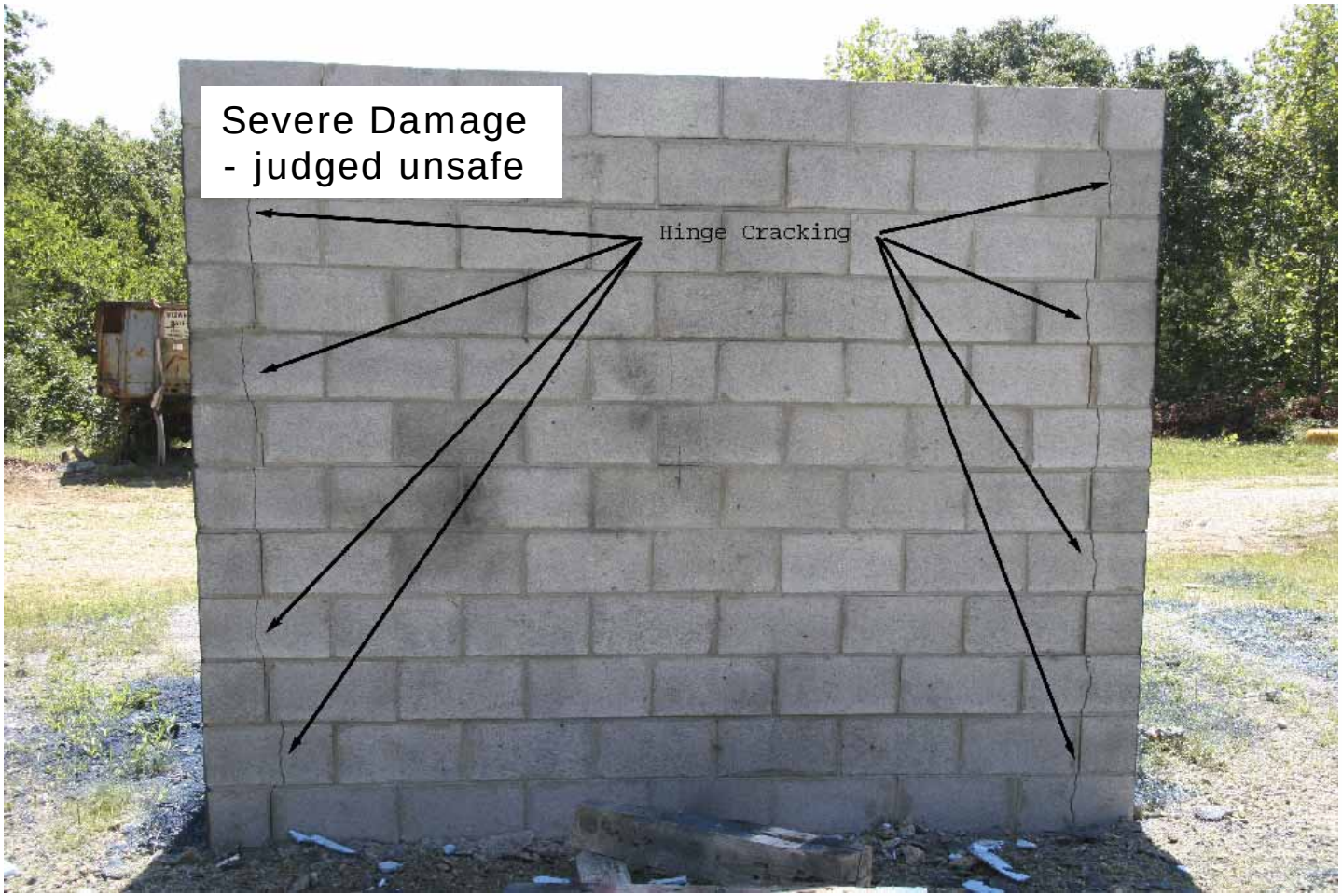
Uncoated Control Wall

Pre-Blast: Outside View @ 3ft

ArmorThane®

Uncoated Control Wall

Post-Blast Results: Outside View



Uncoated Control Wall

Post-Blast Results: Inside View

One Side ArmorBlast™

1/8” Coating Post-Blast: Outside View

One Side ArmorBlast™

1/8” Coating Post-Blast: Inside View

ArmorThane®

Two Sides ArmorBlast™

1/8” Coating Pre-Blast @ 1½ ft: Outside View

ArmorThane®

Two Sides ArmorBlast™

1/8” Coating Post-Blast @ 1½ ft: Outside View

ArmorBlast™

1/8” Coated Two Sides Post-Blast @ 1½ ft: Inside View

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